UNIMOTION

MGBS and MGTB
MINI LINEAR UNITS

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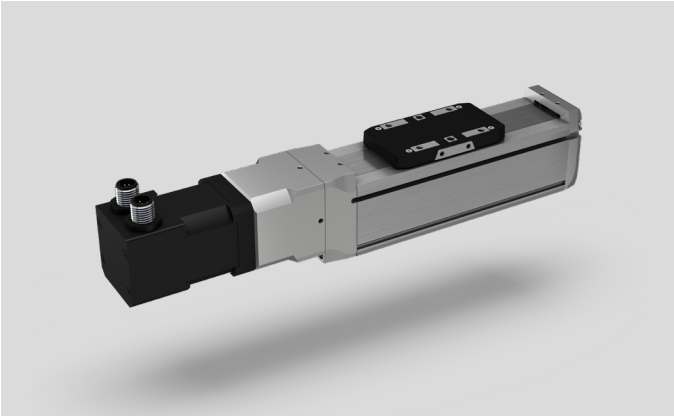
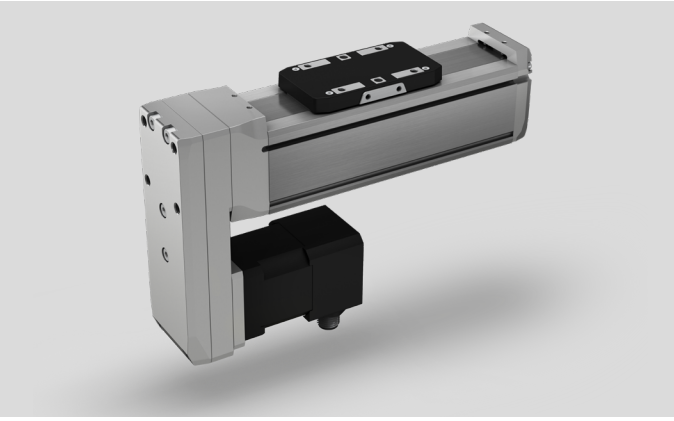
MINI LINEAR UNIT – MGBS

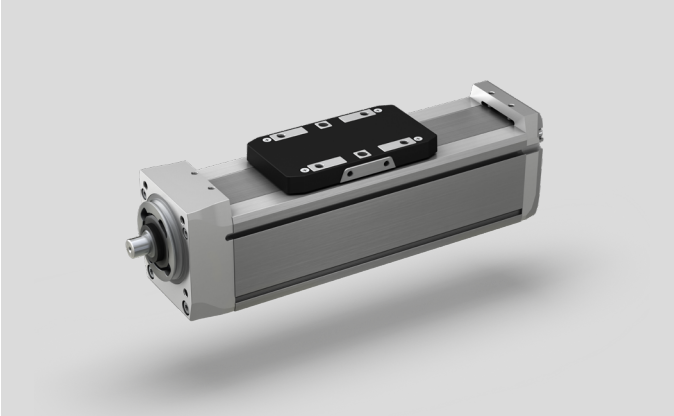
Combination with a standard motor and a motor adapter VK



Combination with a standard motor and a motor side drive MSD



Without a motor



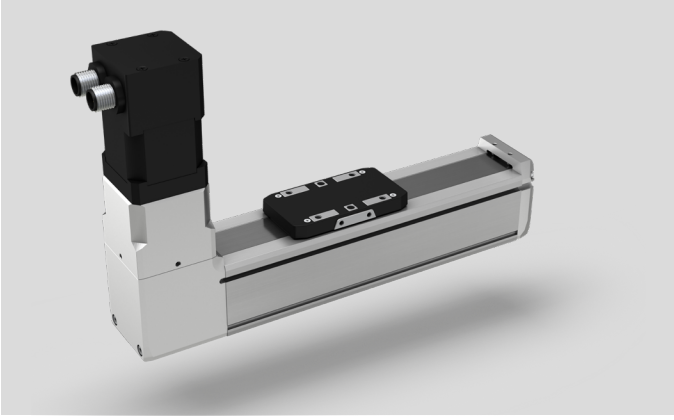
Basic technical data

MGBS	Maximum permissible axial load [N]	Maximum travel speed [m/s]	Maximum stroke [mm]	Maximum repeatability [mm][3]	Dimensions	
					Width [mm][1]	Height [mm][2]
32	285	0,60	800	±0,015	32,0	38,5
45	695	0,75	800	±0,015	45,0	54,0
60	1100	0,97	1000	±0,010	60,0	72,0

