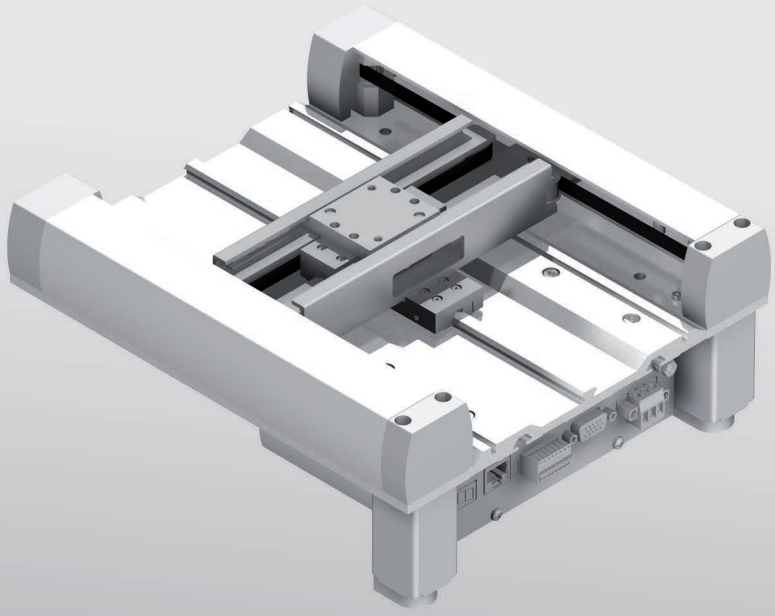
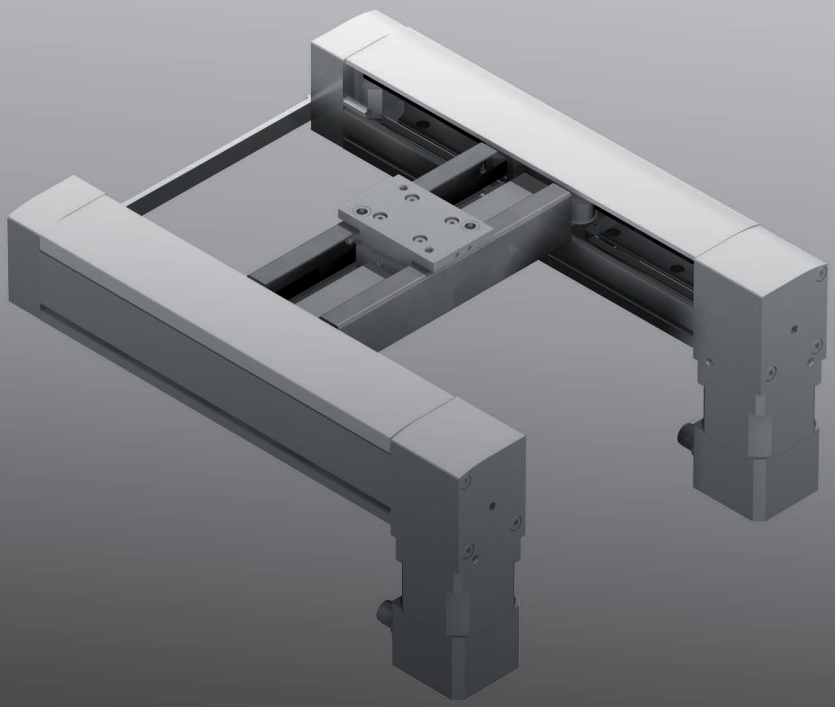
Planar surface gantry

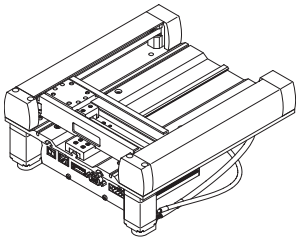
EXCM-10 / 30

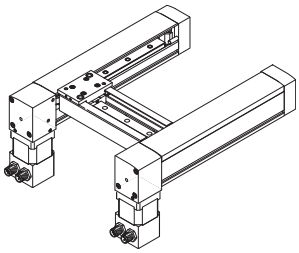
FESTO

Repair instructions (en)









7EXCMc_en

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Foreword

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

The descriptions in these repair instructions may deviate depending on the design and/or modification status of the planar surface gantries. The user must check this prior to carrying out the repair and take the deviations into consideration if necessary.

These repair instructions have been prepared with care.

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

Further information is given in Chapter 8 on page 51.

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

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Table of Contents

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Table of Contents

1 Important information

1.1 About these repair instructions

This document contains important information about the professional repair of planar surface gantries of the type EXCM.

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

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

For reasons of clarity, these repair instructions do not contain all detailed information. The following documents should therefore also be available while performing repair work on the planar surface gantry:

- **Description of "mechanical installation"**
  Describes how to mount, install and dismantle the respective planar surface gantry. It can be found on the Festo website (➔ www.festo.com/sp).
- **"Commissioning" description**
  Describes the functions, the electrical installation, the commissioning using the FCT, the operation, the control principle and the procedure for error diagnostics for planar surface gantries. It can be found on the Festo website (➔ www.festo.com/sp).
- **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 tools (e.g. lubricants, locking agent), special tools, schematic diagrams, fixtures, measuring devices, etc. The information brochure 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

Caution

Marking special information

The following symbols identify text passages which contain special information.

Note

Information

Environment

1.3 Text designations used in these repair instructions

- Activities that can be carried out in any order.

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

– General lists.

➔ Reference to further information.

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

1.4 General safety instructions

Danger

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

– The planar surface gantry must be de-energised, depressurised and reliably secured against unauthorised reactivation before the maintenance and repair work begins.

Caution

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

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

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

Caution

Unintended switching on can trigger unexpected movements and cause bruises.

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

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

Note

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

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

Festo recommends use of LOCTITE 243 thread locking agent.

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

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

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

1.5 Technical requirements

Note

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

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

1.6 Standards and test values

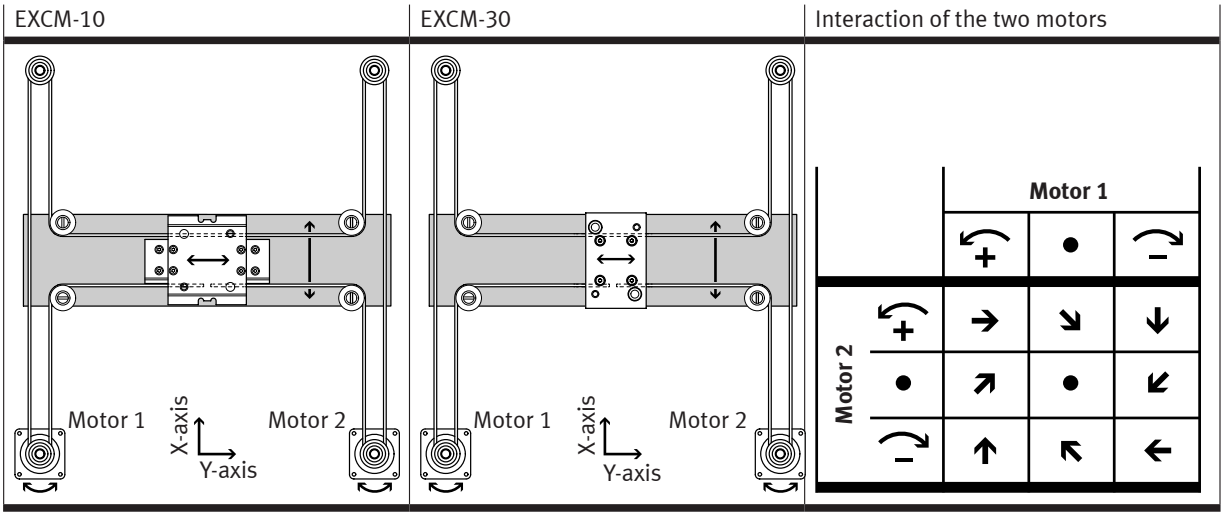
Standards and test values which products comply with and fulfil can be found in the “Technical data” sections of the enclosed documentation.

2 General product description

2.1 Functional description

The EXCM-10 and EXCM-30 are compact planar surface gantries, whose slides can be moved freely in a 2-dimensional space (X-Y-axis).

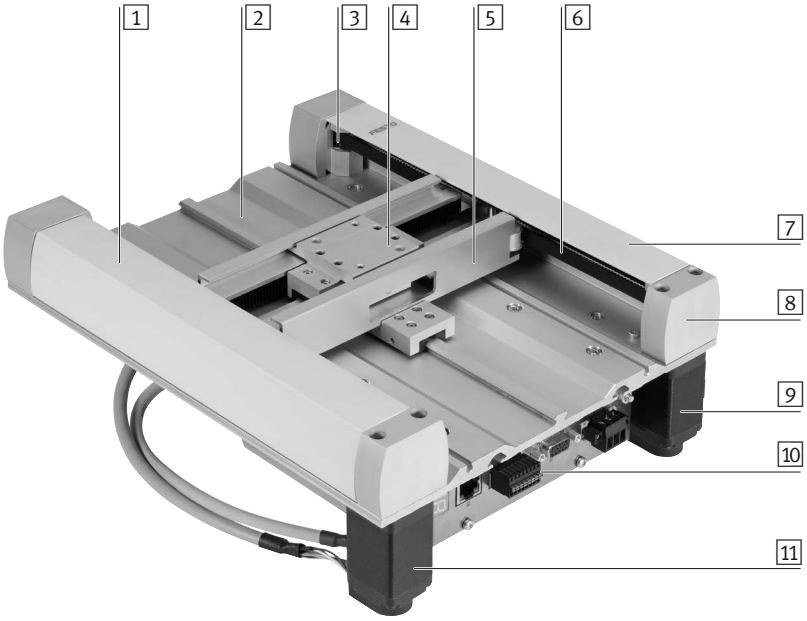
The slides are driven in position-controlled operation via two fixed stepper motors. The motors and the slide are coupled to a toothed belt. The toothed belt is guided via pulleys so that the slide can move to any position within the working space. This drive concept results in a very low moving mass.



2.2 Design of the planar surface gantries

2.2.1 EXCM-10

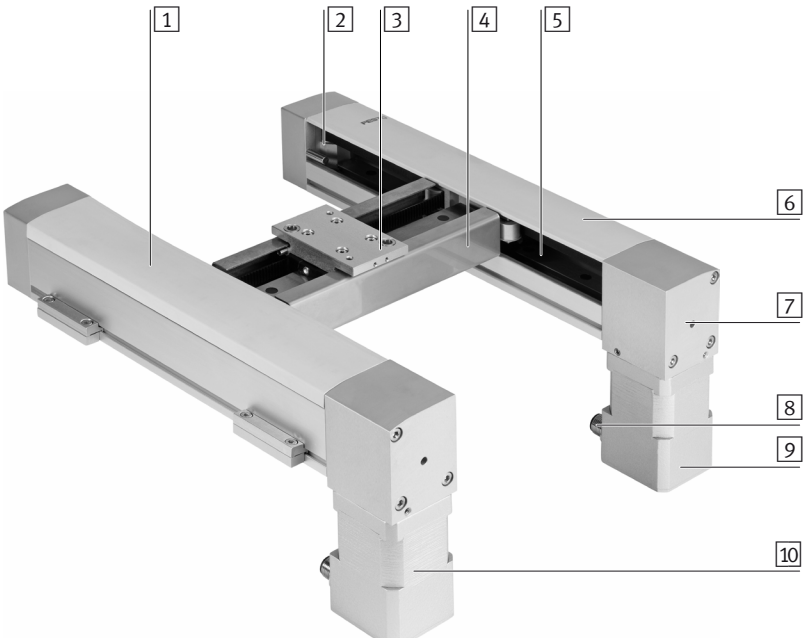
This illustration provides you with an overview of the design of the planar surface gantry EXCM-10.



1 Cover, left
2 Baseplate
3 Guide pulley
4 Slide
5 Y-traverse
6 Toothed belt
7 Cover, right
8 Actuator end cap
9 Motor 2
10 Controller
11 Motor 1

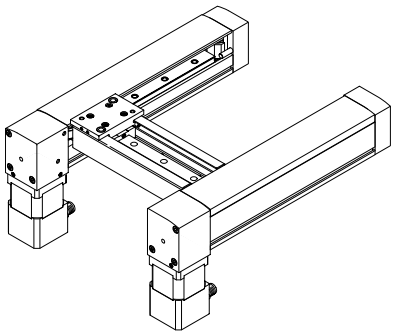
2.2.2 EXCM-30

This illustration provides you with an overview of the design of the planar surface gantry EXCM-30.



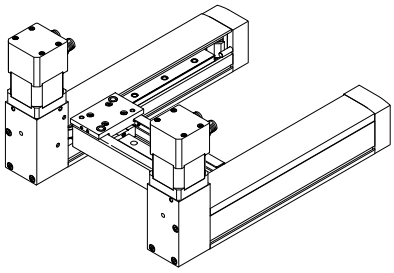
1 Cover, left
2 Guide pulley
3 Slide
4 Y-traverse
5 Toothed belt
6 Cover, right
7 Drive cover (motor 2)
8 Cable outlet
9 Motor 2
10 Motor 1

2.2.2.1 Motor mounting variants EXCM-30



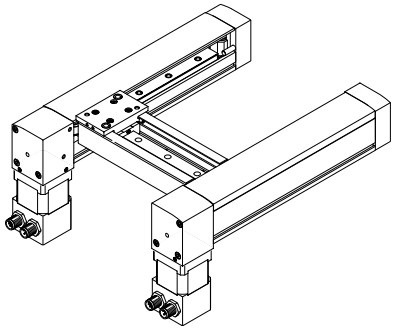
EXCM-30-...-...-KF-...-**B1**-...

– Motor is flange mounted underneath
– Cable outlet at front



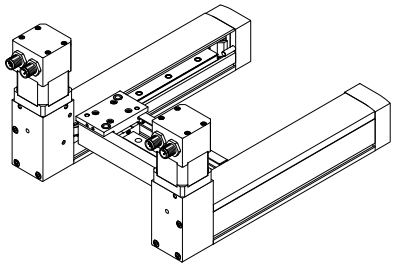
EXCM-30-...-...-KF-...-**T1**-...

– Motor is flange mounted at the top
– Cable outlet at front



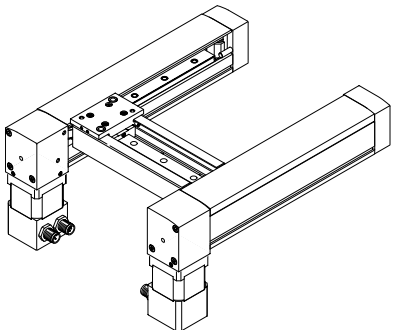
EXCM-30-...-...-KF-...-**B2**-...

– Motor is flange mounted underneath
– Cable outlet at rear



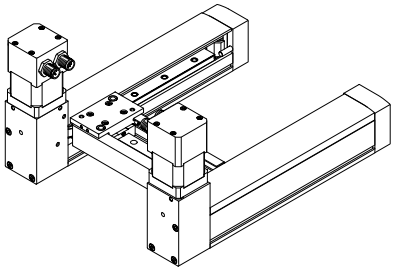
EXCM-30-...-...-KF-...-**T2**-...

