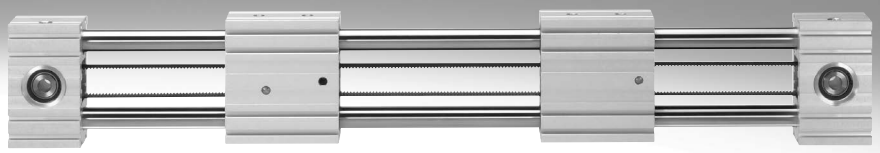
Toothed belt axes ELGG

FESTO

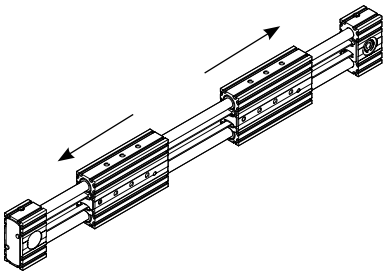


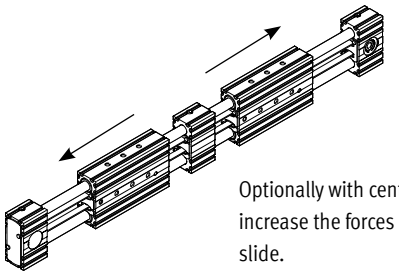
Key features

At a glance

- Toothed belt axis with two opposing slides
- Optimum price/performance ratio
- Ready-to-install unit for quick and easy installation
- High reliability thanks to tested service life of 2500 km per slide
- Motor mounting possible on 4 sides with identical mounting accessories
- Complete module for a simple and space-saving solution for end-position sensing
- Plain-bearing guide
  - For small loads
  - Restricted operating behaviour with torque load
  - Guide not backlash-free
- Recirculating ball bearing guide
  - For medium loads
  - Very good operating behaviour with torque load
  - Backlash-free guide (preloaded guide elements)

Movement in opposite directions, controlled via a motor





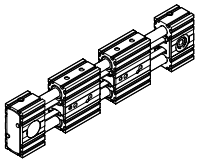
Optionally with central support to increase the forces and torques per slide.

Application examples

- Suitable for sorting, separating and spreading
- For opening doors
- For gripping tasks with small loads
- Positioning and handling with low process forces
- Centring and aligning

Characteristic values of the axes

The specifications shown in the table are maximum values.
The precise values for each of the variants can be found in the relevant datasheet.

Version	Size	Working stroke per slide [mm]	Speed [m/s]	Repetition accuracy [mm]	Feed force[1] [N]	Guide characteristics Forces and torques Fy [N]	Fz [N]	Mx [Nm]	My [Nm]	Mz [Nm]
	35	50 ... 700	3	±0.1	50	50	50	2.5	20	20
	45	50 ... 900	3	±0.1	100	100	100	5	40	40
	55	50 ... 1200	3	±0.1	350	300	300	15	124	124

1) Combined feed force of both slides

Note

Engineering software
Electric Motion Sizing
www.festo.com

Key features

Complete system comprising toothed belt axis, motor, motor controller and motor mounting kit

Toothed belt axis with recirculating ball bearing guide or plain-bearing guide

Motor

Servo motor:
EMMT-AS
Stepper motor:
EMMB-ST, EMMT-ST

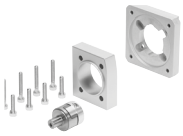
Note

A range of specially adapted complete solutions is available for the toothed belt axis ELGG and the motors.