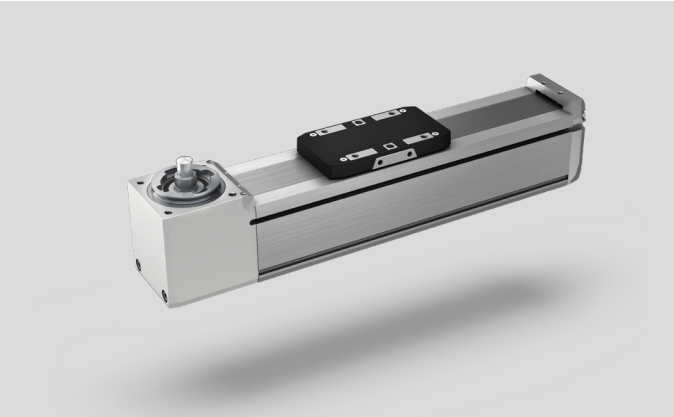
[1] Width of the profile.
[2] Height from the bottom of the profile to the top of the carriage.
[3] Valid for one-directional axial load.

MINI LINEAR UNIT – MGTB

Combination with a standard motor and a motor adapter VK



Without a motor



Basic technical data

MGTB	Maximum permissible axial load [N]	Maximum travel speed [m/s]	Maximum stroke [mm]	Maximum repeatability [mm][3]	Dimensions	
					Width [mm][1]	Height [mm][2]
32	65	1,50	1600	±0,08	32,0	38,5
45	85	1,50	1600	±0,08	45,0	54,0
60	130	1,50	2000	±0,08	60,0	72,0

[1] Width of the profile.
[2] Height from the bottom of the profile to the top of the carriage.
[3] Valid for one-directional axial load.

Mini linear unit – MGBS

CHARACTERISTICS

The MGBS is a ball screw driven mini linear unit where the rotary motion (rotation) of the drive shaft is converted to the linear motion (translation) of the carriage with high mechanical efficiency and low internal friction.

High-performance features such as high speed, good positioning accuracy, and high repeatability are ensured through a precision ball screw drive and a linear guiding system.

A preassembled standard motor (in-line with a motor adapter and a coupling or in-parallel with a motor side drive and a timing belt) together with a standard drive, makes the system plug and drive ready. Compact dimensions and optimally selected motor combinations cover a wide range of applications.

The aluminium profile body includes side slots for clamping fixtures as well as slots for the magnetic field sensors.

Options, such as different ball screw leads, together with a wide range of accessories and possible multi-axis sistem combinations make this product highly flexible.

There is also an option of the mini linear unit without the preassembled motor if an individual motor is required.

There are prepared connection and centering holes on the carriage of the mini linear unit that allow mounting of the clamping fixtures, connection plates or custom applications.

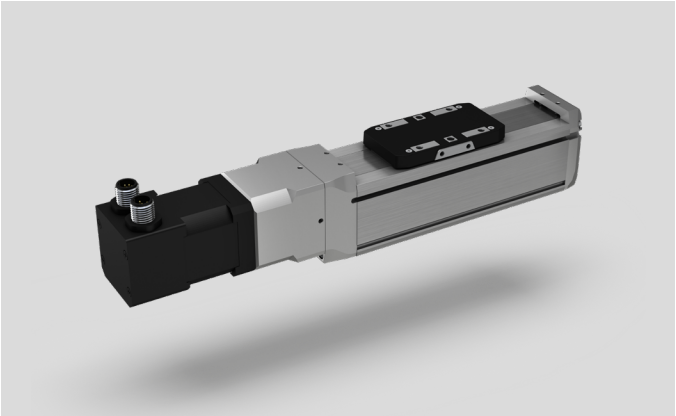
Mini linear units MGBS can be easily assembled into a multi-axis system with other MGBS or MGTB linear units and/or mini electrical cylinders MCE or mini electrical sliders MSCE.

