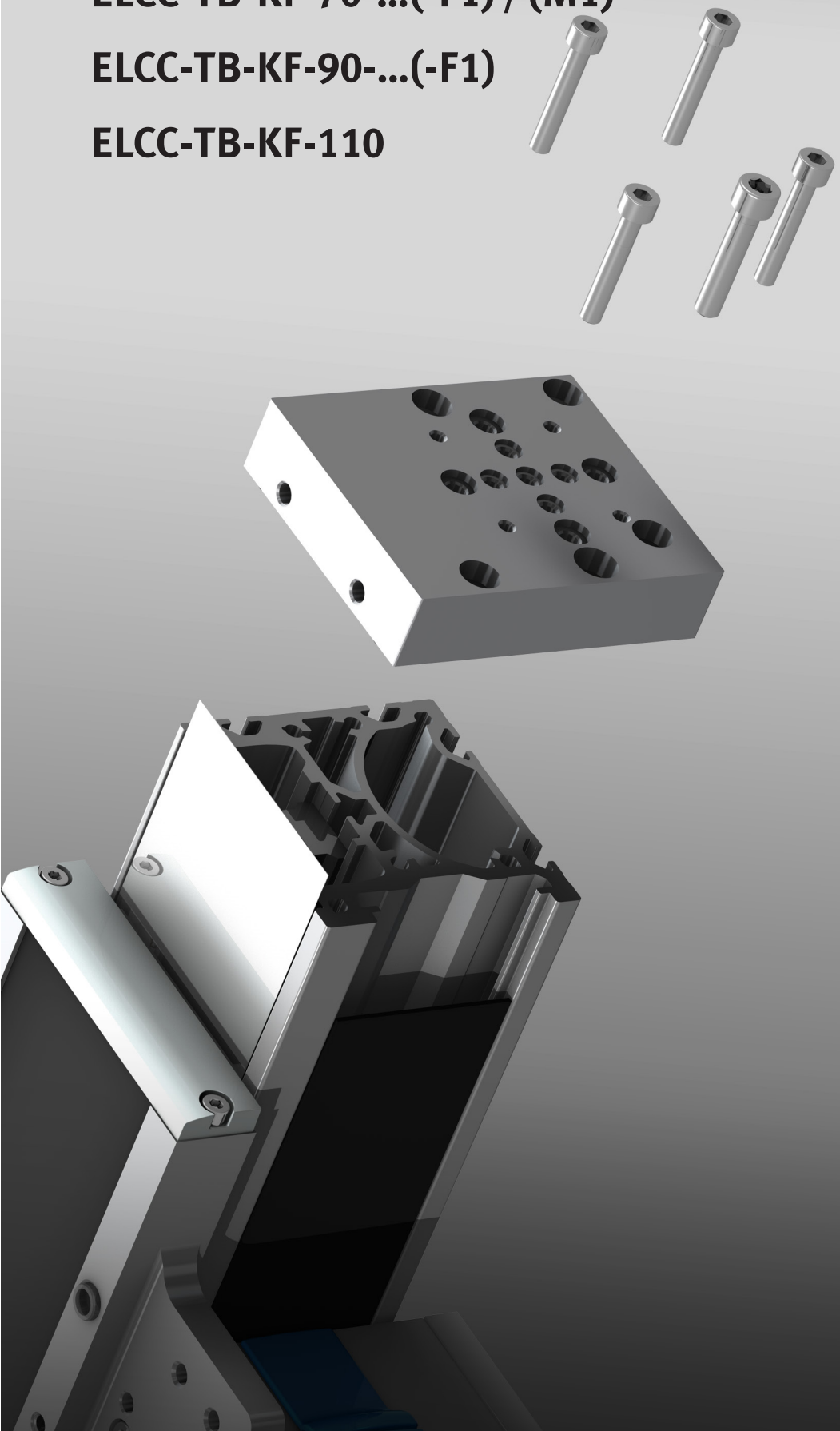
Cantilever axis

ELCC-TB-KF-60-...(-F1) / (M1)

ELCC-TB-KF-70-...(-F1) / (M1)

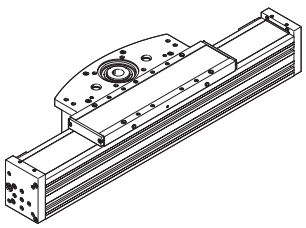
ELCC-TB-KF-90-...(-F1)

ELCC-TB-KF-110



FESTO

Repair instructions (en)



7ELCC_TB_KFc_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 52.

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 cantilever axis type ELCC-TB-KF is also referred to as 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:

- **ELCC-TB-KF cantilever axis 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).
- **ELCC-...-M1 displacement encoder operating instructions**

  Contains information on the installation of the sensor bracket, sensor mounting and measuring unit of the displacement encoder on the ELCC-TB-KF-60 / 70 (➔ www.festo.com).
- **DAYP shock absorber retainer assembly instructions**

  Contains information on mounting the shock absorber retainer on the ELCC-TB-KF (➔ www.festo.com).
- **Sensor bracket and switch lug DASI-E21-...-SR/-SL assembly instructions**

  Contains information on the assembly of the sensor bracket and switch lug for the use of proximity switches on the ELCC-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

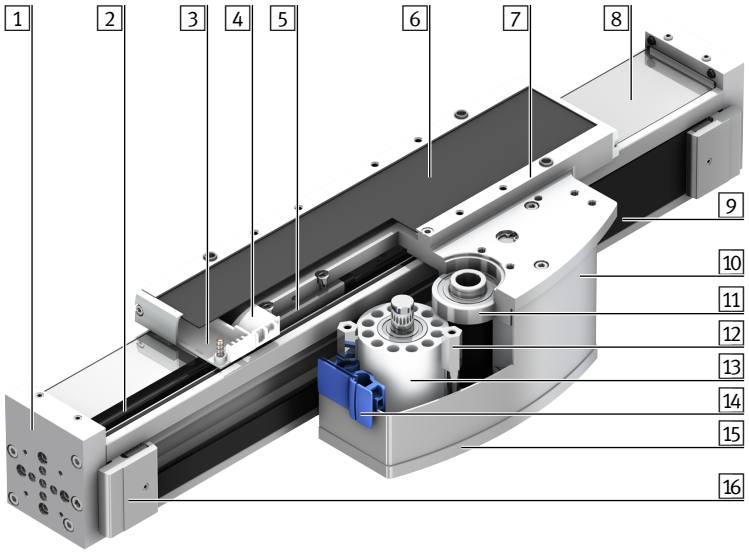
2.1 Functional description

ELCC-... is a cantilever axis with the functional principle of a fixed toothed belt for power transmission.

The rotational movement, of the toothed belt pulley driven via a servomotor, in the fixed drive head causes linear movement of the profile tube of the cantilever axis by means of the toothed belt tightly clamped onto both ends of the profile tube.

The ELCC cantilever axis is generally mounted on the drive head, and the toothed belt pulls the movable profile back and forth. Compared to the predecessor type DGEA, the toothed belt and the roller guide are attached offset by 90 degrees and thus ensure a high degree of stiffness.

The ELCC-TB-KF is approved for slide and cantilever operating mode.



1 End cap (2x)
2 Roller track
3 Top belt reversal (2x)
4 Bottom belt reversal (2x)
5 Roller carriage (2x)
6 Blanking plate
7 Slide module
8 Cover strip
9 Toothed belt
10 Housing
11 Toothed belt pulley module
12 Spacing bolt (4x)
13 Roller module (2x)
14 Locking clip (2x)
15 End plate
16 Clamping component module (2x)

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 – standard designs

Type	Part number
ELCC-TB-KF-60-200-0H-P0-CR	8082386
ELCC-TB-KF-60-300-0H-P0-CR	8082387
ELCC-TB-KF-60-500-0H-P0-CR	8082388
ELCC-TB-KF-60-600-0H-P0-CR	8082389
ELCC-TB-KF-60-800-0H-P0-CR	8082390
ELCC-TB-KF-60-1000-0H-P0-CR	8082391
ELCC-TB-KF-70-200-0H-P0-CR	8082392
ELCC-TB-KF-70-300-0H-P0-CR	8082393
ELCC-TB-KF-70-500-0H-P0-CR	8082394
ELCC-TB-KF-70-600-0H-P0-CR	8082395
ELCC-TB-KF-70-800-0H-P0-CR	8082396
ELCC-TB-KF-70-1000-0H-P0-CR	8082397
ELCC-TB-KF-70-1200-0H-P0-CR	8082398
ELCC-TB-KF-90-200-0H-P0-CR	8082399
ELCC-TB-KF-90-300-0H-P0-CR	8082400

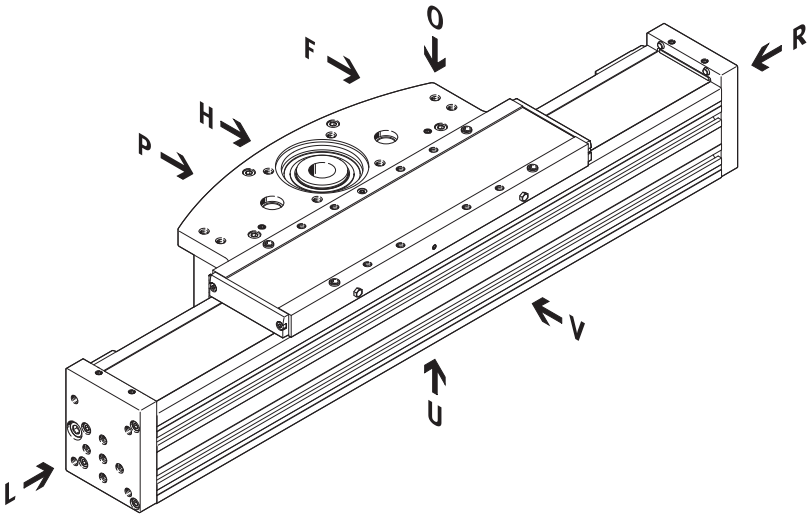
Type	Part number
ELCC-TB-KF-90-500-0H-P0-CR	8082401
ELCC-TB-KF-90-600-0H-P0-CR	8082402
ELCC-TB-KF-90-800-0H-P0-CR	8082403
ELCC-TB-KF-90-1000-0H-P0-CR	8082404
ELCC-TB-KF-90-1200-0H-P0-CR	8082405
ELCC-TB-KF-90-1500-0H-P0-CR	8082406
ELCC-TB-KF-90-1700-0H-P0-CR	8082407
ELCC-TB-KF-90-2000-0H-P0-CR	8082408
ELCC-TB-KF-110-200-0H-P0-CR	8082409
ELCC-TB-KF-110-300-0H-P0-CR	8082410
ELCC-TB-KF-110-500-0H-P0-CR	8082411
ELCC-TB-KF-110-600-0H-P0-CR	8082412
ELCC-TB-KF-110-800-0H-P0-CR	8082413
ELCC-TB-KF-110-1000-0H-P0-CR	8082414
ELCC-TB-KF-110-1200-0H-P0-CR	8082415
ELCC-TB-KF-110-1500-0H-P0-CR	8082416
ELCC-TB-KF-110-1700-0H-P0-CR	8082417
ELCC-TB-KF-110-2000-0H-P0-CR	8082418

2.2.2 Types and part numbers – product module

Type	Module number
ELCC-TB-KF-60	8060571
ELCC-TB-KF-70	8060572
ELCC-TB-KF-90	8060573
ELCC-TB-KF-110	8060574

2.3 Orientation designations

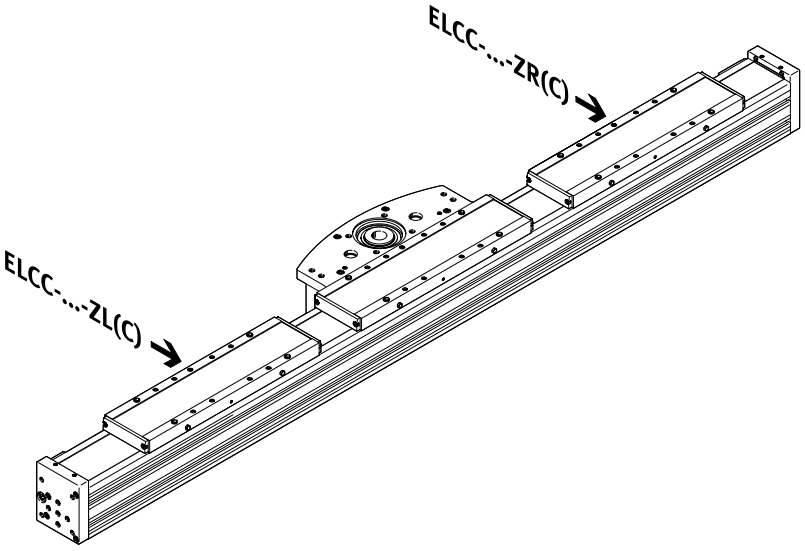
These illustration provide an overview of the orientation designations.



Point of reference:
The front is defined as the viewing side of the cylinder barrel opposite the toothed belt drive.

