ROLLCO

TECHNICAL INFORMATION

MINI LINEAR UNITS
MGBS & MGTB

Index

Product overview

MGBS & MGTB are modular and cost-effective rod-less electromechanical linear drive units. They feature a high capacity and high precision linear guide system with either a precision ball screw (MGBS) or a timing belt transmission (MGTB) to convert a rotary input to linear motion and force.

Endurance

Our range of miniature units is designed to survive in the most intense automation situations, counting several million cycles over its lifetime. And this with practically no need for maintenance. High-quality components are used from inside and out, starting with a robust anodized aluminium extrusion as the base. Inside only first-rate bearings and ball screws are used.

Sustainability

Our miniature linear units have highly efficient mechanical solutions, and the size and form factor to easily replace a lot of functions traditionally driven by pneumatics. The faster and more frequent the motion is, the greater the potential energy saving. On a system level, pneumatic motion has a typical efficiency between 5 to 10 %. Electromechanical systems with low friction mechanics easily achieve over 50 % system efficiency.

Modularity

The MG series is a further extension of the MCE and MSCE miniature cylinder series, sharing the same outer shape and mounting hardware. The motor interfaces, in-line with a coupling or parallel over a belt drive, are the same for both MG and MCE/MSCE. To enable the best value and shortest delivery time, MG is batch produced and stocked in several standard stroke lengths.

Proven system performance with our stepper motor system

All our miniature drive units can be calculated and mechanically adapted for your preferred motor, given it is within suitable physical dimensions. But to save time and cost, our stepper motor system is an excellent choice. The performance of all combinations of linear miniature units and our motors is already calculated and validated.

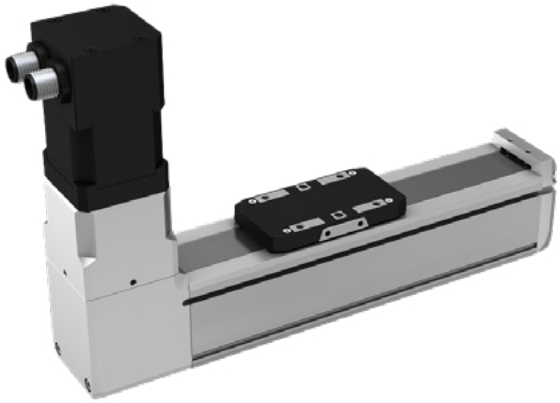
Characteristics

- Up to 1500 mm/s linear speed
- < 0.05 mm mechanical backlash
- < 0.03 mm uni-directional repeatability (MGBS, ball screw)
- < 0.16 mm uni-directional repeatability (MGTB, timing belt)
- 90 % typical mechanical efficiency
- Linear guided with ball-raced guiding
- In-line or parallel-mounted motor options
- Maintenance free
- Prepared for multi-axis arrangements.

Motor adapter VK with a coupling and a motor

MGBS

MGTB



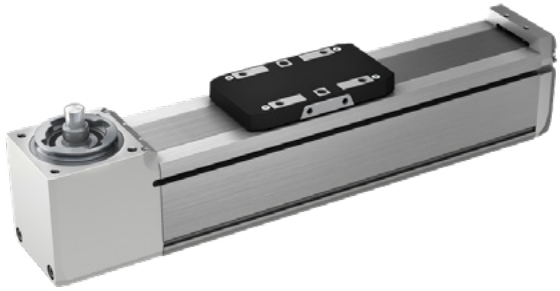
Motor side drive with timing a belt and a motor

MGBS

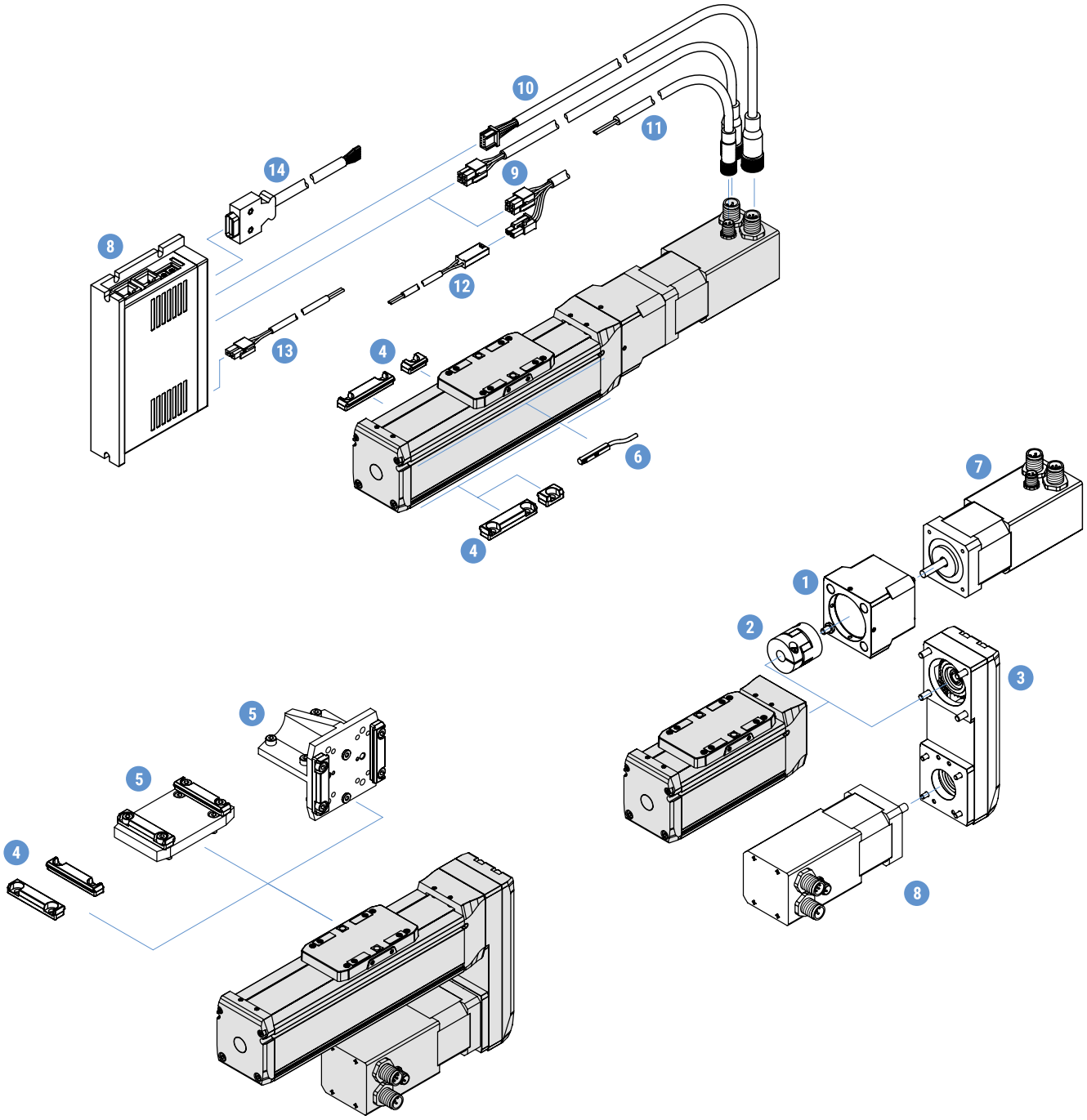
Without a preassambled motor

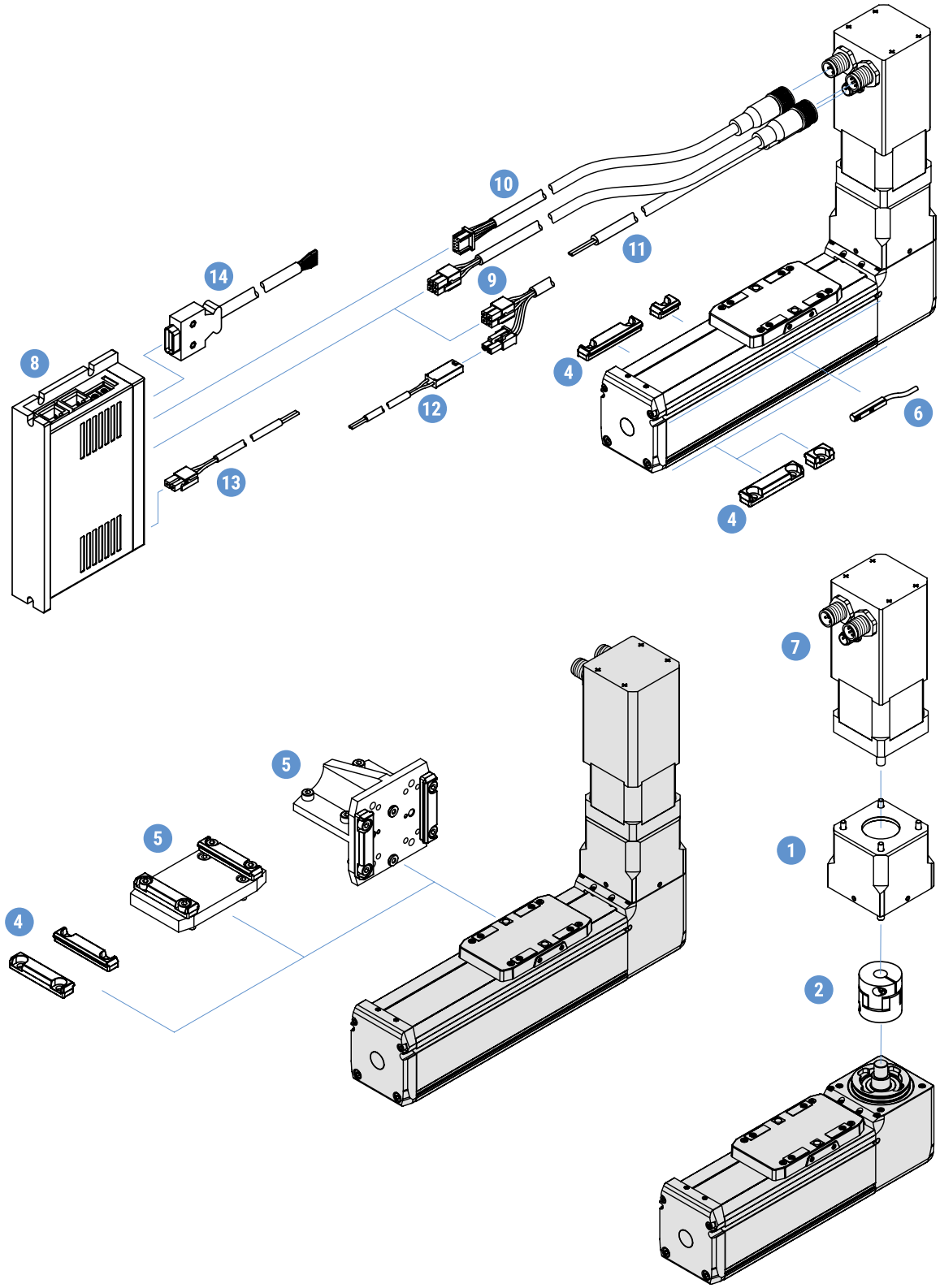
MGBS

MGTB



Accessory overview

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#	Accessories	Compatible with						Type
		MGBS 32	MGBS 45	MGBS 60	MGTB 32	MGTB 45	MGTB 60	
1	Motor adapter VK	•	•	•	•	•	•	Motor adapters
2	Coupling	•	•	•	•	•	•	Elastomer couplings
3	Motor side drive MSD	•	•	•				Motor side drives
4	Clamping fixture	•	•	•	•	•	•	Mounting attachment
5	Connection plate	•	•	•	•	•	•	
6	Magnetic field sensor	•	•	•	•	•	•	Limit switches
7	Motor	•	•	•	•	•	•	Motors
8	Drive	•	•	•	•	•	•	Drives
9	Motor cable	•	•	•	•	•	•	Cables
10	Encoder cable	•	•	•	•	•	•	
11	Brake cable	•	•	•	•	•	•	
12	Brake to terminal cable	•			•			
13	Power cable	•	•	•	•	•	•	
14	Signal cable	•	•	•	•	•	•	

For the stepper motor size of 28, the motor and brake cables are combined into one cable. For connectivity between the brake and terminal, an additional brake to terminal cable is used

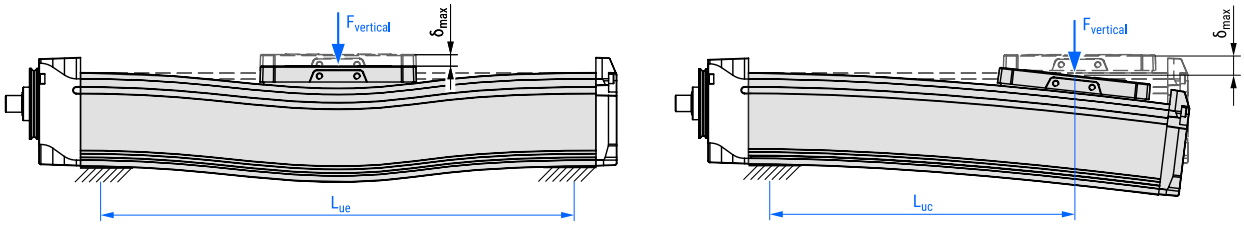
MGBS

Operating conditions

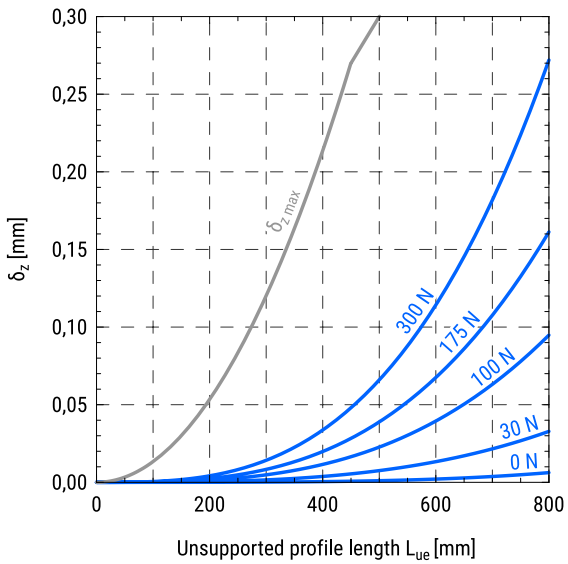
Ambient temperature	0 °C ~ +50 °C
Ambient temperature without a motor	0 °C ~ +60 °C
Protection class	IP40
Duty cycle	100 %
Maintenance	Life-time pre-lubricated

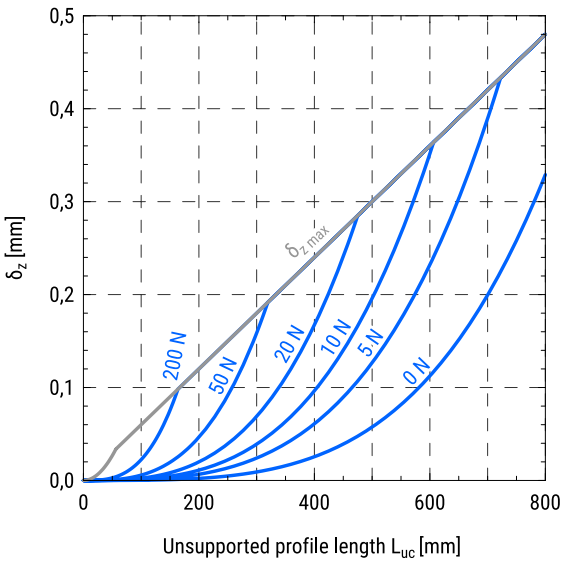
Deflection of the linear unit as a function of a vertical force and the unsupported profile length

In the following diagrams, the deflection of the linear unit as a function of a vertical force and unsupported profile length is presented. For the case of both ends of the profile are supported and for the case of a console mounting the left and the right diagrams below should be considered, respectively.