– Motor is flange mounted at the top
– Cable outlet at rear



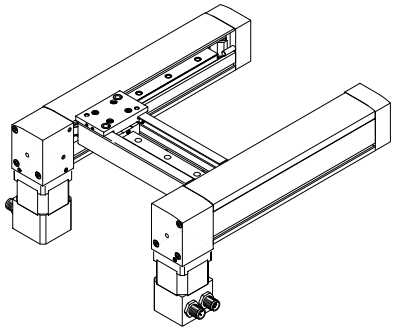
EXCM-30-...-...-KF-...-**B3**-...

– Motor is flange mounted underneath
– Cable outlet inside



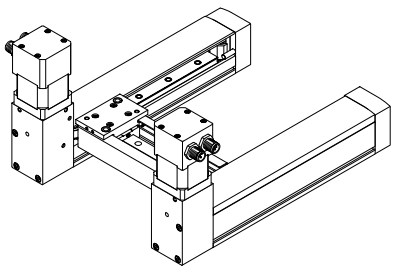
EXCM-30-...-...-KF-...-**T3**-...

– Motor is flange mounted at the top
– Cable outlet inside



EXCM-30-...-...-KF-...-**B4**-...

– Motor is flange mounted underneath
– Cable outlet outside



EXCM-30-...-...-KF-...-**T4**-...

– Motor is flange mounted at the top
– Cable outlet outside

2.3 Sizes and part numbers

2.3.1 EXCM-10

Size	Part number
EXCM-10-150-110-GF-ST-B-E1	1801920
EXCM-10-260-110-GF-ST-B-E1	1801915
EXCM-10-300-110-GF-ST-B-E1	1801917
EXCM-10-360-110-GF-ST-B-E1	1801918
EXCM-10-460-110-GF-ST-B-E1	1801916
EXCM-10-700-110-GF-ST-B-E1	1801919

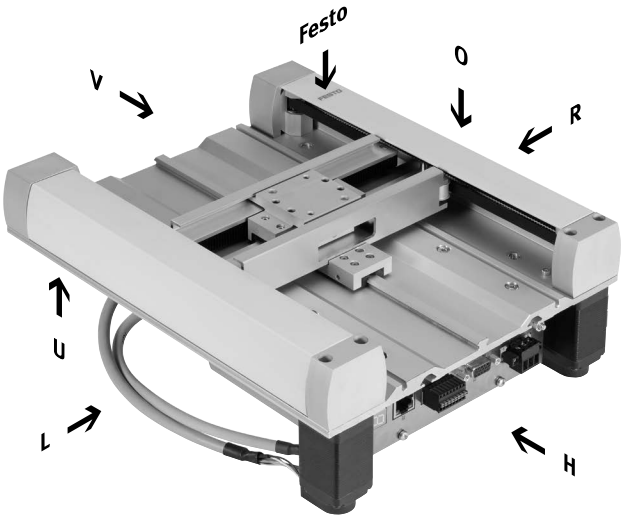
2.3.2 EXCM-30

Size	Part number
EXCM-30-...	2226101

2.4 Orientation designations

2.4.1 EXCM-10

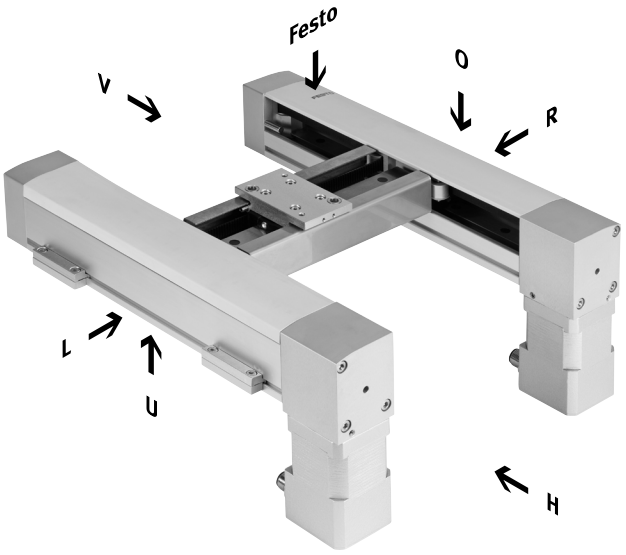
This illustration provides an overview of the orientation designations for the planar surface gantry EXCM-10.



Festo logo	=	reference point
O	=	top
U	=	bottom
R	=	right
L	=	left
V	=	front
H	=	rear

2.4.2 EXCM-30

This illustration provides an overview of the orientation designations for the planar surface gantry EXCM-30.



Festo logo	=	reference point
O	=	top
U	=	bottom
R	=	right
L	=	left
V	=	front
H	=	rear

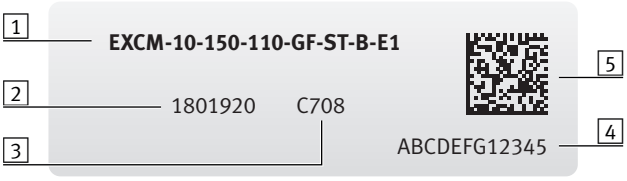
2.5 Type code

The features of a planar surface gantry can be determined with the help of the product labelling on the planar surface gantry. The Festo logo and the product labelling are attached separately to the planar surface gantry. The product labelling for both sizes is located on the drive cover. The order code describes the planar surface gantry's features, separated by a hyphen "-".

A list and description of all possible equipment features of the planar surface gantry can be found in the data sheet, It is available on the Festo website (➔ www.festo.com).

2.5.1 EXCM-10

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:

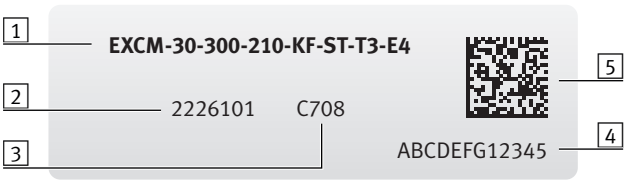
EXCM	Electric planar surface gantry
10	Size, slide load max. 0.5 kg
150	150 mm stroke of the X-axis
110	110 mm stroke of the Y-axis
GF	Plain-bearing guide of the X- and Y-axis
ST	Stepper motor with encoder function
B	Motor flange mounted downwards
E1	Controller flange mounted on the portal

Key features of the planar surface gantry EXCM-10

Planar surface gantry feature	Code	Specification
Type	EXCM	Electric planar surface gantry
Size	10	Specification of the max. payload at max. dynamic response, approx. 0.5 kg
Work area	Stroke of the X-axis	150 mm, 260 mm, 300 mm, 360 mm, 460 mm, 700 mm
	Stroke of the Y-axis	110 mm
Guide	GF	Plain-bearing guide of the X- and Y-axes
Motor type	ST	Stepper motor with encoder function
Motor attachment position	B	Motor flange mounted downwards
Controller	E1	Controller flange mounted on the portal

2.5.2 EXCM-30

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:

EXCM	Electric planar surface gantry
30	Size, slide load max. 3 kg
300	300 mm stroke of the X-axis
210	210 mm stroke of the Y-axis
KF	Recirculating ball bearing guide of the X- and Y-axis
ST	Stepper motor with encoder function
T3	Motor flange mounted upwards, cable outlets to the inside
E4	with controller, motor and encoder cables (1.5 m)

For the X-axis stroke lengths, fixed and variable stroke lengths are available, see the table below.

Key features of the planar surface gantry EXCM-30

Planar surface gantry feature	Code	Specification
Type	EXCM	Electric planar surface gantry
Size	30	Specification of the max. load of the slide, approx. 3 kg
Work area	Stroke of the X-axis	100 mm, 150 mm, 200 mm, 300 mm, 400 mm, 500 mm (fixed stroke length) 90 mm ... 700 mm (variable stroke lengths)
	Stroke of the Y-axis	110 mm, 160 mm, 210 mm, 260 mm, 310 mm, 360 mm, 410 mm, 460 mm, 510 mm (fixed stroke lengths) 110 mm ... 510 mm (variable stroke lengths)
Guide	KF	Recirculating ball bearing guide of the X- and Y-axes
Motor type	ST	Stepper motor
	SB	Stepper motor with brake function
	W	Without stepper motor
Motor attachment position	B	bottom
	B1	bottom, cable outlets to the front
	B2	bottom, cable outlets to the rear
	B3	bottom, cable outlets to the inside
	B4	bottom, cable outlets to the outside
	T	top
	T1	top, cable outlets to the front
	T2	top, cable outlets to rear
	T3	top, cable outlets to the inside
	T4	top, cable outlets to the outside
Protection against particles	–	Standard
	P8	Protected version
Controller	–	without controller
	E2	with controller, motor and encoder cables (0.5 m)
	E3	with controller, motor and encoder cables (1 m)
	E4	with controller, motor and encoder cables (1.5 m)
	E5	with controller, motor and encoder cables (2 m)

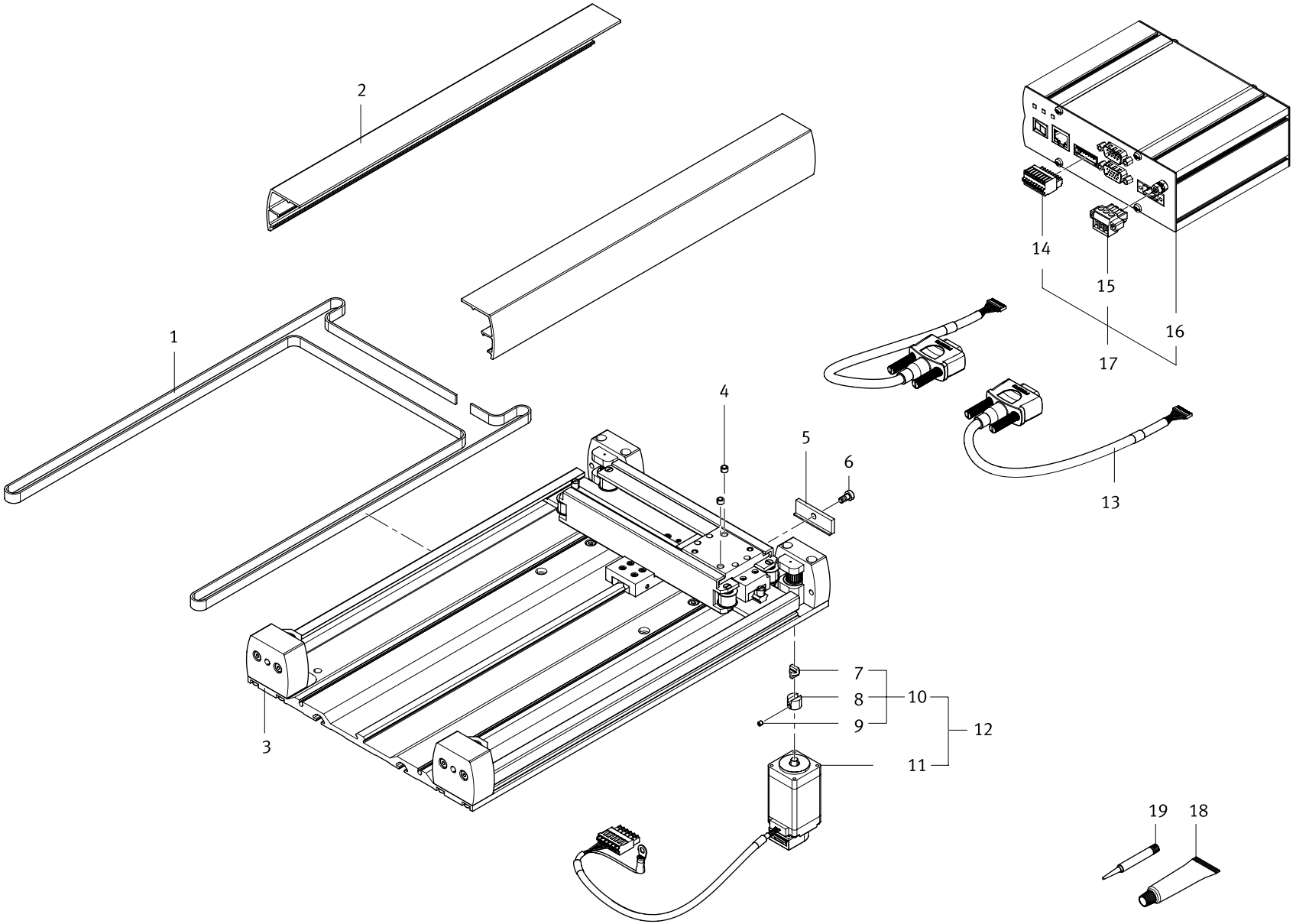
3 Component overviews with bill of materials

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

Size	Series	Components list	Bill of materials
EXCM-10	all	➔ Chapter 3.1 on page 16	➔ Chapter 3.1.1 on page 17
EXCM-30	up to H7 / July 2016	➔ Chapter 3.2 on page 18	➔ Chapter 3.2.1 on page 19
EXCM-30	from H8 / August 2016	➔ Chapter 3.3 on page 20	➔ Chapter 3.3.1 on page 21
EXCM-30-...-P8	from H8 / August 2016	➔ Chapter 3.4 on page 22	➔ Chapter 3.4.1 on page 23