Orientation:

F = FESTO (Logo)
P = Product labelling
O = top
U = bottom
R = right
L = left
V = front
H = rear



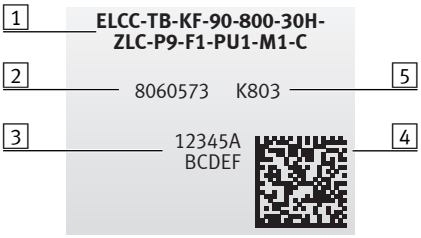
Versions:

ZL(C) = Additional slide, left
ZR(C) = Additional slide, 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:

ELCC	Cantilever axis type ELCC
TB	Toothed belt
KF	Recirculating ball bearing guide
90	Size
800	Stroke [mm]
30H	Stroke reserve [mm]
ZLC	Additional slide, left with clamping unit
P9	with strip cover
F1	Suitable for use in the food industry in accordance with the extended material information
PU1	uncoated PU for food zone
M1	Displacement encoder, incremental (resolution 2.5 µm)
C	Clamping unit attached

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:

Standard designs

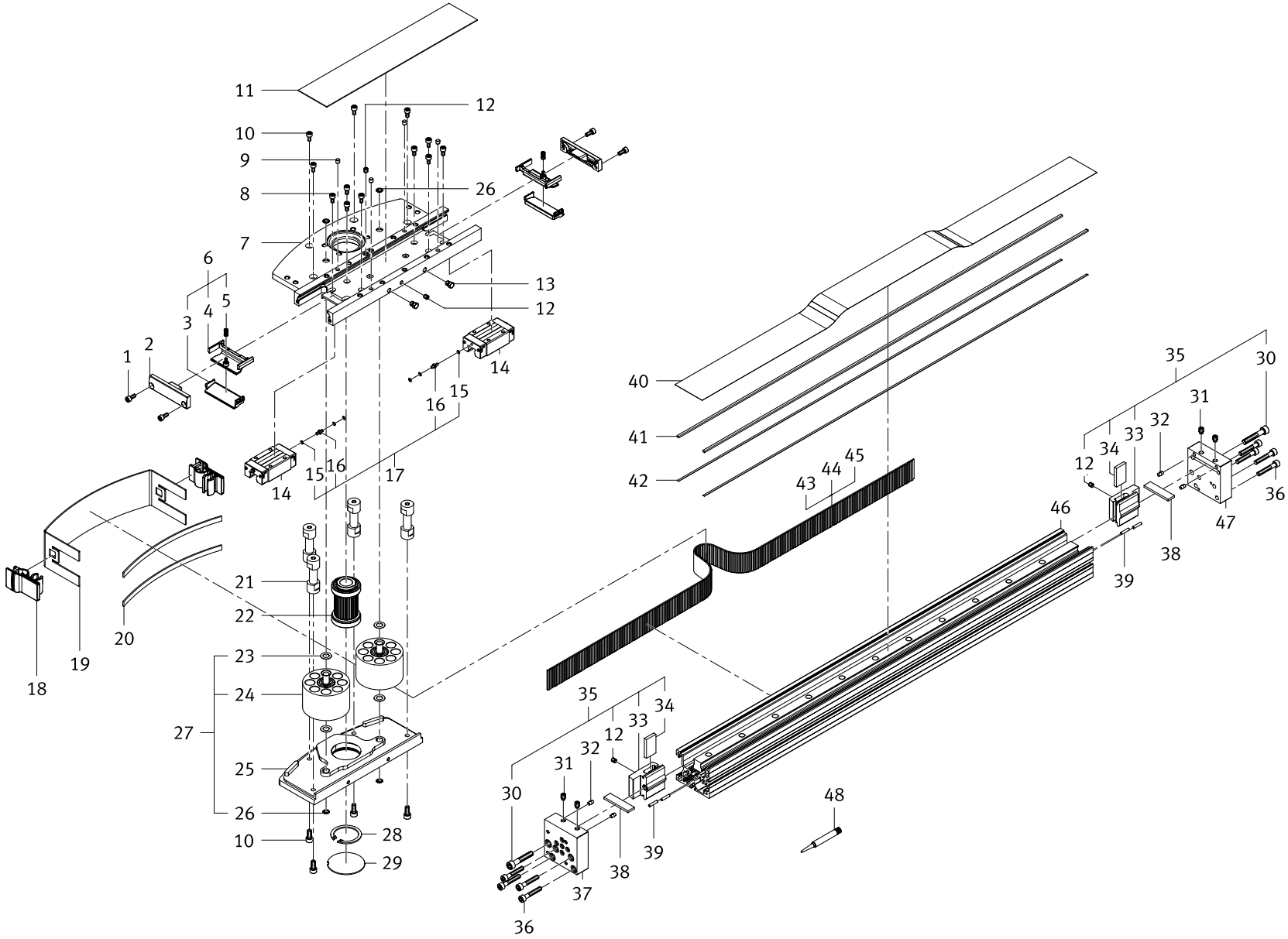
Size	Part number	Components list	Bill of materials
ELCC-TB-KF-60	8082386	➔ Chapter 3.1 on page 14	➔ Chapter 3.1.1 on page 15
	8082387		
	8082388		
	8082389		
	8082390		
	8082391		
ELCC-TB-KF-70	8082392	➔ Chapter 3.2 on page 16	➔ Chapter 3.2.1 on page 17
	8082393		
	8082394		
	8082395		
	8082396		
	8082397		
	8082398		
ELCC-TB-KF-90	8082399	➔ Chapter 3.3 on page 18	➔ Chapter 3.3.1 on page 19
	8082400		
	8082401		
	8082402		
	8082403		
	8082404		
	8082405		
	8082406		
	8082407		
	8082408		
ELCC-TB-KF-110	8082409	➔ Chapter 3.4 on page 20	➔ Chapter 3.4.1 on page 21
	8082410		
	8082411		
	8082412		
	8082413		
	8082414		
	8082415		
	8082416		
	8082417		
	8082418		

Modular product

Size	Module number	Components list	Bill of materials
ELCC-TB-KF-60-...(-F1)	8060571	➔ Chapter 3.1 on page 14	➔ Chapter 3.1.1 on page 15
ELCC-TB-KF-70-...(-F1)	8060572	➔ Chapter 3.2 on page 16	➔ Chapter 3.2.1 on page 17
ELCC-TB-KF-90-...(-F1)	8060573	➔ Chapter 3.3 on page 18	➔ Chapter 3.3.1 on page 19
ELCC-TB-KF-110	8060574	➔ Chapter 3.4 on page 20	➔ Chapter 3.4.1 on page 21

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 ELCC-TB-KF-60-...(-F1) component overview

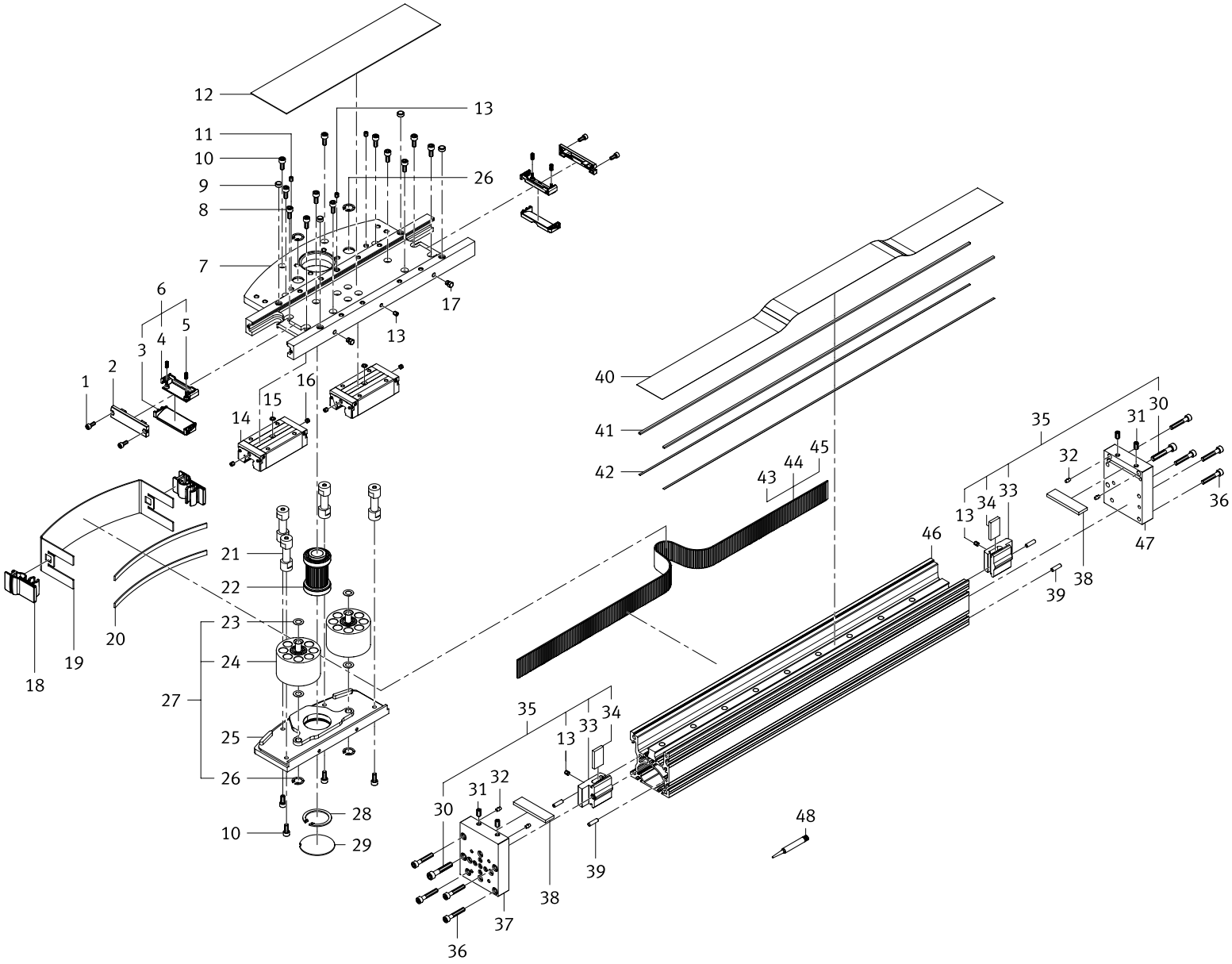


3.1.1 ELCC-TB-KF-60-...(-F1) bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M4×10-8.8
2	Cover cap
3	Belt reversal
4	Belt reversal
5	Compression spring
6	Belt reversal
7	Slide module
8	Socket head screw, ISO 4762-M4×8-10.9
9	Centring pin, ZBS-5
10	Socket head screw, ISO 4762-M5×12-10.9
11	Cover plate
12	Grub screw, ISO 4026-M5×6-45H
13	Lubrication nipple, AM 6 DIN 3405
14	Roller carriage
15	Sealing ring, O-M3-B
16	Lubricating channel
17	Lubricating channel
18	Locking
19	Housing
20	Cushioning element
21	Spacing bolt
22	Toothed belt pulley module Toothed belt pulley module (F1)
23	Shim, DIN 988-8×14×0.5
24	Roller module Roller module (F1)
25	End plate
26	Retaining ring, DIN 472-8×0.8
27	Roller module Roller module (F1)
28	Retaining ring, DIN 472-37×1.5
29	Sealing disc
30	Socket head screw, ISO 4762-M6×35-10.9
31	Grub screw, DIN 915-M6×8-45H
32	Buffer element
33	Clamping component module
34	Clamping plate

No.	Designation, type
35	Clamping
36	Self-tapping screw, SF-F-I-M5X30-10.9
37	Cover
38	Clamping plate
39	Spring pin, ISO 13337-3×14-ST
40	Cover strip
41	Magnetic strip
42	Adhesive tape
43	Toothed belt
44	Toothed belt [CR], 5m piece Toothed belt [PU1] (F1), 5m piece
45	Toothed belt [PU2], 5 m piece
46	Cylinder barrel module Cylinder barrel module (F1)
47	Cover
48	Locking agent (threadlocker)

