

Guide axes ELFR, without drive

FESTO



Characteristics

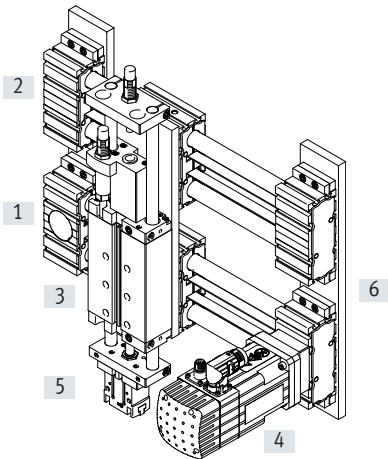
At a glance			
• Driveless linear guide units with guide and freely movable slide	• Higher torsional resistance	• Plain-bearing guide	• Recirculating ball bearing guide
• The guide axis is designed to support force and torque capacity in multi-axis applications	• Reduced vibrations with dynamic loads	– For small loads	– For medium loads
	• Drive axis and guide axis can be arranged adjacent to or above one another	– Restricted operating behaviour with torque load	– Very good operating behaviour with torque load
		– Guide not backlash-free	– 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 of 350 N

System product for handling and assembly technology



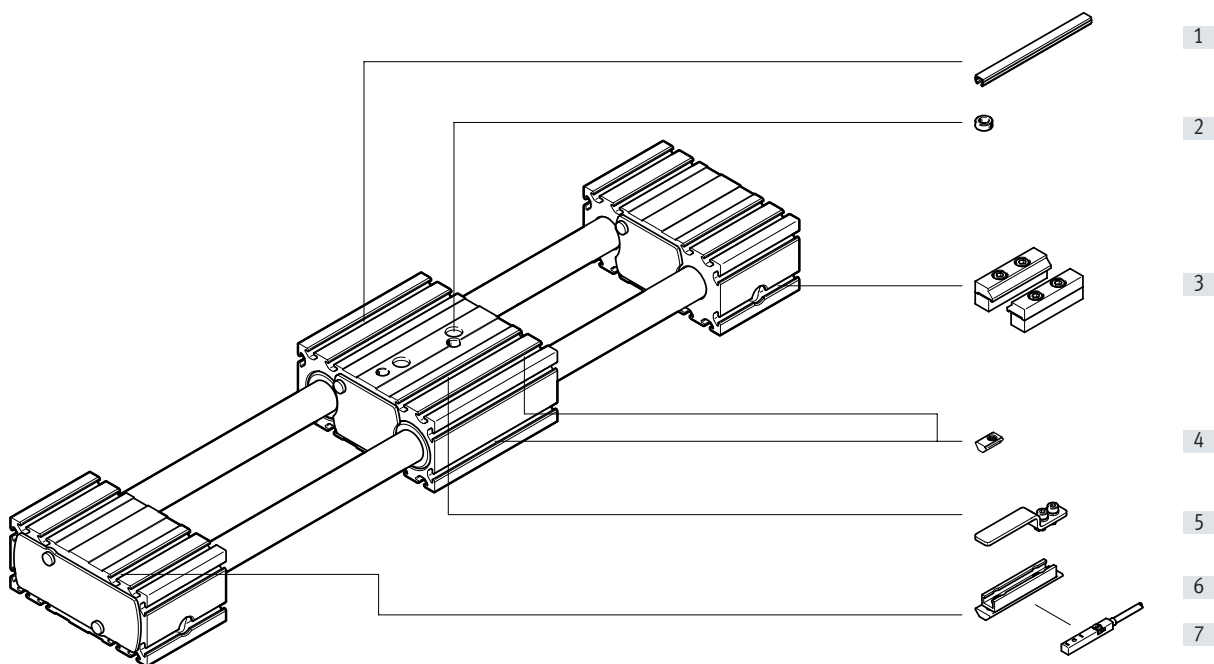
System components and accessories		
	Description	→ Page/Internet
[1] Axes	Wide range of combinations possible within handling and assembly technology	axis
[2] Guide axes	To support force and torque capacity in multi-axis applications	guide axis
[3] Drives	Wide range of combinations possible within handling 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

