Toothed belt axes ELGD-TB-WD

FESTO



Key features

At a glance

ELGD-TB (standard design)

- Profile with a square cross section and sturdy drive elements for high feed forces
- Suitable for the production of Li-ion batteries

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 the standard design
- Suitable for the production of Li-ion batteries

Innovative guide technology

- Excellent rigidity and load capacity of the guide for greater loads 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 → <u>electric-motion-sizing</u>



Save time with smart engineering tools for the optimum solution. Our goal is to increase your productivity. Our engineering tools play an integral part in achieving this goal. 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 great variety of useful tools.

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 you with all the relevant data including the bill of materials and documentation for the selected combination. This avoids design errors and results in significantly improved energy efficiency for the system. A smooth connection to the Festo Automation Suite also makes commissioning easier for you.

Graphs

More information $\rightarrow \underline{\text{elgd-tb}}$



The graphs shown in this document are also available online. These can be used to display precise values.

Key features

Drive system

[TB] Toothed belt

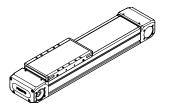
- For applications requiring a high dynamic response and short positioning times
- For long strokes

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.

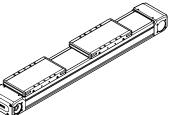
Slide design

[L] Long



Additional slide

[ZL] Lef



The side on which the labelling is applied is defined as the front.

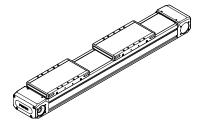
Lubrication

[] Standard

With lifetime lubrication. Lubrication nipple not included in delivery.

[7D]

Right



[GN] Lubrication nipple

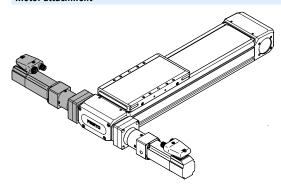
- The lubrication adapters enable the guide to be permanently lubricated using semi- or fully automatic relubrication devices
- · The adapters are suitable for oils and greases

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 axes from Festo, the motor cannot be mounted at both ends
 of the axis. However, the axis has a symmetrical design so that the left end can
 also be rotated to the right

Type codes

001	Series
ELGD	Gantry axis
002	Drive system
ТВ	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	
ОН	None	
Н	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	

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⁾		
ELGDPU1	[Nm]	0.4
ELGDPU2	[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/s ²]	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

Mass moments of inertia		
Size		100
J ₀	[kg mm ²]	295.42
J _H per metre stroke	[kg mm ² /m]	22.52
J _L per kg payload	[kg mm ² /kg]	178.76

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

 $J_A = J_0 + J_H x$ working stroke [m] + $J_L x$ 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	[mJ]	0.75
Note on the impact energy in the end posi-	[m/s]	At maximum homing speed of 0.01 m/s
tions		

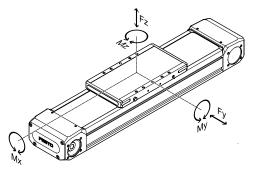
Materials

Axis	
Drive cover	Gravity die-cast aluminium, painted
Slide	Wrought aluminium alloy
Cover strip	High-alloy stainless steel
Toothed belt	
ELGDPU2	Polyurethane with steel cord and nylon cover
ELGDPU1	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
Suitable for the production of Li-ion batteries	Metals with more than 1% by mass of copper, zinc or nickel are excluded from use. Exceptions are nickel in steel, chemically nickel-plated surfaces, printed circuit boards, cables, electrical plug connectors and coils

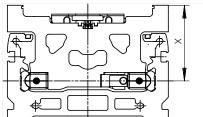
Load values

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

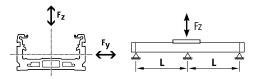
1. Check the maximum permissible values

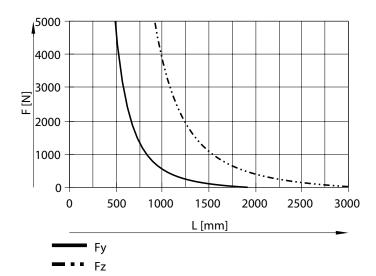
Max. permissible forces and torques for the overall axis (strength limits)		
Size		100
Max. force Fy, overall axis	[N]	3236
Max. force Fz, overall axis	[N]	2250
Max. torque Mx, overall axis	[Nm]	168
Max. torque My, overall axis	[Nm]	200
Max. torque Mz, overall axis	[Nm]	200

Maximum permissible support spacing L as a function of force F

The axis may need to be supported in order to limit deflection in the case of long strokes.