Servo drive

Servo drive:
CMMT-AS
Servo drive for extra-low voltage:
CMMT-ST

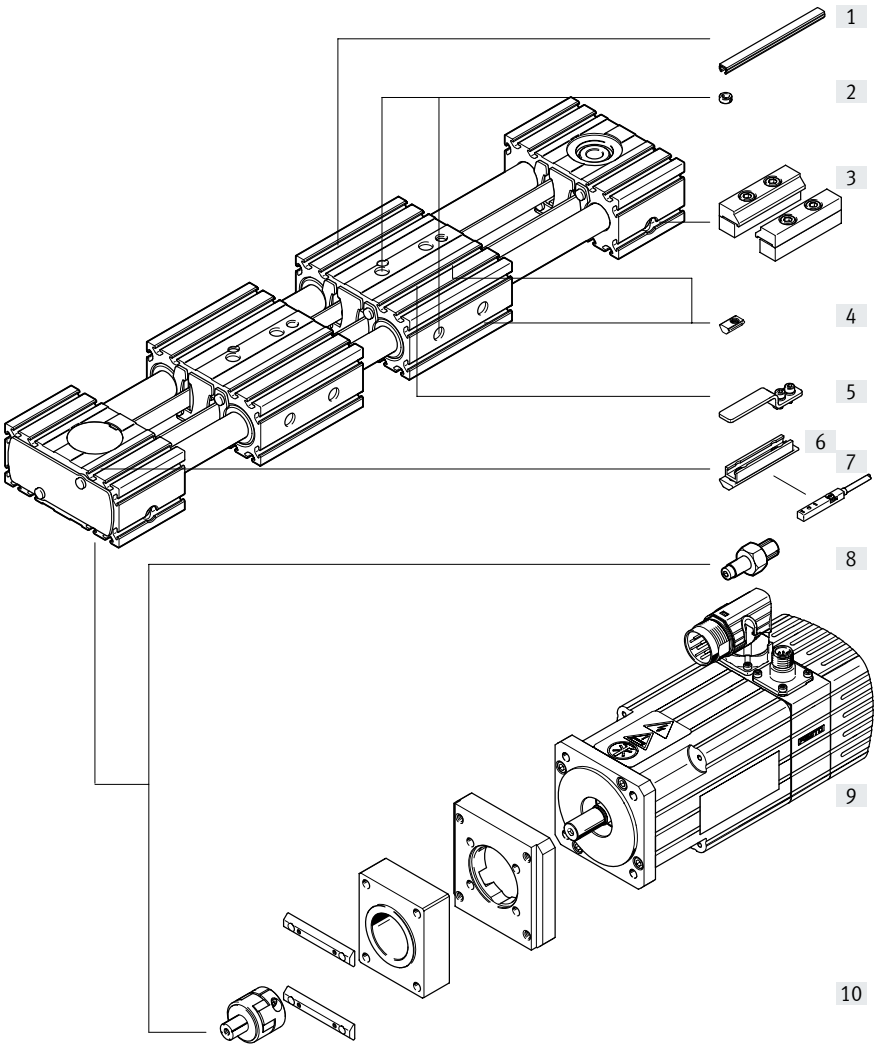
Motor mounting kit



Kit comprising:

- Motor flange
- Coupling housing
- Coupling
- Screws
- Slot nuts

Peripherals overview



Peripherals overview

Variants and accessories

	Type/order code	Description	→ Page/Internet
[1]	Slot cover NC	• For protection against contamination	20
[2]	Centring sleeve ZBH	• For centring loads and attachments on the slide • 4 centring sleeves included in the scope of delivery for the axis	20
[3]	Profile mounting MA	For mounting the axis on the bearing cap	18
[4]	Slot nut NM	For mounting attachments	20
[5]	Switch lug SA, SB	For sensing the slide position	19
[6]	Sensor bracket SA, SB	Adapter for mounting the inductive proximity sensors on the axis	19
[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	21
[8]	Drive shaft adapter EA	• Can be used as an alternative interface, as required • For the axis/motor combinations → eamm-a	20
[9]	Motor EMMT	Motors specially matched to the axis, with or without brake	emmt
[10]	Axial kit EAMM	For axial motor mounting (comprising: coupling, coupling housing and motor flange)	eamm-a
–	Connecting cable NEBA	For proximity switch (order code SA and SB)	21

Type codes

001	Series	
ELGG	Linear axis	

002	Drive system	
TB	Toothed belt	

003	Guide	
GF	Plain bearing	
	Recirculating ball bearing guide	

004	Size	
35	35	
45	45	
55	55	

005	Stroke	
...	50 ... 1200	

006	Stroke reserve	
...H	0 ... 999 mm	

007	Slide design	
	Standard	
L	Slide, long	

008	Additional slide	
	None	
ZB	Additional slide 1x left, 1x right	

009	Additional function	
	None	
M	With central support	

010	Proximity sensor, inductive, slot 8, N/O contact, cable 7.5 m	
	Without	
...SA	1 ... 6 units	

011	Proximity sensor, inductive, slot 8, N/C contact, cable 7.5 m	
	Without	
...SB	1 ... 6 units	

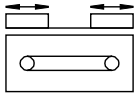
012	Mounting slot covering	
	None	
...NC	1 ... 50 units	

013	Slot nut for mounting slot	
	None	
...NM	1 ... 50 units	

014	Drive shaft	
	None	
...EA	1 ... 4 pieces	

015	Profile mounting	
	None	
...MA	1 ... 2 units	

Datasheet



Size
35 ... 55

Stroke length
50 ... 1200 mm

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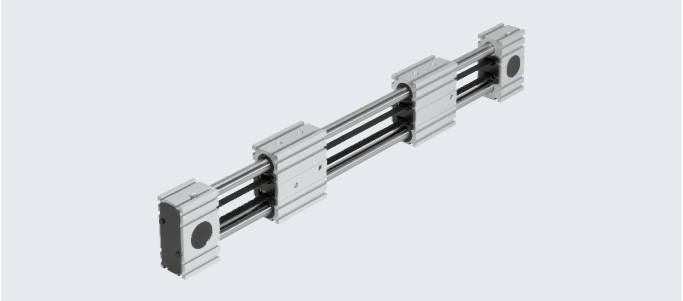
Repair service



General technical data				
Size		35	45	55
Design		Electromechanical linear axis with toothed belt		
Guide		Recirculating ball bearing guide		
		Plain-bearing guide		
Mounting position		Any		
Working stroke per slide	[mm]	50 ... 700	50 ... 900	50 ... 1200[1]
Max. feed force F_x[2]	[N]	50	100	350
Max. no-load torque	[Nm]	0.18	0.3	0.5
Max. driving torque	[Nm]	0.46	1.24	5
Max. no-load resistance to shifting	[N]	10.8	16.1	27.9
Max. speed				
Recirculating ball bearing guide	[m/s]	3		
Plain-bearing guide	[m/s]	1		
Max. acceleration[3]	[m/s²]	50		
Repetition accuracy	[mm]	±0.1		