Type codes

001	Series	
ELFR	Guide axis, without drive	
002	Guide	
GF	Plain bearing	
	Recirculating ball bearing guide	
003	Size	
35	35	
45	45	
55	55	
004	Stroke	
...	50 ... 1500	
005	Stroke reserve	
0H	None	
...H	0 ... 999 mm	
006	Slide design	
	Standard	
L	Slide, long	

007	Additional slide	
	None	
ZR	1 slide right	
ZL	1 slide left	
ZB	Additional slide 1x left, 1x right	
008	Proximity sensor, inductive, slot 8, N/O contact, cable 7.5 m	
	Without	
...SA	1 ... 6 units	
009	Proximity sensor, inductive, slot 8, N/C contact, cable 7.5 m	
	Without	
...SB	1 ... 6 units	
010	Mounting slot covering	
	None	
...NC	1 ... 50 units	
011	Slot nut for mounting slot	
	Without	
...NM	1 ... 99 units	
012	Profile mounting	
	None	
...MA	1 ... 2 units	

Peripherals overview

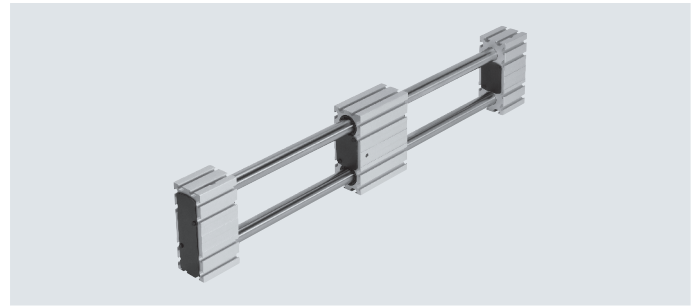


Variants and accessories			
Type/order code	Description		→ Page/Internet
[1] Slot cover NC	For protection against contamination		13
[2] Centring sleeve ZBH	- For centring loads and attachments on the slide 2 centring sleeves included in the scope of delivery of the axis		13
[3] Profile mounting MA	For 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 switches on the axis		12
[7] Proximity switch, T-slot SA, SB	- Inductive proximity switch, for T-slot 1 switch lug and 1 sensor bracket are included in the scope of delivery with the order code SA, SB		13
– Connecting cable NEBU	For proximity switch (order code SA and SB)		13

Data sheet



-  - Size
35 ... 55
-  - Stroke length
50 ... 1500 mm
-  - www.festo.com

**General technical data**

Size	35	45	55
Design	Guide axis without drive		
Guide	Recirculating ball bearing guide		
	Plain-bearing guide		
Mounting position	Any		
Working stroke [mm]	50 ... 800	50 ... 1000	50 ... 1500
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	
Degree of protection	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 1000 mm stroke	2.4	5.0	7.7
Moving mass	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) Including slide

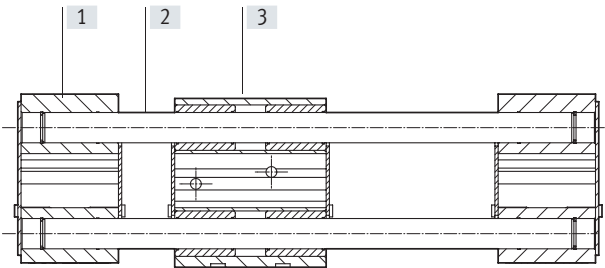
Data sheet

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 1000 mm stroke	2.3	5.0	7.7
Moving mass	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) Including slide

Materials

Sectional view

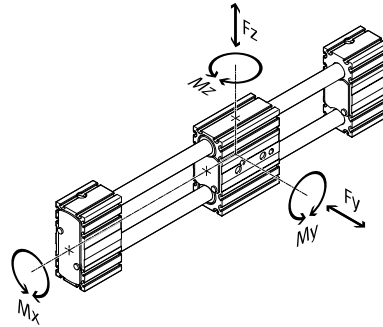


Axis	
[1] Bearing cap, profile	Anodised wrought aluminium alloy
[2] Guide rods	Steel
[3] Slide, profile	Anodised wrought aluminium alloy
Note on materials	RoHS-compliant
	Contains paint-wetting impairment substances

Data sheet

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 deceleration phase.