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

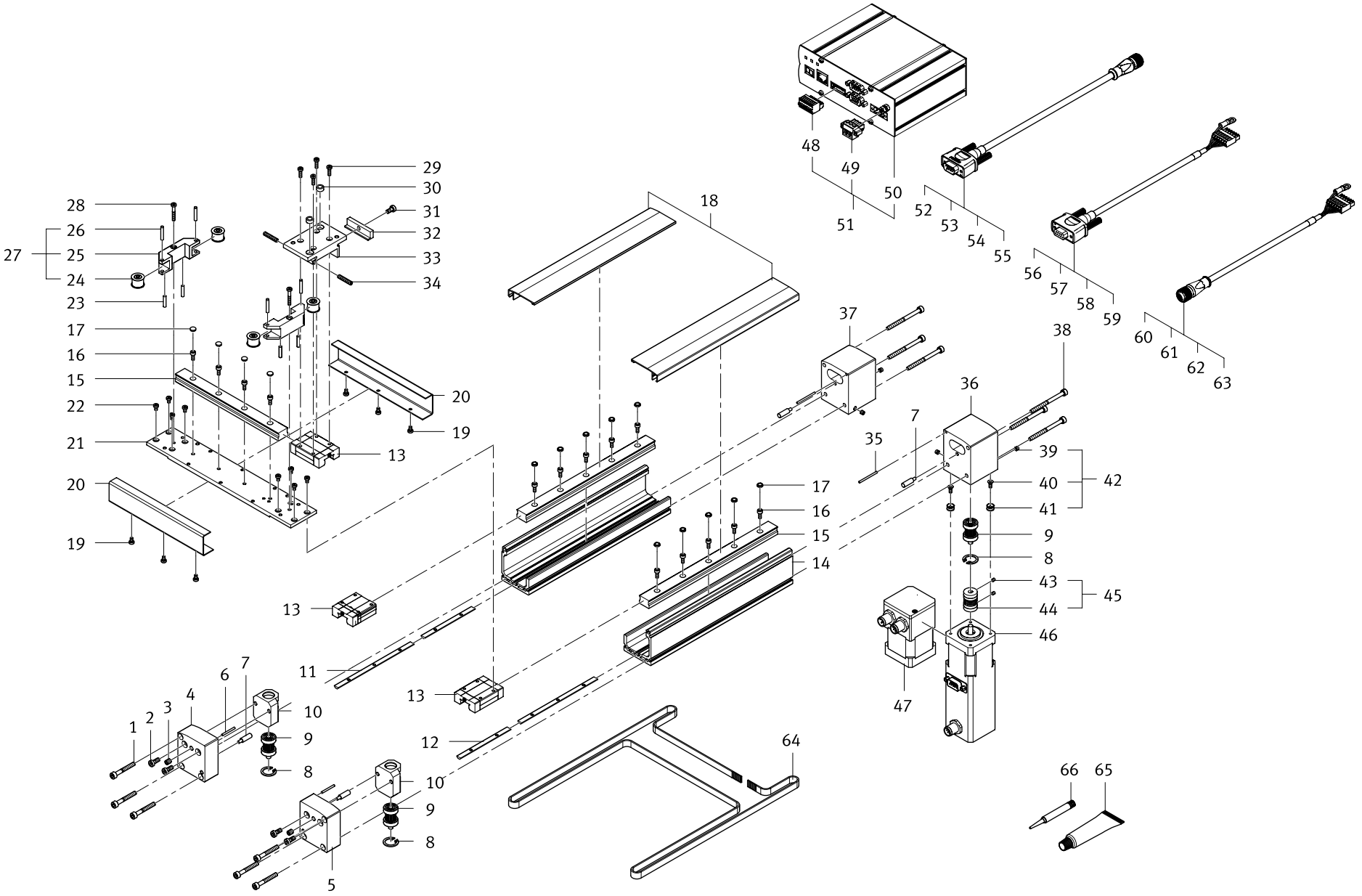
3.1 EXCM-10 components overview



3.1.1 EXCM-10 bill of materials

No.	Designation, type
1	Toothed belt
2	Cover
3	Baseplate
4	Centring sleeve
5	Clamping plate
6	Socket head screw, DIN 6912-M4×8-8.8
7	Ring gear
8	Coupling piece
9	Threaded pin, DIN 913-M3×3-45H
10	Couplings
11	Stepper motor, EMMS-ST-28-L-SE-G3
12	Motor unit
13	Encoder cable, NEBM-S1G9-K-0.29-N-L2G10
14	Terminal strip, 8GD-1RR2,5-FEDER-CBL
15	Terminal strip, 3GD-1RR5-SCHRAUB-CBL
16	Housing
17	Controller, EXCM-2ST-C3-1
18	Lubricating grease LUB-KC1, silicone free
19	Screw locking agent, LOCTITE 243

3.2 Components overview EXCM-30 (Product series up to H7 / July 2016

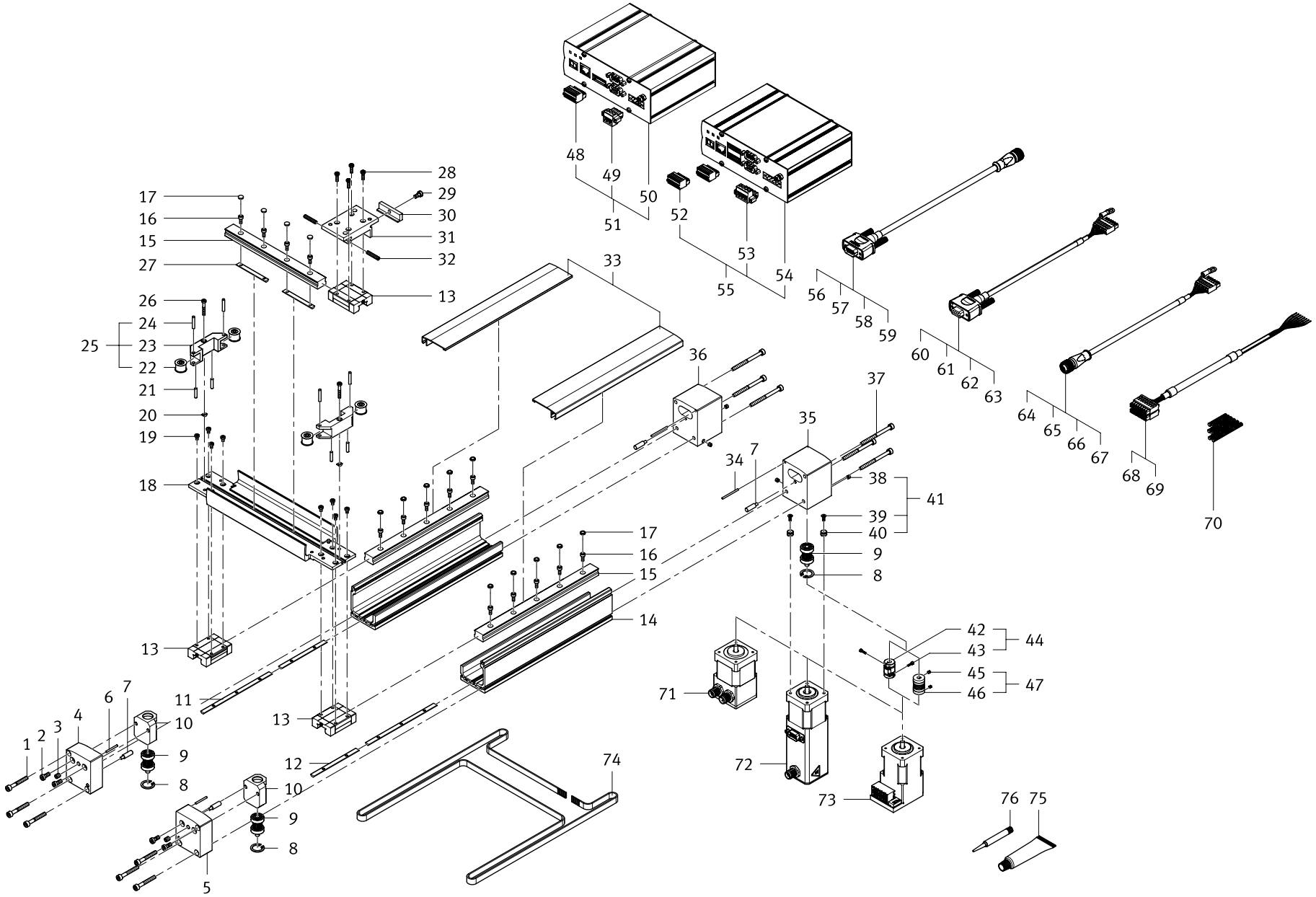


3.2.1 Bill of materials EXCM-30 (Product series up to H7 / July 2016)

No.	Designation, type
1	Self-tapping screw, M4×30-10.9
2	Socket head screw, DIN 6912-M4×10-8.8
3	Threaded pin, DIN 913-M5×6-45H
4	End cap
5	End cap
6	Cylindrical dowel pin, DIN 6325-2M6×20
7	Pin
8	Retaining ring, DIN 472-16×1
9	Pinion module
10	Housing
11	Slot nut
12	Slot nut
13	Bearing cartridge
14	Profile module
15	Roller track
16	Socket head screw, ISO 4762-M3×8-10.9
17	Cover cap
18	Cover
19	Socket head screw, DIN 7984-M3×5-8.8
20	Cover
21	Traverse
22	Socket head screw, DIN 7984-M3×5-8.8
23	Cylindrical dowel pin, ISO 2338-3M6×14-ST
24	Guide pulley assembly
25	Retainer
26	Pin
27	Guide roller unit
28	Socket head screw, DIN 7984-M3×20-8.8
29	Socket head screw, DIN 7984-M3×10-8.8
30	Ring, 5×8×3.6
31	Socket head screw, DIN 6912-M4×8-8.8
32	Clamping plate
33	Slide
34	Threaded pin, M4×20-45H
35	Cylindrical dowel pin, DIN 6325-2M6×28
36	Actuator end cap assembly
37	Actuator end cap assembly

No.	Designation, type
38	Self-tapping screw, F-M4×50-10.9
39	Threaded pin, DIN 913-M4×4-45H
40	Countersunk screw, DIN 7991-M3×8-8.8
41	Sleeve
42	Motor kit, EAMM-E×CM-30
43	Threaded pin, DIN 916-M3×4-A2-70
44	Coupling, EAMC-B-15-22-5-5
45	Coupling, EAMC-B-15-22-5-5
46	Stepper motor, EMMS-ST-42-SS-SEB-G2
47	Stepper motor, EMMS-ST-42-S-SE-S1-G3
48	Terminal strip, 8GD-1RR2,5-FEDER-CBL
49	Terminal strip, 3GD-1RR5-SCHRAUB-CBL
50	Housing
51	Controller, E×CM-2ST-C3-1
52	Encoder cable, NEBM-M12G8-E-0.5-N-S1G9
53	Encoder cable, NEBM-M12G8-E-1.0-N-S1G9
54	Encoder cable, NEBM-M12G8-E-1.5-N-S1G9
55	Encoder cable, NEBM-M12G8-E-2.0-N-S1G9
56	Motor cable, NEBM-S1G9-E-0.5-N-C1G6
57	Motor cable, NEBM-S1G9-E-1.0-N-C1G6
58	Motor cable, NEBM-S1G9-E-1.5-N-C1G6
59	Motor cable, NEBM-S1G9-E-2.0-N-C1G6
60	Motor cable, NEBM-M12G5-E-0.5-N-C1G6
61	Motor cable, NEBM-M12G5-E-1.0-N-C1G6
62	Motor cable, NEBM-M12G5-E-1.5-N-C1G6
63	Motor cable, NEBM-M12G5-E-2.0-N-C1G6
64	Toothed belt
65	Lubricating grease LUB-KC1, silicone free
66	Screw locking agent, LOCTITE 243

3.3 Components overview EXCM-30 (Product series from H8 / August 2016)



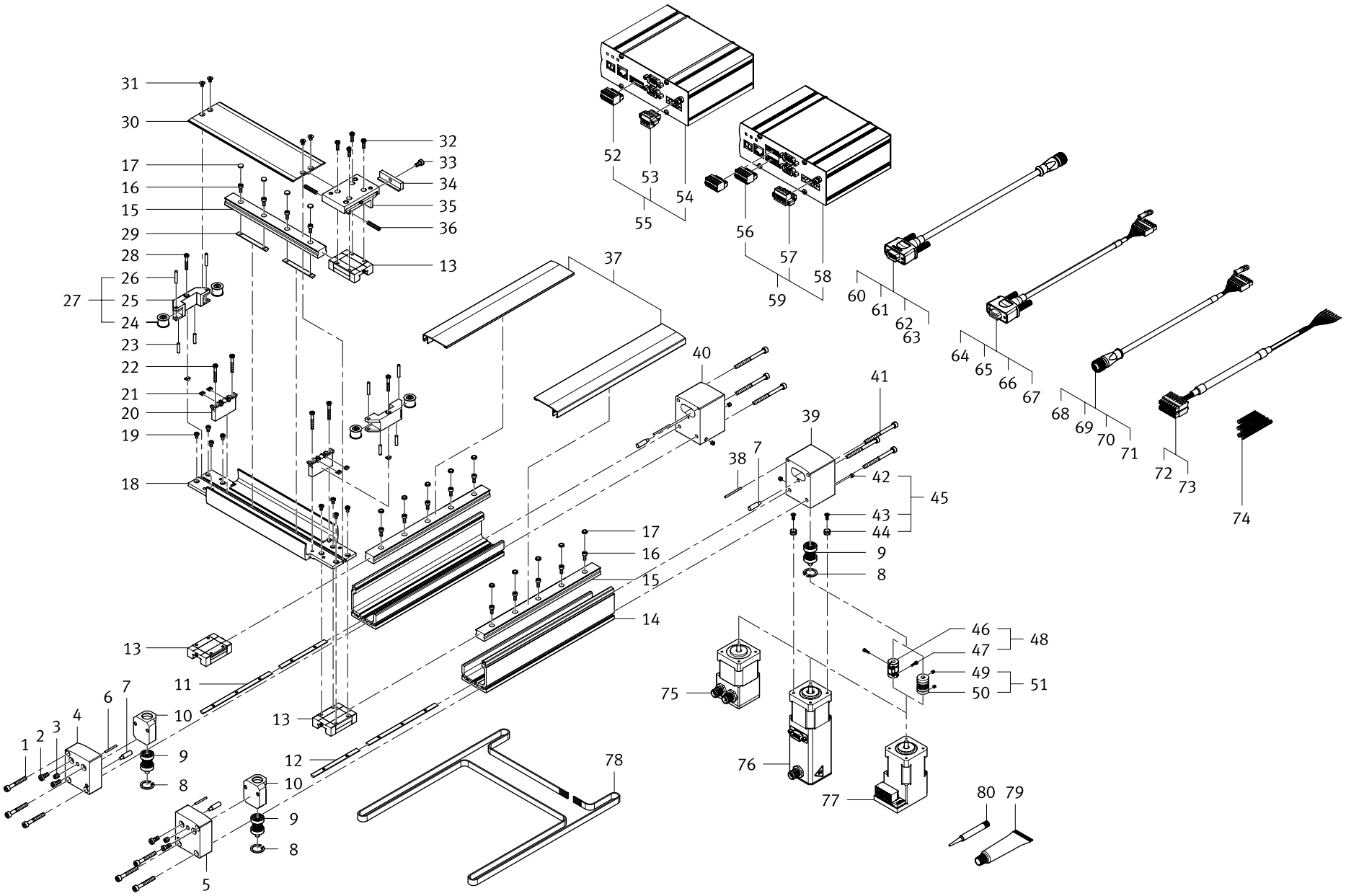
3.3.1 Bill of materials EXCM-30 (Product series from H8 / August 2016)

No.	Designation, type
1	Self-tapping screw, M4×30-10.9
2	Socket head screw, DIN 6912-M4×10-8.8
3	Threaded pin, DIN 913-M5×6-45H
4	End cap
5	End cap
6	Cylindrical dowel pin, DIN 6325-2M6×20
7	Pin
8	Retaining ring, DIN 472-16×1
9	Pinion module
10	Housing
11	Slot nut
12	Slot nut
13	Bearing cartridge
14	Profile module
15	Roller track
16	Socket head screw, ISO 4762-M3×8-10.9
17	Cover cap
18	Traverse
19	Socket head screw, DIN 7984-M3×5-8.8
20	Slot nut
21	Cylindrical dowel pin, ISO 2338-3M6×14-ST
22	Guide pulley assembly
23	Retainer
24	Pin
25	Guide roller unit
26	Socket head screw, DIN 7984-M3×20-8.8
27	Slot nut
28	Socket head screw, DIN 7984-M3×10-8.8
29	Countersunk screw, ISO 10642-M4×8-8.8
30	Clamping plate
31	Slide
32	Threaded pin, M4×20-45H
33	Cover
34	Cylindrical dowel pin, DIN 6325-2M6×28
35	Actuator end cap assembly
36	Actuator end cap assembly
37	Self-tapping screw, F-M4×50-10.9