1) In combination with extended slide, the max. stroke = 1190 mm
2) Combined feed force of both slides
3) The max. acceleration is dependent on the moving mass, the driving torque and the max. feed force

Operating and environmental conditions		
Ambient temperature		
Recirculating ball bearing guide	[°C]	–10 ... +50
Plain-bearing guide	[°C]	0 ... +40
Degree of protection		IP20
Duty cycle	[%]	100

Weight [kg]				
Size		35	45	55
Recirculating ball bearing guide				
Basic weight with 0 mm stroke[1]				
Standard slide		1.9	4.2	7.2
Long slide		2.6	6.0	10.3
Additional weight per 1000 mm stroke		4.9	10.0	15.6
Moving mass		0.8	1.7	2.9
Slide				
Standard slide		0.8	1.7	2.9
Long slide		1.3	3.0	5.2
Additional slide		0.6	1.5	2.6
Central support		0.2	0.5	0.7

1) Incl. 2 slides, without central support

Datasheet

Weight [kg]			
Size	35	45	55
Plain-bearing guide			
Basic weight with 0 mm stroke[1]			
Standard slide	1.9	4.3	7.2
Long slide	2.7	6.2	10.8
Additional weight per 1000 mm stroke	4.9	10.0	15.6
Moving mass	0.8	1.7	3.0
Slide			
Standard slide	0.8	1.7	3.0
Long slide	1.5	3.2	5.6
Additional slide	0.6	1.5	2.6
Central support	0.2	0.5	0.7

1) Incl. 2 slides, without central support

Toothed belt				
Size		35	45	55
Pitch	[mm]	2	3	3
Elongation	[%]	0.094	0.08	0.21
Width	[mm]	10	15	19.3
Effective diameter	[mm]	18.46	24.83	28.65
Feed constant	[mm/rev]	58	78	90

Mass moment of inertia				
Size		35	45	55
J_O				
Standard slide	[kg mm^2]	76.12	289.55	656.98
Long slide	[kg mm^2]	128.6	522.01	1 212.78
J_H per metre stroke	[kg mm^2/m]	0.26	1.1	1.9
J_L per kg payload	[kg mm^2/Kg]	85	154	205
J_W Additional slide	[kg mm^2]	55	224	533

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

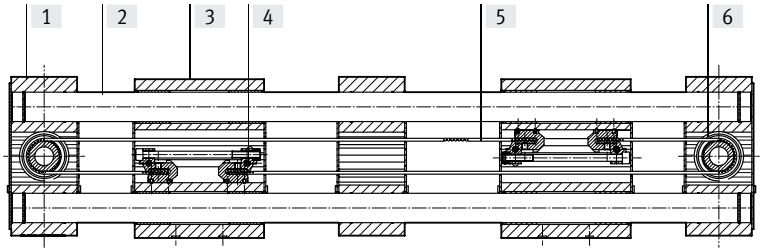
$J_A = J_O + K \times J_W + J_H \times \text{working stroke [m]} + J_L \times m_{payload}$ [kg]

K = Number of additional slides

Datasheet

Materials

Sectional view



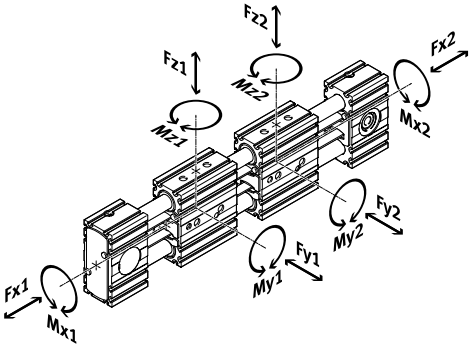
Axis		
[1]	Bearing cap, profile	Anodised wrought aluminium alloy
[2]	Guide rods	Tempered steel, hardened and hard chrome plated
[3]	Slide, profile	Anodised wrought aluminium alloy
[4]	Toothed belt clamping component	Beryllium copper
[5]	Toothed belt	Polychloroprene with glass cord and nylon coating
[6]	Belt	High-alloy stainless steel
	Note on materials	RoHS-compliant
		Contains paint-wetting impairment substances

Datasheet

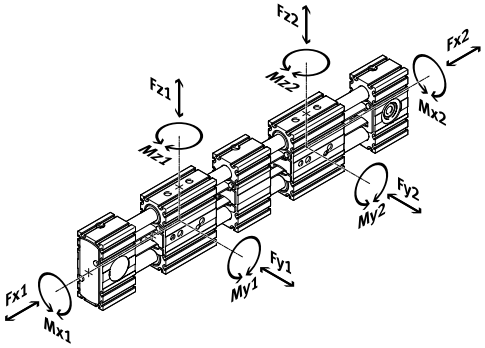
Load values

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

Without central support



With central support



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:

Without central support

Calculating the load comparison factor:

$$f_v = \frac{|F_{y1} + F_{y2}|}{F_{y3}} + \frac{|F_{z1} + F_{z2}|}{F_{z3}} + \frac{|M_{x1} + M_{x2}|}{M_{x3}} + \frac{|M_{y1} + M_{y2}|}{M_{y3}} + \frac{|M_{z1} + M_{z2}|}{M_{z3}} \leq 1$$

