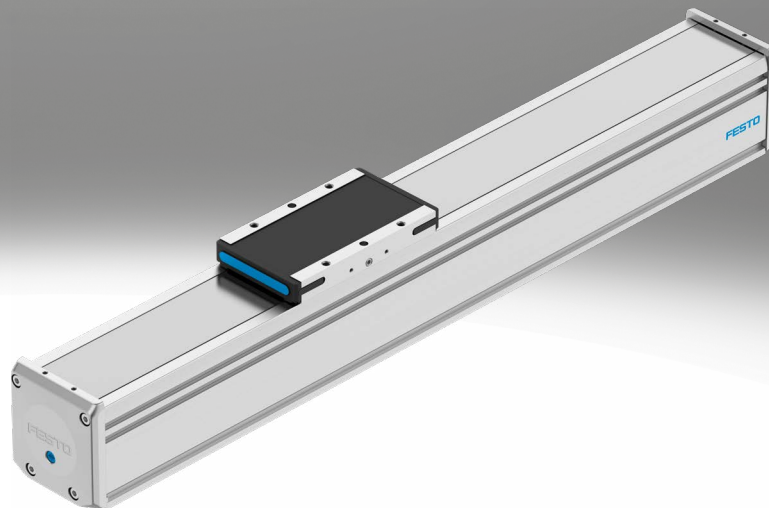


## Guide axes ELFD, without drive

**FESTO**



## Key features

### At a glance

- Driveless linear guide units with guide and freely movable slide
- The guide axis is designed to support forces and torques in multi-axis applications

#### 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

#### 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

#### 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 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 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 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 seamless connection to the Festo Automation Suite also makes commissioning easier for you.

### Graphs

More information → [elfd](#)



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

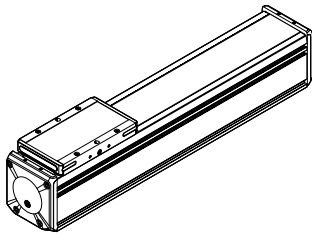
### Stroke reserve

- 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.

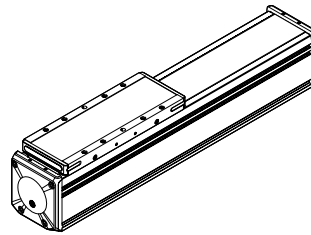
## Key features

## Slide design

[ ] Standard

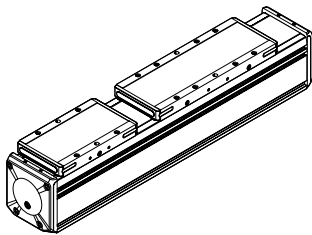


[L] Long

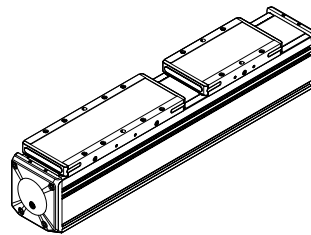


## Additional slide

[ZL] Left



[ZR] Right



- The additional slide is always a standard slide

## 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

Type codes

001	Series	
ELFD	Guide axis	
002	Guide	
KF	Recirculating ball bearing guide	
003	Size	
60	60	
80	80	
004	Stroke [mm]	
...	50 ... 2850	

005	Stroke reserve	
OH	None	
...H	0 ... 999 mm	
006	Slide design	
	Standard	
L	Slide, long	
007	Additional slide	
	None	
ZL	1 slide left	
ZR	1 slide right	
008	Lubrication	
	Standard	
GN	Lubrication nipple	

## Datasheet

General technical data					
Size	60		80		
Slide design		L		L	
Design	Guide				
Guide	Recirculating ball bearing guide				
Mounting position	Any				
Working stroke	[mm]	50 ... 2850	50 ... 2800	50 ... 2850	50 ... 2750
Max. no-load resistance to shifting	[N]	6			
Max. speed	[m/s]	3			
Max. acceleration	[m/s <sup>2</sup> ]	50			
Position sensing	For inductive sensors				

Operating and environmental conditions		
Ambient temperature <sup>1)</sup>	[°C]	0 ... +60
Storage temperature	[°C]	-20 ... +60
Degree of protection		IP30
Duty cycle	[%]	100
Maintenance interval		Lifetime lubrication

1) Note operating range of the proximity switches

Weight [g]					
Size	60		80		
Slide design		L		L	
Basic weight with 0 mm stroke <sup>1)</sup>		1261	1683	2345	3645
Additional weight per 10 mm stroke		49	49	76	76
Moving mass		419	643	911	1615

1) Including slide

## Materials

Axis	
End cap	Gravity die-cast aluminium, painted
Slide	Wrought aluminium alloy
Cover strip	High-alloy stainless steel
Guide	Steel
Profile	Anodised wrought aluminium alloy
Note on materials	RoHS-compliant
LABS (PWIS) conformity	VDMA24364 zone III

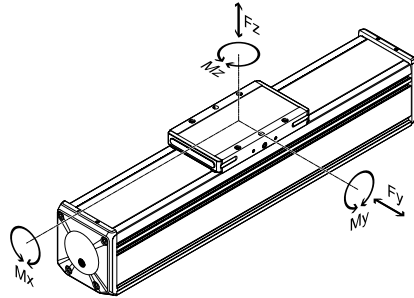
# Datasheet

## Load values

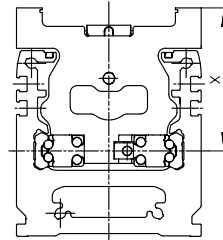
The indicated forces and torques refer to the centre of the guide. The point of application of force is the point where the centre of the guide and the longitudinal centre of the slide intersect.

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	60	80
Dimension x [mm]	49	62

## 1. Check the maximum permissible values

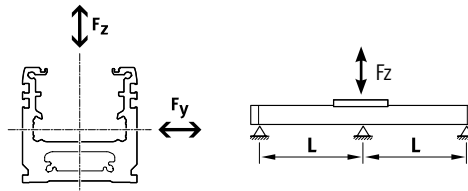
### Max. permissible forces and torques for the overall axis (strength limits)

Size		60		80	
			L		L
Max. force $F_y$ , overall axis	[N]	1513	3026	2291	4581
Max. force $F_z$ , overall axis	[N]	2200	3200	3500	5600
Max. torque $M_x$ , overall axis	[Nm]	38	75	106	200
Max. torque $M_y$ , overall axis	[Nm]	15	128	42	356
Max. torque $M_z$ , overall axis	[Nm]	15	133	42	294

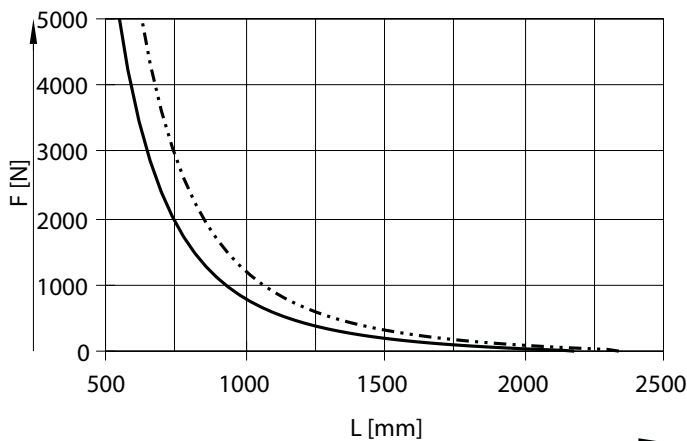
### Maximum permissible support spacing L as a function of force F

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 L as a function of force F acting on the axis. The deflection is  $f = 0.5 \text{ mm}$ .

