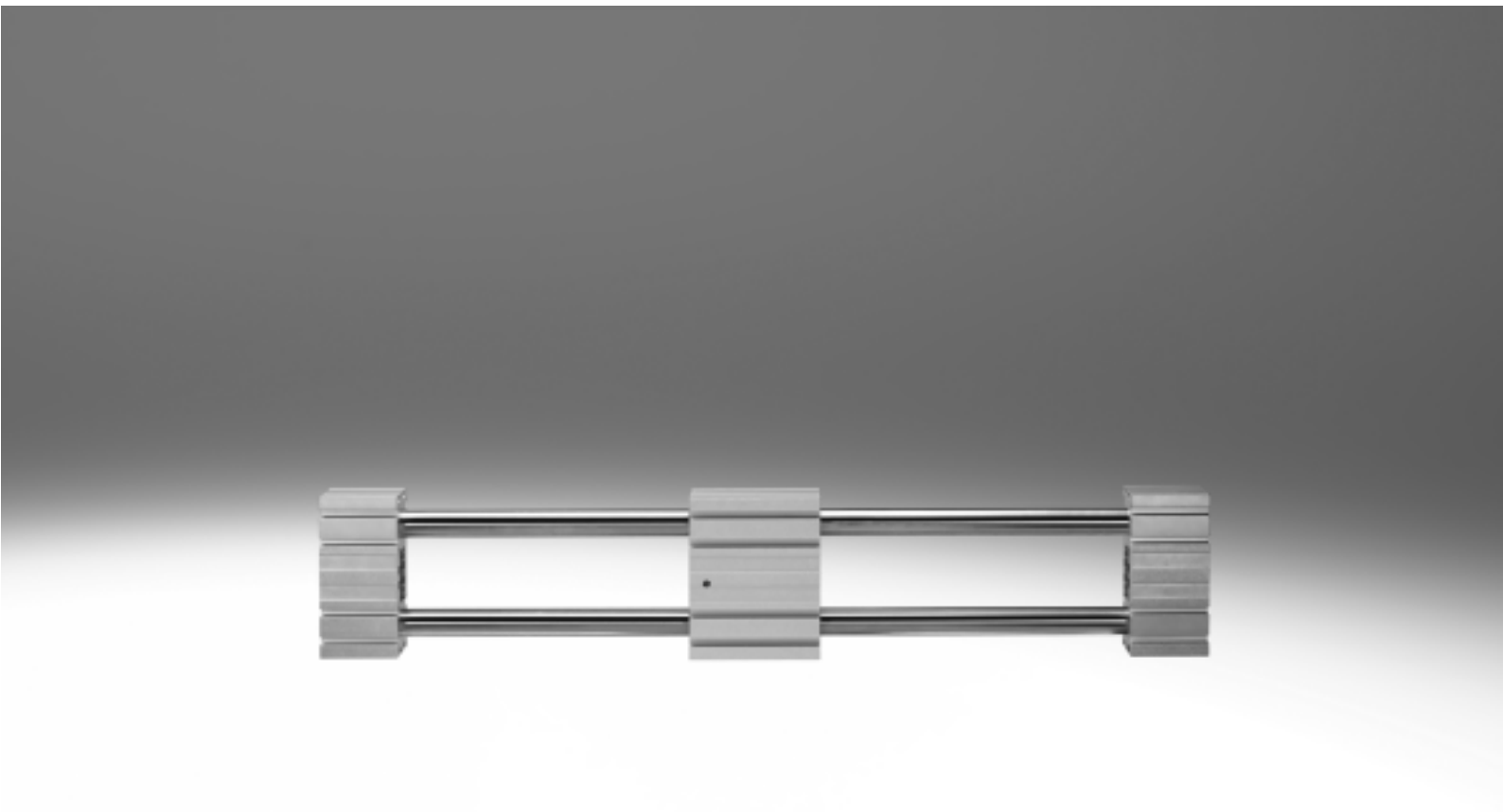
Passive guide axes ELFR, without drive



Passive guide axes ELFR, without drive

Key features

At a glance

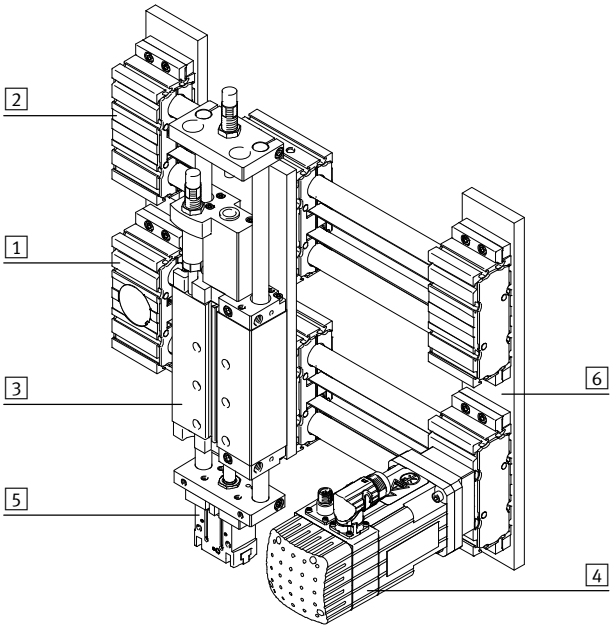
- Driveless linear guide units with guide and freely movable slide
- Passive guide axes are designed to increase force and torque in multi-axis applications
- Higher torsional resistance
- Reduced vibrations with dynamic loads
- Drive axes and passive guide axes can be arranged adjacent to or above one another
- Plain-bearing guide
  - For small loads
  - Restricted operating behaviour with torque load
  - Not backlash-free guide
- Recirculating ball bearing guide
  - For medium loads
  - Very good operating behaviour with torque load
  - Backlash-free guide (preloaded guide elements)

