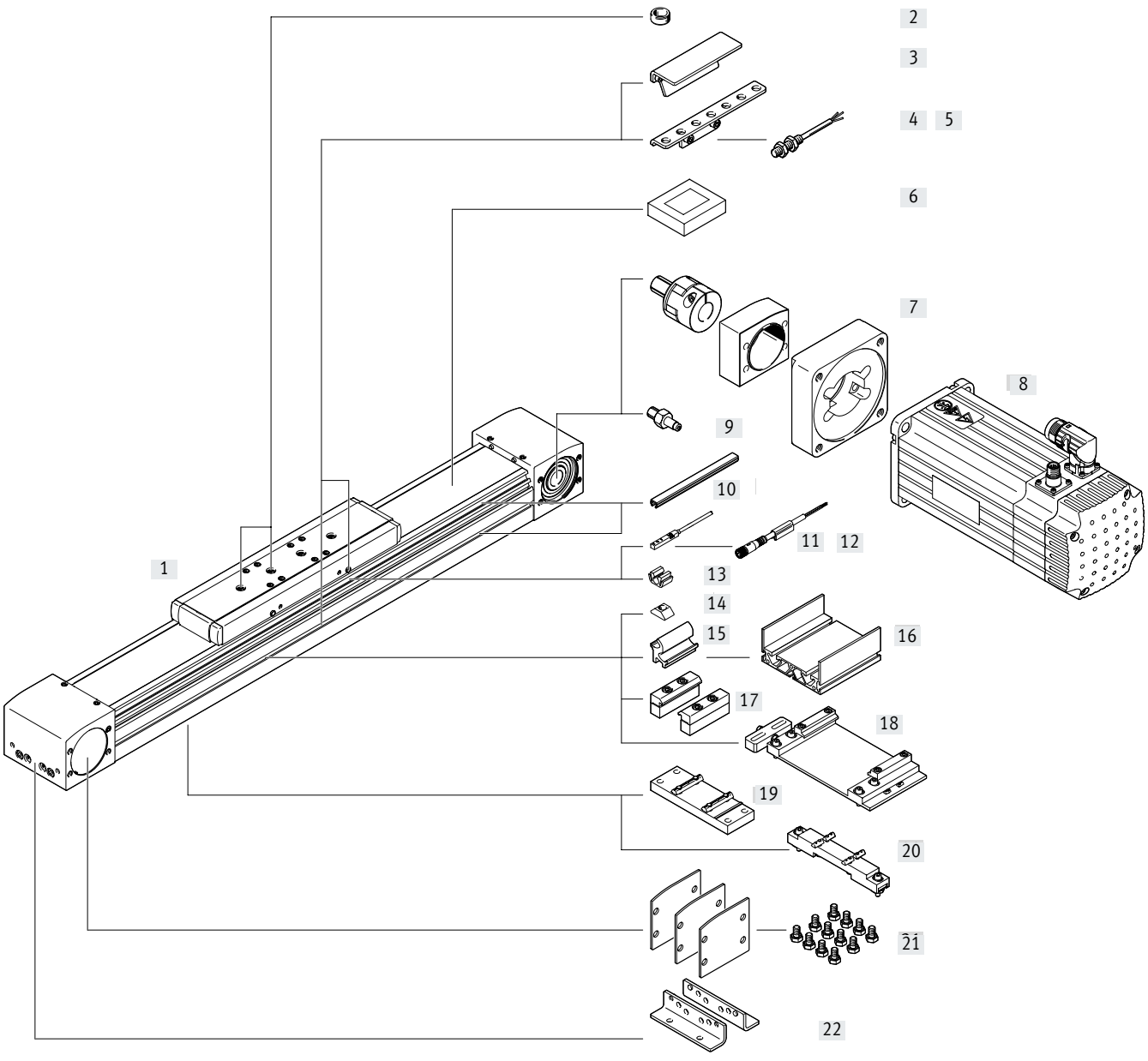
Peripherals overview



Peripherals overview

Accessories

	Type	Description	➔ Page/Internet
[1]	Toothed belt axis ELGA-TB-KF	Electric drive	12
[2]	Centring pin/sleeve ZBS, ZBH	• For centring loads and attachments on the slide • Included in the scope of delivery: – With size 70: 2x ZBS-5 – With size 80, 120, 150: 2x ZBH-9	108
[3]	Switch lug SF-EGC	For sensing the slide position	105
[4]	Sensor bracket HWS-EGC	For mounting the inductive proximity switches (round design) on the axis	106
[5]	Proximity switch, M8 SIEN-M8	Inductive proximity switch, round design	110
[6]	Clamping element EADT	Tool for retensioning the cover strip	108
[7]	Axial kit EAMM	For axial motor mounting (comprising: coupling, coupling housing and motor flange)	94
[8]	Motor EMME, EMMS	Motors specially matched to the axis, with or without gear unit, with or without brake	94
[9]	Drive shaft EAMB	• Can, if required, be used as an alternative interface • No drive shaft is required for the axis/motor combinations ➔ page 94	99
[10]	Slot cover ABP	For protection against contamination	108
[11]	Proximity switch, T-slot SIES-8M	• Inductive proximity switch, for T-slot • The order code SA, SB includes 1 switch lug in the scope of delivery	109
[12]	Connecting cable NEBU, SIM	Via proximity switch	110
[13]	Clip SMBK	For mounting the proximity switch cable in the slot	108
[14]	Slot nut NST	For mounting attachments	108
[15]	Adapter kit DHAM	For mounting the support profile on the axis	109
[16]	Support profile HMIA	For mounting and guiding an energy chain	109
[17]	Profile mounting MUE	For mounting the axis on the side of the profile	101
[18	Adjusting kit EADC-E16	For mounting the axis on a vertical surface. Once mounted, the axis can be aligned horizontally	104
[19]	Central support EAHF-L5	For mounting the axis on the profile from underneath	102
[20]	Adjusting kit EADC-E15	Height-adjustable. Can be used to easily compensate for any unevenness in the bearing surface	103
[21]	Cover kit EASC-L5	For covering the sides of the drive cover	108
[22]	Foot mounting HPE	• For mounting the axis on the end cap • With higher forces and torques, the axis should be mounted using the profile	100

Type codes

001	Series	
ELGA	Gantry axis	

002	Drive system	
TB	Toothed belt	

003	Guide	
KF	Recirculating ball bearing guide	

004	Size	
70	70	
80	80	
120	120	
150	150	

005	Stroke range [mm]	
...	50 ... 8500	

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

007	Additional slide	
	None	
ZL	1 slide left	
ZR	1 slide right	

008	Protection against particles	
	Standard	
P11	Cover strip with magnetic deflection	

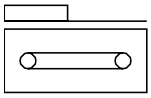
009	Additional characteristics	
	None	
F1	Food-safe according to supplementary information on materials	