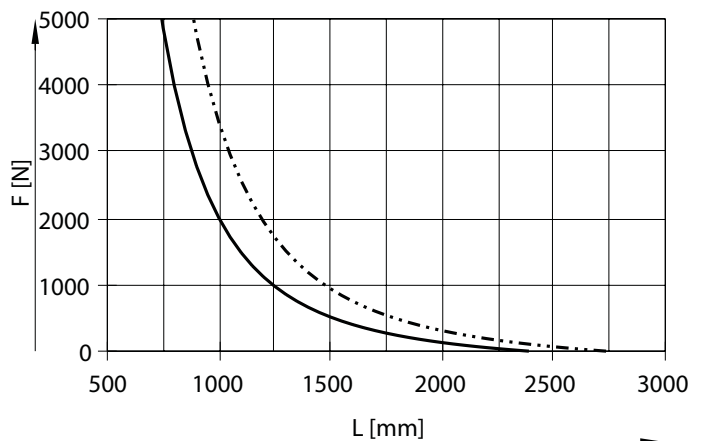


Size 60



—  $F_y$   
- - -  $F_z$

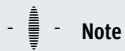
Size 80



—  $F_y$   
- - -  $F_z$

## 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  $f_v \leq 1$ , 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](http://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:

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

$F_1/M_1$  = values occurring in the application

$F_2$  = Permissible values at 5000 km from the graph "support spacing over load"

$M_2$  = maximum permissible values (see table)

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

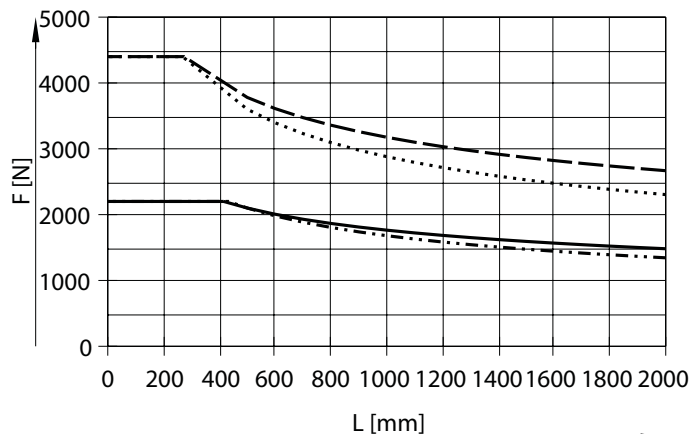
Size	60	80	
Slide design		L	L
Reference service life [km]	5000		
Max. torque Mx [Nm]	38	75	106
Max. torque My [Nm]	15	150	42
Max. torque Mz [Nm]	15	140	42

#### 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.

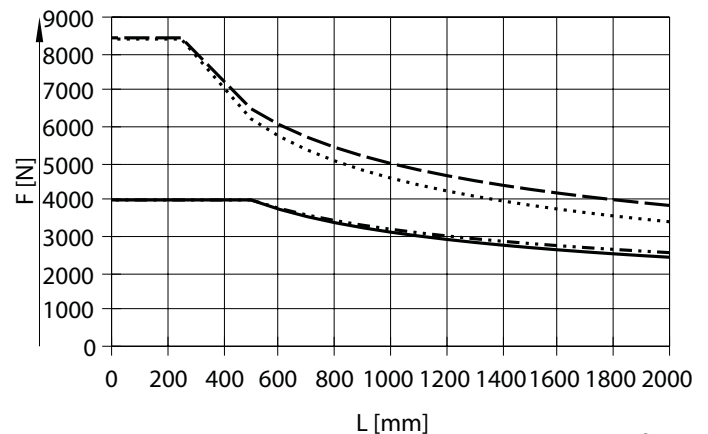
If the axis is used as a cantilever or in yoke operation, the values for a support spacing of 2000 mm can be selected.

##### Size 60



- Fy - ELFD-60
- - - Fz - ELFD-60
- ■ Fy - ELFD-60-L
- ... ■ Fz - ELFD-60-L

##### Size 80



- Fy - ELFD-80
- - - Fz - ELFD-80
- ■ Fy - ELFD-80-L
- ... ■ Fz - ELFD-80-L

## 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  $f_v$  against the service life.

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

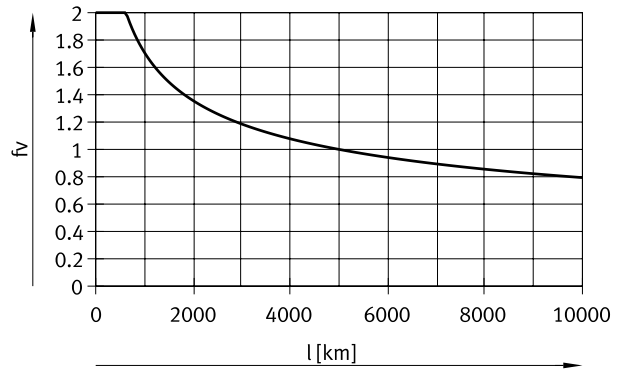
Load comparison factor  $f_v$  as a function of service life  $l$

Example:

A user wants to move an  $x$  kg load. Using the formula (→ page 7) 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  $M_z$  and  $M_y$  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  $f_v = 1$ ). 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 guide axes ELFD 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.

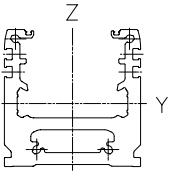
Max. permissible forces and torques for a theoretical service life of 100 km (from a guide perspective only)

Size	60		80	
		L		L
$F_{y_{max}}$ [N]	9208	18415	17576	35153
$F_{z_{max}}$ [N]	9208	18415	17576	35153
$M_{x_{max}}$ [Nm]	157	314	422	844
$M_{y_{max}}$ [Nm]	60	500	162	1356
$M_{z_{max}}$ [Nm]	60	500	162	1356



## Datasheet

## 2nd moment of area



Size		60	80
$I_y$	[mm <sup>4</sup> ]	$0.485 \times 10^6$	$1.213 \times 10^6$
$I_z$	[mm <sup>4</sup> ]	$0.731 \times 10^6$	$2.052 \times 10^6$

