Planar surface gantries EXCM

Key features

At a glance

General

- A gantry that is characterised by excellent functionality in compact installation spaces
- The drive concept has a low moving mass

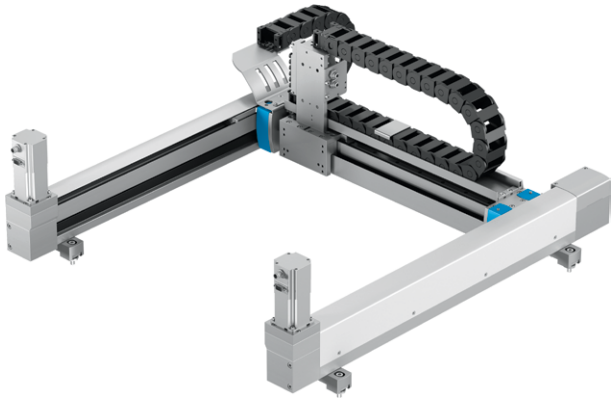
Application examples

- Feeding, pressing, joining components
- Dispensing liquid media
- Mounting electronic components

EXCM-30

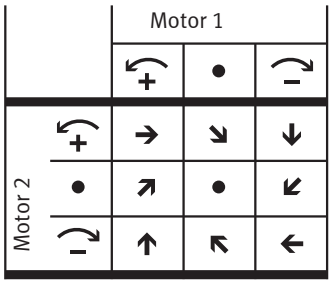
Sample product image,
motors not included in scope of delivery!

EXCM-40

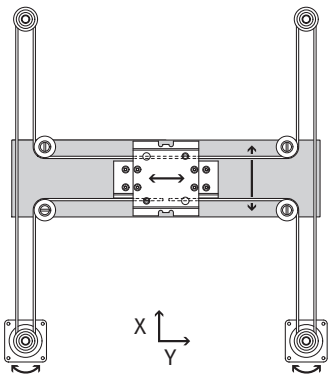


Operating principle

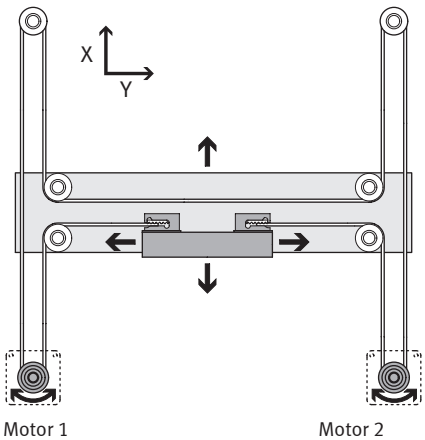
A slide is moved in a two-dimensional space (XY-axis) via a toothed belt. The system is powered by 2 fixed motors in position-controlled operation (closed loop). The motors are coupled to the toothed belt. The belt is guided via guide pulleys so that the slide can move to any position in a working space when the motors are actuated accordingly.



EXCM-30



EXCM-40



Note

Additional multi-axis controller required for interpolation (e.g. CPX-E-CEC-M1-...).

Key features

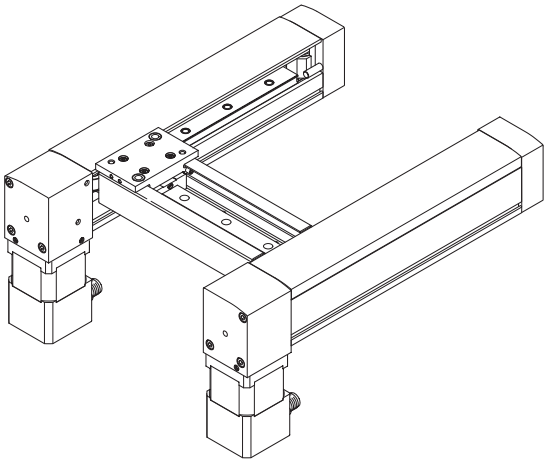
Planar surface gantry			
Type		EXCM-30	EXCM-40
Guide		Recirculating ball bearing guide	Recirculating ball bearing guide
Stroke of the			
X-axis	[mm]	100, 150, 200, 300, 400, 500	–
		90 ... 700	200 ... 2000
Y-axis	[mm]	110, 160, 210, 260, 310, 360, 410, 460, 510	–
		110 ... 526	200 ... 1000
Rated load at max. dynamic response[1]	[kg]	2/3[2]	4
Repetition accuracy	[mm]	±0.05	±0.1
Mounting position		Any	Horizontal
Additional technical data		→ Page 6	→ Page 20

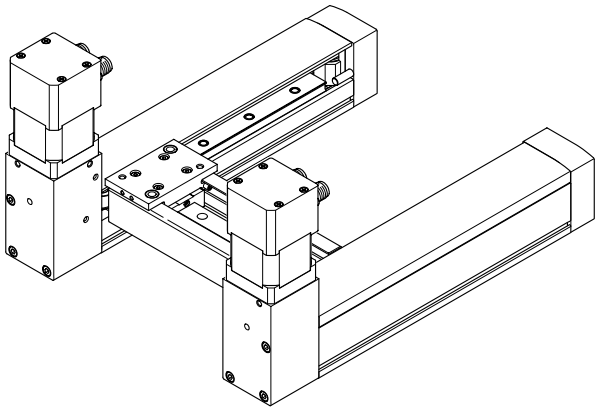
1) Rated load = tool load (attachment components) + payload
2) Vertical/horizontal installation position. For vertical installation, we recommend consulting a sales engineer from Festo.

Key features

Motor attachment variants	
Below	On top

Sample product image,
motors not included in scope of delivery!





Type codes

001	Series	
EXCM	Planar surface gantry	

002	Size	
30	30	
40	40	

003	Stroke of the X-axis [mm]	
...	90 ... 2000	

004	Stroke of the Y-axis [mm]	
...	110 ... 1000	

005	Guide	
KF	Recirculating ball bearing guide	

006	Motor type	
W	Without motor	

007	Protection against particles	
	Standard	
P8	Protected version	

008	Motor attachment position	
B	Underneath	
T	Top	

009	Controller	
	None	

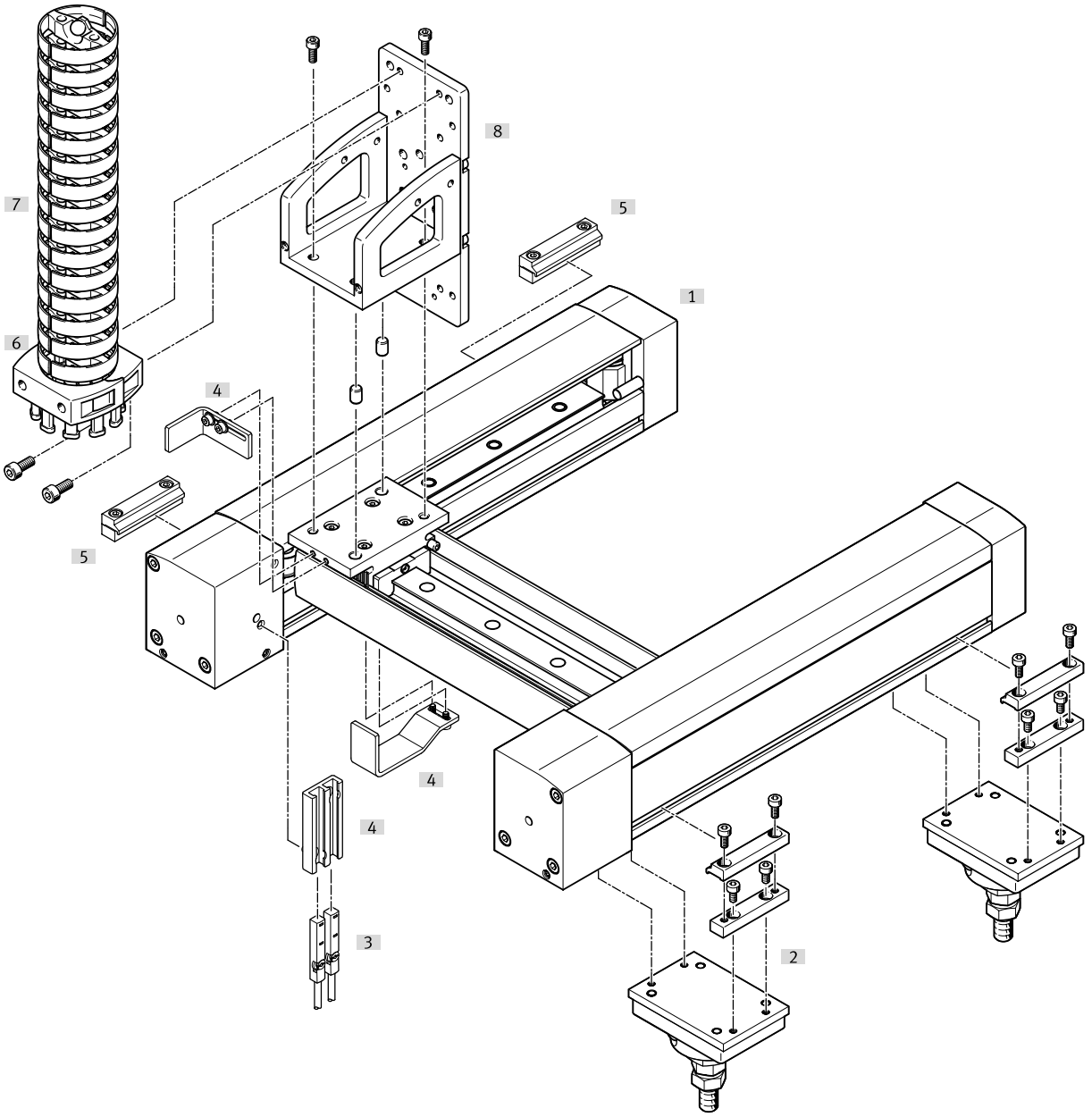
010	Cable length	
	None	
2	0.5 m	
3	1 m	
4	1.5 m	
5	2 m	
6	5 m	
7	10 m	

011	Attachment components	
	None	

012	Mounting kit	
	With mounting component	
J	With adjusting kit	

013	Document language	
DE	German	
EN	English	
ES	Spanish	
FR	French	
IT	Italian	
RU	Russian	
ZH	Chinese	
	No documentation	

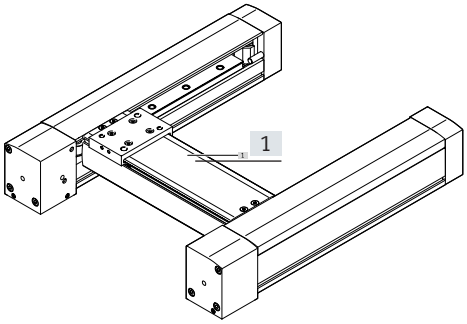
Peripherals overview



Variants and accessories

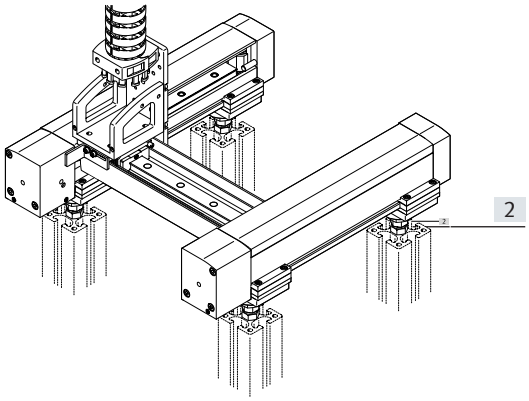
[1] With protection against particles EXCM-...-P8

The cover protects the guide of the Y-axis against contamination.



[2] With adjusting kit EADC-E11

The gantry can be aligned after installation with the adjusting kit.



Peripherals overview

Accessories

Type		Description	→ Page/Internet
[1]	Planar surface gantries EXCM	Planar surface gantry	8
[2]	Adjusting kit EADC-E11	Height-adjustable mounting kit	34
[3]	Proximity switch SIES-8M	For homing in combination with third-party motors	40
[4]	Sensor mounting EAPR		36
[5]	Profile mounting MUE	Included in the scope of delivery of the planar surface gantry: • X-stroke < 500 mm: 2 pairs • X-stroke ≥ 500 mm: 3 pairs	34
[6]	Connection kit	Retaining brackets for mounting the energy chain Included in the scope of delivery: • 2 connecting pieces • 4 socket head screws M4x10	37
[7]	Energy chain EADH-U-3D	As a cable guide for the Z-axis	37
[8]	Mounting kit EAHT-E9	Mounting kit for the energy chain and a Z-axis, such as EGSL, DGSL, EGSK Stroke reduction in combination with mounting kit EAHT → page 13	35

Note

Homing is always carried out using the mechanical stop in combination with the drive package from Festo; the sensor mounting and proximity switch are not required in this case.