F_1/M_1 dynamic values
F_2/M_2 dynamic values
F_3/M_3 maximum values

With central support

Calculating the load comparison factor:

$$f_v = \frac{|F_{y1}|}{F_{y3}} + \frac{|F_{z1}|}{F_{z3}} + \frac{|M_{x1}|}{M_{x3}} + \frac{|M_{y1}|}{M_{y3}} + \frac{|M_{z1}|}{M_{z3}} \leq 1 \qquad f_v = \frac{|F_{y2}|}{F_{y3}} + \frac{|F_{z2}|}{F_{z3}} + \frac{|M_{x2}|}{M_{x3}} + \frac{|M_{y2}|}{M_{y3}} + \frac{|M_{z2}|}{M_{z3}} \leq 1$$

F_1/M_1 dynamic values
F_2/M_2 dynamic values
F_3/M_3 maximum values

Permissible forces and torques for a service life of 2500 km per slide

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

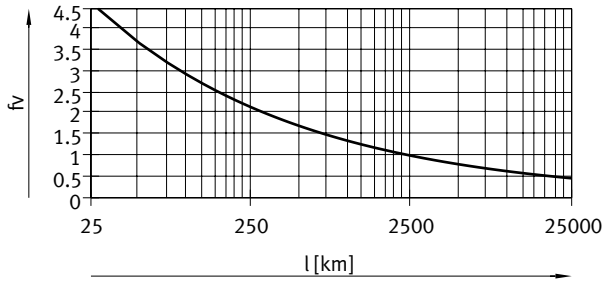
Datasheet

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



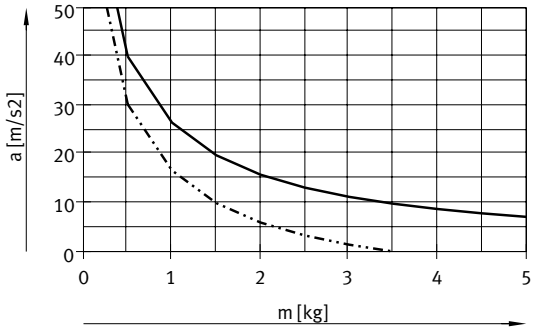
Example:
A user wants to move an X kg load. Using the formula ➔ page 10 gives a value of 1.5 for the load comparison factor f_v. According to the graph, the guide would have a service life of approx. 750 km. Reducing the acceleration reduces the Mz and My values. A load comparison factor of 1 now gives a service life of 2500 km.

Note

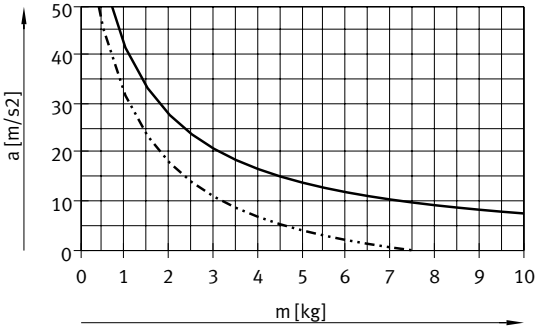
Engineering software
Electric Motion Sizing
www.festo.com

Max. acceleration a as a function of applied load m

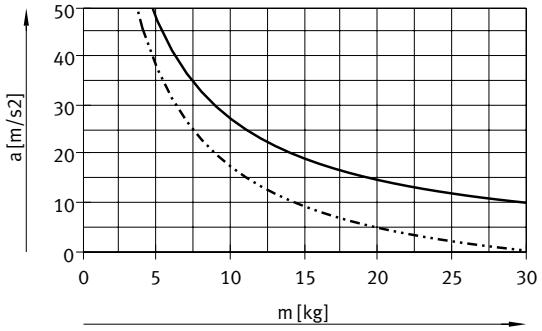
ELGG-35



ELGG-45



ELGG-55



Horizontal
Vertical

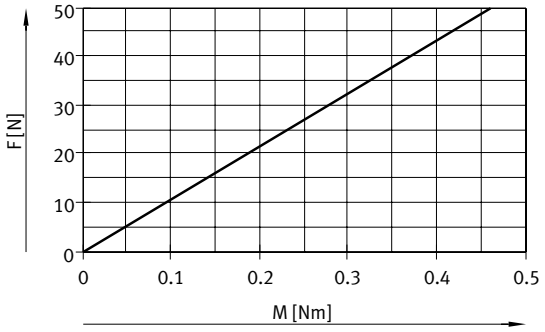
Note

It is recommended to reduce the acceleration for the plain-bearing guide (GF) to minimise overshooting and increase positioning accuracy.