## Recommended deflection limits

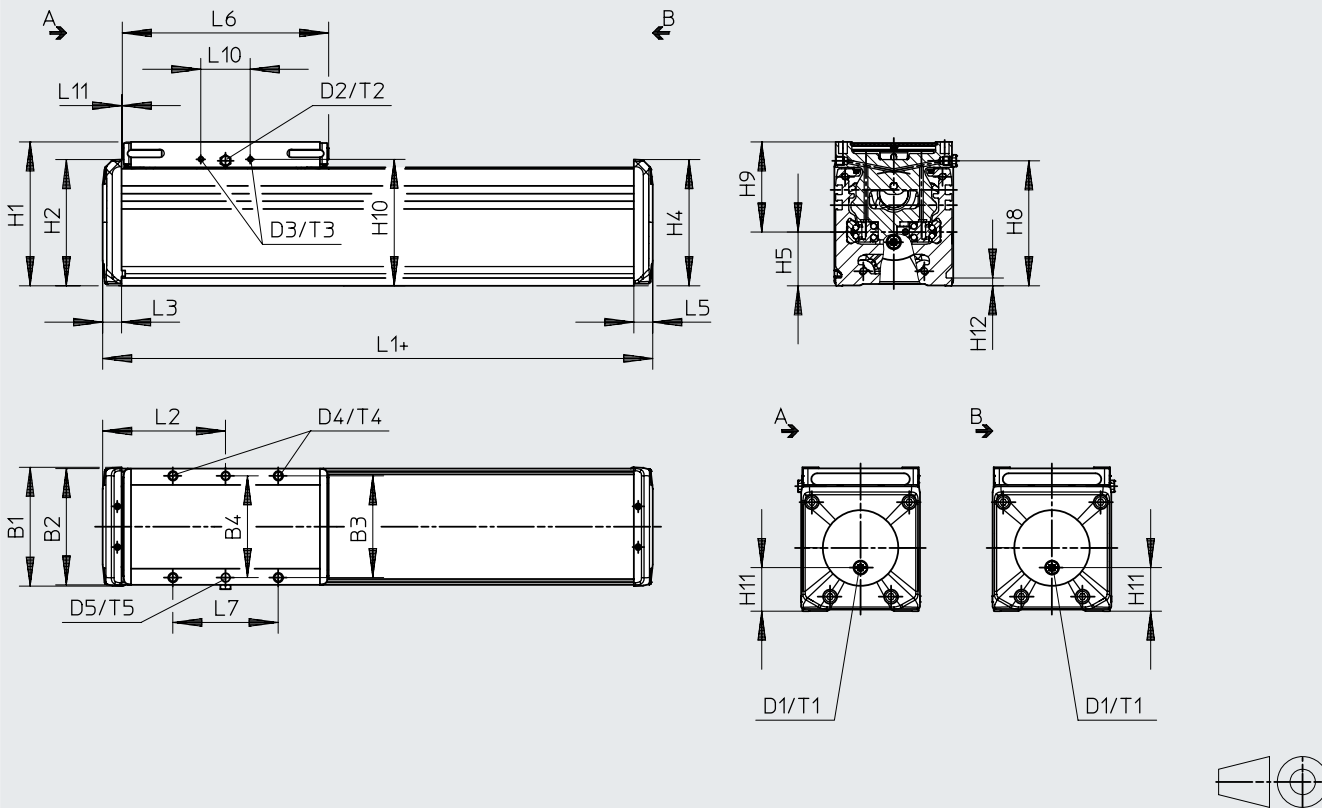
To avoid impairing the functionality of the axes, we recommend that the following deflection limits are observed. Greater deformation can result in increased friction, greater wear and reduced service life.

Size	Dynamic deflection (moving load)	Static deflection (stationary load)
60, 80	0.05% of the axis length, max. 0.5 mm	0.1% of the axis length

Datasheet

Dimensions – ELFD-...

Download CAD data → [www.festo.com](http://www.festo.com)



+ = plus stroke length + 2x stroke reserve

	B1	B2	B3	B4	D1	D2	D3	D4	D5	H1	H2
				±0.03					∅ H7		
ELFD-60	62	60	52.5	52.5	G1/8	M6	M3	M5	5	82	69.9
ELFD-80	82	80	70	70	G1/8	M6	M3	M6	6	99	86.9

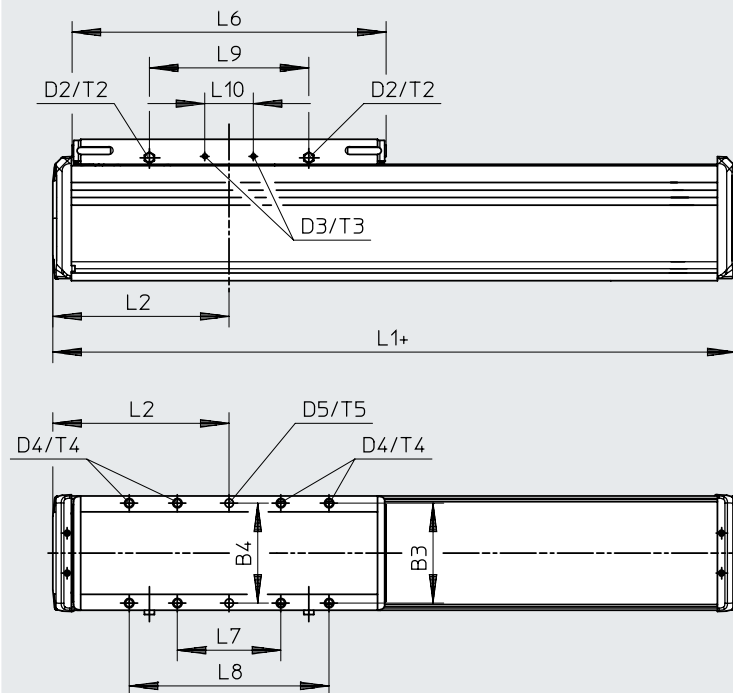
	H4	H5	H8	H9	H10	H11	H12	L1	L2	L3	L5
									min.		
ELFD-60	69.9	33	70	49	71	23.4	5.3	159.5	79.5	15.5	15.5
ELFD-80	86.9	37	86	62	87	30	5.3	178.5	89	13	13

	L6	L7	L10	L11		T1	T2	T3	T4	T5
				min.	max.					
		±0.1								
ELFD-60	118	50	34	1.5	5	6	6	7	16.5	7
ELFD-80	142	72.5	34	1.5	5	6	6	7	17.5	7

Datasheet

Dimensions – ELFD-...-L (with long slide)

Download CAD data → [www.festo.com](http://www.festo.com)



+ = plus stroke length + 2x stroke reserve

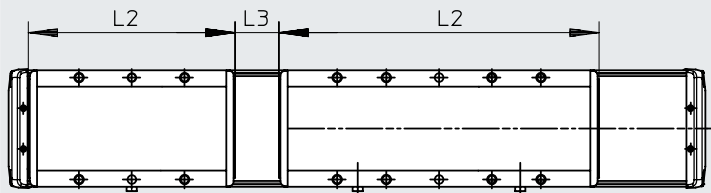
	B3	B4	D2	D3	D4	D5 ∅ H7	L1	L2 min.	L6
ELFD-60-L	52.5	52.5 ±0.03	M6	M3	M5	5	200.5	100	159
ELFD-80-L	70	70	M6	M3	M6	6	256.5	128	220

	L7	L8	L9	L10	T2	T3	T4	T5
	±0.1	±0.1						
ELFD-60-L	50	95	79	34	6	7	16.5	7
ELFD-80-L	72.5	140	124.6	34	6	7	17.5	7

Datasheet

Dimensions – ELFD-...-ZL/-ZR (with additional slide)