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.





2. Calculate the load comparison factor



For a guide system to have a service life of 5000 km, the load comparison factor must have a value of $fv \le 1$, 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 several of the indicated forces and torques at the same time, the following equation must be satisfied in addition to the indicated maximum loads:

Calculating the load comparison factor:

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

 F_1/M_1 = values occurring in the application

F₂ = permissible values at 5000 km from the graph "load support spacing"

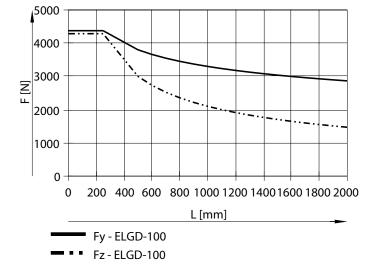
M₂ = maximum permissible values (see table)

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.



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

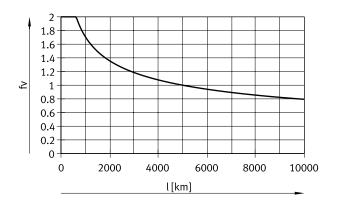
Example:

A user wants to move an x kg load. Using the formula (\rightarrow 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 IIS.

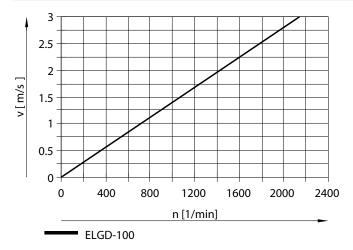
As the characteristic load values are dependent on the service life, the maximum permissible forces and torques for a 5000 km service life cannot be compared with the dynamic forces and torques of bearing guides to ISO/JIS.

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.

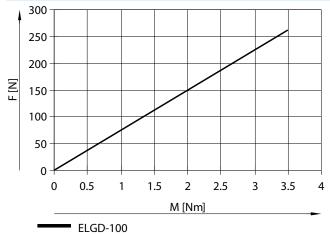
These 100 km values have been calculated mathematically and are only to be used for comparing with dynamic forces and torques to ISO. The drives must not be loaded with these characteristic values as this could damage the axes.

Max. permissible	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						

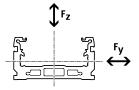
Speed v as a function of rotational speed n



Feed force F as a function of input torque M



Second moment of area

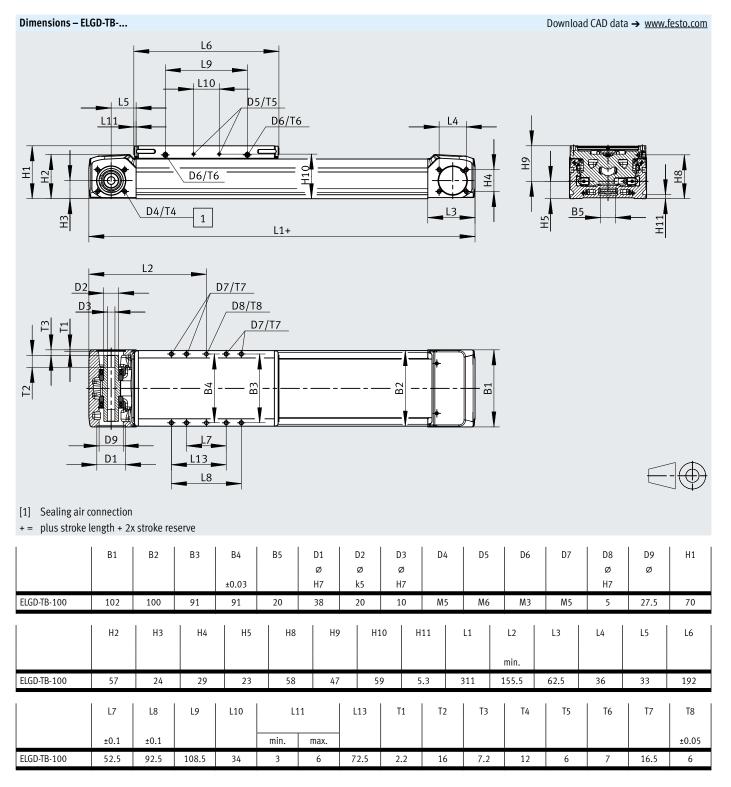


Size		100
ly	[mm ⁴]	0.347x10 ⁶
Iz	[mm ⁴]	2.268x10 ⁶

Recommended deflection limits

Adherence to the following deflection limits is recommended so as not to impair the functionality of the axes. Greater deformation can result in increased friction, greater wear and reduced service life.

