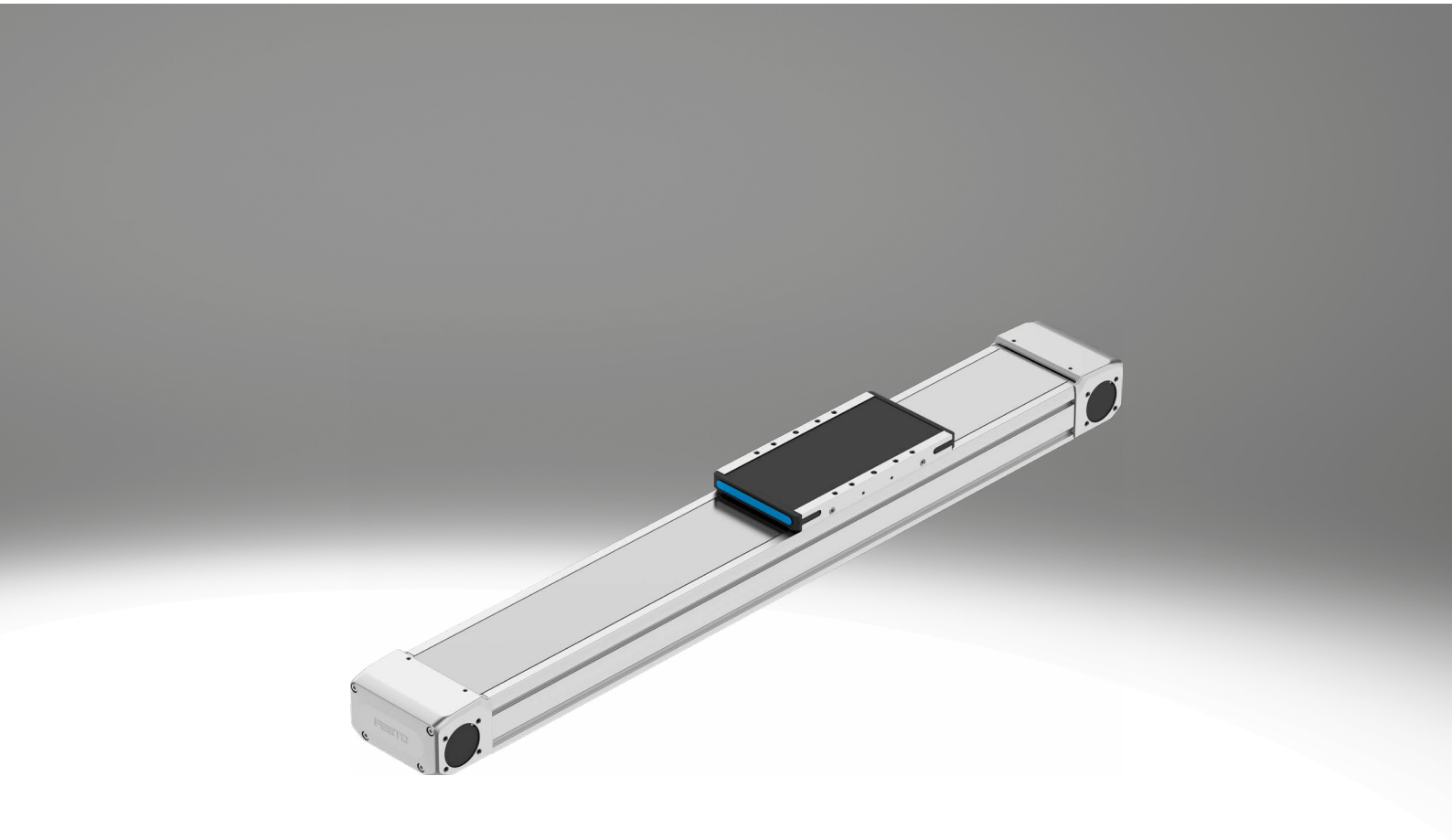
Toothed belt axes ELGD-TB-WD



Key features

At a glance

ELGD-TB (standard design)
- Profile with a square cross section and sturdy drive elements for high feed forces

ELGD-TB-WD (wide design)
- Reduced profile height offers smaller installation dimensions for handling systems and applications that do not require such high feed forces
- 30% lighter, while rigidity and guide load capacity are still similar to the axis in standard design

Innovative guide technology
- Excellent rigidity and load capacity of the guide for higher load in the same installation space
- Less vibration and smoother slide movement protect sensitive workpieces
- High speeds ensure short cycle times and a very long service life minimises downtime

Powerful drive elements
- High feed forces and acceleration for shorter process times
- Long service life and increased reliability reduce TCO

Innovative stainless steel cover strip solution
- Abrasion-free and clean surface protects workpieces from particles
- Minimised number of particles for use in cleanrooms
- Reduced ingress of dirt for use in harsh ambient conditions

Options:
- Extended or additional slide for higher axial and lateral torques and higher loads
- Two freely selectable motor positions at one end of the axis

Sealing air connection:
- Air is exchanged between the interior of the cylinder and the environment via the sealing air connection. This prevents negative pressure or excess pressure from building up inside the cylinder.
- Application of slight negative pressure prevents the emission of particles
- Application of slight excess pressure prevents the ingress of particles

Engineering tools More information ➔ electric-motion-sizing

Save time with smart engineering tools for the optimal solution. Our goal is to increase your productivity. Our engineering tools play an integral part in this. They help you size your system correctly, tap into unimagined productivity reserves and generate additional productivity along the entire value chain. In every phase of your project, from the initial contact to the modernisation of your machine, you will come across a number of different tools which will be of use to you.

Electric Motion Sizing
- Create the optimum drive package quickly and reliably. Electric Motion Sizing calculates suitable combinations of electric axis, electric motor and servo drive using just a few application details. It provides all the relevant data including the bill of materials and documentation for your selected combination. This avoids design errors and results in significantly improved energy efficiency for the system. A seamless connection to the Festo Automation Suite also makes commissioning easier for you.

Icoms More information ➔ elgd-tb

The icons shown in this document are also available online. There, precise values can be displayed.

Key features

Drive system

[TB] Toothed belt

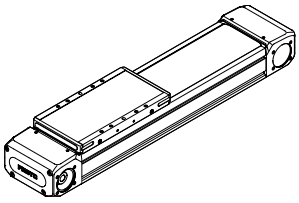
- For applications requiring a high dynamic response and short positioning times
- For long strokes

Stroke reserve

- The stroke reserve is a safety distance from the mechanical end position and is not used in normal operation.
- The sum of the stroke length and 2x stroke reserve must not exceed the maximum working stroke.

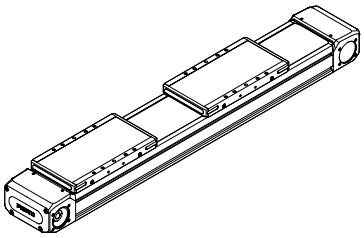
Slide design

[L] Long

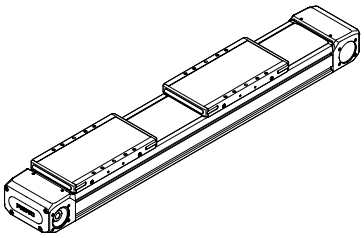


Additional slide

[ZL] Left



[ZR] Right



Lubrication

[ ] Standard

With lifetime lubrication. Lubrication nipple not included in delivery.