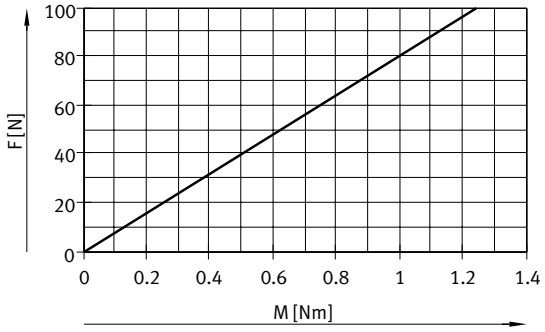
Datasheet

Feed force F_x as a function of input torque M

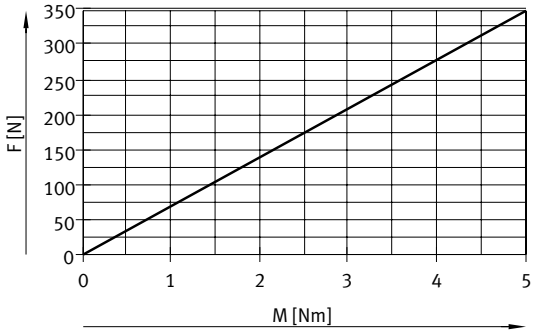
ELGG-35



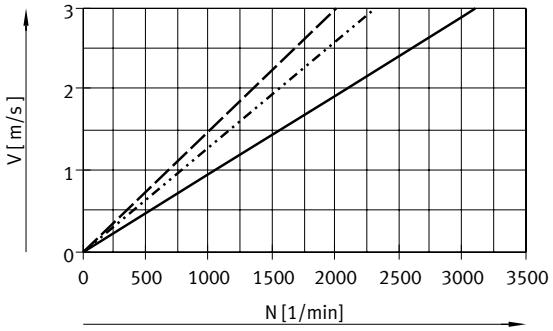
ELGG-45



ELGG-55



Speed v as a function of rotational speed n



ELGR-TB-35
ELGR-TB-45
ELGR-TB-55

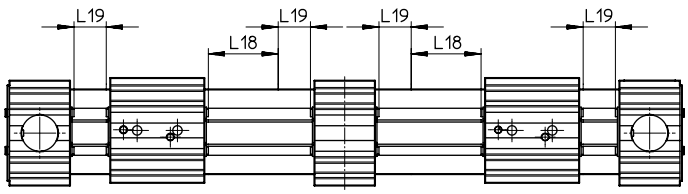
Minimum nominal stroke

With standard slide or long slide L with additional slide ZB

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

Datasheet

Stroke reserve



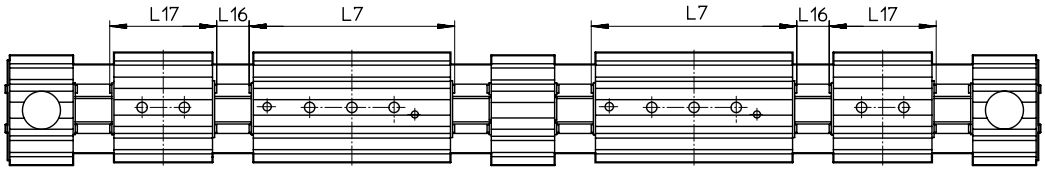
L18 = Nominal stroke
L19 = Stroke reserve

- 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 per slide
- 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 ELGG-TB-45-500-20H-...
Nominal stroke = 500 mm
2x stroke reserve = 40 mm
Working stroke per slide = 540 mm
(540 mm = 500 mm + 2x 20 mm)

Working stroke reduction

With standard slide or long slide L with additional slide ZB



L7 = Slide length
L16 = Distance between the two slides
L17 = Additional slide length

- 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

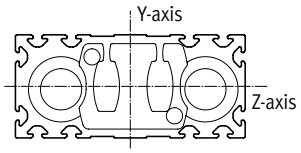
Example:
Type ELGG-TB-35-500-...-ZR
Working stroke = 500 mm
L16 = 10 mm
L7 = 146 mm
L17 = 76 mm

Working stroke per slide 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



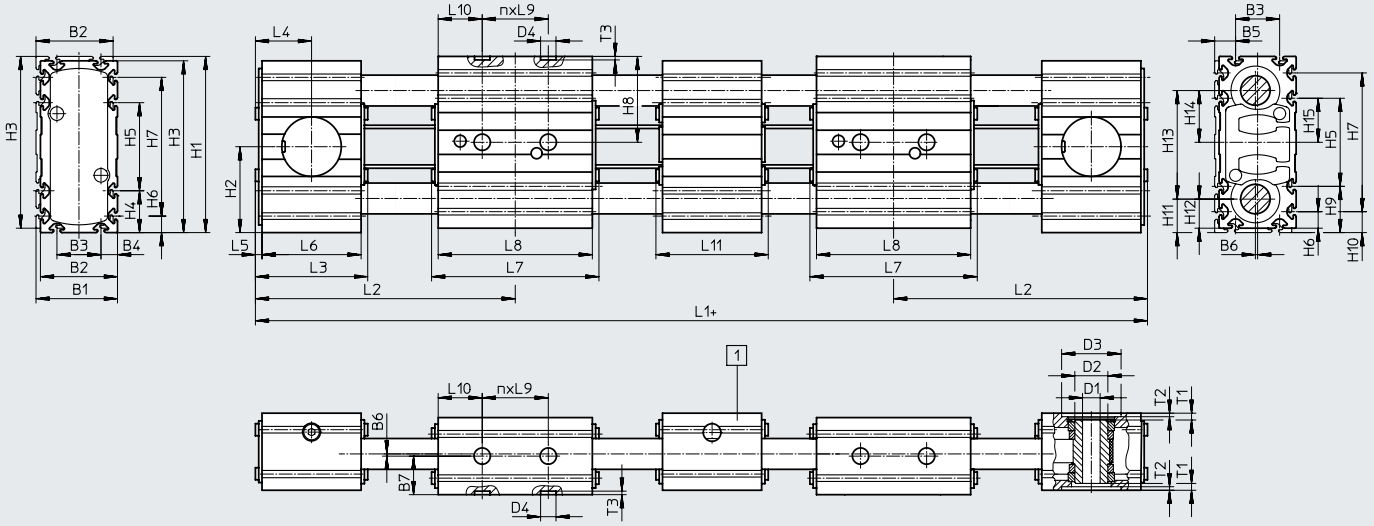
Size		35	45	55
Iy	[mm⁴]	$4.19x10^3$	$17.95x10^3$	$41.18x10^3$
Iz	[mm⁴]	$3.77x10^3$	$15.71x10^3$	$38.35x10^3$