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 = dynamic value

F_2/M_2 = maximum value

Permissible forces and torques for a service life of 5000 km

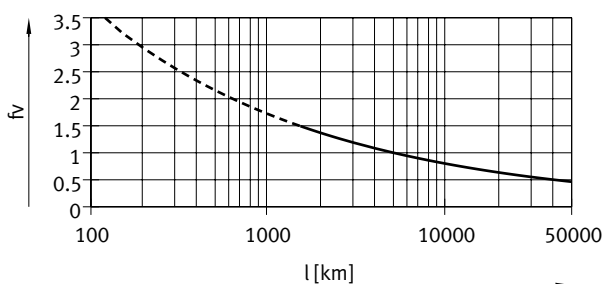
Guide	Plain-bearing guide			Recirculating ball bearing guide		
Size	35	45	55	35	45	55
$F_{y\max}, F_{z\max}$ [N]	50	100	300	50	100	300
Standard slide						
$M_{x\max}$ [Nm]	1	2.5	5	2.5	5	15
$M_{y\max}$ [Nm]	4	8	16	8	16	48
$M_{z\max}$ [Nm]	4	8	16	8	16	48
Long slide						
$M_{x\max}$ [Nm]	1	2.5	5	2.5	5	15
$M_{y\max}$ [Nm]	10	20	40	20	40	124
$M_{z\max}$ [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.

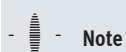
These values are only theoretical. You must consult your local contact person at Festo for load comparison factors f_v greater than 1.5.

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. 1500 km. Reducing the acceleration reduces the M_z and M_y values. A load comparison factor of 1 now gives a service life of 5000 km.



Note

Engineering software
Electric Motion Sizing
www.festo.com

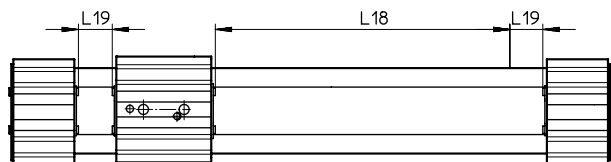
Data sheet

Minimum 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 from the mechanical end position and is not used in normal operation
- The sum of the nominal stroke and 2x stroke reserve must not exceed the maximum permissible working stroke
- The stroke reserve length can be freely selected
- The stroke reserve is defined via the "stroke reserve" characteristic in the modular product system.

Example:

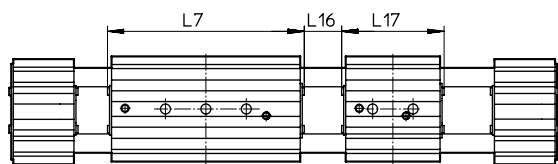
Type ELFR-45-500-20H-...

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 = Length of slide
L16 = Distance between the two slides
L17 = Length of additional slide

- For a toothed belt axis with additional slide, the working stroke is reduced by the length of the additional slide and the distance between the two slides
- If the variant long slide L 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