Associated drive axis

Toothed belt axis ELGR

- For size 35, 45, 55
- Load capacity up to max. 300 N or 124 Nm
- Max. feed force 350 N

System product for handling and assembly technology

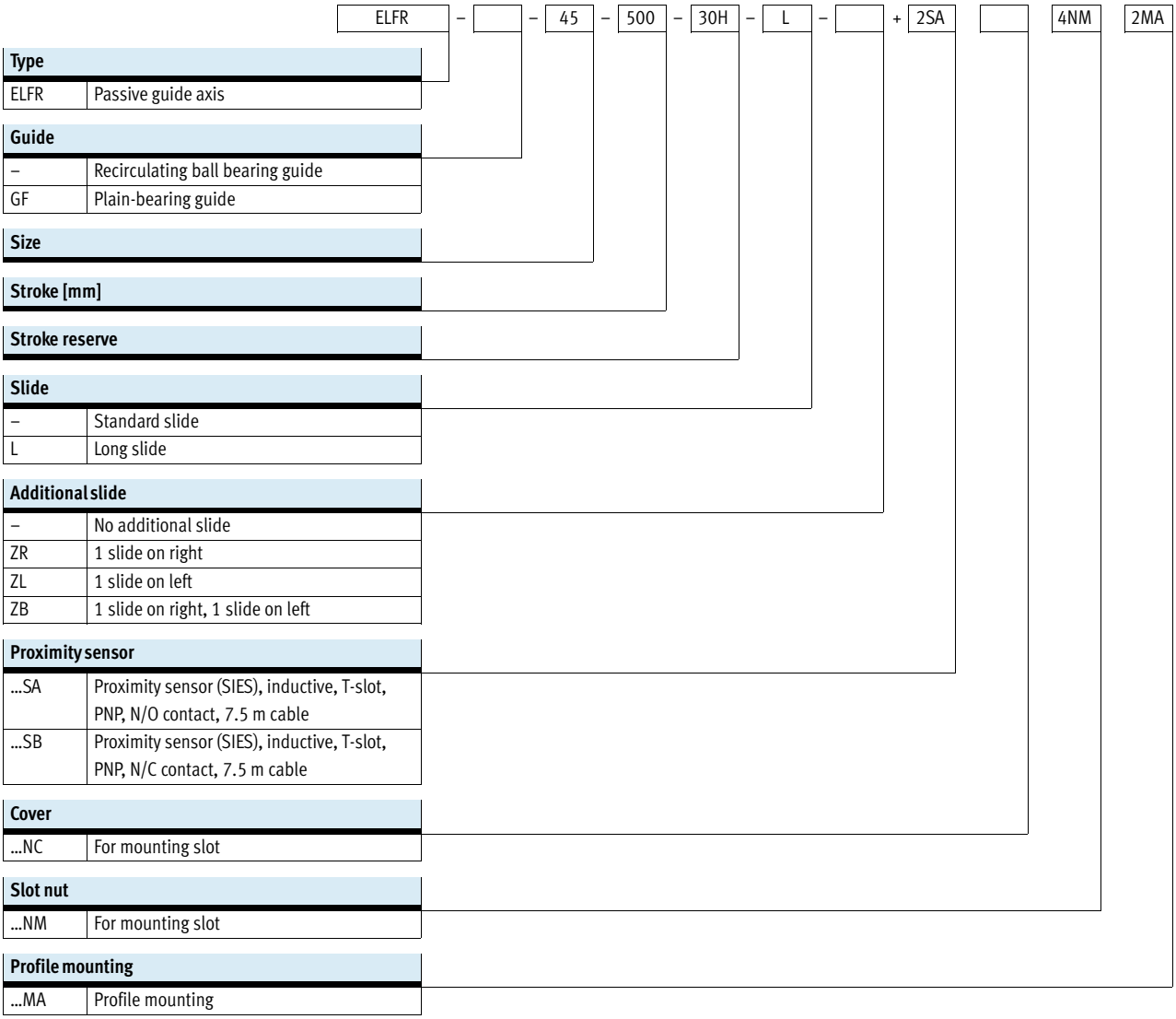


System components and accessories

	Brief description	➔ Page/Internet
1 Axes	Wide range of combinations possible within handling and assembly technology	axis
2 Guide axes	For increasing force and torque in multi-axis applications	guide axis
3 Drives	Wide range of combinations possible within handling and assembly technology	drive
4 Motors	Servo and stepper motors, with or without gear unit	motor
5 Grippers	Wide range of variations possible within handling and assembly technology	gripper
6 Adapters	For drive/drive and drive/gripper connections	adapter kit