Download CAD data → [www.festo.com](http://www.festo.com)



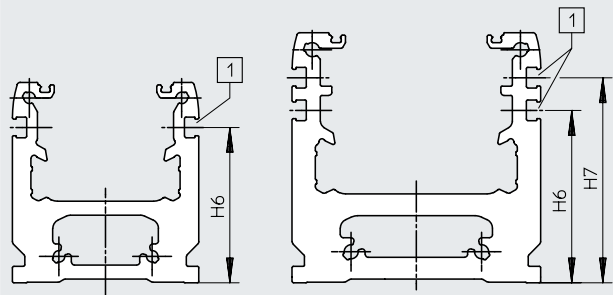
	L2	L3
ELFD-60	118	50
ELFD-80	142	50
ELFD-60-L	159	50
ELFD-80-L	220	50

Dimensions – ELFD-...- (profile)

Download CAD data → [www.festo.com](http://www.festo.com)

ELGD-TB-80

ELGD-TB-80



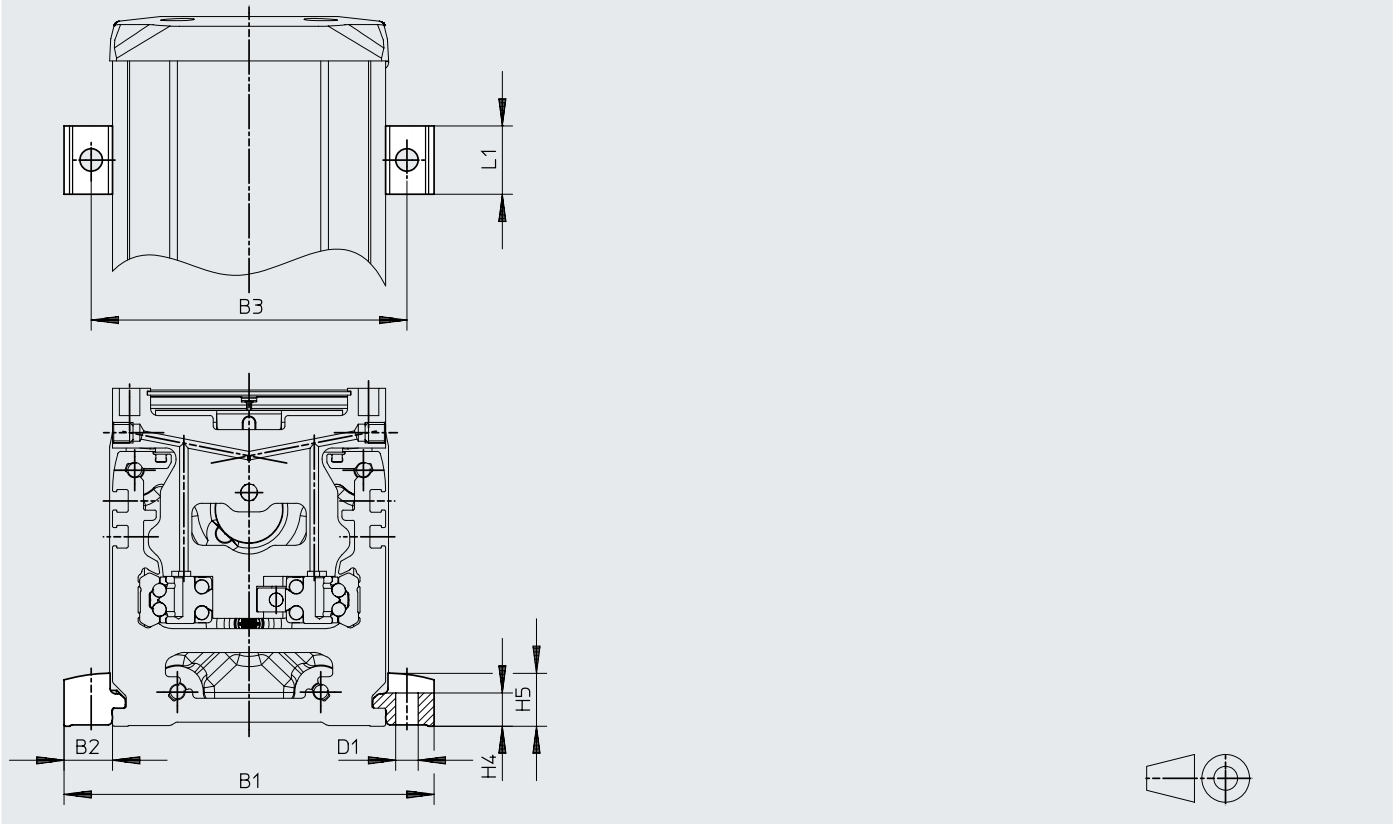
[1] Sensor slot for proximity switch

	H6	H7
ELFD-60	50	–
ELFD-80	55.5	66

Datasheet

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

Download CAD data → [www.festo.com](http://www.festo.com)