3.2 ELCC-TB-KF-70-...(-F1) component overview

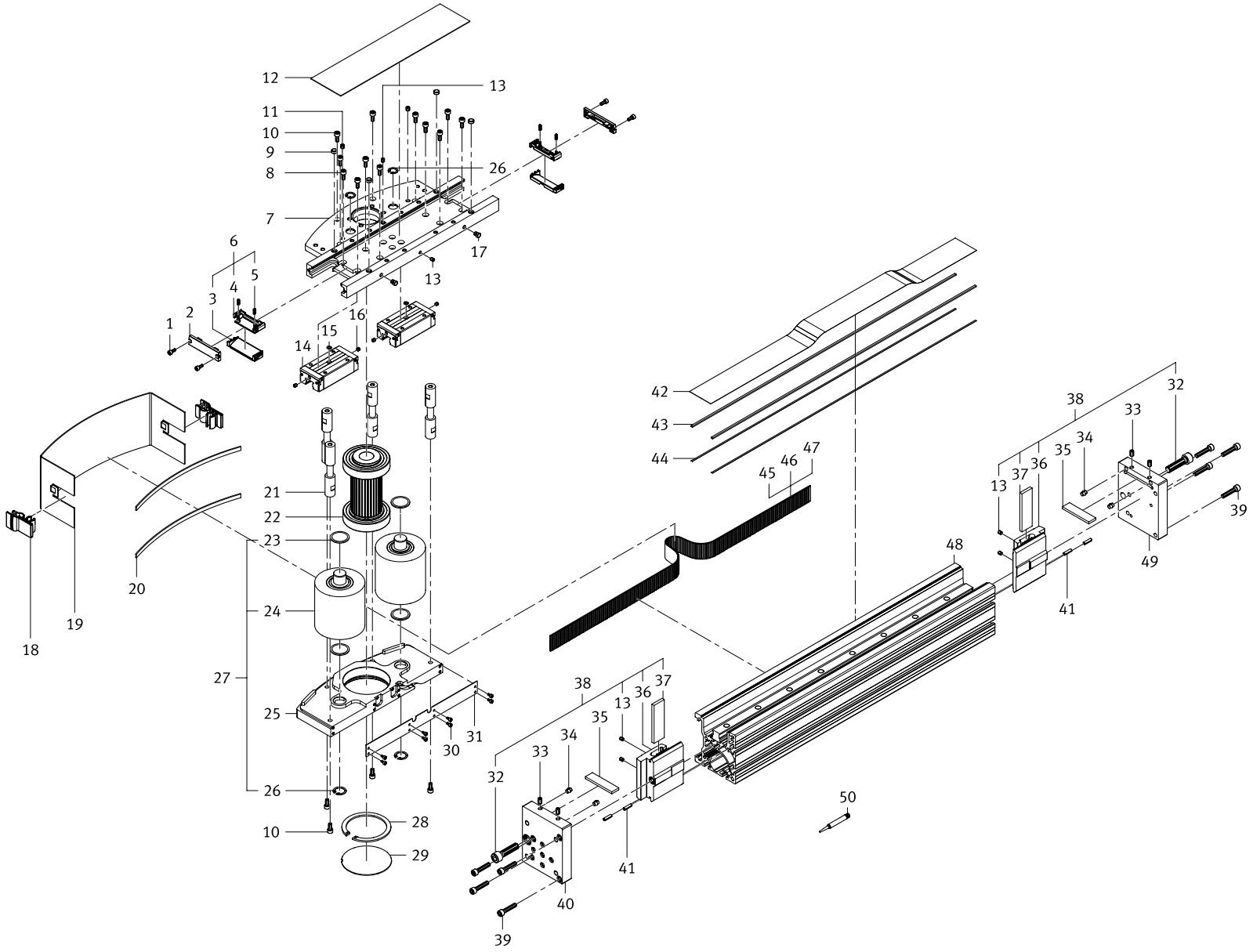


3.2.1 ELCC-TB-KF-70-...(-F1) bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M4×10-8.8
2	Cover cap
3	Belt reversal
4	Belt reversal
5	Compression spring
6	Belt reversal
7	Slide module
8	Socket head screw, ISO 4762-M5×12-10.9
9	Centring sleeve, ZBH-9
10	Socket head screw, ISO 4762-M5×16-10.9
11	Grub screw, ISO 4026-M6×6-45H
12	Cover plate
13	Grub screw, ISO 4026-M5×6-45H
14	Roller carriage
15	O-Ring
16	Grub screw
17	Lubrication nipple, AM 6 DIN 3405
18	Locking
19	Housing
20	Cushioning
21	Spacing bolt
22	Toothed belt pulley module Toothed belt pulley module (F1)
23	Shim, DIN 988-15×21×0.5
24	Roller module Roller module (F1)
25	End plate
26	Retaining ring, DIN 472-15×1
27	Roller module Roller module (F1)
28	Retaining ring, DIN 472-48×1.75
29	Sealing disc
30	Socket head screw, ISO 4762-M6×35-10.9
31	Grub screw, ISO 4026-M6×10-45H
32	Buffer
33	Clamping component module
34	Clamping plate

No.	Designation, type
35	Clamping
36	Self-tapping screw, SF-F-I-M5X30-10.9
37	Cover
38	Clamping plate
39	Spring pin, ISO 13337-4.5×16-ST
40	Cover strip
41	Magnetic tape
42	Adhesive tape
43	Toothed belt
44	Toothed belt [CR], 5 m piece Toothed belt [PU1] (F1), 5 m piece
45	Toothed belt [PU2], 5 m piece
46	Cylinder barrel module Cylinder barrel module (F1)
47	Cover
48	Locking agent (threadlocker)

3.3 ELCC-TB-KF-90-...(-F1) component overview

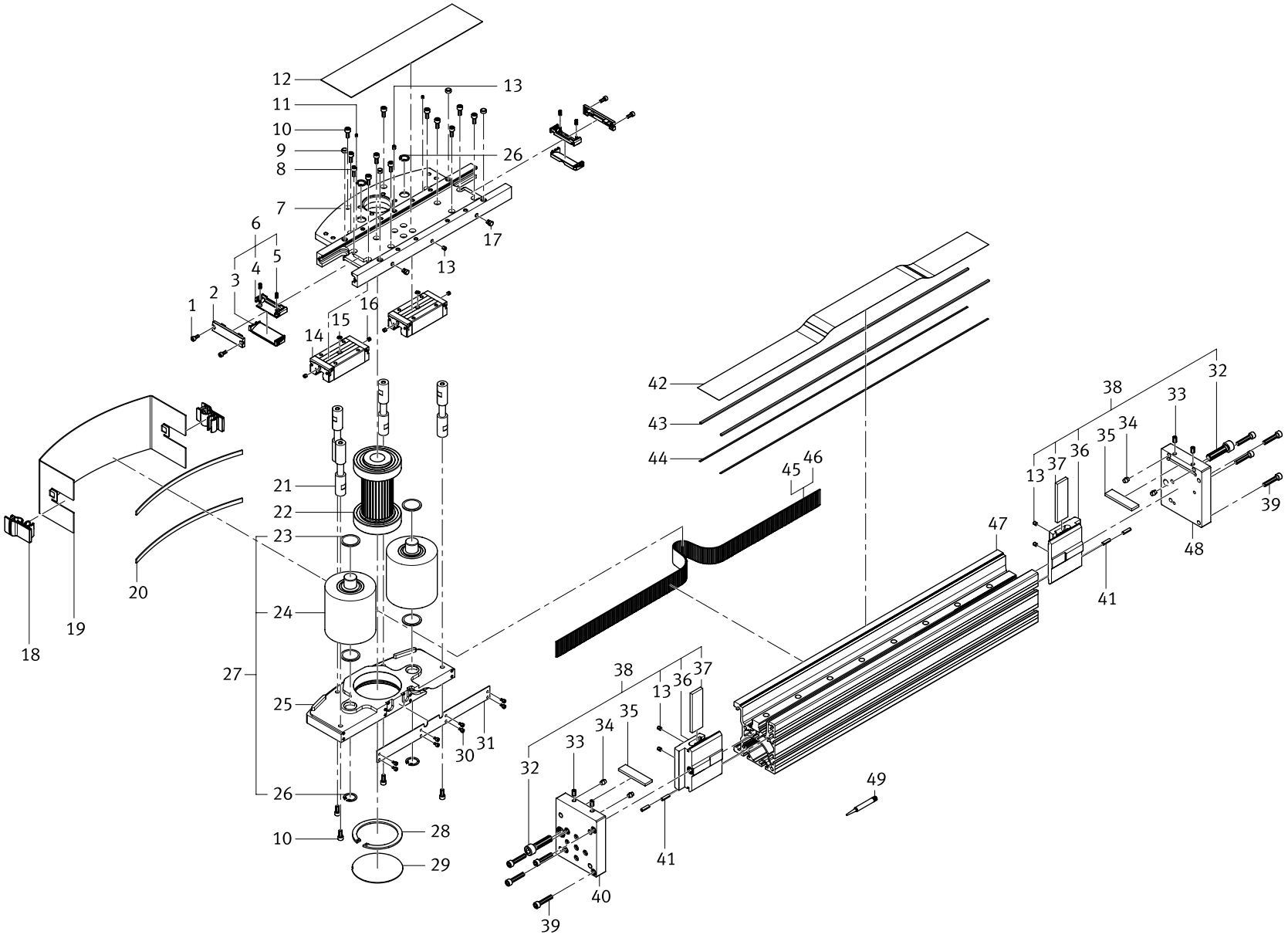


3.3.1 ELCC-TB-KF-90-...(-F1) bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M4×10-8.8
2	Cover cap
3	Belt reversal
4	Belt reversal
5	Compression spring
6	Belt reversal
7	Slide module
8	Socket head screw, ISO 4762-M6X14-10.9
9	Centring sleeve, ZBH-9
10	Socket head screw, ISO 4762-M6×25-10.9
11	Grub screw, ISO 4026-M6×6-45H
12	Cover plate
13	Grub screw, ISO 4026-M5×6-45H
14	Roller carriage
15	O-Ring
16	Grub screw
17	Lubrication nipple, AM 6 DIN 3405
18	Locking
19	Housing
20	Cushioning
21	Spacing bolt
22	Toothed belt pulley module Toothed belt pulley module (F1)
23	Shim, DIN 988-20×28×1
24	Roller module Roller module (F1)
25	End plate
26	Retaining ring, DIN 472-20×1
27	Roller module Roller module (F1)
28	Retaining ring, DIN 472-75×2.5
29	Sealing disc
30	Socket head screw, ISO 4762-M3×6-8.8
31	Cover
32	Socket head screw, ISO 4762-M10×40-10.9
33	Grub screw, ISO 4026-M6×10-45H
34	Buffer

No.	Designation, type
35	Clamping plate
36	Clamping component module
37	Clamping plate
38	Clamping
39	Self-tapping screw, SF-F-I-M6X30-10.9
40	Cover
41	Spring pin, ISO 13337-4.5×16-ST
42	Cover strip
43	Magnetic strip
44	Adhesive tape
45	Toothed belt
46	Toothed belt [CR], 5m piece Toothed belt [PU1] (F1), 5m piece
47	Toothed belt [PU2], 5 m piece
48	Cylinder barrel module Cylinder barrel module (F1)
49	Cover
50	Locking agent (threadlocker)

3.4 ELCC-TB-KF-110 components overview



3.4.1 ELCC-TB-KF-110 bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M4×12-8.8
2	Cover cap
3	Belt reversal
4	Belt reversal
5	Compression spring
6	Belt reversal
7	Slide module
8	Socket head screw, DIN 7984-M8×14-8.8
9	Centring sleeve, ZBH-9
10	Socket head screw, ISO 4762-M8×25-10.9
11	Grub screw, ISO 4026-M6×6-45H
12	Cover plate
13	Grub screw, ISO 4026-M5×6-45H
14	Roller carriage
15	Grub screw
16	O-ring
17	Lubrication nipple, AM 6 DIN 3405
18	Locking
19	Housing
20	Cushioning element
21	Spacing bolt
22	Toothed belt pulley module
23	Shim, DIN 988-35×45×1
24	Roller module
25	End plate
26	Retaining ring, DIN 472-35×1.5
27	Roller module
28	Retaining ring, DIN 472-95×3
29	Sealing disc
30	Socket head screw, ISO 4762-M3×6-8.8
31	Cover
32	Socket head screw, ISO 4762-M10×40-10.9
33	Grub screw, DIN 915-M6×12-45H
34	Buffer
35	Clamping plate
36	Clamping component module
37	Clamping plate

No.	Designation, type
38	Clamping
39	Self-tapping screw, SF-F-I-M8X30-10.9
40	End cap
41	Spring pin, DIN 7346-4.5×16
42	Cover strip
43	Magnetic strip
44	Adhesive tape
45	Toothed belt
46	Toothed belt [CR], 5 m piece
47	Cylinder barrel module
48	End cap
49	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 module (wear of the tooth surface/tooth geometry, radial clearance between bearing inner raceway and the bearing seat: interference fit when new) and also the condition of the deep-groove ball bearings (e.g. perceptible bearing clearance, disrupted, non-smooth rolling behaviour and increased running noise, etc.) should always be evaluated too. 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 are signs of wear. For example, these can be caused by operation outside the permitted temperature range, impermissible chemical effects or possibly reaching the end of its fatigue life.
- **Toothed belt made of neoprene with nylon coating (CR)**
  - Wear of the nylon fabric (fabric cover) on the tooth side of the belt. This is indicated by lint and pilling, 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. On replacing the toothed belt due to long operation, it is useful to replace the toothed belt pulley module including deep-groove ball bearings at the same time (➔ Chapter 5 on page 24).
- **Toothed belt made of polyurethane with uncoated steel cord (PU1)**
  - The tooth geometry wears very uniformly, so that despite high wear the contour is maintained for a relatively long time. In addition, the tension members made of steel cord start to protrude out of the PU material, so that iron oxide forms and colours the abraded toothed belt material red. At this stage, in general there is not yet any visible damage to the toothed belt pulley module. This status is a good indicator for toothed belt replacement.
- **Toothed belt made of polyurethane with steel cord and fabric coating (PU2)**
  - On replacing the toothed belt due to long operation, it is useful to replace the toothed belt pulley module including deep-groove ball bearings at the same time (➔ Chapter 5 on page 24).

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 “PositioningDrives” design 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

The ELCC-TB-KF-... cantilever axis is made up of the following modules:

– Cylinder barrel with end caps, integrated roller track and optional cover strip, driven by a toothed belt.

– Drive head with toothed belt pulley, drive, slide with recirculating ball bearing guide and optional cover strip guide.