Excellent price-performance ratio and a quick delivery time, due to standard lengths, are ensured.

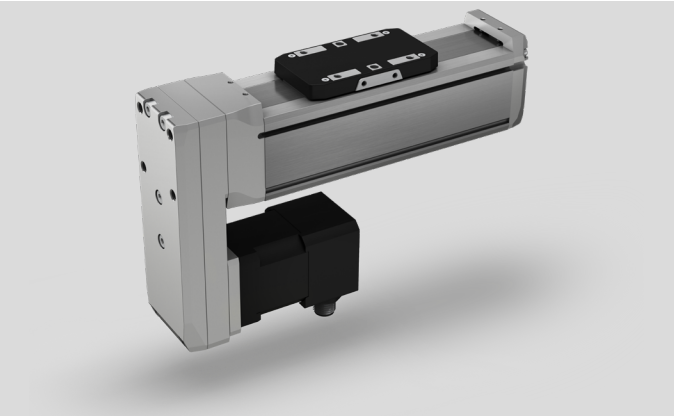
Each MGBS is optimally pre-lubricated and ready for a maintenance-free operating process.

MGBS allows relatively high load capacities and optimal cycles for moving payloads at high speeds in both horizontal and vertical directions.

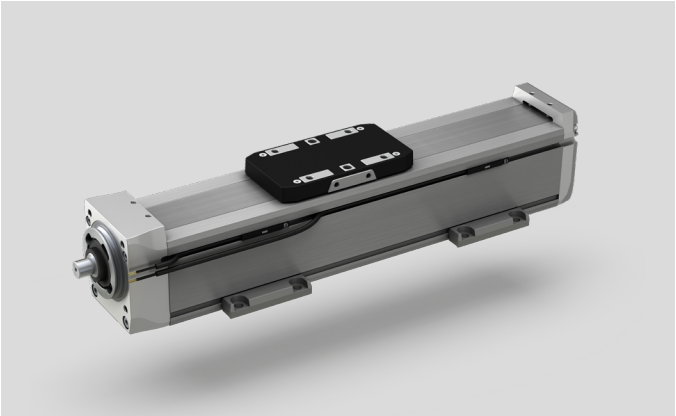
The aluminium profiles are manufactured according to the EN 12020-2 standard



Motor adapter VK with a coupling and a motor



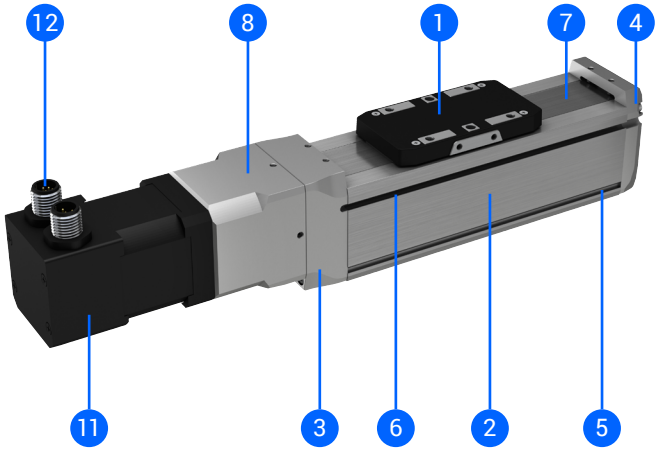
Motor side drive with a timing belt and a motor