Datasheet

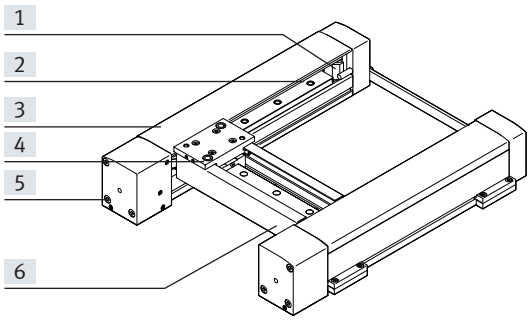
General technical data		
Design		Planar surface gantry
Guide		Recirculating ball bearing guide
Stroke of the		
X-axis	[mm]	100, 150, 200, 300, 400, 500
		90 ... 700
Y-axis	[mm]	110, 160, 210, 260, 310, 360, 410, 460, 510
		110 ... 526
Rated load at max. dynamic response[1]	[kg]	2/3[2]
Max. process force[3]	[N]	100
Max. torque		→ Page 10
Max. no-load torque		→ Page 10
Nominal torque of motor	[Nm]	0.5
Motor holding torque	[Nm]	0.5
Max. acceleration	[m/s²]	20/10[4]
Max. speed		
EXCM-...-SB-...	[m/s]	0.5
EXCM-...-ST-...	[m/s]	1.0/0.5[4]
Repetition accuracy	[mm]	±0.05
Mounting position		Any[5]
Type of mounting		
Planar surface gantry		With profile mounting
Controller		Via DIN rail, on sub-base

1) Rated load = tool load (attachment components) + payload
2) Vertical/horizontal installation position.
3) Perpendicular to the working plane, at standstill
4) In case of a load supply of 48 V/24 V
5) Motors with brake must be used in the case of vertical installation

Operating and environmental conditions		
Degree of protection		IP20
Ambient temperature	[°C]	+10 ... +45
Storage temperature	[°C]	–10 ... +60
Relative humidity	[%]	0 ... 90 (non-condensing)
Noise level	[dB(A)]	52
Duty cycle	[%]	100
CE marking (see declaration of conformity)		To EU Machinery Directive

Datasheet

Materials



Size		30
[1]	Guide pulley	Aluminium
[2]	Toothed belt	Polychloroprene with glass cord
[3]	Covering	
	X-Axis	Polymer
	Y-axis	Stainless steel
[4]	Slide	Aluminium
[5]	End cap	Aluminium
[6]	Y-axis	Aluminium
–	Guide	Steel
	Ball bearings	Steel
	Note on materials	RoHS-compliant
		Contains paint-wetting impairment substances

Weight [kg]	
Product weight with 0 mm stroke (without rated load, motors and controllers)	
EXCM-...	1.73
EXCM-...-P8	1.80
Y-axis (without slide)	0.34/0.4[1]
Slide of the Y-axis	0.13
Additional weight per 50 mm stroke	
X-axis	0.237
Y-axis	0.12 0/0.132[1]
Weight	
2 motors	0.9
2 motors with brake	1.5

1) Standard/with protection against particles P8

Toothed belt		
Size		30
Pitch	[mm]	2
Elongation	[%]	0.14
Reference force for elongation	[N]	40
Width	[mm]	8
Effective diameter	[mm]	12.1
Feed constant[1]	[mm/rev]	38

1) Feed constant at 45° travel

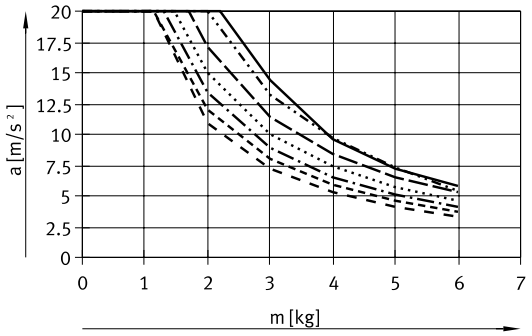
Note

Engineering software
Handling Guide Online
www.festo.com/handling-guide

Datasheet

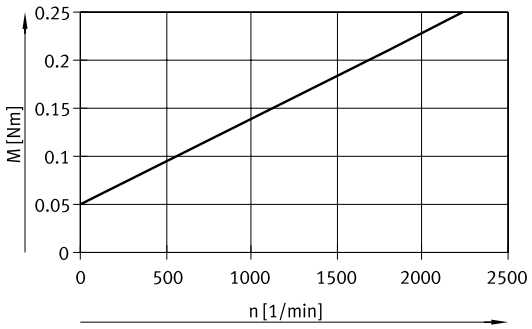
Acceleration a as a function of the rated load m and stroke of the Y-axis

The following data applies to a horizontal installation position and refers to the service life of the mechanical system of 3500 km. For vertical installation positions, please get in touch with your local contact at Festo.
The centre of gravity of the slide is at the height of the slide in the Z-direction and in the centre of the slide in the X-/Y-directions.



- Stroke, Y-axis = 110/160/210 mm
- Stroke, Y-axis = 260 mm
- Stroke, Y-axis = 310 mm
- Stroke, Y-axis = 360 mm
- Stroke, Y-axis = 410 mm
- Stroke, Y-axis = 460 mm
- Stroke, Y-axis = 510 mm

No-load torque M as a function of rotational speed n



Datasheet

Load values

The centre of gravity of the slide is at the height of the slide in the Z-direction and in the centre of the slide in the X-/Y-directions.
The system is subject to the greatest load in the case of 45° travel.
The following data apply in this case:

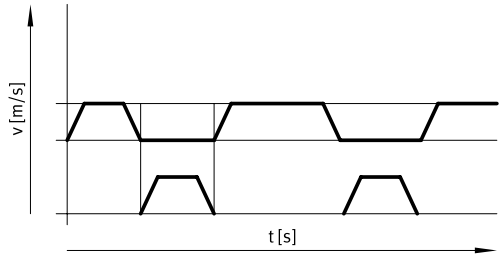
Formula for calculating the required torque M and the required rotational speed n
$M_{45°} = a \times (4.28 \times m_L + 2.14 \times m_{Ay} + 23.38 \times J_m + 0.56) \times 10^{-3} + M_R$
$n_{45°} = 60000 / \text{feed constant(mm)} \times \text{sqrt(2)}$

a = acceleration [m/s²]
v = speed [m/s]
m_{Ay} = product weight of the Y-axis [kg] ➔ page 9
m_L = attachment component (Z-axis) [kg] with payload
J_m = moment of inertia of the motor [kgcm²] ➔ table below
M_R = no-load torque [Nm] ➔ page 10
$n_{45°}$ = rotational speed at 45° travel [rpm]

Sample calculation

Assuming:
Planar surface gantry
EXCM-30-700-410-KF-ST

$a_{max} = 10$ m/s²
$v_{max} = 2$ m/s
Payload = 0.5 kg



Calculation:
1. What is the max. acceleration permitted by the mechanical system?

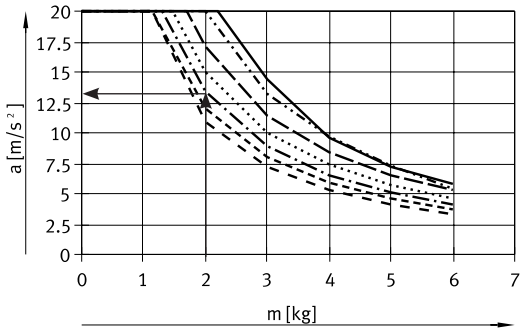
Moving mass m_L on the Y-axis:
m_L = 2 kg

Stroke of the Y-axis:
410 mm

Results:
With a moving mass m_L of 2 kg, the maximum permissible acceleration is 13 m/s².
The required acceleration of 10 m/s² is therefore permissible.

Note

The following data applies to a horizontal installation position. For a vertical installation position, please get in touch with your local contact at Festo.
The centre of gravity of the slide is at the height of the slide in the Z-direction and in the centre of the slide in the X-/Y-directions.



Stroke, Y-axis = 110/160/210 mm
Stroke, Y-axis = 260 mm
Stroke, Y-axis = 310 mm
Stroke, Y-axis = 360 mm
Stroke, Y-axis = 410 mm
Stroke, Y-axis = 460 mm
Stroke, Y-axis = 510 mm

Datasheet

Sample calculation

2. Is the attached motor sufficient for this load?

Assuming:

a_{max} = 10 m/s²
v_{max} = 0.35 m/s
m_{Ay} = 1.32 kg
m_L = 2 kg
J_m = 0.082 kgcm²

$M_{45°} = a \times (4.28 \times m_L + 2.14 \times m_{Ay} + 23.38 \times J_m + 0.56) \times 10^{-3} + M_R$
$n_{45°}$ = 60000 / feed constant(mm) x sqrt(2)

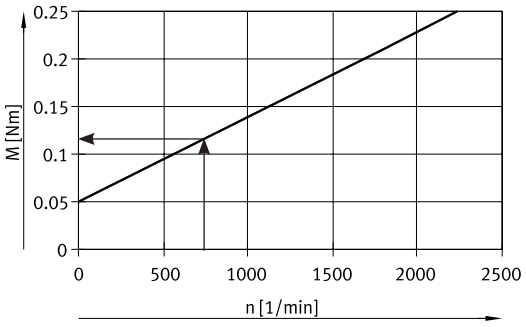
a = acceleration [m/s²]
v = speed [m/s]
m_{Ay} = product weight of the Y-axis [kg] ➔ page 9
m_L = attachment component (Z-axis) [kg] with payload
J_m = moment of inertia of the motor [kgcm²] ➔ table below
M_R = no-load torque [Nm] ➔ page 10
$n_{45°}$ = nominal rotational speed at 45° travel [rpm]

Note

These requirements for the dynamic response apply to 45° travel.
The dynamic values may be higher for travel only in the X- or Y-direction.

Determining M45°

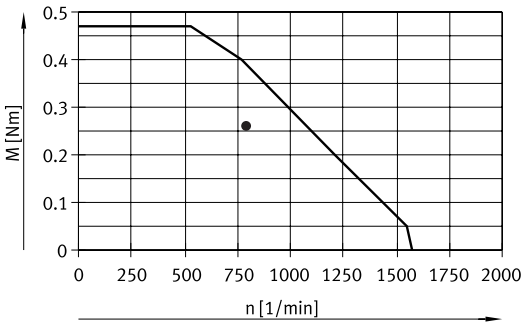
$n_{45°}$ = 60000 / feed constant(mm) x sqrt(2)



No-load torque:
EXCM-30

M_R = 0.12 Nm
$M_{45°} = a \times (4.28 \times m_L + 2.14 \times m_{Ay} + 23.38 \times J_m + 0.56) \times 10^{-3} + M_R$
$M_{45°}$ = 10 m/s² x (4.28 x 2 kg + 2.14 x 1.32 kg + 23.38 x 0.082 kgcm² + 0.56) x 10^{-3} + 0.12 Nm = 0.26 Nm

Results:



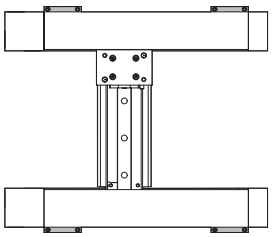
The torque value lies below the motor characteristic curve.
The design is thus acceptable.

Datasheet

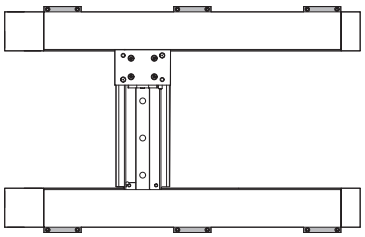
Minimum number of profile mountings

Depending on the installation position and the stroke of the X-axis, a different number of profile mountings is required.