010	Displacement encoder	
	None	
M1	With displacement encoder, incremental, resolution 2.5 µm	
M2	With displacement encoder, incremental, resolution 10 µm	

011	Displacement encoder attachment position	
	None	
F	Front	
B	Rear	

012	Material of toothed belt	
CR	Chloroprene rubber	
PU1	Uncoated PU, FDA-compliant	
PU2	Coated PU	

Data sheet



Size
70 ... 150

Stroke length
50 ... 8500 mm

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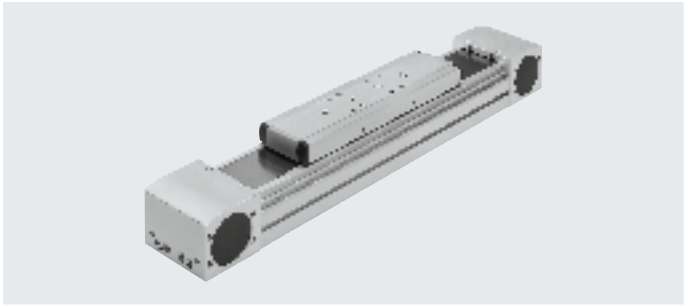


General technical data					
Size		70	80	120	150
Design		Electromechanical axis with toothed belt			
Guide		Recirculating ball bearing guide			
Mounting position		Any			
Working stroke	[mm]	50 ... 5000	50 ... 8500	50 ... 8500	50 ... 7000
Max. feed force F_x	[N]	350	800	1300	2000
Max. no-load torque[1]	[Nm]	0.6	1	2.8	4
Max. no-load resistance to shifting[1]	[N]	41.9	50.3	76.2	108.3
Max. driving torque	[Nm]	5.02	15.92	34.1	73.85
Max. speed	[m/s]	5			
Max. acceleration	[m/s²]	50			
Repetition accuracy	[mm]	±0.08			

1) At 0.2 m/s

Operating and environmental conditions		
Ambient temperature[1]	[°C]	–10 ... +60
Degree of protection		IP40
Duty cycle	[%]	100

1) Note operating range of proximity switches

Weight [kg]					
Size		70	80	120	150
Basic weight with 0 mm stroke[1]		2.97	4.70	15.68	32.83
Additional weight per 1000 mm stroke		3.94	5.13	10.64	17.22
Moving mass					
ELGA-...		0.90	1.90	4.19	7.24
ELGA-...-ZL/ZR		0.74	1.53	3.24	5.84

1) Incl. slide

Toothed belt					
Size		70	80	120	150
Pitch	[mm]	3	5	5	8
Elongation[1]					
ELGA-...	[%]	0.213	0.168	0.21	0.258
ELGA-...-PU2	[%]	0.105	0.1	0.122	0.083
Effective diameter	[mm]	28.65	39.79	52.52	73.85
Feed constant	[mm/rev]	90	125	165	232

1) At max. feed force

Data sheet

Mass moments of inertia					
Size		70	80	120	150
J_O	[kg mm²]	243	982	4099	15426
J_H per metre stroke	[kg mm²/m]	19	93	215	586
J_L per kg payload	[kg mm²/kg]	205	396	690	1363
J_W for additional slide	[kg mm²]	186	761	2891	9869

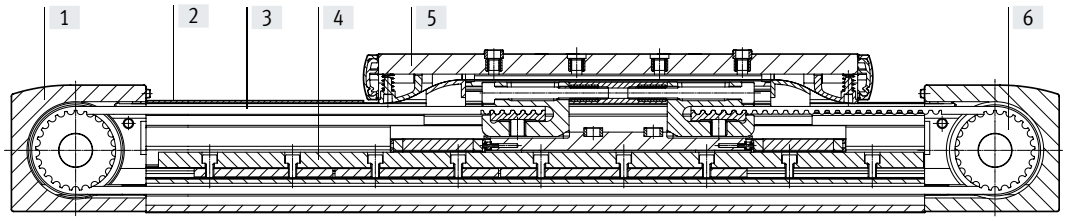
The mass moment of inertia J_A of the entire axis is calculated as follows:

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

K = Number of additional slides

Materials

Sectional view



Axis					
Size		70	80	120	150
[1]	Drive cover	Anodised wrought aluminium alloy			
[2]	Cover strip	Stainless steel strip, non-corroding			
[3]	Toothed belt				
	ELGA-...	Polychloroprene with glass cord and nylon coating			
	ELGA-...-PU2	Polyurethane with steel cord and nylon cover			
[4]	Guide rail	Stainless steel		Tempered steel	
[5]	Slide	Anodised wrought aluminium alloy			
[6]	Belt pulley	High-alloy stainless steel			
	Note on materials	RoHS-compliant			
		Contains paint-wetting impairment substances			

Data sheet

Technical data – Displacement encoder

Dimensions → page 26

Type		ELGA-...-M1	ELGA-...-M2
Resolution	[µm]	2.5	10
Max. travel speed with displacement encoder	[m/s]	4	4
Encoder signal		5 V TTL; A/A, B/B; reference signal (N/N) cyclically every 5 mm (zero pulse)	
Signal output		Line driver, alternating, resistant to sustained short circuit	
Electrical connection		8-pin plug, round design, M12	
Cable length	[mm]	160	

Operating and environmental conditions – Displacement encoder system

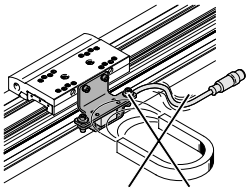
Ambient temperature	[°C]	–10 ... +70
Degree of protection		IP64
CE marking (see declaration of conformity)		To EU EMC Directive[1)]

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/sp → Certificates.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

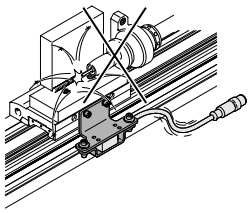
Application information

The spindle axis with displacement encoder is not designed for the following application examples:

- Magnetic field



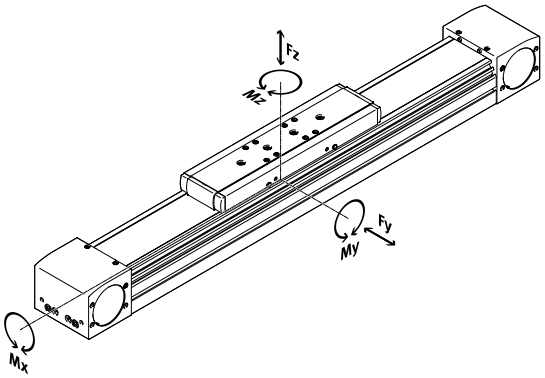
- Welding application



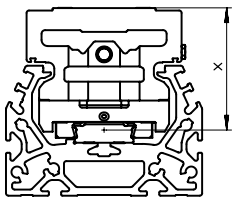
Data sheet

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 cushioning phase.



