Документация

Направляющая EAGF

Guide units EAGF, for electric cylinders

Key features

At a glance

The guide unit EAGF is used to protect electric cylinders against torsion when these are subjected to high torque loads.

It offers high precision guiding for workpiece handling and other applications.

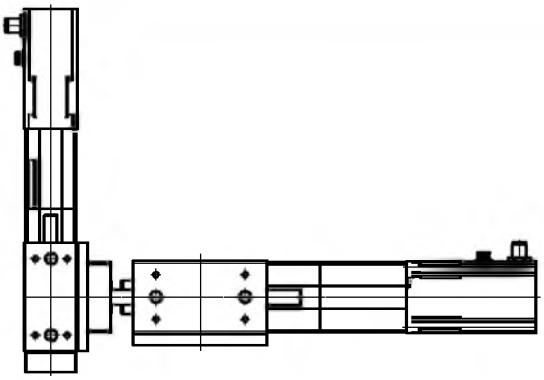
The interface enables quick and easy installation on many Festo drives/ axes.

For electric cylinder ESBF ➔ page 4

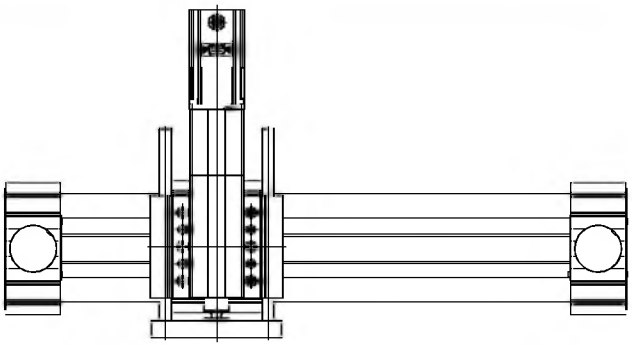
For electric cylinder EPCO ➔ page 14

Sample applications

Pick & place with two guide units



Pick & place with guide unit and linear axis



Guide units EAGF, for electric cylinders ESBF

Type codes

EAGF	–	V2	–	KF	–	63	–	100

Type	
EAGF	Guide unit

Designation	
V2	For electric cylinder ESBF

Guidance	
KF	Recirculating ball bearing guide

Size	
32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Stroke [mm]	
100	100 mm
200	200 mm
320	320 mm
400	400 mm
...	1 ... 500 mm

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Technical data

Diameter
32 ... 100 mm

Stroke length
1 ... 500 mm

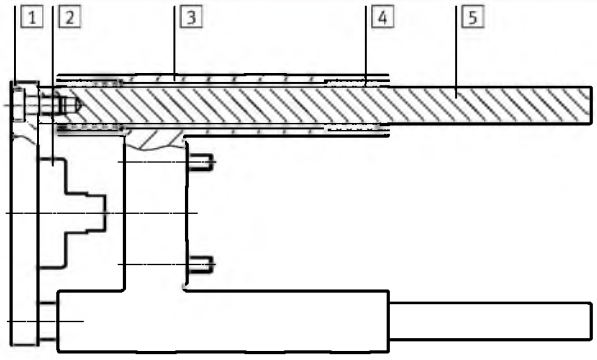
General technical data							
Size		32	40	50	63	80	100
Stroke	[mm]	1 ... 500					
Design		Guide					
Guidance		Recirculating ball bearing guide					
Displacement force	[N]	15				40	
Reversing backlash	[µm]	0					
Type of mounting		Via female thread					
Mounting position		Any					
Ambient temperature	[°C]	–20 ... +80 °C					

Weight [g] (for calculation example ➔ page 6)						
Size	32	40	50	63	80	100
Basic weight with 0 mm stroke	1685	2517	4059	5525	10517	13263
Additional weight per 10 mm stroke	18	32	49	49	76	76
Moving mass with 0 mm stroke	724	1283	2015	2560	5166	6148
Additional mass per 10 mm stroke	18	32	49	49	76	76

Centre of gravity of the moving mass [mm] (for calculation example ➔ page 6)						
Size	32	40	50	63	80	100
With 0 mm stroke	30	38	46	48	54	47
Supplement per 10 mm stroke	4.1	4.2	4.3	4.1	3.8	3.6

Materials

Sectional view



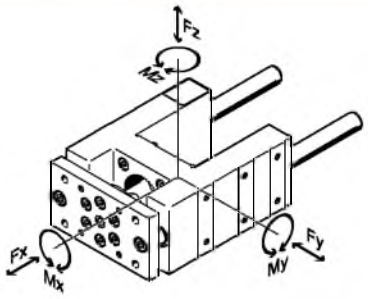
Guide unit		
1	Yoke plate	Steel
2	Compensating component	Steel
3	Housing	Anodised wrought aluminium alloy
4	Bearing	Steel
5	Guide rod	Steel
–	Note on materials	RoHS compliant
		Free of copper and PTFE

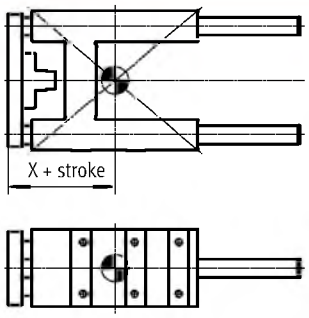
Guide units EAGF, for electric cylinders ESBF

Technical data

Characteristic load values

The indicated forces and torques refer to the guide centre.





If the guide unit 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:

$$f_v = \frac{|F_y|}{F_{y,max}} + \frac{|F_z|}{F_{z,max}} + \frac{|M_x|}{M_{x,max}} + \frac{|M_y|}{M_{y,max}} + \frac{|M_z|}{M_{z,max}} \leqq 1$$

Distance X (for calculation example ➔ page 6)							
Size		32	40	50	63	80	100
Dimension X	[mm]	83	85	99	117	142	145

Max. permissible forces and torques							
Size		32	40	50	63	80	100
Static							
$Fy_{max.}/Fz_{max.}$	[N]	1020	1260	1600	1600	3120	3120
$Mx_{max.}$	[Nm]	38	55	83	95	231	268
$My_{max.}/Mz_{max.}$	[Nm]	46	65	89	115	259	267
Dynamic (for a service life of 5000 km)							
$Fy_{max.}/Fz_{max.}$	[N]	750	1000	1260	1260	2300	2300
$Mx_{max.}$	[Nm]	28	44	65	75	170	198
$My_{max.}/Mz_{max.}$	[Nm]	34	52	70	90	191	197

Guide units EAGF, for electric cylinders ESBF

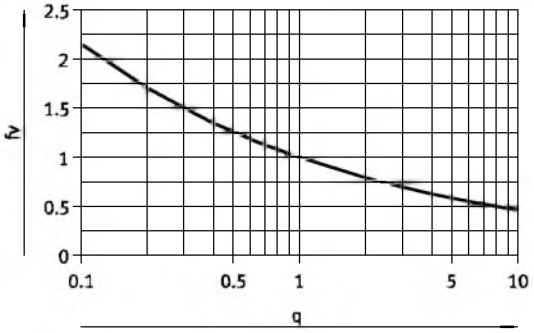
Technical data

Calculating the 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 ratio q.

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

Load comparison factor f_v as a function of service life ratio q



Example:

The effect on the service life, deviating from the specified reference service life, can be determined by means of the service life ratio q:

Given:

Reference service life = 5000 km

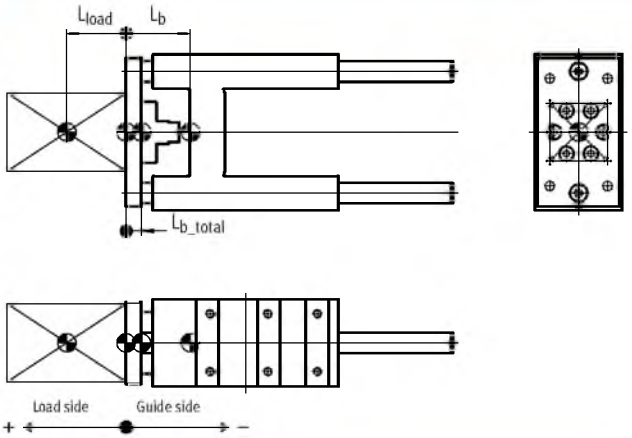
Required service life = 3000 km

$$q = \frac{3000km}{5000km} = 0.6$$

The graph gives a load comparison factor f_v of 1.2. This means that the permissible resultant load can be utilised up to 120%.