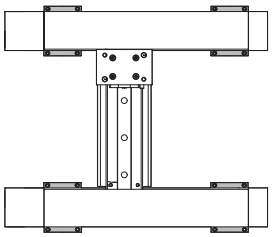
Horizontal installation position
Stroke < 500 mm



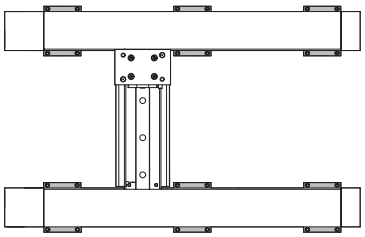
Stroke ≥ 500 mm



Vertical installation position
Stroke < 500 mm



Stroke ≥ 500 mm

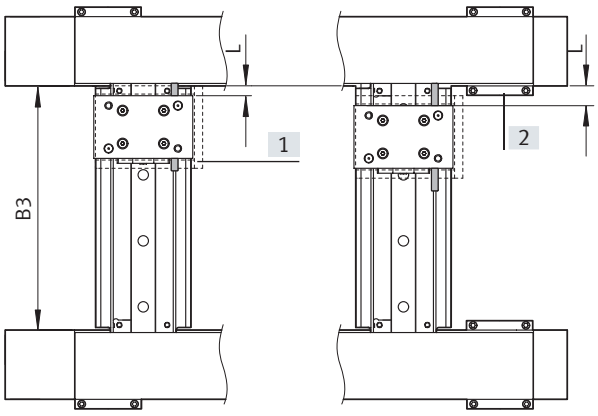


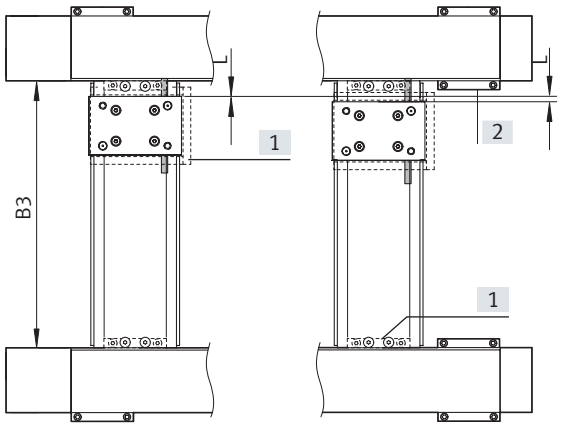
Stroke of the X-axis [mm]	Number of profile mountings Horizontal installation position	Vertical installation position
100 ... 499	2 per profile, inside or outside	4 per profile, inside and outside
500 ... 700	3 per profile, inside or outside	6 per profile, inside and outside

Stroke reduction in combination with mounting kit EAHT-E9

The reduction is influenced by the following factors:

- [1] The mounting kit EAHT-E9 is wider than the slide of the Y-axis
- [2] By adjusting kits EADC-E11 or profile mountings MUE that are mounted on the inside of the X-axis
- [3] When using an additional mounting surface for the cover in combination with EXCM-...-P8 (with protection against particles)





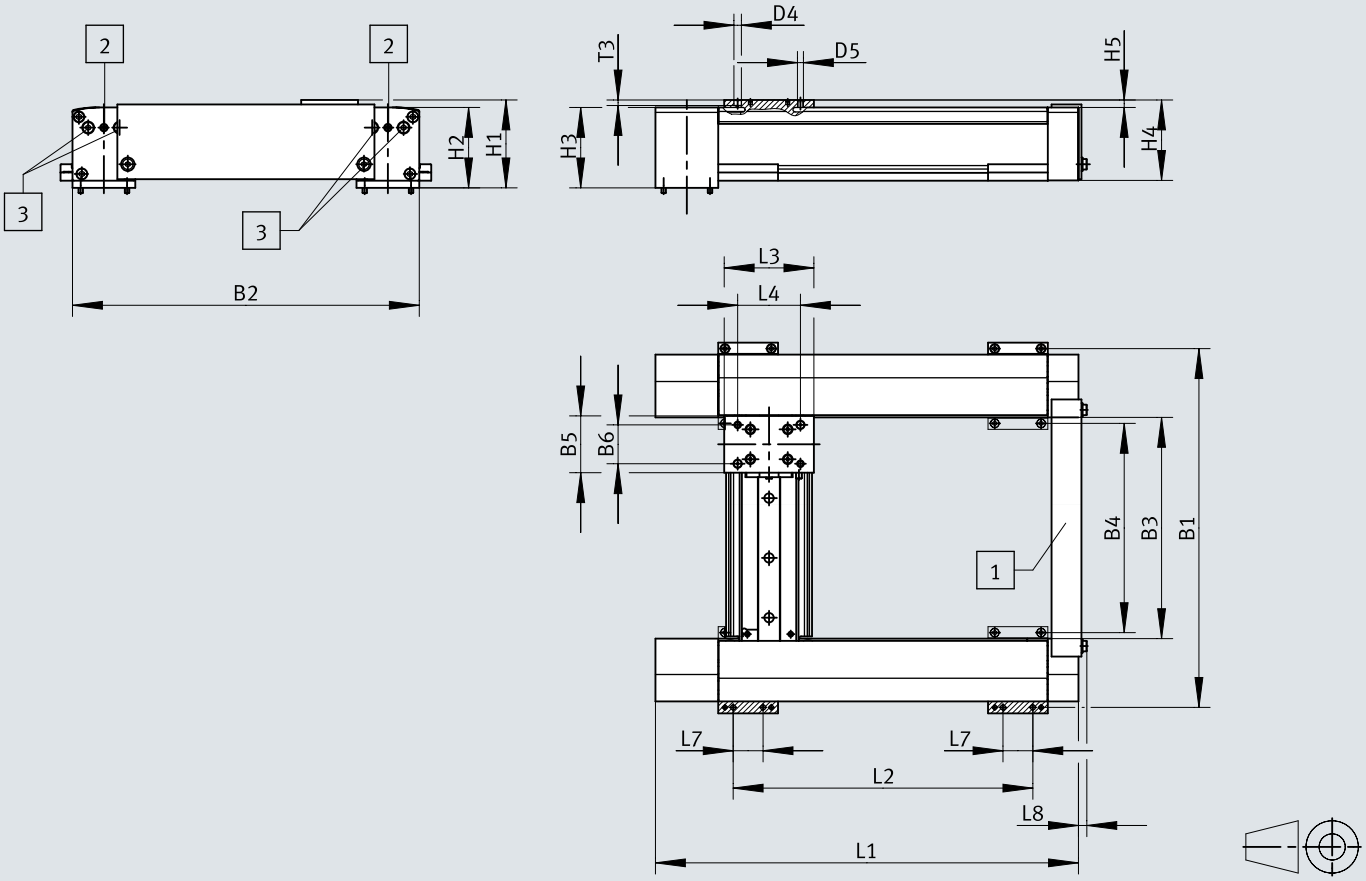
	B3 (→ from page 14)		L	
	For EXCM-...	For EXCM-...-P8	For EXCM-...	For EXCM-...-P8
With mounting kit EAHT-E9	38 + stroke	63 + stroke	2x 8 mm	No stroke reduction
With mounting kit EAHT-E9 and adjusting kits EADC-E11/ profile mountings MUE			2x 16 mm	2x 4 mm

Datasheet

Dimensions Download CAD data ➔ www.festo.com

EXCM-30-... and EXCM-30-...-P8

Motor attachment position – Underneath



[1] Transport lock serves as transport aid and can be removed after assembly

[2] Threaded pin for securing the adjusting screws

[3] Screw for setting the toothed belt tension

Datasheet

Type	B5	B6 ±0.03	D4 ø H8	D5	H1	H2	H3
EXCM-30-...	38	26	5	M4	58.8	53.8	53.8
EXCM-30-...-P8	38	26	5	M4	58.8	53.8	53.8

Type	H4	H5	L3	L4 ±0.03	L7	L8	T3
EXCM-30-...	54	5	60	42	20	5.6	3.7
EXCM-30-...-P8	56	7	60	42	20	5.6	3.7

Stroke-dependent dimensions

Stroke of the X-axis	L1	L2 ±0.2
100	233	150.5
150	283	200.5
200	333	250.5
300	433	350.5
400	533	450.5
500	633	550.5
90 ... 700	133 + stroke	50.5 + stroke

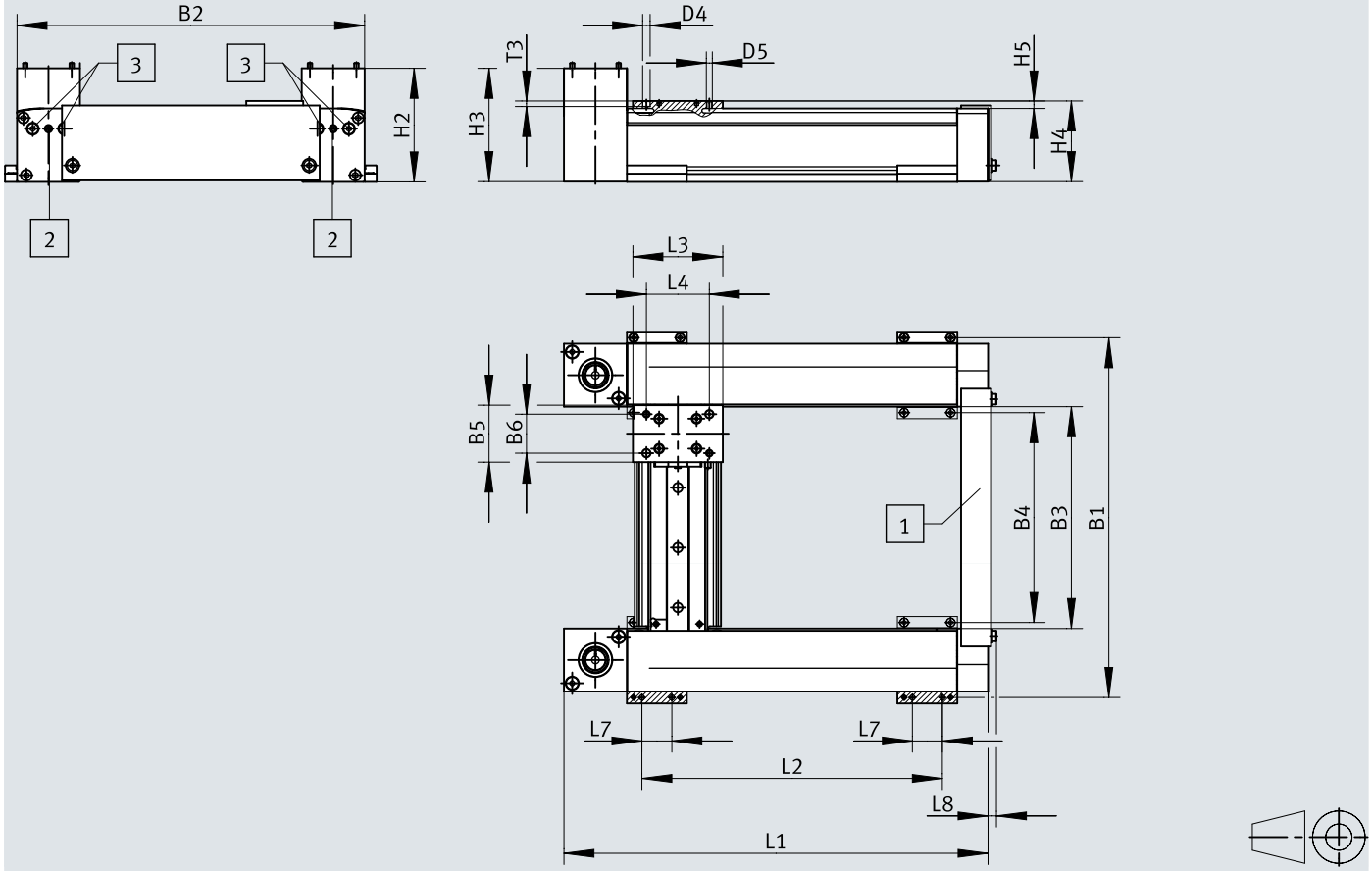
Stroke of the Y-axis	B1		B2		B3		B4	
	EXCM-30-...-		EXCM-30-...-		EXCM-30-...-		EXCM-30-...-	
		P8		P8		P8		P8
110	240	265	232	257	148	173	140	165
160	290	315	282	307	198	223	190	215
210	340	365	332	357	248	273	240	265
260	390	415	382	407	298	323	290	315
310	440	465	432	457	348	373	340	365
360	490	515	482	507	398	423	390	415
410	540	565	532	557	448	473	440	465
460	590	615	582	607	498	523	490	515
510	640	665	632	657	548	573	540	565
110 ... 510	130 + stroke	155 + stroke	122 + stroke	147 + stroke	38 + stroke	63 + stroke	30 + stroke	55 + stroke