Distance from the slide surface to the centre of the guide



Distance from the slide surface to the centre of the guide

Size		70	80	120	150
Dimension x	[mm]	37	50	70	86

Max. permissible forces and torques for a service life of 5000 km

Size		70	80	120	150
$Fy_{max.}$	[N]	1500	2500	5500	11000
Fz_{max}	[N]	1850	3050	6890	11000
$Mx_{max.}$	[Nm]	16	36	104	167
$My_{max.}$	[Nm]	132	228	680	1150
$Mz_{max.}$	[Nm]	132	228	680	1150

Note

For a guide system to have a service life of 5000 km, the load comparison factor must have a value of fv ≤ 1, based on the maximum permissible forces and torques for a service life of 5000 km.

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

Data sheet

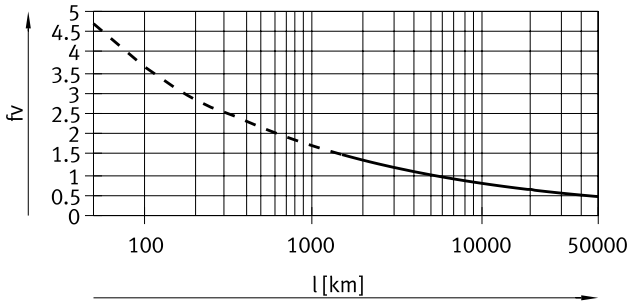
Calculating the service life

The service life of the guide depends on the load. To be able to make a statement as to the service life of the guide, the graph below plots the load comparison factor fv against the service life.

These values are only theoretical. You must consult your local Festo contact for a load comparison factor fv greater than 1.5.

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 16) 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 Mz and My values. A load comparison factor f_v of 1 now gives a service life of 5000 km.



Note

Engineering software
Electric Motion Sizing
www.festo.com/x/electric-motion-sizing

The engineering software can be used to calculate the guide workload for a service life of 5000 km.

f_v > 1.5 are only theoretical comparison values for the recirculating ball bearing guide.

Comparison of the characteristic load values for 5000 km with dynamic forces and torques of recirculating ball bearing guides

The characteristic load values of 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 linear axes ELGA 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.

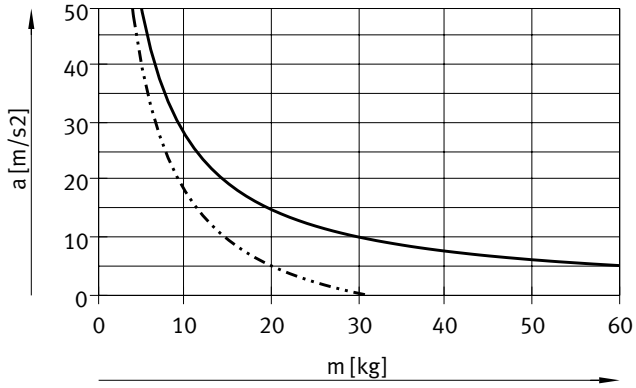
Max. permissible forces and torques for a theoretical service life of 100 km (from a guide perspective only)

Size		70	80	120	150
$Fy_{max.}$	[N]	5520	9200	20240	40480
Fz_{max}	[N]	6808	11224	25355	40480
$Mx_{max.}$	[Nm]	59	132	383	615
$My_{max.}$	[Nm]	486	839	2502	4232
$Mz_{max.}$	[Nm]	486	839	2502	4232