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.

Datasheet

Dimensions Download CAD data ➔ www.festo.com

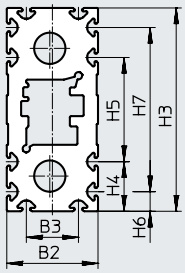


With size 35 and stroke > 350 mm,
size 45 and stroke > 450 mm,
size 55 and stroke > 700 mm,
the toothed belt axis is always supplied with central support M.

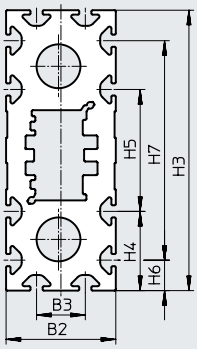
\+ = plus 2x stroke + 4x stroke reserve + L11
[1] Central support

Profile

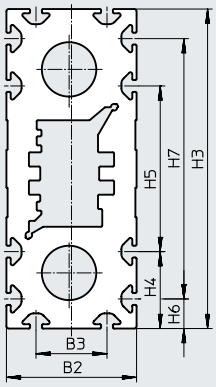
ELGG-35



ELGG-45



ELGG-55



Datasheet

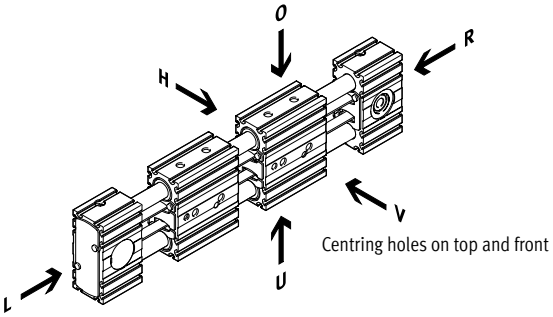
Size	B1	B2	B3	B4	B5	B6	B7	D1 ø H7	D2 ø	D3 ø H7	D4 ø H7	H1	H2	H3
ELGG-35	37	35	20	7.5	9.5	1	17.5	8	15	27	7	80	39	78
ELGG-35-L														
ELGG-45	47	45	20	12.5	14.5		22.5	10	20	38		117	57.5	115
ELGG-45-L														
ELGG-55	57	55	30	12.5	14.5		27.5	16	25	48		137	67.5	135
ELGG-55-L														

Size	H4	H5	H6	H7	H8	H9	H10	H11	H12	H13	H14	H15	L1	L2
ELGG-35	19	40	7.5	63	39	21	9.5	15.5	13.5	49	23.5	20	259	89
ELGG-35-L													399	124
ELGG-45	32.5	50	12.5	90	57.5	34.5	14.5	23	21	71	34.5	25	317	108
ELGG-45-L													497	153
ELGG-55	32.5	70	12.5	110	67.5	34.5	14.5	25.5	23.5	86	42	35	361	120
ELGG-55-L													581	175

Size	L3	L4	L5	L6	L7	L8	L9	L10	L11	n	T1	T2	T3 +0.1
ELGG-35	51	25.5	3	45	76	70	30	20	51	1	3.1	1.6	1.6
ELGG-35-L					146	140		40		2			
ELGG-45	60	30		54	96	90	40	25	60	1	3	1.7	
ELGG-45-L					186	180		50		2			
ELGG-55	62	31		56	116	110	40	35	62	1	4.5	2	
ELGG-55-L					226	220		70		2			