Datasheet

Dimensions Download CAD data ➔ www.festo.com

EXCM-30-... and EXCM-30-...-P8

Motor attachment position – On top



[1] Transport lock serves as transport aid and can be removed after assembly

[2] Threaded pin for securing the adjusting screws

[3] Screw for setting the toothed belt tension

Datasheet

Type	B5	B6 ±0.03	D4 ø H8	D5	H2	H3	H4
EXCM-30-...	38	26	5	M4	75.8	75.6	54
EXCM-30-...-P8	38	26	5	M4	75.8	75.6	56

Type	H5	L3	L4 ±0.03	L7	L8	T3
EXCM-30-...	5	60	42	20	5.6	3.7
EXCM-30-...-P8	7	60	42	20	5.6	3.7

Stroke-dependent dimensions

Stroke of the X-axis	L1	L2 ±0.2
100	233	150.5
150	283	200.5
200	333	250.5
300	433	350.5
400	533	450.5
500	633	550.5
90 ... 700	133 + stroke	50.5 + stroke

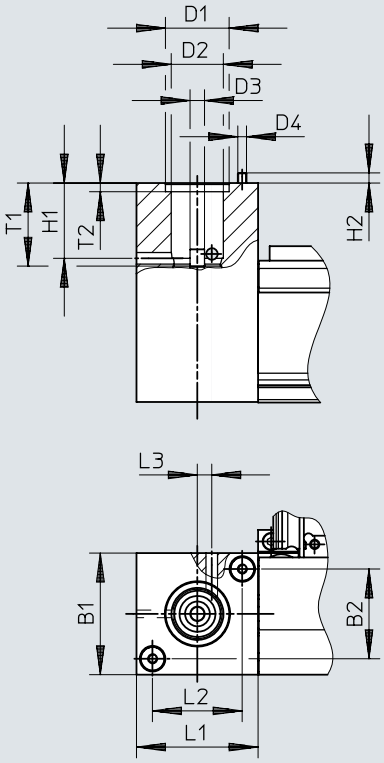
Stroke of the Y-axis	B1		B2		B3		B4	
	EXCM-30-...-		EXCM-30-...-		EXCM-30-...-		EXCM-30-...-	
		P8		P8		P8		P8
110	240	265	232	257	148	173	140	165
160	290	315	282	307	198	223	190	215
210	340	365	332	357	248	273	240	265
260	390	415	382	407	298	323	290	315
310	440	465	432	457	348	373	340	365
360	490	515	482	507	398	423	390	415
410	540	565	532	557	448	473	440	465
460	590	615	582	607	498	523	490	515
510	640	665	632	657	548	573	540	565
110 ... 510	130 + stroke	155 + stroke	122 + stroke	147 + stroke	38 + stroke	63 + stroke	30 + stroke	55 + stroke

Datasheet

Dimensions Download CAD data ➔ www.festo.com

EXCM-30-... and EXCM-30-...-P8

Motor interface



Type	B1	B2 ±0.1	D1 ø H7	D2 ø	D3 ø f8	D4	H1
EXCM-30-...	42	31	22	16	5	M3	26

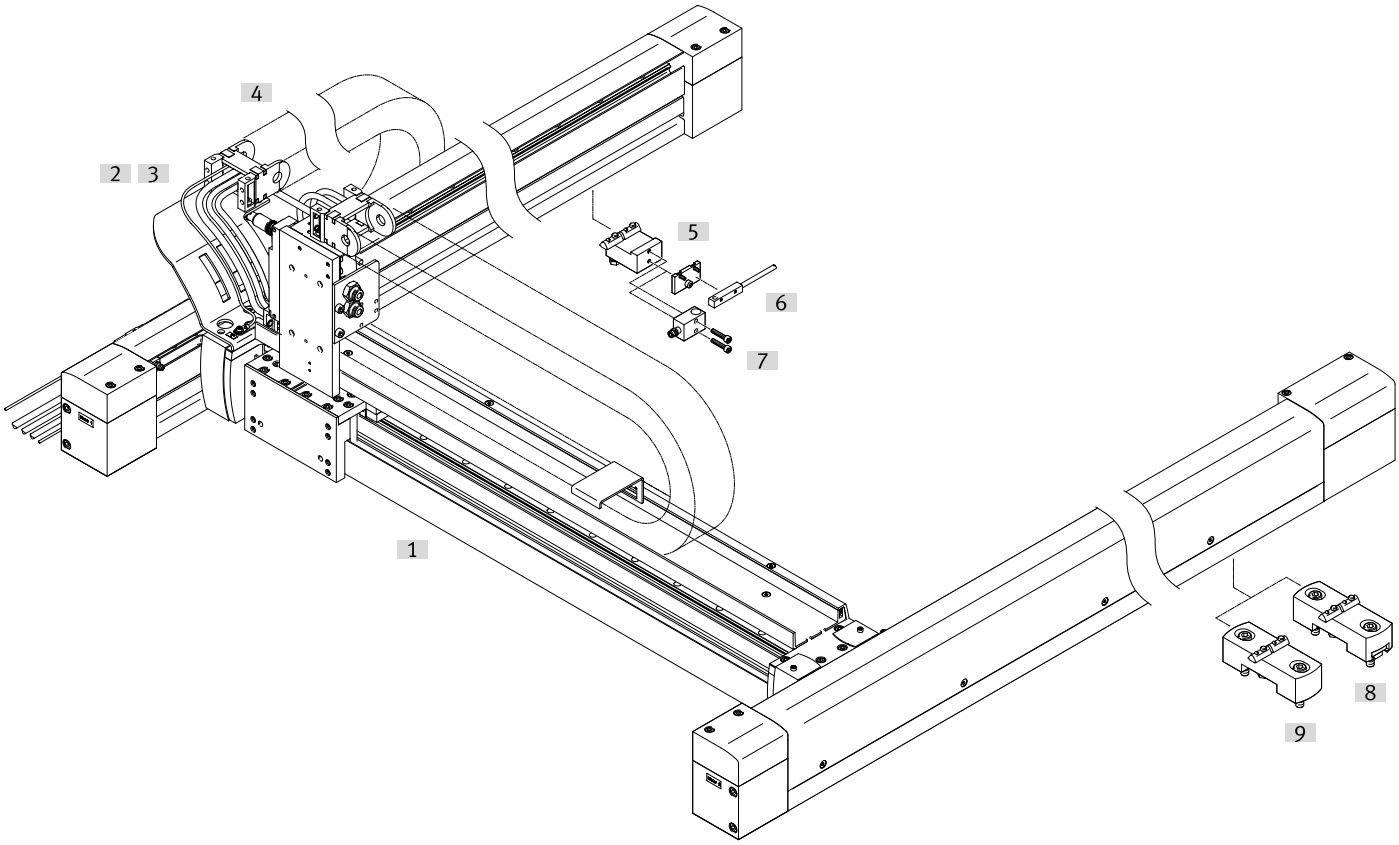
Type	H2	L1	L2 ±0.1	L3	T1	T2
EXCM-30-...	3.6	42	31	5	28.7	3

Ordering data – Modular product system

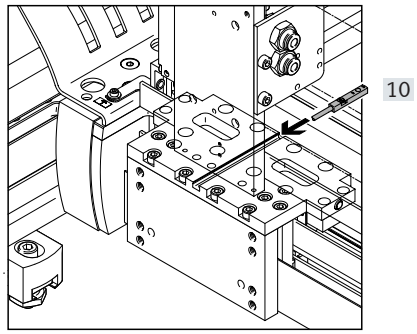
Ordering table

Size		30	Condi-tions	Code		Enter code
Module no.		**2226101**				
Product type		EXCM series M		**EXCM**		EXCM
Size		30		**-30**		30
Stroke of the X-axis	[mm]	100		**-100**		
	[mm]	150		**-150**		
	[mm]	200		**-200**		
	[mm]	300		**-300**		
	[mm]	400		**-400**		
	[mm]	500		**-500**		
	[mm]	90 ... 700		**-...**		
Stroke of the Y-axis	[mm]	110		**-110**		
	[mm]	160		**-160**		
	[mm]	210		**-210**		
	[mm]	260		**-260**		
	[mm]	310		**-310**		
	[mm]	360		**-360**		
	[mm]	410		**-410**		
	[mm]	460		**-460**		
	[mm]	510		**-510**		
	[mm]	110 ... 526		**-...**		
Guide		Recirculating ball bearing guide		**-KF**		KF
Motor type		Without stepper motors		**-W**		
Protection against particles		Standard				
		Protected version		**-P8**		
Motor attachment position		Underneath		**-B**		
		On top		**-T**		
Cable length		None				
		Motor and encoder cable 0.5 m		**2**		
		Motor and encoder cable 1 m		**3**		
		Motor and encoder cable 1.5 m		**4**		
		Motor and encoder cable 2 m		**5**		
Document language		German		**-DE**		
		English		**-EN**		
		Spanish		**-ES**		
		French		**-FR**		
		Italian		**-IT**		
		Russian		**-RU**		
		Chinese		**-ZH**		

Peripherals overview



Proximity switch for sensing the position of the slide on the Y-axis



Peripherals overview

Attachments and accessories

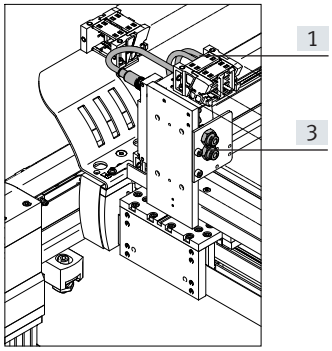
Type		Description	→ Page/Internet
[1]	Planar surface gantry EXCM	–	22
[2]	Multi-pin plug distributor NEDU	• For connecting up to 6 inputs/outputs • Included in the scope of delivery of the planar surface gantry	nedu
[3]	Plug socket with cable SIM	• Connecting cable between multi-pin plug distributor NEDU and the controller • Included in the scope of delivery of the planar surface gantry	sim
[4]	Energy chain	• For EXCM-40: type IGUS 2500.03.075.0	–
[5]	Sensor mounting EAPR	• For mounting the proximity switches SIES-Q8B, SIES-V3B on the X-axis • Not included in the scope of delivery of the planar surface gantry	39
[6]	Proximity switch SIES-Q8B	• For position sensing on the X-axis • Not included in the scope of delivery of the planar surface gantry	40
[7]	Proximity switch SIES-V3B	• For position sensing on the X-axis • Not included in the scope of delivery of the planar surface gantry	40
[8]	Adjusting kit EADC-12	• Height-adjustable mounting kit for the planar surface gantry • Included in the scope of delivery of the planar surface gantry. If no adjusting kit is selected in the modular product system, the mounting kit will automatically be delivered	38
[9]	Mounting kit EAHM-E12	• Non-height-adjustable mounting kit for the planar surface gantry	38
[10]	Proximity switch SIES-8M	• For position sensing on the Y-axis • Not included in the scope of delivery of the planar surface gantry	40
–	Plastic tubing PUN-H-6x1	• Two pieces of tubing are connected to the bulkhead fittings and routed in the energy chains on delivery (for pneumatic Z-axis, one tube on the valve and one on the bulkhead fitting)	pun

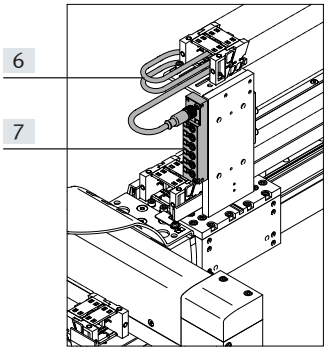
Selection of attachment components

The gantry is delivered as standard in the configuration without attachment elements.
The engineering software "Handling Guide Online" can be used to configure the planar surface gantry with other attachment components, such as a pneumatic or electric Z-axis.