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:

Type	Toothed belt material	Minimum bending radius R_{min}
ELCC-TB-KF-60-...-CR	Polychloroprene	16 mm
ELCC-TB-KF-60-...-F1	Polyurethane PU1	60 mm
ELCC-TB-KF-60-...-PU2	Polyurethane PU2, coated	60 mm
ELCC-TB-KF-70-...-CR	Polychloroprene	16 mm
ELCC-TB-KF-70-...-F1	Polyurethane PU1	60 mm
ELCC-TB-KF-70-...-PU2	Polyurethane PU2, coated	60 mm
ELCC-TB-KF-90-...-CR	Polychloroprene	34 mm
ELCC-TB-KF-90-...-F1	Polyurethane PU1	100 mm
ELCC-TB-KF-90-...-PU2	Polyurethane PU2, coated	100 mm
ELCC-TB-KF-110-...-CR	Polychloroprene	84 mm

Ordering a precise fitting toothed belt:

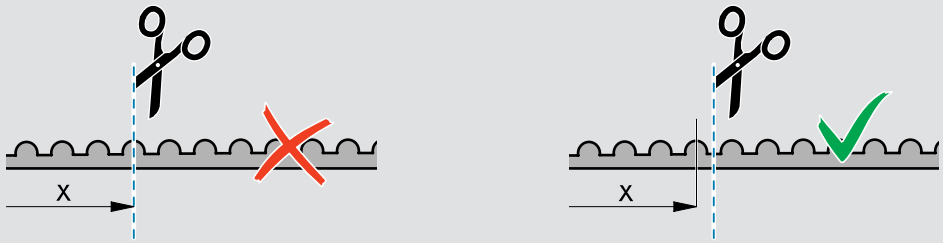
The part number of the cantilever axis is a module number and is dependent on the size of the product. When ordering the toothed belt, in addition to the part number, the stroke and stroke reserve of the product must also be stated. The necessary information is given in the order code in the product 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 + value “B”)

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

Type	Multiplier “A”	Value “B”	Pitch “C”
ELCC-TB-KF-60-...-CR	0,998	332	3
ELCC-TB-KF-60-...-F1[1)]/-PU2	1,0		
ELCC-TB-KF-70-...-CR	0,998	405	
ELCC-TB-KF-70-...-F1[1)]/-PU2	1,0		
ELCC-TB-KF-90-...-CR	0,998	433	5
ELCC-TB-KF-90-...-F1[1)]/-PU2	1,0		
ELGA-TB-RF-110-...-CR	0,998	545	8

[1)] Feature F1 = PU1 toothed belt

Example: **ELCC - TB - KF -** **70** Size **-** **600** Stroke **-** **20H** Stroke reserve **- P9 -** **PU2** Toothed belt material

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

L = 1,0× (600 + 2 × 20 + 405) mm

L = 1.045 mm

rounded down to an integer multiple of the pitch “C” (in this example: 5)

L = 1.044 mm

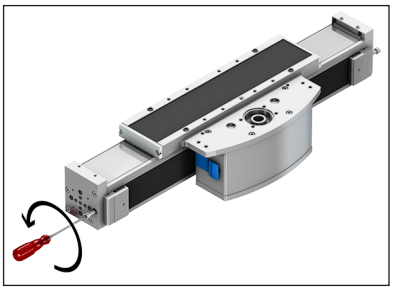
5.1 Replacing the toothed belt

On replacing the toothed belt due to long operation, it is useful to replace the toothed belt pulley module including deep-groove ball bearings at the same time (➔ Chapter 5.2 on page 33 and ➔ Chapter 5.3 on page 33).

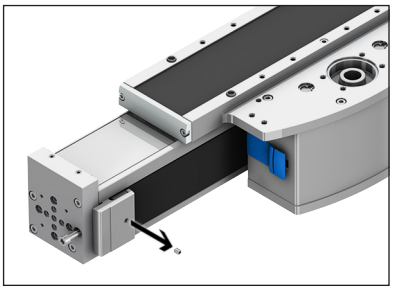
Ideally, the new toothed belt can be threaded in, without dismantling the roller and toothed belt pulley module first.

5.1.1 Removing the toothed belt

1. Loosen the socket head screws of the clamps ➔ toothed belt is tension-free.

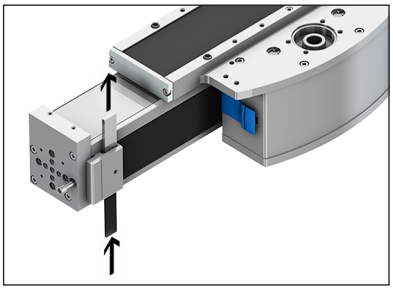


– In the case of ELCC-TB-KF-60 / 70, the clamping plate is pressed into the clamping component module by **one** grub screw.
– In the case of ELCC-TB-KF-90 / 110, the clamping plate is pressed into the clamping component module by **two** grub screws.



2. Unscrew the grub screws (2x) or (4x) from the clamping component modules (2x).

3. Pull the clamping plates (2x) at the side out of the clamping component modules (2x).

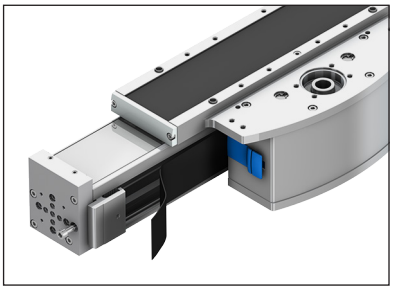


The clamping plate can sit very firmly on the toothed belt. If necessary, drive out carefully using a thin sheet (wood or plastic).

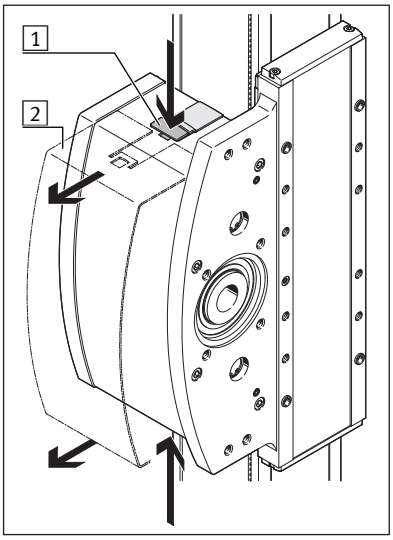
The sheet must be thinner and narrower than the clamping plate (➔ Table).

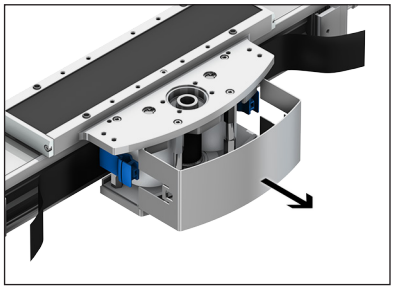
Type	Maximum plate thickness	Maximum plate width
ELCC-TB-KF-60	< 4 mm	< 17 mm
ELCC-TB-KF-70	< 4 mm	< 17 mm
ELCC-TB-KF-90	< 5 mm	< 23 mm
ELCC-TB-KF-110	< 6 mm	< 39 mm

4. Pull the toothed belt out of the clamping component modules (2x).



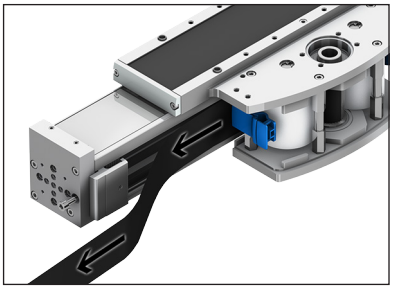
5. Remove the housing [2]; to do this, push in the locking clip [1] at both ends of the housing at the same time and pull off the housing [2].





To pull in the new toothed belt, use adhesive tape to attach it edge to edge to the old toothed belt and pull in (➔ Chapter 5.1.2 on page 27).

6. If the new toothed belt cannot be pulled in with the help of the old toothed belt, pull the old toothed belt completely out of the drive head.



5.1.2 Mounting the toothed belt

Note

Do not bend or fold the toothed belt, this can result in damage to the tension members and reduction of the belt's service life due to cracking of the toothed belt.

Note the minimum bending radius for assembly and storage (➔ Chapter 5 on page 24).

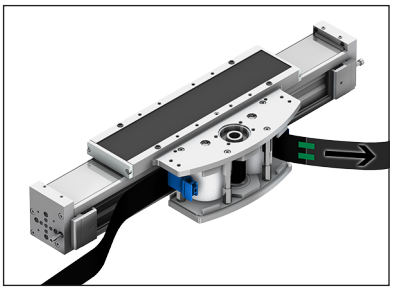
Note

Lightly grease the PU1 toothed belt (feature F1) on the side of the teeth with VP 922 grease before mounting. This increases the service life of the toothed belt.

Do **not grease** the area on the toothed belt that is clamped in the clamping component.

Pulling in new toothed belt with the help of the old toothed belt

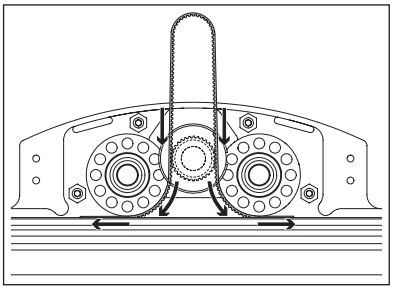
1. Use adhesive tape to attach the new toothed belt edge to edge to the old toothed belt.
2. Use the old toothed belt to carefully pull the new toothed belt through the drive head.
3. Remove old toothed belt.



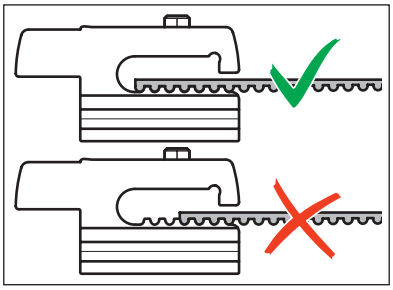
Pulling in new toothed belt without auxiliary means

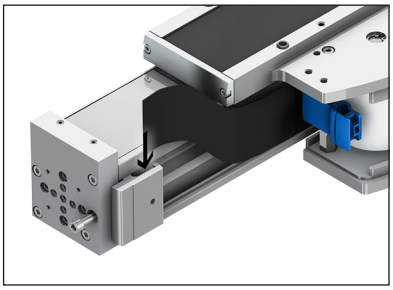
1. Check whether the roller and toothed belt pulley module have to be replaced.
   - Dismantle the roller and toothed belt pulley module (➔ Chapter 5.2 on page 33).
   - Mount the roller and toothed belt pulley module (➔ Chapter 5.3 on page 33).

2. Pass the two ends of the new toothed belt on the right and left between the toothed belt pulley and roller module ➔ figure to the right. If necessary, use the short side of an Allen key to pull out the toothed belt from under the roller modules.

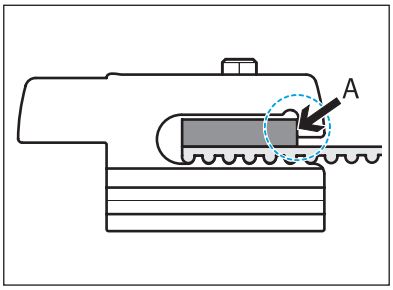


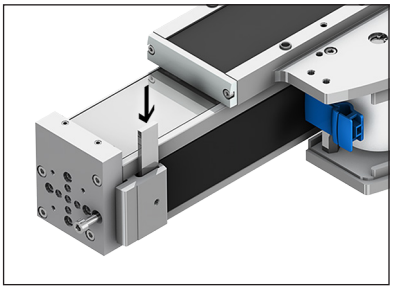
3. Push the toothed belt into the clamping component modules (2x).
4. Align the toothed belt axially centred with the clamping component modules (2x).



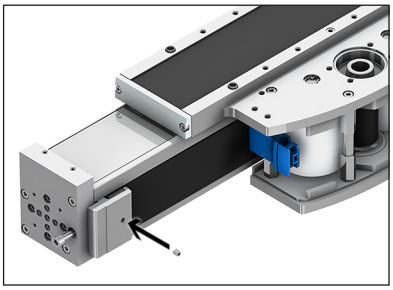


5. Push the clamping plates (2x) in the clamping component modules (2x) onto the toothed belt.
6. Push the clamping plates (2x) against the stop (A) of the clamping component modules (2x).





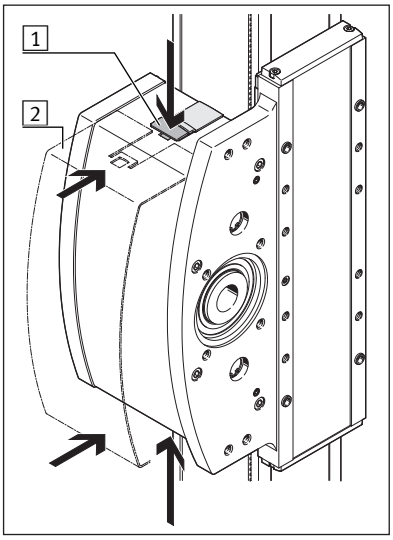
– In the case of ELCC-TB-KF-60 / 70, the clamping plate is pressed into the clamping component module by **one** grub screw.
– In the case of ELCC-TB-KF-90 / 110, the clamping plate is pressed into the clamping component module by **two** grub screws.

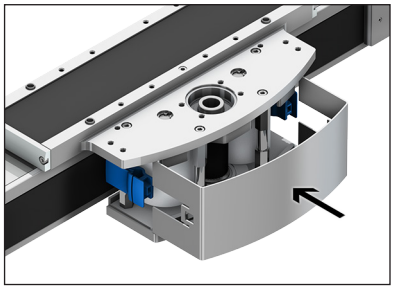


7. Clean the grub screws (2x) or (4x) to remove locking agent.
8. Wet the grub screws (2x) or (4x) with locking agent.
9. Screw the grub screws (2x) or (4x) into the clamping component modules (2x) and tighten to the appropriate tightening torque (➔ Table).