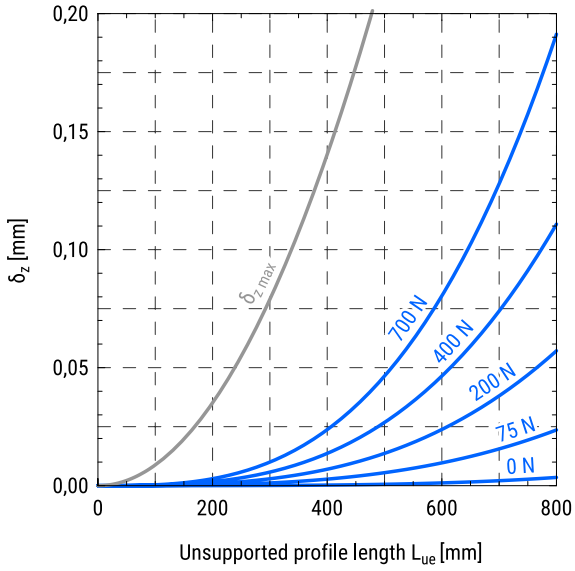


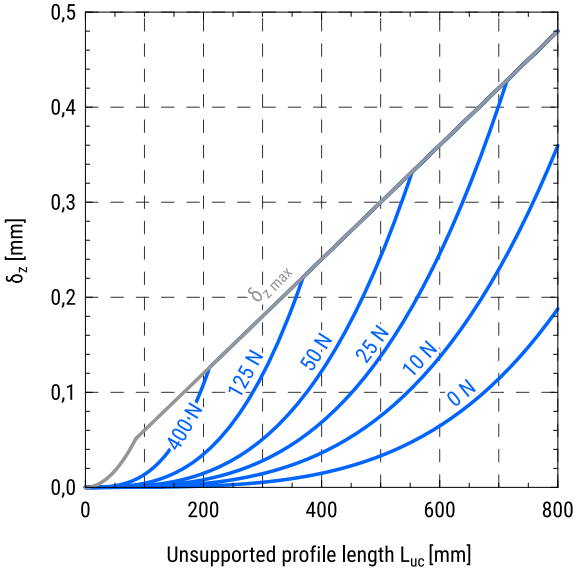
MGBS 32



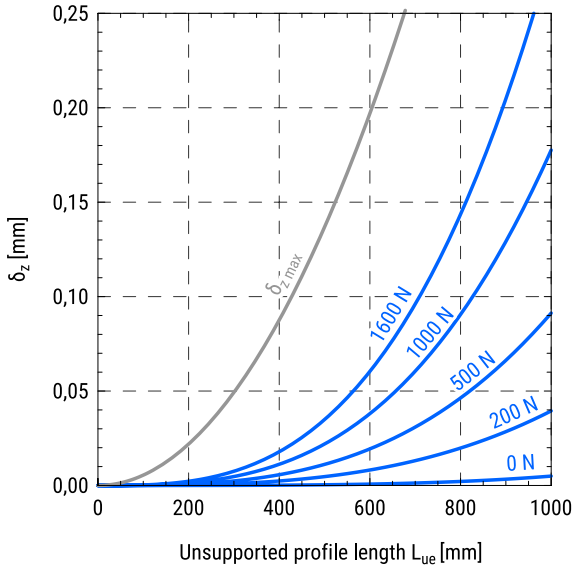


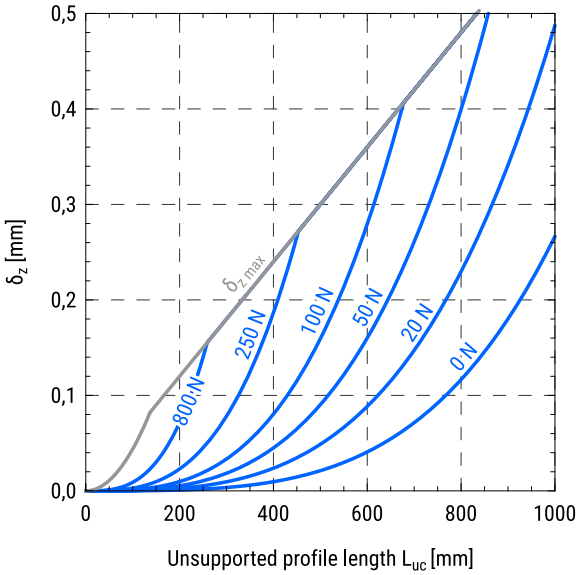
MGBS 45





MGBS 60



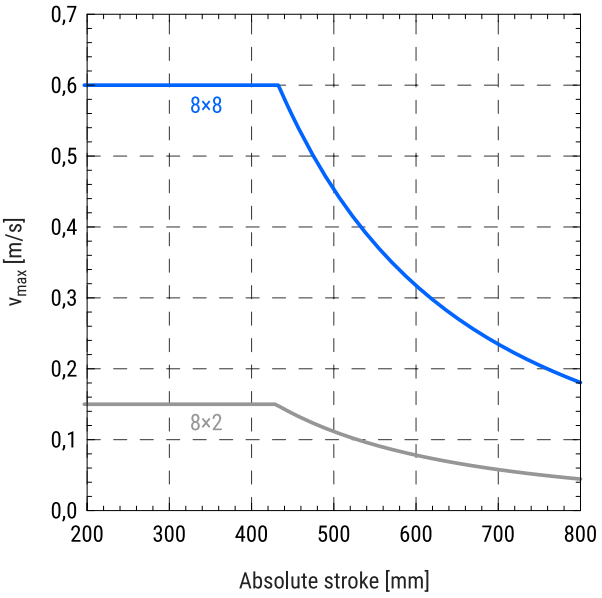


Maximum travel speed of the carriage as a function of the absolute stroke

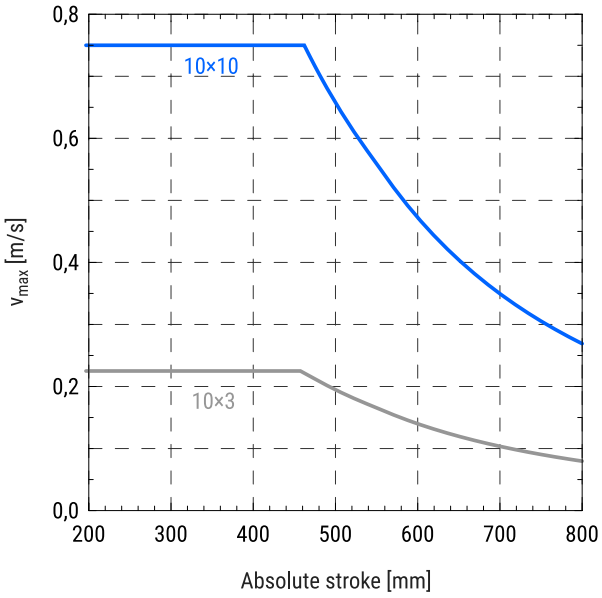
In the following diagrams, the maximum travel speed of the carriage as a function of absolute stroke for a different ball screw lead is presented.

Values on the curves represent a ball screw lead of the linear unit.

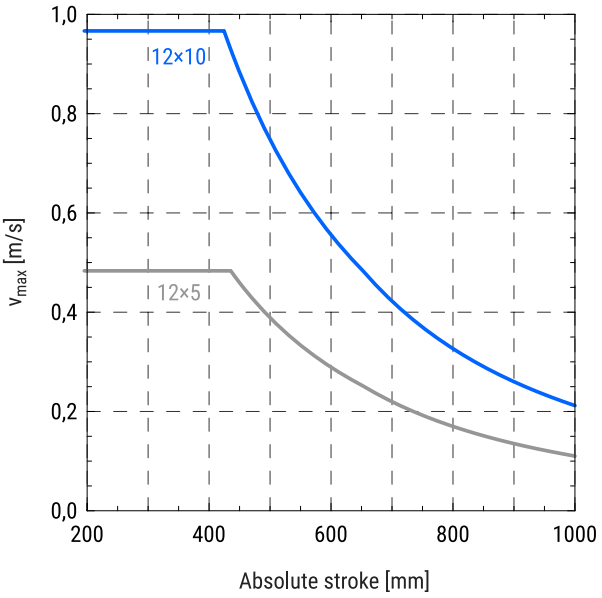
MGBS 32



MGBS 45



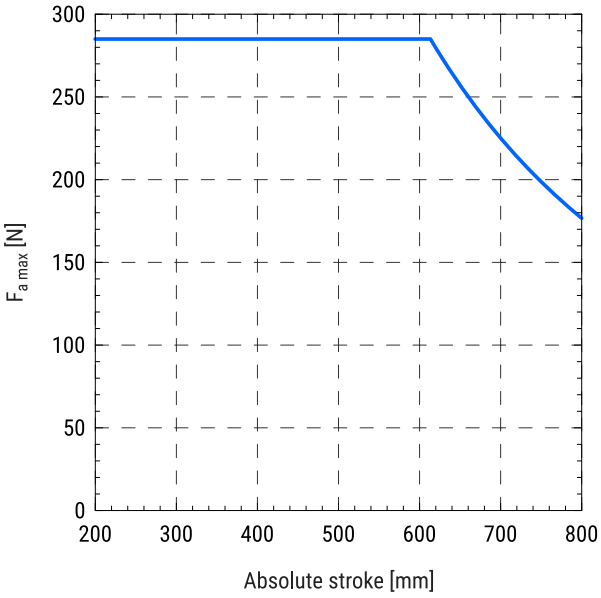
MGBS 60



Maximum axial load as a function of absolute stroke

In the following diagrams, the maximum axial load applied to the carriage of the linear unit as a function of absolute stroke is presented.

MGBS 32



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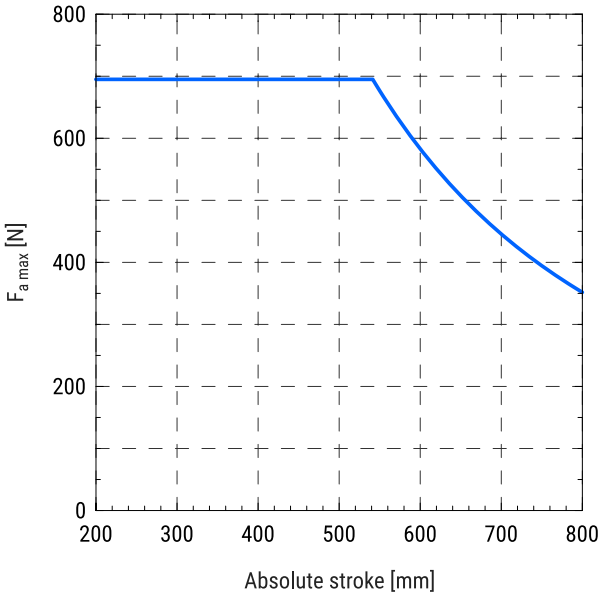

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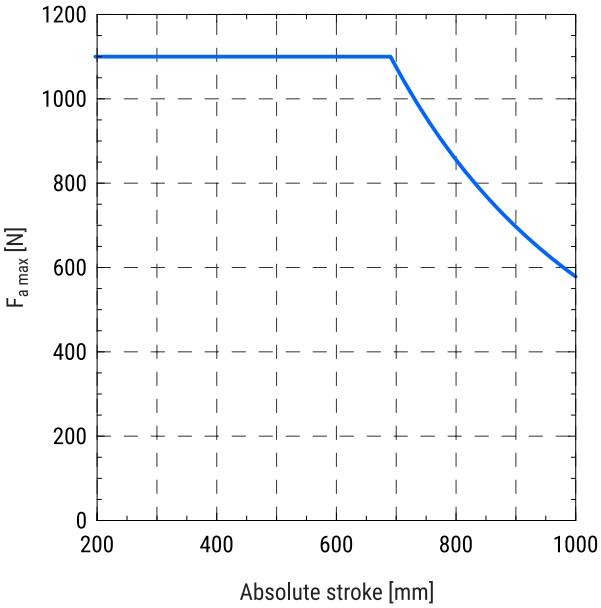
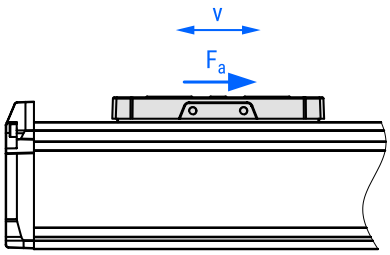


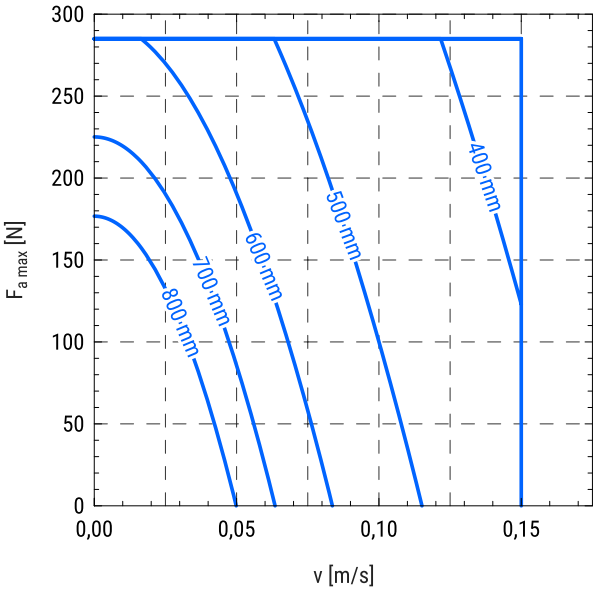
Maximum axial load as a function of the travel speed of the carriage

In the following diagrams, the maximum axial loads applied to the carriage as a function of travel speed for a different values of the absolute stroke are presented.

Values on the curves represent an absolute stroke of the linear unit.



MGBS 32



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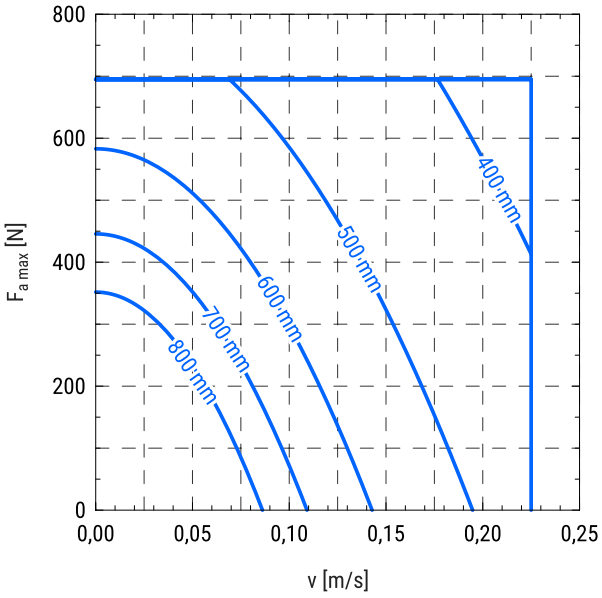
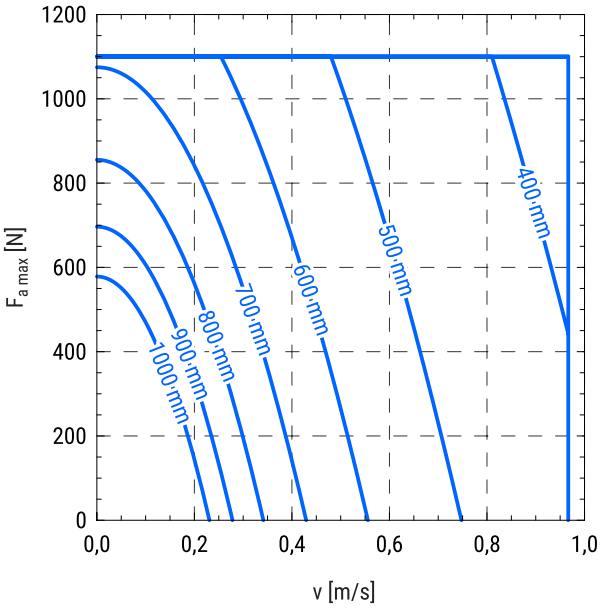


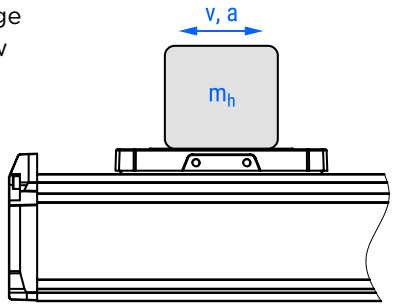
MGBS 60



Maximum horizontal payload as a function of the travel speed and acceleration of the carriage

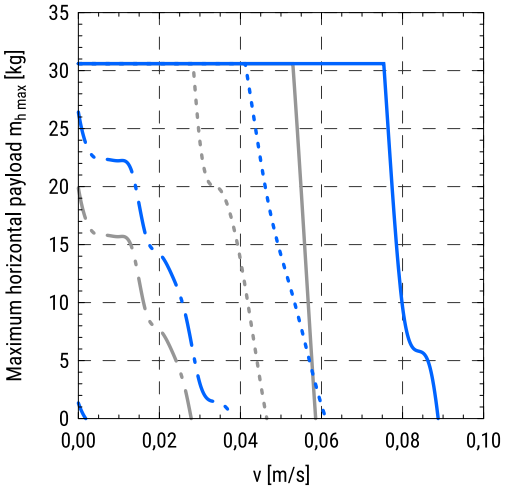
In the following diagrams, maximum horizontal payloads applied to the carriage as a function of the travel speed for different accelerations, different ball screw leads and different combinations of the standard motors are presented. Motor adapter VK and a motor side drive MSD are also considered.