> 1.5 are only theoretical
>mparison values.

Calculation example



L_b = Centre of gravity of the moving mass of the guide unit

L_{load} = Centre of gravity of the payload

L_{b_total} = Centre of gravity of the total moving mass

Length measurements should be provided with plus/minus signs as shown in the figure:

$L_{b\_total} > 0$ = Centre of gravity of the moving mass is on the payload side

$L_{b\_total} < 0$ = Centre of gravity of the moving mass is on the guide side

Given:

- Guide unit: EAGF-V2-KF-32-200
- Stroke length H = 200 mm
- Centre of gravity of payload L_{load} = 15 mm
- Payload: m_{load} = 5 kg
- Acceleration: $a_x = a_y = 2\ m/s^2$, $a_z = 0\ m/s^2$

To be calculated:

- Loads Fy_{dyn}/Fz_{dyn} and $Mx_{dyn}/My_{dyn}/Mz_{dyn}$
- Verification of operation with combined load
- Expected service life

Guide units EAGF, for electric cylinders ESBF

Technical data

Calculation example

Solution:

Moving load:

$$m_{b\_total} = m_b + m_{load} \qquad (m_b = m_{0b} + H \times m_{Hb})$$

m_b = Moving mass of the guide unit
m_{0b} = Moving mass with 0 mm stroke
m_{Hb} = Additional mass per 10 mm stroke
H = Stroke length

From table ➔ page 4
m_{0b} = 0.724 kg
m_{Hb} = 0.018 kg/10 mm

m_b = 0.724 kg + 200 mm x 0.018 kg/10 mm = 1.084 kg
m_{b_total} = 1.084 kg + 5 kg = 6.084 kg

Centre of gravity of the moving mass

$$L_{b\_total} = \frac{L_{load} \times m_{load} + L_b \times m_b}{m_{b\_total}} \qquad (L_b = L_{0b} + H \times L_{Hb})$$

L_b = Centre of gravity of the moving mass of the guide unit
m_b = Moving mass of the guide unit
L_{load} = Centre of gravity of the payload
m_{load} = Payload
L_{0b} = Centre of gravity of the moving mass with 0 mm stroke
L_{Hb} = Additional centre of gravity of the moving mass per 10 mm stroke

From table ➔ page 4
L_{0b} = 30 mm
L_{Hb} = 4.1 mm/10 mm

L_b = 30 mm + 200 mm x 4.1 mm/10 mm = 112 mm

$$L_{b\_total} = \frac{(+\ 15\ \text{mm}) \times 5\ \text{kg} + (-\ 112\ \text{mm}) \times 1.084\ \text{kg}}{6.084\ \text{kg}} = -\ 8\ \text{mm}$$

Length measurements should be provided with plus/minus signs as shown in the figure:
$L_{b\_total} > 0$ = Centre of gravity of the moving mass is on the payload side
$L_{b\_total} < 0$ = Centre of gravity of the moving mass is on the guide side

Loads Fy_{dyn}/Fz_{dyn} and $Mx_{dyn}/My_{dyn}/Mz_{dyn}$

$Fy_{dyn} = m_{b\_total} \times a_y = 6.084\ \text{kg} \times 2\ \text{m/s}^2 = 12\ \text{N}$
$Fz_{dyn} = m_{b\_total} \times (g + a_z) = 6.084\ \text{kg} \times (9.81\ \text{m/s}^2 + 0\ \text{m/s}^2) = 60\ \text{N}$

From table ➔ page 5
Dimension X = 83 mm

$My_{dyn} = Fz_{dyn} \times (\text{dimension X} + \text{stroke} + L_{b\_total}) = 60\ \text{N} \times (83\ \text{mm} + 200\ \text{mm} + (-8\ \text{mm})) = 16\ \text{Nm}$
$Mz_{dyn} = Fy_{dyn} \times (\text{dimension X} + \text{stroke} + L_{b\_total}) = 12\ \text{N} \times (83\ \text{mm} + 200\ \text{mm} + (-8\ \text{mm})) = 3\ \text{Nm}$

Verification of operation with combined load

Max values from table ➔ page 5
Fy_{dyn} = 750 N
Fz_{dyn} = 750 N
Mx_{dyn} = 28 Nm
My_{dyn} = 34 Nm
Mz_{dyn} = 34 Nm

$$f_v = \frac{|F_y|}{F_{y,max}} + \frac{|F_z|}{F_{z,max}} + \frac{|M_x|}{M_{x,max}} + \frac{|M_y|}{M_{y,max}} + \frac{|M_z|}{M_{z,max}} \leqq 1$$

$$f_v = \frac{12\ \text{N}}{750\ \text{N}} + \frac{60\ \text{N}}{750\ \text{N}} + \frac{0\ \text{Nm}}{28\ \text{Nm}} + \frac{16\ \text{Nm}}{34\ \text{Nm}} + \frac{3\ \text{Nm}}{34\ \text{Nm}} = 0.7 \leqq 1$$

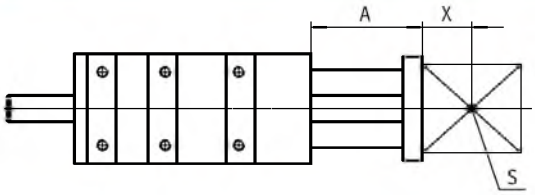
Expected service life

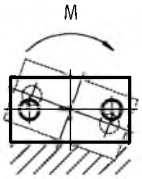
$$L_{calc} = \frac{L_{ref}}{f_v^{\,3}} = \frac{5000\ \text{km}}{0.7^3} = 14000\ \text{km}$$

Guide units EAGF, for electric cylinders ESBF

Technical data

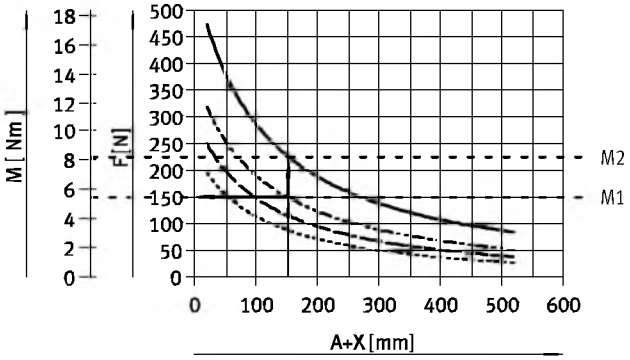
Max. payload F and torque M as a function of cantilever load A





A = Cantilever load
X = Distance to centre of gravity of the payload
S = Centre of gravity of the payload
M = Torque

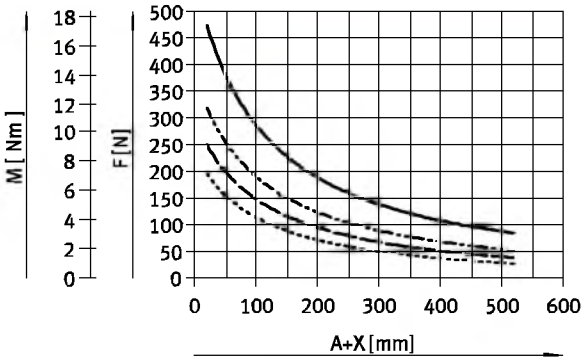
Explanation of how to read the graphs in the case of a combined load



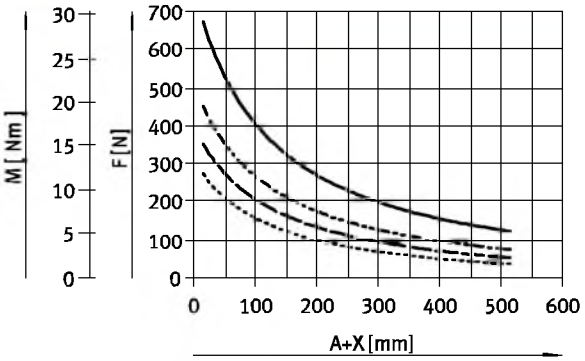
- Determine cantilever load (150 mm)
- Enter lateral force (150 N)
- Enter distance from curve
- Permitted torque is the difference between M2 and M1

Running performance of 500 km
Running performance of 2500 km
Running performance of 5000 km
Running performance of 10000 km