Accessories, MGBS without a preassembled motor

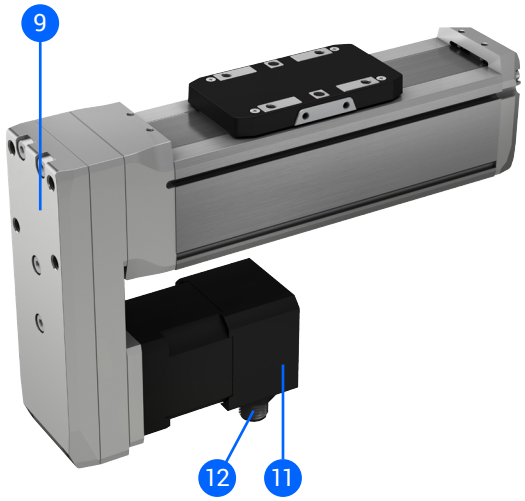
STRUCTURAL DESIGN

Combination with a standard motor and a motor adapter VK

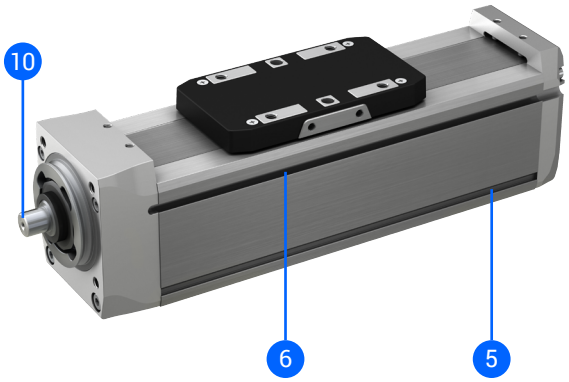


1 – Carriage
2 – Aluminium profile
3 – Drive block
4 – End block
5 – Mounting slots
6 – Slot for the magnetic field sensors
7 – Corrosion-resistance protection strip
8 – Motor adapter VK with a coupling
9 – Motor side drive MSD with a timing belt
10 – Drive shaft of the precision ball screw drive
11 – Preassembled motor (with/without a brake)
12 – Standard connectors (motor, encoder and brake – optionally)

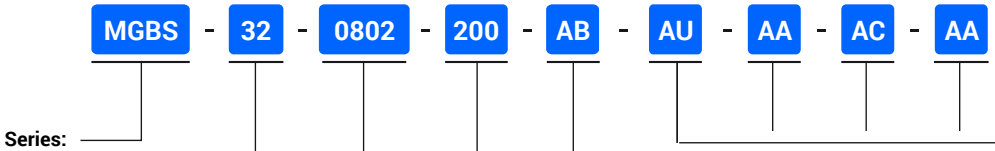
Combination with a standard motor and a motor side drive MSD



Without a motor



HOW TO ORDER



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

Absolute stokes of 900 and 1000 mm are only available for the MGBS 60 unit.

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

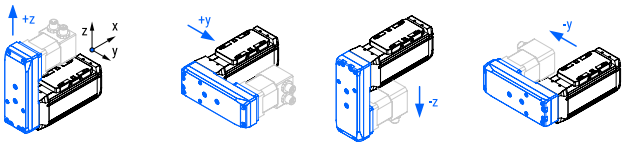
For more details please refer to the section “Electrical data → Motor types and sizes”

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

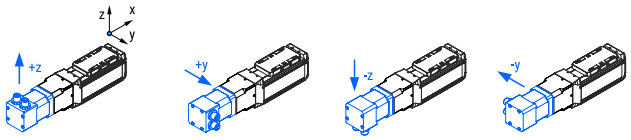
Up Right Down Left



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

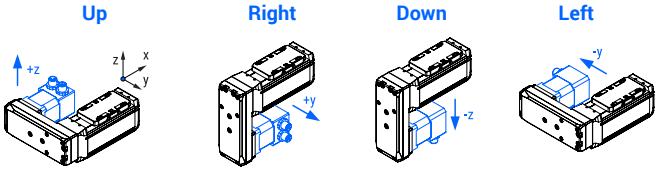
In combination with a motor adapter VK

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

For more details please refer to the section "Electrical data → Drive types"

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

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

A C

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

For more details please refer to the section "Electrical data → Drive-motor cables"

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

Length of the cable = 2 m

For more details please refer to the section "Electrical data → Power and signal cables"

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

Length of the cable = 2 m
Signal cable is mandatory in for the following cases:
– If a motor with a brake is used
– If a pulse-direction drive control is used
– If the limit switches are used