[GN] Lubrication nipple

- The lubrication adapters enable the guide to be permanently lubricated using semi- or fully automatic relubrication devices
- The adapters are suitable for oils and greases

Toothed belt material

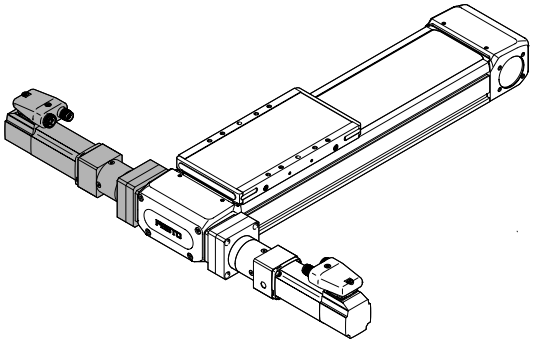
[PU2] Coated PU

- With steel reinforcements for high rigidity
- Fabric coating for a long service life and low abrasion
- Polyurethane material for resistance to many cooling lubricants

[PU1] Uncoated PU, FDA-compliant

- With steel reinforcements for high rigidity
- Blue, FDA-compliant polyurethane for use in the food industry

Motor attachment



- The motor can be attached to the left end of the axis at the front or rear.
- The position of the motor does not have to be specified when ordering and can be changed later
- Note: Unlike other Festo axes, the motor for the ELGD can only be mounted on the left hand end of the axis, as this is the location of the drive pulley. However, the mechanical axis has a symmetrical design so that the axis can be rotated and the motor can be mounted in the required location.

Type codes

001	Series	
ELGD	Gantry axis	

002	Drive system	
TB	Toothed belt	

003	Guide	
KF	Recirculating ball bearing guide	

004	Design type	
WD	Wide	

005	Size	
100	100	

006	Stroke [mm]	
200	200	
300	300	
500	500	
600	600	
800	800	
1000	1000	
1200	1200	
1500	1500	
1800	1800	
2000	2000	
...	50 ... 2800	

007	Stroke reserve	
0H	None	
...H	0 ... 999 mm	

008	Slide design	
L	Slide, long	

009	Additional slide	
	None	
ZL	1 slide left	
ZR	1 slide right	

010	Lubrication	
	Standard	
GN	Lubrication nipple	

011	Material of toothed belt	
PU1	Uncoated PU, FDA-compliant	
PU2	Coated PU	

Datasheet

General technical data		
Size		100
Design		Electromechanical axis with toothed belt
Guide		Recirculating ball bearing guide
Mounting position		Any
Working stroke	[mm]	50 ... 2800
Max. feed force F_x	[N]	240
Max. no-load torque[1]		
ELGD-...-PU1	[Nm]	0.4
ELGD-...-PU2	[Nm]	0.4
Max. no-load resistance to shifting[1]	[N]	29.9
Max. driving torque	[Nm]	3.2
Max. speed	[m/s]	3
Max. acceleration	[m/s²]	50
Repetition accuracy	[mm]	±0.04
Position sensing		For inductive sensors

1) At 0.2 m/s

Operating and environmental conditions		
Ambient temperature[1]	[°C]	0 ... +60
Storage temperature	[°C]	–20 ... +60
Degree of protection		IP40
Duty cycle	[%]	100
Maintenance interval		Lifetime lubrication

1) Note operating range of proximity switches

Weight [g]	
Size	100
Basic weight with 0 mm stroke[1]	3864
Additional weight per 10 mm stroke	55
Moving mass	1360

1) Including slide

Toothed belt		
Size		100
Pitch	[mm]	3
Effective diameter	[mm]	26.74
Feed constant	[mm/rev]	84

Datasheet

Mass moments of inertia		
Size		100
J_0	[kg mm²]	295.42
J_H per metre stroke	[kg mm²/m]	22.52
J_L per kg payload	[kg mm²/kg]	178.76

The mass moment of inertia J_A of the entire axis is calculated as follows:

$J_A = J_0 + J_H \times \text{working stroke [m]} + J_L \times m_{payload}$ [kg]

Homing

Homing can be carried out in two ways:

- Against a fixed stop
- Using a reference switch

The following values must be observed:

Size		100
Max. impact energy	[J]	0.75
Note on the impact energy in the end positions	[m/s]	At maximum homing speed of 0.01 m/s

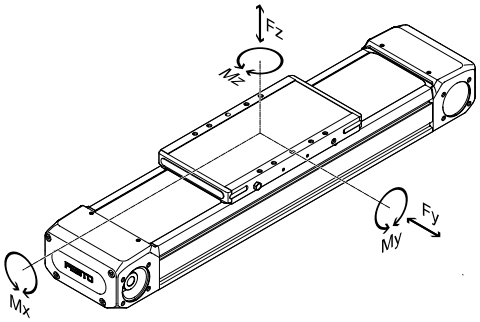
Materials

Axis	
Drive cover	Gravity die-cast aluminium, painted
Slide	Wrought aluminium alloy
Cover strip	High-alloy stainless steel
Toothed belt	
ELGD-...-PU2	Polyurethane with steel cord and nylon cover
ELGD-...-PU1	Polyurethane with steel cord
Guide	Steel
Profile	Anodised wrought aluminium alloy
Belt	High-alloy stainless steel
Note on materials	RoHS-compliant
LABS (PWIS) conformity	VDMA24364 zone III

Datasheet

Load values

The indicated forces and torques refer to the centre of the guide. The point of application of force is the point where the centre of the guide and the longitudinal centre of the slide intersect.
The appropriate size is selected using the following three steps:
1. Check the maximum permissible values (must not be exceeded)
2. Calculate the load comparison factor
3. Determine the service life



Distance from the slide surface to the centre of the guide

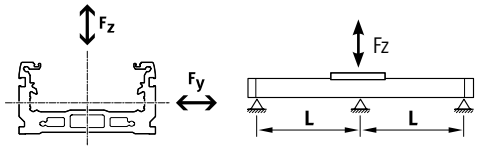
Distance from the slide surface to the centre of the guide		
Size		100
Dimension x	[mm]	47

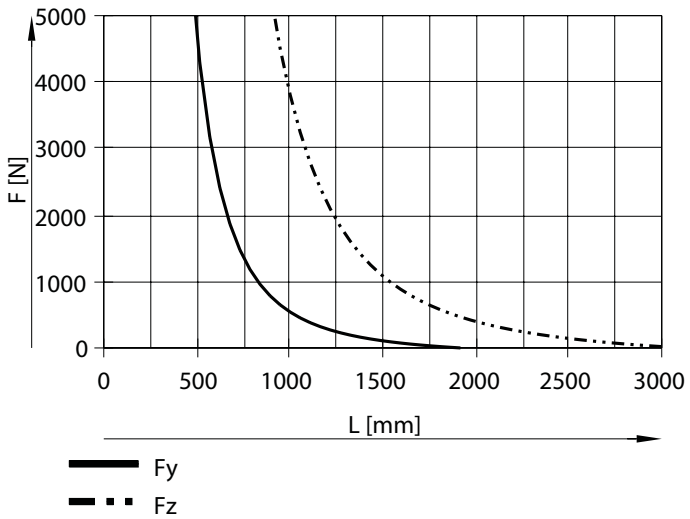
1. Check the maximum permissible values

Max. permissible forces and torques for the overall axis (strength limits)		
Size		100
Max. force Fy, overall axis	[N]	3236
Max. force Fz, overall axis	[N]	2250
Max. torque Mx, overall axis	[Nm]	168
Max. torque My, overall axis	[Nm]	200
Max. torque Mz, overall axis	[Nm]	200

Maximum permissible support spacing L as a function of force F

In order to limit deflection in the case of large strokes, the axis may need to be supported.
The following graphs can be used to determine the maximum permissible support spacing Ly as a function of force F acting on the axis. The deflection is f = 0.5 mm.





