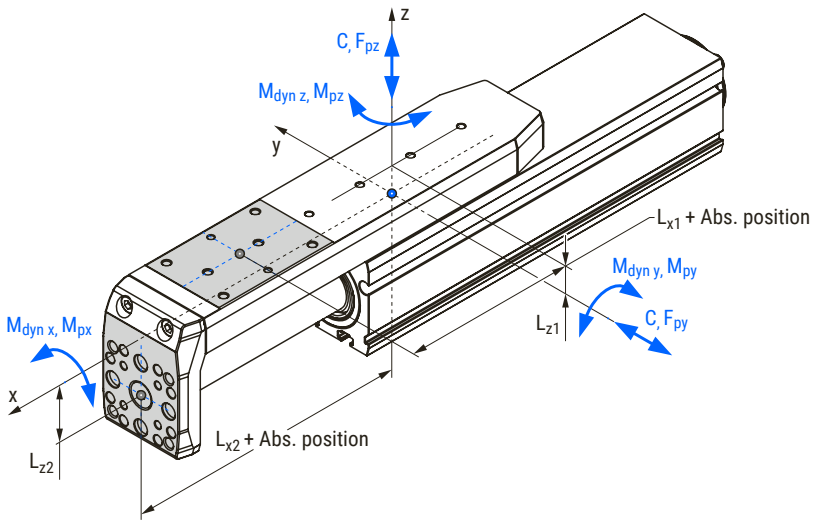
Service life
Linear guiding

Dynamic load capacity, dynamic moments and maximum permissible loads of the linear guiding system integrated into the mini electric slider refer to the centre of the linear guides.

The applied loading condition needs to be calculated, with respect to the centre of the linear guides. The presented attachment distances, measured from the centre of the linear guides, together with an absolute position of the slider must be taken into consideration.



Valid for mini electric slider MSCE.

Designation	Attachment distances			
	Slide		Front plate	
	L_{x1} [mm]	L_{z1} [mm]	L_{x2} [mm]	L_{z2} [mm]
MSCE 25	0,0	7,5	34,0	-16,5
MSCE 32	0,0	7,7	39,0	-21,3
MSCE 45	0,0	10,6	50,5	-27,4

Abs. position	Absolute position [mm]
C	Dynamic load capacity [N]
$M_{dyn\ x}$	Dynamic moment about the x axis [Nm]
$M_{dyn\ y}$	Dynamic moment about the y axis [Nm]
$M_{dyn\ z}$	Dynamic moment about the z axis [Nm]
F_{py}	Max. permissible force in the y direction [N]
F_{pz}	Max. permissible force in the z direction [N]
M_{px}	Max. permissible moment about the x axis [Nm]
M_{py}	Max. permissible moment about the y axis [Nm]
M_{pz}	Max. permissible moment about the z axis [Nm]

Permissible load

Permissible load factor $f_{p\,g}$

A permissible load factor of the linear guiding system $f_{p\,g}$ must never exceed the value of 1.

$$f_{p\,g} = \frac{|F_y|}{F_{py}} + \frac{|F_z|}{F_{pz}} + \frac{|M_x|}{M_{px}} + \frac{|M_y|}{M_{py}} + \frac{|M_z|}{M_{pz}} \leq 1$$

$f_{p\,g}$	Permissible load factor
F_y	Applied force in the y direction [N]
F_z	Applied force in the z direction [N]
M_x	Applied moment about the x axis [Nm]
M_y	Applied moment about the y axis [Nm]
M_z	Applied moment about the z axis [Nm]