EXCM-... (without attachment component)

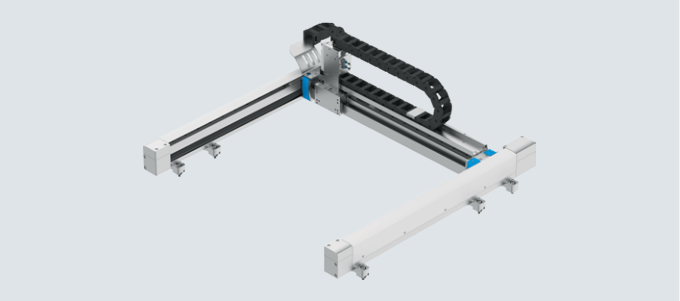
The following are pre-installed:
- 2 supply ports for e.g. Z-axis
- Multi-pin plug distributor for bundling signals:
  – e.g. proximity switch





Components		Number of components
[1]	Tubing	2
[3]	Bulkhead fitting	2
[6]	Plug socket with cable	1
[7]	Multi-pin plug distributor (6-way)	1
–	Earthing cable	2

Datasheet



General technical data		
Design		Planar surface gantry
Guide		Recirculating ball bearing guide
Stroke of the		
X-axis	[mm]	200 ... 2000
Y-axis	[mm]	200 ... 1000
Rated load at max. dynamic response[1]	[kg]	4
Process force in Z-direction	[N]	450
Max. no-load torque[2][3]		→ Page 25
Max. acceleration[4]		
Purely mechanical system	[m/s²]	20
Max. speed[4]		
With motor	[m/s]	1
Purely mechanical system	[m/s]	2
Repetition accuracy	[mm]	±0.1
Mounting position		Horizontal
Type of mounting		Mounting kit, adjusting kit

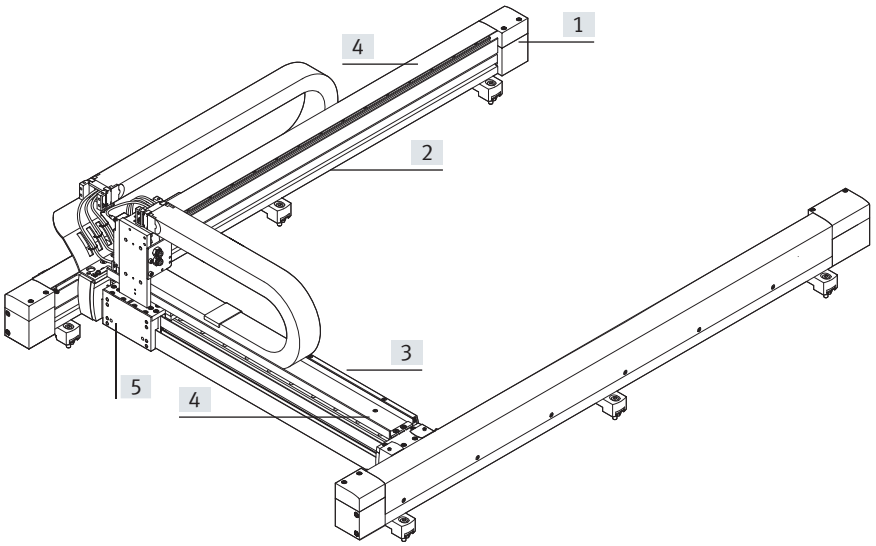
1) Rated load = tool load (attachment component (Z-axis) + e.g. gripper) + payload
2) These values must also be complied with when installing third-party motors
3) At v=0.2 m/s and 45° travel.
4) This data applies only under ideal conditions.
Please consult a sales engineer from Festo for a precise configuration.
Additional information → page 25

Operating and environmental conditions		
Degree of protection		IP40
Ambient temperature[1]	[°C]	+10 ... +50
Storage temperature	[°C]	–10 ... +60
Relative humidity	[%]	0 ... 90 (non-condensing)
Noise level	[dB(A)]	65
Duty cycle	[%]	100
CE marking (see declaration of conformity)		To EU Machinery Directive

1) Note operating range of proximity switches and motors

Datasheet

Materials



Size		40
[1]	Drive and end caps	Aluminium
[2]	Profiles of the X-axis	Aluminium
[3]	Profile of the Y-axis	Aluminium
[4]	Covering	
	X-Axis	Aluminium
	Y-axis	Aluminium
[5]	Slide	Aluminium
–	Coupling	Aluminium with elastomer ring gear
	Guide	Steel
	Drive pinion	Steel
	Ball bearings	Steel
	Toothed belt	PU with steel cord
	Note on materials	RoHS-compliant
		Contains paint-wetting impairment substances

Datasheet

Weight [kg]	
Product weight at 0 mm stroke (without rated load, motors, axial kits, mounting kits)	
EXCM-...-W-T	16.7
EXCM-...-W-B	17.5
X-axis (2x)	8.5
Y-axis (without slide)	6.2
Slide of the Y-axis	1.5
Additional weight per 100 mm stroke	
X-axis	1.75
Y-axis	0.89
Axial kit[1)]	
For EMMS-ST-57-M	0.54
Motor[1)]	
EXCM-...-ST (without brake)	1.2
EXCM-...-SB (with brake)	1.38
Mounting kit for X-axis	
Adjusting kit[1)]	0.78
Mounting kit[1)]	0.33

1) Weight per component

Toothed belt		
Size		40
Pitch	[mm]	3
Elongation	[%]	0.04
Reference force for elongation	[N]	80
Width	[mm]	20
Effective diameter	[mm]	27.69
Feed constant[1)]	[mm/rev]	87

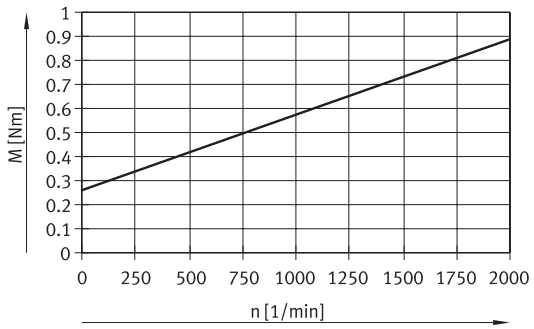
1) Feed constant at 45° travel

Note

Engineering software
Handling Guide Online
www.festo.com/handling-guide

Datasheet

No-load torque M as a function of rotational speed n



Load values

The centre of gravity of the slide is at the height of the slide in the Z-direction and in the centre of the slide in the X-/Y-directions.
The system is subject to the greatest load in the case of 45° travel.
The following data apply in this case:

Formula for calculating the required torque M and the required rotational speed n

$M_{45°} = a \times (9.79 \times m_L + 4.89 \times m_{Ay} + 10.21 \times J_m + 19.58) \times 10^{-3} + M_R$

$n_{45°} = 60000 / \text{feed constant(mm)} \times \text{sqrt}(2)$

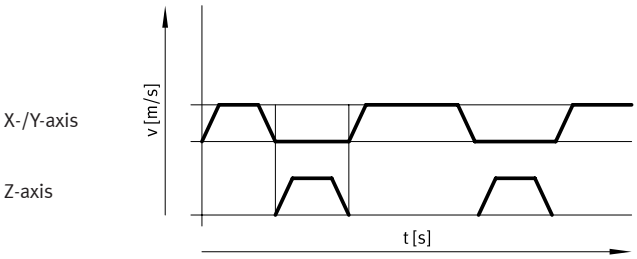
a = acceleration [m/s²]
v = speed [m/s]
m_{Ay} = product weight of the Y-axis [kg] ➔ page 24
m_L = attachment component (Z-axis) [kg] with payload
J_m = moment of inertia of the motor [kgcm²] ➔ table below
M_R = no-load torque [Nm] ➔ page 25
$n_{45°}$ = nominal rotational speed at 45° travel [rpm]

Datasheet

Sample calculation

Assuming:
Planar surface gantry
EXCM-40-1000-500-KF-SB-B-PF7-HE1-...
with motor attached
EMMS-ST-57-M-SEB-G2

a_{max} = 2 m/s²
v_{max} = 0.5 m/s
Payload = 0.5 kg
Attachment component on Z-axis: EGSL-BS-45-100-10P



Sample calculation

2. Is the attached motor sufficient for this load?

Assuming:
a_{max} = 2 m/s²
v_{max} = 0.5 m/s
m_{Ay} = 10.65 kg
m_L = 3.8 kg
J_m = 0.5 kgcm²

$M_{45°} = a \times (9.79 \times m_L + 4.89 \times m_{Ay} + 10.21 \times J_m + 19.58) \times 10^{-3} + M_R$
$n_{45°}$ = 60000 / feed constant(mm) x sqrt(2)

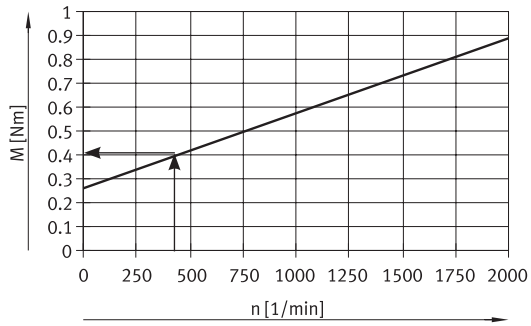
a = acceleration [m/s²]
v = speed [m/s]
m_{Ay} = product weight of the Y-axis [kg] ➔ page 24
m_L = attachment component (Z-axis) [kg] with payload
J_m = moment of inertia of the motor [kgcm²] ➔ table below
M_R = no-load torque [Nm] ➔ page 25
$n_{45°}$ = nominal rotational speed at 45° travel [rpm]

Note
These requirements for the dynamic response apply to 45° travel.
The dynamic values may be higher for travel only in the X- or Y-direction.

Sample calculation

Determining M45°

$n_{45°}$ = 60000 / feed constant(mm) x sqrt(2)



No-load torque:

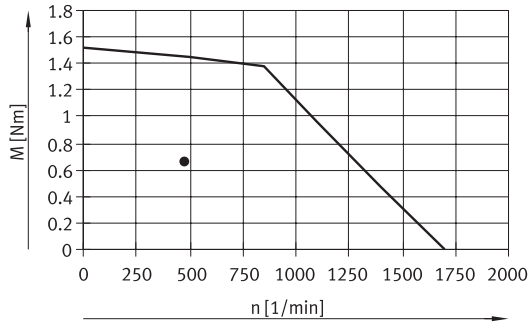
EXCM-40

M_R = 0.4 Nm

$M_{45°} = a \times (9.79 \times m_L + 4.89 \times m_{Ay} + 10.21 \times J_m + 19.58) \times 10^{-3} + M_R$

$M_{45°} = 2\ m/s^2 \times (9.79 \times 3.8\ kg + 4.89 \times 10.65\ kg + 10.21 \times 0.5 kg\ cm^2 + 19.58) \times 10^{-3} + 0.4\ Nm = 0.63\ Nm$

Results:



The torque value lies below the motor characteristic curve.
The design is thus acceptable.

Datasheet

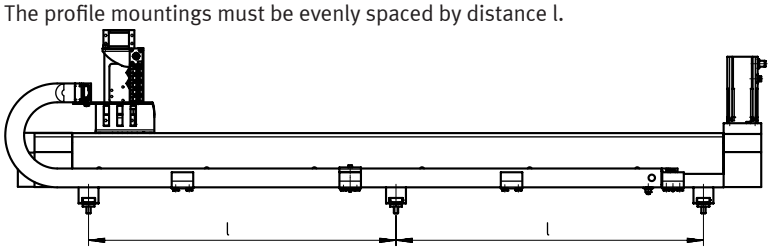
Minimum number of profile mountings

Irrespective of the installation position, a different number of profile mountings needs to be used depending on the stroke of the X-axis.
The required number is mounted on delivery.

Stroke of the X-axis [mm]	Number of profile mountings per axis
200 ... 499	2
500 ... 899	2
900 ... 1799	3
1800 ... 2000	4

Distances between the profile mountings

The profile mountings must be evenly spaced by distance l.