Passive guide axes ELFR, without drive

Type codes



Type	
ELFR	Passive guide axis

Guide	
–	Recirculating ball bearing guide
GF	Plain-bearing guide

Size

Stroke [mm]

Stroke reserve

Slide	
–	Standard slide
L	Long slide

Additional slide	
–	No additional slide
ZR	1 slide on right
ZL	1 slide on left
ZB	1 slide on right, 1 slide on left

Proximity sensor	
...SA	Proximity sensor (SIES), inductive, T-slot, PNP, N/O contact, 7.5 m cable
...SB	Proximity sensor (SIES), inductive, T-slot, PNP, N/C contact, 7.5 m cable

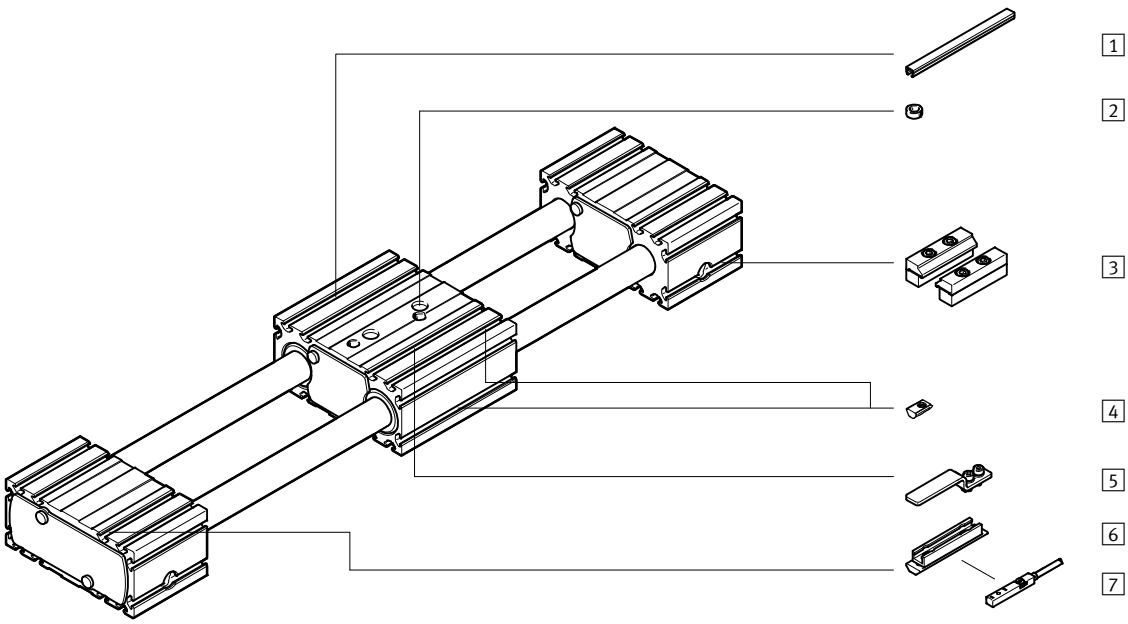
Cover	
...NC	For mounting slot

Slot nut	
...NM	For mounting slot

Profile mounting	
...MA	Profile mounting

Passive guide axes ELFR, without drive

Peripherals overview

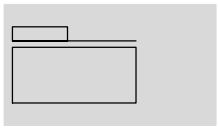


Variants and accessories			
	Type	**Brief description**	**➔ Page/Internet**
1	Slot cover NC	• For protecting against ingress of dirt	13
2	Centring sleeve ZBH	• For centring loads and attachments on the slide • 2 centring sleeves included in the scope of delivery of the axis	13
3	Profile mounting MA	For mounting the axis on the bearing cap	12
4	Slot nut NM	For mounting attachments	13
5	Switch lug SA, SB	For sensing the slide position	12
6	Sensor bracket SA, SB	Adapter for mounting the inductive proximity sensors on the axis	12
7	Proximity sensor, T-slot SA, SB	• Inductive proximity sensor, for T-slot • The scope of delivery with the order code SA, SB includes 1 switch lug and 1 sensor bracket	13
–	Connecting cable NEBU	For proximity sensors (order code SA and SB)	13

Passive guide axes ELFR, without drive

Technical data

Function



Size
35 … 55

Stroke length
50 … 1,500 mm

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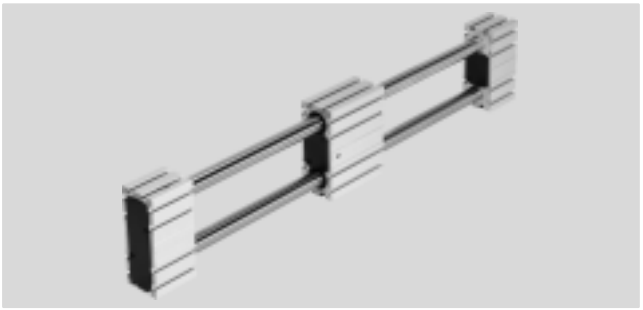