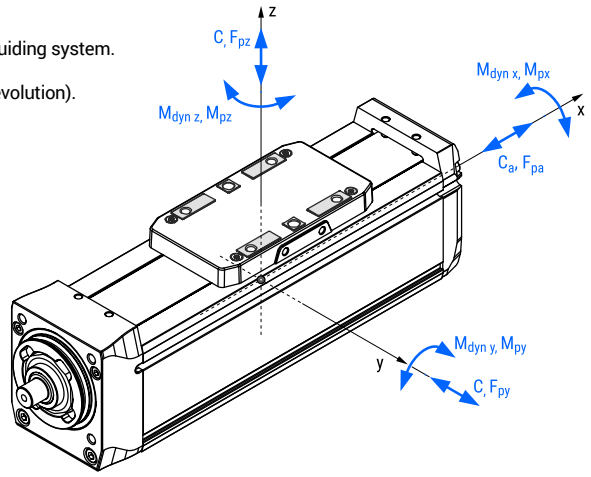
For more details please refer to the section "Electrical data → Power and signal cables"

TECHNICAL DATA

General technical data

MGBS	Ball screw[4]	Dynamic axial load capacity[1]	Dynamic load capacity[3]	Dynamic moments[3]			Max. permissible loads					Axial backlash (BS)[2]	Max. repeatability[5]	Absolute stroke
							Forces		Moments					
	d × l [mm]	C_a [N]	C [N]	$M_{dyn\,x}$ [Nm]	$M_{dyn\,y}$ [Nm]	$M_{dyn\,z}$ [Nm]	F_{py} [N]	F_{pz} [N]	M_{px} [Nm]	M_{py} [Nm]	M_{pz} [Nm]	[mm]	[mm]	[mm]
32	8 × 2	2000	1310	4,8	4,1		200	300	2,0	1,8	1,3	≤ 0,06	±0,015	50, 100, 150, 200, 250, 300, 400, 500, 600, 700, 800
	8 × 8	1500												
45	10 × 3	3500	3240	20,1	17,4		400	700	7,4	6,3	4,7	≤ 0,06	±0,015	50, 100, 150, 200, 250, 300, 400, 500, 600, 700, 800
	10 × 10	3200												
60	12 × 5	5000	11190	77,4	79,8		850	2000	29,2	30,8	31,8	≤ 0,06	±0,010	50, 100, 150, 200, 250, 300, 400, 500, 600, 700, 800, 900, 1000
	12 × 10	3800												

[1] Dynamic axial load capacity of the ball screw drive.
This value is the basis for calculating the service life.
[2] Valid for ball screw drive in new condition.
[3] Dynamic load capacity and dynamic moments of the linear guiding system.
These values are the basis for calculating the service life.
[4] d = ball screw nominal diameter, l = ball screw lead (for one revolution).
[5] Valid for one-directional axial load.



Drive data

Combination with a standard motor and a motor adapter VK

MGBS + motor and VK	Ball screw	Motor		Max. permissible axial load[1, 2, 3]	Max. permissible payload[1, 2, 3]		Max. travel speed[2]	Max. rotational speed[2]	Max. acceleration
					Horizontal	Vertical			
	d × l [mm]	Type	Size □ [mm]	F_{pa} [N]	m_{ph} [kg]	m_{pv} [kg]	v_{max} [m/s]	n_{max} [rev/min]	a_{max} [m/s²]
32	8 × 2	Stepper	28	200	31	17	0,093	2800	16
			42	285	31	24	0,100	3000	20
	8 × 8		28	50	6,2	4,1	0,300	2250	
			42	200	31	17	0,400	3000	
45	10 × 3		42	395	71	33	0,146	2920	20
			56	695	71	59	0,150	3000	
	10 × 10		42	120	20	10	0,477	2860	
			56	570	71	48	0,500	3000	
60	12 × 5		56	1030	204	87	0,250	3000	20
			86	Currently not available					
	12 × 10		56	525	127	44	0,500	3000	
			86	Currently not available					

[1] This value depends on the selected motor, travel speed and acceleration of the carriage (see the following diagrams relating to the combinations with the standard motors). MGBS with an absolute stroke of 500 mm is considered.
[2] The value depends on the absolute stroke. The maximum permissible axial load also depends on the travel speed. Please, see the following diagrams.
[3] Carriage acceleration of 2 m/s² is considered.