The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm. Limitations regarding travel speed and axial loads in respect of absolute stroke are not considered and should be taken into account separately.

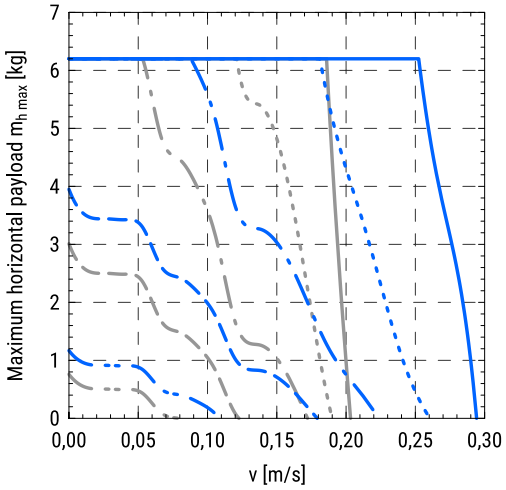


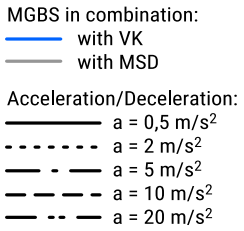
MGBS 32

8 × 2 with a stepper motor ☐28



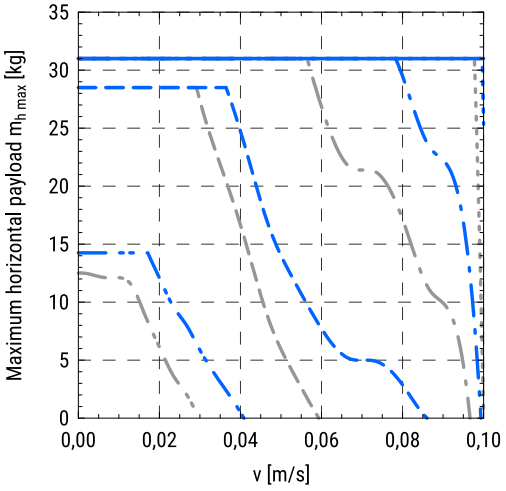
8 × 8 with a stepper motor ☐28



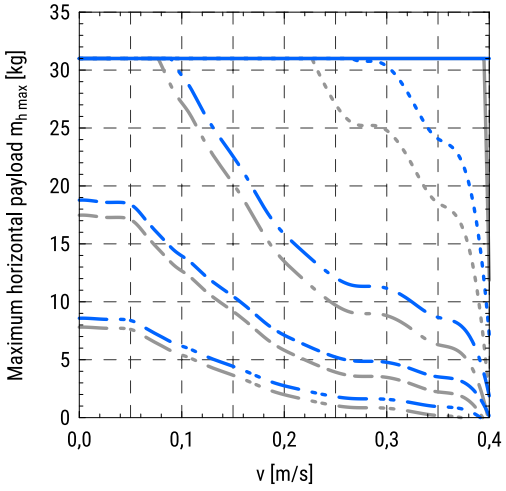


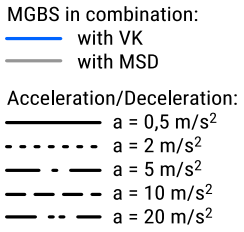
MGBS 32

8 × 2 with a stepper motor ☐42



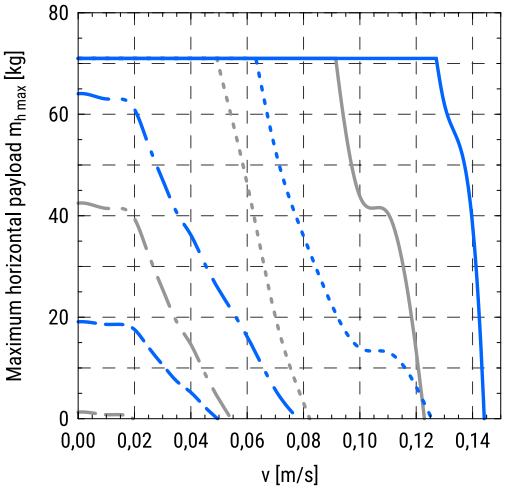
8 × 8 with a stepper motor ☐42



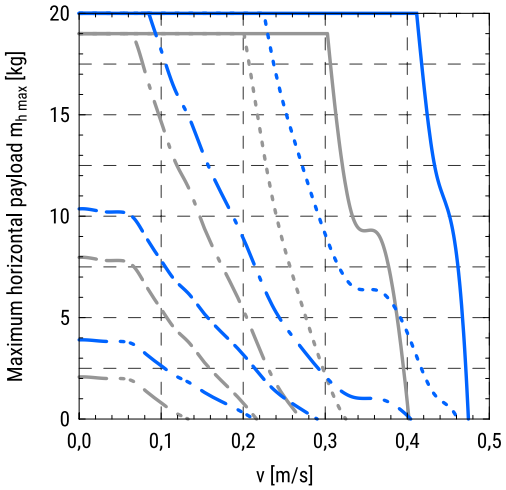


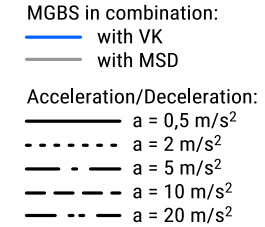
MGBS 45

10 × 3 with a stepper motor ☐42



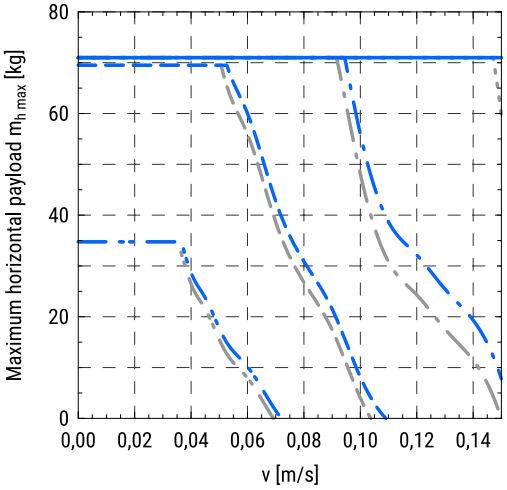
10 × 10 with a stepper motor ☐42



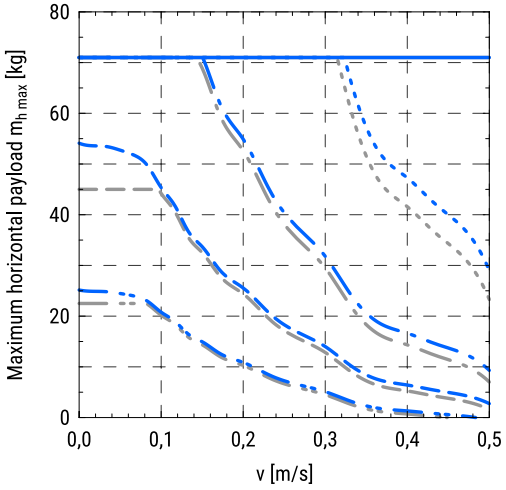


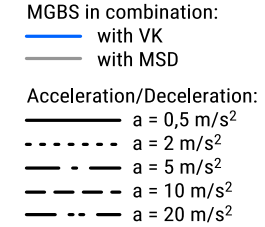
MGBS 45

10 × 3 with a stepper motor ☐56



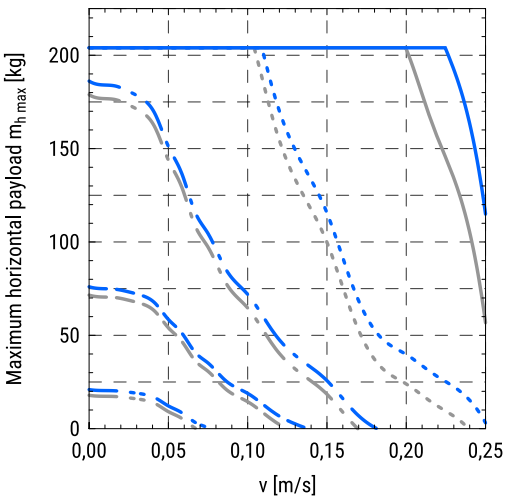
10 × 10 with a stepper motor ☐56



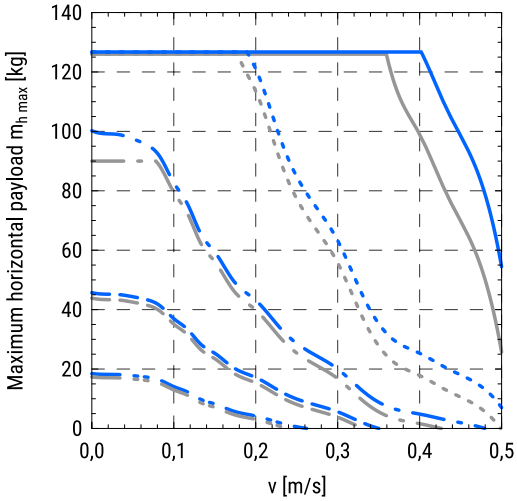


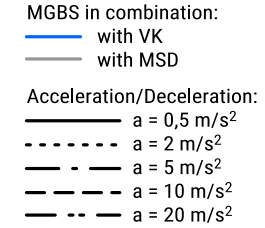
MGBS 60

12 × 5 with a stepper motor ☐56



12 × 10 with a stepper motor ☐56

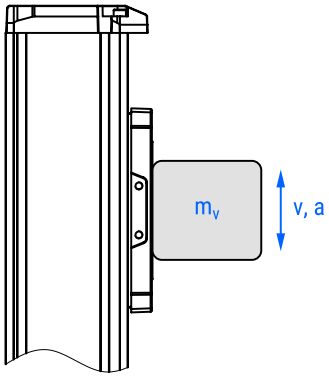




Maximum vertical payload as a function of the travel speed and acceleration of the carriage

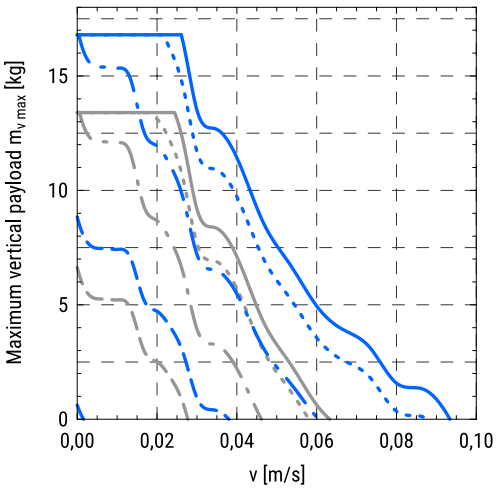
In the following diagrams, maximum vertical payloads applied to the carriage as a function of the travel speed for different accelerations, different ball screw leads and different combinations of the standard motors are presented. Motor adapter VK and a motor side drive MSD are also considered.

The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm. Limitations regarding travel speed and axial loads in respect of absolute stroke are not considered and should be taken into account separately.

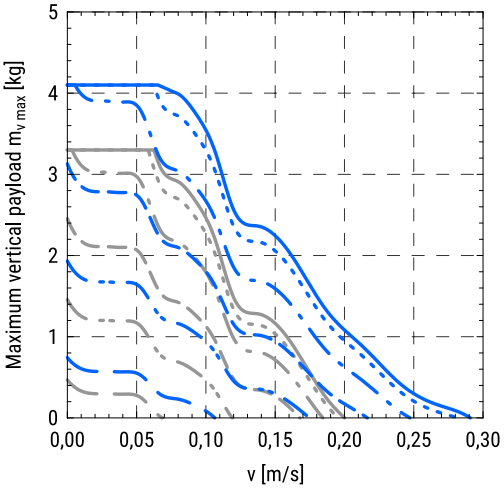


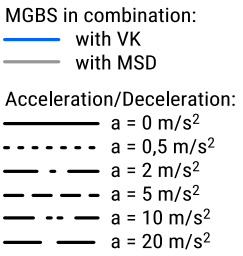
MGBS 32

8 × 2 with a stepper motor ☐28



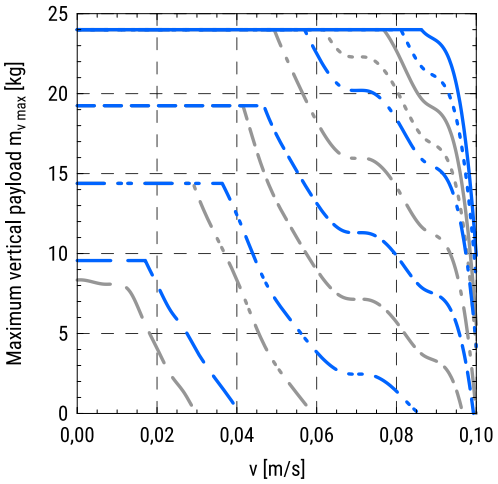
8 × 8 with a stepper motor ☐28



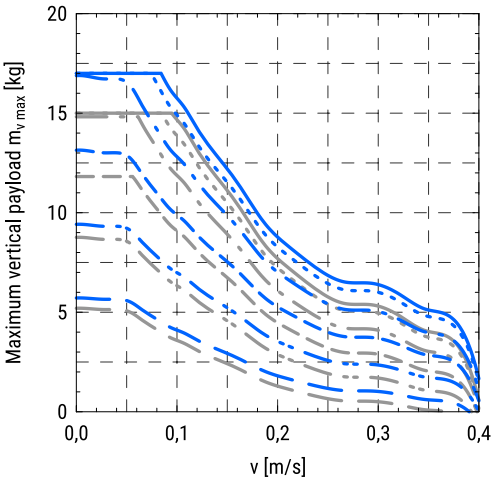


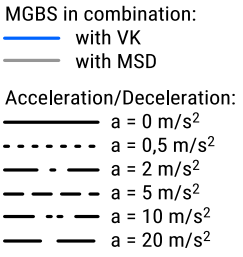
MGBS 32

8 × 2 with a stepper motor ☐42



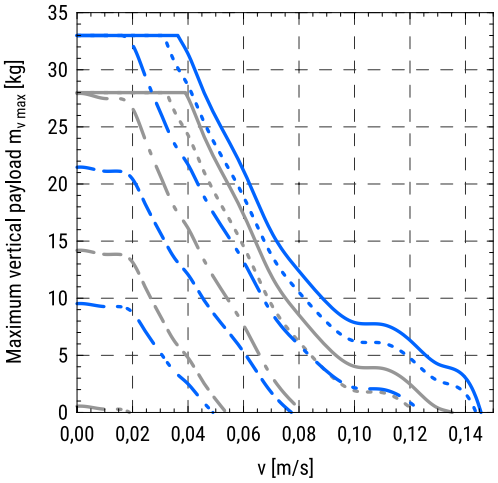
8 × 8 with a stepper motor ☐42



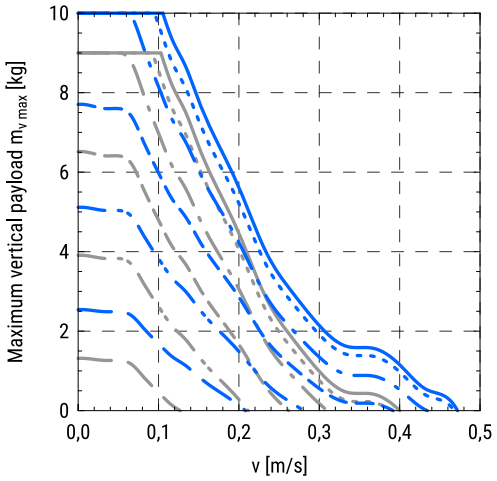


MGBS 45

10 × 3 with a stepper motor ☐42



10 × 10 with a stepper motor ☐42

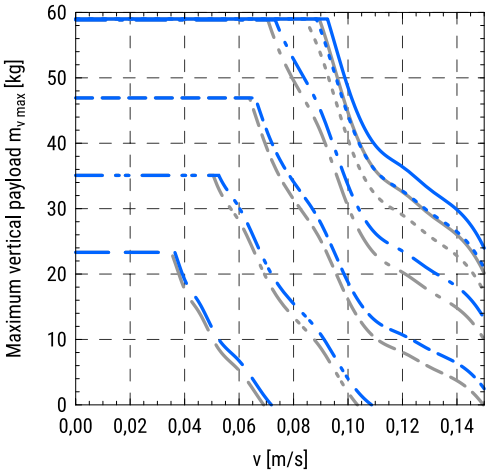


MGBS in combination:
- with VK
- with MSD

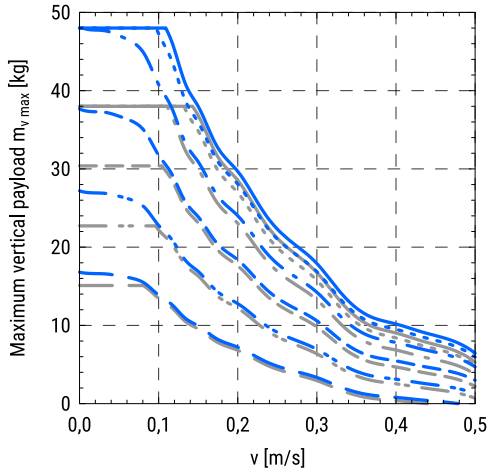
Acceleration/Deceleration:
- a = 0 m/s²
- a = 0,5 m/s²
- a = 2 m/s²
- a = 5 m/s²
- a = 10 m/s²
- a = 20 m/s²