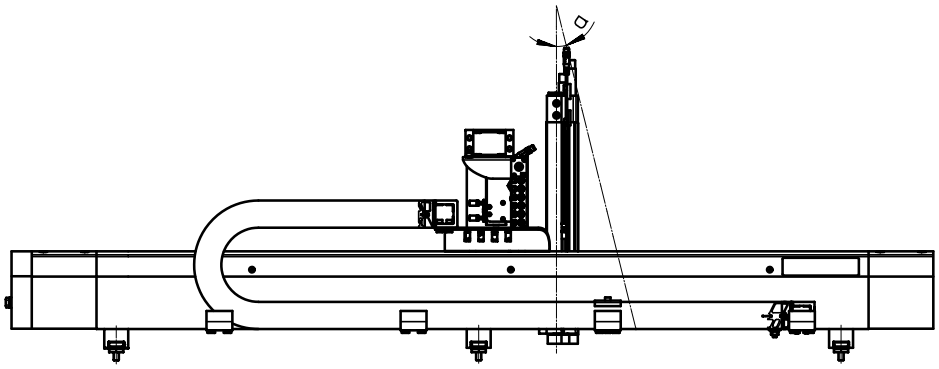


$$l_1 = \frac{l + 141}{n - 1}$$

l_1 = distance
l = stroke
n = number of profile mountings per axis

Installation position of attachment components

Due to manufacturing tolerances and the backlash in the guides, the angle between the mounting plane and the attachment component, e.g. Z-axis, may not be exactly 90° in certain circumstances.
Max. deviation:
á = ±1.1°

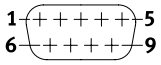


Datasheet

Pin allocations

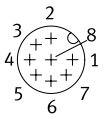
Motors on the X-/Y-axis

Motor



PIN	Function
1	String A
2	String A/
3	String B
4	String B/
5	n. c.
6	n. c.
7	Brake (24 V)
8	Brake (0 V)
9	–

Encoder

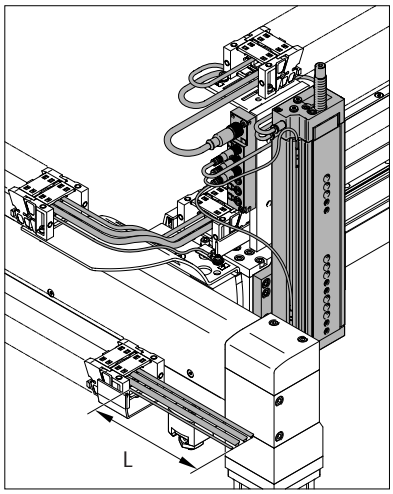


PIN	Function
1	Signal trace A
2	Signal trace A/
3	Signal trace B
4	Signal trace B/
5	0 V
6	Signal trace N
7	Signal trace N/
8	5 V

Selection of cable lengths

2 cable lengths (5 m or 10 m) can be selected using the modular product system ➔ page 32.
This specification relates to the output of the energy chain at the X-axis (dimension L) and describes the minimum length by which the cables and tubing protrude.
The selected length applies to the following components:

- Tubing
- Plug sockets with cable

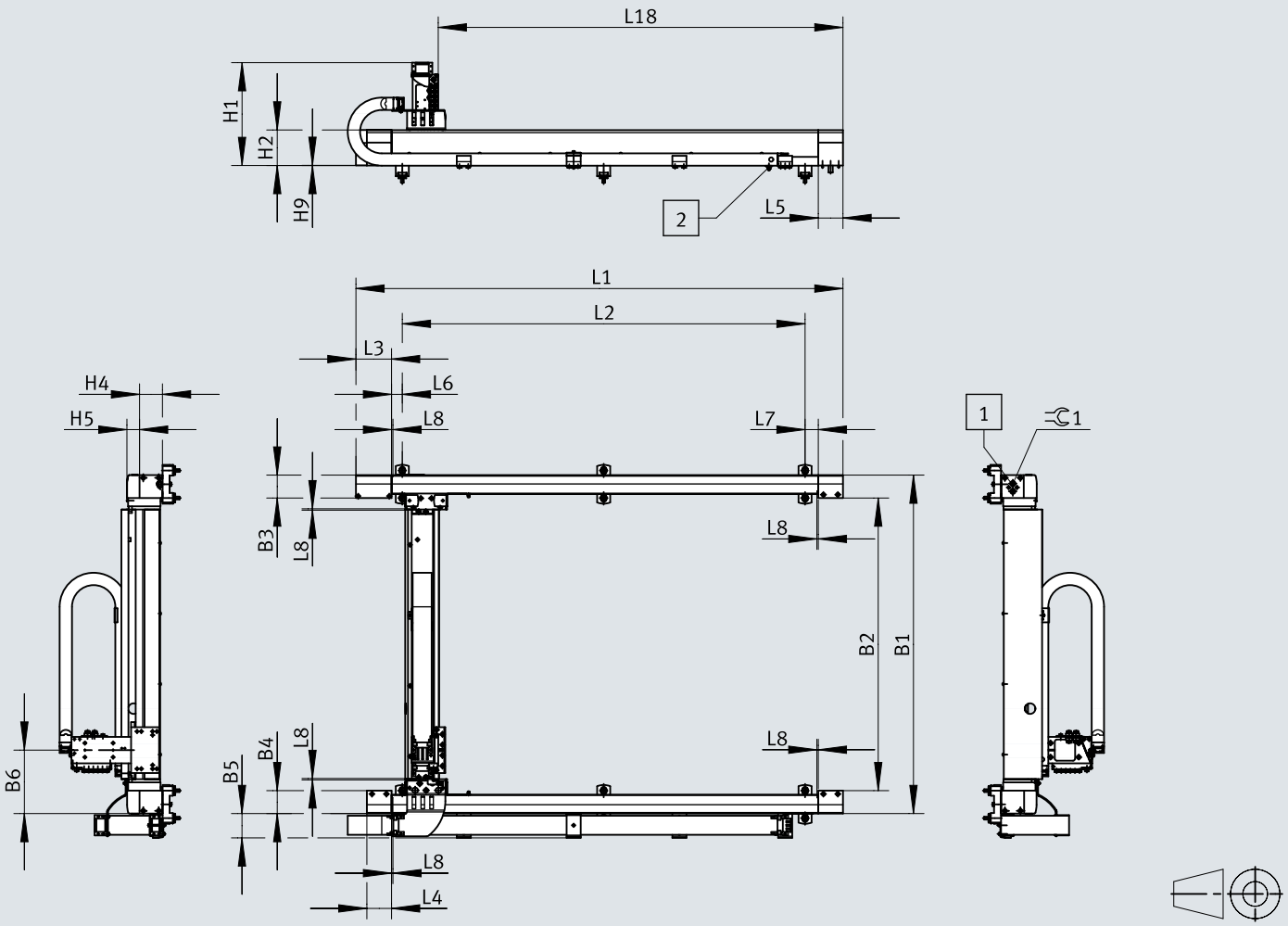


Sample product image

Datasheet

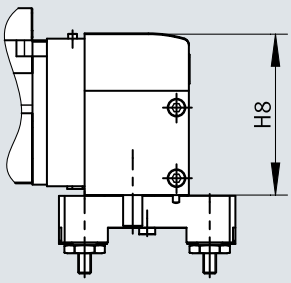
Dimensions Download CAD data ➔ www.festo.com

EXCM-40-...-T – Motor attachment position on top

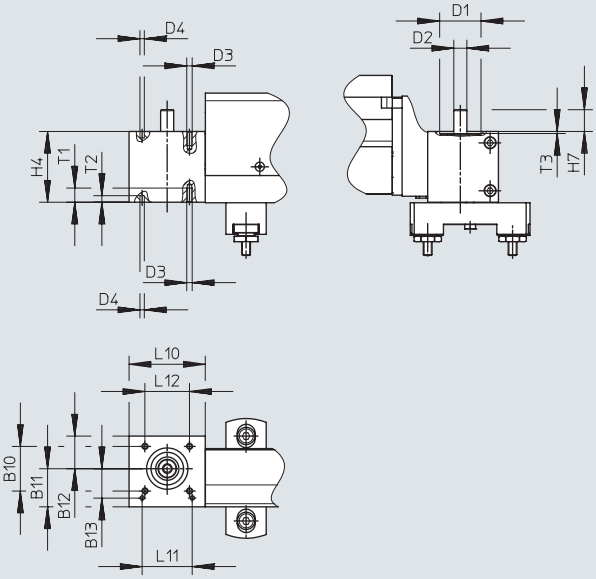


[1] Screw for toothed belt tension
[2] Earthing point
L8 Safety distance per side

EXCM-40-...-B – Motor attachment position underneath



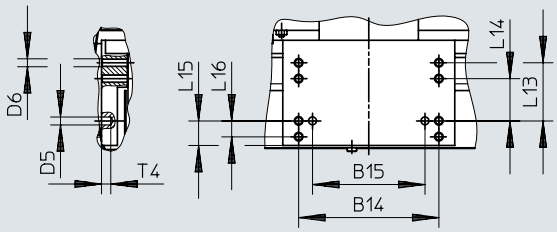
EXCM-40-... – Motor interface

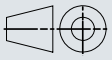


Datasheet

Dimensions Download CAD data ➔ www.festo.com

EXCM-40-... – Slide





Type	B3	B4	B5	B6	B9	B10	B11	B12	B13 ±0.05	B14 ±0.1
EXCM-40	65	65	69	179.9	56.4	41	35	30	27	106

Type	B15 ±0.03	D1 ø H7	D2 ø h6	D3	D4 ø H7	D5 ø H7	D6	H1	H2	H3
EXCM-40	85	38	12	M5	4	6	M6	Approx. 293	100.8	124/159.5[1)]

Type	H4	H5	H6	H7	H8	H9	L3	L4	L5	L6	L7	L8
EXCM-40	65	33.6	20	20	100.3	0.5	101	70	70	30.5	37.5	6

Type	L10	L11 ±0.03	L12	L13 ±0.1	L14 ±0.1	L15	L16 ±0.1	T1	T2	T3	T4	=⊂1
EXCM-40	70	46	41	44	32	18.5	12	12	6	1.9	7	6

Stroke-dependent dimensions

Stroke of the X-axis	L1	L2	L18	Stroke of the Y-axis	B1	B2
200 ... 2000	382+stroke	➔ Page 28	167.2+stroke	200 ... 1000	360+stroke	230+stroke

1) With brake

Note

Depending on the stroke of the X-axis, a different number of profile mountings is required. The distance between the profile mountings must always be the same (➔ page 28).

The tension of the toothed belt must be set before commissioning. The tools required to do this (e.g. frequency meter) are not included in the scope of delivery.

Ordering data – Modular product system

Ordering table

Size	40	Conditions	Code		Enter code
Module no.	**3741955**				
Product type	EXCM series M		**EXCM**		EXCM
Size	40		**-40**		-40
Stroke of the X-axis [mm]	200 ... 2000				
Stroke of the Y-axis [mm]	200 ... 1000				
Guide	Recirculating ball bearing guide		**-KF**		-KF
Motor type	Without motor		**-W**		
Motor attachment position	Underneath		**-B**		
	On top		**-T**		
Cable length	None				
	5 m		**6**		
	10 m		**7**		
Mounting kit	With mounting kit				
	With adjusting kit		**-J**		
Document language	German		**-DE**		
	English		**-EN**		
	Spanish		**-ES**		
	French		**-FR**		
	Italian		**-IT**		
	Russian		**-RU**		
	Swedish		**-SV**		
	Chinese		**-ZH**		

Note

In combination with key feature W (without motor), the planar surface gantry EXCM is provided without a coupling housing and without a coupling.

Note

The planar surface gantry can only be operated with a load voltage of 48 V.

Accessories

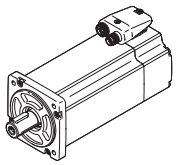
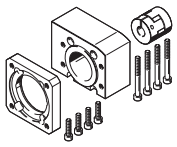
Note

Depending on the combination of motor and drive, it may not be possible to reach the maximum feed force of the drive.

Third-party motors that have an overly high driving torque may damage the linear gantry. When selecting the motors, please observe the limits specified in the technical data.

Permissible axis/motor combinations with axial kit

Datasheets → Internet: eamm-a

Motor / gear unit[1]	Axial kit		
		• Kits for third-party motors → Internet: eamm-a	
Type	Part no.	Type	
EXCM-30			
With stepper motor			
EMMT-ST-42-..., EMMB-ST-42-...	**8210057**	**EAMM-A-X22-42A**	
EXCM-40			
With stepper motor			
EMMS-ST-57-...	**8165289**	**EAMM-A-X48-57A**	
EMMT-ST-87-..., EMMB-ST-87-...	**8210061**	**EAMM-A-X48-87A**	

1) The input torque must not exceed the max. permissible transferable torque of the axial kit.