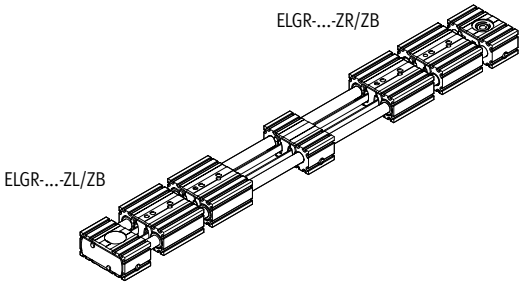
Ordering data – Modular product system

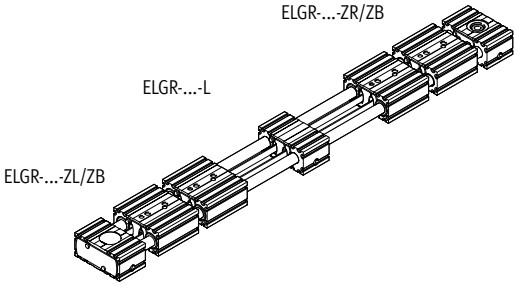
Orientation guide



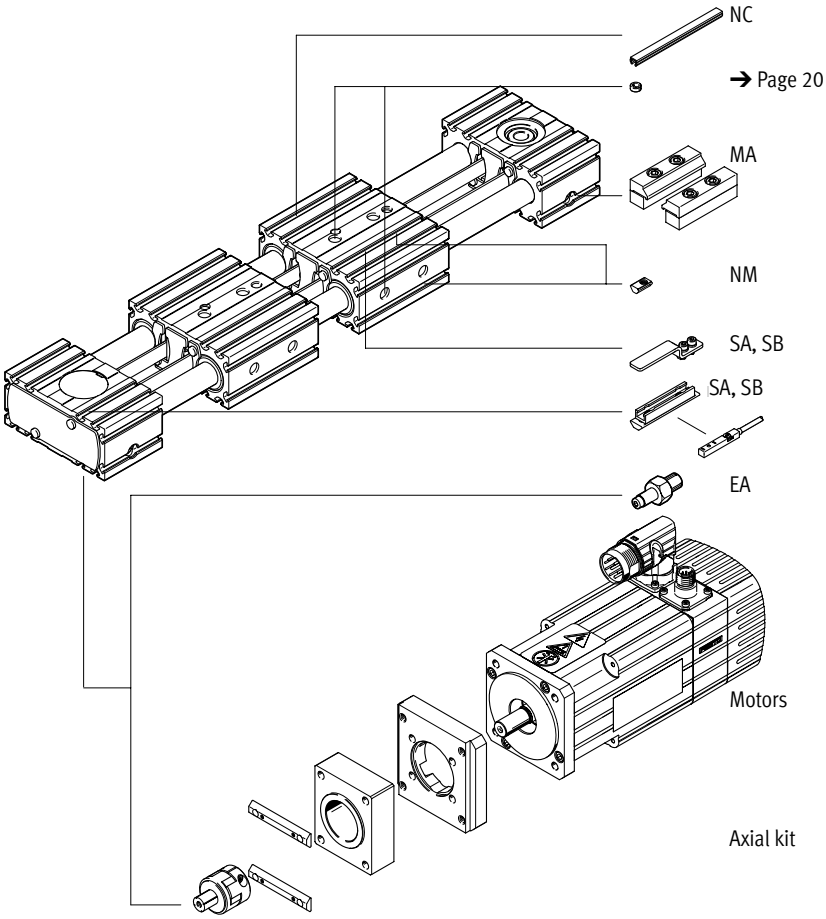
Centring holes on top and front

O Top
U Bottom
R Right
L Left
V Front
H Rear





Accessories



Ordering data – Modular product system

Ordering table

Size		35	45	55	Conditions	Code		Enter code
Module no.		**571058**	**571059**	**571060**				
Design		Linear axis				**ELGG**		ELGG
Function		Toothed belt				**-TB**		-TB
Guide		Recirculating ball bearing guide						
		Plain-bearing guide				**-GF**		
Size	[mm]	35	45	55		**-...**		-...
Stroke length per slide	[mm]	1 ... 700	1 ... 900	1 ... 1200		**-...**		-...
Stroke reserve per slide		0 ... 999 (0 = no stroke reserve)			[1]	**-...H**		
Slide design		Standard slide						
		Long slide				**-L**		
Additional slide		No additional slide						
		1 slide right, 1 slide left			[2]	**-ZB**		
Additional function		None						
		Central support			[3]	**-M**		
Accessories		Accessories enclosed separately				**+**		+
Proximity switch (SIES), inductive, slot type 8, PNP, incl. switch lug	N/O contact, 7.5 m cable	1 ... 6				**...SA**		
	N/C contact, 7.5 m cable	1 ... 6				**...SB**		
Mounting slot covering		–	1 ... 50 (1 = 2 units, 500 mm length)			**...NC**		
Slot nut for mounting slot		1 ... 99				**...NM**		
Drive shaft adapter		1 ... 4				**...EA**		
Profile mounting		1 ... 2				**...MA**		

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

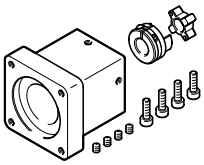
[2] ZB Working stroke reduction → page 13

[3] M With size 35 and stroke > 350 mm, size 45 and stroke > 450 mm, size 55 and stroke > 700 mm, the toothed belt axis is always supplied with central support M.