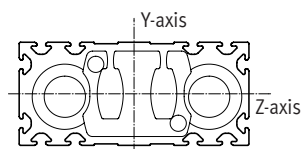
additional slide = 414 mm

(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 moments of area



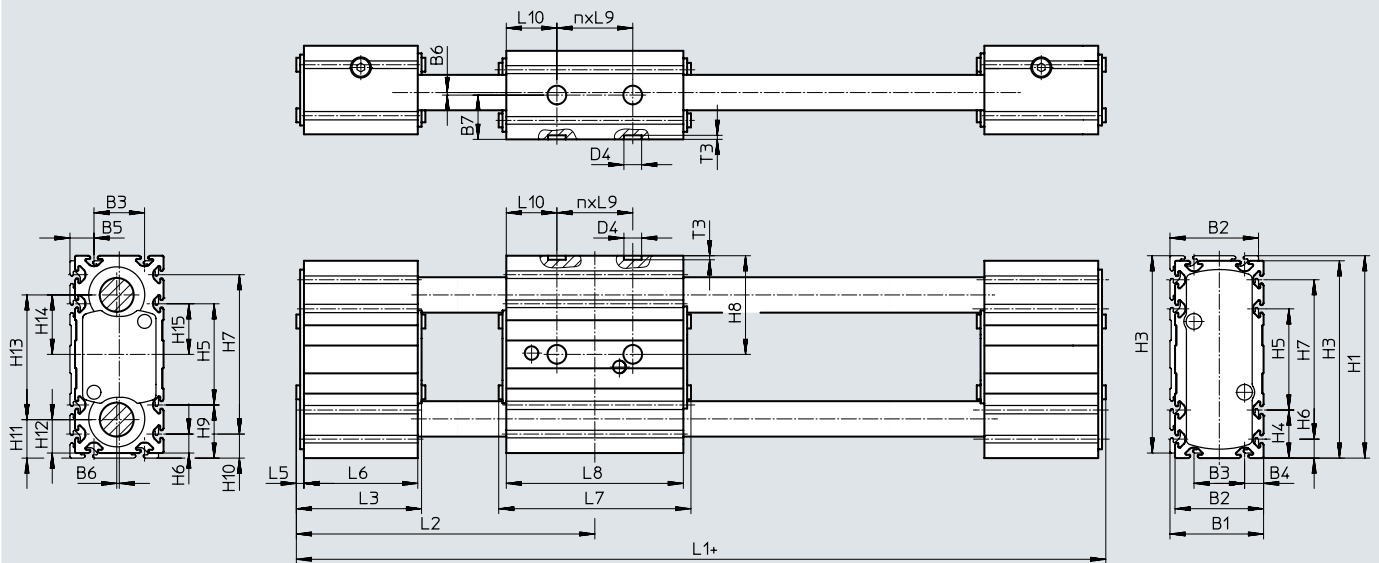
Size	35	45	55
I _y [mm ⁴]	4.19x10 ³	17.95x10 ³	41.18x10 ³
I _z [mm ⁴]	3.77x10 ³	15.71x10 ³	38.35x10 ³