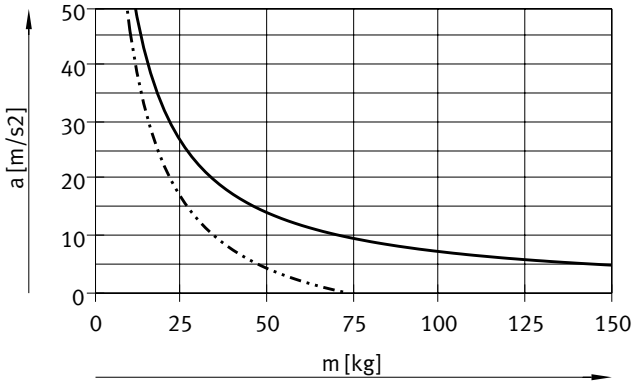
Data sheet

Max. acceleration a as a function of payload m

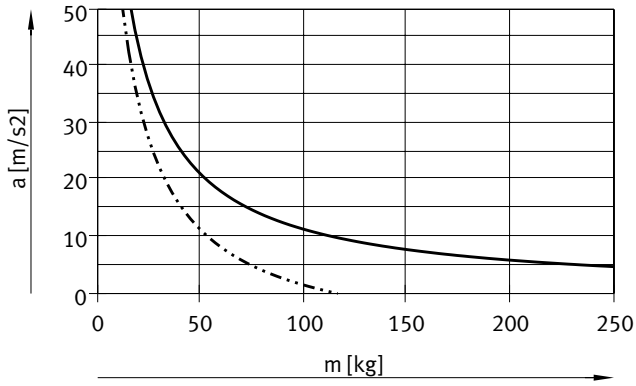
Size 70



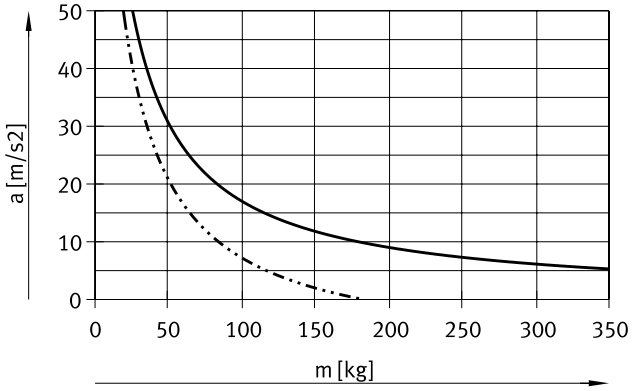
Size 80



Size 120

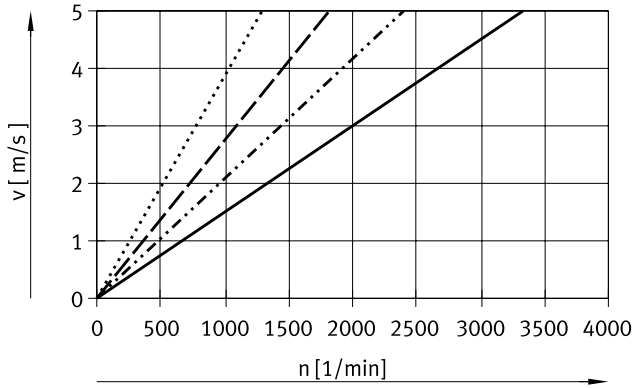


Size 150



Horizontal mounting position
Vertical mounting position

Velocity v as a function of rotational speed n

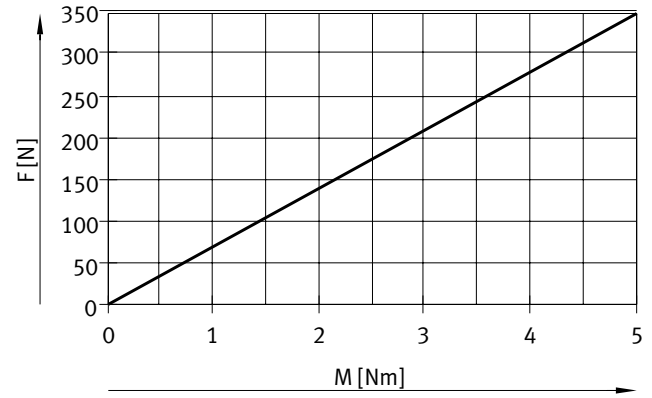


ELGA-TB-KF-70
ELGA-TB-KF-80
ELGA-TB-KF-120
ELGA-TB-KF-150

Data sheet

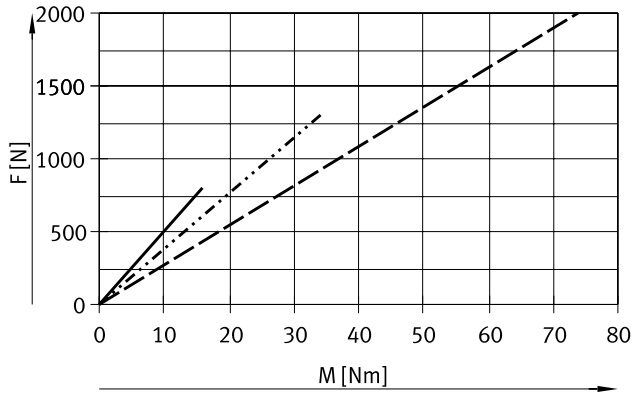
Theoretical feed force F as a function of input torque M

Size 70



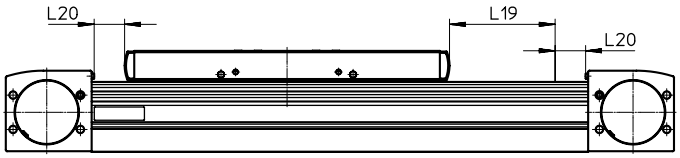
ELGA-TB-KF-70

Size 80/120/150



ELGA-TB-KF-80
ELGA-TB-KF-120
ELGA-TB-KF-150

Stroke reserve



L19 = Nominal stroke
L20 = Stroke reserve

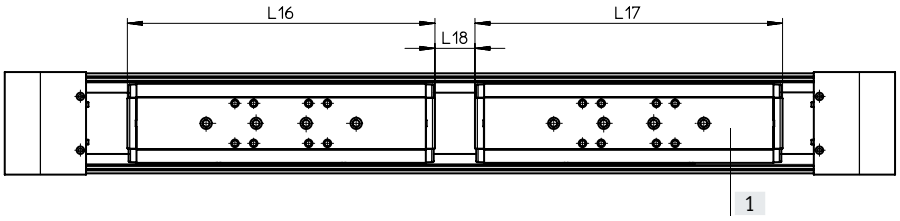
- The stroke reserve is a safety distance from the mechanical end position and is not used in normal operation
- The sum of the nominal stroke and 2x stroke reserve must not exceed the maximum permissible working stroke
- The stroke reserve length can be freely selected
- The stroke reserve is defined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

Example:
Type ELGA-TB-KF-70-500-20H-...
Nominal stroke = 500 mm
2x stroke reserve = 40 mm
Working stroke = 540 mm
(540 mm = 500 mm + 2x 20 mm)

Working stroke reduction

With axis ELGA with additional slide ZL/ZR

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



L16 = Slide length
L17 = Additional slide length
L18 = Distance between both slides
[1] Additional slide

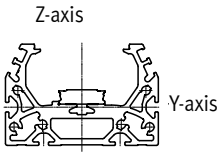
Example:
Type ELGA-TB-KF-70-500-...-ZL/ZR
Working stroke without additional slide = 500 mm
L18 = 50 mm
L16, L17 = 221 mm
Working stroke with additional slide = 229 mm
(500 mm – 50 mm – 221 mm)

Dimensions – Additional slide

Size		70	80	120	150
Length L17	[mm]	221	246	335	378.4
Min. distance between the slides L18	[mm]	≥ 50	≥ 50	≥ 50	≥ 50

Data sheet

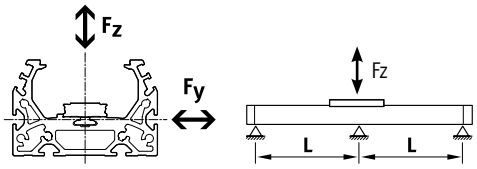
2nd moments of area



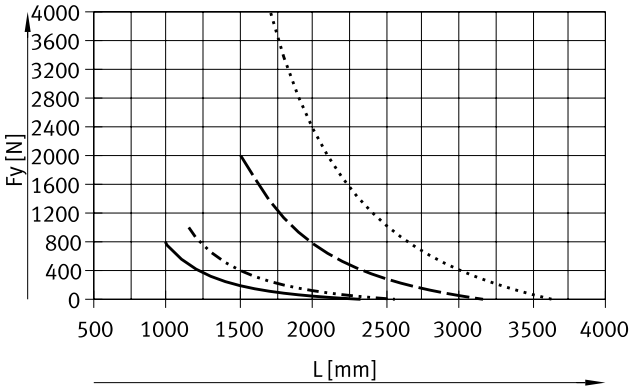
Size		70	80	120	150
Iy	[mm^4]	1.46x10^5	2.57x10^5	1.26x10^6	4.62x10^6
Iz	[mm^4]	4.59x10^5	9.14x10^5	4.37x10^6	12.32x10^6

Maximum permissible support spacing L (without profile mounting MUE/central support EAHF) as a function of force F

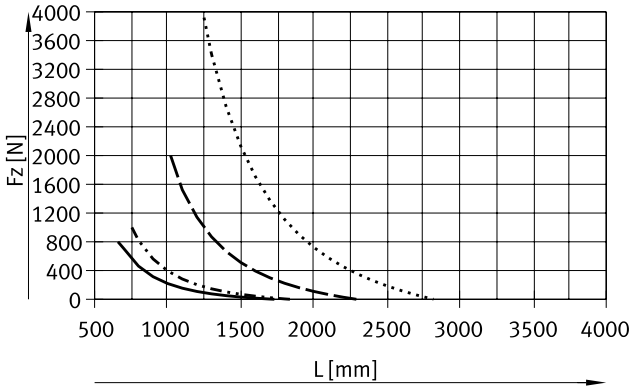
In order to limit deflection in the case of large strokes, the axis may need to be supported.
The following graphs can be used to determine the maximum permissible support spacing l as a function of force F acting on the axis. The deflection is f = 0.5 mm.