Size 32



Size 40

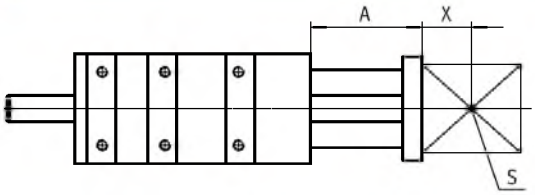


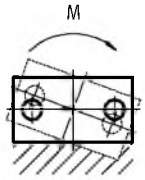
Running performance of 500 km
Running performance of 2500 km
Running performance of 5000 km
Running performance of 10000 km

Guide units EAGF, for electric cylinders ESBF

Technical data

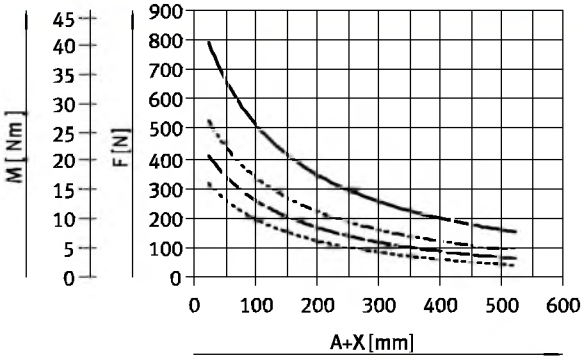
Max. payload F and torque M as a function of cantilever load A



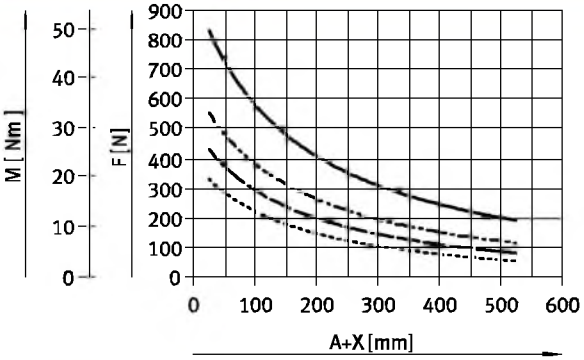


A = Cantilever load
X = Distance to centre of gravity of the payload
S = Centre of gravity of the payload
M = Torque

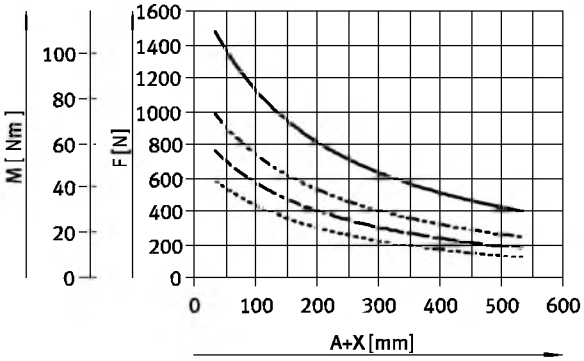
Size 50



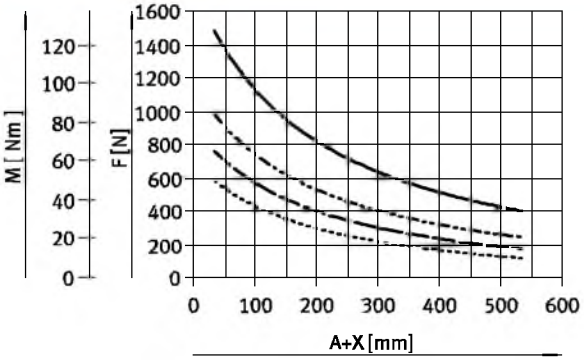
Size 63



Size 80



Size 100

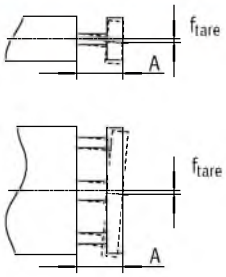


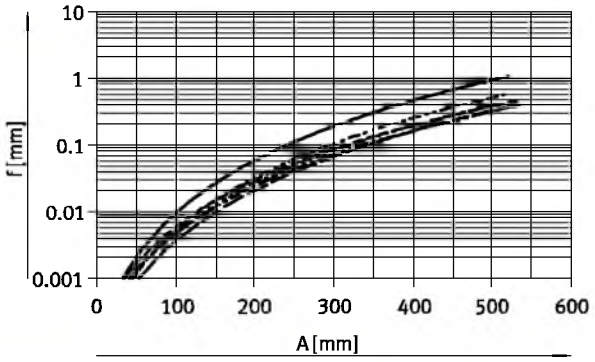
Running performance of 500 km
Running performance of 2500 km
Running performance of 5000 km
Running performance of 10000 km

Guide units EAGF, for electric cylinders ESBF

Technical data

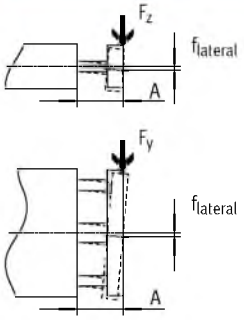
Deflection f_{tare} (due to tare weight) as a function of cantilever load A

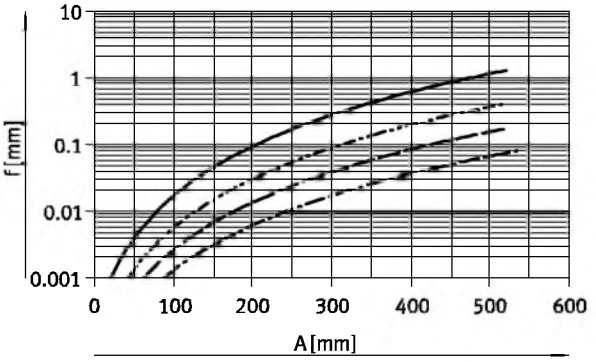




EAGF-V2-KF-32
EAGF-V2-KF-40
EAGF-V2-KF-50
EAGF-V2-KF-63
EAGF-V2-KF-80
EAGF-V2-KF-100

Deflection $f_{standard}$ (due to lateral force) as a function of cantilever load A





EAGF-V2-KF-32
EAGF-V2-KF-40
EAGF-V2-KF-50/
EAGF-V2-KF-63
EAGF-V2-KF-80/
EAGF-V2-KF-100

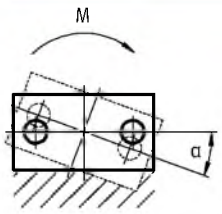
The maximum permissible lateral force must not be exceeded.

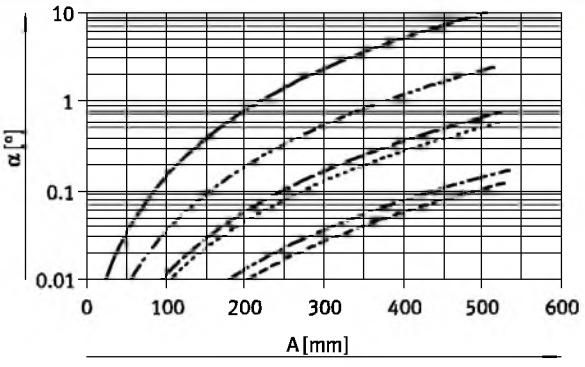
$$f_{lateral} = \frac{F_{lateral}}{F_{standard}} \times f_{standard}$$

$F_{standard}$ = 10 N

A = Cantilever load of guide rod
$f_{lateral}$ = Deflection due to lateral force
$F_{lateral}$ = Lateral force
$F_{standard}$ = Standardised lateral force
$f_{standard}$ = Deflection due to standardised lateral force (value from graph)