Recommended deflection limits

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

Data sheet

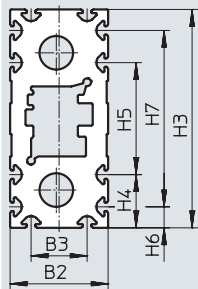
Dimensions

Download CAD data → www.festo.com

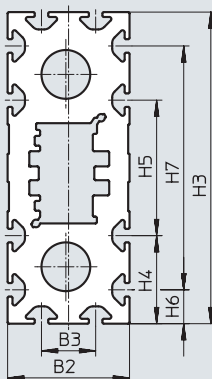
+ = plus stroke + 2x stroke reserve

Profile

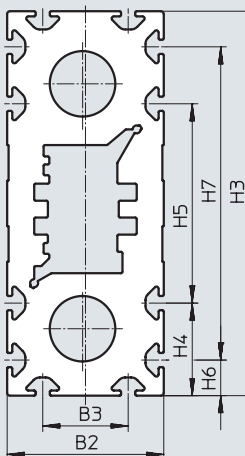
ELFR-35



ELFR-45



ELFR-55

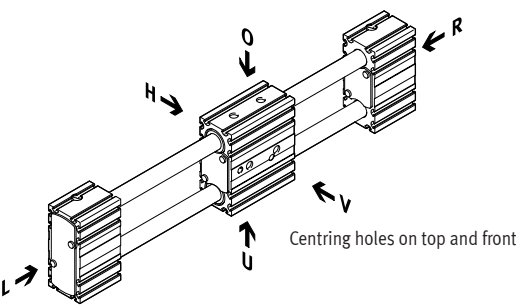


Size	B1	B2	B3	B4	B5	B6	B7	D4 ø H7	H1	H3	H4	H5	H6	H7	H8	H9
ELFR-35	37	35	20	7.5	9.5		17.5		80	78	19	40	7.5	63	39	21
ELFR-35-L																
ELFR-45	47	45	20	12.5	14.5	1	22.5	7	117	115	32.5	50	12.5	90	57.5	34.5
ELFR-45-L																
ELFR-55	57	55	30	12.5	14.5		27.5		137	135	32.5	70	12.5	110	67.5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

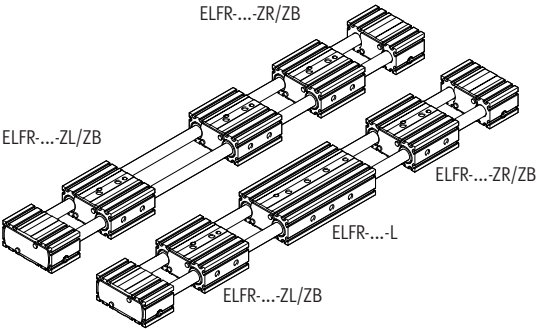
Size	H10	H11	H12	H13	H14	H15	L1	L2	L3	L5	L6	L7	L8	L9	L10	n	T3
ELFR-35																	
ELFR-35-L	9.5	15.5	13.5	49	23.5	20	178	89	51		45	76	70	30	20	1	
ELFR-45							248	124				146	140		40	2	
ELFR-45-L	14.5	23	21	71	34.5	25	219	108	60	3	54	96	90	40	25	1	
ELFR-45-L							309	153				186	180		50	2	
ELFR-55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

Ordering data – Modular product system

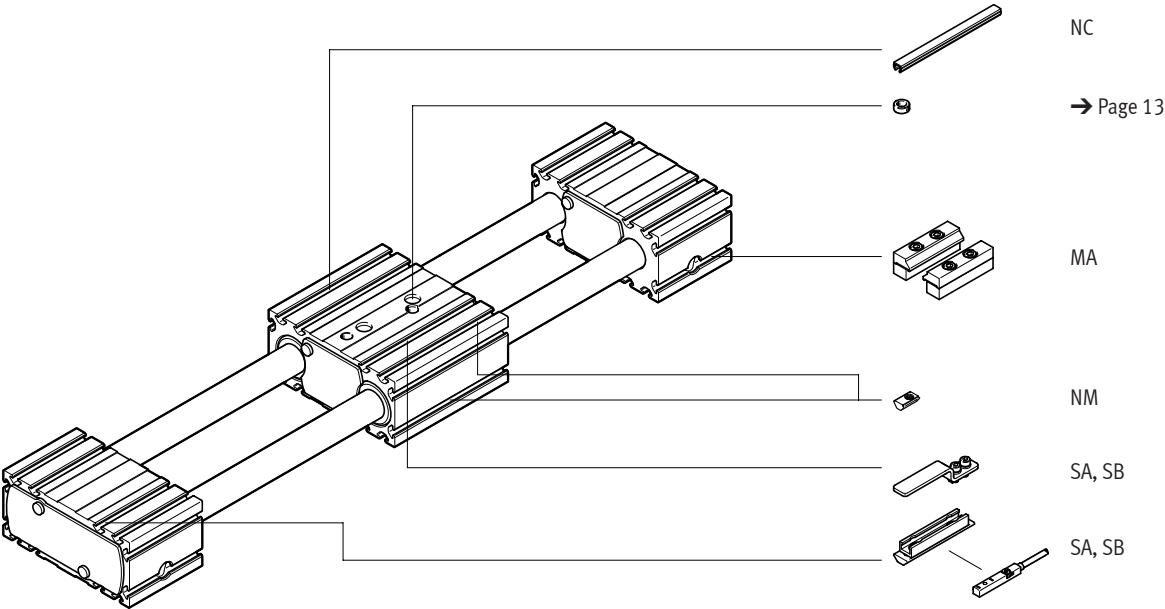
Order code
Mandatory data



- | | | | |
|---|--------|---|-------|
| O | top | L | left |
| U | bottom | V | front |
| R | right | H | rear |