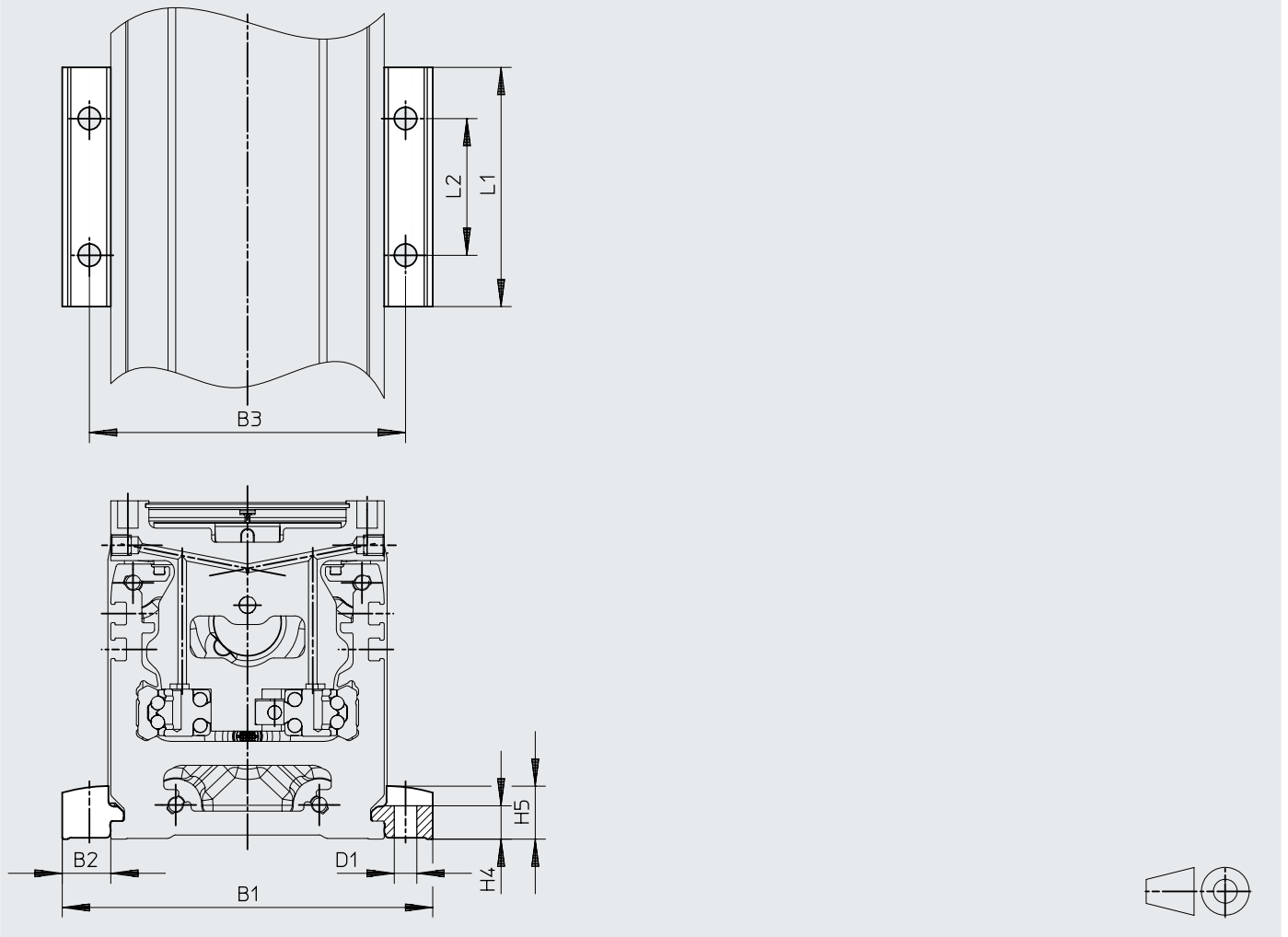


		B1	B2	B3	D1 ∅ H13	H4 ±0.1	H5	L1
EAHF-E24-60-P-S	ELFD-60	88.4	14.2	72.5	6.6	9.8	15.5	20
	ELFD-80	108.4	14.2	92.5	6.6	9.8	15.5	20

Datasheet

Dimensions – Profile mounting EAHF-E24-60-P

Download CAD data → [www.festo.com](http://www.festo.com)

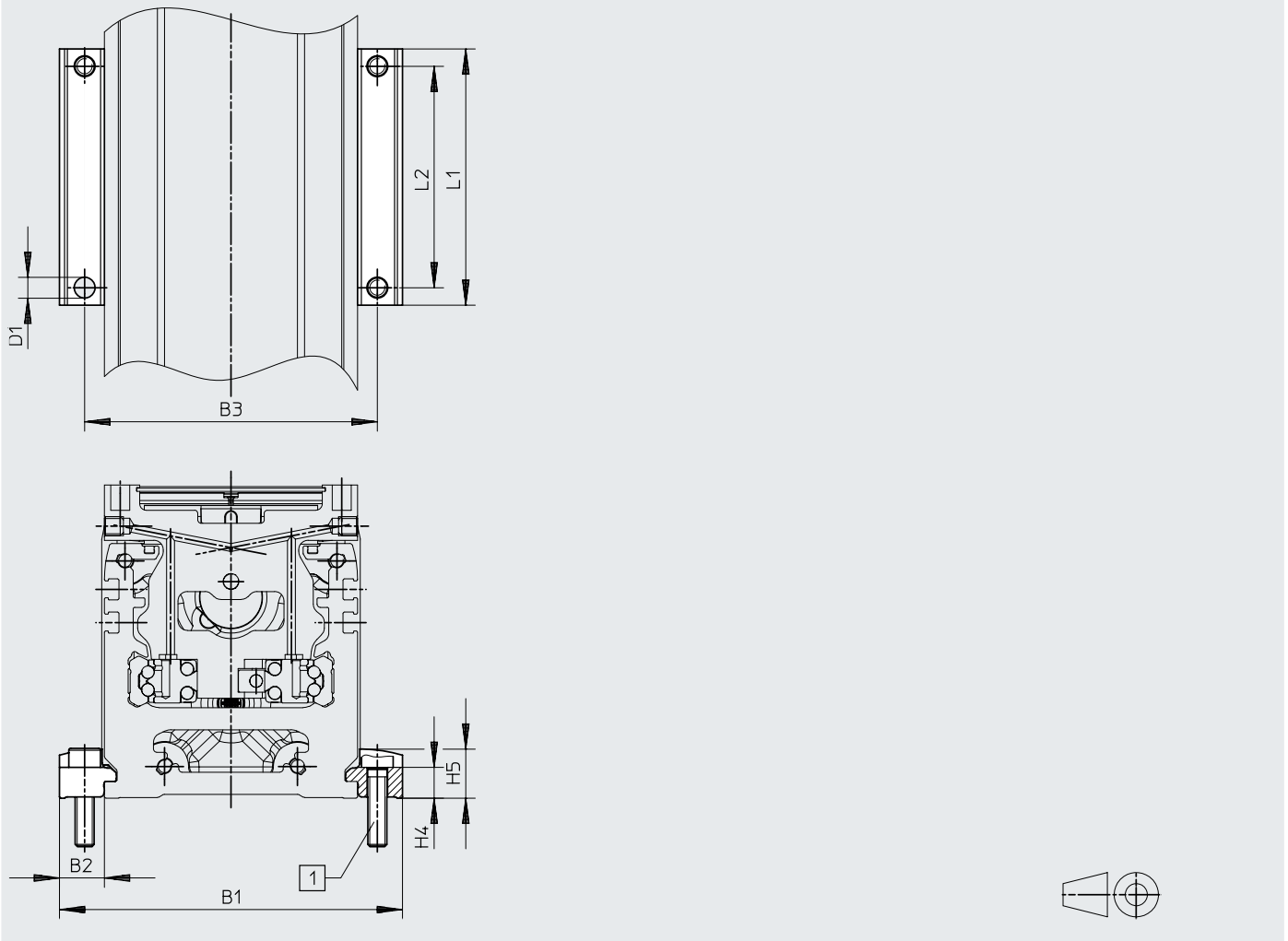


		B1	B2	B3	D1 ∅ H13	H4 ±0.1	H5	L1	L2
EAHF-E24-60-P	ELFD-60	88.4	14.2	72.5	6.6	9.8	15.5	70	40
	ELFD-80	108.4	14.2	92.5	6.6	9.8	15.5	70	40

Datasheet

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

Download CAD data → [www.festo.com](http://www.festo.com)