Inclination α (due to torque) as a function of cantilever load A





EAGF-V2-KF-32
EAGF-V2-KF-40
EAGF-V2-KF-50
EAGF-V2-KF-63
EAGF-V2-KF-80
EAGF-V2-KF-100

$$\alpha = \frac{M}{M_{standard}} \times \alpha_{standard}$$

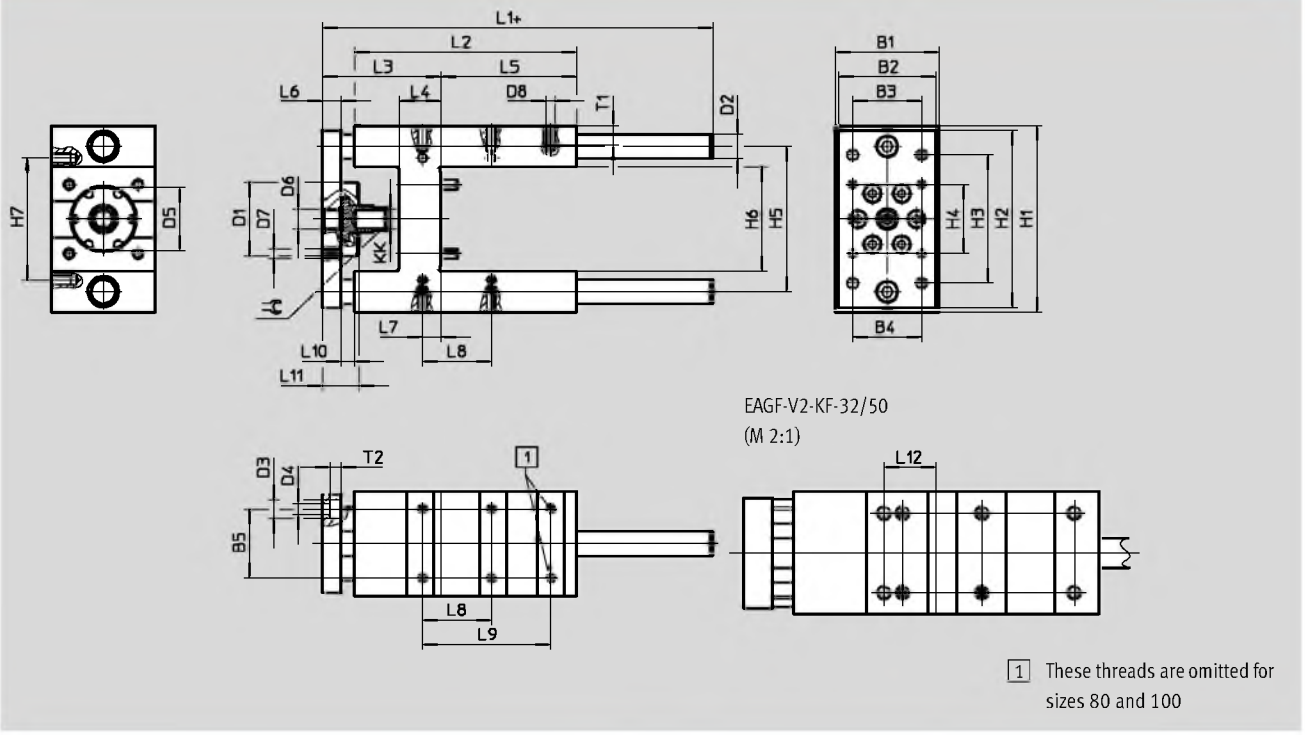
$M_{standard}$ = 2 Nm
(valid for α ≤ 10°)

A = Cantilever load of guide rod
α = Inclination due to torque
M = Torque
$M_{standard}$ = Standardised torque
$\alpha_{standard}$ = Deflection due to standardised torque

Guide units EAGF, for electric cylinders ESBF

Technical data

Dimensions



1 These threads are omitted for sizes 80 and 100

Size	B1 −0.3	B2	B3 ±0.2	B4 ±0.2	B5 ±0.2	D1 ∅	D2 ∅ H6	D3 ∅	D4 ∅	D5 ∅ H8	D6	D7
32	50	45	32.5	32.5	32.5	44	12	11	6.6	34	M6	M6
40	58	54	38	38	38	48	16	11	6.6	39	M8	M8
50	70	63	46.5	46.5	46.5	60	20	15	9	45	M8	M8
63	85	80	56.5	56.5	56.5	60	20	15	9	52	M16	M8
80	105	100	72	72	72	78	25	18	11	60	M18	M10
100	130	120	89	89	89	78	25	18	11	70	M18	M10

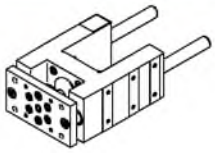
Size	D8	H1 −0.5	H2	H3 ±0.2	H4 ±0.2	H5 ±0.2	H6	H7 ±0.2	KK	L1 ±1	L2
32	M6	97	90	78	32.5	74	50.5±0.3	61	M10x1.25	154.8	125
40	M6	115	110	84	38	87	58.5±0.3	69	M12x1.25	172.8	140
50	M8	137	130	100	46.5	104	70.5±0.3	85	M16x1.5	187.8	150
63	M8	153	145	105	56.5	119	85.5±0.3	100	M16x1.5	219.8	182
80	M10	189	180	130	72	148	106+1/−0.6	130	M20x1.5	257.8	215
100	M10	213	200	150	89	172	131+1/−0.6	150	M20x1.5	262.8	220

Size	L3	L4	L5	L6	L7	L8 ±0.2	L9 ±0.2	L10	L11	L12	T1	T2	⌀1
32	69.5^{+5}	24	76	12	4.3	32.5	78	–	24	12	12	6.5	15
40	74.5^{+5}	28	81	15	11	38	84	–	27	–	14	6.5	15
50	94.5^{+5}	34	79	15	18.8	46.5	100	–	30	37	16	9	19
63	96.6	34	111	15	15.3	56.5	105	11	30	–	16	9	19
80	121.6	40	128	20	21	72	–	15	39	–	20	11	27
100	126.6	40	128	20	24.5	89	–	15	39	–	20	11	27

Guide units EAGF, for electric cylinders ESBF

Technical data

Ordering data

Guide unit	Size	Stroke [mm]	Part No.	Type
	32	100	**2782679**	**EAGF-V2-KF-32-100**
		200	**2782818**	**EAGF-V2-KF-32-200**
		320	**2782885**	**EAGF-V2-KF-32-320**
		400	**2782923**	**EAGF-V2-KF-32-400**
		1 ... 500	**3038083**	**EAGF-V2-KF-32-**
	40	100	**2782939**	**EAGF-V2-KF-40-100**
		200	**2782976**	**EAGF-V2-KF-40-200**
		320	**2783047**	**EAGF-V2-KF-40-320**
		400	**2783080**	**EAGF-V2-KF-40-400**
		1 ... 500	**3038089**	**EAGF-V2-KF-40-**
	50	100	**2783639**	**EAGF-V2-KF-50-100**
		200	**2784152**	**EAGF-V2-KF-50-200**
		320	**2784164**	**EAGF-V2-KF-50-320**
		400	**2784184**	**EAGF-V2-KF-50-400**
		1 ... 500	**3038094**	**EAGF-V2-KF-50-**
	63	100	**1725842**	**EAGF-V2-KF-63-100**
		200	**1725843**	**EAGF-V2-KF-63-200**
		320	**1725844**	**EAGF-V2-KF-63-320**
		400	**1725845**	**EAGF-V2-KF-63-400**
		1 ... 500	**2608521**	**EAGF-V2-KF-63-**
	80	100	**1725846**	**EAGF-V2-KF-80-100**
		200	**1725847**	**EAGF-V2-KF-80-200**
		320	**1725848**	**EAGF-V2-KF-80-320**
		400	**1725849**	**EAGF-V2-KF-80-400**
		1 ... 500	**2608528**	**EAGF-V2-KF-80-**
	100	100	**1725850**	**EAGF-V2-KF-100-100**
		200	**1725851**	**EAGF-V2-KF-100-200**
		320	**1725852**	**EAGF-V2-KF-100-320**
		400	**1725853**	**EAGF-V2-KF-100-400**
		1 ... 500	**2608532**	**EAGF-V2-KF-100-**

Guide units EAGF, for electric cylinders EPCO

Type codes

EAGF – P1 – KF – 16 – 100

Type	
EAGF	Guide unit

Designation	
P1	For electric cylinder EPCO

Guidance	
KF	Recirculating ball bearing guide

Size	
16	16 mm
25	25 mm
40	40 mm

Stroke [mm]	
50	50 mm
75	75 mm
100	100 mm
125	125 mm
150	150 mm
175	175 mm
200	200 mm
250	250 mm
300	300 mm
350	350 mm
400	400 mm