Combination with a standard motor and a motor side drive MSD

MGBS + motor and MSD	Ball screw	Motor		Max. permissible axial load[1, 2, 3]	Max. permissible payload[1, 2, 3]		Max. travel speed[2]	Max. rotational speed[2]	Max. acceleration
					Horizontal	Vertical			
	d × l [mm]	Type	Size □ [mm]	F_{pa} [N]	m_{ph} [kg]	m_{pv} [kg]	v_{max} [m/s]	n_{max} [rev/min]	a_{max} [m/s²]
32	8 × 2	Stepper	28	160	31	13	0,064	1920	16
			42	285	31	24	0,100	3000	20
	8 × 8		28	40	6,3	3,3	0,208	1560	
			42	175	31	15	0,400	3000	
45	10 × 3		42	330	71	28	0,137	2740	13
			56	695	71	59	0,150	3000	20
	10 × 10		42	110	19	9	0,410	2460	
			56	450	71	38	0,500	3000	
60	12 × 5		56	900	204	76	0,250	3000	20
			86	Currently not available					
	12 × 10		56	450	126	38	0,500	3000	
			86	Currently not available					

Without a motor

MGBS without a motor	Ball screw	Max. permissible axial load[2]	Max. permissible payload[3]		Max. drive torque	No load torque	Max. permissible radial load on shaft	Max. travel speed[2]	Max. rotational speed[2]	Max. acceleration
			Horizontal	Vertical[2]						
	d × l [mm]	F_{pa} [N]	m_{ph} [kg]	m_{pv} [kg]	M_p [Nm]	M_0 [Nm]	F_{pr} [N]	v_{max} [m/s]	n_{max} [rev/min]	amax [m/s²]
32	8 × 2	285	31	24	0,10	0,04	50	0,150	4500	20
	8 × 8	285	31	24	0,40	0,05		0,600		
45	10 × 3	695	71	59	0,37	0,10	100	0,225	4500	20
	10 × 10	695	71	59	1,23	0,11		0,750		
60	12 × 5	1100	204	93	0,97	0,16	200	0,483	5800	20
	12 × 10	1100	204	93	1,95	0,17		0,967		

[1] This value depends on the selected motor, travel speed and acceleration of the carriage (see the following diagrams relating to the combinations with the standard motors). MGBS with an absolute stroke of 500 mm is considered.
[2] The value depends on the absolute stroke. The maximum permissible axial load also depends on the travel speed. Please, see the following diagrams.
[3] Carriage acceleration of 2 m/s² is considered.

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

Recommended values of loads:

All the data of the dynamic load capacities (linear guiding system and ball screw drive) stated in the tables above are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety and service life.

We recommend a minimum dynamic safety factor of 5,0 or more. Please refer to pages 75 to 78, where the calculation of the safety factor of the ball screw drive and linear guiding system and how the applied load affects the service life are presented.

Mass and mass moment of inertia

MGBS without a motor	Ball screw	Moved mass[1]	Mass of the linear unit[2]	Mass moment of inertia
	d × l [mm]	$m_{m,\ MGBS}$ [kg]	m_{MGBS} [kg]	J_{MGBS} [10^{-2} kg cm^2]
32	8 × 2	0,12	0,36 + 0,0015 × Abs. stroke	0,85 + 0,0024 × Abs. stroke + 0,1013 × m_{load}
	8 × 8			1,04 + 0,0025 × Abs. stroke + 1,6211 × m_{load}
45	10 × 3	0,23	0,80 + 0,0028 × Abs. stroke	3,17 + 0,0055 × Abs. stroke + 0,2280 × m_{load}
	10 × 10			3,72 + 0,0056 × Abs. stroke + 2,5330 × m_{load}
60	12 × 5	0,53	1,80 + 0,0049 × Abs. stroke	11,04 + 0,0132 × Abs. stroke + 0,6333 × m_{load}
	12 × 10			11,97 + 0,0126 × Abs. stroke + 2,5330 × m_{load}

[1] The moved mass is already considered in the equation for calculating the mass of the linear unit m_{MGBS} and the mass moment of inertia J_{MGBS}. The moved mass includes the mass of the carriage together with the ball nut.
[2] For the combination with a standard motor and motor adapter VK or motor side drive MSD the mass m_{MGBS} should be increased by m_{VK+m} or m_{MSD+m} respectively, see the table below.