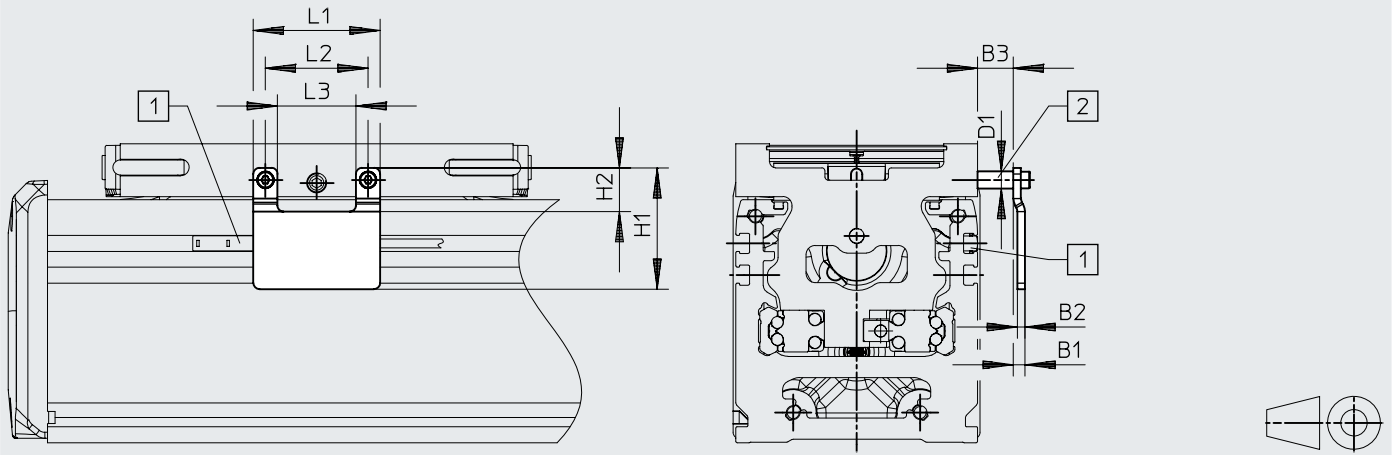


		B1	B2	B3	D1 ∅ H13	H4 ±0.1	H5	L1	L2
EAHF-E24-60-P-D5	ELFD-60	88.4	14.2	72.5	5.5	9.8	15.5	62	52.5
EAHF-E24-60-P-D4	ELFD-80	108.4	14.2	92.5	6.6	9.8	15.5	81	70

Datasheet

Dimensions – Switch lug EAPM-E24-60-SLS

Download CAD data → [www.festo.com](http://www.festo.com)



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

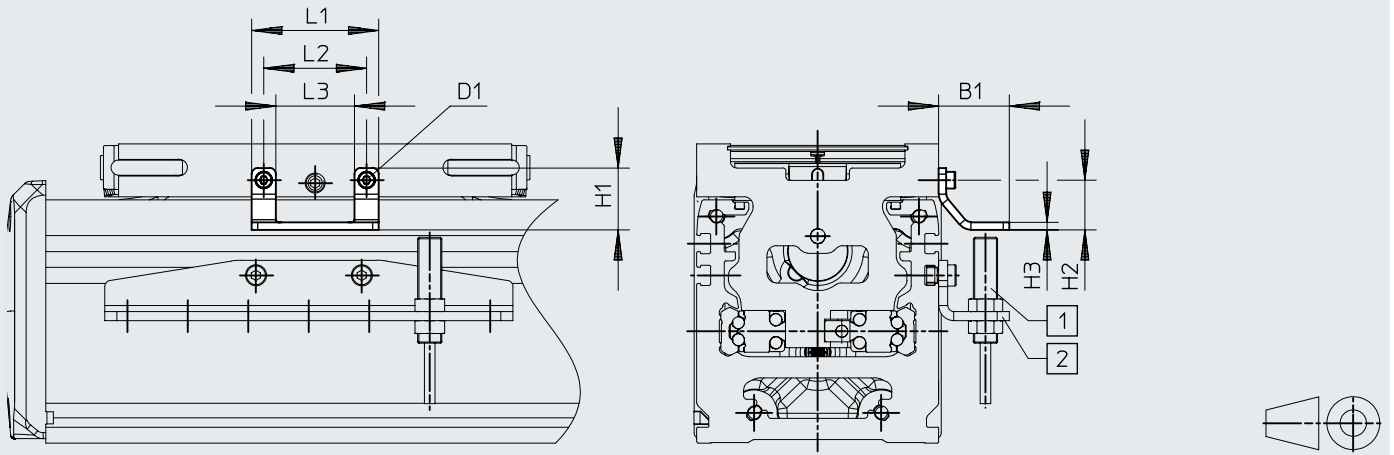
		B1	B2	B3	D1		H1	H2	L1	L2	L3
					With distance sleeve	Without distance sleeve					
EAPM-E24-60-SLS	ELFD-60	3.8	2.5	11.9	M3 x 8	M3 x 20	40.2	14.5	42	34	26
	ELFD-80										



Datasheet

Dimensions – Switch lug EAPM-E24-...-SLE

Download CAD data → [www.festo.com](http://www.festo.com)



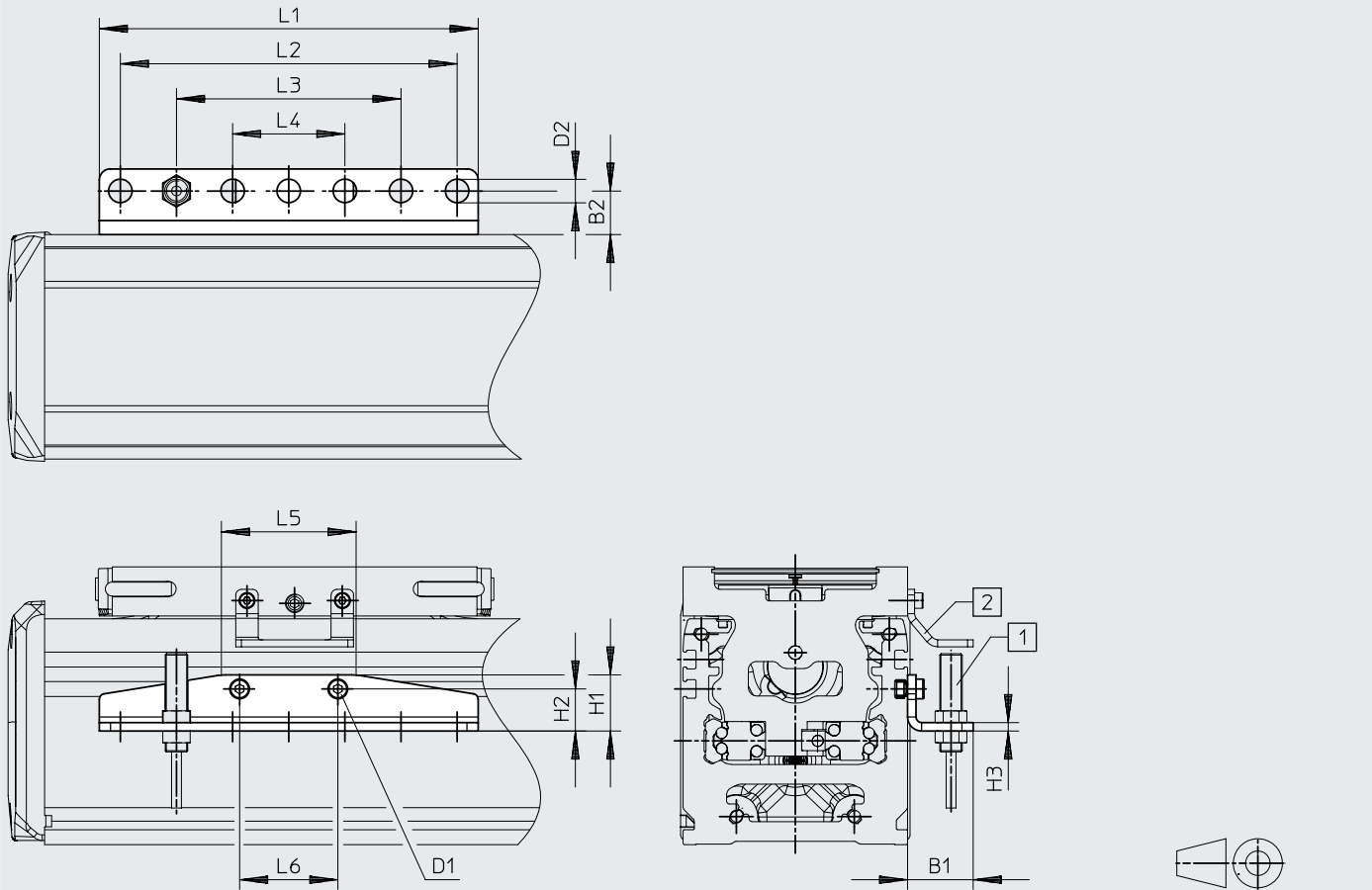
- [1] Proximity switch SIEN-M8
- [2] Sensor bracket EAPM-E24-60-SHE