Service life

Service life calculation

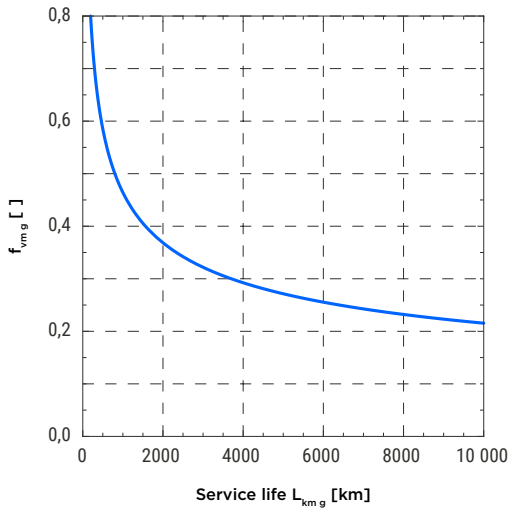
$$L_{km\,g} = \left(\frac{1}{f_{vm\,g}}\right)^3 \cdot 10^2$$

$L_{km\,g}$	Service life of the linear guiding system [km]
$f_{vm\,g}$	Mean load comparison factor

Mean load comparison factor $f_{vm\,g}$ as a function of service life $L_{km\,g}$

Diagram represents the theoretically determined service life of the linear guiding system when the mean load comparison factor fvm g is considered.

It should be noted that the application conditions may have a significant effect on the service life.

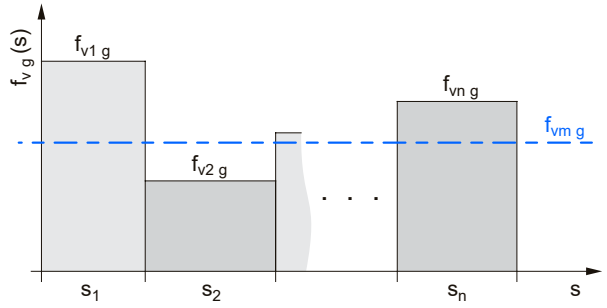


Mean load comparison factor $f_{vm\,g}$

$$f_{vm\,g} = \sqrt[3]{\frac{f_{v1\,g}{}^{3} \cdot s_1 + f_{v2\,g}{}^{3} \cdot s_2 + \cdots + f_{vn\,g}{}^{3} \cdot s_n}{s_1 + s_2 + \cdots + s_n}}$$

$f_{vi\,g}$	i-th load comparison factor of a given loading regime $f_{v\,g}$ (s), i ∈ {1, 2, ..., n}
s_i	i-th travel path of a given loading regime $f_{v\,g}$ (s), i ∈ {1, 2, ..., n}

Loading regime $f_{v\,g}$ (s)



Load comparison factor $f_{v\,g}$

$$f_{v\,g} = \frac{|F_y|}{C} + \frac{|F_z|}{C} + \frac{|M_x|}{M_{dyn\,x}} + \frac{|M_y|}{M_{dyn\,y}} + \frac{|M_z|}{M_{dyn\,z}}$$

$f_{v\,g}$	Load comparison factor

Mean dynamic safety factor $f_{sm\,g}$

The safety factor depends on the application and its requested safety. A minimum dynamic safety factor of 5,0 or more is recommended.

$$f_{sm\,g} = \frac{1}{f_{vm\,g}}$$

$f_{sm\,g}$	Mean dynamic safety factor

Ball screw drive

Valid for the mini electric cylinder MCE and the slider MSCE.

Permissible load

Permissible load factor $f_{p\,bs}$

A permissible load factor of the ball screw drive $f_{p\,bs}$ must never exceed the value of 1.

$$f_{p\,bs} = \frac{|F_x|}{F_{pa}} \leq 1$$

$f_{p\,bs}$	Permissible load factor
F_{pa}	Max. permissible axial load [N]
F_x	Applied force in the x direction [N]