Datasheet

2. Calculate the load comparison factor

Note

For a guide system to have a service life of 5000 km, the load comparison factor must have a value of fv ≤ 1, based on the maximum permissible forces and torques for a service life of 5000 km.
This formula can be used to calculate a guide value.
The engineering software "Electric Motion Sizing" is available
for more precise calculations ➔ www.festo.com/x/electric-motion-sizing

If the axis is subjected to two or more of the indicated forces and torques simultaneously, the following equation must be satisfied in addition to the indicated maximum loads:
Calculating the load comparison factor:

$$f_v = \frac{|F_{y1}|}{F_{y2}} + \frac{|F_{z1}|}{F_{z2}} + \frac{|M_{x1}|}{M_{x2}} + \frac{|M_{y1}|}{M_{y2}} + \frac{|M_{z1}|}{M_{z2}} \leq 1$$

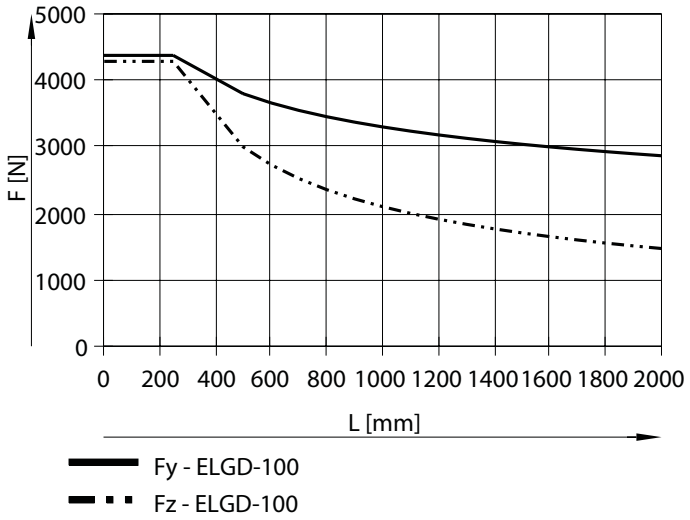
F_1/M_1 = values occurring in the application
F_2 = Permissible values at 5000 km from the graph of support spacing over load
M_2 = maximum permissible values (see table)

Max. permissible torques for the guide calculation with reference service life

Size		100
Reference service life	[km]	5000
Max. torque Mx	[Nm]	130
Max. torque My	[Nm]	200
Max. torque Mz	[Nm]	200

Max. permissible support spacing L as a function of the force F

Depending on how firmly the axis is supported, the maximum permissible forces vary due to the design of the guide system.
If the axis is used as a cantilever or in yoke operation, the values for a support spacing of 2000 mm can be selected.



Datasheet

3. Determine the service life

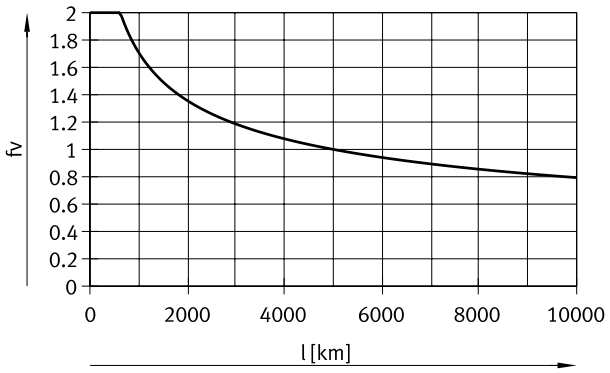
The service life of the guide depends on the load. To be able to provide an indication of the service life of the guide, the graph below plots the load comparison factor fv against the service life.

These values are only theoretical. You must consult your local Festo contact for a load comparison factor fv greater than 1.3.

Load comparison factor f_v as a function of service life l

Example:
A user wants to move an x kg load. Using the formula (➔ page 8) gives a value of 1.3 for the load comparison factor f_v. According to the graph, the guide would have a service life of approx. 2500 km. Reducing the acceleration reduces the Mz and My values. A load comparison factor f_v of 1 now gives a service life of 5000 km.

Note:
If the application has been calculated using “Electric Motion Sizing”, the average guide comparison index represents the workload of the guide.
(100% average guide comparison index corresponds to fv = 1). With this value, the service life can be estimated using the service life graph



Comparison of the characteristic load values for 100 km with dynamic forces and torques of recirculating ball bearing guides

The characteristic load values of the bearing guides are standardised to ISO and JIS using dynamic and static forces and torques. These forces and torques are based on an expected service life of the guide system of 100 km to ISO or 50 km to JIS.
As the characteristic load values are dependent on the service life, the maximum permissible forces and torques for a 5000 km service life cannot be compared with the dynamic forces and torques of bearing guides to ISO/JIS.

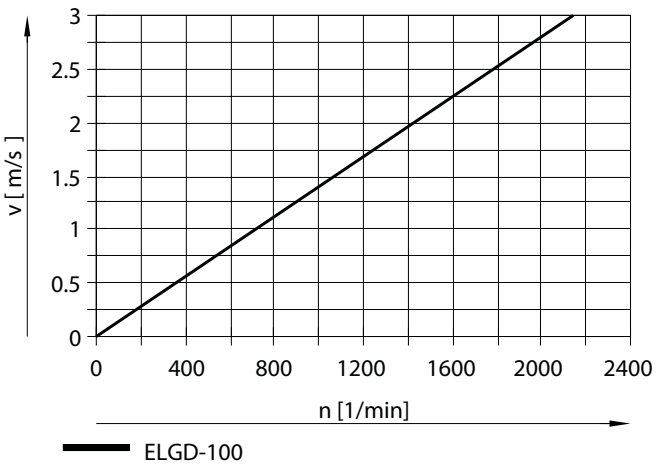
To make it easier to compare the guide capacity of linear axes ELGD with bearing guides, the table below lists the theoretically permissible forces and torques for a calculated service life of 100 km. This corresponds to the dynamic forces and torques to ISO.
These 100 km values have been calculated mathematically and are only to be used for comparing with dynamic forces and torques to ISO. The drives must not be loaded with these characteristic values as this could damage the axes.

Max. permissible forces and torques for a theoretical service life of 100 km (from a guide perspective only)

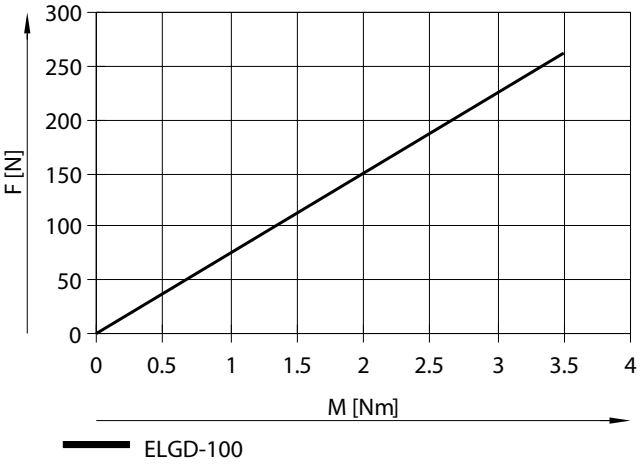
Size		100
$Fy_{max.}$	[N]	18415
Fz_{max}	[N]	18415
$Mx_{max.}$	[Nm]	645
$My_{max.}$	[Nm]	720
$Mz_{max.}$	[Nm]	720

Datasheet

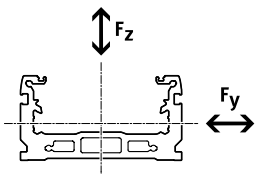
Speed v as a function of rotational speed n