Force Fy



Force Fz



ELGA-TB-KF-70
ELGA-TB-KF-80
ELGA-TB-KF-120
ELGA-TB-KF-150

Recommended deflection limits

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

Size	Dynamic deflection (moving load)	Static deflection (stationary load)
70 ... 150	0.05% of the axis length, max. 0.5 mm	0.1% of the axis length

Data sheet

Central lubrication

The lubrication connections enable the guide of the toothed belt axis ELGA-TB-KF to be permanently lubricated in applications in humid or wet ambient conditions using semi- or fully automatic relubrication devices.

- The connection options are already available in the standard design of the axes
- There is a dedicated lubrication connection for the spindle nut and the two ball cassettes

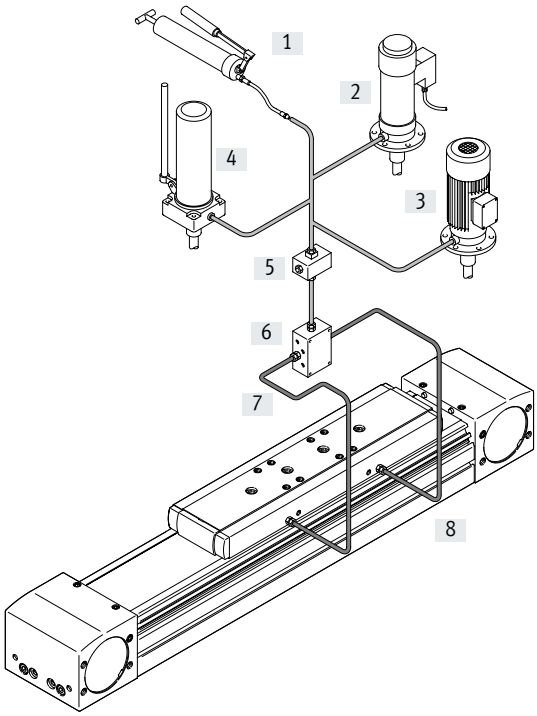
Slide dimensions
➔ page 24

Design of a central lubrication system

A central lubrication system requires various additional components. The illustration shows different options (using a hand pump, pneumatic container pump or electric container pump) required as a minimum for designing a central lubrication system. Festo does not sell these additional components; however, they can be obtained from the following companies:

- Lincoln
- Bielomatik
- SKF (Vogel)

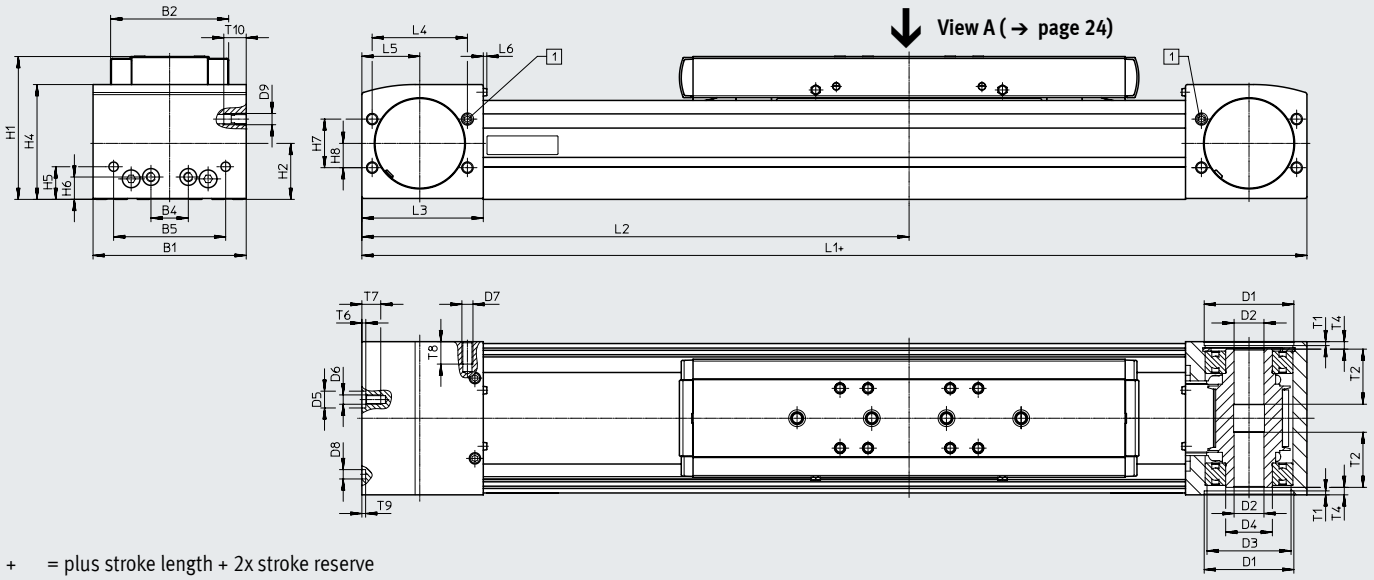
Festo recommends these companies because they can supply all the necessary components.



[1] Hand pump
[2] Pneumatic container pump
[3] Electric container pump
[4] Manually operated container pump
[5] Nipple block
[6] Distributor block
[7] Tubing or piping
[8] Fittings

Data sheet

Dimensions Download CAD data ➔ www.festo.com



\+ = plus stroke length + 2x stroke reserve

[1] Sealing air connection

Size	B1	B2	B4	B5	D1 ø H7	D2 ø H7	D3 ø	D4 ø	D5 ø H7	D6	D7
70	69	48.2	30	45	38	16	34	25	–	M5	M6
80	82	63.2	20	60	48	16	45	25	9	M5	M6
120	120	95	80	40	80	23	72	45	–	M8	M8
150	154	125	115	80	95	32	90	60	–	M8	M8

Size	D8 ø H7	D9	H1	H2	H4	H5	H6	H7	H8	L1	L2 min.
70	5	M6	64	26.5	50.8	13	13	24	12	346	173
80	5	M6	76.5	30	61.5	17.5	12	26	13	386	193
120	9	M8	111.5	45	91	22	22	59	32	546	273
150	9	M8	141.5	58.6	121	26.5	26.5	80	40	712	356