General technical data				
Size		35	45	55
Design		Passive guide axis		
Guide		Recirculating ball bearing guide		
		Plain-bearing guide		
Mounting position		Any		
Working stroke	[mm]	50 … 800	50 … 1,000	50 … 1,500
Max. no-load resistance to shifting	[N]	3	6	10
Max. speed				
Recirculating ball bearing guide	[m/s]	3		
Plain-bearing guide	[m/s]	1		
Max. acceleration	[m/s^2]	50		

Operating and environmental conditions		
Ambient temperature		
Recirculating ball bearing guide	[°C]	–10 … +50
Plain-bearing guide	[°C]	0 … +40
Protection class		IP20

Weight [kg]			
Size	35	45	55
Recirculating ball bearing guide			
Basic weight with 0 mm stroke[1)]			
Standard slide	1.2	2.7	4.6
Long slide	1.6	3.8	6.5
Additional weight per 1,000 mm stroke	2.4	5.0	7.7
Moving load	0.4	0.9	1.7
Slide			
Standard slide	0.4	0.9	1.7
Long slide	0.7	1.5	2.8
Additional slide	0.4	0.9	1.7

1) Incl. slide

Passive guide axes ELFR, without drive

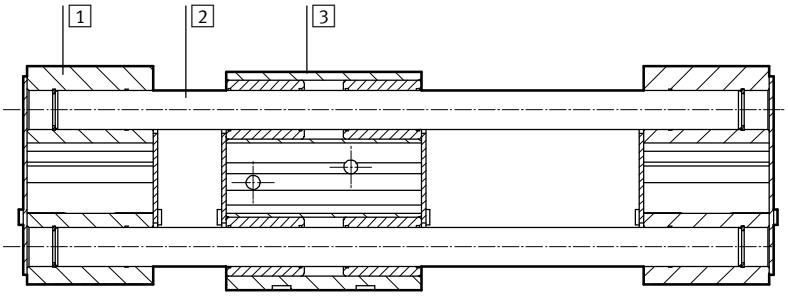
Technical data

Weight [kg]			
Size	35	45	55
Plain-bearing guide			
Basic weight with 0 mm stroke[1)]			
Standard slide	1.1	2.5	4.2
Long slide	1.6	3.7	6.4
Additional weight per 1,000 mm stroke	2.3	5.0	7.7
Moving load	0.3	0.7	1.3
Slide			
Standard slide	0.3	0.7	1.3
Long slide	0.6	1.5	2.6
Additional slide	0.3	0.7	1.3

1) Incl. slide

Materials

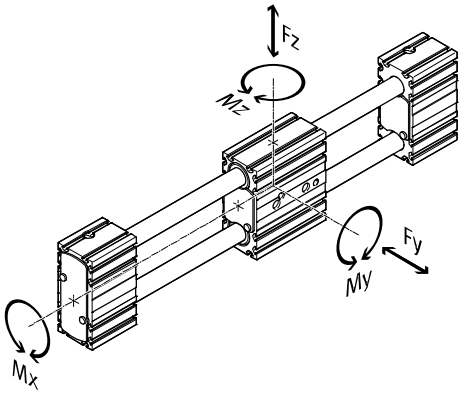
Sectional view



Axis	
1 Bearing cap, profile	Anodised wrought aluminium alloy
2 Guide rods	Steel
3 Slide, profile	Anodised wrought aluminium alloy
Note on materials	RoHS-compliant
	Contains PWIS (paint wetting impairment substances)

Characteristic 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. These values must not be exceeded during dynamic operation. Special attention must be paid to the cushioning phase.



If the axis is subjected to more than two 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:

$$f_v = \frac{|F_{y,dyn}|}{Fy_{max.}} + \frac{|F_{z,dyn}|}{Fz_{max.}} + \frac{|M_{x,dyn}|}{Mx_{max.}} + \frac{|M_{y,dyn}|}{My_{max.}} + \frac{|M_{z,dyn}|}{Mz_{max.}} \leq 1$$

Permissible forces and torques for a service life of 5,000 km

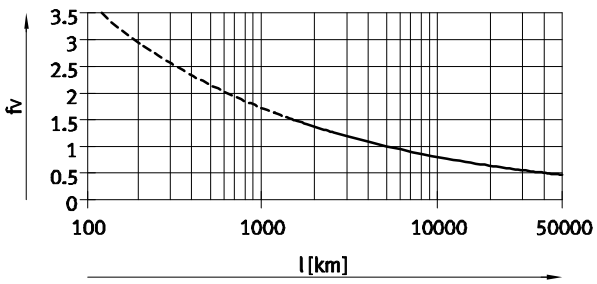
Guide		Plain-bearing guide			Recirculating ball bearing guide		
Size		35	45	55	35	45	55
$Fy_{max.}$, Fz_{max}	[N]	50	100	300	50	100	300
Standard slide							
$Mx_{max.}$	[Nm]	1	2.5	5	2.5	5	15
$My_{max.}$	[Nm]	4	8	16	8	16	48
$Mz_{max.}$	[Nm]	4	8	16	8	16	48
Long slide							
$Mx_{max.}$	[Nm]	1	2.5	5	2.5	5	15
$My_{max.}$	[Nm]	10	20	40	20	40	124
$Mz_{max.}$	[Nm]	10	20	40	20	40	124

Service life

The service life of the guide depends on the load. To provide a rough 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. Consultation with your local contact person at Festo is mandatory for load comparison factors f_v greater than 1.5.