Feed force F as a function of input torque M



2nd moment of area



Size		100
Iy	[mm^4]	0.347 x 10^6
Iz	[mm^4]	2.268 x 10^6

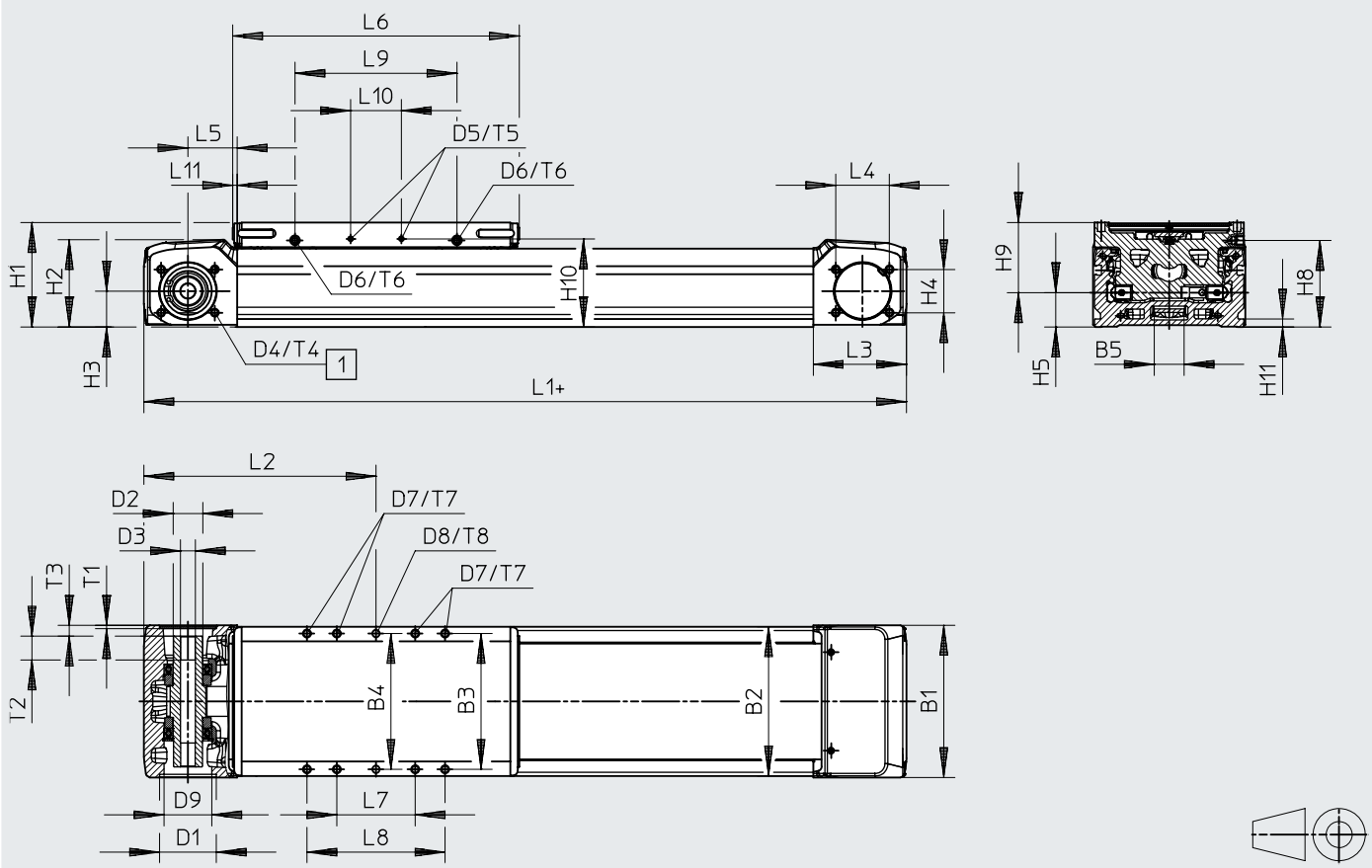
Recommended deflection limits

To avoid impairing the functionality of the axes, we recommend that the following deflection limits are observed. Greater deformation can result in increased friction, greater wear and reduced service life.

Size	Dynamic deflection (moving load)	Static deflection (stationary load)
100	0.05% of the axis length, max. 0.5 mm	0.1% of the axis length

Datasheet

Dimensions – ELGD-TB-... Download CAD data ➔ www.festo.com



[1] Sealing air connection

+ = plus stroke length + 2x stroke reserve

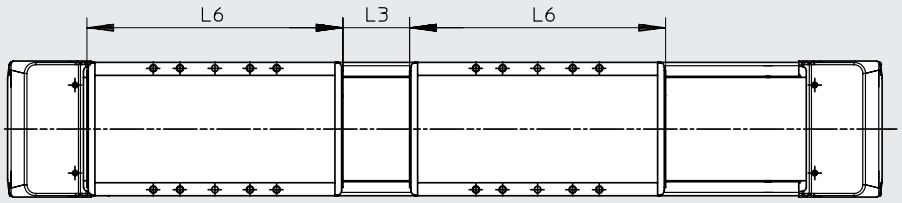
	B1	B2	B3	B4 ±0.03	B5	D1 ø H7	D2 ø k5	D3 ø H7	D4	D5	D6	D7	D8 ø H7	D9 ø	H1
ELGD-TB-100	102	100	91	91	20	38	20	10	M5	M6	M3	M5	5	27.5	70

	H2	H3	H4	H5	H8	H9	H10	H11	L1	L2 min.	L3	L4	L5	L6
ELGD-TB-100	57	24	29	23	58	47	59	5.3	311	155.5	62.5	36	33	192

	L7 ±0.1	L8 ±0.1	L9	L10	L11		T1	T2	T3	T4	T5	T6	T7	T8 ±0.05
					min.	max.								
ELGD-TB-100	52.5	92.5	108.5	34	3	6	2.2	16	7.2	12	6	7	16.5	6

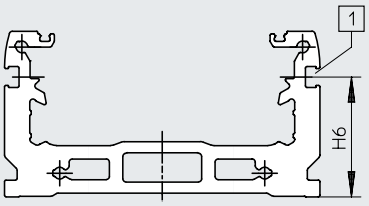
Datasheet

Dimensions – ELGD-TB-...-ZL/-ZR (with additional slide) Download CAD data ➔ www.festo.com