Ordering data

Coupling	For axial kit	Part no.	Type
	EAMM-A-X48-57A	**550995**	**EAMC-30-35-6.35-12**

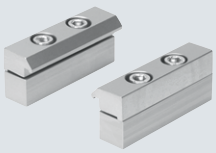
Accessories

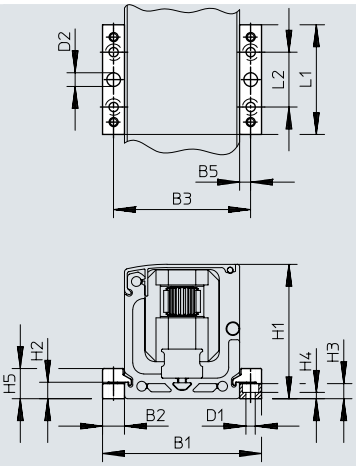
Profile mounting MUE
For size 30

Material:
Anodised aluminium
RoHS-compliant

For mounting the planar surface gantry (scope of delivery: 1 pair)

Included in the scope of delivery of the planar surface gantry:
X-stroke < 500 mm: 2 pairs
X-stroke ≥ 500 mm: 3 pairs





Dimensions and ordering data

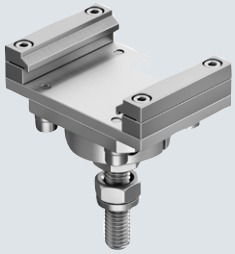
For size	B1	B2	B3	B5	D1 ø	D2 ø H7	H1	H2	H3
30	58	8	50	4	3.4	5	49	6	5.5

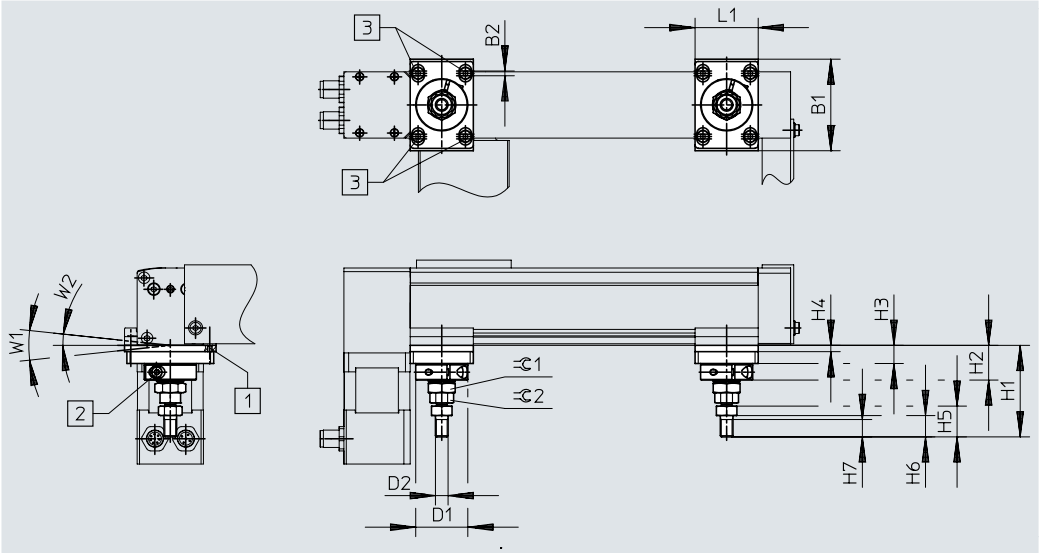
For size	H4	H5	L1	L2	Weight [g]	Part no.	Type
30	2.3	11	40	20	20	**558042**	**MUE-50**

Adjusting kit EADC-E11
For size 30

Material:
Anodised aluminium
RoHS-compliant

For mounting and aligning the planar surface gantry. The kit is height adjustable.





[1] Interface for MUE-50
[2] Socket head screw M4x16
[3] Socket head screw M4x8

Dimensions and ordering data

For size	B1	B2	D1 ø	D2	H1 +12/–2	H2	H3	H4	H5	H6	H7
30	58	3	33	M8	58	22	11.5	4	19.5	13.5	11

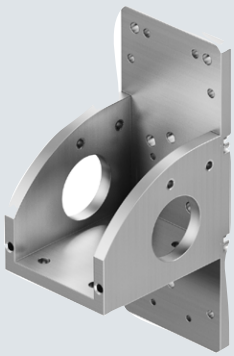
For size	L1	W1	W2	⊂1	⊂2	Weight [g]	Part no.	Type
30	40	12°	6°	17	13	160	**4706964**	**EADC-E11-30**

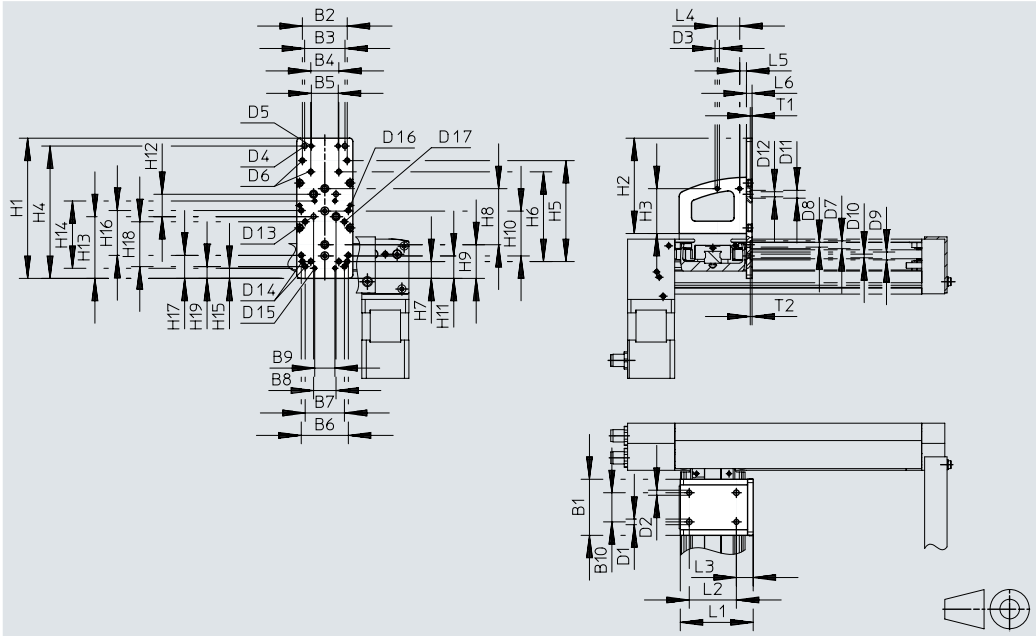
Accessories

Mounting kit EAHT-E9
For size 30

Material:
Anodised aluminium
RoHS-compliant

Prepared hole patterns for:
- Mini slide EGSL-35
- Mini slide DGSL-8/-10/-12
- Electric slide EGSK-20/-26
- Electric cylinder EPCO-16
- Mini slide EGSC-BS-25/-32





Dimensions and ordering data

For size	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	D1 ø H7	D2 ø
30	50	40	36	25	24	42	35	20	18	26	5	4.5

For size	D3	D4	D5	D6	D7 ø H7	D8	D9 ø H7	D10	D11 ø H7	D12 ø	D13 ø	D14
30	M4	M5	M4	M4	7	M5	7	M4	7	4.5	4.5	M4

For size	D15	D16	D17	H1	H2	H3	H4 ±0.2	H5	H6	H7	H8	H9
30	M3	M4	M4	125	85	40	118	90	80	15	50	30

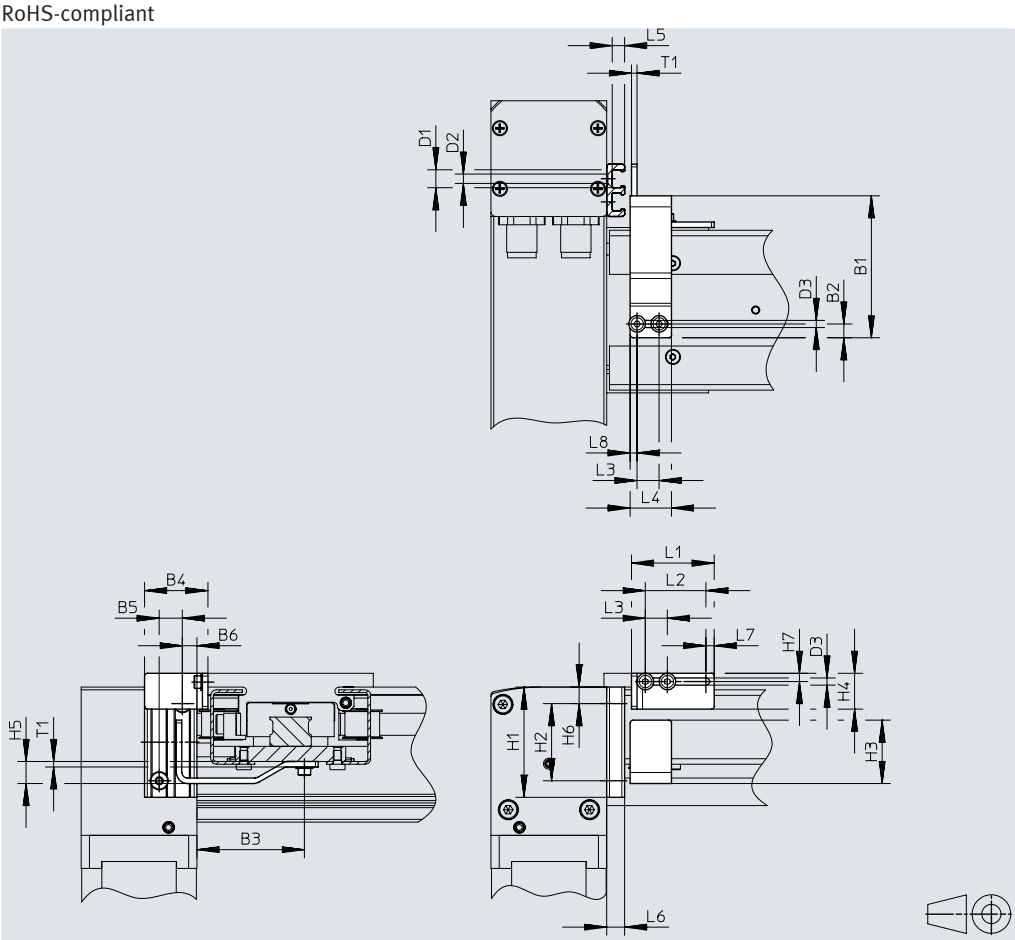
For size	H10	H11	H12	H13	H14	H15	H16	H17	H18	H19	L1	L2
30	40	20	20	55	60	9	40	20.5	40	10.5	65	42

For size	L3	L4	L5	L6	T1 ±0.1	T2 ±0.1	Weight [g]	Part no.	Type
30	15	20	6	5	1.6	1.6	165	**4070088**	**EAHT-E9-FB-3D-30**

Accessories

Sensor mounting EAPR
For size 30
(incl. switch lug)

Material:
Retaining bracket: Wrought aluminium alloy
Switch lug: Steel
RoHS-compliant



For homing in combination with third-party motors.

Dimensions and ordering data

For size	B1	B2	B3	B4	B5	B6	D1 ø	D2 ø	D3 ø	H1
30	51.5	5	39	23	8.4	5.3	6.5	3.4	2.6	40

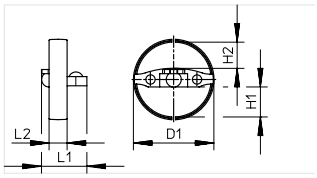
For size	H2	H3	H4	H5	H6	H7	L1	L2	L3	L4
30	28	23	13	8	6	3	30	22	8	15

For size	L5	L6	L7	L8	T1	Weight [g]	Part no.	Type
30	4.5	6.5	3	2.5	2	330	**2319236**	**EAPR-E11-30**

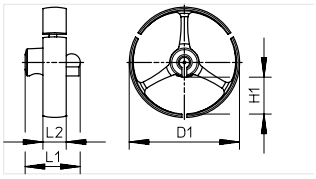
Accessories

Energy chain and connection set for size 30
Ordering data – Energy chain

EADH-U-30-30



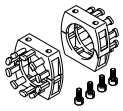
EADH-U-30-40



Type		D1 ø	H1	H2
	EADH-U-3D-30	34.5	12.5	11
	EADH-U-3D-40	45	15	–

For size	Max. bending radius [mm]	Length [mm]	Weight [g]	Part no.	Type
30	50	Approx. 500	75	**8059999**	**EADH-U-3D-30**
	58	Approx. 500	100	**8060324**	**EADH-U-3D-40**

Ordering data – Connection set

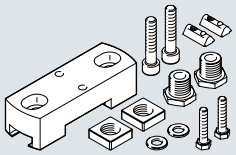
	For energy chain	Description	Part no.	Type
	EADH-U-3D-30	For mounting the energy chain. Included in the scope of delivery: • 2 connecting pieces • 4 socket head screws M4x10	**8060325**	**EAHT-AE-3D-30**
	EADH-U-3D-40		**8060326**	**EAHT-AE-3D-40**

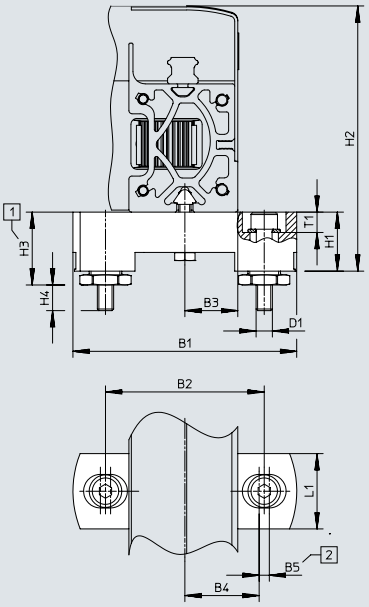
Accessories

Adjusting kit EADC-E12
For size 40

Material:
Anodised aluminium
RoHS-compliant

For mounting and aligning the planar surface gantry. The kit is height adjustable.