MGBS 45

10 × 3 with a stepper motor ☐56



10 × 10 with a stepper motor ☐56

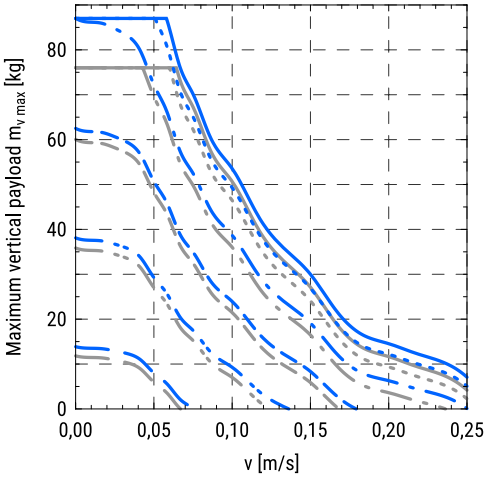


MGBS in combination:
- with VK
- with MSD

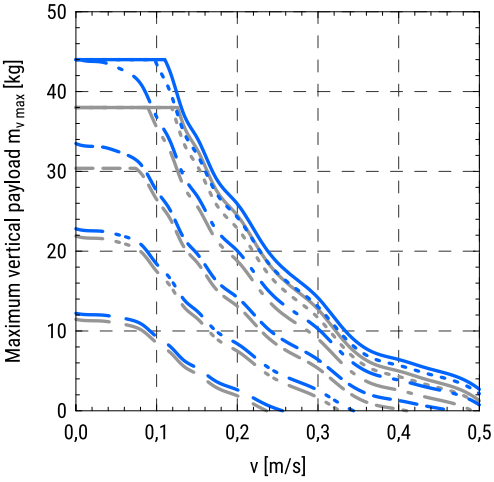
Acceleration/Deceleration:
- a = 0 m/s²
- a = 0,5 m/s²
- a = 2 m/s²
- a = 5 m/s²
- a = 10 m/s²
- a = 20 m/s²

MGBS 60

12 × 5 with a stepper motor ☐56



12 × 10 with a stepper motor ☐56



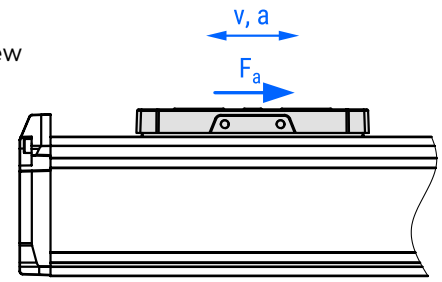
MGBS in combination:
- with VK
- with MSD

Acceleration/Deceleration:
- a = 0 m/s²
- a = 0,5 m/s²
- a = 2 m/s²
- a = 5 m/s²
- a = 10 m/s²
- a = 20 m/s²

Maximum axial load as a function of travel speed and acceleration of the carriage

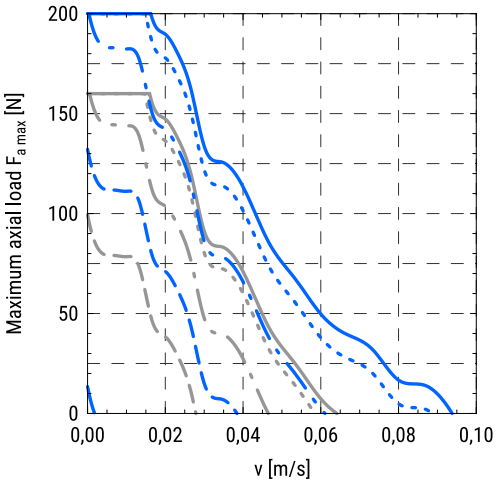
In the following diagrams, maximum axial load applied to the carriage as a function of the travel speed for different accelerations, different ball screw leads and different combinations of the standard motors is presented. Motor adapter VK and a motor side drive MSD are also considered.

The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm. Limitations regarding travel speed and axial loads in respect of absolute stroke are not considered and should be taken into account separately.

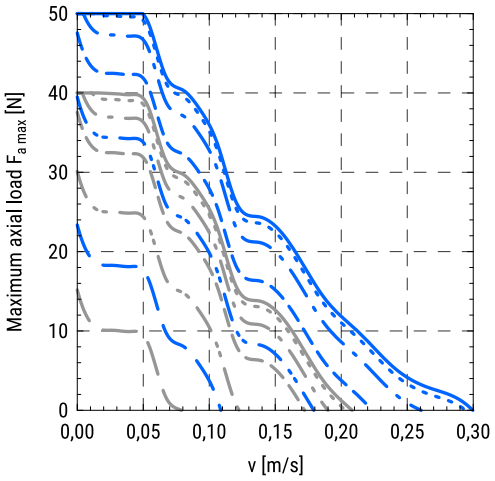


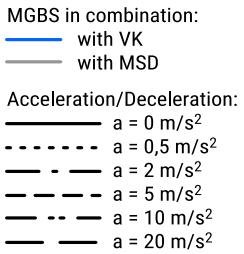
MGBS 32

8 × 2 with a stepper motor ☐28



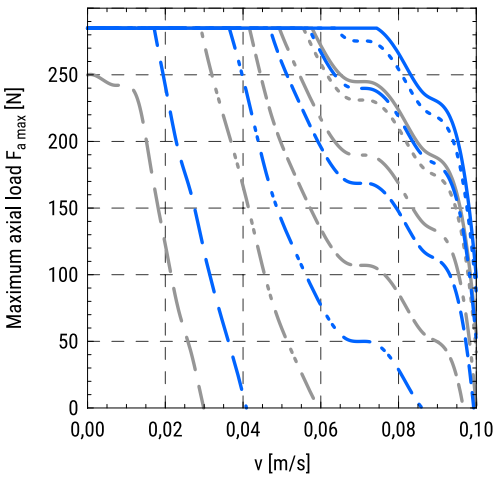
8 × 8 with a stepper motor ☐28



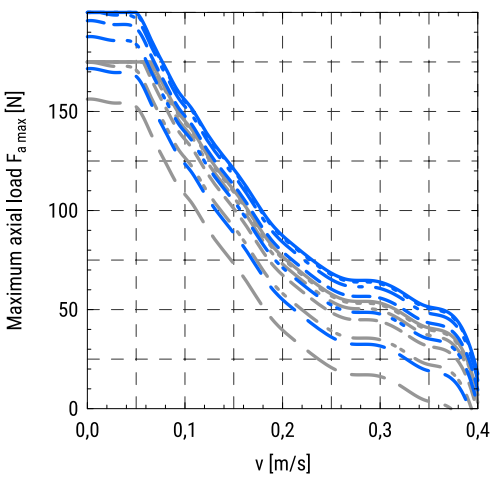


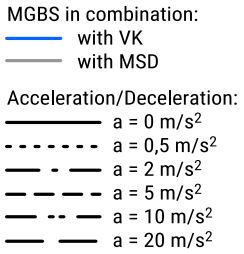
MGBS 32

8 × 2 with a stepper motor ☐42



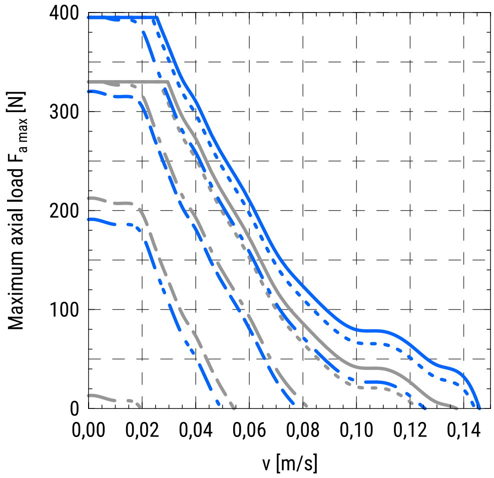
8 × 8 with a stepper motor ☐42



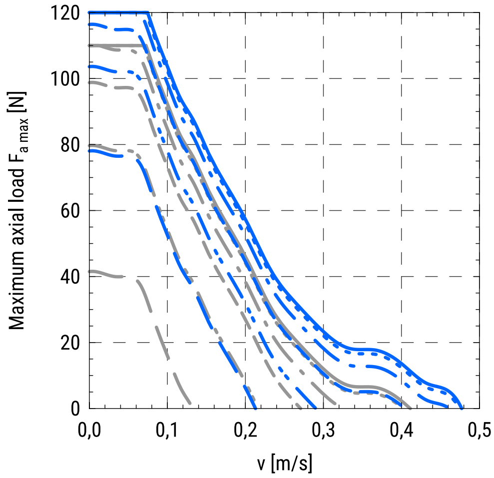


MGBS 45

10 × 3 with a stepper motor □42



10 × 10 with a stepper motor □42

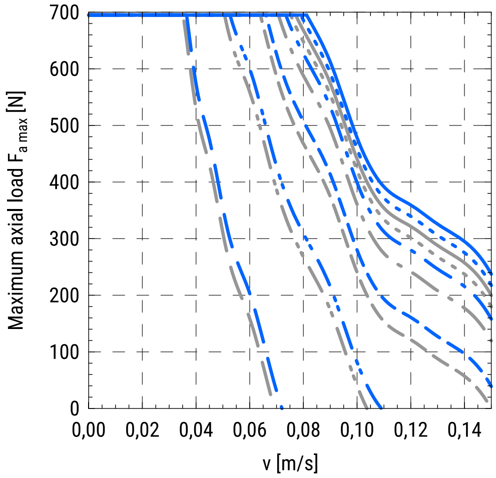


MGBS in combination:
- with VK
- with MSD

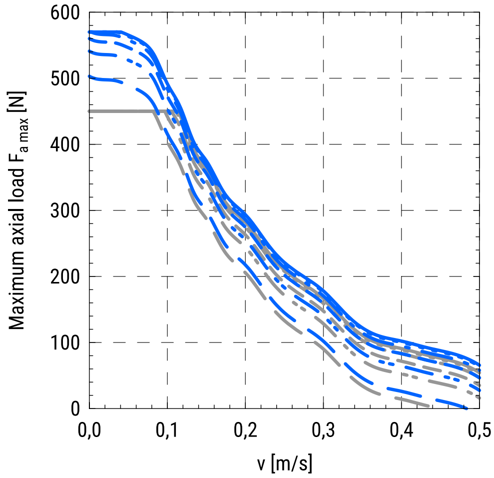
Acceleration/Deceleration:
- a = 0 m/s^2
- a = 0,5 m/s^2
- a = 2 m/s^2
- a = 5 m/s^2
- a = 10 m/s^2
- a = 20 m/s^2

MGBS 45

10 × 3 with a stepper motor □56



10 × 10 with a stepper motor □56

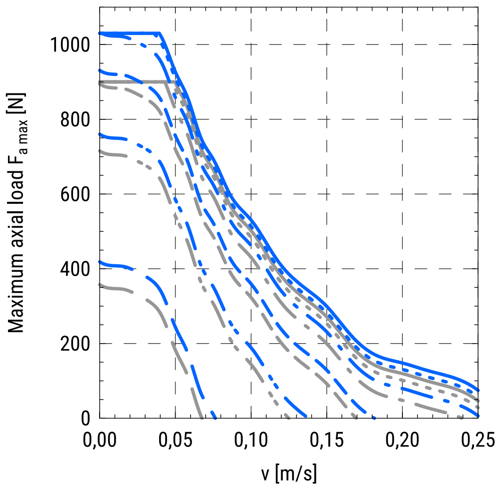


MGBS in combination:
- with VK
- with MSD

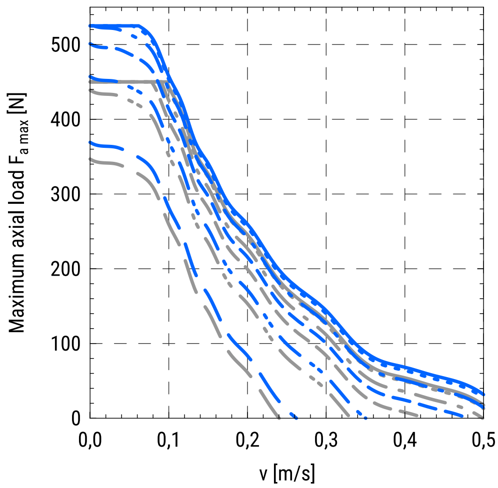
Acceleration/Deceleration:
- a = 0 m/s^2
- a = 0,5 m/s^2
- a = 2 m/s^2
- a = 5 m/s^2
- a = 10 m/s^2
- a = 20 m/s^2

MGBS 60

12 × 5 with a stepper motor □56



12 × 10 with a stepper motor □56

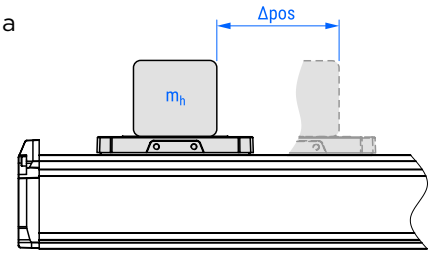


MGBS in combination:
- with VK
- with MSD

Acceleration/Deceleration:
- a = 0 m/s^2
- a = 0,5 m/s^2
- a = 2 m/s^2
- a = 5 m/s^2
- a = 10 m/s^2
- a = 20 m/s^2

Maximum horizontal payload as a function of position change and positioning time of the carriage

The following diagrams show the maximum payload that can be moved by a certain horizontal distance within a positioning time frame. Acceleration/deceleration time of 100 ms is taken into account.

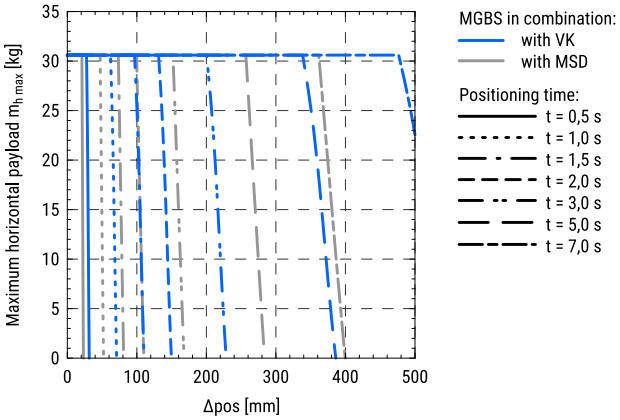


Diagrams depend on the ball screw leads and different combinations of the standard motors. Motor adapter VK and a motor side drive MSD are also considered

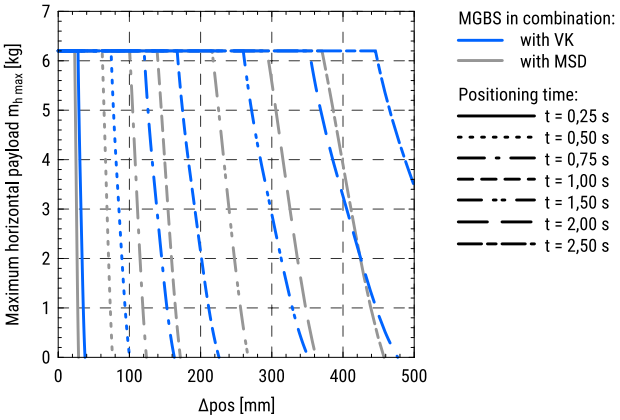
The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm. Limitations regarding travel speed and axial loads in respect of absolute stroke are not considered and should be taken into account separately.