	L3	L6
ELGD-TB-100	50	192

Dimensions – ELGD-TB-...- (profile) Download CAD data ➔ www.festo.com



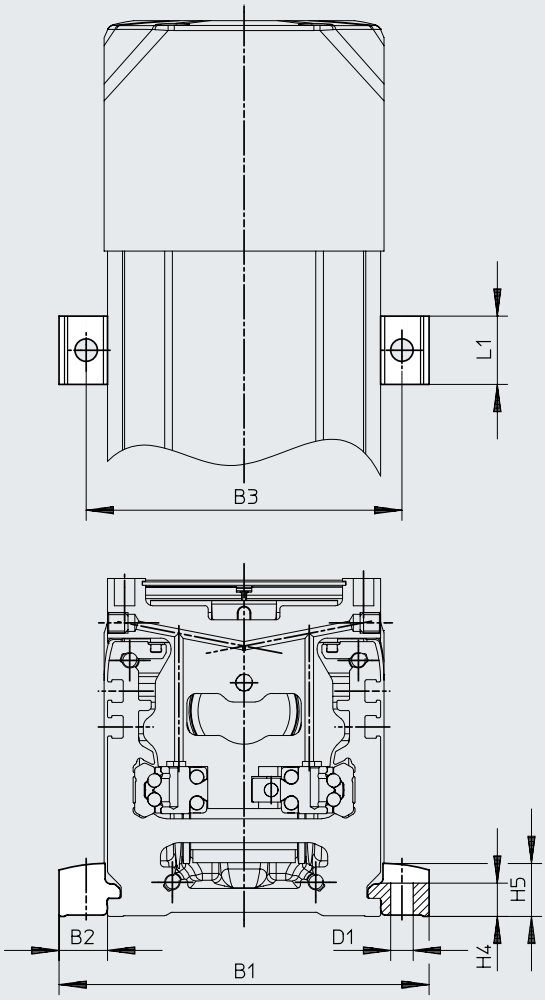
[1] Sensor slot for proximity switch

	H6
ELGD-TB-100	38

Datasheet

Dimensions – Profile mounting EAHF-E24-60-P-S

Download CAD data ➔ www.festo.com

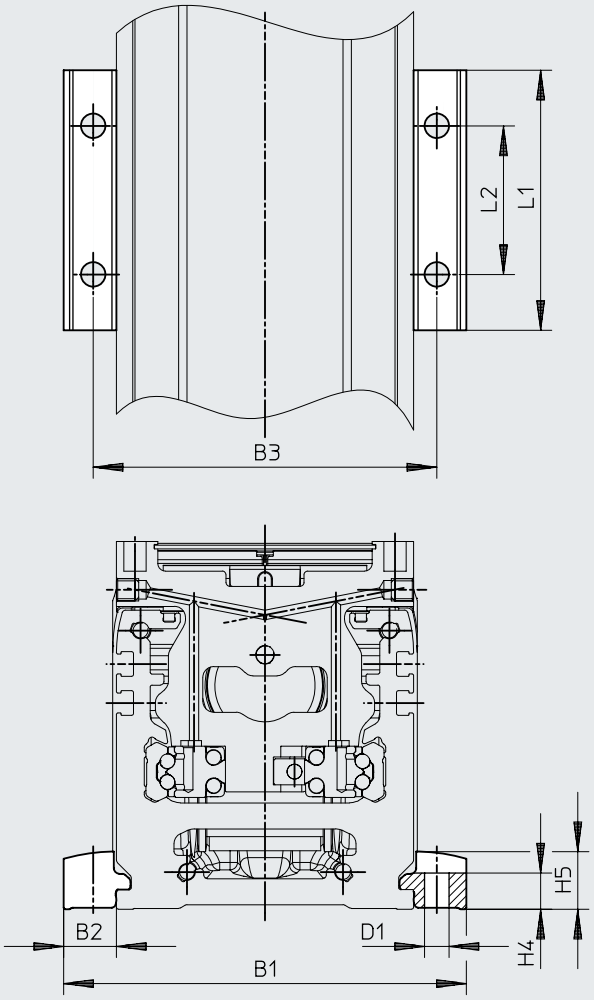


		B1	B2	B3	D1 ø H13	H4 ±0.1	H5	L1
EAHF-E24-60-P-S	ELGD-TB-100	128.4	14.2	112.5	6.6	9.8	15.5	20

Datasheet

Dimensions – Profile mounting EAHF-E24-60-P

Download CAD data ➔ www.festo.com

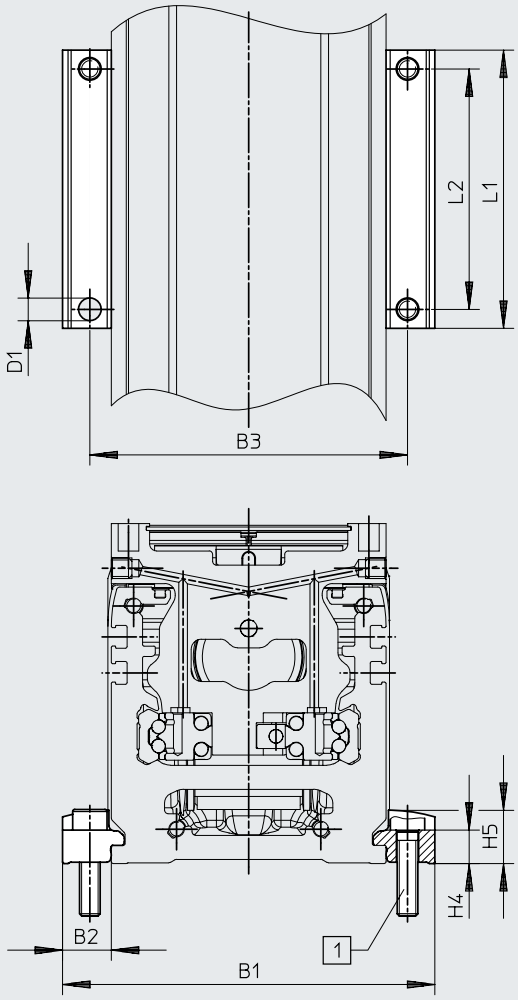


		B1	B2	B3	D1 ø H13	H4 ±0.1	H5	L1	L2
EAHF-E24-60-P	ELGD-TB-100	128.4	14.2	112.5	6.6	9.8	15.5	70	40

Datasheet

Dimensions – Profile mounting EAHF-E24-60-P-D

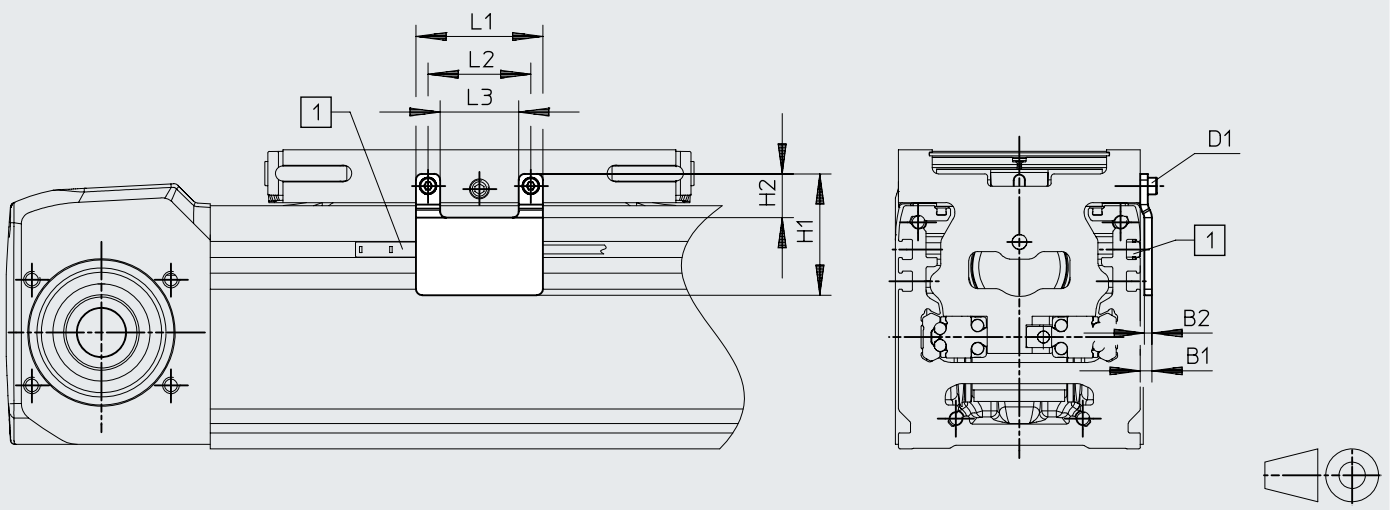
Download CAD data ➔ www.festo.com



		B1	B2	B3	D1 ø H13	H4 ±0.1	H5	L1	L2
EAHF-E24-60-P-D5	ELGD-TB-60	88.4	14.2	72.5	5.5	9.8	15.5	62	52.5
EAHF-E24-60-P-D4	ELGD-TB-80	108.4	14.2	92.5	6.6	9.8	15.5	81	70
EAHF-E24-60-P-D6	ELGD-TB-100	128.4	14.2	112.5	5.5	9.8	15.5	102	91