Guide units EAGF, for electric cylinders EPCO

Technical data

- Ø - Diameter
16, 25, 40 mm

- I - Stroke length
50 ... 400 mm

General technical data				
Size		16	25	40
Stroke	[mm]	50, 75, 100, 125, 150, 175, 200	50, 75, 100, 125, 150, 175, 200, 250, 300	50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400
Design		Guide		
Guidance		Recirculating ball bearing guide		
Displacement force	[N]	3.2	4	6
Reversing backlash	[µm]	0		
Permissible speed	[m/s]	1		
Permissible acceleration	[m/s²]	25		
Type of mounting		Via female thread		
Mounting position		Any		

Operating and environmental conditions				
Size		16	25	40
Ambient temperature	[°C]	0 ... +50		
Storage temperature	[°C]	–20 ... +60		
Relative air humidity		0 ... 95 (non-condensing)		
Degree of protection		IP40		
Corrosion resistance class CRC[1)]		1		

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. For dry indoor applications or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Weight [g] (for calculation → page 16)			
Size	16	25	40
Basic weight with 0 mm stroke	600	1080	1910
Additional weight per 10 mm stroke	8	12	18
Moving mass with 0 mm stroke	160	300	560
Additional mass per 10 mm stroke	8	12	18

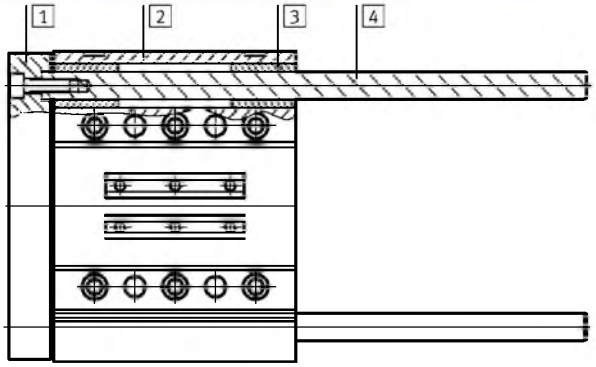
Centre of gravity of the moving mass [mm] (for calculation → page 16)			
Size	16	25	40
With 0 mm stroke	29	30	36
Supplement per 10 mm stroke	4.5	4.5	4.5

Guide units EAGF, for electric cylinders EPCO

Technical data

Materials

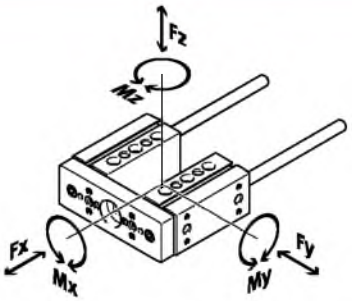
Sectional view

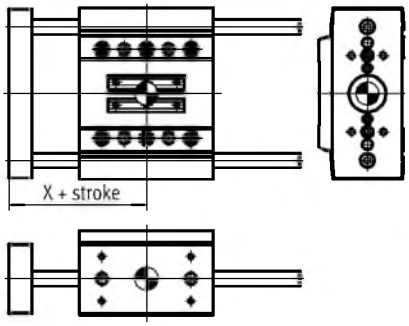


Guide unit		
1	Yoke plate	Anodised wrought aluminium alloy
2	Housing	Anodised wrought aluminium alloy
3	Bearing	Steel
4	Guide rod	Hard-chromium plated tempered steel
–	Note on materials	RoHS compliant
		Free of copper and PTFE

Characteristic load values

The indicated forces and torques refer to the guide centre.





If the guide unit 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:

$$f_v = \frac{|F_y|}{F_{y,max}} + \frac{|F_z|}{F_{z,max}} + \frac{|M_x|}{M_{x,max}} + \frac{|M_y|}{M_{y,max}} + \frac{|M_z|}{M_{z,max}} \leqq 1$$

Distance X (for calculation ➔ page 16)				
Size		16	25	40
Dimension X	[mm]	51	59	72

Max. permissible forces and torques				
Size		16	25	40
Static				
$Fy_{max.}/Fz_{max.}$	[N]	355	415	510
$Mx_{max.}$	[Nm]	13	19	27
$My_{max.}/Mz_{max.}$	[Nm]	9	12	20
Dynamic (for a service life of 5000 km)				
$Fy_{max.}/Fz_{max.}$	[N]	160	320	380
$Mx_{max.}$	[Nm]	6	15	20
$My_{max.}/Mz_{max.}$	[Nm]	4	10	15

o New

Guide units EAGF, for electric cylinders EPCO

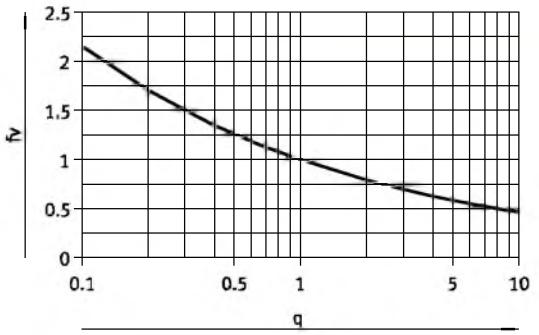
Technical data

Calculating the 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 ratio q.

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

Load comparison factor f_v as a function of service life ratio q



Example:

The effect on the service life, deviating from the specified reference service life, can be determined by means of the service life ratio q:

Given:

Reference service life = 5000 km

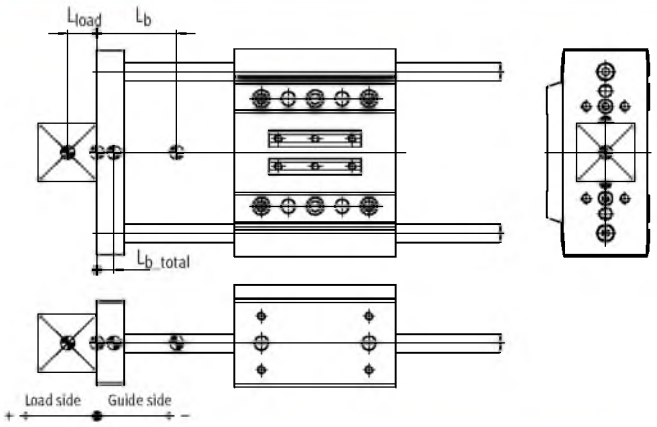
Required service life = 3000 km

$$q = \frac{3000km}{5000km} = 0.6$$

The graph gives a load comparison factor f_v of 1.2. This means that the permissible resultant load can be utilised up to 120%.

$f_v > 1.5$ are only theoretical comparison values.

Calculation example



L_b = Centre of gravity of the moving mass of the guide unit

L_{load} = Centre of gravity of the payload

L_{b_total} = Centre of gravity of the total moving mass

Length measurements should be provided with plus/minus signs as shown in the figure:

$L_{b\_total} > 0$ = Centre of gravity of the moving mass is on the payload side

$L_{b\_total} < 0$ = Centre of gravity of the moving mass is on the guide side

Given:

- Guide unit: EAGF-P1-KF-25-200
- Stroke length: H = 200 mm
- Centre of gravity of payload L_{load} = 15 mm
- Payload: m_{load} = 2 kg
- Acceleration: $a_x = a_y = 2$ m/s², $a_z = 0$ m/s²

To be calculated:

- Loads Fy_{dyn}/Fz_{dyn} and $Mx_{dyn}/My_{dyn}/Mz_{dyn}$
- Verification of operation with combined load
- Expected service life

Guide units EAGF, for electric cylinders EPCO

Technical data

Calculation example

Solution:

Moving load:

$$m_{b\_total} = m_b + m_{load} \qquad (m_b = m_{0b} + H \times m_{Hb})$$

m_b = Moving mass of the guide unit
m_{0b} = Moving mass with 0 mm stroke
m_{Hb} = Additional mass per 10 mm stroke
H = Stroke length

From table ➔ page 14
m_{0b} = 0.3 kg
m_{Hb} = 0.012 kg/10 mm

m_b = 0.3 kg + 200 mm x 0.012 kg/10 mm = 0.54 kg
m_{b_total} = 0.54 kg + 2 kg = 2.54 kg

Centre of gravity of the moving mass

$$L_{b\_total} = \frac{L_{load} \times m_{load} + L_b \times m_b}{m_{b\_total}} \qquad (L_b = L_{0b} + H \times L_{Hb})$$

L_b = Centre of gravity of the moving mass of the guide unit
m_b = Moving mass of the guide unit
L_{load} = Centre of gravity of the payload
m_{load} = Payload
L_{0b} = Centre of gravity of the moving mass with 0 mm stroke
L_{Hb} = Additional centre of gravity of the moving mass per 10 mm stroke