Service life

Service life calculation

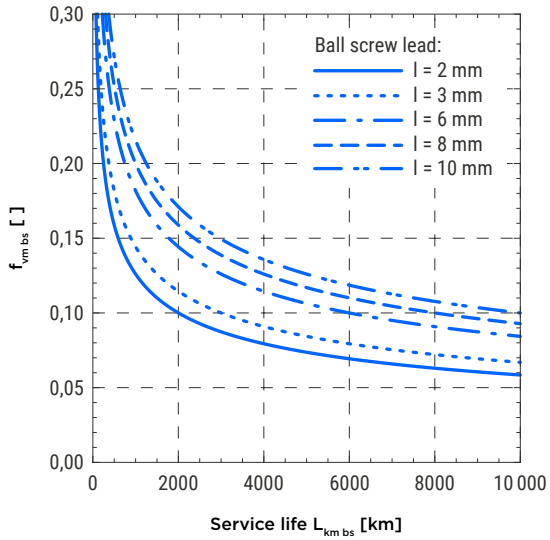
$$L_{km\,bs} = \left(\frac{1}{f_{vm\,bs}}\right)^3 \cdot l$$

$L_{km\,bs}$	Service life [km]
$f_{vm\,bs}$	Mean load comparison factor
l	Ball screw lead [mm]

Mean load comparison factor $f_{vm\,bs}$ as a function of service life $L_{km\,bs}$

Diagram represents the theoretically determined service life of the ball screw drive when the mean load comparison factor $f_{vm\,bs}$ is considered.

It should be noted that the application conditions may have a significant effect on the service life.

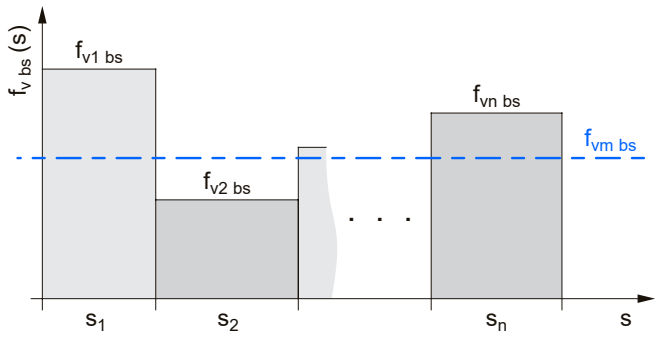


Mean load comparison factor $f_{vm\ bs}$

$$f_{vm\ bs} = \sqrt[3]{\frac{f_{v1\ bs}{}^3 \cdot s_1 + f_{v2\ bs}{}^3 \cdot s_2 + \cdots + f_{vn\ bs}{}^3 \cdot s_n}{s_1 + s_2 + \cdots + s_n}}$$

$f_{vi\ bs}$	i-th load comparison factor of a given loading regime $f_{v\ bs}$ (s), i ∈ {1, 2, ..., n}
s_i	i-th travel path of a given loading regime $f_{v\ bs}$ (s), i ∈ {1, 2, ..., n}

Loading regime $f_{v\ bs}$ (s)



Load comparison factor $f_{v\ bs}$

$$f_{v\ bs} = \frac{|F_x|}{C_a}$$

$f_{v\ bs}$	Load comparison factor
C_a	Dynamic axial load capacity [N]

Mean dynamic safety factor $f_{sm\ bs}$

The safety factor depends on the application and its requested safety. A minimum dynamic safety factor of 5,0 or more is recommended.

$$f_{sm\ bs} = \frac{1}{f_{vm\ bs}}$$

$f_{sm\ bs}$	Mean dynamic safety factor

Mini electric cylinder MCE

Service life of the mini electric cylinder is the calculated service life of the ball screw drive $L_{km\ bs}$.

$L_{km} = L_{km\ bs}$

L_{km}	Service life of the mini electric cylinder or slider [km]

Mini electric slider MSCE

Service life of the mini electric slider is the minimum value between the calculated service life of the linear guiding system $L_{km\ g}$ and the ball screw drive $L_{km\ bs}$.

$L_{km} = \text{Min}\ [L_{km\ g}, L_{km\ bs}]$

L_{km}	Service life of the mini electric cylinder or slider [km]