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

Accessories

Permitted axis/motor combinations for axial kits



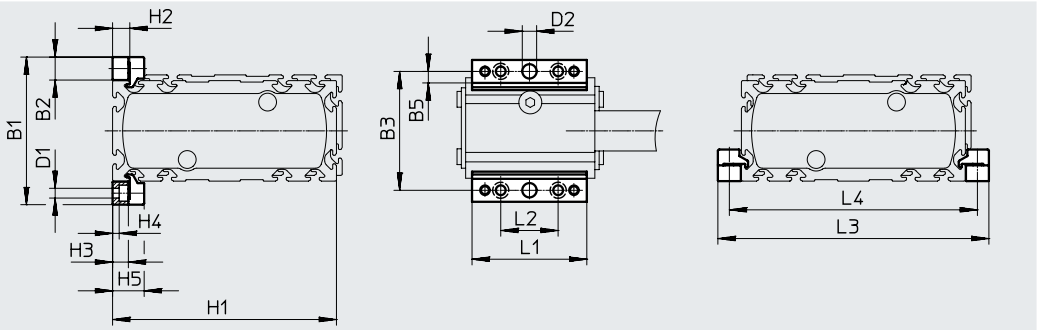
Under the following links you will find all information about:
- Axis/motor combinations
- Permitted third-party motors
- Technical data
- Dimensions

For axial kits ➔ Internet: eamm-a

Profile mounting MUE
(order code MA)

Material:
Anodised aluminium
RoHS-compliant

Note
The central support can also be attached using the profile mounting.



Dimensions and ordering data

For size	B1	B2	B3	B5	D1 ø	D2 ø 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**

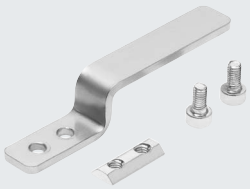
Accessories

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

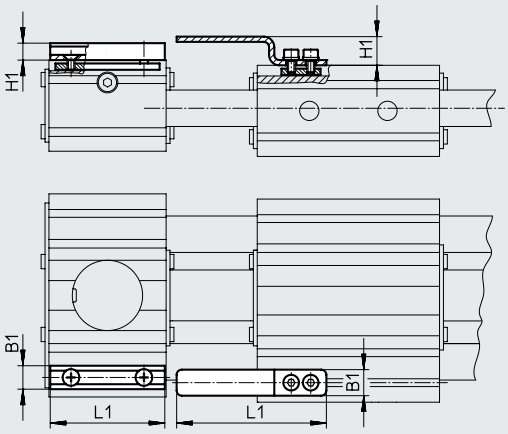
Material:
Switch lug: Galvanised steel
Sensor bracket: Anodised wrought aluminium alloy
RoHS-compliant

Note
The sensor bracket can also be mounted on the central support.

EAPM-L4-SHS



EAPM-L4-SHS

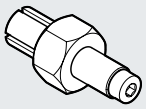


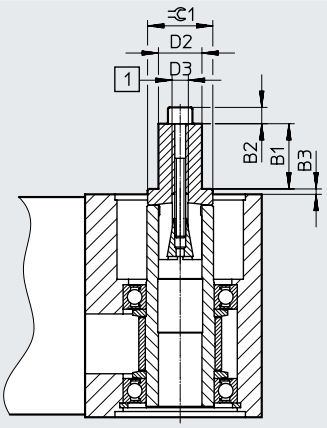
Dimensions and ordering data

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

Drive shaft EAMB
Alternative interface
(order code EA)





[1] Draw-off thread

Dimensions and ordering data

For size	B1	B2	B3	D2 ⌀	D3	⌀C1	Weight [g]	Part no.	Type
35	12	3	3.9	8	M4	12	20	**558034**	**EAMB-16-7-8X15-8X10**
45	12	4	6	8	M5	15	29	**558035**	**EAMB-18-9-8X16-10X12**
55	21	–	1.5	15	M6	21	70	**558036**	**EAMB-24-6-15X21-16X20**

Ordering data

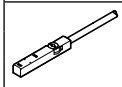
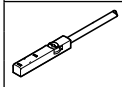
	For size	Comment	Order code	Part no.	Type	PU[1]
Slot nut NST						
	35	For mounting slot	NM	**558045**	**ABAN-3-1 M3-4-M-P1**	1
	45, 55			**150914**	**NST-5-M5**	
			–	**8047843**	**NST-5-M5-10**	10
				8047878	**NST-5-M5-50**	50
Centring sleeve ZBH[2]						
	35, 45, 55	For slide	–	**8146544**	**ZBH-7-B**	10
Slot cover ABP						
	45, 55	For mounting slot Every 0.5 m	NC	**151681**	**ABP-5**	2

1) Packaging unit
2) 4 centring sleeves included in the scope of delivery of the axis

Accessories

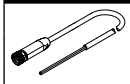
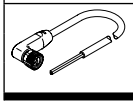
Ordering data – Proximity switches for T-slot, inductive

Datasheets → Internet: sies

	Type of mounting	Electrical connection	Switching output	Cable length [m]	Order code	Part no.	Type
N/O							
	Insertable in the slot from above, flush with the cylinder profile	Cable, 3-core	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-core	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							
	Insertable in the slot from above, flush with the cylinder profile	Cable, 3-core	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-core	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

Datasheets → Internet: neba

	Electrical connection 1, connection technology	Electrical connection 1, cable outlet	Electrical connection 2, connection technology	Electrical connection 2, number of pins/cores	Cable length [m]	Part no.	Type
	M8x1 A-coded to EN 61076-2-104	Straight	Open end	3	2.5	**8078223**	**NEBA-M8G3-U-2.5-N-LE3**
					5.0	**8078224**	**NEBA-M8G3-U-5-N-LE3**
	M8x1 A-coded to EN 61076-2-104	Angled	Open end	3	2.5	**8078230**	**NEBA-M8W3-U-2.5-N-LE3**
					5.0	**8078231**	**NEBA-M8W3-U-5-N-LE3**