No.	Designation, type
38	Threaded pin, DIN 913-M4×4-45H
39	Countersunk screw, DIN 7991-M3×8-8.8
40	Sleeve
41	Motor kit, EAMM-E×CM-30
42	Coupling, EAMC-14-22-5-5
43	Socket head screw, DIN 912-M2×8-12.9
44	Coupling, EAMC-14-22-5-5
45	Threaded pin, DIN 916-M3×4-A2-70
46	Coupling, EAMC-B-15-22-5-5
47	Coupling, EAMC-B-15-22-5-5
48	Terminal strip, 8GD-1RR2,5-FEDER-CBL
49	Terminal strip, 3GD-1RR5-SCHRAUB-CBL
50	Housing
51	Controller, E×CM-2ST-C3-1
52	Terminal strip, 8GD-1RR2,5-FEDER-CBL
53	Terminal strip, 4GD-1RR5-SCHRAUB-CBL
54	Housing
55	Controller, CM×H-ST2-C5-7-DIOP
56	Encoder cable, NEBM-M12G8-E-0.5-N-S1G9
57	Encoder cable, NEBM-M12G8-E-1.0-N-S1G9
58	Encoder cable, NEBM-M12G8-E-1.5-N-S1G9
59	Encoder cable, NEBM-M12G8-E-2.0-N-S1G9
60	Motor cable, NEBM-S1G9-E-0.5-N-C1G6
61	Motor cable, NEBM-S1G9-E-1.0-N-C1G6
62	Motor cable, NEBM-S1G9-E-1.5-N-C1G6
63	Motor cable, NEBM-S1G9-E-2.0-N-C1G6
64	Motor cable, NEBM-M12G5-E-0.5-N-C1G6
65	Motor cable, NEBM-M12G5-E-1.0-N-C1G6
66	Motor cable, NEBM-M12G5-E-1.5-N-C1G6
67	Motor cable, NEBM-M12G5-E-2.0-N-C1G6
68	Motor cable, NEBM-L2G16-EH-1.5-Q6N-L&
69	Motor cable, NEBM-L2G16-EH-3-Q6N-LE8
70	Pin module
71	Stepper motor, EMMS-ST-42-S-SE-S1-G3
72	Stepper motor, EMMS-ST-42-SS-SEB-G2
73	Integrated drive, EMCX-ST-42-L-S-7-C1-S-C0
74	Toothed belt

No.	Designation, type
75	Lubricating grease LUB-KC1, silicone free
76	Screw locking agent, LOCTITE 243

3.4 Component overview EXCM-30-...-P8 (Product series from H8 / August 2016)



3.4.1 Bill of materials EXCM-30-...-P8 (Product series from H8 / August 2016)

No.	Designation, type
1	Self-tapping screw, M4×30-10.9
2	Socket head screw, DIN 6912-M4×10-8.8
3	Threaded pin, DIN 913-M5×6-45H
4	End cap
5	End cap
6	Cylindrical dowel pin, DIN 6325-2M6×20
7	Pin
8	Retaining ring, DIN 472-16×1
9	Pinion module
10	Housing
11	Slot nut
12	Slot nut
13	Bearing cartridge
14	Profile module
15	Roller track
16	Socket head screw, ISO 4762-M3×8-10.9
17	Cover cap
18	Traverse
19	Socket head screw, DIN 7984-M3×5-8.8
20	Terminal block
21	Slot nut
22	Socket head screw, DIN 7984-M3×23-8.8
23	Cylindrical dowel pin, ISO 2338-3M6×14-ST
24	Guide pulley assembly
25	Retainer
26	Pin
27	Guide roller unit
28	Socket head screw, DIN 7984-M3×20-8.8
29	Slot nut
30	Cover
31	Countersunk screw, ISO 10642-M3×5-8.8
32	Socket head screw, DIN 7984-M3×10-8.8
33	Countersunk screw, ISO 10642-M4×8-8.8
34	Clamping plate
35	Slide
36	Threaded pin, M4×30-45H
37	Cover

No.	Designation, type
38	Cylindrical dowel pin, DIN 6325-2M6×28
39	Actuator end cap assembly
40	Actuator end cap assembly
41	Self-tapping screw, F-M4×50-10.9
42	Threaded pin, DIN 913-M4×4-45H
43	Countersunk screw, DIN 7991-M3×8-8.8
44	Sleeve
45	Motor kit, EAMM-E×CM-30
46	Coupling, EAMC-14-22-5-5
47	Socket head screw, DIN 912-M2×8-12.9
48	Coupling, EAMC-14-22-5-5
49	Threaded pin, DIN 916-M3×4-A2-70
50	Coupling, EAMC-B-15-22-5-5
51	Coupling, EAMC-B-15-22-5-5
52	Terminal strip, 8GD-1RR2,5-FEDER-CBL
53	Terminal strip, 3GD-1RR5-SCHRAUB-CBL
54	Housing
55	Controller, E×CM-2ST-C3-1
56	Terminal strip, 8GD-1RR2,5-FEDER-CBL
57	Terminal strip, 4GD-1RR5-SCHRAUB-CBL
58	Housing
59	Controller, CM×H-ST2-C5-7-DIOP
60	Encoder cable, NEBM-M12G8-E-0.5-N-S1G9
61	Encoder cable, NEBM-M12G8-E-1.0-N-S1G9
62	Encoder cable, NEBM-M12G8-E-1.5-N-S1G9
63	Encoder cable, NEBM-M12G8-E-2.0-N-S1G9
64	Motor cable, NEBM-S1G9-E-0.5-N-C1G6
65	Motor cable, NEBM-S1G9-E-1.0-N-C1G6
66	Motor cable, NEBM-S1G9-E-1.5-N-C1G6
67	Motor cable, NEBM-S1G9-E-2.0-N-C1G6
68	Motor cable, NEBM-M12G5-E-0.5-N-C1G6
69	Motor cable, NEBM-M12G5-E-1.0-N-C1G6
70	Motor cable, NEBM-M12G5-E-1.5-N-C1G6
71	Motor cable, NEBM-M12G5-E-2.0-N-C1G6
72	Motor cable, NEBM-L2G16-EH-1.5-Q6N-L&
73	Motor cable, NEBM-L2G16-EH-3-Q6N-LE8
74	Pin module

No.	Designation, type
75	Stepper motor, EMMS-ST-42-S-SE-S1-G3
76	Stepper motor, EMMS-ST-42-SS-SEB-G2
77	Integrated drive, EMCX-ST-42-L-7-C1-S-C0
78	Toothed belt
79	Lubricating grease LUB-KC1, silicone free
80	Screw locking agent, LOCTITE 243

4 Repair steps

Where possible, it is recommended to remove the planar surface gantry from the system entirely before carrying out the repair.

Before starting the repair, dismantle any attachments in accordance with the instructions in the accompanying operating instructions.

Keep your working environment clean and tidy.

Before dismantling the planar surface gantry, it is imperative that the cause of the failure is investigated to prevent repeated and premature failure. A planar surface gantry that has been used as intended 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 (general status, toothed belt pretensioning, etc.) should always be checked also.

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

If the planar surface gantry suffers premature failure, the operating conditions should be observed more closely.

The following possibilities should be considered, among other things:

- **Overloading**
  - In case of overloading, the application parameters (load, speed) should be adjusted accordingly.
- **Ambient conditions/material resistance**
  - Check whether the ambient temperature is within the permissible range.
  - Check the chemical and physical ambient conditions for hazardous substances, such as dust, abrasive particles, cooling lubricants, solvents, ozone, radiation, water-soluble substances, greases and oils, etc.

Note

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

To prevent damage to sealing rims and toothed belt, do not use pointed or sharp-edged assembly aids.

The planar surface gantries can be divided into two groups for the repair, which differ from one another in the repair steps.

Planar surface gantry	Repair described from page
EXCM-10	➔ Chapter 4.1 on page 24
EXCM-30	➔ Chapter 4.2 on page 34

4.1 EXCM-10

4.1.1 Preparatory steps

Danger

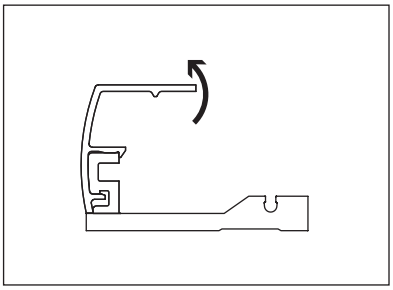
Risk of fatal injury from electric shock.

- The control system of the planar surface gantry remains 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.

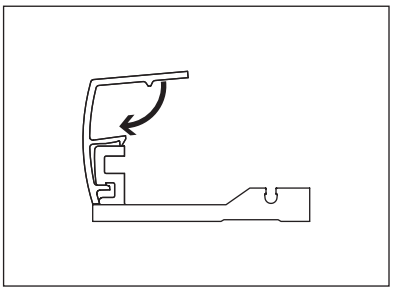
4.1.1.1 Dismantling covers

When dismantling the covers, pay attention to the position of the Festo logo. To ensure the orientation definition is clearly retained, the covers must be remounted on the same side during the subsequent assembly (➔ Chapter 2.3 on page 11).

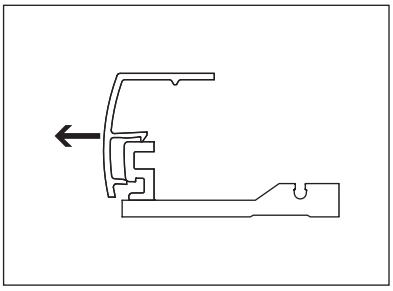
1. Unhook the retaining lug on both sides by pulling the upper edge upwards and outwards.



2. Release the lower retaining spring by pressing the top edge downwards and outwards.



3. Pull cover off outwards.



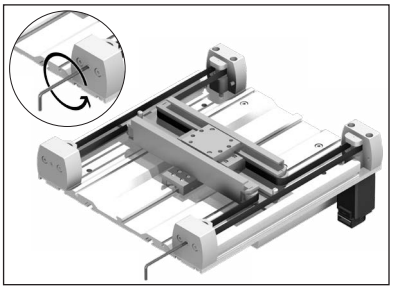
4.1.2 Visual inspection

- Check the planar surface gantry for visible damage that can impair its function, such as major defects in the guide rails of both X-axes or the Y-traverse.

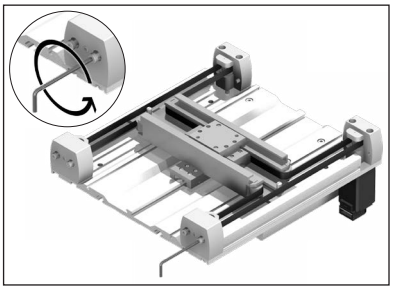
The planar surface gantry must be completely replaced if significant damage exists.

4.1.3 Dismantling the planar surface gantry

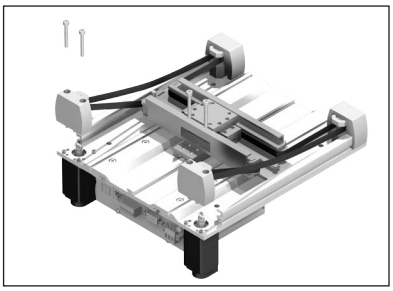
1. Unscrew the threaded pin in both pulley housings until it is flush with the pulley housing.



2. Unscrew the socket head screws in both pulley housings evenly until the toothed belt is completely tension-free.

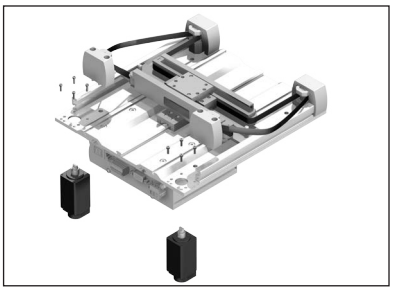


When removing the motor pulley housing, ensure that the ring gear is not lost between the coupling and motor.

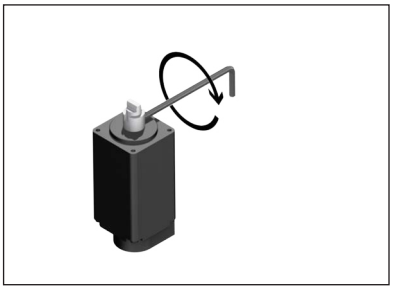


3. Unscrew the socket head screws in the motor pulley housing.
4. Remove the motor pulley housing by pulling it upwards.

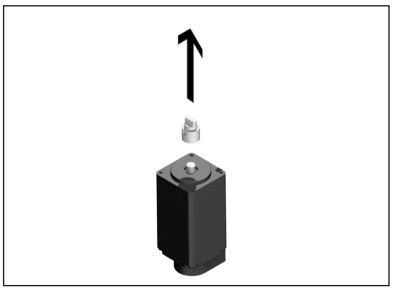
5. Unscrew the mounting screws of the motor.
6. Remove the motor by pulling it downwards.



7. Release the threaded pin in the coupling piece.

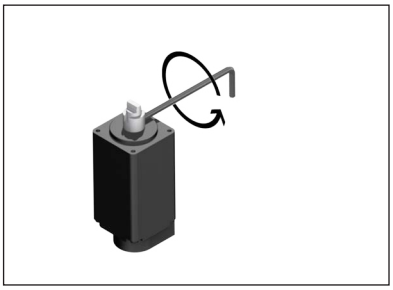


8. Remove the coupling piece from the motor shaft by pulling it upwards.

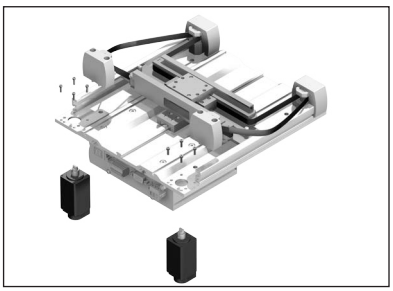


When using the old coupling, the thread locking agent must be cleaned off the threaded pin and the coupling piece.

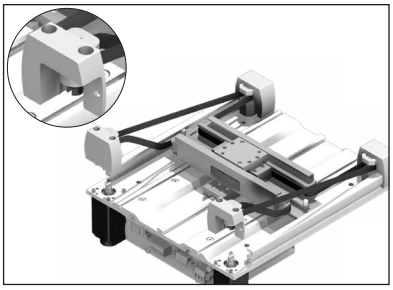
If a new coupling is installed, step 9 can be skipped.



9. Clean the threaded pin and coupling piece (➔ Chapter 6 on page 48) to remove thread locking agent.
10. Push the coupling piece onto the motor shaft until it reaches the stop.
11. Wet the threaded pin with locking agent.
12. Insert the threaded pin into the coupling piece and tighten to a tightening torque of 0.5 Nm ±20 %.