Load comparison factor f_v as a function of service life



Example:
A user wants to move an X kg load. Using the above formula gives a value of 1.5 for the load comparison factor f_v. According to the graph, the guide would have a service life of approx. 1,500 km. Reducing the acceleration reduces the Mz and My values. A load comparison factor of 1 now gives a service life of 5,000 km.

- Note

PositioningDrives
sizing software
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Passive guide axes ELFR, without drive

Technical data

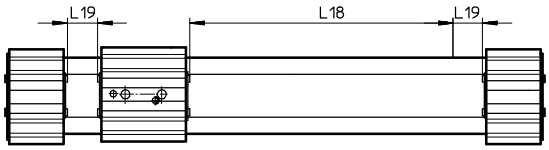
FESTO

Min. nominal stroke

With standard slide or long slide L with additional slide ZR/ZL/ZB

Size		35			45			55		
Variant		–/L	ZR/ZL	ZB	–/L	ZR/ZL	ZB	–/L	ZR/ZL	ZB
Min. nominal stroke	[mm]	50	126	202	50	146	242	50	166	282

Stroke reserve



L18 = Nominal stroke
L19 = Stroke reserve

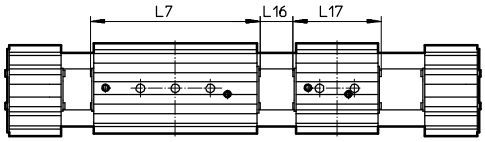
- The stroke reserve is a safety distance that can be available on both sides of the axis in addition to the nominal stroke
- The sum of the nominal stroke and 2x stroke reserve must not exceed the maximum working stroke
- The stroke reserve length can be freely selected
- The stroke reserve is defined via the “stroke reserve” attribute in the modular product system

Example:
Type ELFR-45-500-20H-...
Nominal stroke = 500 mm
2x stroke reserve = 40 mm

Working stroke = 540 mm
(540 mm = 500 mm + 2x 20 mm)

Working stroke reduction

With standard slide or long slide L with additional slide ZR/ZL/ZB



L7 = Slide length
L16 = Distance between both slides
L17 = Additional slide length

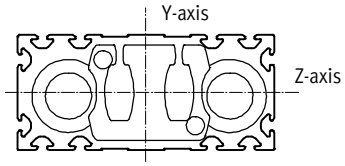
- With a toothed belt axis with additional slide, the working stroke is reduced by the length of the additional slide and the distance between both slides
- If the long slide L variant is ordered, the additional slide is not extended

Example:
Type ELFR-35-500-...-ZR
Working stroke = 500 mm
L16 = 10 mm
L7, L17 = 76 mm

Working stroke with additional slide = 414 mm
(500 mm – 10 mm – 76 mm)

Dimensions – Additional slide				
Size		35	45	55
Length L17	[mm]	76	96	116
Distance between the slides L16	[mm]	≥ 0		

2nd moment of area



Size		35	45	55
Iy	[mm^4]	4.19x10^3	17.95x10^3	41.18x10^3
Iz	[mm^4]	3.77x10^3	15.71x10^3	38.35x10^3