Datasheet

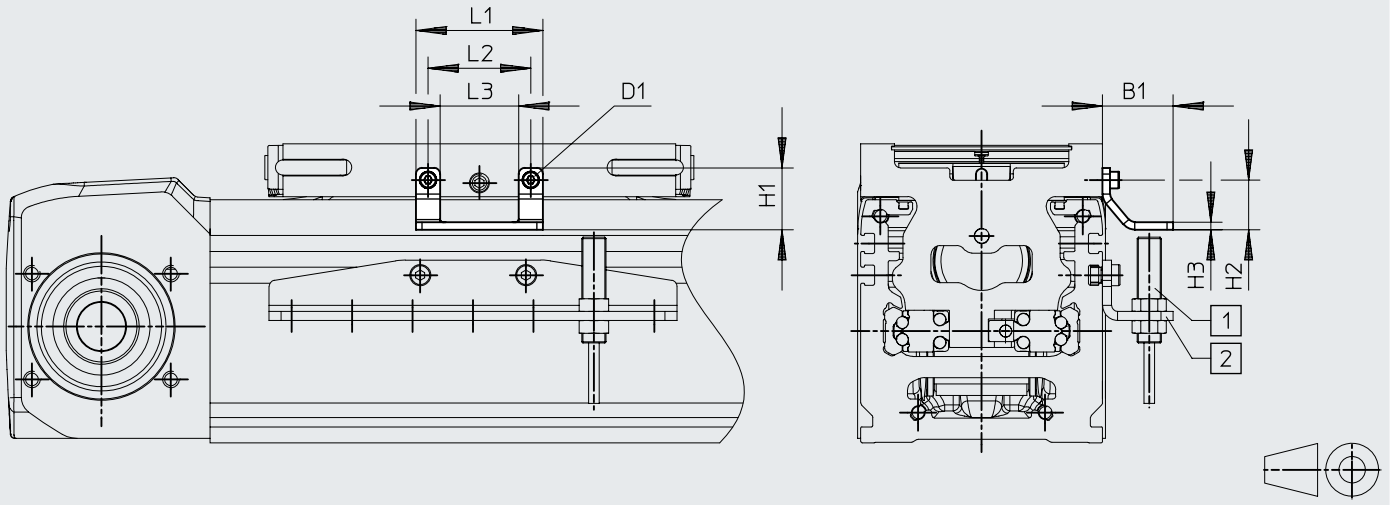
Dimensions – Switch lug EAPM-E24-60-SLS Download CAD data ➔ www.festo.com



[1] Sensor slot for proximity switch SIES-8M
[2] Distance sleeve

		B1	B2	B3	D1		H1	H2	L1	L2	L3
					With distance sleeve	Without distance sleeve					
EAPM-E24-60-SLS	ELGD-TB-100	3.8	2.5	11.9	M3 x 20	M3 x 8	40.2	14.5	42	34	26

Dimensions – Switch lug EAPM-E24-...-SLE Download CAD data ➔ www.festo.com



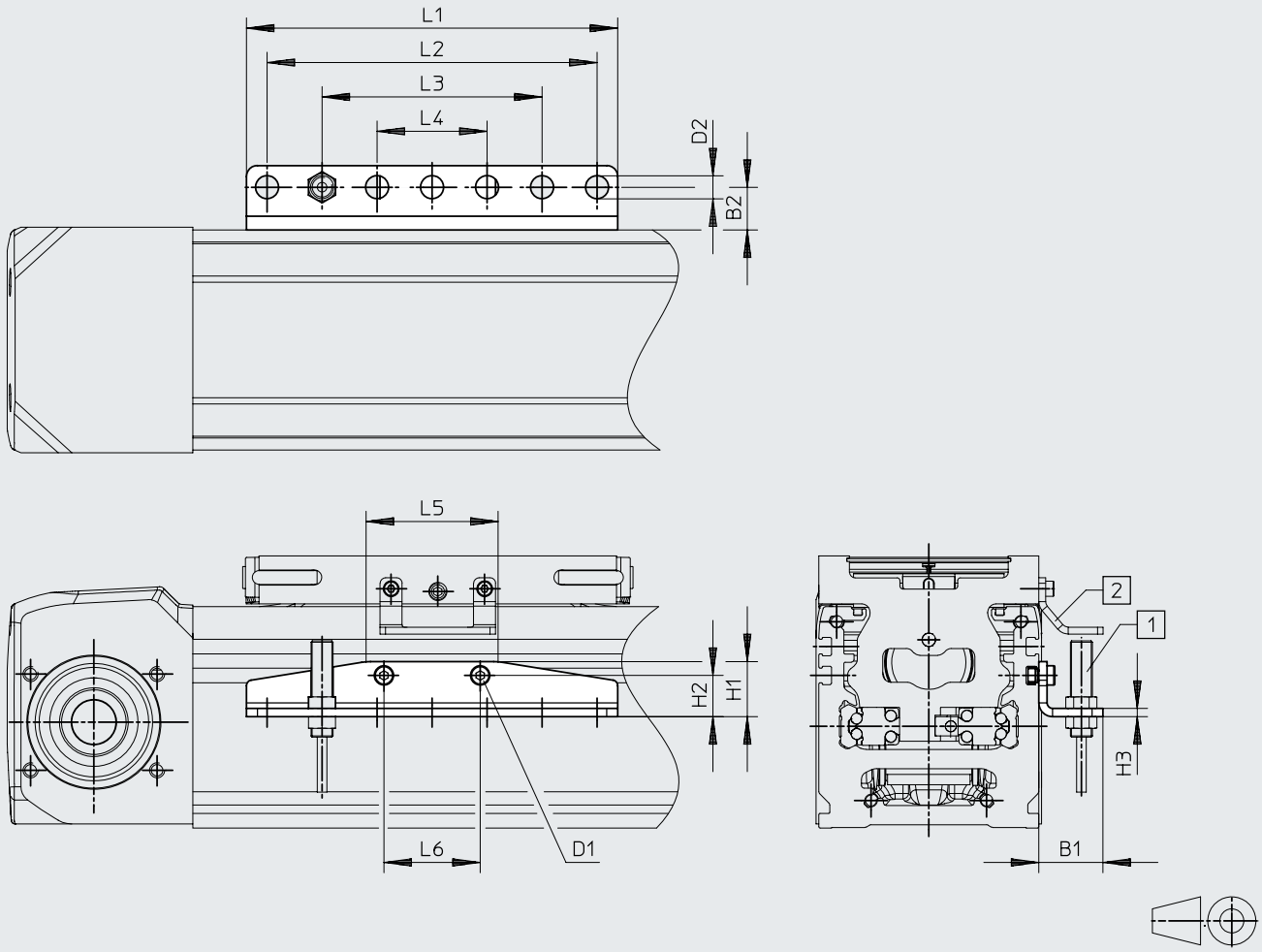
[1] Proximity switch SIEN-M8
[2] Sensor bracket EAPM-E24-60-SHE