MGBS 32

8 × 2 with a stepper motor ☐28

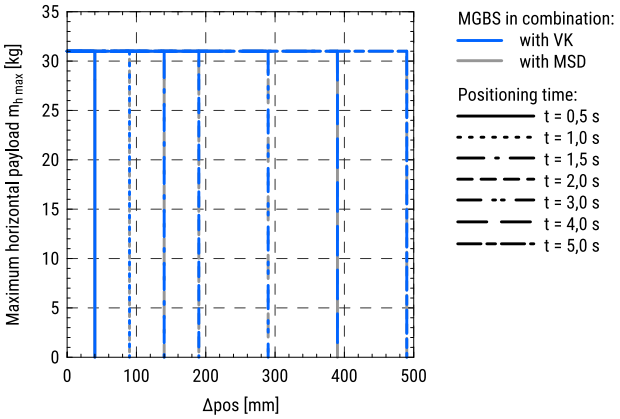


8 × 8 with a stepper motor ☐28

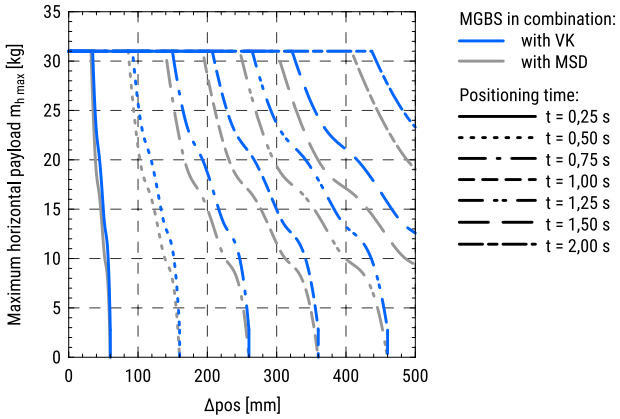


MGBS 32

8 × 2 with a stepper motor ☐42

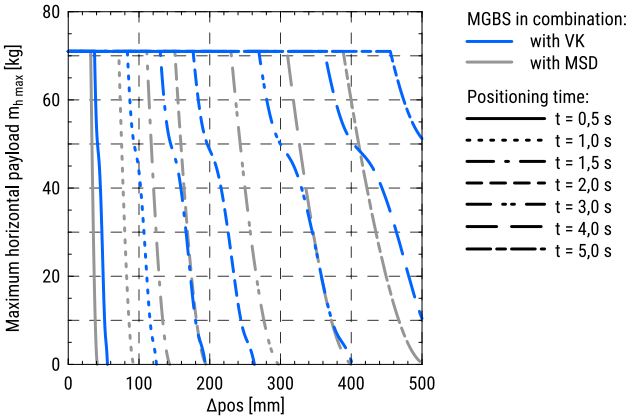


8 × 8 with a stepper motor ☐42

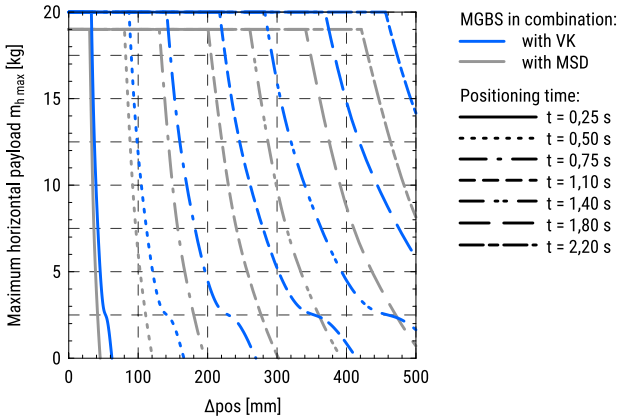


MGBS 45

10 × 3 with a stepper motor ☐42

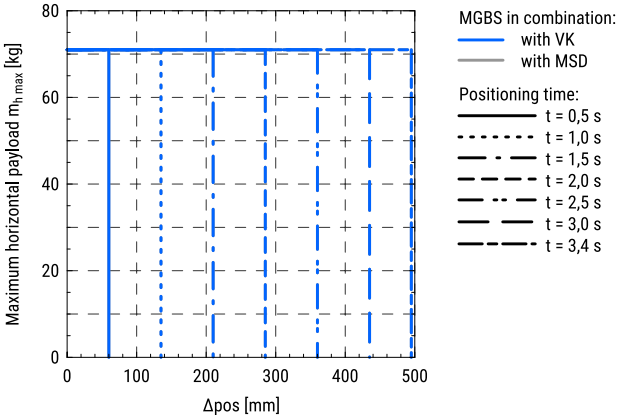


10 × 10 with a stepper motor ☐42

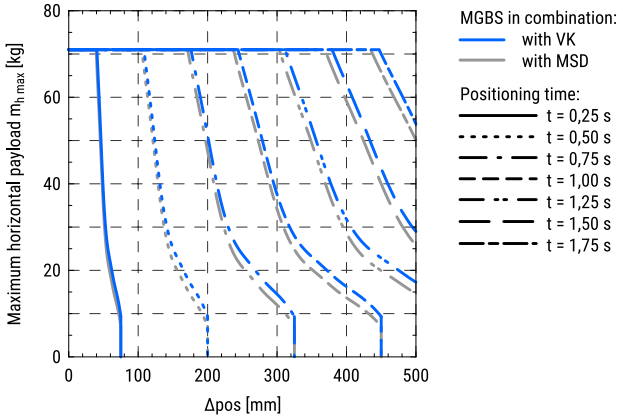


MGBS 45

10 × 3 with a stepper motor ☐56

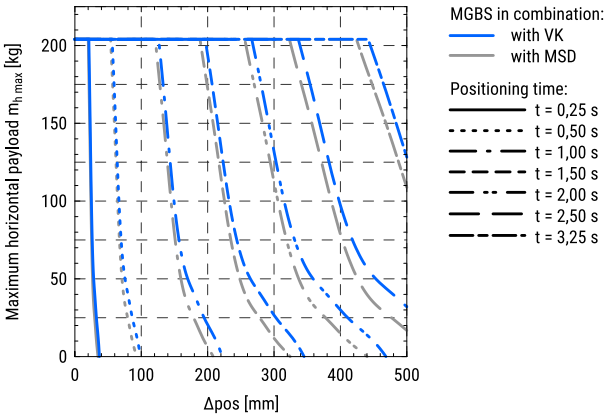


10 × 10 with a stepper motor ☐56

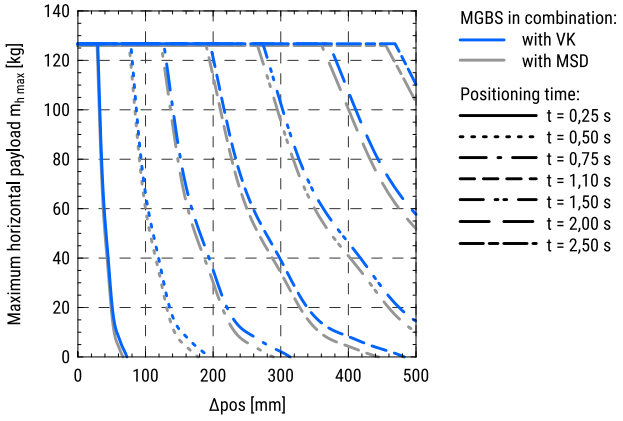


MGBS 60

12 × 5 with a stepper motor ☐56



12 × 10 with a stepper motor ☐56

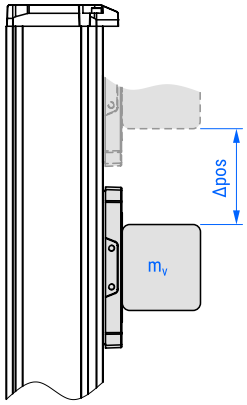


Maximum vertical payload as a function of position change and positioning time of the carriage

The following diagrams show the maximum payload that can be moved by a certain vertical distance in a positioning time frame. Acceleration/deceleration time of 100 ms is taken into account.

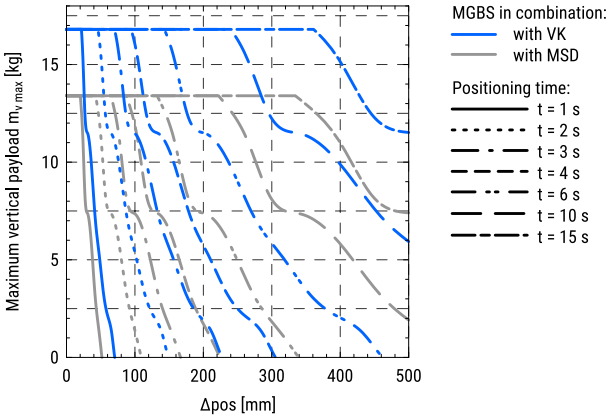
Diagrams depend on the ball screw leads and combinations of standard motors. Motor adapter VK and a motor side drive MSD are also considered.

The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm. Limitations regarding travel speed and axial loads in respect of absolute stroke are not considered and should be taken into account separately.