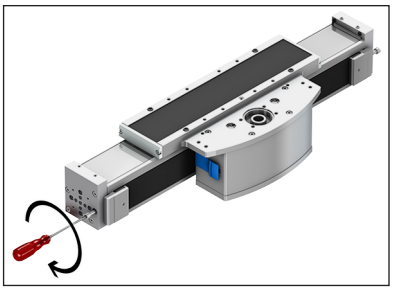
Type	Tightening torque
ELCC-TB-KF-60	0.5 Nm ± 10 %
ELCC-TB-KF-70	0.5 Nm ± 10 %
ELCC-TB-KF-90	0.5 Nm ± 10 %
ELCC-TB-KF-110	0.5 Nm ± 10 %

10. Push the housing [2] into the grooves of the locking clips (2x) [1].
11. At the same time, push in the top part of the locking clip [1] at both ends and push the housing [2] into the locking clips [1] until it stops. Locking clips must latch into position.





12. Use the socket head screws (2x) to lightly tension the clamping of the toothed belt.



5.1.3 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

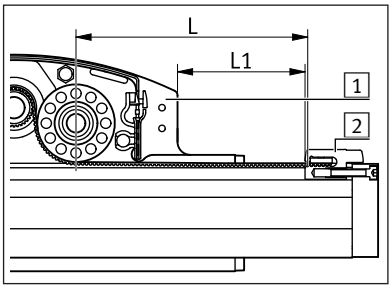
Correct toothed belt pretension is essential for the life of the toothed belt as well as the positioning accuracy and the performance of the product. The toothed belt pretension must therefore be checked extremely carefully.

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.

As the freely oscillating strand length (L) cannot be measured directly, the distance (L1) of the drive head 1 from one of the clamping component modules 2 is set instead and the oscillation measurement is then taken at this point.

The toothed belt pretension is thus determined by measuring the fundamental component (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	freely oscillating strand length [m]
F_v	Pretension force [N]
m	weight per metre of the toothed belt [kg/m]

The frequency to be set can be calculated using the data in the following tables:

For normal strokes (≥ 100 mm)

Chloroprene belt (CR)

Type	Weight per metre m	Freely oscillating strand length L	Pretension force F_v
ELCC-TB-KF-60	0.072 kg/m	150.5 mm	360 – 375 N
ELCC-TB-KF-70	0.113 kg/m	160.5 mm	720 – 750 N
ELCC-TB-KF-90	0.275 kg/m	168.5 mm	1440 – 1500 N
ELCC-TB-KF-110	0.546 kg/m	182.5 mm	3000 – 3125 N

Polyurethane belt (PU1 / PU2)

Type	Weight per metre m	Freely oscillating strand length L	Pretension force F_v
ELCC-TB-KF-60-...(-F1)	0.090 kg/m	150.5 mm	360 – 375 N
ELCC-TB-KF-70-...(-F1)	0.150 kg/m	160.5 mm	720 – 750 N
ELCC-TB-KF-90-...(-F1)	0.346 kg/m	168.5 mm	1440 – 1500 N

For short strokes (< 99 mm)

Chloroprene belt (CR)

Type	Weight per metre m	Freely oscillating strand length L	Pretension force F_v
ELCC-TB-KF-60	0.072 kg/m	103.5 mm	360 – 375 N
ELCC-TB-KF-70	0.113 kg/m	113.5 mm	720 – 750 N
ELCC-TB-KF-90	0.275 kg/m	121.5 mm	1440 – 1500 N
ELCC-TB-KF-110	0.546 kg / m	135.5 mm	3000 – 3125 N

Polyurethane belt (PU1 / PU2)

Type	Weight per metre m	Freely oscillating strand length L	Pretension force F_v
ELCC-TB-KF-60-...(-F1)	0.090 kg/m	103.5 mm	360 – 375 N
ELCC-TB-KF-70-...(-F1)	0.150 kg/m	113.5 mm	720 – 750 N
ELCC-TB-KF-90-...(-F1)	0.346 kg/m	121.5 mm	1440 – 1500 N

Note on measurement using the acoustic frequency measuring device:

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 measuring device measures the natural frequency generated (transverse oscillation) using the acoustic operating principle. In addition to the fundamental frequency (natural frequency), harmonics can also occur. From expe-

rience 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.

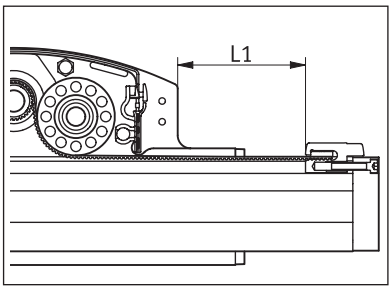
For this reason, several measurements should always be taken in order to differentiate between the necessary fundamental (natural frequency) and the harmonic. Only this frequency can be used to conclude the force acting in the strand.

5.1.4 Checking the toothed belt pretension

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

Measuring the toothed belt pretension

1. Set the distance between the drive head and clamping component module (L1) according to the Table.



– **For normal strokes (≥ 100 mm)**

Type	Distance L1
ELCC-TB-KF-60-...(-F1)	80 mm
ELCC-TB-KF-70-...(-F1)	80 mm
ELCC-TB-KF-90-...(-F1)	80 mm
ELCC-TB-KF-110	80 mm

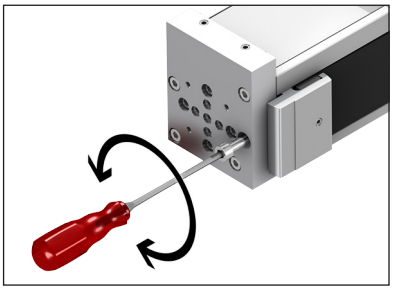
[1] Feature F1 = PU1 toothed belt

– **For short strokes (< 99 mm)**

Type	Distance L1
ELCC-TB-KF-60-...(-F1)	33 mm
ELCC-TB-KF-70-...(-F1)	33 mm
ELCC-TB-KF-90-...(-F1)	33 mm
ELCC-TB-KF-110	33 mm

[1] Feature F1 = PU1 toothed belt

2. Align the acoustic frequency measuring device towards the centre of the toothed belt as described in the corresponding operating instructions.
3. Make the toothed belt oscillate by hitting it, e.g. with an Allen key or punch.



Several measurements should be taken to compensate for measurement tolerances.

The toothed belt must be able to oscillate freely.

4. Compare the measured values with the respective value (➔ Table).

For normal strokes (≥ 100 mm)

Chloroprene belt (CR)

Type	Minimum frequency (f)	Maximum frequency (f)
ELCC-TB-KF-60	235 Hz	239 Hz
ELCC-TB-KF-70	249 Hz	253 Hz
ELCC-TB-KF-90	215 Hz	219 Hz
ELCC-TB-KF-110	204 Hz	207 Hz

Polyurethane belt (PU1 / PU2)

Type	Minimum frequency (f)	Maximum frequency (f)
ELCC-TB-KF-60-...(-F1)	211 Hz	214 Hz
ELCC-TB-KF-70-...(-F1)	217 Hz	220 Hz
ELCC-TB-KF-90-...(-F1)	192 Hz	195 Hz

For short strokes (< 99 mm)

Chloroprene belt (CR)

Type	Minimum frequency (f)	Maximum frequency (f)
ELCC-TB-KF-60	342 Hz	348 Hz
ELCC-TB-KF-70	352 Hz	358 Hz
ELCC-TB-KF-90	298 Hz	303 Hz
ELCC-TB-KF-110	274 Hz	279 Hz

Polyurethane belt (PU1 / PU2)

Type	Minimum frequency (f)	Maximum frequency (f)
ELCC-TB-KF-60-...(-F1)	307 Hz	312 Hz
ELCC-TB-KF-70-...(-F1)	306 Hz	312 Hz
ELCC-TB-KF-90-...(-F1)	266 Hz	271 Hz

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.

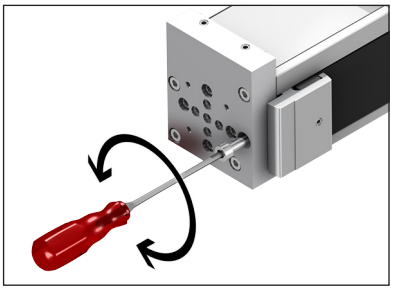
The toothed belt is set to the specified value in the factory, and is thus maintenance-free for its entire service life.

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, adjust the toothed belt pretension as follows:

1. Adjust the toothed belt pretension by turning the socket head screws.
2. Before the toothed belt pretension is measured again, move the slide back and forth several times so that the toothed belt can fully settle and tension differences are levelled out.



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.

5.2 Dismantling the roller and toothed belt pulley modules

Only ELCC-TB-KF-90 / 110-...-M1

For replacement of the roller and toothed belt pulley modules, contact Festo (➔ www.festo.com).

1. Remove the housing of the drive head (➔ Chapter 5.1.1 on page 25).
2. Dismantle the toothed belt (➔ Chapter 5.1.1 on page 25).

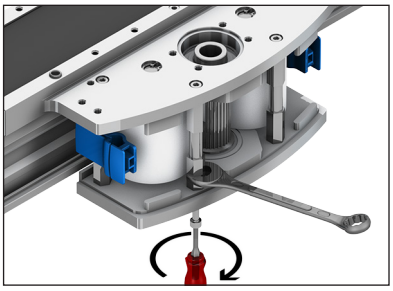
Note

ELCC-TB-KF-60 / 70-...-M1

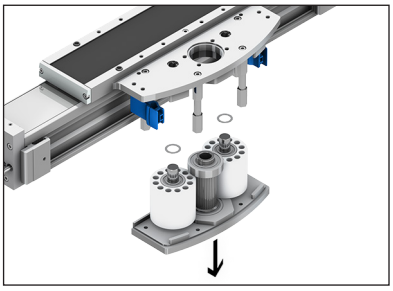
The sensor bracket with measuring unit for these types is mounted on the end plate.

- On removing the end plate, avoid damaging the measuring tape on the cylinder barrel module.

3. Unscrew the socket head screws (4x) from the end plate, at the same time, fix the spacing bolt with an open-ended spanner.
4. Secure the end plate with roller and toothed belt pulley modules against falling.

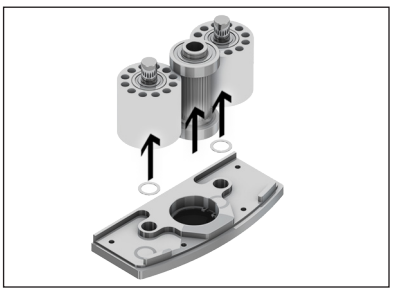


On removing the end plate with roller and toothed belt pulley modules, secure the top shims (2x) of the roller modules to prevent loss.



5. Carefully remove the end plate with roller and toothed belt pulley modules.
6. Secure shims (2x).

On removing the roller and toothed belt pulley modules from the end plate, secure the bottom shims (2x) of the roller modules to prevent loss.



7. Remove the roller modules (2x) and toothed belt pulley module from the end plate.
8. Secure shims (2x).
9. Check the roller and toothed belt pulley modules for wear ➔ replace if necessary (➔ Chapter 5.3 on page 33).

5.3 Mounting the roller and toothed belt pulley modules

Note

ELCC-TB-KF-60 / 70-...-M1

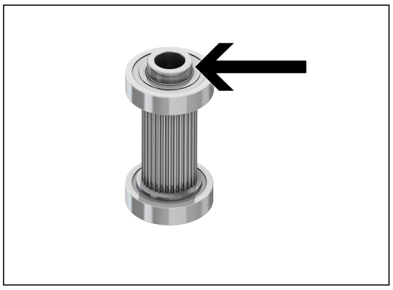
The sensor bracket with measuring unit for these types is mounted on the end plate.

- On mounting the end plate, avoid damaging the measuring tape on the cylinder barrel module.

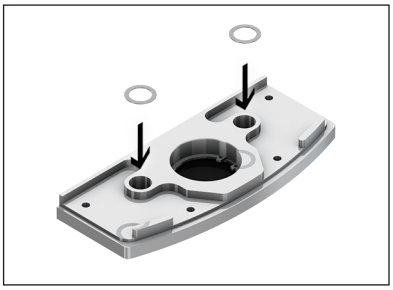
Note

ELCC-TB-KF-70 only

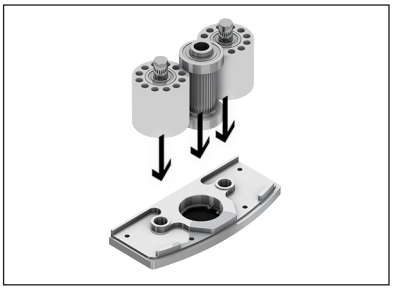
The toothed belt pulley module is not symmetrical, the side with the larger overhang of the toothed belt pulley beyond the deep-groove ball bearing must face the slide module.



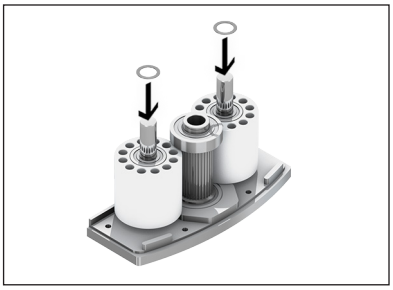
1. Place the shims (2x) on the holes (2x) for the shafts of the roller modules (2x) in the end plate.