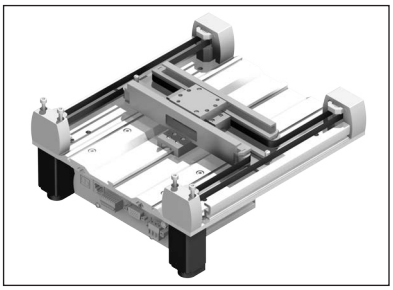


13. Carefully insert the motor into the opening from below.
14. Wet the mounting screws of the motor with locking agent.
15. Screw in the mounting screws and tighten to a tightening torque of 1 Nm ±10 %.



16. Insert the ring gear into the coupling piece on the motor shaft.
17. Align the drive pinion in the motor pulley housing so that the connecting lug of the ring gear is flush with the recess in the drive pinion.

Pulling the toothed belt on the corresponding side of the motor pulley housing is the easiest way to align the drive pinion with the ring gear.



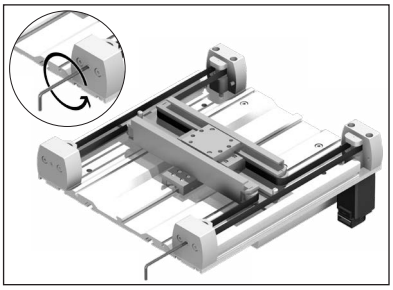
18. Fit the motor pulley housing from above so that the dowel pins are aligned with the fitting holes.
19. Apply locking agent to the socket head screws of the motor pulley housing.
20. Screw in the socket head screws and tighten them with a tightening torque of 1.5 Nm ±20 %.

If the toothed belt does not have to be replaced, you can skip the next sections and continue with Chapter 4.1.4.5 on page 32.

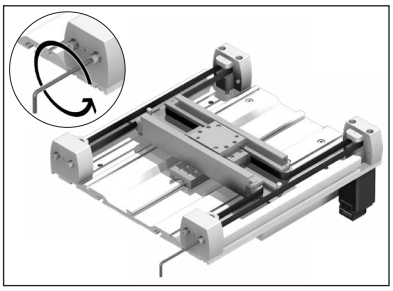
4.1.3.1 Removing the toothed belt

If the tension on the toothed belt was already released when dismantling the motor, steps 1 and 2 can be skipped.

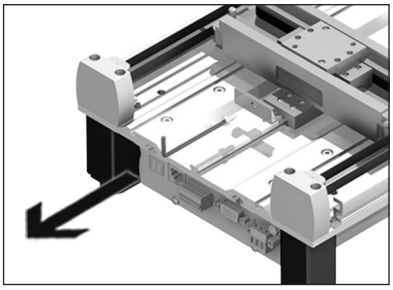
1. Unscrew the threaded pin in both pulley housings until it is flush with the pulley housing.



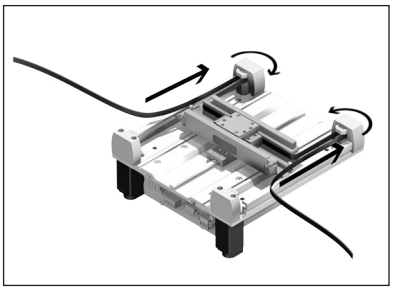
2. Unscrew the socket head screws in both pulley housings evenly until the toothed belt is completely tension-free.



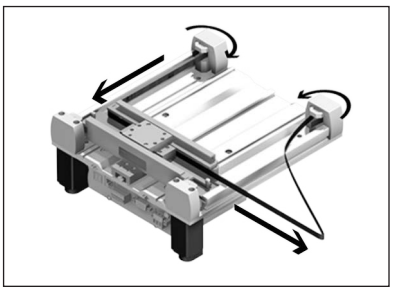
3. Unscrew the socket head screw from the clamping plate and remove it with the clamping plate.



4. Pull the toothed belt out of the Y-axis.
5. Pull the toothed belt out of both motor pulley housings.



6. Push the Y-axis towards the motor pulley housings until it reaches the stop.
7. Pull the toothed belt from both pulley housings.
8. Pull the toothed belt out of the Y-axis completely to the left or right.



4.1.4 Mounting the planar surface gantry

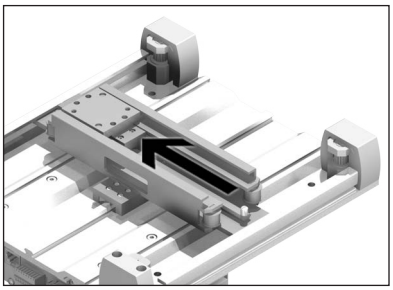
4.1.4.1 Cleaning and Greasing

– Clean and grease as described in Chapter 6 on page 48.

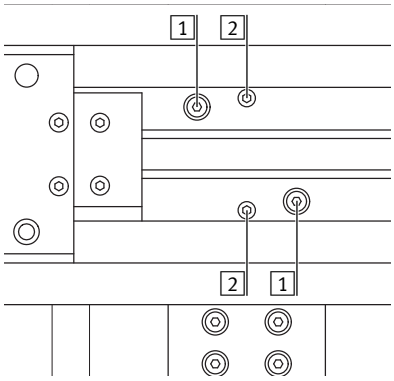
4.1.4.2 Adjusting the guide backlash

The guide backlash only needs to be adjusted if the planar surface gantry has been distorted during the mounting process. If it has been installed according to the specifications (see description of “Mechanical installation”), no adjustments are necessary. Mounting a distorted planar surface gantry should be avoided where possible.

1. Move the slide to the right or left to the stop.



2. Loosen the locking screws [1] and unscrew them by approx. 3 turns.
3. Use the threaded pins [2] to set the guide to be backlash-free. Check the displacement resistance. It must not exceed 9 N over the entire stroke.
4. Secure the setting by tightening the locking screws [1] with a tightening torque of 0.2 Nm.
5. Check the displacement resistance again by moving the slide repeatedly.



4.1.4.3 Notes on the toothed belt

The toothed belt is ordered from the online spare parts catalogue using the appropriate part number (dependent on the size and version of the planar surface gantry) (➔ www.festo.com/spareparts).

The part number is a module number and is dependent on the size of the planar surface gantry. In addition to the part number, you must also specify the stroke of your planar surface gantry when ordering. The information required is shown in the product labelling on the planar surface gantry (see order example below). You can use this information to calculate the necessary toothed belt length.

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 planar surface gantry used as intended and designed correctly will not normally show any premature signs of failure.

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

Possible visible signs of wear of the toothed belt:

– Cracks on the back of the toothed belt indicate wear, for example, due to operation outside the allowed temperature range, impermissible chemical effects or possibly by reaching the end of the fatigue life.
– Wear of the nylon fabric (fabric cover) on the tooth side of the belt. This is indicated by lint formation and bobbling, for example, and constitutes primary wear (abrasion of the fabric).

– Visible individual glass fibre cords in the tooth gullet are secondary signs of wear due to primary wear of the nylon fabric. In this case, the toothed belt pulley assembly 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 pulleys.

If the toothed belt suffers premature failure, the operating conditions should be observed more closely.

The following possibilities should be considered, among other things:

– **Overloading**

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

  The elasticity of the toothed belt delays the acceleration and braking performance of the planar surface gantry 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 controller settings can be adjusted (e.g. jerk limitation, smoothing of the acceleration profile).
  – Check the settings for all braking ramps in your controller or the higher-order control system (deceleration values and jerk).
  – Make sure that the deceleration values (braking deceleration, deceleration times) for the speed, the load to be moved and the installation position (horizontal / vertical) and the specified maximum drive torque or the feed force correspond to the allowable values of the planar surface gantry used.
  – Use the Festo “PositioningDrives” design software, available via the Festo website (➔ www.festo.com), to design the planar surface gantry.

– **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.

4.1.4.4 Installing the toothed belt

Cutting the new toothed belt to length

The exact length of the toothed belt in mm is derived from the total of the zero stroke plus 4 × X stroke plus 2 × Y stroke.

Check the length of the new toothed belt and shorten it, if necessary, to the calculated length with sturdy general purpose scissors. See order example:

Toothed belt length = Zero stroke length + ((4 × X stroke) + (2 × Y stroke))

↓ ↓

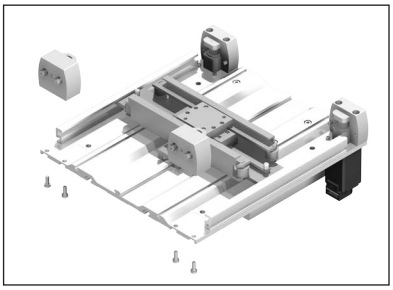
Example: EXCM-10-300-210-GF-ST-B-E1

Zero stroke length:	490 mm
X-stroke:	300 mm
Y-stroke:	210 mm
Length of the toothed belt =	**2110 mm**

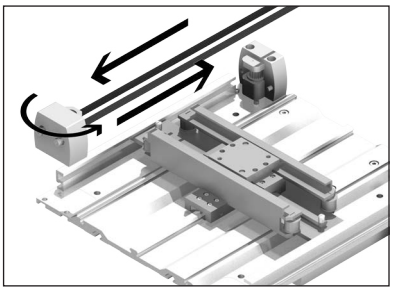
Note

Always cut the toothed belt to length between two teeth.

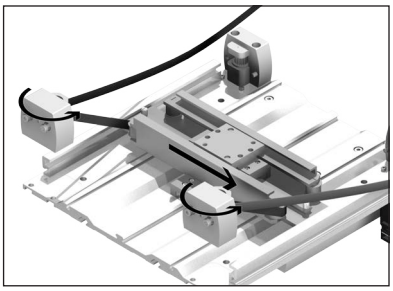
1. Unscrew the mounting screws of both pulley housings.
2. Remove both pulley housings.
3. Move the Y-axis and slide to the middle of the base profile.



4. Insert the toothed belt into the first pulley housing with the teeth facing the pinion.

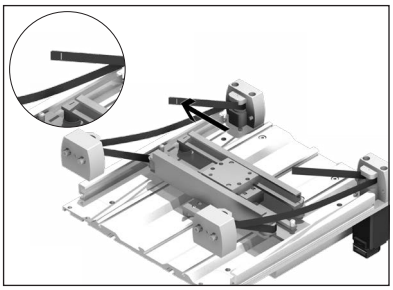


5. Feed the toothed belt past the guide pulley into the Y-axis and push it through the Y-axis.
6. Feed the toothed belt past the second guide pulley on the Y-axis and push it into the second pulley housing.



The overhang of the toothed belt from the pulley housings should be roughly equal on both sides.

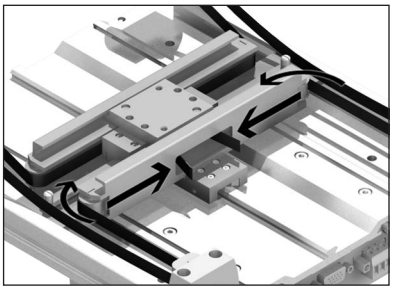
7. Push the toothed belt through both motor pulley housings.



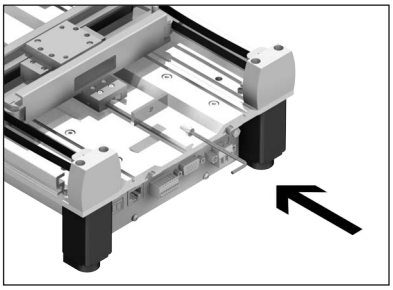
To help check the clamping area of the toothed belt, mark the toothed belt on the rear after the seventh tooth with a white pen. That is the only way to check that the toothed belt is pressed far enough onto the milled tooth profile on the slide.

8. Mark both ends of the toothed belt with a white pen as an assembly aid.

9. Pass the toothed belt through the guide pulleys of the Y-axis and feed both ends of the toothed belt through the Y-axis.



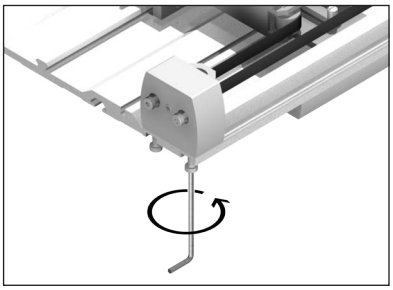
10. Remove the thread locking agent from the countersunk screw of the clamping plate.
11. Push the toothed belt onto the milled teeth of the Y-axis.



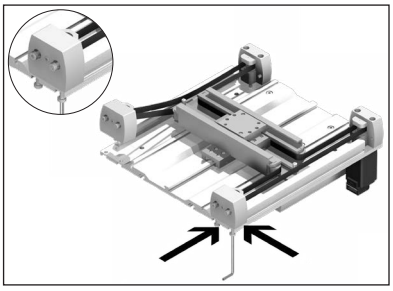
The milled profile of the slide is designed such that the teeth of the profile mesh with the teeth of the toothed belt. That makes it easier to mount the toothed belt.

12. Place the clamping plate with the socket head screw onto the toothed belt so that the guide lug of the clamping plate faces the base profile.
13. Wet the socket head screws of the clamping plate with locking agent.
14. Screw in the socket head screws and tighten them with a tightening torque of 0.7 Nm ±20 %.

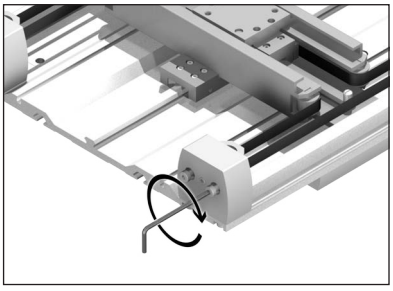
15. Remove the thread locking agent from the socket head screws of the pulley housing.
16. Wet the socket head screws of the pulley housing with locking agent.
17. Screw the socket head screws into the pulley housing and do **not** tighten yet.



18. Align the outer and rear edge of the pulley housing parallel to the edges of the base profile.
19. Tighten the socket head screws to a torque of 1.5 Nm ±20 %.
20. Mount the second pulley housing using a similar procedure to the first.



21. Pre-tension the toothed belt slightly.



Turning the socket head screws clockwise increases the toothed belt pre-tension, and turning the socket head screws anticlockwise decreases the tension.

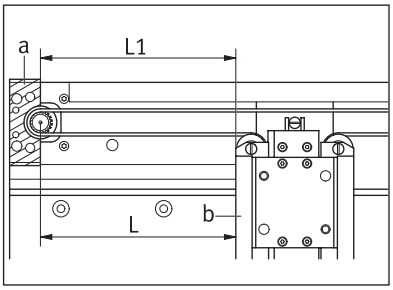
4.1.4.5 Adjusting the toothed belt pretensioning

Caution

The toothed belt pre-tension has a direct influence on the service life of the toothed belt and the performance of the planar surface gantry. The toothed belt pretension must therefore be checked extremely carefully.

Before the toothed belt pre-tension can be measured, the slide must be moved back and forth a number of times so that the toothed belt can fully settle and differences in tension can be compensated.