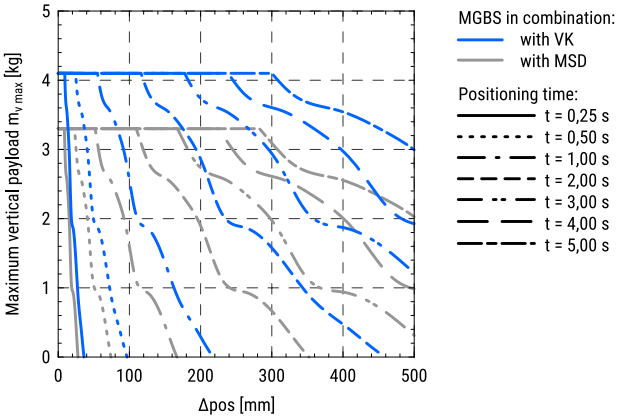


MGBS 32

8 × 2 with a stepper motor ☐28

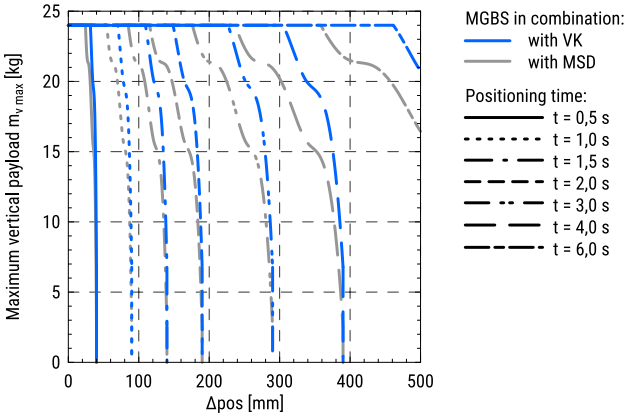


8 × 8 with a stepper motor ☐28

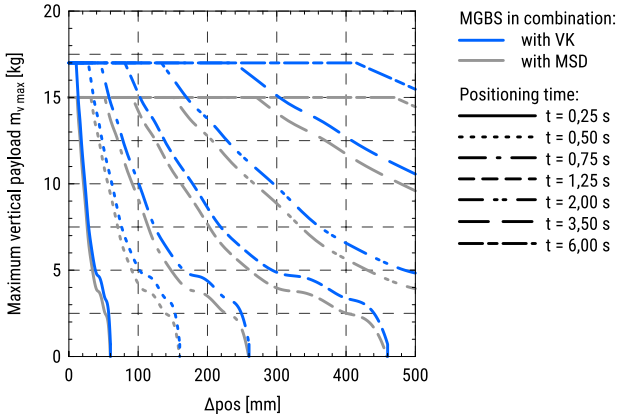


MGBS 32

8 × 2 with a stepper motor ☐42

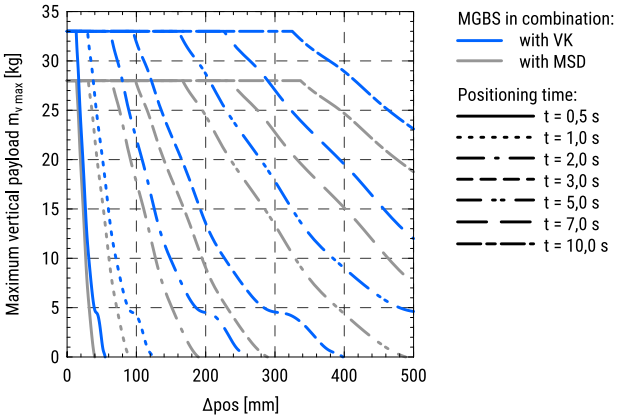


8 × 8 with a stepper motor ☐42

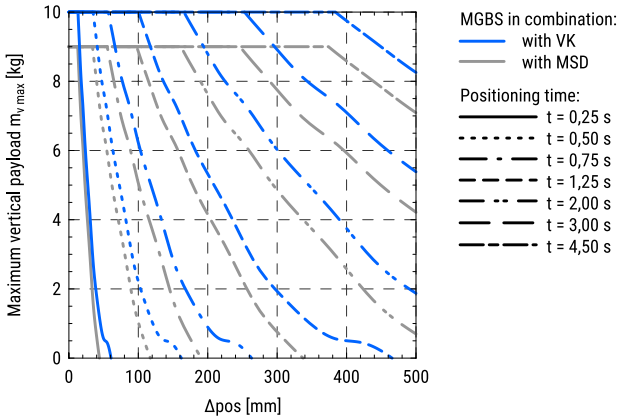


MGBS 45

10 × 3 with a stepper motor ☐42

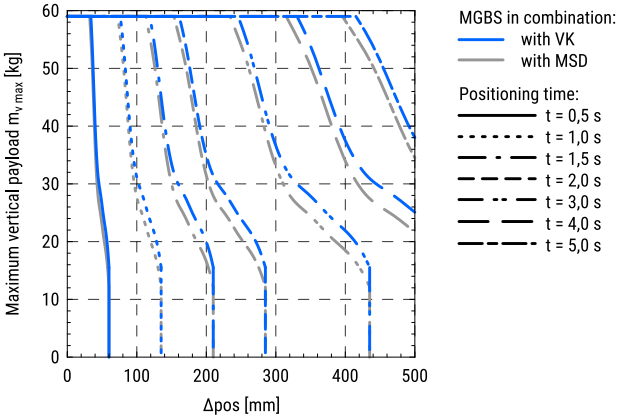


10 × 10 with a stepper motor ☐42

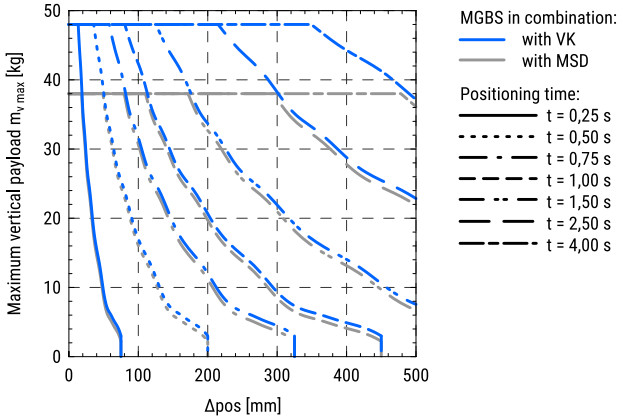


MGBS 45

10 × 3 with a stepper motor ☐56

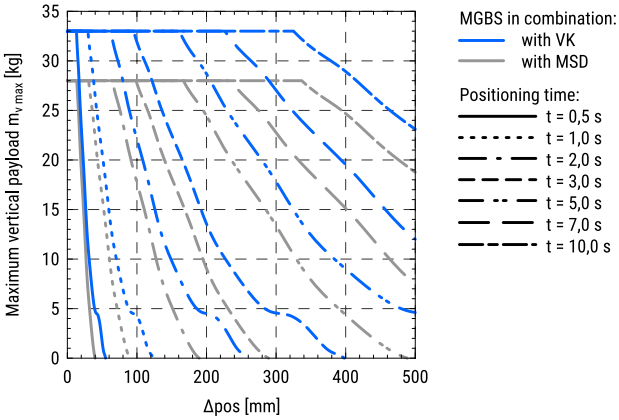


10 × 10 with a stepper motor ☐56

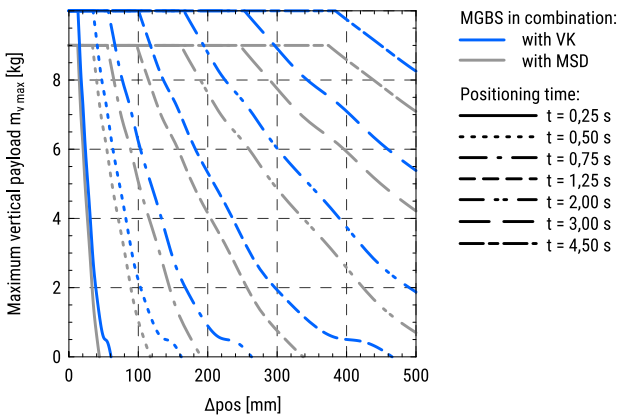


MGBS 60

12 × 5 with a stepper motor ☐56



12 × 10 with a stepper motor ☐56



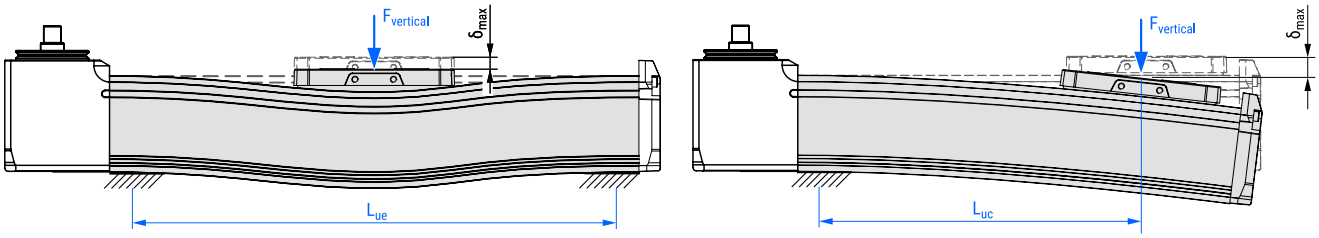
MGTB

Operating conditions

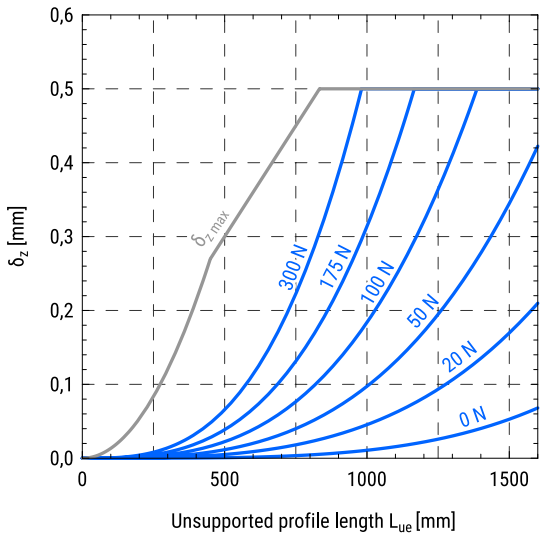
Ambient temperature	0 °C ~ +50 °C
Ambient temperature without a motor	0 °C ~ +60 °C
Protection class	IP40
Duty cycle	100 %
Maintenance	Life-time pre-lubricated

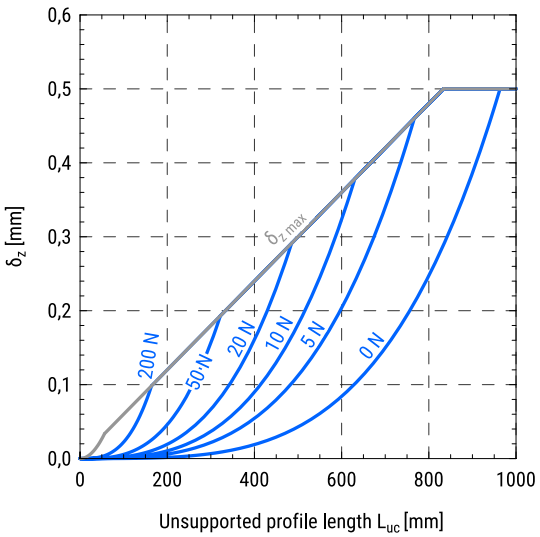
Deflection of the linear unit as a function of a vertical force and the unsupported profile length

In the following diagrams, the deflection of the linear unit as a function of a vertical force and unsupported profile length is presented. For the case of both ends of the profile are supported and for the case of a console mounting the left and the right diagrams below should be considered, respectively.

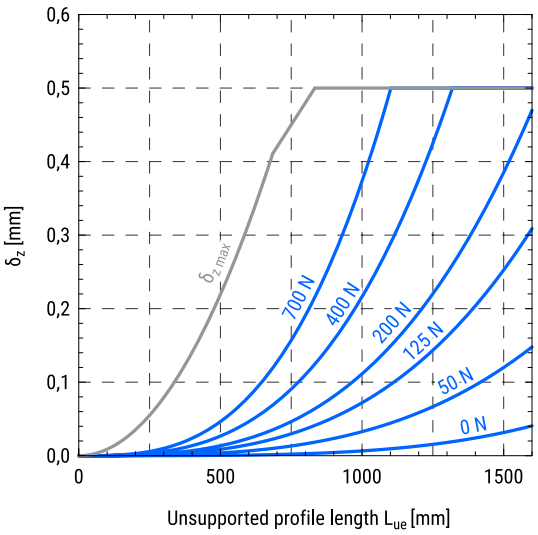


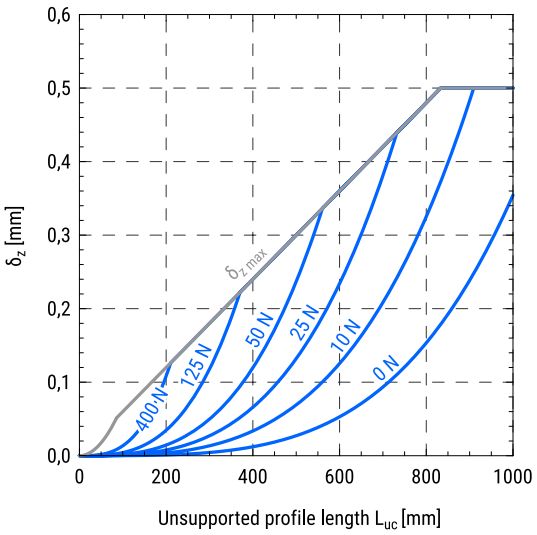
MGTB 32



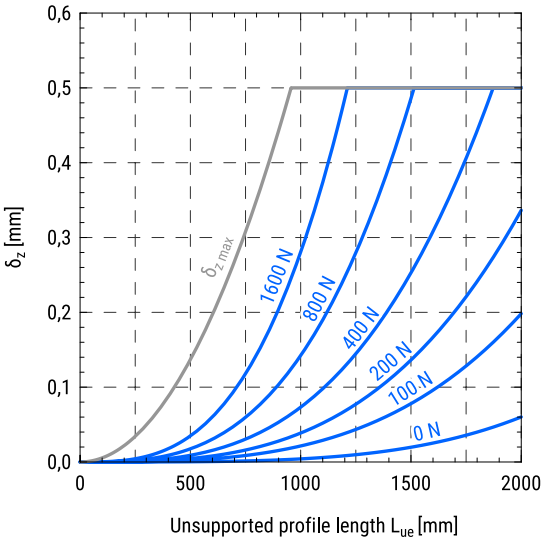


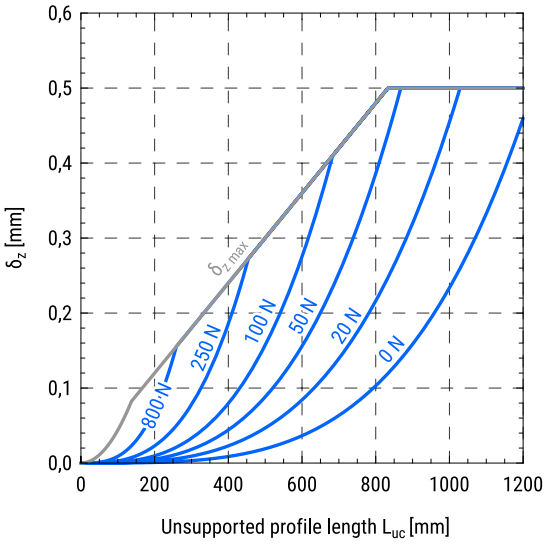
MGTB 45





MGTB 60

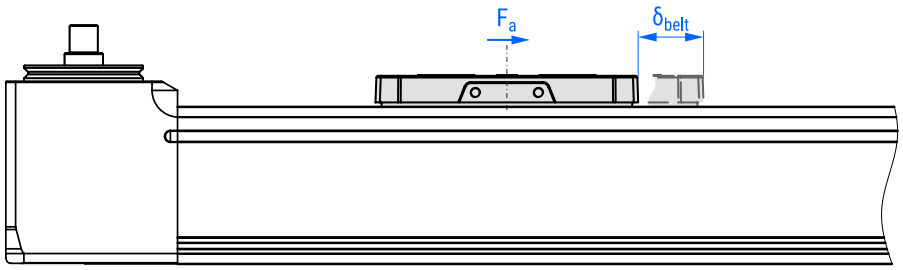


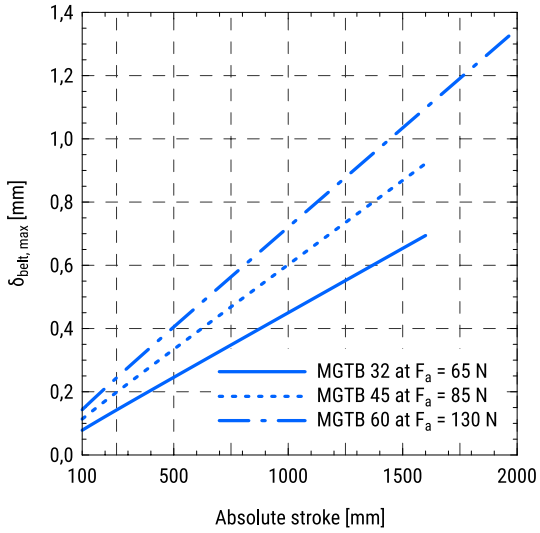


Deformation of the toothed belt under an axial load

In the following diagram, the maximal toothed belt elongation in respect of the absolute stroke and a given axial load is presented.

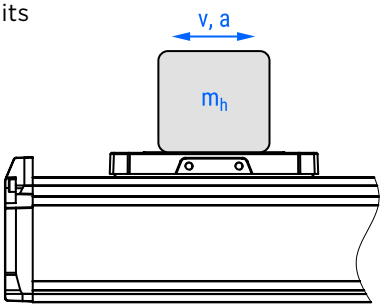
The maximum belt elongation $\delta_{belt, max}$ is proportionally changed in accordance with the ratio between the actual axial load F_a and the specific axial load given in the diagram for the particular size of the linear unit MGTB.





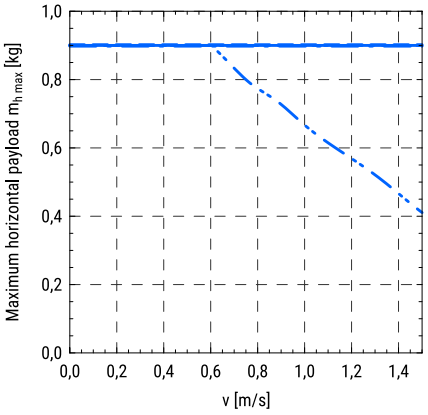
Maximum horizontal payload as a function of the travel speed and acceleration of the carriage

In the following diagrams, maximum horizontal payloads applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors are presented. Motor adapter VK is considered. The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.



MGTB 32

With a stepper motor ☐42

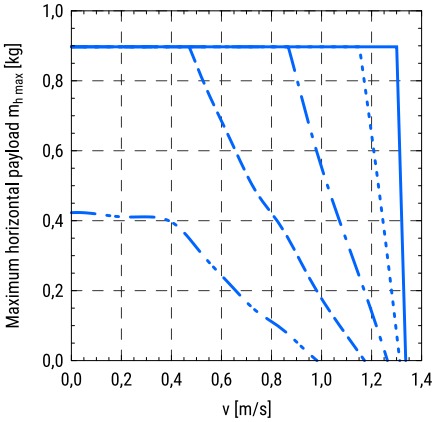


MGTB in combination:
with VK

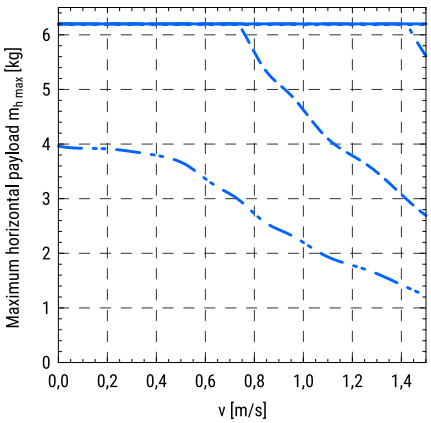
Acceleration/Deceleration:
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGTB 45

With a stepper motor ☐42



With a stepper motor ☐56

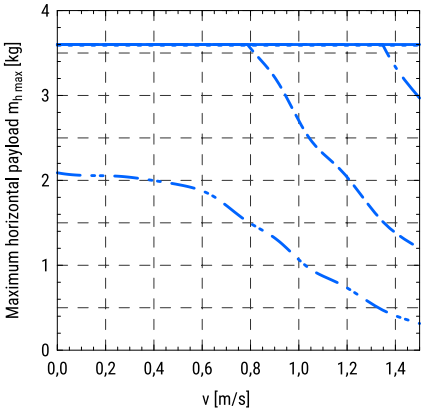


MGTB in combination:
with VK

Acceleration/Deceleration:
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGTB 60

With a stepper motor ☐56

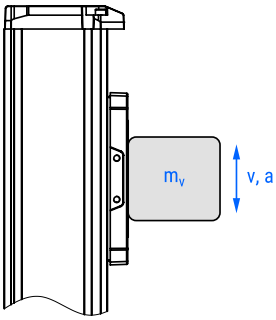


MGTB in combination:
with VK

Acceleration/Deceleration:
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

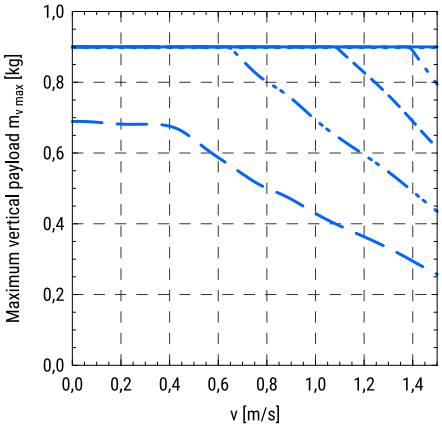
Maximum vertical payload as a function of the travel speed and acceleration of the carriage

In the following diagrams, the maximum vertical payloads applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors are presented. Motor adapter VK is considered. The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.