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

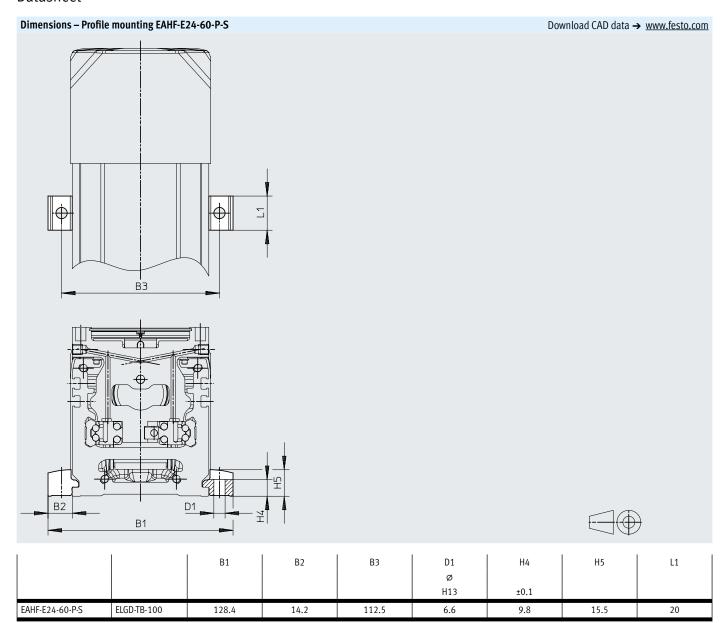


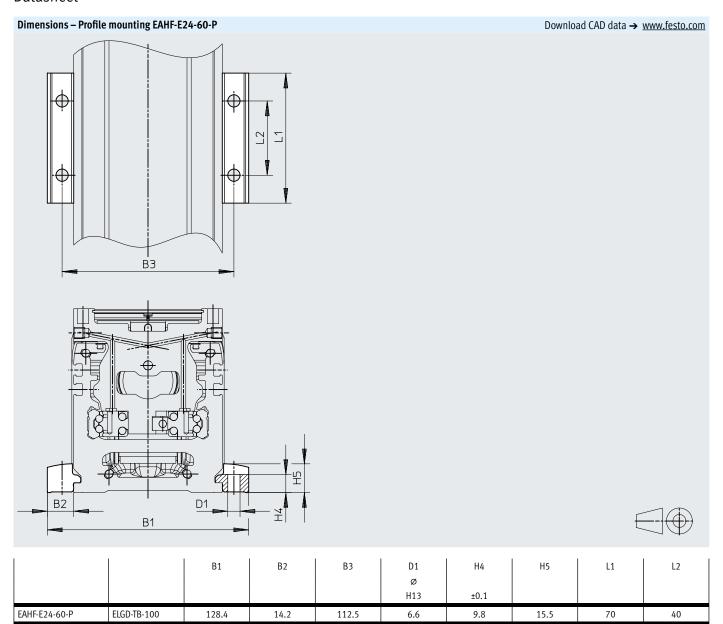
ELGD-TB-100

Dimensions – ELGD-TB-...- (profile) Download CAD data → www.festo.com L6 (Minimum distance) L6 Download CAD data → www.festo.com L6 L92 Dimensions – ELGD-TB-...- (profile) Download CAD data → www.festo.com

Н6

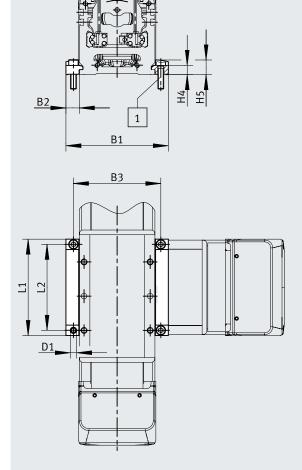
38





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

Download CAD data → www.festo.com



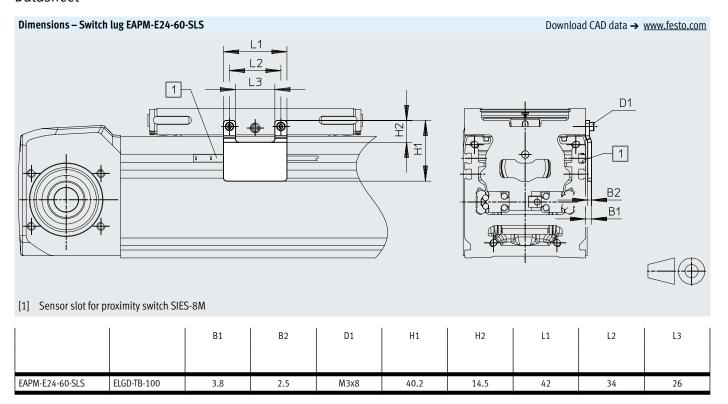
Note:

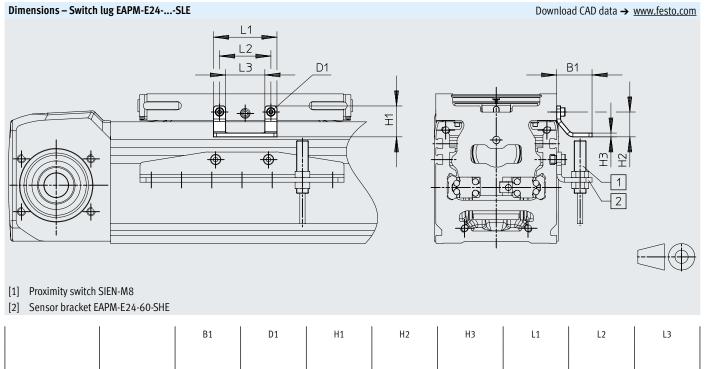
The profile mounting EAHF-E24-60-P-D... is designed for mounting axis ELGD on axis ELGD.



[1] Screws are included in the scope of delivery

		B1	B2	В3	D1	H4	H5	L1	L2
					Ø				
					H13	±0.1			
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





20.5

16.5

2.5

42

34

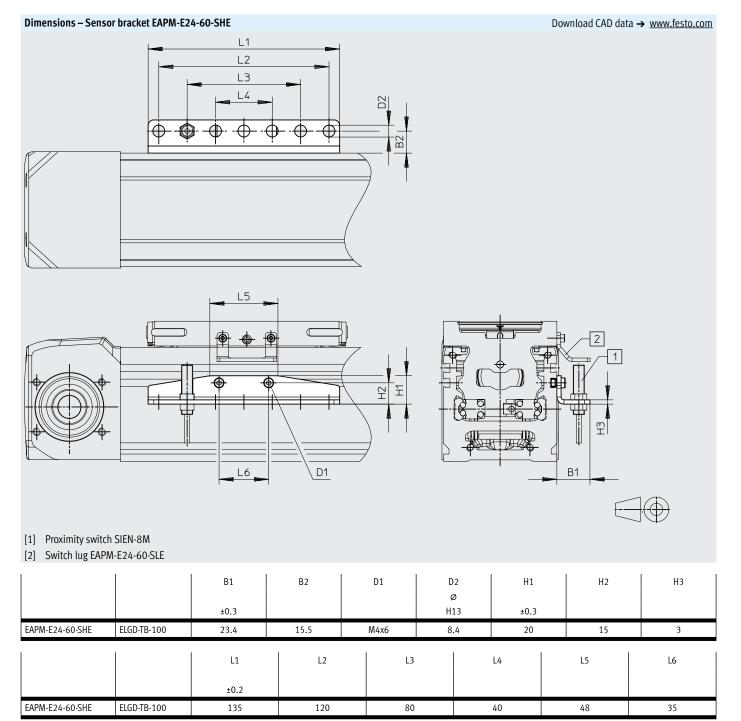
МЗ

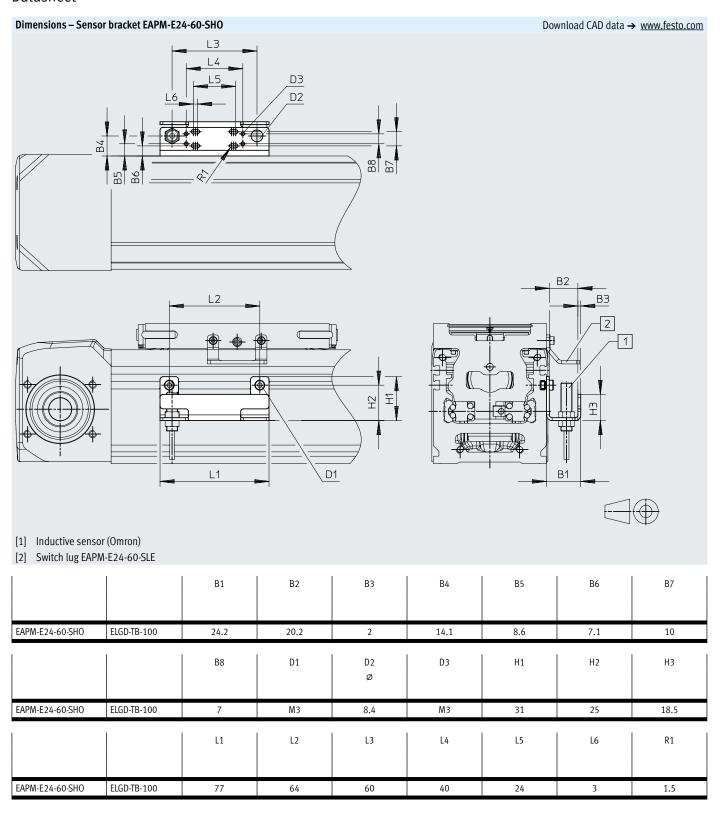
26

EAPM-E24-60-SLE

ELGD-TB-100

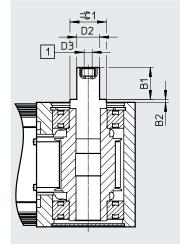
23.4





Dimensions – Drive shaft adapter EAMB-18-...

Download CAD data → www.festo.com

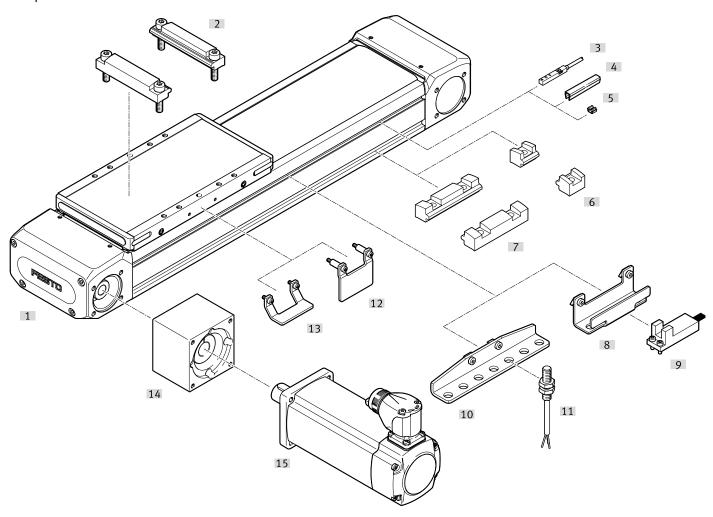


[1] Draw-off thread

		B1	B2	D2	D3	=©1
				Ø		
				h7		
EAMB-18-9-8X16-10X12	ELGD-TB-100	12	1.8	8	M5	15

Ordering data					
	Size	Stroke [mm]	Part no.	Туре	
	100	200	8192374	ELGD-TB-KF-WD-100-200-0H-L-PU2	
		300	8192375	ELGD-TB-KF-WD-100-300-0H-L-PU2	
3		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	Part no.	Туре	
		[mm]			
	100	50 2800	8176888	ELGD-TB-KF-WD-100	
					_

Peripherals overview

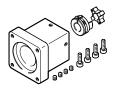


Peripherals overview

Acces	sories	Tall and the second	1 .
	Type	Description	→ Page/Internet
[1]	Toothed belt axis ELGD-TB-WD	Electric drive	elgd-tb
[2]	Profile mounting EAHF-E24D	For axis/axis mounting with adapter plate	23
[3]	Proximity switch, T-slot SIES-8M	Inductive proximity switch, for T-slot	24
[4]	Slot cover ABP-S	For protection against contamination	25
[5]	Clip SMBK	For mounting the proximity switch cable in the slot	25
[6]	Profile mounting EAHF-E24S	For mounting the axis on the side of the profile	23
[7]	Profile mounting EAHF-E24	For mounting the axis on the side of the profile	23
[8]	Sensor bracket EAPM-E24-SHO	For mounting third-party sensors on the axis	24
[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	24
[11]	Proximity switch, M8 SIEN-M8	Inductive proximity switch, round design	25
[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	23
[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	24
[14]	Axial kit EAMM	For axial motor mounting	eamm-a
[15]	Motor EMMT	Motors and kits specially matched with the axis Detailed information: www.festo.com/catalogue/eamm Engineering tool: www.festo.com/x/electric-motion-sizing	emmt

Accessories

Permitted axis/motor combinations for axial kits



The complete information is available via the following link:

- Axis/motor combinations
- Permitted third-party motors
- Technical data
- Dimensions