The toothed belt pretensioning is determined by measuring the fundamental oscillation (natural frequency) of the toothed belt with a fixed and freely oscillating strand length (L). As the freely oscillating strand length (L) cannot be measured directly, the distance (L1) between the motor pulley housing (a) and the Y-axis (b) is used as a reference. This distance can be adjusted by offsetting the Y-axis. The oscillation measurement is then carried out at this point.



1. Set the distance (L1) between the motor pulley housing (a) and the Y-axis (b) to 90 mm, see the drawing above.

Caution

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.

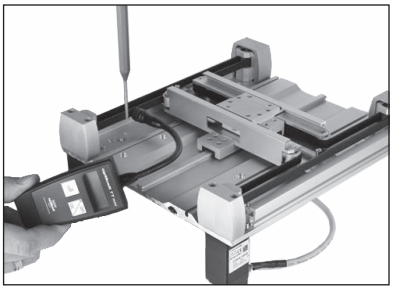
The pretension of the toothed belt reduces due to storage time and operation. This is not an indication of wear; it is a normal process that must not be changed by retensioning the toothed belt.

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

Note

The belt must be able to oscillate freely. The acoustic frequency meter must not touch the oscillating toothed belt.

To assess the toothed belt pre-tension, several measurements should be taken to balance out any measurement tolerances.



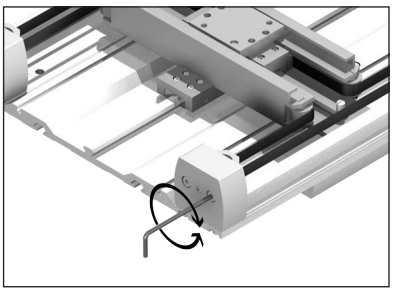
Example representation

2. Hold the acoustic frequency meter towards the centre of the distance (L1) between the motor pulley housing (a) and the Y-axis (b) as described in the accompanying operating instructions.
3. Make the toothed belt oscillate by striking it with a thin, heavy object, such as an Allen key or pin punch.
4. If the measured natural frequency is within the allowable range of **182 Hz to 192 Hz**, the threaded pins in the pulley housings can be tightened with a tightening torque of 2.4 Nm ±10 %.

Adjusting the toothed belt pre-tension

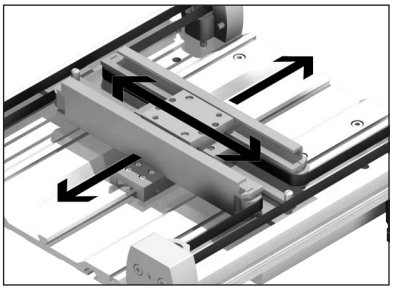
If the measured natural frequency is outside the specified range, the toothed belt pre-tension must be adjusted as follows:

Turning the socket head screws clockwise increases the toothed belt pre-tension, and turning the socket head screws anticlockwise decreases the toothed belt pre-tension.



5. Adjust the toothed belt pre-tension by turning the socket head screws evenly in the pulley housings.

Before you measure the toothed belt pre-tension again, the Y-axis and the slide must be moved back and forth a number of times manually to compensate for differences in tension.

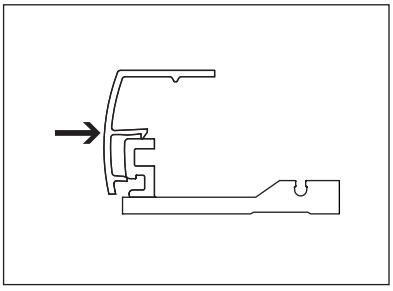


6. Set the distance (L1) between the motor pulley housing (a) and the Y-axis (b) to 90 mm again.
7. Check the toothed belt pre-tension again as described above.
8. If the toothed belt pre-tension is within the permitted range, screw the threaded pins into the pulley housing and tighten them to a torque of 2.4 Nm ±10 %.

4.1.4.6 Final steps

When mounting the covers, pay attention to the position of the Festo logo. To ensure the orientation definition is clearly retained, the covers must be remounted on the same side during assembly (➔ Chapter 2.3 on page 11).

- Push both covers inwards against the base profile until the retaining lug clicks into place audibly.



Caution

Every time the controller is restarted, and thus every time the planar surface gantry is repaired, it must be re-homed. Further information is available in the Chapter 5 on page 48 and in the **“Commissioning” description**. They can be found on the Festo website (➔ www.festo.com).

4.2 EXCM-30

4.2.1 Preparatory measures

Where possible, it is recommended to remove the planar surface gantry from the system entirely before carrying out the repair.

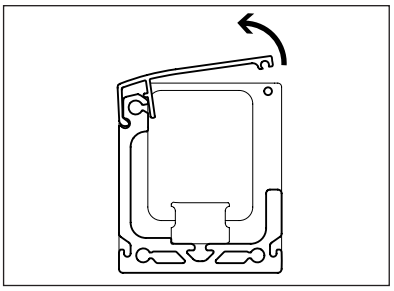
Before starting the repair, dismantle any attachments in accordance with the instructions in the accompanying operating instructions.

Keep your working environment clean and tidy.

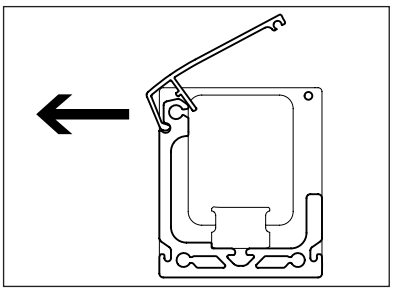
4.2.1.1 Dismantling covers

When dismantling the covers, pay attention to the position of the Festo logo. To ensure the orientation definition is clearly retained, the covers must be remounted on the same side during the subsequent assembly (➔ Chapter 2.3 on page 11).

1. Unclip the cover from both cylindrical dowel pins and swivel it upwards.



2. Remove the cover away from the base profile of the axis.



Note

To prevent damage to sealing rims and toothed belt, do not use pointed or sharp-edged assembly aids.

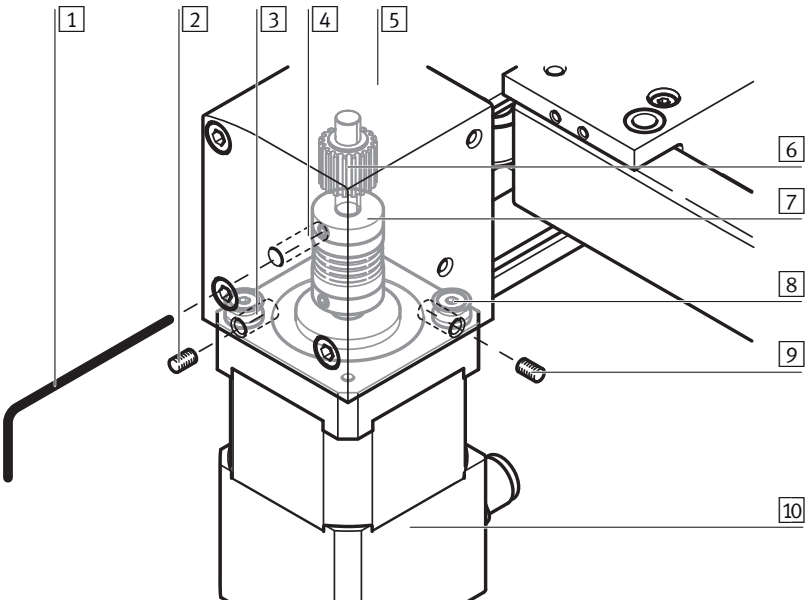
4.2.2 Visual inspection

- Check the planar surface gantry for visible damage that can impair its function, such as major defects in the guide rails of both X-axes or the Y-traverse.

The planar surface gantry must be completely replaced if significant damage exists.

4.2.3 Dismantling the planar surface gantry

Motor connection mounting principle



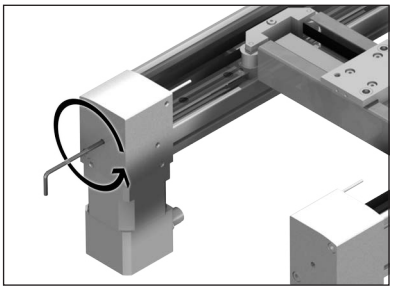
1 Allen key
2 Motor clamp threaded pin
3 Motor clamp access hole
4 Coupling access hole
5 Motor pulley housing
6 Drive pinion
7 Coupling
8 Sleeve
9 Motor clamp threaded pin
10 Motor, mounting variant B1

4.2.3.1 Dismantling the motor / coupling

Note

To release and tighten the threaded pins of the coupling and the motor clamp, do not use an Allen key with a ball head. The internal hexagonal socket of the threaded pins could be severely damaged, making it impossible to open them in future.

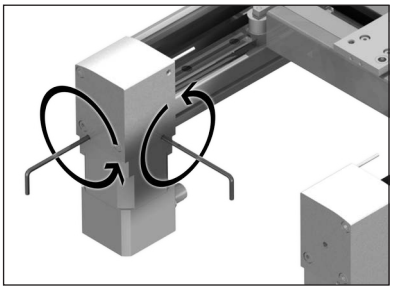
1. Move the Y-axis to position the coupling so that the threaded pin of the coupling can be seen through the cross hole in the motor pulley housing.
2. Release the threaded pin of the coupling.



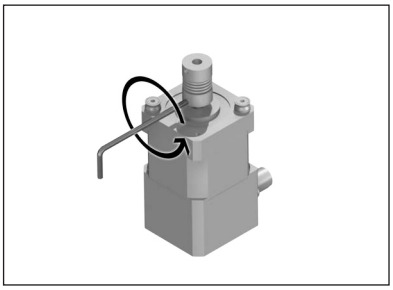
Note

Do not unscrew the threaded pins of the motor clamp completely out of the motor pulley housing.

3. Unscrew both threaded pins of the motor clamp until the motor can be removed from the motor pulley housing.



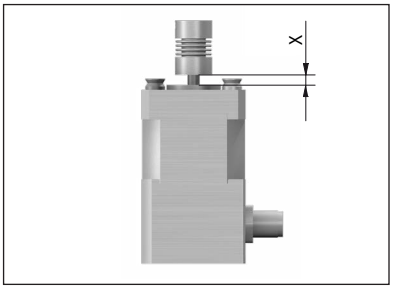
4. Release the threaded pin in the coupling.
5. Remove the coupling from the motor shaft.



4.2.3.2 Mounting the motor / coupling

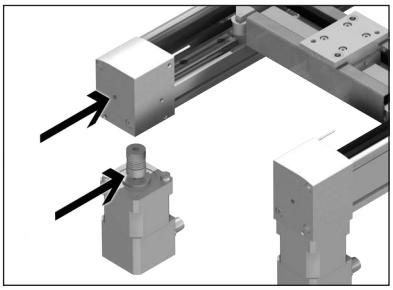
1. Push the coupling onto the motor shaft until the distance between the motor and coupling is $X = 4^{\pm 0.1}$ mm.
2. Tighten the threaded pin to the appropriate tightening torque.

Type	Tightening torque
Coupling, EAMC-14-22-5-5	0.37 Nm ± 20 %
Coupling, EAMC-B-15-22-5-5	1.5 Nm ± 20 %



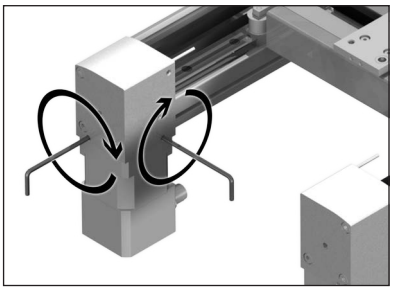
Note

When attaching the motor, ensure that the coupling does not tilt with the pinion shaft. Therefore, the motor must be positioned on the motor pulley housing at a 90° angle.



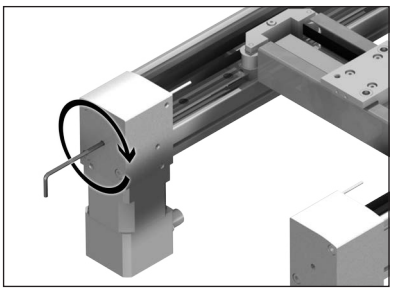
3. Turn the motor shaft so that the threaded pin of the coupling is aligned with the drill hole in the motor pulley housing.
4. Insert the motor carefully according to the motor mounting variant (➔ Chapter 2.2.2.1 on page 10).

5. Push the motor onto the motor pulley housing and tighten the threaded pins of the motor clamp to a tightening torque of 1.2 Nm ±10 %.



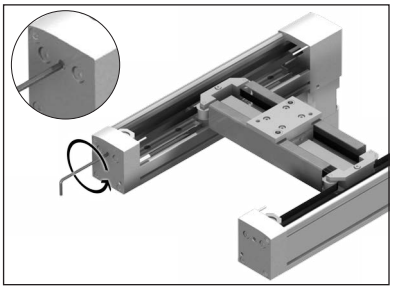
6. Tighten the threaded pin of the coupling to the appropriate tightening torque.

Type	Tightening torque
Coupling, EAMC-14-22-5-5	0.37 Nm ± 20 %
Coupling, EAMC-B-15-22-5-5	1.5 Nm ± 20 %

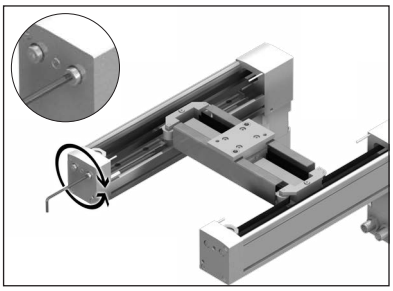


4.2.3.3 Disassembling the toothed belt EXCM-30

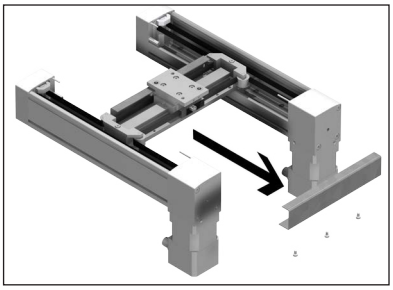
1. Unscrew the threaded pin in both pulley housings until it is flush with the pulley housing.



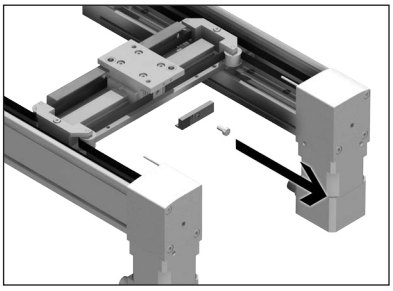
2. Unscrew the socket head screws in both pulley housings evenly until the toothed belt is completely tension-free.



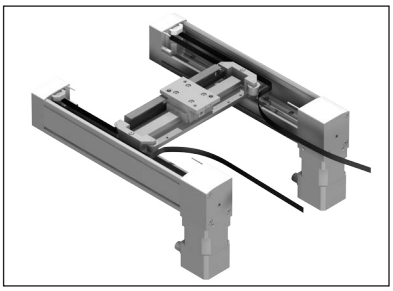
3. Unscrew the mounting screws of the cover sheet and remove the cover sheet.