MGTB 32

With a stepper motor ☐42

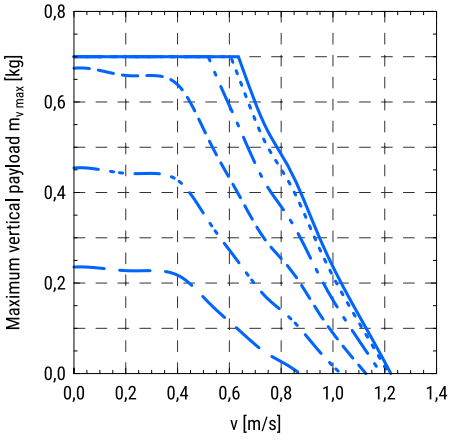


MGTB in combination:
with VK

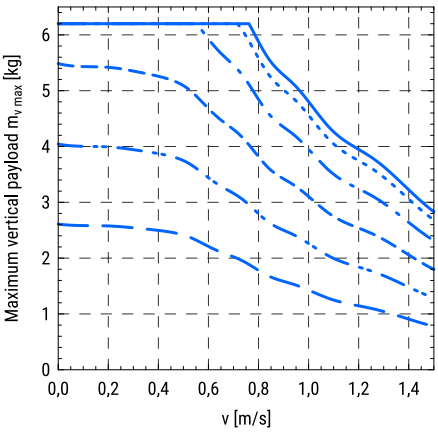
Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGTB 45

With a stepper motor ☐42



With a stepper motor ☐56

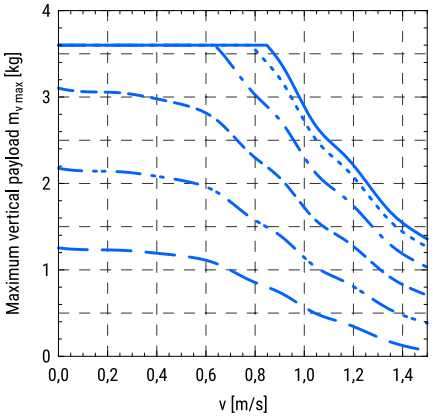


MGTB in combination:
with VK

Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGTB 60

With a stepper motor ☐56

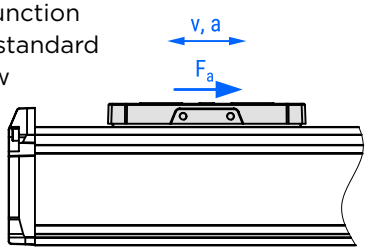


MGTB in combination:
with VK

Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

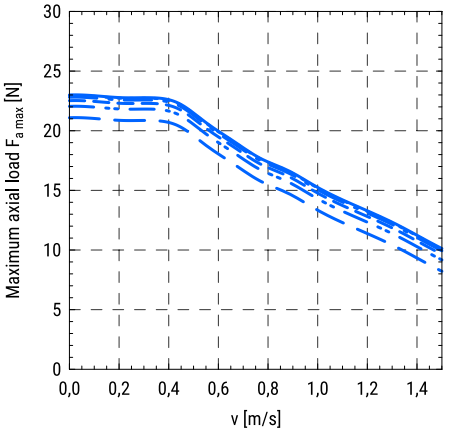
Maximum axial load as a function of the travel speed and acceleration of the carriage

In the following diagrams, the maximum axial load applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors is presented. Motor adapter VK is considered. The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.



MGTB 32

With a stepper motor ☐42

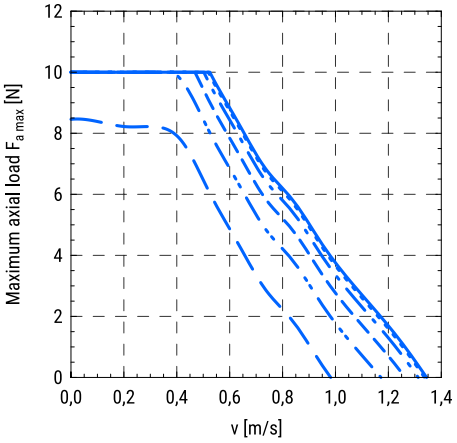


MGTB in combination:
with VK

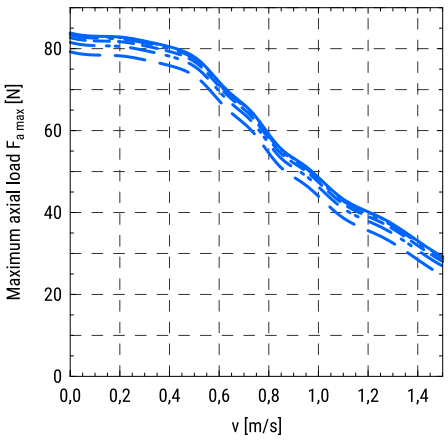
Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGTB 45

With a stepper motor ☐42



With a stepper motor ☐56

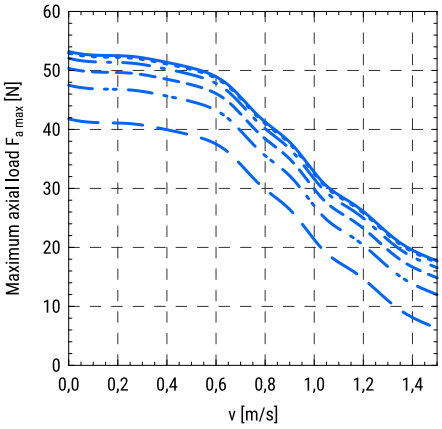


MGTB in combination:
with VK

Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGTB 60

With a stepper motor ☐56

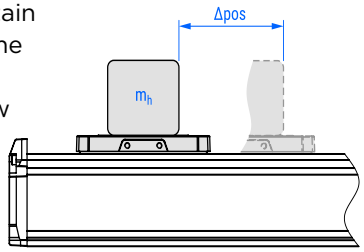


MGTB in combination:
with VK

Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

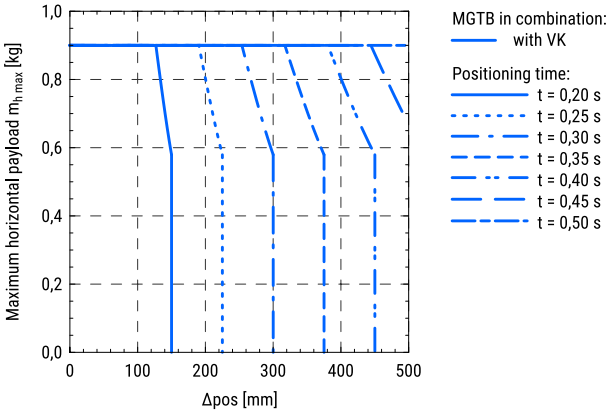
Maximum horizontal payload as a function of position change and positioning time of the carriage

The following diagrams show the maximum payload that can be moved by a certain horizontal distance within a positioning time frame. Acceleration/deceleration time of 100 ms is taken into account. Diagrams depend on different combinations of the standard motors. Motor adapter VK is considered. The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.



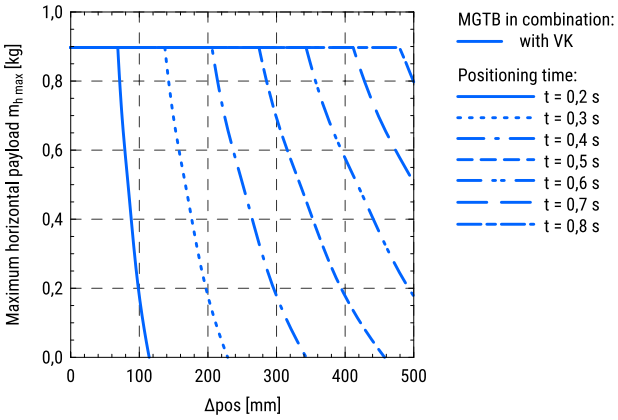
MGTB 32

With a stepper motor ☐42

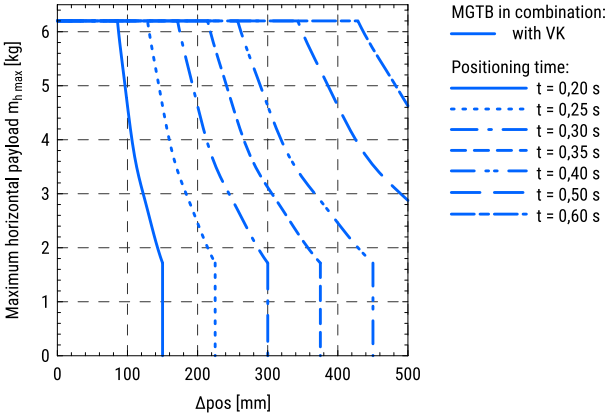


MGTB 45

With a stepper motor ☐42

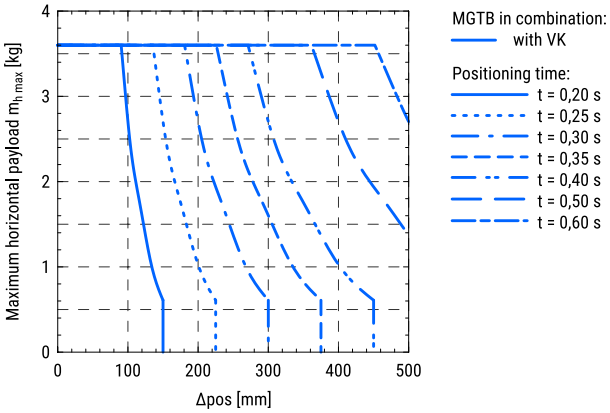


With a stepper motor ☐56



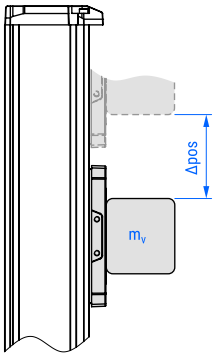
MGTB 60

With a stepper motor ☐56



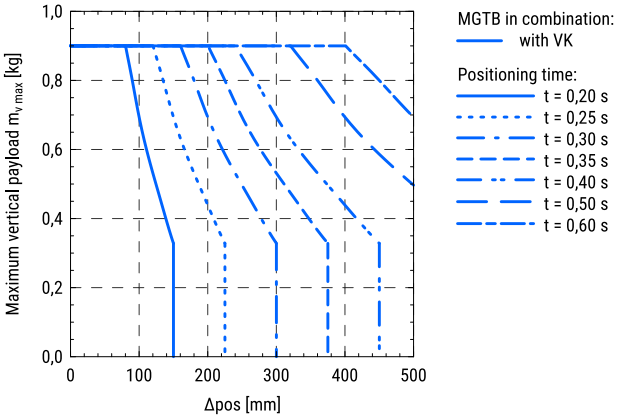
Maximum vertical payload as a function of position change and positioning time of the carriage

The following diagrams show the maximum payload that can be moved by a certain vertical distance within a positioning time frame. Acceleration/deceleration time of 100 ms is taken into account. Diagrams depend on different combinations of the standard motors. Motor adapter VK is considered. The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.



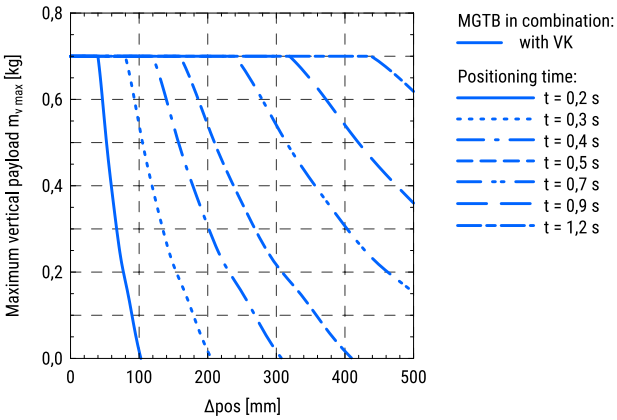
MGTB 32

With a stepper motor ☐42

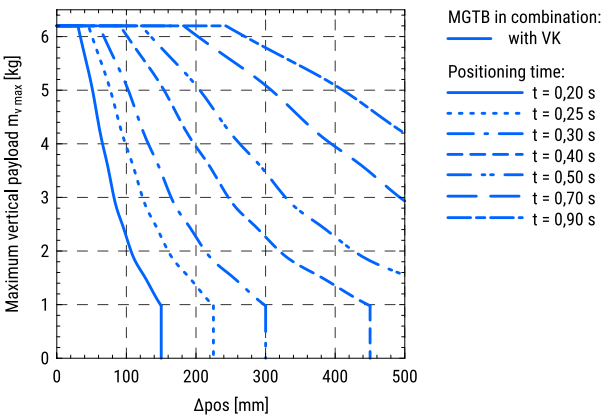


MGTB 45

With a stepper motor ☐42

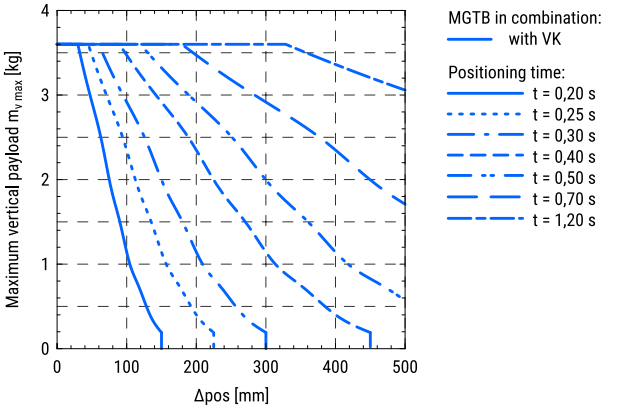


With a stepper motor ☐56



MGTB 60

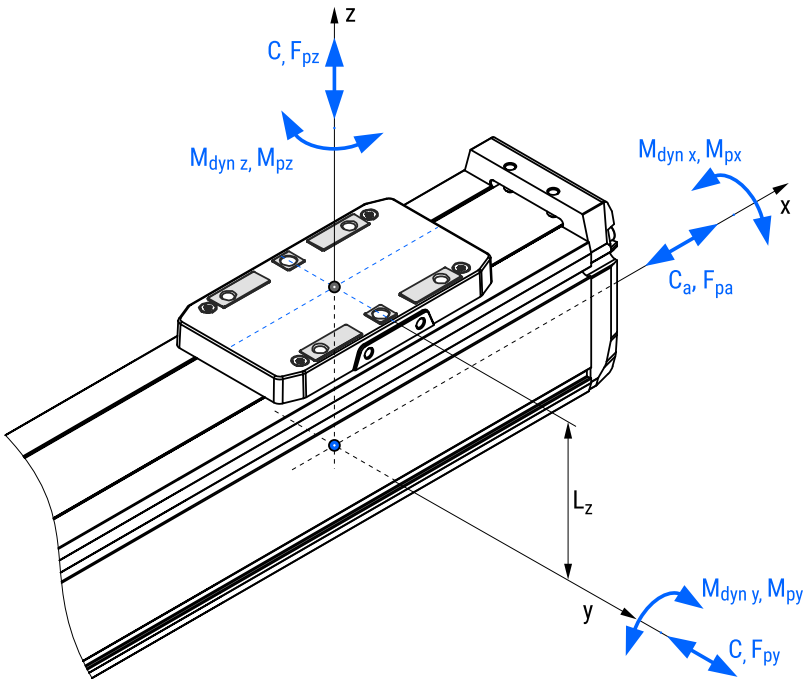
With a stepper motor ☐56



Linear guiding

Dynamic load capacity, dynamic moments and maximum permissible loads of the linear guiding system integrated in the mini linear unit refers to the centre of the linear guides.

The applied loading condition needs to be calculated with respect to the centre of the linear guides.



Designation	Attachment distances L_z [mm]
MGBS/MGTB 32	30.0
MGBS/MGTB 45	40.7
MGBS/MGTB 60	54.7

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]
$F_{py\ max}$	Max. permissible force in the y direction [N]
$F_{pz\ max}$	Max. permissible force in the z direction [N]
$M_{px\ max}$	Max. permissible moment about the x axis [Nm]
$M_{py\ max}$	Max. permissible moment about the y axis [Nm]
$M_{pz\ max}$	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

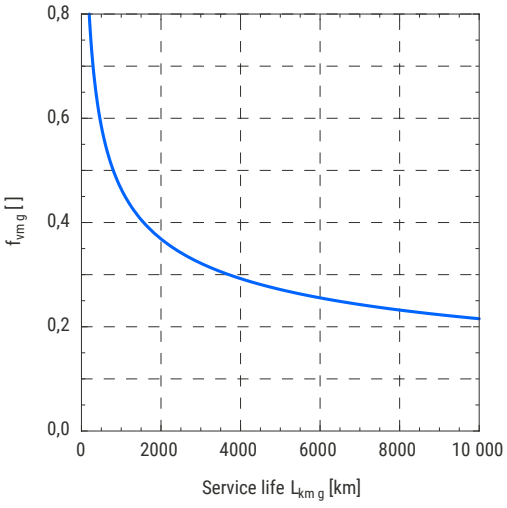
$$L_{km\,g} = \left(\frac{1}{f_{vm\,g}}\right)^3 \cdot 10^2$$

$L_{km\,g}$	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 $L_{km\,g}$

The diagram represents the theoretically determined service life of the linear guiding system when the mean load comparison factor $f_{vm\,g}$ is considered.