Accessories



Ordering data – Modular product system

Ordering table											
Size		35		45		55		Conditions	Code		Enter code
Module no.		571435		571436		571437					
Design		Guide axis							ELFR		ELFR
Guide		Recirculating ball bearing guide									
		Plain-bearing guide							-GF		
Size		35		45		55			-...		-...
Stroke length [mm]		1 ... 800		1 ... 1000		1 ... 1500			-...		-...
Stroke reserve [mm]		0 ... 999 (0 = no stroke reserve)						[1]	-...H		
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 switch (SIES), inductive, slot type 8, PNP, including 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 length)					...NC		
Slot nut for mounting slot		1 ... 99							...NM		
Profile mounting		1 ... 2							...MA		

[1] -... The sum of nominal stroke and 2x stroke reserve must not exceed the maximum stroke length.

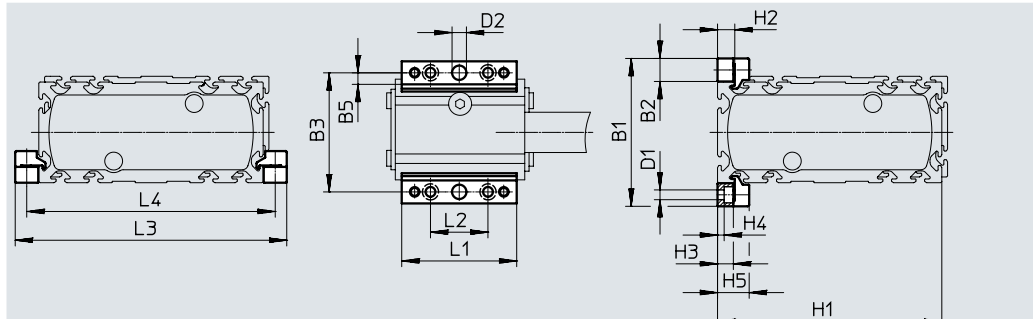
[2] ZR, ZL, ZB working stroke reduction → page 8

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

Accessories

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

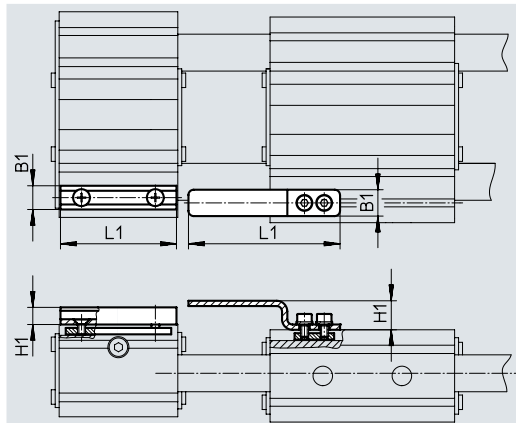
**Sensor bracket EAPM-...-SHS,
switch lug EAPM-...-SLS**
(order code SA/SB)

Material:
Switch lug: galvanised steel
Sensor bracket: anodised wrought
aluminium alloy
RoHS-compliant

EAPM-L4-SHS



EAPM-L4-SLS

**Dimensions and ordering data**

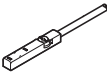
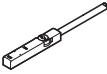
For size	B1	H1	L1	Weight [g]	Part no.	Type
Sensor bracket						
35, 45, 55	9	6.5	44	20	567537	EAPM-L4-SHS
Switch lug						
35, 45, 55	10	11	57.5	15	567538	EAPM-L4-SLS

Accessories

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 Each 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 switches for T-slot, inductive							Data sheets → 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						Data sheets → 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	

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