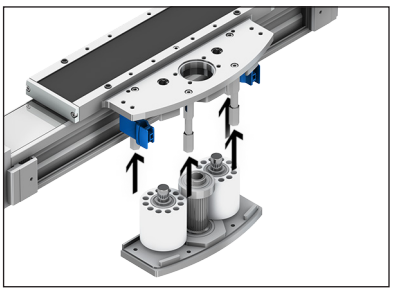
2. Insert the roller modules (2x) together with the toothed belt pulley module (in correct position) into the end plate.



3. Place the shims (2x) on the top of the shafts of the roller modules (2x).

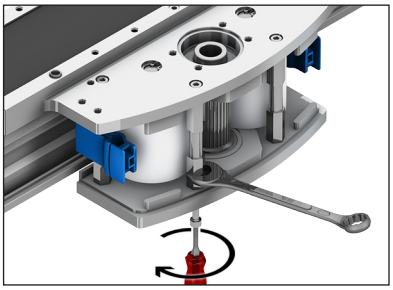


4. Clean socket head screws (4x) to remove locking agent.
5. Wet the socket head screws (4x) with locking agent.
6. Align the end plate with roller and toothed belt pulley modules at the spacing bolt (4x) and at the same time, push the shafts of the roller modules (2x) and the deep-groove ball bearing of the toothed belt pulley module into the mountings of the slide module.



7. Screw in socket head screws (4x) through the end plate in the spacing bolt (4x) and tighten to the appropriate tightening torque (➔ Table), use an open-ended spanner to fix the spacing bolt in position.

Type	Tightening torque
ELCC-TB-KF-60	6 Nm ± 10 %
ELCC-TB-KF-70	6 Nm ± 10 %
ELCC-TB-KF-90	10 Nm ± 10 %
ELCC-TB-KF-110	23 Nm ± 10 %



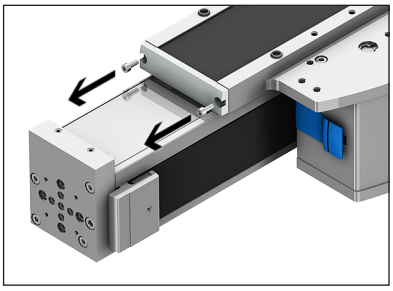
10. Mount toothed belt (➔ Chapter 5.1.2 on page 27).
11. Mount the housing on the drive head (➔ Chapter 5.1.2 on page 27).

5.4 Replacing the cover strip

The cover strip is only supplied for cantilever axes with feature **P9**.

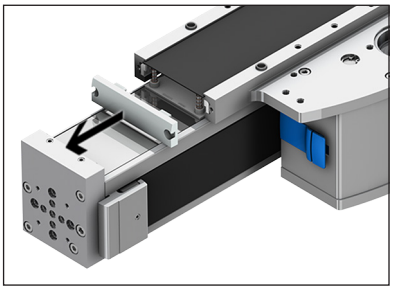
5.4.1 Dismantling the cover strip

1. Unscrew the socket head screws (2x each) from the cover caps (2x) of the slide module.

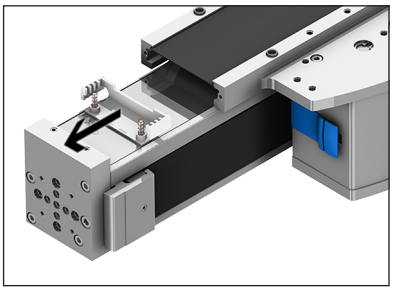


When removing the cover caps from the side module, secure the compression springs of the top belt reversals (2x) to prevent them from jumping off.

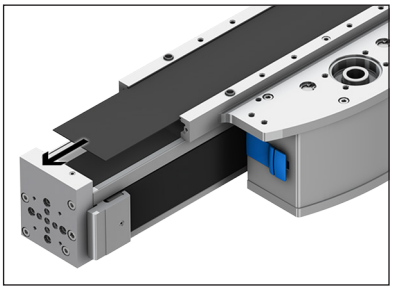
– The ELCC-TB-KF-60 has **one** compression spring mounted on each top belt reversal.
– The ELCC-TB-KF-70 / 90 / 110 has **two** compression springs mounted on each top belt reversal.



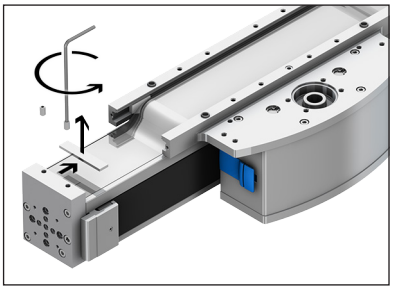
2. Remove cover caps from the slide module.
3. Secure the compression springs.
4. Remove top belt reversals (2x).



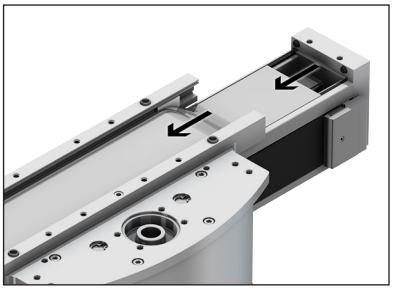
5. Pull the cover plate from the slide module.



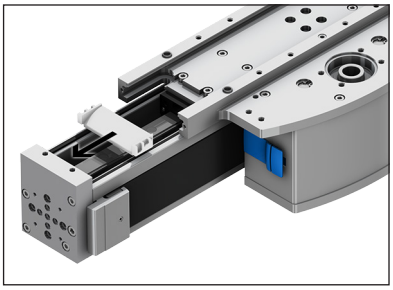
6. Unscrew grub screws (2x each) from the end cap (2x).
7. Pull the clamping plates (2x) with cover strip from the end cap.
8. Remove the clamping plates (2x).



9. Remove the cover strip.

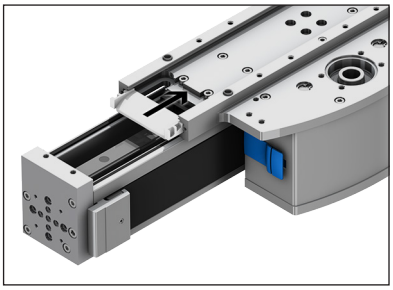


10. Remove the bottom belt reversals (2x) from the slide module.

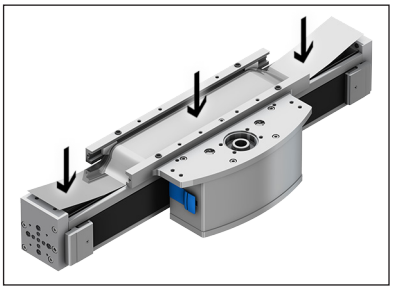


5.4.2 Mounting the cover strip

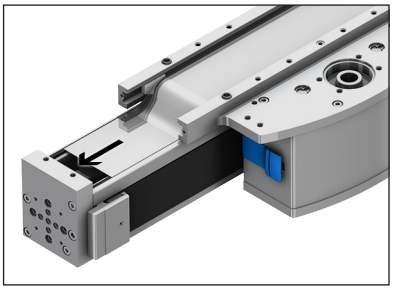
1. Insert the bottom belt reversals (2x) in the correct position in the slide module.



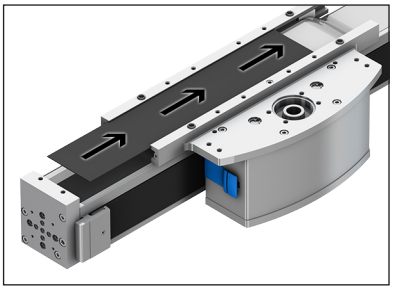
2. Put on the cover strip ➔ The cover strip lies on the bottom belt reversals.



3. Push the cover strip into the slots of the end cap (2x).

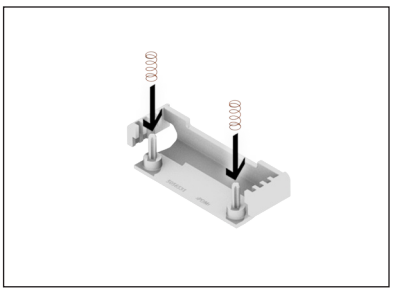


4. Push the cover plate, with the matt side facing upwards, into the slide module.



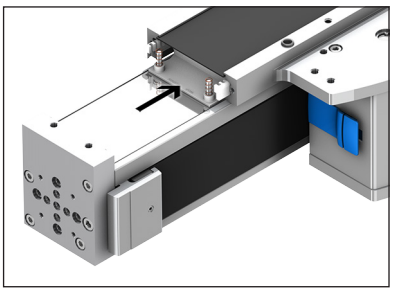
At the top belt reversals:

- the ELCC-TB-KF-60 has **one** compression spring mounted on each.
- the ELCC-TB-KF-70 / 90 / 110 has **two** compression springs mounted on each.

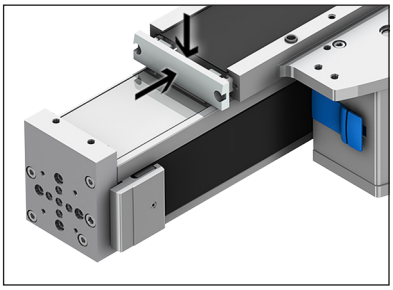


5. Place the compression springs (2x) on the trunnion (2x) of the top belt reversals (2x).

6. Position the top belt reversals (2x) on the right and left of the slide module.



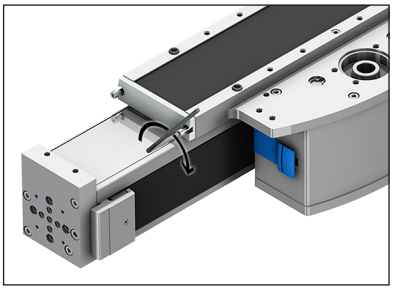
7. Position the cover cap in the correct position on the compression springs.
8. Push down the compression springs by pressing the cover cap.
9. Push the cover cap with top belt reversal completely into the slide module.
10. Repeat steps for second cover cap.



11. Clean socket head screws (2x) to remove locking agent.
12. Wet the socket head screws (2x) with locking agent.
13. Screw the socket head screws (2x) through the cover cap and tighten to the appropriate tightening torque (➔ Table).

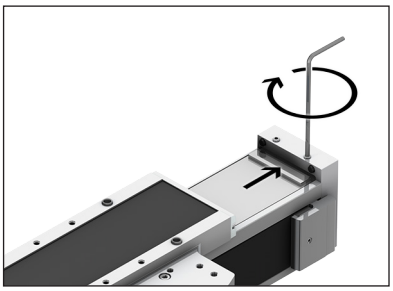
Type	Tightening torque
ELCC-TB-KF-60	1.2 Nm ± 10 %
ELCC-TB-KF-70	1.2 Nm ± 10 %
ELCC-TB-KF-90	1.2 Nm ± 10 %
ELCC-TB-KF-110	1.2 Nm ± 10 %

14. Repeat steps for second cover cap.

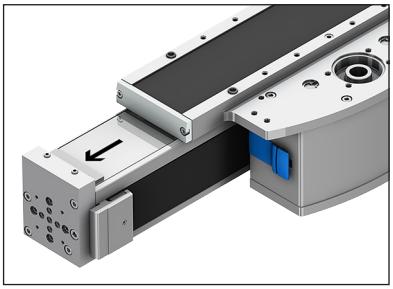


15. Push the cover strip into the slot of an end cap until it stops.
16. Place the clamping plate on the cover strip and push into the slot of the end cap.
17. Clean the grub screws (2x) to remove thread locking agent.
18. Wet the grub screws (2x) with locking agent.
19. Screw the grub screws (2x) into the end cap and tighten to the appropriate tightening torque (➔ Table).

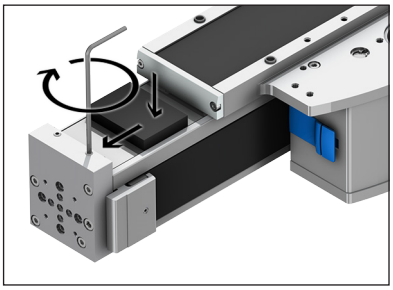
Type	Tightening torque
ELCC-TB-KF-60	6 Nm ± 10 %
ELCC-TB-KF-70	6 Nm ± 10 %
ELCC-TB-KF-90	6 Nm ± 10 %
ELCC-TB-KF-110	6 Nm ± 10 %



20. Push the cover strip into the slot of the second end cap until it stops.
21. Place the clamping plate on the cover strip and push into the slot of the end cap.



22. Clean the grub screws (2x) to remove thread locking agent.
23. Wet the grub screws (2x) with locking agent.
24. Screw the grub screws loosely into the end cap. The cover strip may not be fixed in place.
25. Select the suitable clamping element depending on the axis size (➔ Table and Chapter 8.2 on page 50).



Type	Clamping element
ELCC-TB-KF-60	EADT-S-L5-70 (use crosswise)
ELCC-TB-KF-70	EADT-S-L5-90 (use lengthwise or crosswise)
ELCC-TB-KF-90	EADT-S-L5-90 (use lengthwise or crosswise)
ELCC-TB-KF-110	EADT-S-L5-120 (use crosswise)

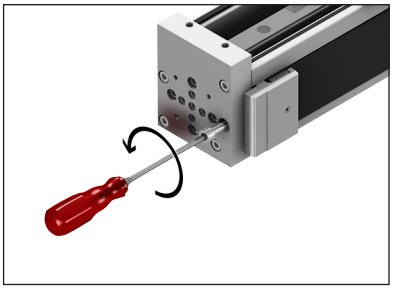
26. Place the clamping element in the correct position on the cover strip.
27. Press the clamping element onto the cover strip and at the same time, push the cover strip into the slot in the end cap.
28. Tighten the grub screws (2x) in the end cap to the appropriate tightening torque (➔ Table).