Abs. stroke	Absolute stroke	[mm]
m_{load}	Applied mass to be moved	[kg]

Additional mass of the linear unit when combining the motor with the motor adapter VK or the motor side drive MSD

MGBS	Motor		Motor without a brake		Motor with a brake	
			Mass of the motor and motor adapter VK	Mass of the motor and motor side drive MSD	Mass of the motor and motor adapter VK	Mass of the motor and motor side drive MSD
	Type	Size □ [mm]	$m_{VK\ +\ m}$ [kg]	$m_{MSD\ +\ m}$ [kg]	$m_{VK\ +\ m}$ [kg]	$m_{MSD\ +\ m}$ [kg]
32	Stepper	28	Currently not available			
		42	0,52	0,62	0,65	0,75
45		42	0,57	0,71	0,70	0,84
		56	1,31	1,49	1,50	1,68
60		56	1,50	1,73	1,69	1,92
		86	Currently not available			

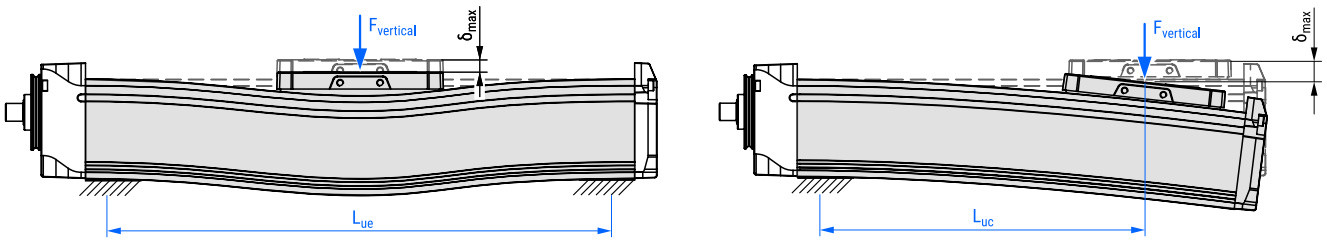
Planar moment of inertia

MGBS	Profile	
	I_y [cm^4]	I_z [cm^4]
32	4,3	4,6
45	14,3	15,9
60	43,8	50,3

Holding torque of a motor brake

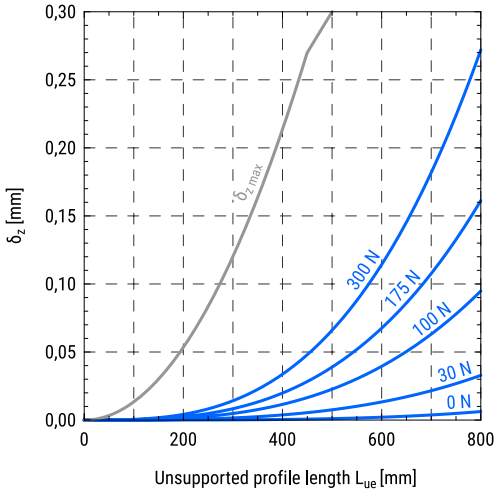
Motor		Holding torque (brake) [Nm]
Type	Size □ [mm]	
Stepper	28	Currently not available
	42	0,4
	56	1,0
	86	Currently not available