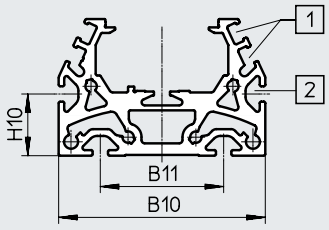
Size	L3	L4	L5	L6	T1	T2	T4	T6	T7	T8	T9	T10
70	57.5	42	27.5	2.3	2.1	18	7.2	–	10	12	3.1	12
80	65	51	31	2.3	2.1	29.5	4	2.1	10.1	12	2	12
120	100	76	50	2.5	3.1	29.5	4	–	16	16	2.1	16
150	140	80	70	2.5	2.8	32	4	–	18	17	2.1	17

Data sheet

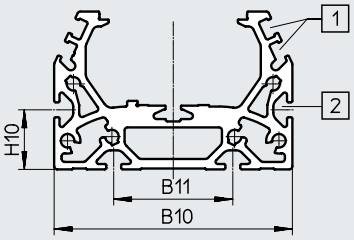
Dimensions Download CAD data ➔ www.festo.com

Profile

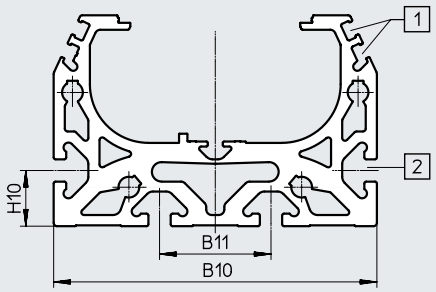
Size 70



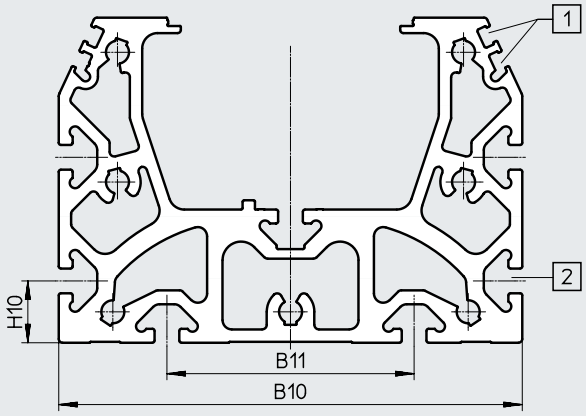
Size 80



Size 120



Size 150



[1] Sensor slot for proximity switch
[2] Mounting slot for slot nut
With size 70, 80: slot nut NST-5-M5
With size 120, 150: slot nut NST-8-M6

Note

Requirements for the evenness of the bearing surface and of attachments as well as for use in parallel structures
➔ www.festo.com/sp User documentation.

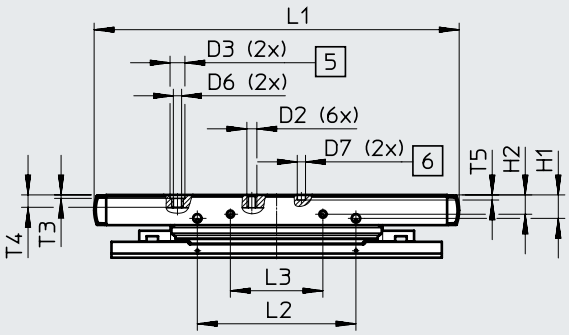
Size	B10	B11	H10
70	67	40	20
80	80	40	20
120	116	40	20
150	150	80	20

Data sheet

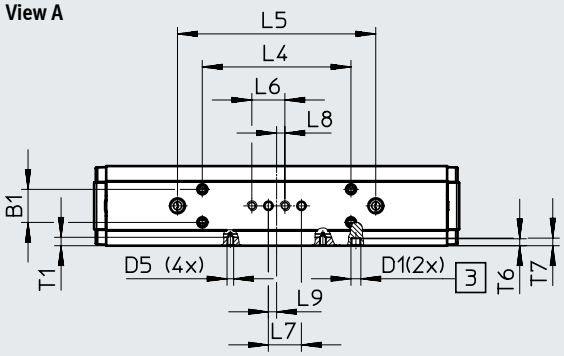
Dimensions Download CAD data ➔ www.festo.com

Slide

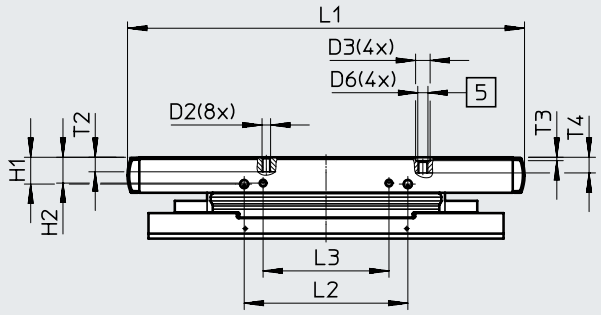
Size 70



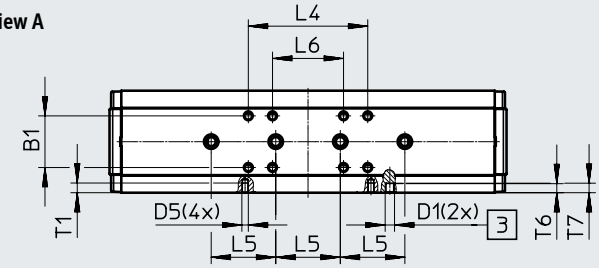
View A



Size 80



View A



[3] Lubrication connections
[5] Drilled hole for centring sleeve ZBH
[6] Drilled hole for centring pin ZBS

Size	B1 ±0.1	D1	D2	D3 ø H7	D5	D6	D7 ø H7	H1 ±0.1	H2 ±0.1	L1	L2 ±0.1	L3 ±0.1
70	20	M6	M5	9	M4	M6	5	14.2	11.7	221	96	56
80	32	M6	M5	9	M4	M6	–	16.6	16	246	101.4	78