From table ➔ page 14
L_{0b} = 30 mm
L_{Hb} = 4.5 mm/10 mm

L_b = 30 mm + 200 mm x 4.5 mm/10 mm = 120 mm

$$L_{b\_total} = \frac{(+\ 15\ mm) \times 2\ kg + (-\ 120\ mm) \times 0.54\ kg}{2.54\ kg} = -\ 14\ mm$$

Length measurements should be provided with plus/minus signs as shown in the figure:
$L_{b\_total} > 0$ = Centre of gravity of the moving mass is on the payload side
$L_{b\_total} < 0$ = Centre of gravity of the moving mass is on the guide side

Loads Fy_{dyn}/Fz_{dyn} and $Mx_{dyn}/My_{dyn}/Mz_{dyn}$

$Fy_{dyn} = m_{b\_total} \times a_y = 2.54\ kg \times 2\ m/s^2 = 5\ N$
$Fz_{dyn} = m_{b\_total} \times (g + a_z) = 2.54\ kg \times (9.81\ m/s^2 + 0\ m/s^2) = 25\ N$

From table ➔ page 15
Dimension X = 59 mm

My_{dyn} = Fz_{dyn} x (dimension X + stroke + L_{b_total}) = 25 N x (59 mm + 200 mm + (–14 mm) = 6.1 Nm
Mz_{dyn} = Fy_{dyn} x (dimension X + stroke + L_{b_total}) = 5 N x (59 mm + 200 mm + (–14 mm) = 1.2 Nm

Verification of operation with combined load

Max values from table ➔ page 15
Fy_{dyn} = 320 N
Fz_{dyn} = 320 N
Mx_{dyn} = 15 Nm
My_{dyn} = 10 Nm
Mz_{dyn} = 10 Nm

$$f_v = \frac{|F_y|}{F_{y,max}} + \frac{|F_z|}{F_{z,max}} + \frac{|M_x|}{M_{x,max}} + \frac{|M_y|}{M_{y,max}} + \frac{|M_z|}{M_{z,max}} \leqq 1$$

$$f_v = \frac{5\ N}{320\ N} + \frac{25\ N}{320\ N} + \frac{0\ Nm}{15\ Nm} + \frac{6.1\ Nm}{10\ Nm} + \frac{1.2\ Nm}{10\ Nm} = 0.8 \leqq 1$$

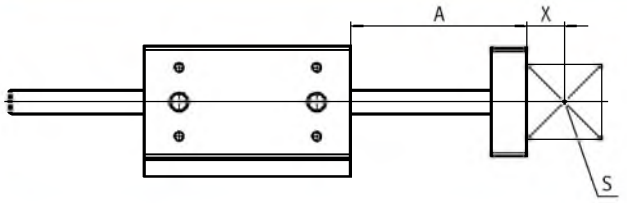
Expected service life

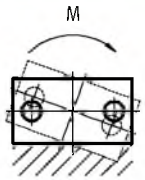
$$L_{calc} = \frac{L_{ref}}{f_v^{\,3}} = \frac{5000\ km}{0.8^3} = 9000\ km$$

Guide units EAGF, for electric cylinders EPCO

Technical data

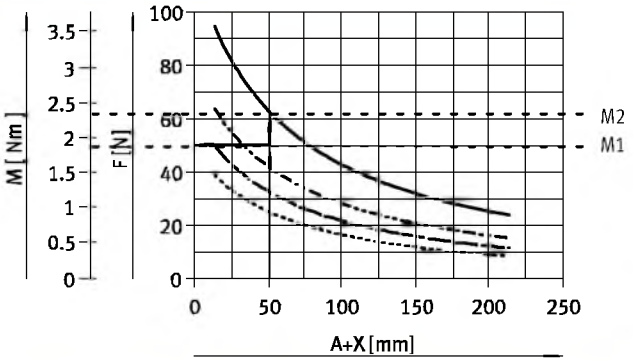
Max. payload F and torque M as a function of cantilever load A





A = Cantilever load
X = Distance to centre of gravity of the payload
S = Centre of gravity of the payload
M = Torque

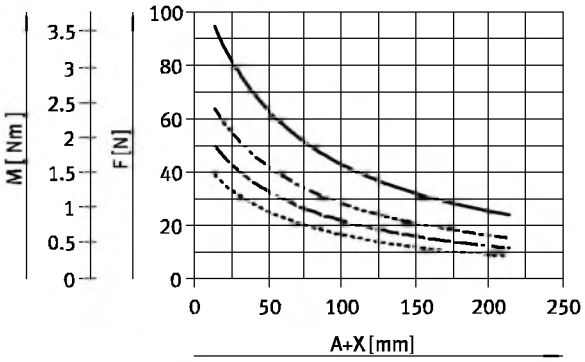
Explanation of how to read graphs in the case of a combined load



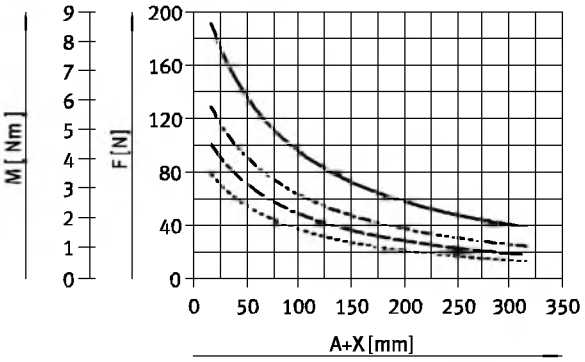
- Determine cantilever load (50 mm)
- Enter lateral force (50 N)
- Enter distance from curve
- Permitted torque is the difference between M2 and M1

Running performance of 500 km
Running performance of 2500 km
Running performance of 5000 km
Running performance of 10000 km

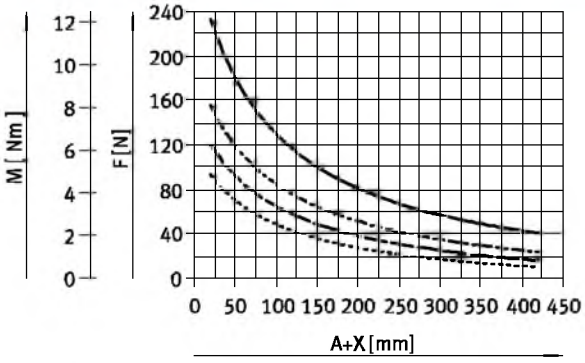
Size 16



Size 25



Size 40



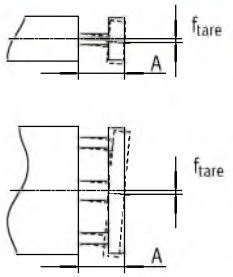
Running performance of 500 km
Running performance of 2500 km
Running performance of 5000 km
Running performance of 10000 km

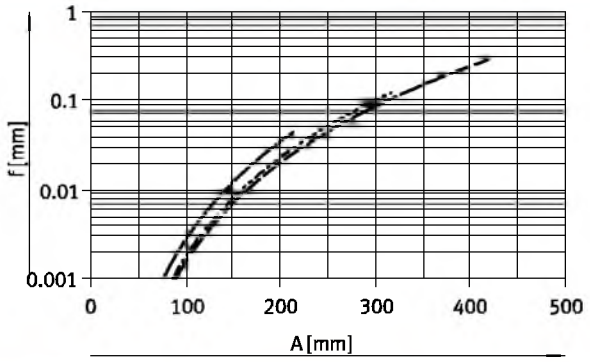
o New

Guide units EAGF, for electric cylinders EPCO

Technical data

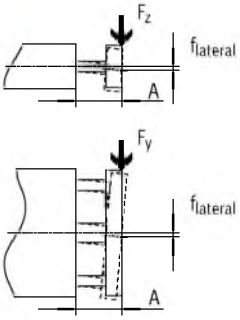
Deflection f_{tare} (due to tare weight) as a function of cantilever load A

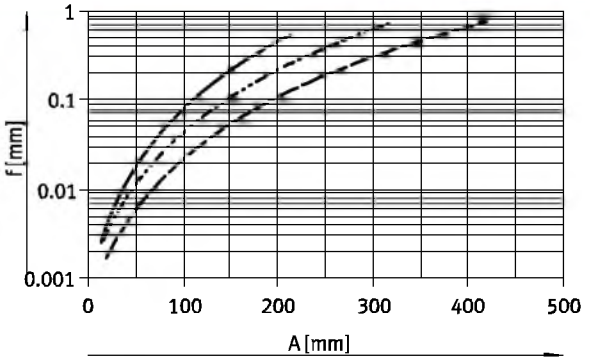




EAGF-P1-KF-16
EAGF-P1-KF-25
EAGF-P1-KF-40

Deflection $f_{standard}$ (due to lateral force) as a function of cantilever load A





EAGF-P1-KF-16
EAGF-P1-KF-25
EAGF-P1-KF-40

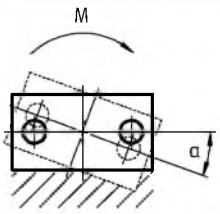
The maximum permissible lateral force must not be exceeded.