Type	Tightening torque
ELCC-TB-KF-60	6 Nm ± 10 %
ELCC-TB-KF-70	6 Nm ± 10 %
ELCC-TB-KF-90	6 Nm ± 10 %
ELCC-TB-KF-110	6 Nm ± 10 %

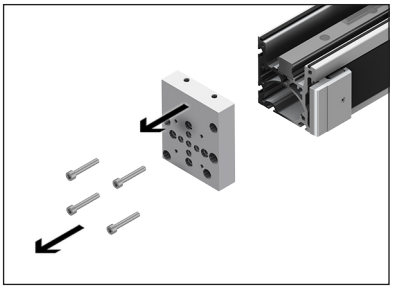
29. Move the cylinder barrel module to check whether the cover strip is firmly in place. The cover strip may not make contact with the inside top of the slide.
30. If the cover strip undulates, push the cover strip further into the end cap.

5.5 Dismantling the end cap

1. Carry out preparatory work (➔ Chapter 4.2 on page 23).
2. **Only for cantilever axes with feature P9**
   Remove cover strip from the end cap (➔ Chapter 5.4.1 on page 35).
3. Unscrew the socket head screw of the clamping from the end cap.



4. Unscrew the self-tapping screws (4x) from the end cap.

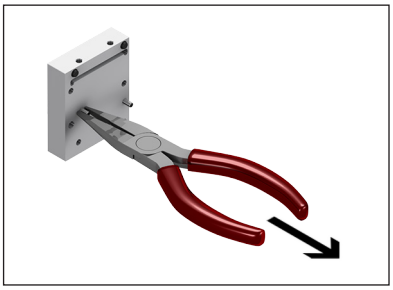


The end caps are connected to the cylinder barrel via grub screws (2x each). A certain amount of force is required to pull it off.

After they have been dismantled from the end cap, however, there may also be grub screws in the cylinder barrel.

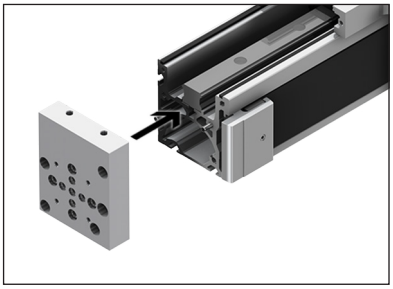
5. Remove the end cap.

6. If necessary, use pliers to pull out grub screws (2x each) and replace.
7. Dismantle the second end cap in the same way as the first.

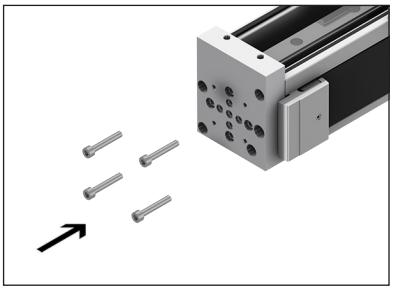


5.6 Mounting the end cap

The end cap is centred with the cylinder barrel via two grub screws. A certain amount of force may need to be applied for assembly.

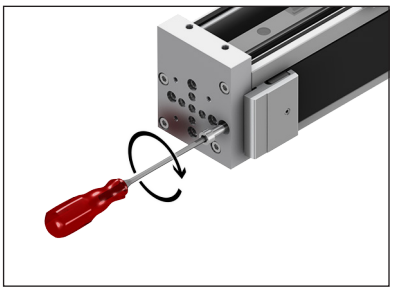


1. Position the end cap on the grub screws (2x) in the cylinder barrel.



2. Screw in self-tapping screws (4x) and tighten to the appropriate tightening torque (➔ Table).

Type	Tightening torque
ELCC-TB-KF-60	6 Nm ± 10 %
ELCC-TB-KF-70	6 Nm ± 10 %
ELCC-TB-KF-90	11 Nm ± 10 %
ELCC-TB-KF-110	22 Nm ± 10 %

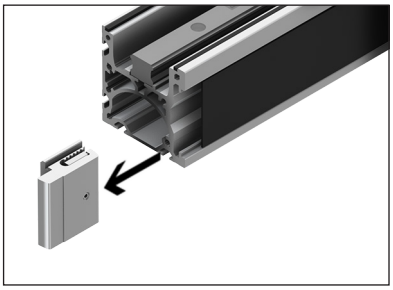


3. Screw in the socket head screw of the clamping and tighten slightly.
4. Mount the second end cap in the same way as the first.
5. **Only for cantilever axes with feature P9**
   Mount the cover strip (➔ Chapter 5.4.2 on page 36).
6. Adjust the toothed belt pretension (➔ Chapter 5.1.4 on page 31).

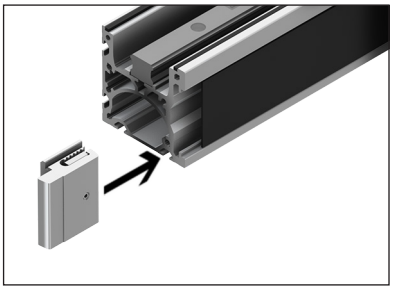
5.7 Replacing the clamping component module

1. Carry out preparatory work (➔ Chapter 4.2 on page 23).
2. Remove the toothed belt from the clamping component modules (➔ Chapter 5.1.1 on page 25).
3. **Only for cantilever axes with feature P9**
   Remove cover strip from the end cap (➔ Chapter 5.4 on page 35).
4. Dismantle end cap (➔ Chapter 5.5 on page 39).

5. Pull the clamping component module out of the cylinder barrel module.



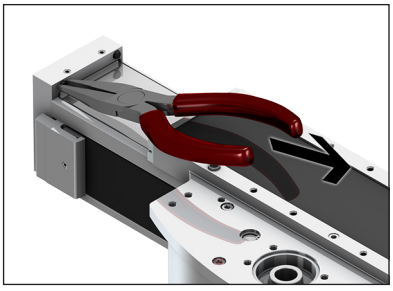
6. Push the new clamping component module into the cylinder barrel module.



7. Mount end cap (➔ Chapter 5.6 on page 40).
8. **Only for cantilever axes with feature P9**
   Mount the cover strip (➔ Chapter 5.9 on page 41).
9. Mount toothed belt (➔ Chapter 5.1.2 on page 27).
10. Adjust the toothed belt pretension (➔ Chapter 5.1.4 on page 31).

5.8 Replacing buffer elements

1. Use pliers to pull out the buffer elements.
2. Insert the new buffer elements.



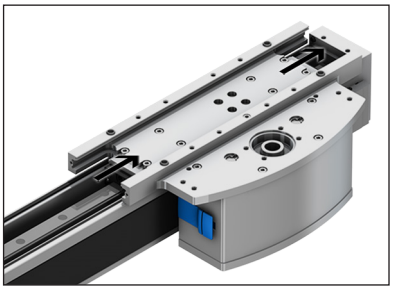
5.9 Replacing magnetic strips on cylinder barrel module (only with feature P9)

Magnetic strips of cantilever axes with a short stroke cannot be replaced.

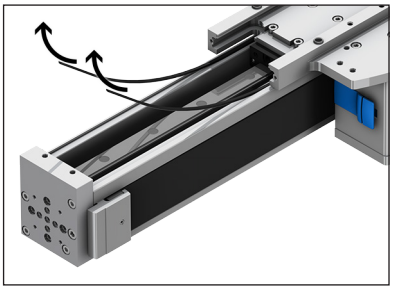
5.9.1 Removing old magnetic strips

1. Carry out preparatory work (➔ Chapter 4.2 on page 23).
2. Remove cover strip from the end cap (➔ Chapter 5.4.1 on page 35).

3. Push the slide module up to the stop at one end cap.

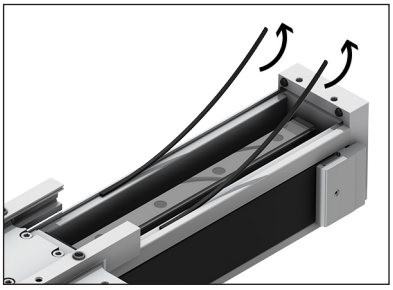


4. Carefully remove the magnetic strips (2x) up to the slide module, do not use sharp-edged tools.
5. Use a suitable tool to cut off loose parts of the magnetic strips (2x).



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

6. Carefully remove residues of the adhesive tapes (2x) from the cylinder barrel module; do not use sharp-edged tools.
7. Push the slide module up to the stop at the other end cap.
8. Remove remaining pieces of the magnetic strips (2x), do not use sharp-edged tools.



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

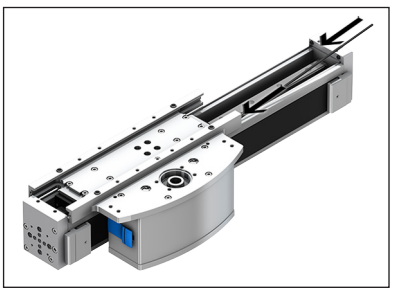
9. Carefully remove residues of the adhesive tapes (2x) from the cylinder barrel module; do not use sharp-edged tools.

5.9.2 Sticking on new magnetic strips

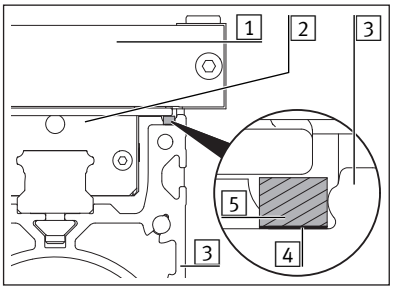
Note

- 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).

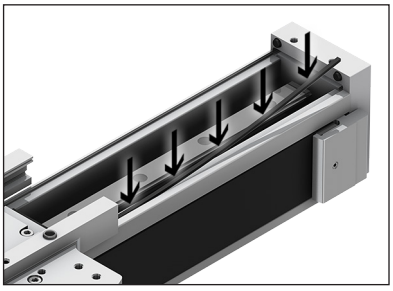
1. Stick one adhesive tape (2x) each onto the **wide** side of the magnetic strips (2x), do **not** pull off the protective film of the adhesive tapes (2x).
2. Push the magnetic strip with adhesive tape in the rebate of the cylinder barrel module under the slide module.



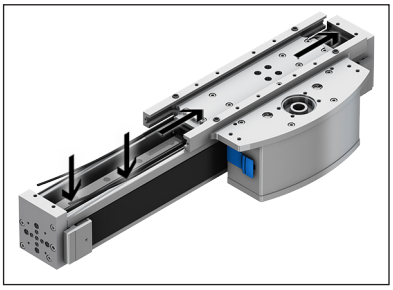
3. Align the magnetic strip with adhesive tape, the protective film faces downwards.
4. Pull the protective film off the adhesive tape **only** up to the slide module, the magnetic strip with adhesive tape may not by pulled out beyond the bottom of the slide module. Starting at the end cap, stick on the adhesive tape [4] with the magnetic strip [5] in the rebate of the cylinder barrel module [3].
   - [1] Slide module
   - [2] Roller carriage
   - [3] Cylinder barrel module
   - [4] Adhesive tape
   - [5] Magnetic strip



5. Firmly press on magnetic tape with adhesive tape.
6. Cut off the protective film at the slide module.
7. Repeat the procedure on the other side of the cylinder barrel module.



8. Push the slide module up to the stop at the other end cap.
9. Pull off the remaining protective film from the adhesive tape.
10. Stick on the adhesive tape with the magnetic strip in the rebate of the cylinder barrel module up to the end cap.
11. Firmly press on magnetic tape with adhesive tape.
12. Repeat the procedure on the other side of the cylinder barrel module.



13. Mount the cover strip (➔ Chapter 5.4.2 on page 36).

5.10 Replacing the measuring tape of the displacement encoder of the ELCC-TB-KF-60 / 70-...-M1

Note

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

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

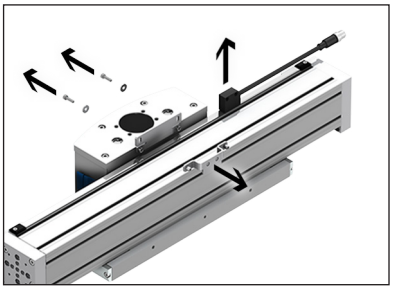
Note

Reduced system accuracy due to external magnetic fields.

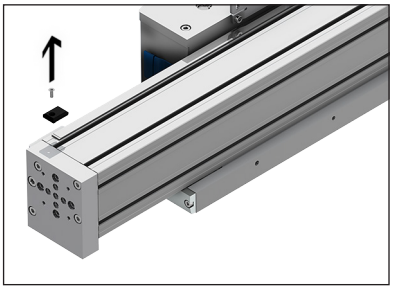
- Avoid external magnetic fields (> 1 mT) at the sensor.

5.10.1 Removing the old measuring tape

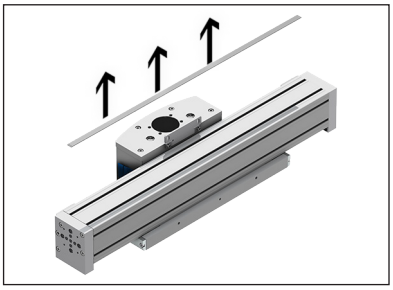
1. Dismantle the sensor mounting with the measuring unit from the end plate.