[1] Adjustable
[2] Width of elongated hole
Height differences of up to 5 mm can be compensated using the adjusting kit.

Dimensions and ordering data

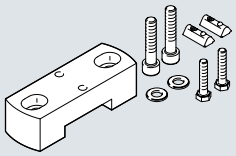
For size	B1	B2	B3	B4 ±0.2	B5	D1	H1	H2
40	110	78	26	36.5	5	M8	29	129.8

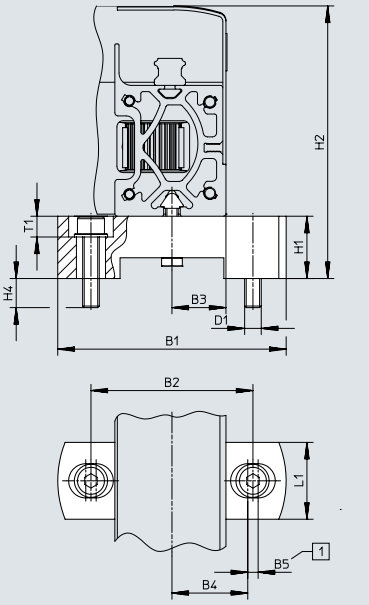
For size	H3 min.	H3 max.	H4 max.	L1	T1 ±0.1	Weight [g]	Part no.	Type
40	34.8	39.8	14	37	10	800	**8029165**	**EADC-E12-40**

Mounting kit EAHM-E12
For size 40

Material:
Anodised aluminium
RoHS-compliant

For mounting the planar surface gantry. The kit is not height adjustable.





[2] Width of elongated hole
The mounting kit cannot be used for compensation.

Dimensions and ordering data

For size	B1	B2	B3	B4 ±0.2	B5	D1	H1 ±0.2
40	110	78	26	36.5	5	M8	30

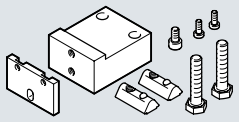
For size	H2	H4 max.	L1	T1 ±0.1	Weight [g]	Part no.	Type
40	131.3	14	37	10	330	**3489340**	**EAHM-E12-K-40**

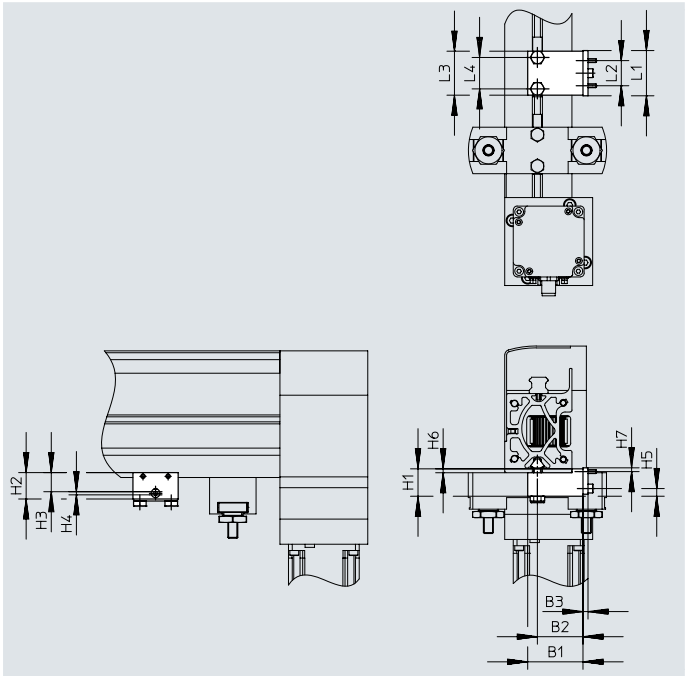
Accessories

Sensor mounting EAPR
For size 40

Material:
Switch lug: Steel
Sensor bracket: Wrought aluminium alloy
RoHS-compliant

For proximity switches SIES-V3B and SIES-Q8B (for sensing the position of the slide on the X-axis)





Dimensions and ordering data

For size	B1	B2	B3	H1	H2	H3 ±0.1	H4	H5	H6 –0.1	H7 –0.2
40	44	36.3	4	21.8	21	15	2.5	6.1	3.1	3

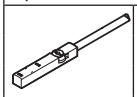
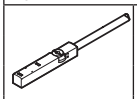
For size	L1	L2	L3	L4	Weight [g]	Part no.	Type
40	36	20	35	25	120	**2536353**	**EAPR-E12-40**

Accessories

Proximity switches for size 30

Ordering data – Proximity switches for T-slot, inductive

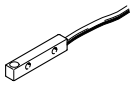
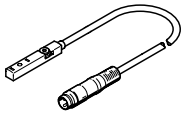
Datasheets → Internet: sies

	Type of mounting	Electrical connection	Switching output	Cable length [m]	Part no.	Type
N/O						
	Inserted in the slot from above, flush with the cylinder profile	Cable, 3-core	PNP	7.5	**551386**	**SIES-8M-PS-24V-K-7.5-OE**
		Plug M8x1, 3-pin		0.3	**551387**	**SIES-8M-PS-24V-K-0.3-M8D**
		Cable, 3-core	NPN	7.5	**551396**	**SIES-8M-NS-24V-K-7.5-OE**
		Plug M8x1, 3-pin		0.3	**551397**	**SIES-8M-NS-24V-K-0.3-M8D**
N/C						
	Inserted in the slot from above, flush with the cylinder profile	Cable, 3-core	PNP	7.5	**551391**	**SIES-8M-PO-24V-K-7.5-OE**
		Plug M8x1, 3-pin		0.3	**551392**	**SIES-8M-PO-24V-K-0.3-M8D**
		Cable, 3-core	NPN	7.5	**551401**	**SIES-8M-NO-24V-K-7.5-OE**
		Plug M8x1, 3-pin		0.3	**551402**	**SIES-8M-NO-24V-K-0.3-M8D**

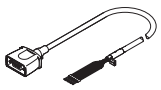
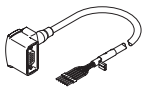
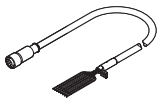
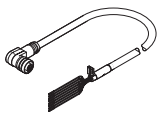
Note

For homing in combination with third-party motors.

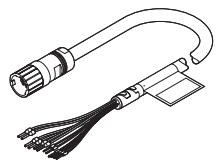
Proximity switches for size 40

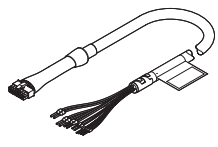
Designation	Description		Cable length [m]	Part no.	Type
Proximity switches for sensing the position of the slide on the X-axis **- To be used in combination with sensor mounting EAPR-E12**					
	• For EXCM-40	PNP, N/O contact	–	**150491**	**SIES-V3B-PS-S-L**
	• For EXCM-40	PNP, N/C contact	–	**174552**	**SIES-Q8B-PO-K-L**
Proximity switch (inductive) for sensing the position of the slide on the Y-axis					
	**Cable with plug**				
	• For EXCM-40 • For DC voltage	PNP, N/C contact	0.3	**551392**	**SIES-8M-PO-24V-K-0.3-M8D**
		PNP, N/O contact	0.3	**551387**	**SIES-8M-PS-24V-K-0.3-M8D**

Accessories

Designation	Description	Cable length [m]	Part no.	Type
For stepper motor EMMS-ST				
Motor cable[1]				
	• For stepper motor EMMS-ST-57 with CMMT-ST • Straight plug	2.5	**1450369**	**NEBM-S1G9-E-2.5-Q5-LE6**
		5	**1450370**	**NEBM-S1G9-E-5-Q5-LE6**
		7	**1450371**	**NEBM-S1G9-E-7-Q5-LE6**
		10	**1450372**	**NEBM-S1G9-E-10-Q5-LE6**
		15	**5085055**	**NEBM-S1G9-E-15-Q5-LE6**
		20	**5085056**	**NEBM-S1G9-E-20-Q5-LE6**
	• For stepper motor EMMS-ST-57 with CMMT-ST • Angled plug	2.5	**1450737**	**NEBM-S1W9-E-2.5-Q5-LE6**
		5	**1450738**	**NEBM-S1W9-E-5-Q5-LE6**
		7	**1450739**	**NEBM-S1W9-E-7-Q5-LE6**
		10	**1450740**	**NEBM-S1W9-E-10-Q5-LE6**
		15	**610856**	**NEBM-S1W9-E-15-Q5-LE6**
Encoder cable[1]				
	• For stepper motor EMMS-ST-57 with CMMT-ST • Straight plug	2.5	**1451587**	**NEBM-M12G8-E-2.5-LE8**
		5	**1451588**	**NEBM-M12G8-E-5-LE8**
		7	**1451589**	**NEBM-M12G8-E-7-LE8**
		10	**1451590**	**NEBM-M12G8-E-10-LE8**
		15	**611110**	**NEBM-M12G8-E-15-LE8**
		20	**611111**	**NEBM-M12G8-E-20-LE8**
	• For stepper motor EMMS-ST-57 with CMMT-ST • Angled plug	2.5	**1451675**	**NEBM-M12W8-E-2.5-LE8**
		5	**1451676**	**NEBM-M12W8-E-5-LE8**
		7	**1451677**	**NEBM-M12W8-E-7-LE8**
		10	**1451678**	**NEBM-M12W8-E-10-LE8**
		15	**610858**	**NEBM-M12W8-E-15-LE8**

1) Cables especially suitable for the motor controller and motor.
Degree of protection to IP65 (in assembled state)

Designation	Description	Cable length [m]	Part no.	Type
For stepper motor EMMT-ST				
Motor cable				
	• For EMMT-ST-42-... with CMMT-ST	2.5	**8181670**	**NEBM-M17G12-EH-2.5-Q6N-LE12**
		5	**8181668**	**NEBM-M17G12-EH-5-Q6N-LE12**
		7	**8190096**	**NEBM-M17G12-EH-7.5-Q6N-LE12**
		10	**8195457**	**NEBM-M17G12-EH-10-Q6N-LE12**
		15	**8214679**	**NEBM-M17G12-EH-15-Q7N-LE12**
	• For EMMT-ST-87-... with CMMT-ST	2.5	**8195458**	**NEBM-M17G12-EH-2.5-Q7N-LE12**
		5	**8195459**	**NEBM-M17G12-EH-5-Q7N-LE12**
		7	**8214681**	**NEBM-M17G12-EH-7.5-Q9N-LE12**
		10	**8214682**	**NEBM-M17G12-EH-10-Q9N-LE12**
		15	**8214683**	**NEBM-M17G12-EH-15-Q9N-LE12**

Designation	Description	Cable length [m]	Part no.	Type
For stepper motor EMMB-ST				
Motor cable				
	• For EMMB-ST-42-... with CMMT-ST	2.5	**8181675**	**NEBM-L5G14-EH-2.5-Q6N-LE12**
		5	**8181664**	**NEBM-L5G14-EH-5-Q6N-LE12**
		7	**8181676**	**NEBM-L5G14-EH-7.5-Q6N-LE12**
		10	**8181672**	**NEBM-L5G14-EH-10-Q6N-LE12**
		15	**8214680**	**NEBM-L5G14-EH-15-Q6N-LE12**
	• For EMMB-ST-87-... with CMMT-ST	2.5	**8181666**	**NEBM-L10G14-EH-2.5-Q7N-LE12**
		5	**8181671**	**NEBM-L10G14-EH-5-Q7N-LE12**
		7	**8214687**	**NEBM-L10G14-EH-7.5-Q9N-LE12**
		10	**8214688**	**NEBM-L10G14-EH-10-Q9N-LE12**
		15	**8214689**	**NEBM-L10G14-EH-15-Q9N-LE12**