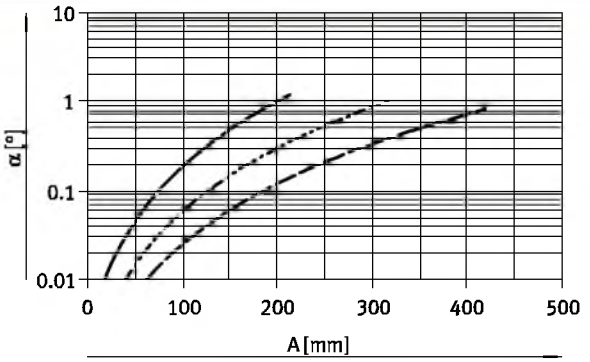
$$f_{lateral} = \frac{F_{lateral}}{F_{standard}} \times f_{standard}$$

$F_{standard}$ = 10 N

A = Cantilever load of guide rod
$f_{lateral}$ = Deflection due to lateral force
$F_{lateral}$ = Lateral force
$F_{standard}$ = Standardised lateral force
$f_{standard}$ = Deflection due to standardised lateral force (value from graph)

Inclination α (due to torque) as a function of cantilever load A





EAGF-P1-KF-16
EAGF-P1-KF-25
EAGF-P1-KF-40

$$\alpha = \frac{M}{M_{standard}} \times \alpha_{standard}$$

$M_{standard}$ = 2 Nm
(valid for α ≤ 10°)

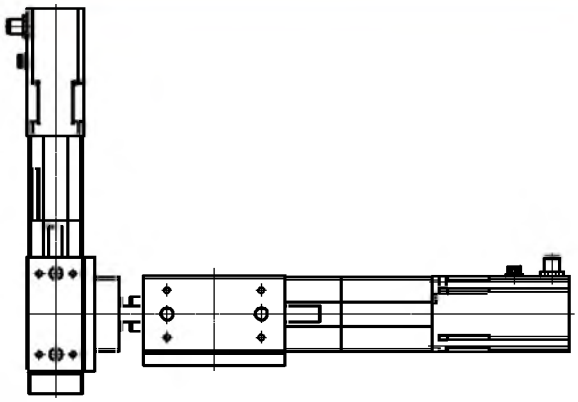
A = Cantilever load of guide rod
α = Inclination due to torque
M = Torque
$M_{standard}$ = Standardised torque
$\alpha_{standard}$ = Deflection due to standardised torque

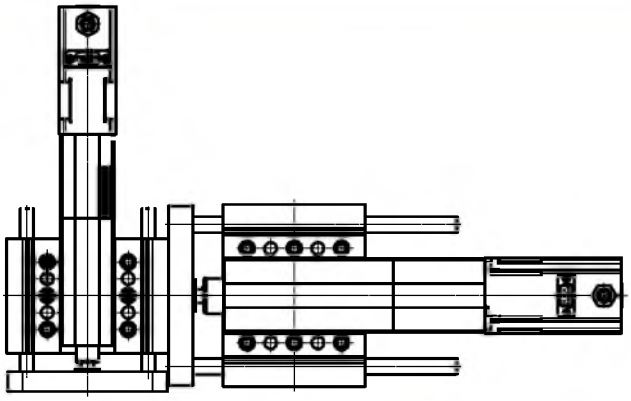
Guide units EAGF, for electric cylinders EPCO

Technical data

Possible combinations with other drives/axes via direct mounting

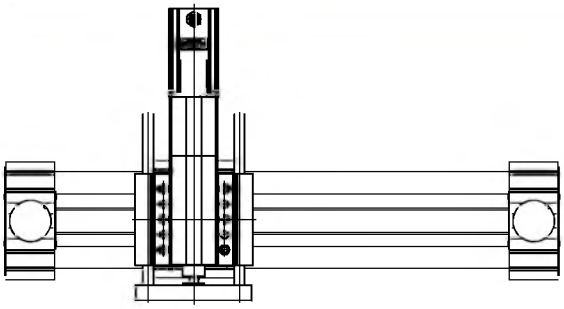
Guide unit EAGF with electric cylinder EPCO and guide unit EAGF





Size	Base axis	
	EAGF-P1-KF-25	EAGF-P1-KF-40
Assembly axis		
EAGF-P1-KF-16	■	–
EAGF-P1-KF-25	–	■

Toothed belt axis ELGR with electric cylinder EPCO and guide unit EAGF



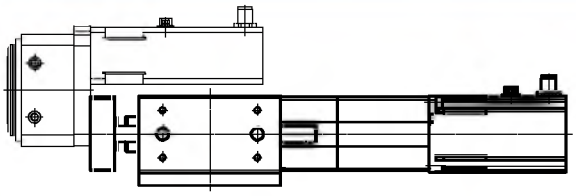
Size	Base axis		
	ELGR-TB-35	ELGR-TB-45	ELGR-TB-55
Assembly axis			
EAGF-P1-KF-16	■	–	–
EAGF-P1-KF-25	–	■	–
EAGF-P1-KF-40	–	–	■

Guide units EAGF, for electric cylinders EPCO

Technical data

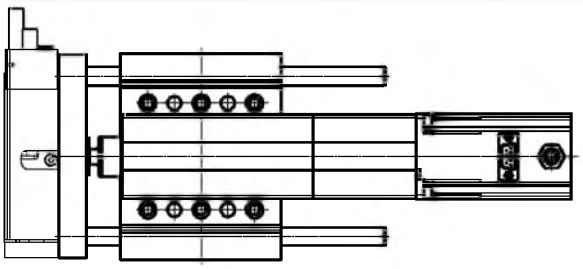
Possible combinations with other drives/axes via direct mounting

Rotary drive ERMO with electric cylinder EPCO and guide unit EAGF



Size	Base axis		
	EAGF-P1-KF-16	EAGF-P1-KF-25	EAGF-P1-KF-40
Assembly axis			
ERMO-12	■	–	–
ERMO-16	–	■	–
ERMO-25	–	–	■