		B1	D1	H1	H2	H3	L1	L2	L3
EAPM-E24-60-SLE	ELGD-TB-100	23.4	M3	20.5	16.5	2.5	42	34	26

Datasheet

Dimensions – Sensor bracket EAPM-E24-60-SHE

Download CAD data ➔ www.festo.com



[1] Proximity switch SIEN-8M
[2] Switch lug EAPM-E24-60-SLE

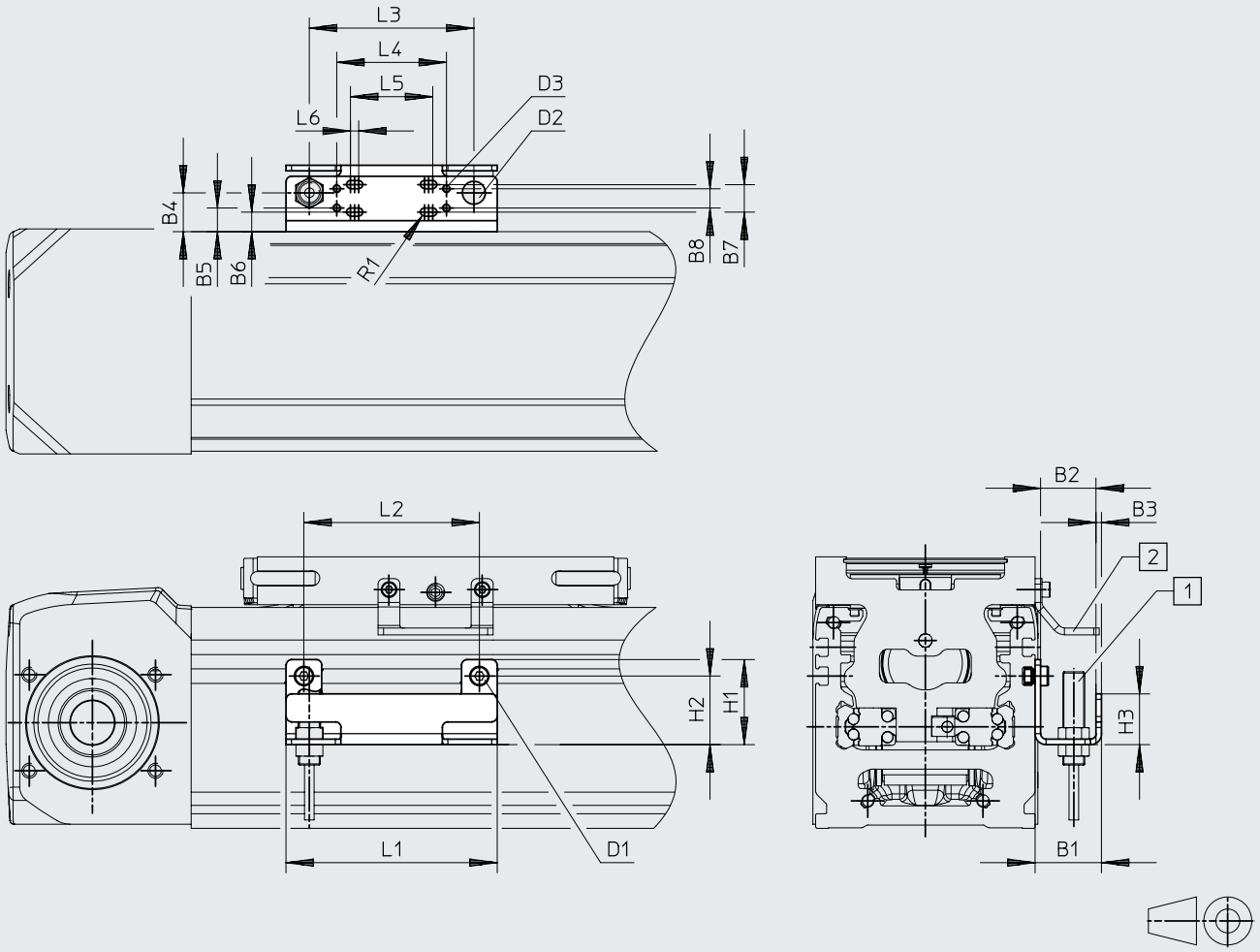
		B1 ±0.3	B2	D1	D2 Ø H13	H1 ±0.3	H2	H3
EAPM-E24-60-SHE	ELGD-TB-100	23.4	15.5	M4 x 6	8.4	20	15	3

		L1 ±0.2	L2	L3	L4	L5	L6
EAPM-E24-60-SHE	ELGD-TB-100	135	120	80	40	48	35

Datasheet

Dimensions – Sensor bracket EAPM-E24-60-SHO

Download CAD data ➔ www.festo.com



[1] Inductive sensor (Omron)

[2] Switch lug EAPM-E24-60-SLE

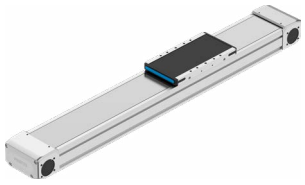
		B1	B2	B3	B4	B5	B6	B7
EAPM-E24-60-SHO	ELGD-TB-100	24.2	20.2	2	14.1	8.6	7.1	10

		B8	D1	D2 ø	D3	H1	H2	H3
EAPM-E24-60-SHO	ELGD-TB-100	7	M3	8.4	M3	31	25	18.5

		L1	L2	L3	L4	L5	L6	R1
EAPM-E24-60-SHO	ELGD-TB-100	77	64	60	40	24	3	1.5

Datasheet

Ordering data

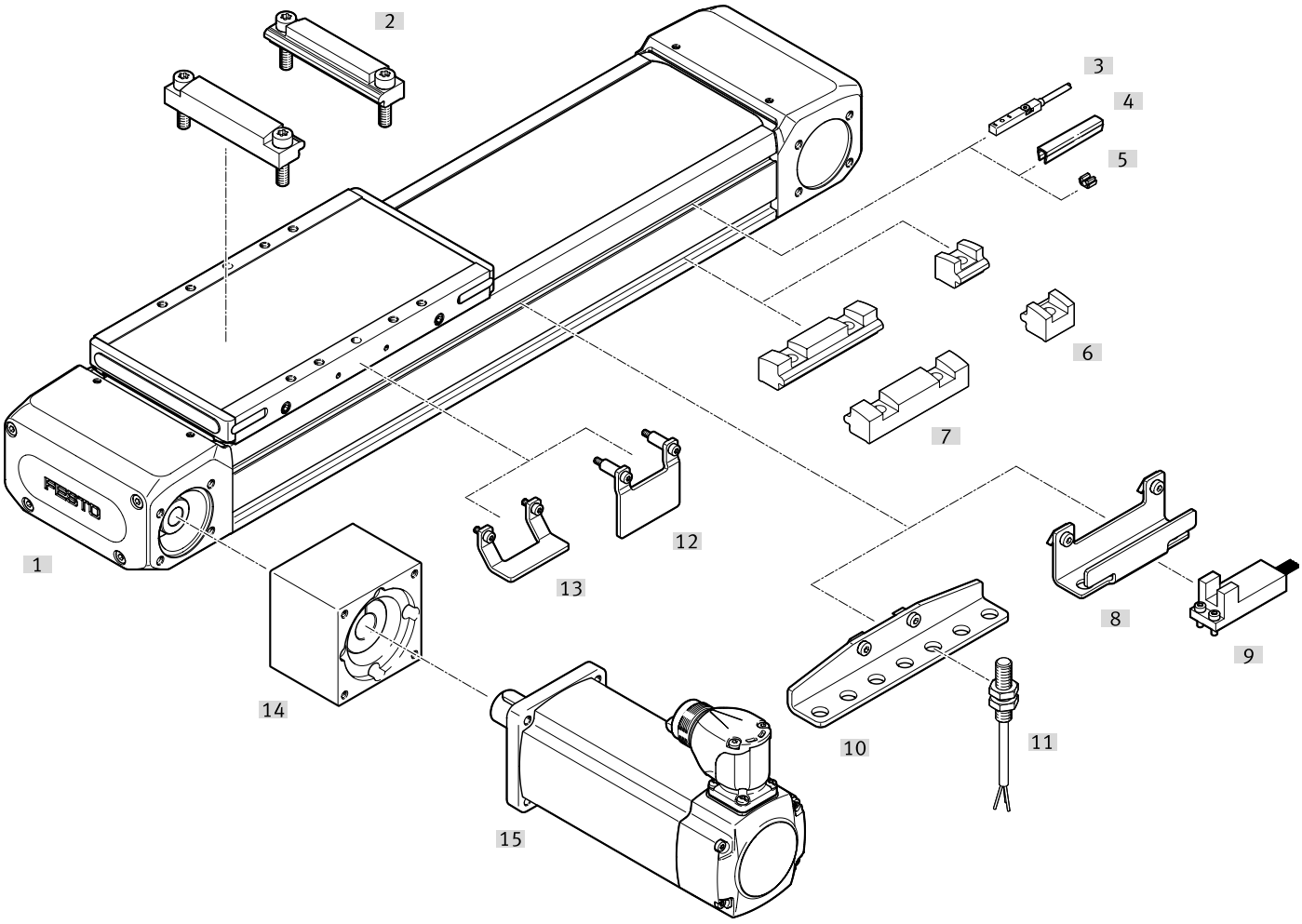
	Size	Stroke [mm]	Part no.	Type
	100	200	**8192374**	**ELGD-TB-KF-WD-100-200-0H-L-PU2**
		300	**8192375**	**ELGD-TB-KF-WD-100-300-0H-L-PU2**
		500	**8192376**	**ELGD-TB-KF-WD-100-500-0H-L-PU2**
		600	**8192377**	**ELGD-TB-KF-WD-100-600-0H-L-PU2**
		800	**8192378**	**ELGD-TB-KF-WD-100-800-0H-L-PU2**
		1000	**8192379**	**ELGD-TB-KF-WD-100-1000-0H-L-PU2**
		1200	**8192380**	**ELGD-TB-KF-WD-100-1200-0H-L-PU2**
		1500	**8192381**	**ELGD-TB-KF-WD-100-1500-0H-L-PU2**
		1800	**8192382**	**ELGD-TB-KF-WD-100-1800-0H-L-PU2**
		2000	**8192383**	**ELGD-TB-KF-WD-100-2000-0H-L-PU2**