For axial kits → eamm-a

Connecting shaft KSK



• For synchronising two base axes in gantry systems
The complete information is available via the following link:
Connecting shaft → ksk

Profile mounting EAHF-E24	Profile mounting EAHF-E24P-S										
	Description	Suitable for the production of Li-ion batteries	Material	Product weight	Part no.	Туре					
	For size 100	F1a	Anodised wrought al-	18 g	8197128	EAHF-E24-60-P-S					
			uminium alloy								

	Profile mounting EAHF-E24	Р					
		Description	Suitable for the production of Li-ion batteries	Material	Product weight	Part no.	Туре
Ī		For size 100	F1a	Anodised wrought al-	71 g	8197132	EAHF-E24-60-P
				uminium alloy			

Profile mounting EAHF-E24	P-D					
	Description ¹⁾	Suitable for the production of Li-ion batteries	Material	Product weight	Part no.	Туре
	ELGD-60 on ELGD-100	F1a	Anodised wrought al- uminium alloy	133 g	8197130	EAHF-E24-60-P-D6
	ELGD-80 on ELGD-100			133 g	8197130	EAHF-E24-60-P-D6

¹⁾ With this combination, the axis is mounted off-centre on the slide (see dimension L13 on the dimensional drawing with long slide).

Switch lug EAPM-E24SLS										
	Description	Suitable for the production of Li-ion batteries	Material	Product weight	Part no.	Туре				
~ 19	For size 100	F1a	Steel	32 g	8197117	EAPM-E24-60-SLS				

2025/01 – Subject to change

Accessories

Switch lug EAPM-E24SLE						
	Description	Suitable for the production of Li-ion batteries	Material	Product weight	Part no.	Туре
10	For size 100	F1a	Steel	20 g	8197116	EAPM-E24-60-SLE

Sensor bracket EAPM-E24SHE								
	Description	Suitable for the production of Li-ion batteries	Material	Product weight	Part no.	Туре		
	For size 100	F1a	Steel	103 g	8197123	EAPM-E24-60-SHE		

Sensor bracket EAPM-E24	-SHO					
	Description	Suitable for the production of Li-ion batteries	Material	Product weight	Part no.	Туре
			0. 1	4 =	0405404	
46	For size 100	F1a	Steel	67 g	8197121	EAPM-E24-60-SHO

Proximity switch	h for T-slot, inductive					Datasheets → Internet: sies
	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part no.	Туре
N/O						
	Inserted in the slot from above,	PNP	Cable, 3-core	7.5	551386	SIES-8M-PS-24V-K-7.5-OE
280	flush with the cylinder profile		Plug M8x1, 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 M8x1, 3-pin	0.3	551397	SIES-8M-NS-24V-K-0.3-M8D
N/C						
	Inserted in the slot from above,	PNP	Cable, 3-core	7.5	551391	SIES-8M-PO-24V-K-7.5-OE
S	flush with the cylinder profile		Plug M8x1, 3-pin	0.3	551392	SIES-8M-PO-24V-K-0.3-M8D
6 /		NPN	Cable, 3-core	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

25



Accessories

OXIIIILY SWIL		design), inductive									Datasheets → Internet: s
	Switching output		Elec	Electrical connection			Cable length [m]			no.	Туре
						[m]					
0											
PNP NPN		Cab	Cable, 3-core		2.5			150	386	SIEN-M8B-PS-K-L	
					2.5		150384		SIEN-M8B-NS-K-L		
	PNP NPN		Plug	Plug M8x1, 3-pin		-			150387 150385		SIEN-M8B-PS-S-L
											SIEN-M8B-NS-S-L
						-					
	PNP		Cab	le, 3-core		2.5			150	390	SIEN-M8B-PO-K-L
	NPN					2.5			150388 150391		SIEN-M8B-NO-K-L
	PNP		Plug	M8x1, 3-pin							SIEN-M8B-PO-S-L
	NPN					-			150389		SIEN-M8B-NO-S-L
)	For size 100	ABS		2 every 0.5 m		13 g	563360		ABP-5-	51
p SMBK		Description		Pack size		Produ	ct weight	Part no.		Туре	
		J escription		. delt size			at mongt	raition		.,,,,	
		For size 100	00 10		1g		534254		SMBK-8		
215/				:				:			
ive shaft ada	apter EAMB										
		Description		Transferable	torque	Produ	ct weight	Part no.		Туре	
>		For size 100		12Nm		29g		558035		EAMB-	18-9-8X16-10X12

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