Mini slide DGSL with electric cylinder EPCO and guide unit EAGF



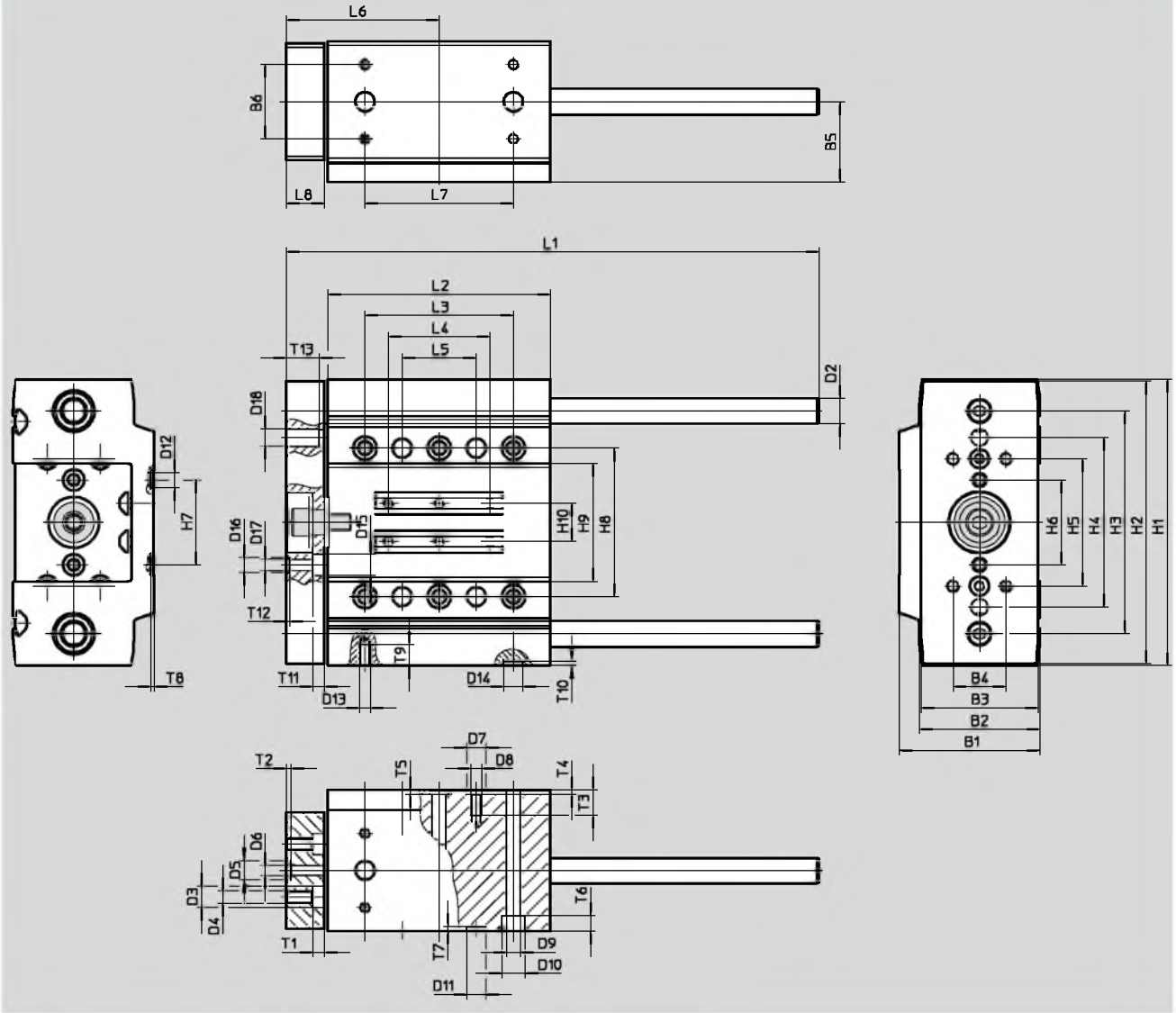
Size	Base axis		
	EAGF-P1-KF-16	EAGF-P1-KF-25	EAGF-P1-KF-40
Assembly axis			
DGSL-8-40[1)]	■	–	–
DGSL-10-30[1)]	–	■	–
DGSL-12-40[1)]	–	–	■

1) Minimal stroke

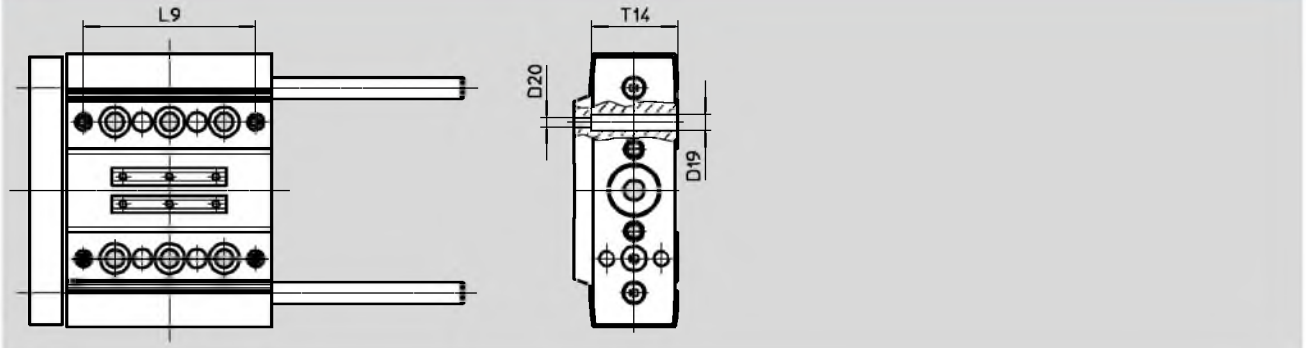
Guide units EAGF, for electric cylinders EPCO

Technical data

Dimensions



Size 16



o New

Guide units EAGF, for electric cylinders EPCO

Technical data

Size	B1	B2	B3	B4 ±0.05	B5	B6 ±0.05	D2 ∅ h7	D3 ∅	D4 ∅	D5 ∅ H8	D6	D7 ∅ H8
16	38	32	30	20	22	20	8	–	M6	9	M4	9
25	50	42	40	20	29	25	10	10	M6	9	M4	9
40	66.5	57	55	25	38	35	12	10	M6	9	M5	9

Size	D8	D9 ∅	D10 ∅	D11 ∅ H8	D12 ∅ H8	D13	D14 ∅ H8	D15 ∅	D16 ∅ H8	D17 ∅	D18 ∅ H7	D19 ∅
16	M5	6.6	11	7	7	M5	9	8	7	5^{H7}	–	6
25	M5	6.6	11	9	7	M5	9	10	7	5.5	5	–
40	M5	6.6	11	9	7	M5	9	10	7	5.5	8	–

Size	D20 ∅	H1	H2	H3	H4 ±0.05	H5 ±0.05	H6 ±0.05	H7 ±0.05	H8 ±0.05	H9	H10
16	3.4	100	98	75	–	50	30	30	50	30.7	10
25	–	120	118	90	70	50	33	40	60	40.7	14
40	–	135	133	105	80	60	40	40	70	55.7	18

Size	L1	L2	L3 ±0.05	L4	L5 ±0.05	L6	L7 ±0.05	L8	L9 ±0.1	T1	T2 +0.1
16	109 + stroke	75	40	34	20	51	50	12	63	–	2.1
25	124 + stroke	85	50	40	25	59	60	15	–	5.5	2.1
40	151 + stroke	105	70	48	35	72	70	18	–	5.5	2.1

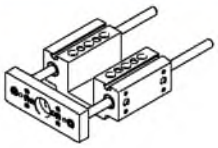
Size	T3	T4 +0.1	T5 +0.1	T6	T7 +0.1	T8 +0.1	T9	T10 +0.1	T11	T12 +0.1	T13 ±1	T14
16	15.5	2.1	2.1	6.5	1.6	1.6	$8.5_{-0.5}$	2.1	4.4	1.6	–	31.5
25	14	2.1	2.1	6.4	2.1	1.6	Min. 10	2.1	5.7	1.6	12.5	–
40	12	2.1	2.1	7.3	2.1	1.6	Min. 10	2.1	5.5	1.6	15.5	–

o New

Guide units EAGF, for electric cylinders EPCO

Technical data

Ordering data

Guide unit	Size	Stroke [mm]	Part No.	Type
	16	50	**3192932**	**EAGF-P1-KF-16-50**
		100	**3192934**	**EAGF-P1-KF-16-100**
		150	**3192936**	**EAGF-P1-KF-16-150**
		200	**3192938**	**EAGF-P1-KF-16-200**
		75, 125, 175	**3192939**	**EAGF-P1-KF-16-**
	25	50	**3192943**	**EAGF-P1-KF-25-50**
		100	**3192945**	**EAGF-P1-KF-25-100**
		150	**3192947**	**EAGF-P1-KF-25-150**
		200	**3192949**	**EAGF-P1-KF-25-200**
		300	**3192951**	**EAGF-P1-KF-25-300**
		75, 125, 175, 250	**3192952**	**EAGF-P1-KF-25-**
	40	50	**3192955**	**EAGF-P1-KF-40-50**
		100	**3192957**	**EAGF-P1-KF-40-100**
		150	**3192959**	**EAGF-P1-KF-40-150**
		200	**3192961**	**EAGF-P1-KF-40-200**
		300	**3192963**	**EAGF-P1-KF-40-300**
		75, 125, 175, 250 350, 400	**3192966**	**EAGF-P1-KF-40-**

Accessories

Ordering data

	For size	Description	Part No.	Type	PU[1]
Centring sleeve					
	16, 25, 40	For centring the drive or attachments	**186717**	**ZBH-7**	10
			150927	**ZBH-9**	
Connector sleeve					
	16	For centring the drive or attachments	**548805**	**ZBV-9-7**	10

1) Packaging unit