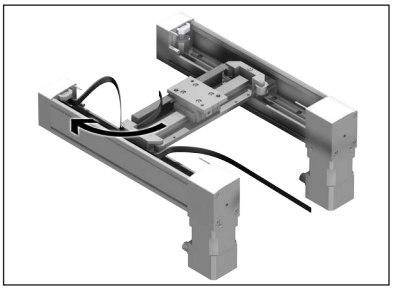
4. Unscrew the socket head screw from the clamping plate and remove it with the clamping plate.



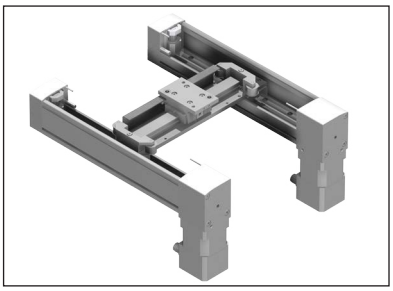
5. Pull both ends of the toothed belt out of the guide pulleys and motor pulley housing.



6. Pull the toothed belt out of the Y-axis.

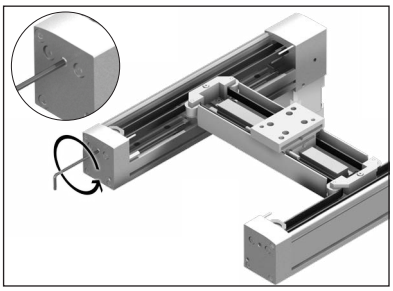


7. Pull the toothed belt from the motor pulley housing and remove it completely from the planar surface gantry.

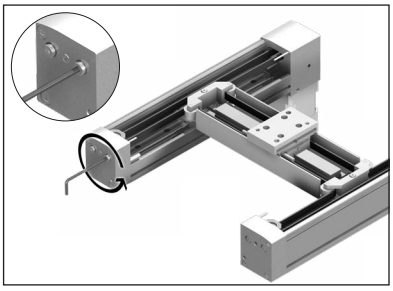


4.2.3.4 Disassembling the toothed belt EXCM-30 from product series H8

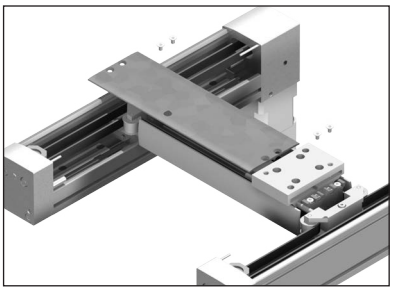
1. Unscrew the threaded pin in both pulley housings until it is flush with the pulley housing.



2. Unscrew the socket head screws in both pulley housings evenly until the toothed belt is completely tension-free.



Only with EXCM-30-...-P8

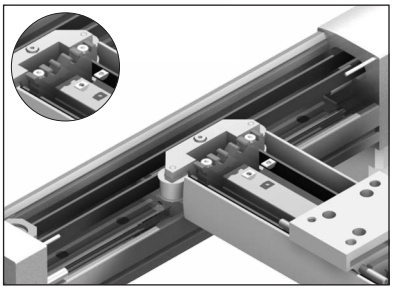


Note

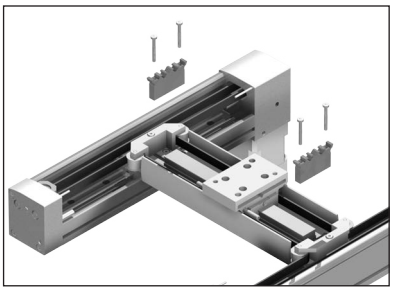
On unscrewing the countersunk screws and removing the cover, ensure that the slot nuts do not fall into the gantry and / or become lost.

1. Unscrew the countersunk screws from the terminal block.
2. Push the cover sidewards out of the slide.

3. Remove all four slot nuts from the terminal blocks.

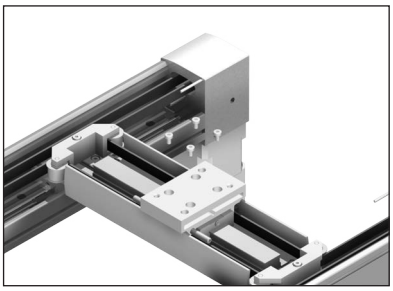


4. Unscrew the socket head screws from the Y-traverse and remove the terminal block.
5. Dismantle the second terminal block in the same way as the first.



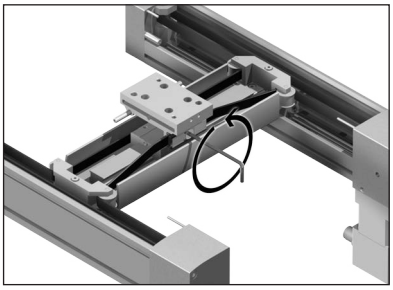
Note

Do not use an Allen key with a knob to undo and tighten the socket head screws of the slide. The internal hexagonal socket of the socket head screws could be severely damaged, making it impossible to undo them in future.

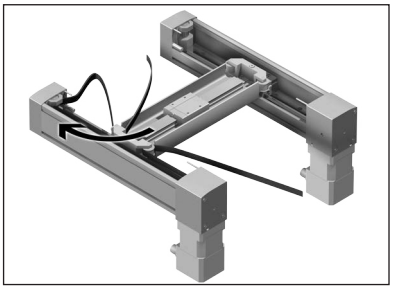


3. Unscrew all four socket head screws of the slide and remove.

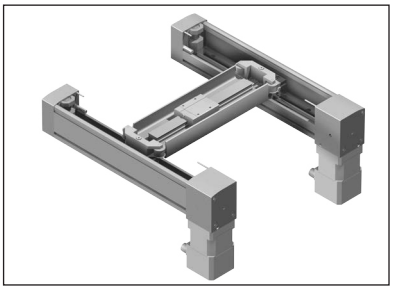
4. Lift up the slide carefully from above and unscrew the countersunk screw of the clamping plate.
5. Remove the countersunk screw and the clamping plate.



6. Pull the toothed belt out of the Y-axis.



7. Pull the toothed belt from the motor pulley housing and remove it completely from the planar surface gantry.



4.2.4 Mounting the planar surface gantry

4.2.4.1 Cleaning and Greasing

- Clean and grease as described in Chapter 6 on page 48.

4.2.4.2 Notes on the toothed belt

- Notes on the toothed belt are provided in the Chapter 4.1.4.3 on page 29.

4.2.4.3 Installing the toothed belt EXCM-30

The toothed belt is ordered from the online spare parts catalogue using the appropriate part number (dependent on the size and version of the planar surface gantry) (➔ www.festo.com/spareparts).

The part number is a module number and is dependent on the size of the planar surface gantry. In addition to the part number, you must also specify the stroke of your planar surface gantry when ordering. The information required is shown in the product labelling on the planar surface gantry (see order example below). You can use this information to calculate the necessary toothed belt length.

Cutting the new toothed belt to length

The exact length of the toothed belt in mm is derived from the total of the zero stroke plus 4 × X stroke plus 2 × Y stroke.

Check the length of the new toothed belt and shorten it, if necessary, to the calculated length with sturdy general purpose scissors. See order example:

Toothed belt length = Zero stroke length + ((4 × X stroke) + (2 × Y stroke))

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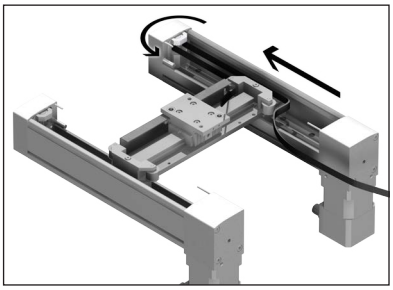
Example: EXCM-30-300-210-GF-ST-B-E1

Zero stroke length:	490 mm
X-stroke:	300 mm
Y-stroke:	210 mm
Length of the toothed belt =	**2110 mm**

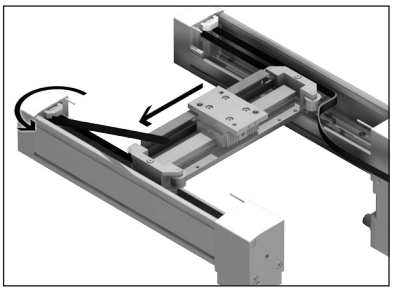
Note

Always cut the toothed belt to length between two teeth.

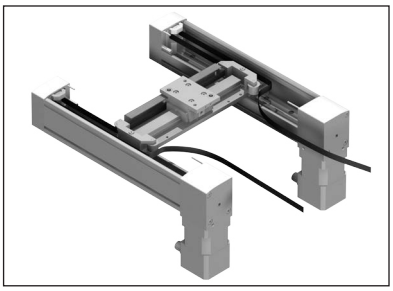
1. Insert the toothed belt into the pulley housing with the teeth facing the pinion.
2. Feed the toothed belt past the guide pulley into the Y-axis.



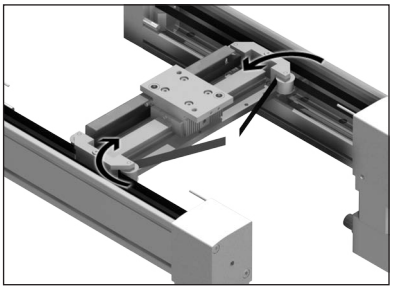
3. Feed the toothed belt through the Y-axis and past the guide pulley of the Y-axis.
4. Insert the toothed belt into the pulley housing.



5. Position the toothed belt by pulling the ends so that the overhang of the toothed belt is approximately the same on both sides.

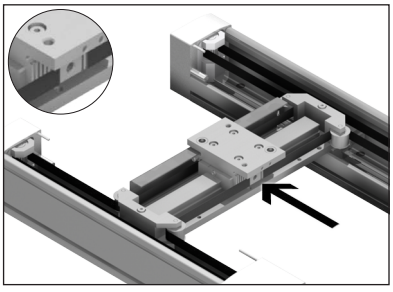


6. Insert both ends of the toothed belt into the respective motor pulley housing.
7. Feed both ends of the toothed belt past the guide pulleys of the Y-axis.



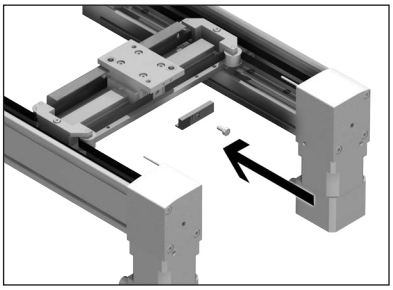
As an assembly aid, the drive pinion can be turned in the motor pulley housing with a blunt, non-splintering object. The rotating movement pulls the toothed belt into the pulley housing.

8. Press the toothed belt against the milled profile of the slide so that it ends flush with the lower edge of the slide.



The milled profile of the slide is designed such that the teeth of the profile mesh with the teeth of the toothed belt. That makes it easier to mount the toothed belt.

9. Place the clamping plate with the socket head screw onto the toothed belt so that the guide lug faces downwards.
10. Tighten the socket head screw with a tightening torque of 0.7 Nm ±10 %.



4.2.4.4 Installing the toothed belt EXCM-30 from product series H8

The toothed belt is ordered from the online spare parts catalogue using the appropriate part number (dependent on the size and version of the planar surface gantry) (➔ www.festo.com/spareparts).

The part number is a module number and is dependent on the size of the planar surface gantry. In addition to the part number, you must also specify the stroke of your planar surface gantry when ordering. The information required is shown in the product labelling on the planar surface gantry (see order example below). You can use this information to calculate the necessary toothed belt length.

Cutting the new toothed belt to length

The exact length of the toothed belt in mm is derived from the total of the zero stroke plus 4 × X stroke plus 2 × Y stroke.

Check the length of the new toothed belt and shorten it, if necessary, to the calculated length with sturdy general purpose scissors. See order example:

Toothed belt length = Zero stroke length + ((4 × X stroke) + (2 × Y stroke))

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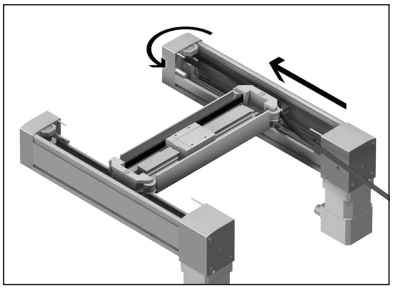
Example: EXCM-30-300-210-GF-ST-B-E1

Zero stroke length:	490 mm
X-stroke:	300 mm
Y-stroke:	210 mm
Length of the toothed belt =	**2110 mm**

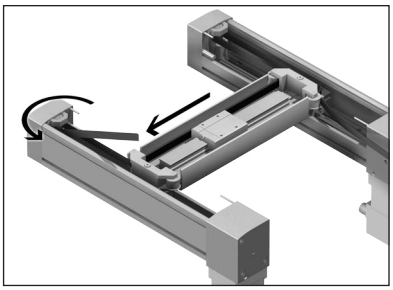
Note

Always cut the toothed belt to length between two teeth.

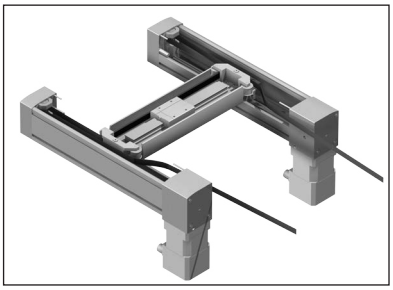
1. Insert the toothed belt into the pulley housing with the teeth facing the pinion.
2. Feed the toothed belt past the guide pulley of the Y-traverse.



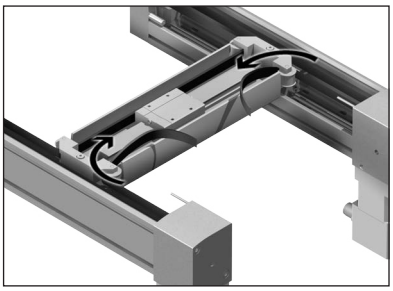
3. Feed the toothed belt through the Y-axis and past the guide pulley of the Y-axis.
4. Insert the toothed belt into the pulley housing.



5. Position the toothed belt by pulling the ends so that the overhang of the toothed belt is approximately the same on both sides.

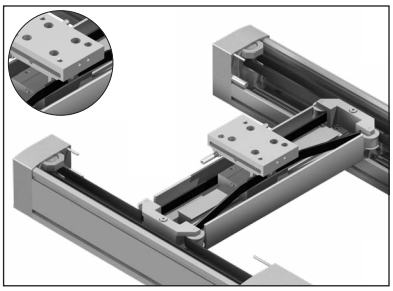


6. Insert both ends of the toothed belt into the respective motor pulley housing.
7. Feed both ends of the toothed belt past the guide pulleys of the Y-axis.



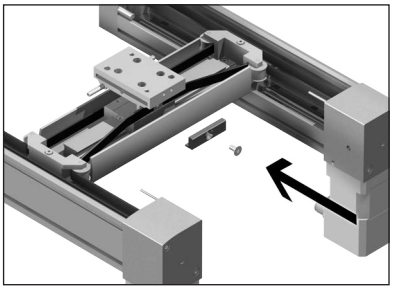
As an assembly aid, the drive pinion can be turned in the motor pulley housing with a blunt, non-splintering object. The rotating movement pulls the toothed belt into the pulley housing.