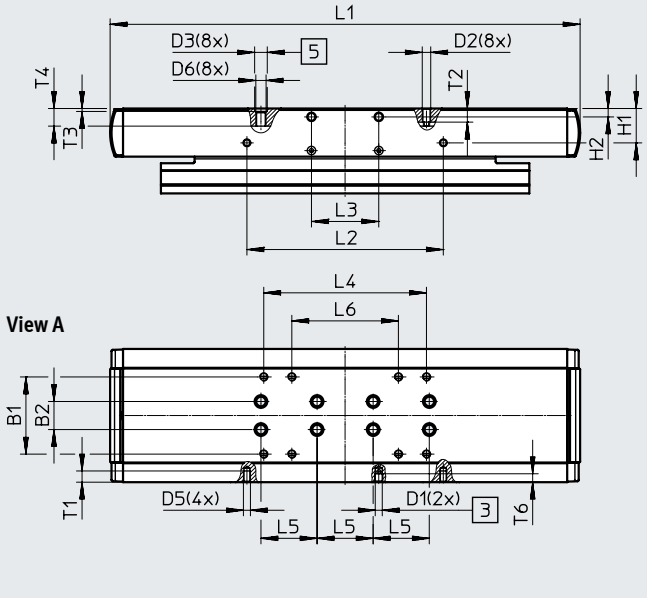
Size	L4 ±0.1	L5 ±0.03	L6 ±0.1	L7 ±0.03	L8	L9 ±0.1	T1	T2	T3 +0.1	T4	T5 ±0.1	T6 min.	T7 max.
70	90	120	20	20	5	10	5.1	–	2.1	7.5	3.1	4.2	$4.6_{-0.1}$
80	74	40	44	–	–	–	6	9	2.1	$9.7_{-0.2}$	–	5.6	$5.9_{-0.1}$

Data sheet

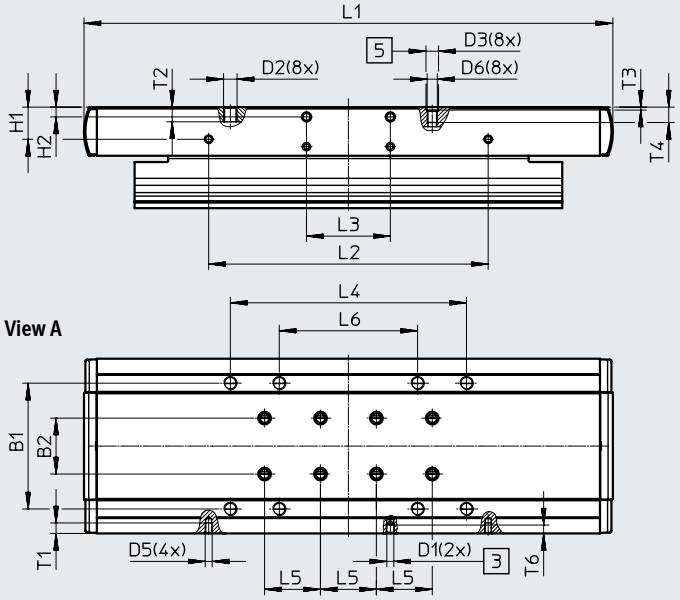
Dimensions Download CAD data ➔ www.festo.com

Slide

Size 120



Size 150



[3] Lubrication connections

[5] Drilled hole for centring sleeve ZBH

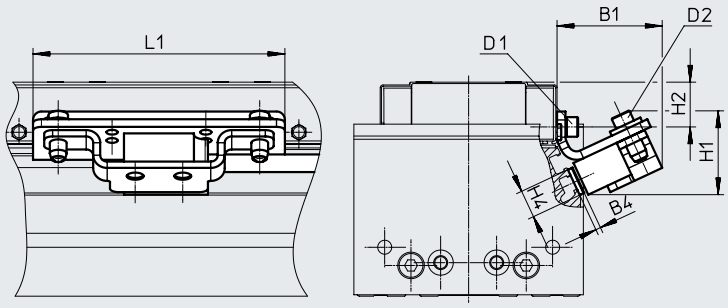
Size	B1 ±0.2	B2 ±0.03	D1	D2	D3 ø H7	D5	D6	H1 ±0.1	H2	L1
120	55	20	M6	M5	9	M5	M6	24.5	6	335
150	90	40	M6	M8	9	M5	M6	23	7±0.1	378.4

Size	L2 ±0.1	L3 ±0.1	L4 ±0.2	L5 ±0.03	L6 ±0.2	T1	T2	T3 +0.1	T4	T6
120	140	48	116	40	76	8	9.7	2.1	$12.6_{-0.3}$	6
150	200	60	169	40	99	7.5	10.7	2.1	11	7

Data sheet

Dimensions Download CAD data ➔ www.festo.com

ELGA-...-M1/M2 – With incremental displacement encoder



Encoder cable
(connection to motor controller/
safety system)
➔ Page 110

Size	B1	B4	D1	D2	H1	H2	H4	L1
70	40	1.8	M4x8	M4x14	35	11.7	10	86
80	40	1.8	M4x14	M4x14	35	16	10	90
120	41	1.8	M5x10	M4x14	35	24.5	10	170
150	42	1.8	M5x10	M4x14	35	23	10	220

Data sheet

Ordering data

Key features:

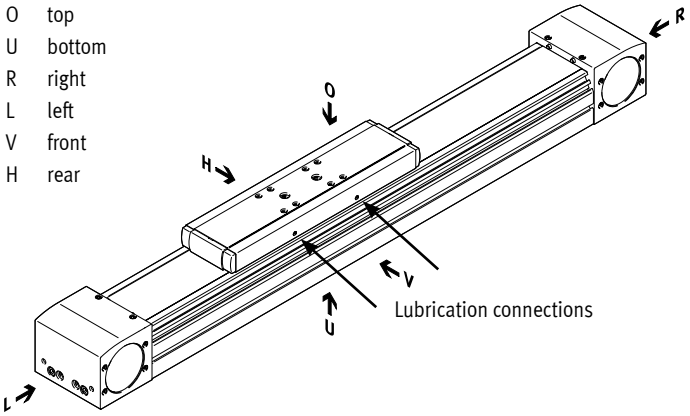
- Stroke reserve: 0 mm
- Standard slide

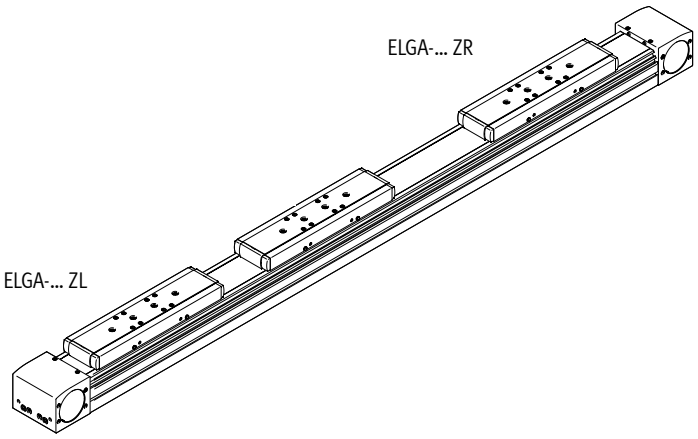
Size	Stroke [mm]	Part no.	Type
70	300	**8041851**	**ELGA-TB-KF-70-300-0H**
	400	**8041852**	**ELGA-TB-KF-70-400-0H**
	500	**8041853**	**ELGA-TB-KF-70-500-0H**
	600	**8041854**	**ELGA-TB-KF-70-600-0H**
	800	**8041855**	**ELGA-TB-KF-70-800-0H**
	1000	**8041856**	**ELGA-TB-KF-70-1000-0H**
	1200	**8041857**	**ELGA-TB-KF-70-1200-0H**
80	400	**8041858**	**ELGA-TB-KF-80-400-0H**
	500	**8041859**	**ELGA-TB-KF-80-500-0H**
	600	**8041860**	**ELGA-TB-KF-80-600-0H**
	800	**8041861**	**ELGA-TB-KF-80-800-0H**
	1000	**8041862**	**ELGA-TB-KF-80-1000-0H**
	1200	**8041863**	**ELGA-TB-KF-80-1200-0H**
120	400	**8041864**	**ELGA-TB-KF-120-400-0H**
	500	**8041865**	**ELGA-TB-KF-120-500-0H**
	600	**8041866**	**ELGA-TB-KF-120-600-0H**
	800	**8041867**	**ELGA-TB-KF-120-800-0H**
	1000	**8041868**	**ELGA-TB-KF-120-1000-0H**
	1200	**8041869**	**ELGA-TB-KF-120-1200-0H**
	1500	**8041870**	**ELGA-TB-KF-120-1500-0H**

Ordering data – Modular product system

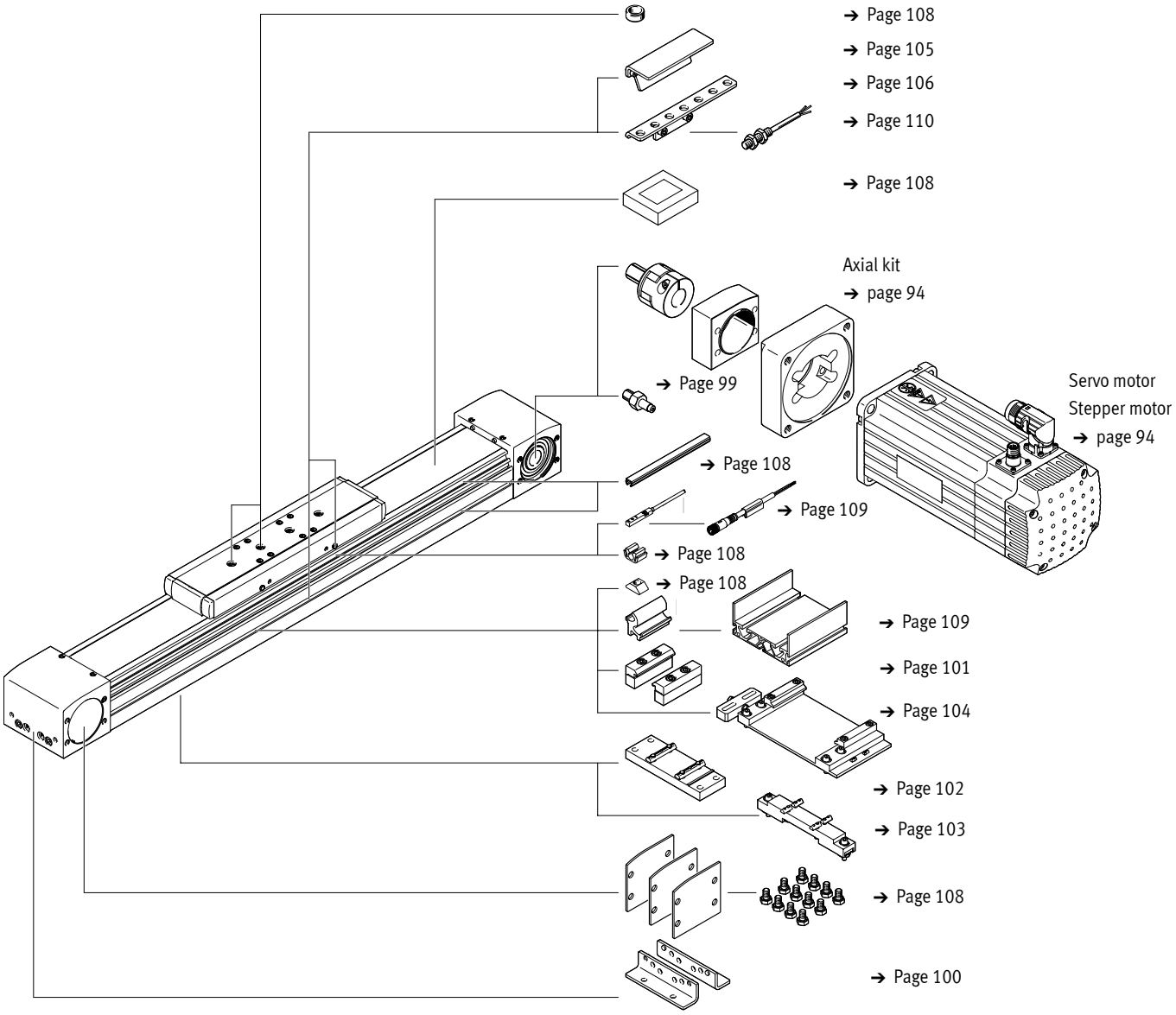
Orientation guide

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





Accessories



Ordering data – Modular product system

Ordering table

Size		70	80	120	150	Conditions	Code	Enter code
Module no.		**8024914**	**8024915**	**8024916**	**8024917**			
Design		Linear axis					**ELGA**	ELGA
Function		Toothed belt					☆ **-TB**	-TB
Guide		Recirculating ball bearing guide					☆ **-KF**	-KF
Size	[mm]	70	80	120	150		☆ **-...**	
Stroke length	[mm]	1 ... 5000	1 ... 8500	1 ... 8500	1 ... 7000		☆ **-...**	
Stroke reserve	[mm]	0 ... 999 (0 = no stroke reserve)				[1]	☆ **-...H**	
Additional slide		Without					☆	
		1 slide left					☆ **-ZL**	
		1 slide right					☆ **-ZR**	
Protection against particles		Standard						
		Cover strip with magnetic deflection					**P11**	
Displacement encoder, incremental		Without					☆	
		Resolution 2.5 µm					**-M1**	
		Resolution 10 µm					**-M2**	
Displacement encoder attachment position		Without					☆	
		Rear				[2]	**B**	
		Front				[2]	**F**	
Material of toothed belt		Chloroprene rubber						
		Coated PU					**-PU2**	

[1] **... H** 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] **B, F** Only with displacement encoder M1, M2

Festo core product range	★	Generally ready for shipping ex works in 24 hours
	☆	Generally ready for shipping ex works in 5 days