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



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



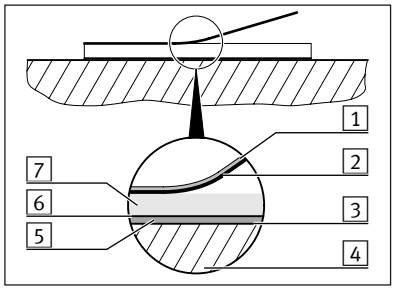
Typical solvents for cleaning surfaces are a 50 / 50 isopropyl-alcohol / water mixture or heptane.

5.10.2 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

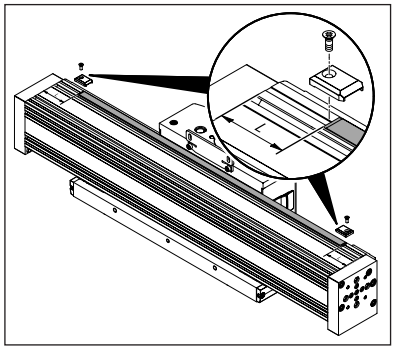


1 Cover strip
2 Adhesive tape
3 Adhesive tape
4 Cylinder barrel module
5 Steel strip
6 Adhesive tape
7 Magnetic strip

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

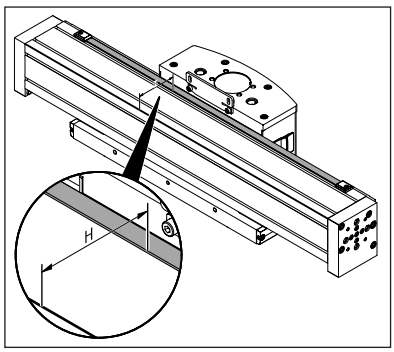
7. Stick the adhesive tape 3 onto the steel strip (= carrier side) 5.

8. Adjust the magnetic strip with the steel strip to the middle of the cylinder barrel module. A size-specific distance **L** from the ends of the cylinder barrel module must be maintained (➔ Table):



Type	Distance **L** to the end cap
ELCC-TB-KF-60	44 mm
ELCC-TB-KF-70	49 mm

9. Adjust the magnetic tape with the steel strip on the cylinder barrel with a size-specific distance **H** from the front edge (= from the cylinder barrel edge facing away from the drive head) of the cylinder barrel module (➔ Table):



Type	Distance **H** to the front edge of the cylinder barrel module
ELCC-TB-KF-60	39.5 mm
ELCC-TB-KF-70	60.5 mm

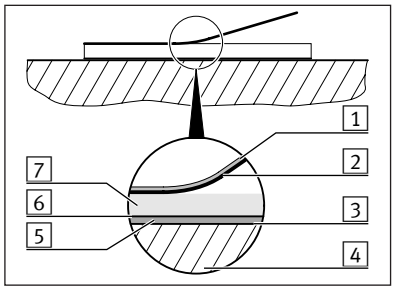
10. Stick the magnetic strip on the cylinder barrel module.

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.

11. Stick the adhesive tape 2 onto the cover strip 1.

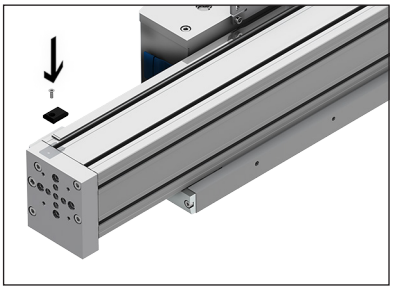
It does not matter on which side of the cover strip the adhesive tape is attached.

12. Stick the cover strip 1 with adhesive tape 2 onto the magnetic strip 7.



13. Place the caps (2x) on the ends of the measuring tape.
14. Clean the countersunk screws (2x) to remove locking agent.
15. Wet the countersunk screws (2x) with locking agent.
16. Screw the countersunk screws (2x) into the cylinder barrel module and tighten to appropriate tightening torque (➔ Table).

Type	Tightening torque
ELCC-TB-KF-60	0.15 Nm ± 10 %
ELCC-TB-KF-70	0.15 Nm ± 10 %



17. Mount the sensor mounting with the measuring unit on the end plate as described in the “Displacement encoder system ELCC-...-M1” operating instruction (➔ Chapter 1.1 on page 6, ➔ www.festo.com).
18. Comply with the tolerances for the distance and angle of the measuring unit with the measuring tape (➔ Chapter 5.10.3 on page 46).

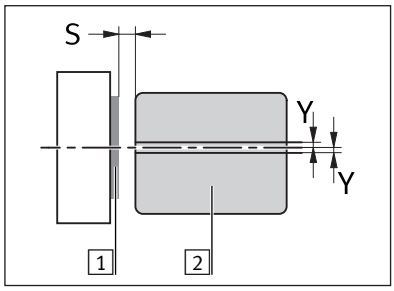
If these tolerances are not complied with, the measuring unit must be realigned.

19. Undo the socket head screws of the sensor mounting.
20. Align the measuring unit correctly (➔ Chapter 5.10.3 on page 46).
21. After aligning, tighten the socket head screws of the sensor mounting to 3.4 Nm ± 20 %.

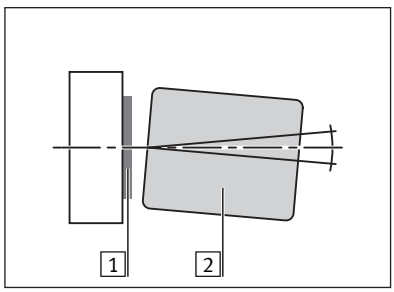
5.10.3 Aligning the measuring unit with the measuring tape

- 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:

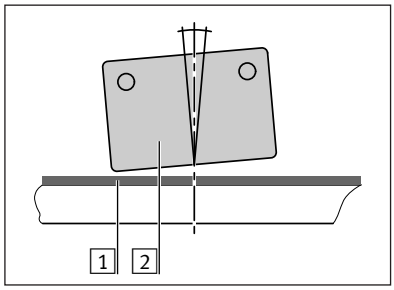
– On assembly, the measuring unit [2] must be set with a distance **S** of 0.1 mm to 2 mm from the magnetic strip [1].
– The offset **Y** of the measuring unit from the horizontal middle axis of the magnetic strip [1] may not exceed 2.5 mm.



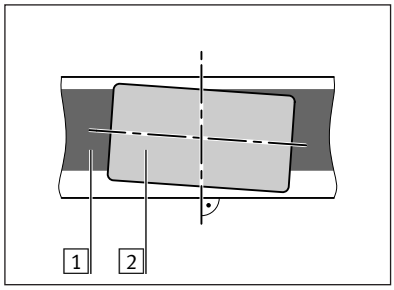
– The inclination between the measuring unit [2] and the magnetic strip [1] may not exceed ± 5°.



– 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] may not exceed ± 1.5°.



5.11 Functional test and commissioning

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

5.12 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 Checking PU1 toothed belt

For cantilever axis ELCC-...-PU1:

- Check the toothed belt for wear, e.g. toothed belt abrasion, after 1000 km operating distance and then every 500 km operating distance (➔ Chapter 4.1 on page 22).
- If there are indications of toothed belt wear:
  – replace toothed belt (➔ Chapter 5 on page 24). On replacing the toothed belt due to long operation, it is useful to replace the toothed belt pulley module including deep-groove ball bearings at the same time (➔ www.festo.com/spareparts).

6.2 Checking the cover strip

- Check the cover strip every 2000 km operating distance.
  Ripples on the cover strip are a sign of belt reversal wear.
- If ripples form, retighten the cover strip on both sides (➔ Chapter 5.9 on page 41).

If the cover strip can no longer be retensioned:

- Replace the belt reversal and cover strip (➔ www.festo.com/spareparts).

6.3 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.

6.4 Relubricating the recirculating ball bearing guide

Note

Two lubricants are available for lubrication of the recirculating ball bearing guide of the roller bearing:

– Mineral-based lubricant (Festo LUB-KC1)

– NSF-H1 lubricant (“food grease” ELKALUB-VP 922)

The two lubricants are not miscible and can decompose each other, in the worst case this can cancel out the lubrication and thus irreparably damage the axis.

- Relubricate with the same lubricant used to lubricate the roller carriages for delivery.

Lubrication notes and information (➔ ELCC-TB-KF operating instructions; www. festo.com).

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

Type	Lubricant
ELCC-TB-KF	Festo LUB-KC1
ELCC-TB-KF-...-**F1** (for PU1 toothed belt)	ELKALUB-VP 922

All other lubricated parts of the cantilever axis are equipped with lifetime lubrication.

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 (➔ ELCC-TB-KF 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)

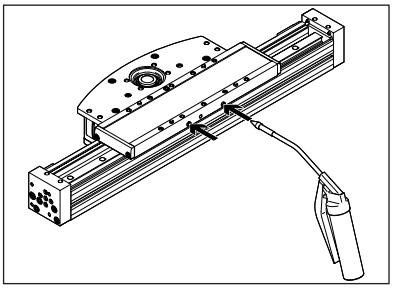
– Ambient temperature > 40 °C

– 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.

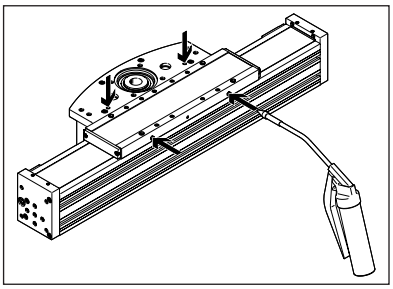
ELCC-TB-KF-60-...

- Add the lubricant in the two lubrication nipples at the front of the slide; note the quantity of grease per lubrication nipple (➔ Table).



ELCC-TB-KF-70 / 90 / 110-...

- Add lubricant in the two lubrication nipples at the front of the slide or via the two lubrication holes on the drive mounting area of the slide plate (In the as-delivered condition, these lubrication holes are sealed by a grub screw.), note the quantity of grease per lubrication nipple (➔ Table).



	ELCC-TB-KF-60	ELCC-TB-KF-70	ELCC-TB-KF-90	ELCC-TB-KF-110
Roller carriage grease quantity **per** lubrication nipple	1.7 g	5 g	7.5 g	11.2 g

Festo offers a one-hand, high-pressure grease gun with suitable pointed nozzle for lubricating the lubrication nipples (➔ Chapter 8.2 on page 50).

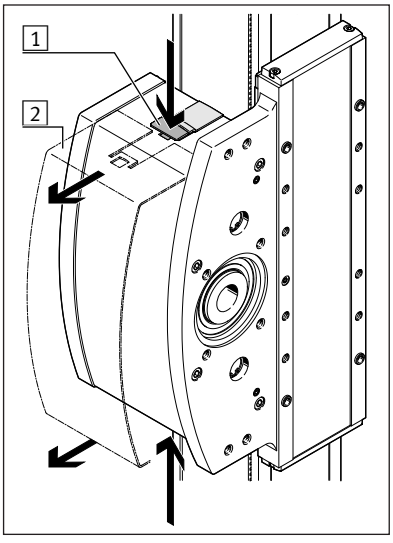
7 Cleaning

Note

- Do not clean the guide elements (e.g. guide rails).
- 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.

If necessary, remove housing and clean the drive.

- At the same time, push in the locking clip [1] at both ends of the housing and pull off the housing [2].



8 Tools and equipment

This section provides an overview of the tools and aids required to repair and maintain the cantilever axis.

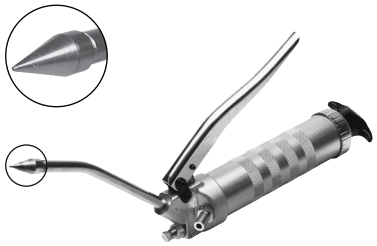
8.1 Standard tools

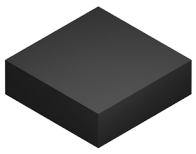
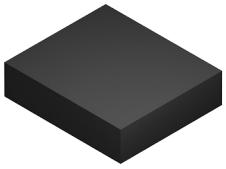
The following standard tools are required for the repair and maintenance of the cantilever axis:

- Phillips screwdriver
- Torx screwdriver
- Allen key
- Torque spanner/torque screwdriver
- Screwdriver set
- Work scissors

8.2 Special tools

The following special tools are required for repair and maintenance of the cantilever 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	
Clamping element EA-DT-S-L5-70	suitable for ELCC-TB-KF-60	8058451	
Clamping element EA-DT-S-L5-90	suitable for ELCC-TB-KF-70 / 90	8097157	
Clamping element EA-DT-S-L5-120	suitable for ELCC-TB-KF-110	8058450	

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 Measuring devices

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

Designation Order No.	Description	Figure
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.	

Designation Order No.	Description	Figure
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 frequency meter TB-TE-EQ13, please **contact** your **local support**.

9 Liability

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c) With the exception of the Festo logo, the user has the right to use pictures and texts from the electronic documentation for creating his own machine and system documentation. The use of the Festo logo requires written consent from Festo. The user is responsible for ensuring that the pictures and texts used match the machine/system or the product.

d) Further uses are permitted within the following framework:

Copying exclusively for use within the framework of machine and system documentation from electronic documents of all documented supplier components. Demonstrating to third parties exclusively under guarantee that no data material is stored wholly or partly in other networks or other data storage devices or can be reproduced there.

Passing on printouts to third parties not covered by the regulation in item 3, as well as any processing or other use are not permitted.

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 SE & Co. KG, D-73734 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.