8. Position the slide so that both ends of the toothed belt can be pressed onto the milled profile of the slide. The toothed belt must end flush with the bottom edge of the slide.

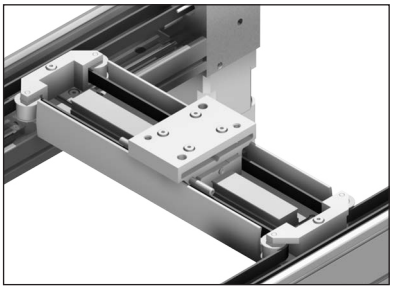


The milled profile of the slide is designed such that the teeth of the profile mesh with the teeth of the toothed belt. That makes it easier to mount the toothed belt.

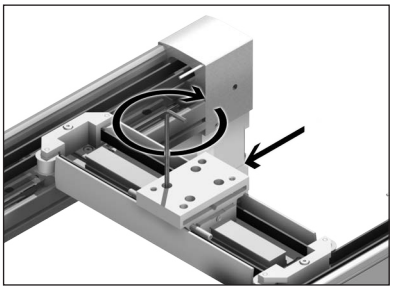
9. Place the clamping plate with the countersunk screw on the toothed belt so that the guide lug faces downwards.
10. Tighten the countersunk screw to a tightening torque of 0.7 Nm ±10 %.



11. Place the slide on the roller carriage and screw in the socket head screws loosely.

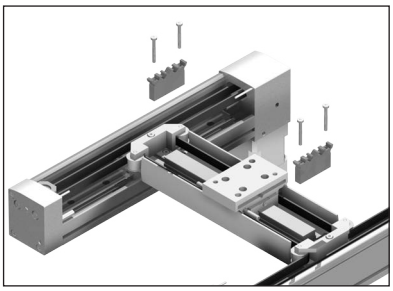


12. Press the stop edge of the slide against the roller carriage.
13. Tighten the socket head screws to a torque of 1.2 Nm ±10 %.



Only with EXCM-30-...-P8

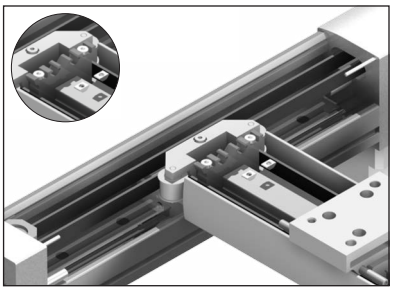
1. Place the terminal block on the Y-traverse.
2. Screw in the socket head screws and tighten to a tightening torque of 1.2 Nm ±10 %.
3. Mount the second terminal block in the same way as the first one.



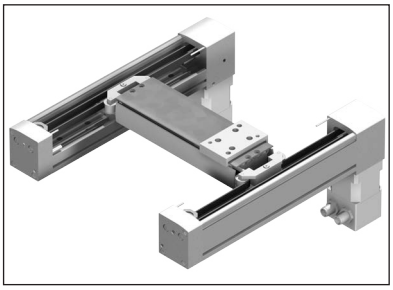
Note

After inserting the slot nuts, ensure that they do not fall into the gantry and / or become lost.

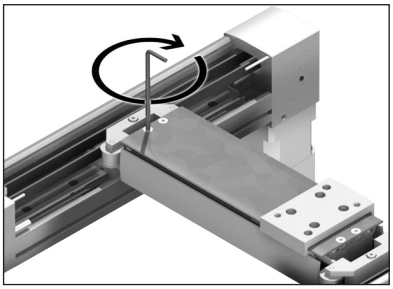
4. Insert the slot nuts into the two terminal blocks.



5. Push the cover through the side of the slide and position in the middle.



6. Screw the countersunk screws into the terminal blocks and tighten to a tightening torque of 1 Nm ±10 %.



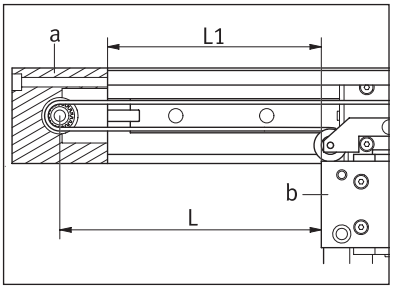
4.2.4.5 Adjusting the toothed belt pretensioning

Caution

The toothed belt pre-tension has a direct influence on the service life of the toothed belt and the performance of the planar surface gantry. The toothed belt pretension must therefore be checked extremely carefully.

Before the toothed belt pre-tension can be measured, the slide must be moved back and forth a number of times so that the toothed belt can fully settle and differences in tension can be compensated.

The toothed belt pretensioning is determined by measuring the fundamental oscillation (natural frequency) of the toothed belt with a fixed and freely oscillating strand length (L). As the freely oscillating strand length (L) cannot be measured directly, the distance (L1) between the motor pulley housing (a) and the cover of the Y-axis (b) is used as a reference. This distance can be adjusted by offsetting the Y-axis. The oscillation measurement is then carried out at this point.



1. Set the distance (L1) between the motor pulley housing (a) and the cover of the Y-axis (b) to 90 mm, see the drawing above.

Caution

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.

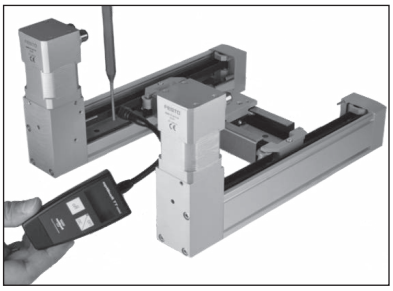
The pretension of the toothed belt reduces due to storage time and operation. This is not an indication of wear; it is a normal process that must not be changed by retensioning the toothed belt.

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

Note

The belt must be able to oscillate freely.

To assess the toothed belt pre-tension, several measurements should be taken to balance out any measurement tolerances.



Example representation

2. Hold the acoustic frequency meter towards the centre of the distance (L1) between the motor pulley housing (a) and the Y-axis (b) as described in the accompanying operating instructions.
3. Make the toothed belt oscillate by striking it with a thin, heavy object, such as an Allen key or pin punch.

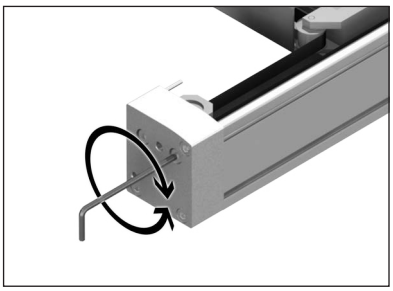
The acoustic frequency meter must not touch the oscillating toothed belt.

4. If the measured natural frequency is within the allowable range of **271 Hz to 280 Hz**, the threaded pins in the pulley housings can be tightened with a tightening torque of 2.4 Nm ±10 %.

Adjusting the toothed belt pre-tension

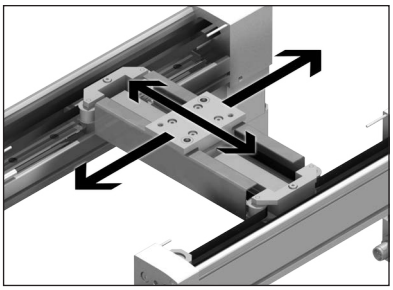
If the measured natural frequency is outside the specified range, the toothed belt pre-tension must be adjusted as follows:

Turning the socket head screws clockwise increases the toothed belt pre-tension, and turning the socket head screws anticlockwise decreases the toothed belt pre-tension.



5. Adjust the toothed belt pre-tension by turning the socket head screws evenly in the pulley housings.

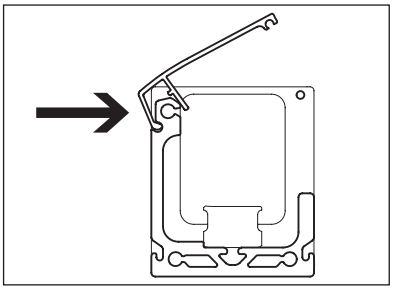
Before you measure the toothed belt pre-tension again, the Y-axis and the slide must be moved back and forth manually a number of times to compensate for differences in tension.



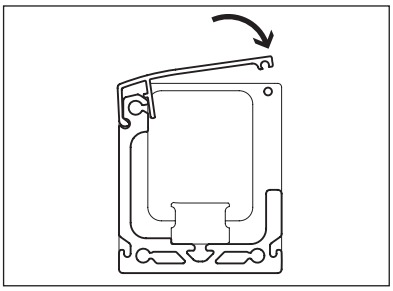
6. Set the distance between the motor pulley housing and the Y-axis to 90 mm again.
7. Check the toothed belt pre-tension again as described above.
8. If the toothed belt pre-tension is within the permitted range, screw the threaded pins into the pulley housing and tighten them to a torque of 2.4 Nm ±10 %.

4.2.4.6 Final steps

1. Push the covers inwards against the base profile of the axis.



2. Swivel the cover downwards and clip the cover into the cylindrical dowel pin.



Caution

Every time the controller is restarted, and thus every time the planar surface gantry is repaired, it must be re-homed. Further information is available in the Chapter 5 on page 48 and in the **“Commissioning” description.** They can be found on the Festo website (➔ www.festo.com).

5 Homing

Every time the controller is restarted, and thus every time a repair is performed, it must be re-homed. Without successful homing, positioning cannot be started (exception: jogging). Homing can be started via the control byte CPOS or through selection of record 0 and always takes places to the axis zero point of the selected coordinate system. The stop is detected by a motor shutdown in combination with a sharp rise in the motor current. After the fixed stop is reached, a movement to zero is automatically performed in order to reach a permanently defined and unchangeable minimum distance from the mechanical stop.

For more information on the homing procedure, see the **"Commissioning" description**. They can be found on the Festo website (➔ www.festo.com).

6 Cleaning and greasing

6.1 Cleaning

Note

The planar surface gantry normally does not need cleaning. It should only be cleaned in exceptional cases and taking the following points into consideration.

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

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

When using other cleaning agents, make sure that they do not corrode the non-metal parts of the planar surface gantry. If in doubt, check the resistance of the non-metal parts with the help of the information on the Festo website (➔ www.festo.com).

- Clean the planar surface gantry as required with a soft cloth.
- Avoid cleaning media that can damage the plastic components. Excessive friction or the use of grease-solvent cleaning agents (e.g. soapsuds) will damage the grease layer.

6.2 Relubricating

Note

The planar surface gantries EXCM-10 and EXCM-30 are initially lubricated during production.

Subsequent lubrication is only required if the guide elements have been degreased.

Relubricate with the same lubricant used to lubricate on delivery.

- Relubricate as described in Chapter 6.2.1 on page 48.

6.2.1 Lubrication

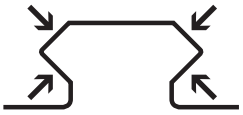
Note

At **each** lubrication nipple, insert a total grease quantity of 1.0 gram (in two doses of 2 × 0.5 gram) with the help of a suitable grease gun.

1. At the same time, lubricate each with half the specified quantity of lubricant.
2. Travel traverse and slide unit of the Y-axis 1 time over the entire stroke.
3. Perform steps 1 and 2 again.

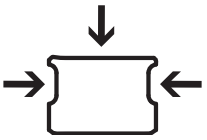
Further information on the lubrication process is given in the description of the **“Mechanical installation”** . The description can be found on the Festo website (➔ www.festo.com/sp).

6.2.2 EXCM-10

Component	Lubricant	Lubrication	
Guide rails of the X-axis Guide rail of the Y-axis	LUB-KC1, silicone-free[1)]		Apply a thin layer of grease all around the guide rails of the X- and Y-axes.

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

6.2.3 EXCM-30-...-(P8)

Component	Lubricant	Lubrication	
Guide rails of the X-axis Guide rail of the Y-traverse	LUB-KC1, silicone-free[1)]		Apply a thin layer of grease all around the guide rails of the X- and Y-axes.
Roller carriage of the X-axis	LUB-KC1, silicone-free[1)]	Quantity of grease: 1.0 gram per lubrication nipple Number of lubrication nipples: – EXCM-30: 4 Grease gun ➔ Chapter 7.2 on page 50	
Roller carriage in the Y-traverse	LUB-KC1, silicone-free[1)]	Quantity of grease: 1.0 gram per lubrication nipple Number of lubrication nipples: – EXCM-30: 2 Grease gun ➔ Chapter 7.2 on page 50	

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

7 Tools

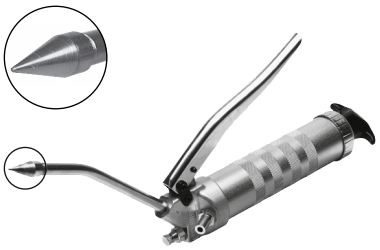
This section provides an overview of the tools and aids required to repair and maintain the planar surface gantry EXCM in its various sizes.

7.1 Standard tools required

- Internal hexagon socket screwdriver (Allen key)
- Screwdriver
- Torque wrench
- Flat pliers
- Sturdy general purpose scissors or metal shears

7.2 Special tools

The following special tools are required for repair and maintenance of the planar surface gantry:

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 6×200 axial)	647959	
Lubrication adapter LUB-1-TR-L	Lubrication adapter (nozzle pipe Ø 6×200 lateral)	647960	
Lubrication adapter LUB-1-TR-W	Lubrication adapter (nozzle pipe Ø 6×200 lateral, 45° angled)	8073388	

Additional information on the fixtures and measuring devices can be found in the **“Tools and repair accessories”** information brochure. It can be found in the online spare parts catalogue on the Festo website (➔ Tools and repair accessories.pdf).

7.3 Acoustic frequency meter

Designation	Description	Figure
TB-TE-EQ13	Acoustic frequency meter for measurement with and without a test device.	

8 Liability

The General Terms and Conditions of Business (AGB) of Festo AG & Co. KG, which can be viewed on the Festo website (➔ www.festo.com), apply.

Conditions of use for “Electronic documentation”

I. Protection rights and scope of use

The file of your choice is subject to protective provisions. Festo or third parties have protective rights to this electronic documentation, which Festo provides both on portable data storage devices (diskettes, CD ROM, removable disks) as well as on the Internet and/or intranet, referred to as electronic documentation below. In so far as third parties have whole or partial right of access to this electronic documentation, Festo has the appropriate rights of use. Festo permits the user the use under the following conditions:

1. Scope of use

a) The user of the electronic documentation is allowed to use this documentation for his own, exclusively company-internal purposes on any number of machines within his business premises (location). This right of use includes exclusively the right to save the electronic documentation on the central processors (machines) used at the location.

b) The electronic documentation may be printed out on a printer at the location of the user as often as desired, providing this printout is printed with or kept in a safe place together with these conditions of use and other user instructions.

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 AG & Co. KG, D-73726 Esslingen

3. Transferring the authorisation of use

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

II. Exporting the electronic documentation

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

III. Warranty

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

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

IV. Liability/limitations on liability

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

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

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

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

V. Safety guidelines/documentation

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