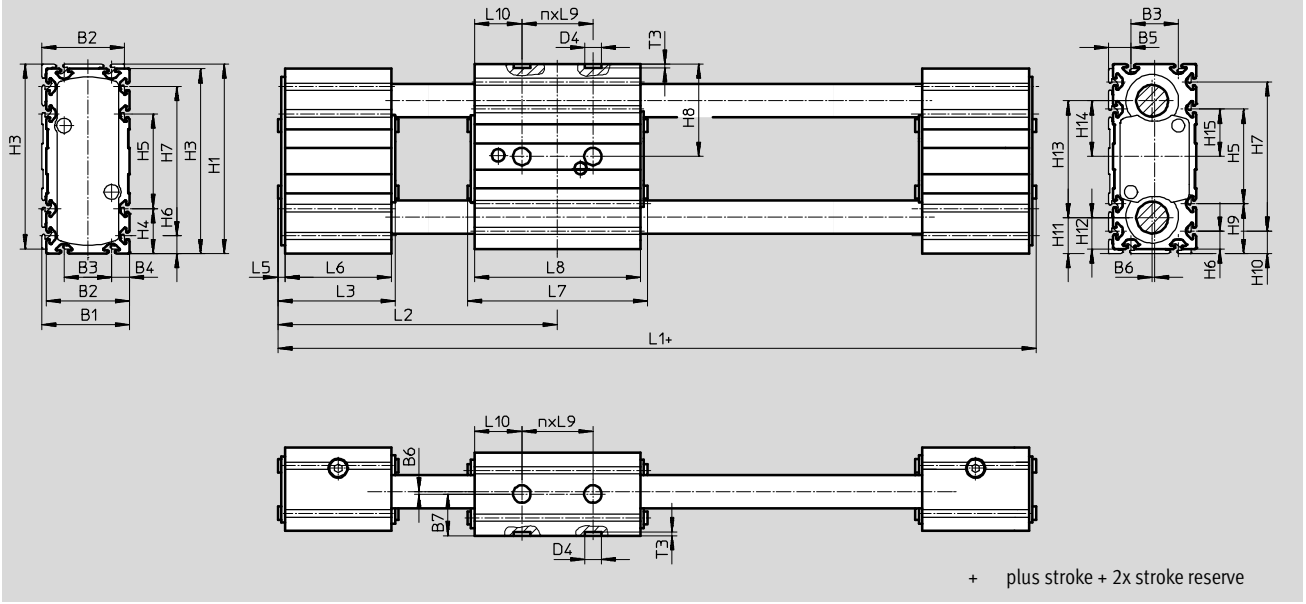
Recommended deflection limits

Adherence to a maximum deflection of 0.5 mm is recommended so as not to impair the functional performance of the axes. Greater deformation can result in increased friction, greater wear and reduced service life.

Passive guide axes ELFR, without drive

Technical data

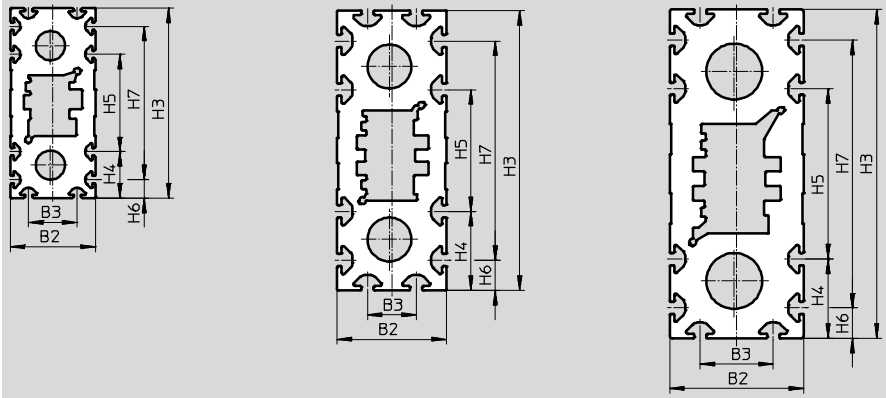
Dimensions Download CAD data ➔ **www.festo.com**



\+ plus stroke + 2x stroke reserve

Profile

ELFR-35 ELFR-45 ELFR-55



Size	B1	B2	B3	B4	B5	B6	B7	D4 ∅ H7	H1	H3	H4	H5	H6	H7	H8	H9
ELFR-35	37	35	20	7.5	9.5	1	17.5	7	80	78	19	40	7.5	63	39	21
ELFR-35-L																
ELFR-45	47	45	20	12.5	14.5		22.5		117	115	32.5	50	12.5	90	57.5	34.5
ELFR-45-L																
ELFR-55	57	55	30	12.5	14.5		27.5		137	135	32.5	70	12.5	110	67.5	34.5
ELFR-55-L																

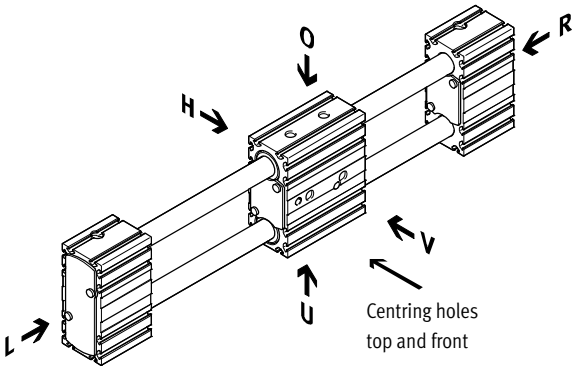
Size	H10	H11	H12	H13	H14	H15	L1	L2	L3	L5	L6	L7	L8	L9	L10	n	T3 +0.1
ELFR-35	9.5	15.5	13.5	49	23.5	20	178	89	51	3	45	76	70	30	20	1	1.6
ELFR-35-L							248	124				146	140		40	2	
ELFR-45	14.5	23	21	71	34.5	25	219	108	60		54	96	90	40	25	1	
ELFR-45-L							309	153				186	180		50	2	
ELFR-55	14.5	25.5	23.5	86	42	35	243	120	62		56	116	110	40	35	1	
ELFR-55-L							353	175				226	220		70	2	