Ordering data – Modular product system

More information ➔ elgd-tb

	Size	Stroke [mm]	Part no.	Type
	100	50 ... 2800	**8176888**	**ELGD-TB-KF-WD-100-...**

Peripherals overview



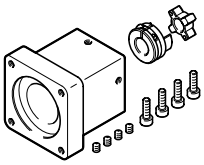
Peripherals overview

Accessories

	Type	Description	→ Page/Internet
[1]	Toothed belt axis ELGD-TB-WD	Electric drive	elgd-tb
[2]	Profile mounting EAHF-E24-...-D...	For axis/axis mounting with adapter plate	22
[3]	Proximity switch, T-slot SIES-8M	Inductive proximity switch, for T-slot	23
[4]	Slot cover ABP-S	For protection against contamination	24
[5]	Clip SMBK	For mounting the proximity switch cable in the slot	24
[6]	Profile mounting EAHF-E24-...-S	For mounting the axis on the side of the profile	22
[7]	Profile mounting EAHF-E24-...	For mounting the axis on the side of the profile	22
[8]	Sensor bracket EAPM-E24-SHO	For mounting third-party sensors on the axis	23
[9]	Sensor OMRON	Third-party sensor OMRON, EE-SX674 series	–
[10]	Sensor bracket EAPM-E24-SHE	For mounting the inductive proximity switches SIEN-M8 (round design) on the axis	23
[11]	Proximity switch, M8 SIEN-M8	Inductive proximity switch, round design	24
[12]	Switch lug EAPM-E24-SLS	For sensing the slide position via inductive proximity switch SIES-8M or for optical sensors (Omron) with sensor bracket EAPM-E24-SHO	22
[13]	Switch lug EAPM-E24-SLE	For sensing the slide position via inductive proximity switch SIEN-M8 (round design) and sensor bracket EAPM-E24-SHE	23
[14]	Axial kit EAMM	For axial motor mounting	eamm-a
[15]	Motor EMMT	Motors and kits specially matched to the axis Detailed information: www.festo.com/catalogue/eamm Engineering tool: www.festo.com/x/electric-motion-sizing	emmt

Accessories

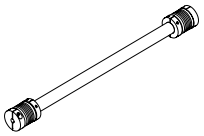
Permissible axis/motor combinations for axial assembly kits



Below are the links where you can find all the information about:
- Axis/motor combinations
- Permissible external motors
- Technical data
- Dimensions

For axial assembly kits ➔ Internet: eamm-a

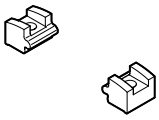
Connecting shaft KSK



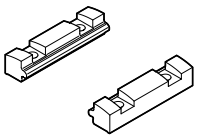
- For the synchronization of two base axes in portal systems

You will find all the information about at the following link:
Connecting shaft ➔ ksk

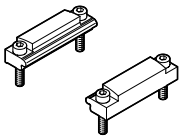
Profile mounting EAHF-E24-...-P-S

	Description	Material	Product weight	Part no.	Type
	For size 100	Anodised wrought aluminium alloy	18 g	**8197128**	**EAHF-E24-60-P-S**

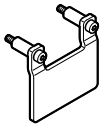
Profile mounting EAHF-E24-...-P

	Description	Material	Product weight	Part no.	Type
	For size 100	Anodised wrought aluminium alloy	71 g	**8197132**	**EAHF-E24-60-P**

Profile mounting EAHF-E24-...-P-D...

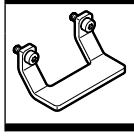
	Description	Material	Product weight	Part no.	Type
	ELGD-80 to ELGD-100		133 g	**8197130**	**EAHF-E24-60-P-D6**

Switch lug EAPM-E24-...-SLS

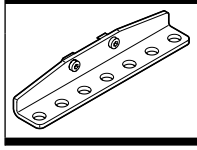
	Description	Material	Product weight	Part no.	Type
	For size 100	Steel	32 g	**8197117**	**EAPM-E24-60-SLS**

Accessories

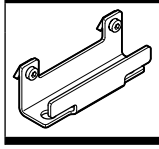
Switch lug EAPM-E24-...-SLE

	Description	Material	Product weight	Part no.	Type
	For size 100	Steel	20 g	**8197116**	**EAPM-E24-60-SLE**

Sensor bracket EAPM-E24-...-SHE

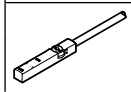
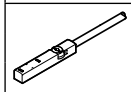
	Description	Material	Product weight	Part no.	Type
	For size 100	Steel	103 g	**8197123**	**EAPM-E24-60-SHE**

Sensor bracket EAPM-E24-...-SHO

	Description	Material	Product weight	Part no.	Type
	For size 100	Steel	67 g	**8197121**	**EAPM-E24-60-SHO**

Proximity switch for T-slot, inductive

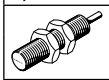
Datasheets → Internet: sies

	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part no.	Type
N/O						
	Inserted in the slot from above, flush with the cylinder profile	PNP	Cable, 3-core	7.5	**551386**	**SIES-8M-PS-24V-K-7.5-OE**
			Plug M8 x 1, 3-pin	0.3	**551387**	**SIES-8M-PS-24V-K-0.3-M8D**
		NPN	Cable, 3-core	7.5	**551396**	**SIES-8M-NS-24V-K-7.5-OE**
			Plug M8 x 1, 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	PNP	Cable, 3-core	7.5	**551391**	**SIES-8M-PO-24V-K-7.5-OE**
			Plug M8 x 1, 3-pin	0.3	**551392**	**SIES-8M-PO-24V-K-0.3-M8D**
		NPN	Cable, 3-core	7.5	**551401**	**SIES-8M-NO-24V-K-7.5-OE**
			Plug M8 x 1, 3-pin	0.3	**551402**	**SIES-8M-NO-24V-K-0.3-M8D**

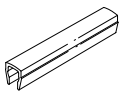
Accessories

Proximity switch M8 (round design), inductive

Datasheets → Internet: sien

	Switching output	Electrical connection	Cable length [m]	Part no.	Type
N/O					
	PNP	Cable, 3-core	2.5	**150386**	**SIEN-M8B-PS-K-L**
	NPN		2.5	**150384**	**SIEN-M8B-NS-K-L**
	PNP	Plug M8 x 1, 3-pin	–	**150387**	**SIEN-M8B-PS-S-L**
	NPN		–	**150385**	**SIEN-M8B-NS-S-L**
N/C					
	PNP	Cable, 3-core	2.5	**150390**	**SIEN-M8B-PO-K-L**
	NPN		2.5	**150388**	**SIEN-M8B-NO-K-L**
	PNP	Plug M8 x 1, 3-pin	–	**150391**	**SIEN-M8B-PO-S-L**
	NPN		–	**150389**	**SIEN-M8B-NO-S-L**

Slot cover ABP-5-S1

	Description	Material	Pack size	Product weight	Part no.	Type
	For size 100	ABS	2 every 0.5 m	13 g	**563360**	**ABP-5-S1**

Clip SMBK

	Description	Pack size	Product weight	Part no.	Type
	For size 100	10	1g	**534254**	**SMBK-8**