		B1	D1	H1	H2	H3	L1	L2	L3
EAPM-E24-60-SLE	ELFD-60	23.4	M3	20.5	16.5	2.5	42	34	26
	ELFD-80								

Datasheet

Dimensions – Sensor bracket EAPM-E24-60-SHE

Download CAD data → [www.festo.com](http://www.festo.com)



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

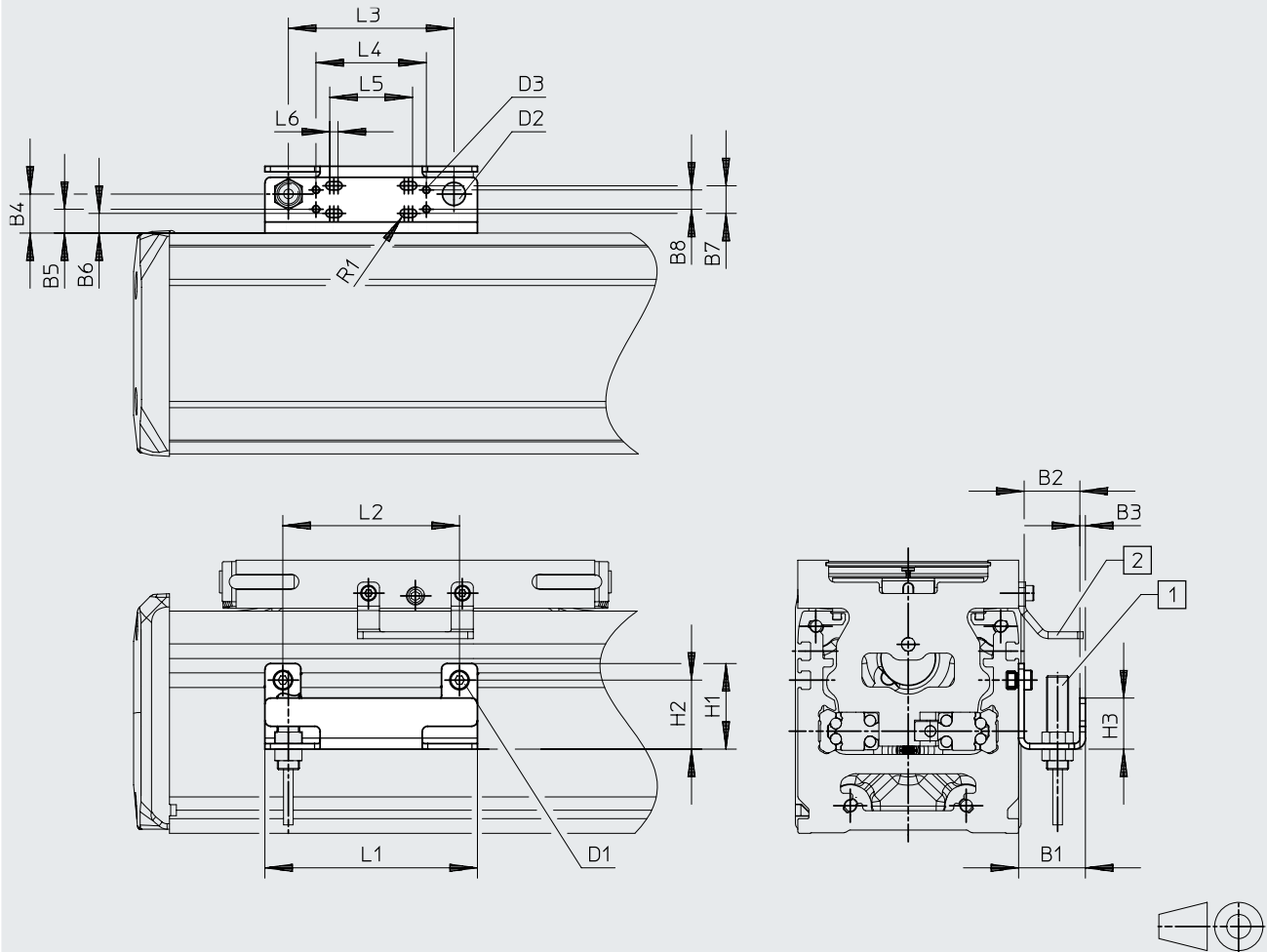
		B1	B2	D1	D2 ∅ H13	H1	H2	H3
		±0.3				±0.3		
EAPM-E24-60-SHE	ELFD-60	23.4	15.5	M4x6	8.4	20	15	3
	ELFD-80							

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

Datasheet

Dimensions – Sensor bracket EAPM-E24-60-SHO


Download CAD data → [www.festo.com](http://www.festo.com)