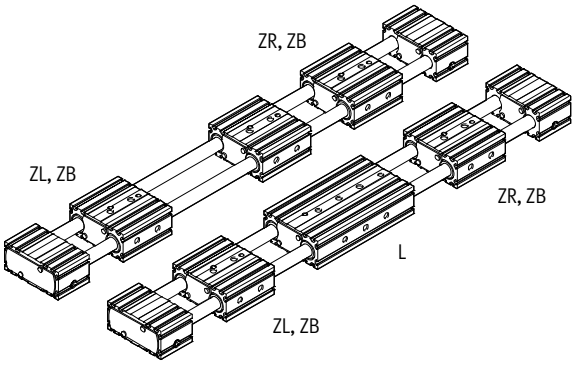
Passive guide axes ELFR, without drive

Ordering data – Modular products

Order code

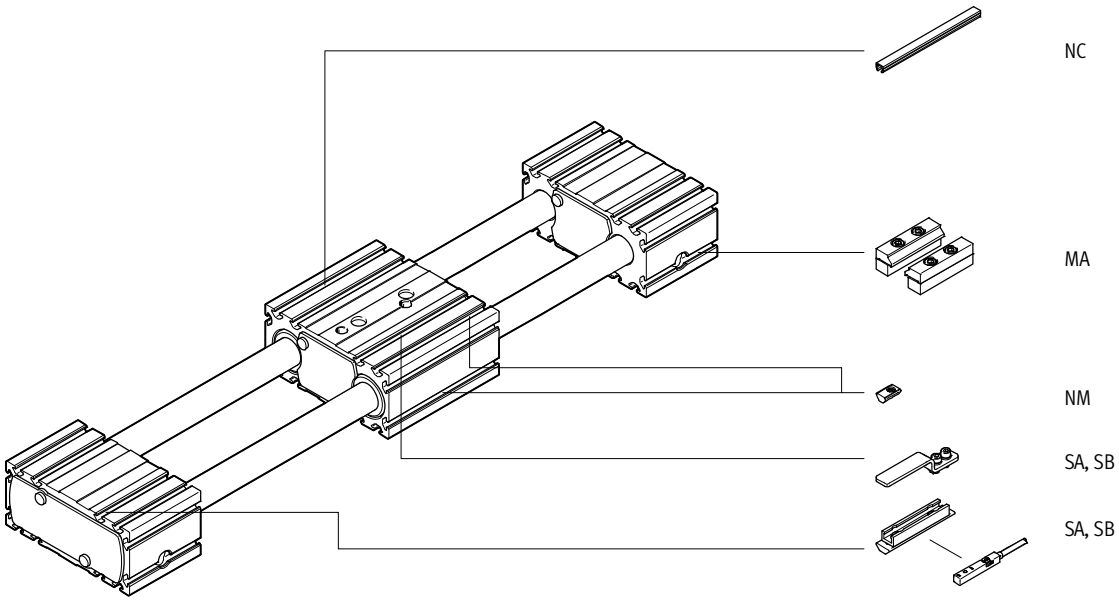
Mandatory data





O	top	L	left
U	underneath	V	front
R	right	H	rear

Accessories



Passive guide axes ELFR, without drive

Ordering data – Modular products

Ordering table

Size			35	45	55	Condi-tions	Code		Enter code
M	Module No.		**571435**	**571436**	**571437**				
	Design		Passive guide axis				**ELFR**		ELFR
O	Guide		Recirculating ball bearing guide						
			Plain-bearing guide				**-GF**		
M	Size		35	45	55		**-...**		**-...**
	Stroke length	[mm]	1 ... 800	1 ... 1,000	1 ... 1,500		**-...**		**-...**
	Stroke reserve	[mm]	0 ... 999 (0 = no stroke reserve)			1	**-...H**		
O	Slide design		Standard slide						
			Long slide				**-L**		
	Additional slide		No additional slide						
			1 slide on right			2	**-ZR**		
			1 slide on left			2	**-ZL**		
			1 slide on right, 1 slide on left			2	**-ZB**		
	Accessories		Accessories enclosed separately				**+**		+
	Proximity sensor (SIES), inductive, T-slot, PNP, incl. switch lug and sensor bracket	N/O contact, 7.5 m cable	1 ... 6				**...SA**		
		N/C contact, 7.5 m cable	1 ... 6				**... SB**		
	Mounting slot cover		–	1 ...50 (1 = 2 units, 500 mm)			**...NC**		
	Slot nut for mounting slot		1 ... 99				**...NM**		
	Profile mounting		1 ... 2				**...MA**		

1 **-...** The sum of the nominal stroke and 2x stroke reserve must be at least 50 mm and must not exceed the maximum stroke length.