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

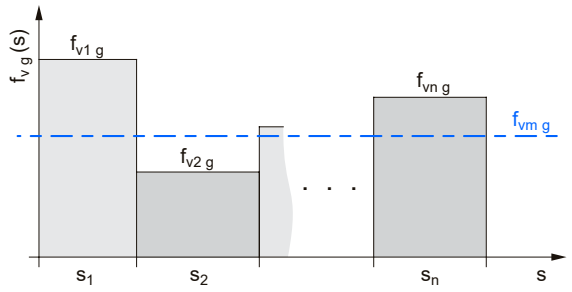


Mean load comparison factor $f_{vm\,g}$

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

$f_{vi\,g}$	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 linear unit MGBS.

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

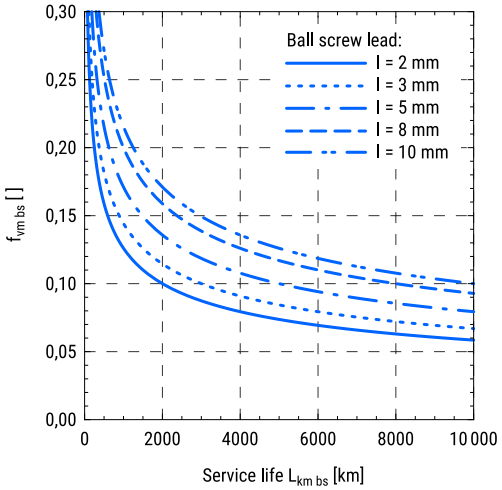
Service life calculation

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

$L_{km\,bs}$	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 $L_{km\,bs}$
The 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.

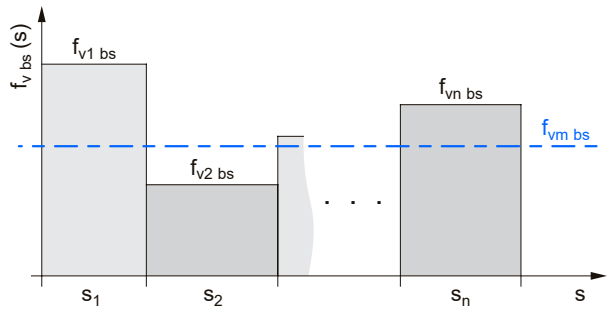


Mean load comparison factor $f_{vm\,bs}$

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

$f_{vi\,bs}$	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 linear unit MGBS

Service life of the mini linear unit is the minimum value between the calculated sevice 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]

Mini linear unit MGTB

Service life of the mini linear unit is the same as the calculated service life of the linear guiding system $L_{km\,g}$.

$L_{km} = L_{km\,g}$

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

Calculations

Load torque

The load torque is a function of an applied axial load (force) to the mini linear unit MGBS/MGTB and can be calculated as follows:

$$M_{load} = \frac{F_x \cdot l}{2000 \cdot \pi \cdot \eta}$$

M_{load}	Load torque [Nm]
F_x	Applied axial force [N]
l	Ball screw lead[1] [mm]
	Pulley-drive ratio[2] [mm/rev]
η	Mechanical efficiency ≈ 0,9[1]
	Mechanical efficiency ≈ 1,0[2]

[1] Valid for the mini linear unit MGBS.
[2] Valid for the mini linear unit MGTB.

It should be noted that the load torque M_{load} must never exceed the maximum drive torque M_p (or $M_{p, MSD}$ if a motor side drive MSD is taken into consideration).

MGBS

MGBS - 32 - 0802 - 200 - AB - AU - AA - AB - AA

Series:
MGBS

Size:
- 32
- 45
- 60

Ball screw size:
- MGBS 32: ø8 × 2, ø8 × 8
- MGBS 45: ø10 × 3, ø10 × 10
- MGBS 60: ø12 × 5, ø12 × 10

Absolute stroke [mm]:
(Absolute stroke = Effective stroke + 2 × Safety stroke)
- 50, 100, 150, 200, 250, 300, 400, 500, 600, 700, 800 (900, 1000 for MGBS 60 only)

Motor type and size:
- Leave blank: Without a motor

A B

Motor type:
- A: Stepper motor without a brake
- B: Stepper motor with a brake

Motor size □:
- A: 28 mm (Currently not available)
- B: 42 mm
- C: 56 mm
- D: 86 mm (Currently not available)

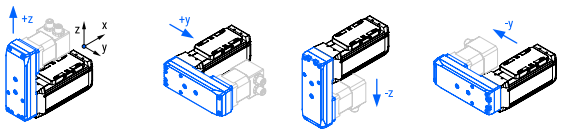
Available sizes:
- MGBS 32: 28, 42
- MGBS 45: 42, 56
- MGBS 60: 56, 86

Motor mounting option:
- Leave blank: Without a motor

A U

Mounting option:
- A: With a motor adapter VK
- B: With a motor side drive MSD facing up
- C: With a motor side drive MSD facing right
- D: With a motor side drive MSD facing down
- E: With a motor side drive MSD facing left

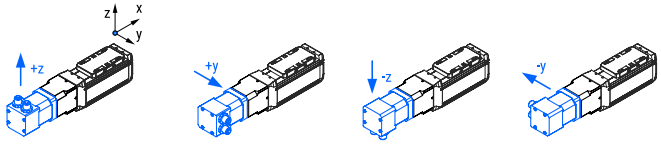
Up Right Down Left



Direction of the motor connectors:
- U: Connectors facing up
- R: Connectors facing right
- D: Connectors facing down
- L: Connectors facing left

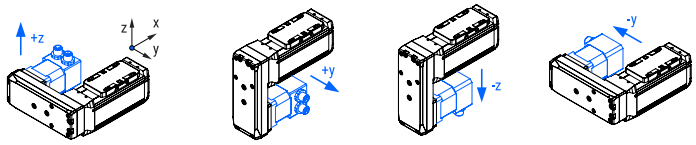
In combination with a motor adapter VK

Up Right Down Left



In combination with a motor side drive MSD

Up Right Down Left



When using the motor side drive MSD, the connectors can not be facing the MGBS otherwise, the connectors and MGBS may collide. These combinations are: BD, CL, DU and ER.

Drive option:
- Leave blank: Without a motor or drive

A A

Drive type:
- A: Stepper

Drive protocol/control:
- A: EtherCAT
- B: Ethernet based communication
- C: Pulse-direction control
- D: Profinet

Drive-motor cables option:
- Leave blank: Without a motor or drive
- 00: Without the cables

A B

Cables type:
- A: Robotic with a straight plug
- B: Robotic with an angled plug

Cables length:
- A: 3 m
- B: 5 m
- C: 10 m

Power and signal cables:
- Leave blank: Without a motor or drive

A A

Power cable:
- 0: Without a power cable
- A: With a power cable

Signal cable:
- 0: Without a signal cable
- A: With a signal cable

MGTB

MGTB - 45 - 500 - AB - AB - AA - AB - AA

Series:
MGTB

Size:
- 32
- 45
- 60

Absolute stroke [mm]:
(Absolute stroke = Effective stroke + 2 × Safety stroke)
– 100, 200, 300, 400, 500, 600, 700, 800, 1000, 1200, 1400, 1600
(1800, 2000 for MGTB 60 only)

Motor type and size:
– Leave blank: Without a motor

A B

Motor type:
– A: Stepper motor without a brake
– B: Stepper motor with a brake

Motor size □:
– B: 42 mm
– C: 56 mm
– D: 86 mm (Currently not available)

Available sizes:
– MGTB 32: 42
– MGTB 45: 42, 56
– MGTB 60: 56, 86

Motor mounting option:
- Leave blank: Without a motor

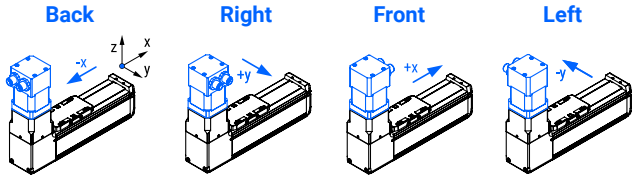
A

Mounting option:
- A: With a motor adapter VK

B

Mounting option:
- B: Connectors facing back
- R: Connectors facing right
- F: Connectors facing front
- L: Connectors facing left

In combination with a motor adapter VK



Drive option:
- Leave blank: Without a motor or drive

A

Drive type:
- A: Stepper

A

Drive protocol/control:
- A: EtherCAT
- B: Ethernet based communication
- C: Pulse-direction control
- D: Profinet

Drive-motor cables option:
- Leave blank: Without a motor or drive
- 00: Without the cables

A

Cables type:
- A: Robotic with a straight plug
- B: Robotic with an angled plug

B

Cables length:
- A: 3 m
- B: 5 m
- C: 10 m

Power and signal cables:
- Leave blank: Without a motor or drive

A

Power cable:
- 0: Without a power cable
- A: With a power cable

A

Signal cable:
- 0: Without a signal cable
- A: With a signal cable

Motor Adapter VK

VK - MG 32 - 42,3 - 43,8 - 22 - 2 - 24 - 4,5 - M3 - 0 - 0 - 45

Motor adapter

Mini series:
- MG

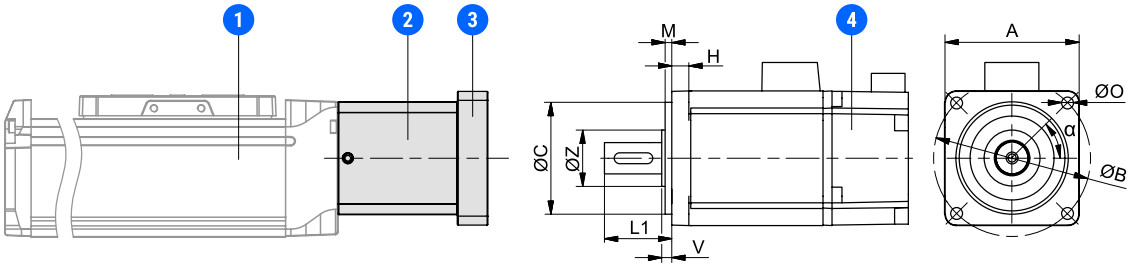
Size:
- 32
- 45
- 60

A ØB ØC M L1 H ØO V ØZ α

Motor dimensions [mm]

[°]

Dimension ØO is also used for tapped holes. In case of tapped holes, prefix M must be applied.



1 – MGBS/MGTB
2 – Motor adapter housing
3 – Motor adapter flange
4 – Motor

Motor adapter VK

Couplings

COUPLING - EKL5 - A - F5 - F6PFN

Coupling

Coupling type/size:
- 2
- 5
- 10

Elastomer insert type:
- A

Hole diameter
[mm]

Option:
- PFN: with the keyway
- Leave blank: without the keyway

Motor side drive MSD with a timing belt

MSD - MG 32 - T2 - 42,3 - 43,8 - 22 - 2 - 24 - 5 - 4,5 - M3 - 0 - 0 - 45

Motor side drive

Mini series:
- MG

Size:
- 32
- 45
- 60

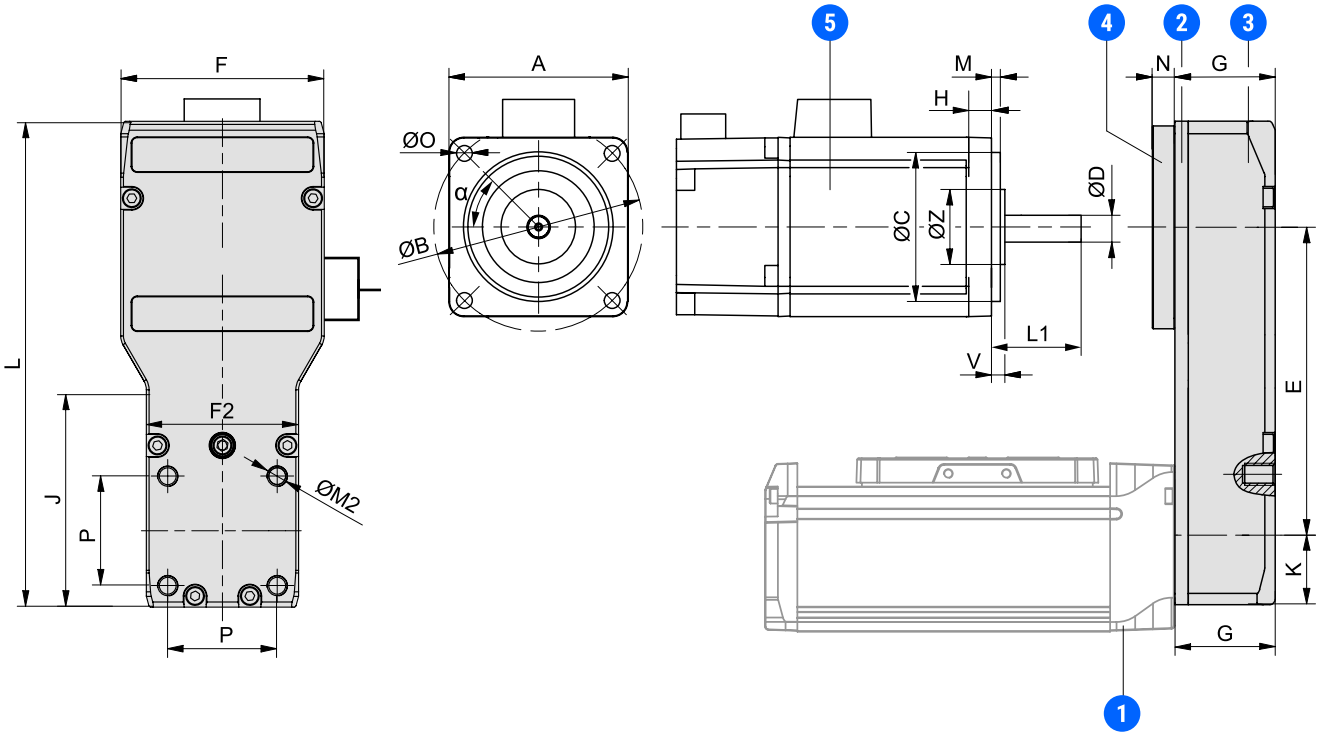
Type

A ØB ØC M L1 ØD H ØO V ØZ α

Motor dimensions [mm]

[°]

Dimension ØO is also used for tapped holes. In case of tapped holes, prefix M must be applied.



1 – MGBS
2 – Motor side drive housing
3 – Motor side drive cap
4 – Motor side drive tensioning plate
5 – Motor

Motor side drive MSD

Motor

STMN - 42 - L - E - B

Stepper motor series

Size:
- 28 (Currently not available)
- 42
- 56
- 86 (Currently not available)

Motor length
- L: Long

Encoder:
- E: With

Brake:
- Leave blank: Without
- B: With

Drive

STDF - 42 - A - EC

Stepper drive series
- STDF
- STDL[1]

Size:
- 28 (Currently not available)
- 42
- 56
- 86 (Currently not available)
- 040[1] (for motor size 42 or 56)

Operating voltage:
- A: 24
- B: 40–70
- C[1]: 20–50

Protocol/control:
- EC: EtherCAT
- EN: Ethernet based communication
- PD: Pulse-direction control
- PN[1]: Profinet

[1] Only available with Profinet comunication, oprating voltage option C and motor size option 040.

Drive-motor cables

STCF - E - A8 - 05

Stepper drive/motor cable series
- STCF: for STDF drives
- STCS: for STDL drives

Type:
- M: Motor cable
- E: Encoder cable
- B: Brake cable

Connector type and size:

A 8

Connector type:
- S: Stepper
- A: Angled

Connector size:
- 8: M8
- 12: M12

Cable length:
- 03: 3 m
- 05: 5 m
- 10: 10 m

STCF - BT - 02

Stepper drive/motor cable series

Type:
- BT: Brake to terminal cable

Cable length:
- 02: 2 m

Power and signal cables

STCF - P - 02

Stepper drive/motor cable series

Type:
– P: Power cable

Cable length:
– 02: 2 m

STCF - S - EC - 02

Stepper drive/motor cable series

Type:
– S: Signal cable

Drive protocol/control:
– EC: EtherCAT
– EN: Ethernet based communication
– PD: Pulse-direction control

Cable length:
– 02: 2 m

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