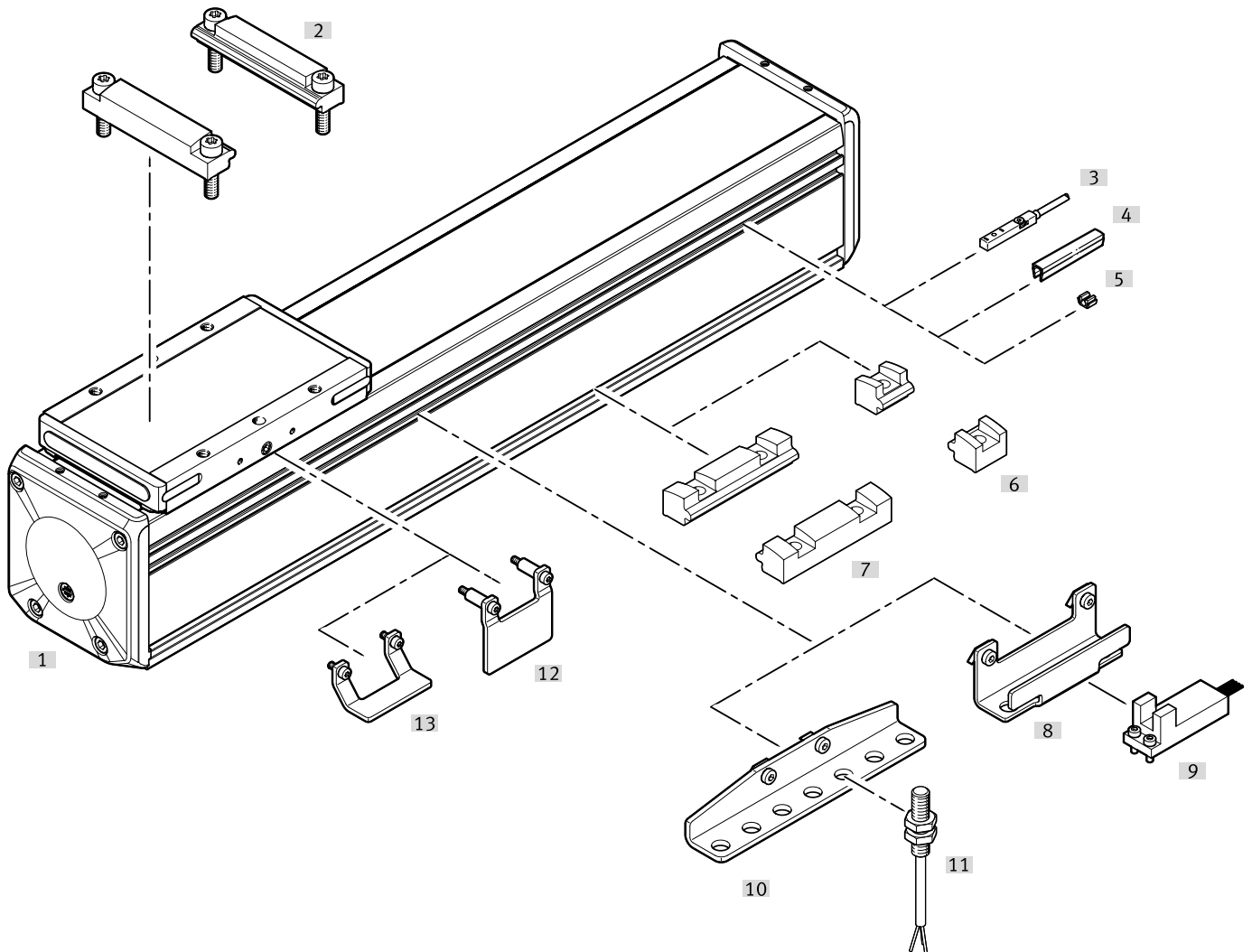
- [1] Inductive sensor (Omron)
- [2] Switch lug EAPM-E24-60-SLE

		B1	B2	B3	B4	B5	B6	B7
EAPM-E24-60-SHO	ELFD-60	24.2	20.2	2	14.1	8.6	7.1	10
	ELFD-80							
		B8	D1	D2 ∅	D3	H1	H2	H3
EAPM-E24-60-SHO	ELFD-60	7	M3	8.4	M3	31	25	18.5
	ELFD-80							
		L1	L2	L3	L4	L5	L6	R1
EAPM-E24-60-SHO	ELFD-60	77	64	60	40	24	3	1.5
	ELFD-80							

## Datasheet

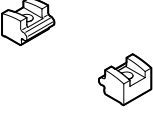
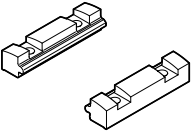
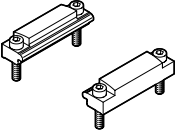
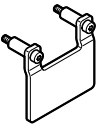
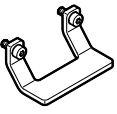
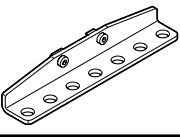
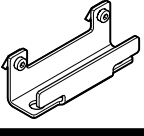
Ordering data – Modular product system	Size	Stroke [mm]	Part no.	Type	More information → elfd
	60	50 ... 2850	<b>8182487</b>	<b>ELFD-KF-60-...</b>	
	80	50 ... 2850	<b>8182488</b>	<b>ELFD-KF-80-...</b>	

## Peripherals overview

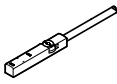
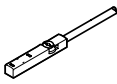






Accessories			
Type	Description		→ Page/Internet
[1] Guide axis ELFD	Guide axis		elfd
[2] Profile mounting EAHF-E24-...-D...	For axis/axis mounting with adapter plate		22
[3] Proximity switch, T-slot SIES-8M	Inductive proximity switch, for T-slot		23
[4] Slot cover ABPS	For protection against contamination		23
[5] Clip SMBK	For mounting the proximity switch cable in the slot		23
[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		22
[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		22
[11] Proximity switch, M8 SIEN-M8	Inductive proximity switch, round design		23
[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		22

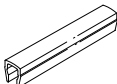
## Accessories

Profile mounting EAHF-E24-...-P-S					
	Description	Material	Product weight	Part no.	Type
	For size 60, 80	Anodised wrought aluminium alloy	18 g	<b>8197128</b>	<b>EAHF-E24-60-P-S</b>
Profile mounting EAHF-E24-...-P					
	Description	Material	Product weight	Part no.	Type
	For size 60, 80	Anodised wrought aluminium alloy	71 g	<b>8197132</b>	<b>EAHF-E24-60-P</b>
Profile mounting EAHF-E24-...-P-D...					
	Description	Material	Product weight	Part no.	Type
	ELGD-60 to ELGD-60	Anodised wrought aluminium alloy	87 g	<b>8197131</b>	<b>EAHF-E24-60-P-D5</b>
	ELGD-60 to ELGD-80	Anodised wrought aluminium alloy	119 g	<b>8197129</b>	<b>EAHF-E24-60-P-D4</b>
	ELGD-80 to ELGD-100		133 g	<b>8197130</b>	<b>EAHF-E24-60-P-D6</b>
Switch lug EAPM-E24-...-SLS					
	Description	Material	Product weight	Part no.	Type
	For size 60, 80	Steel	32 g	<b>8197117</b>	<b>EAPM-E24-60-SLS</b>
Switch lug EAPM-E24-...-SLE					
	Description	Material	Product weight	Part no.	Type
	For size 60, 80	Steel	20 g	<b>8197116</b>	<b>EAPM-E24-60-SLE</b>
Sensor bracket EAPM-E24-...-SHE					
	Description	Material	Product weight	Part no.	Type
	For size 60, 80	Steel	103 g	<b>8197123</b>	<b>EAPM-E24-60-SHE</b>
Sensor bracket EAPM-E24-...-SHO					
	Description	Material	Product weight	Part no.	Type
	For size 60, 80	Steel	67 g	<b>8197121</b>	<b>EAPM-E24-60-SHO</b>

## Accessories

Proximity switch for T-slot, inductive						Datasheets → Internet: sies
	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part no.	Type
<b>N/O</b>						
	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
<b>N/C</b>						
	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

Proximity switch M8 (round design), inductive					Datasheets → Internet: sien
	Switching output	Electrical connection	Cable length [m]	Part no.	Type
<b>N/O</b>					
	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
<b>N/C</b>					
	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 60, 80	ABS	2 every 0.5 m	13 g	563360	ABP-5-S1

Clip SMBK						
	Description	Pack size	Product weight	Part no.	Type	
	For size 60, 80	10	1g	534254	SMBK-8	