2 **ZR, ZL, ZB** Working stroke reduction → 8

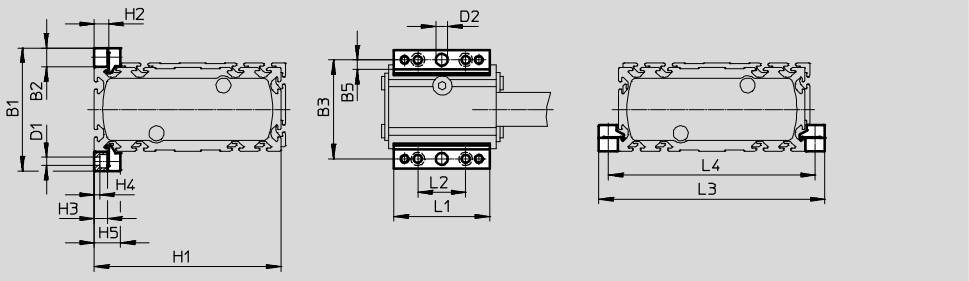
Size		35			45			55		
Variant		–/L	ZR/ZL	ZB	–/L	ZR/ZL	ZB	–/L	ZR/ZL	ZB
Min. nominal stroke	[mm]	50	126	202	50	146	242	50	166	282

Transfer order code

	ELFR	–		–		–		–		–		+	

Profile mounting MUE
(order code MA)

Material:
Anodised aluminium
RoHS-compliant



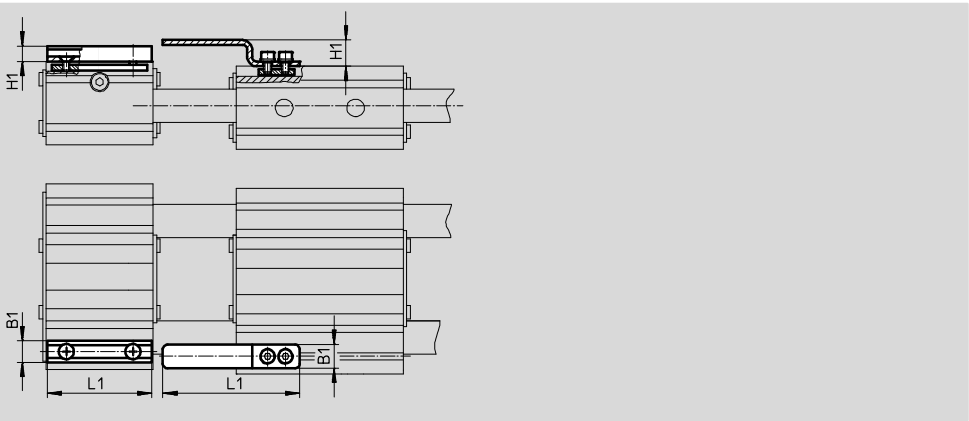
Dimensions and ordering data

For size	B1	B2	B3	B5	D1 ∅	D2 ∅ H7	H1	H2	H3	H4
35	51	8	43	4	3.4	5	78	6	5.5	2.3
45	69	12	57	4	5.5	5	115	10	9	3.2
55	79	12	67	4	5.5	5	135	10	9	3.2

For size	H5	L1	L2	L3	L4	Weight [g]	Part No.	Type
35	11	40	20	94	86	20	**558042**	**MUE-50**
45	17.5	52	40	139	127	32	**562238**	**MUE-45**
55	17.5	52	40	159	147	32	**562238**	**MUE-45**

Sensor bracket EAPM-...-SHS,
switch lug EAPM-...-SLS
(order code SA/SB)

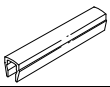
Materials:
Switch lug: Galvanised steel
Sensor bracket: Anodised wrought aluminium alloy
RoHS-compliant



Dimensions and ordering data

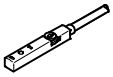
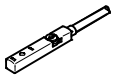
For size	B1	H1	L1	Weight [g]	Part No.	Type
Sensor bracket						
35, 45, 55	9	6.5	44	20	**567537**	**EAPM-L4-SHS**
Switch lug						
35, 45, 55	10	11	57.5	15	**567538**	**EAPM-L4-SLS**

Ordering data

	For size	Comment	Order code	Part No.	Type	PU[1]
Slot nut NST						
	35	For mounting slot	NM	**558045**	**NST-3-M3**	1
	45, 55			**150914**	**NST-5-M5**	
Centring sleeve ZBH[2]						
	35, 45, 55	For slide	–	**186717**	**ZBH-7**	10
Slot cover ABP						
	45, 55	For mounting slot every 0.5 m	NC	**151681**	**ABP-5**	2

1) Packaging unit
2) 2 centring sleeves included in the scope of delivery of the axis

Ordering data – Proximity sensors for T-slot, inductive Technical data ➔ Internet: sies

	Type of mounting	Electrical connection	Switching output	Cable length [m]	Order code	Part No.	Type
N/O contact							
	Insertable in the slot from above, flush with the cylinder profile	Cable, 3-wire	PNP	7.5	SA	**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-wire	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 contact							
	Insertable in the slot from above, flush with the cylinder profile	Cable, 3-wire	PNP	7.5	SB	**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-wire	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**

Ordering data – Connecting cables Technical data ➔ Internet: nebu

	Electrical connection, left	Electrical connection, right	Cable length [m]	Part No.	Type
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	**541333**	**NEBU-M8G3-K-2.5-LE3**
			5	**541334**	**NEBU-M8G3-K-5-LE3**
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	**541338**	**NEBU-M8W3-K-2.5-LE3**
			5	**541341**	**NEBU-M8W3-K-5-LE3**