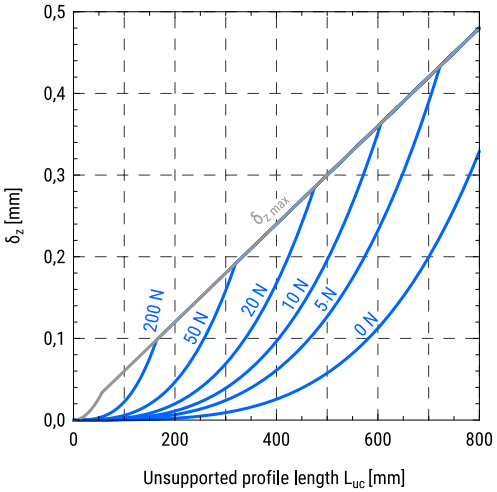
Deflection of the linear unit as a function of a vertical force and the unsupported profile length



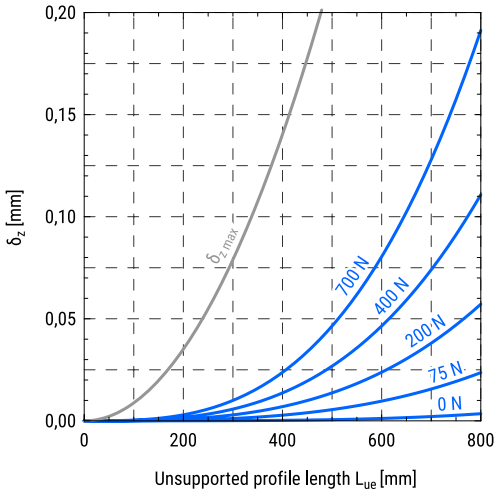
In the following diagrams, the deflection of the linear unit as a function of a vertical force and unsupported profile length is presented. For the case of both ends of the profile are supported and for the case of a console mounting the left and the right diagrams below should be considered, respectively.

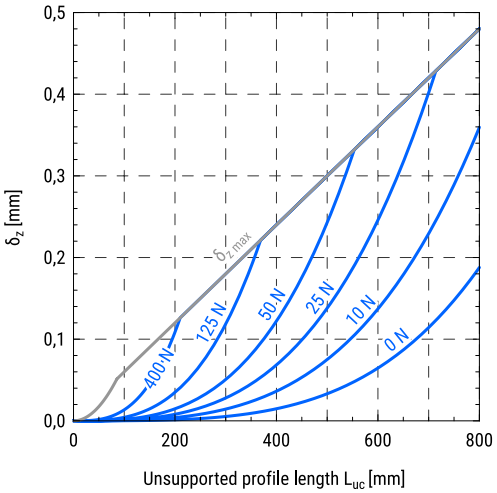
MGBS 32



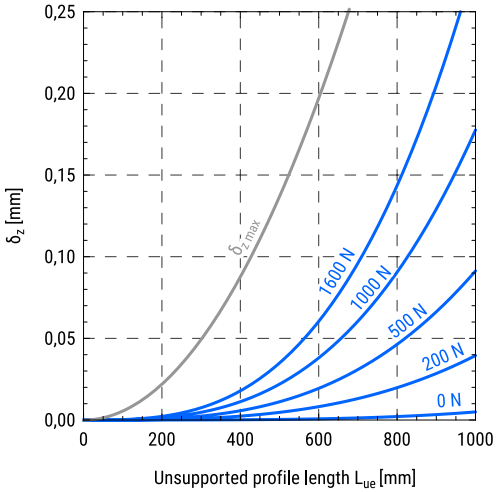


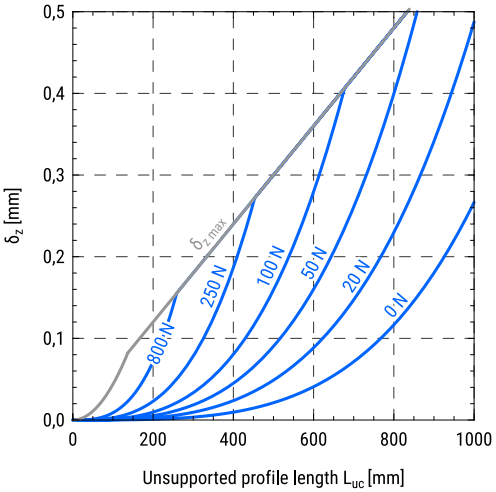
MGBS 45





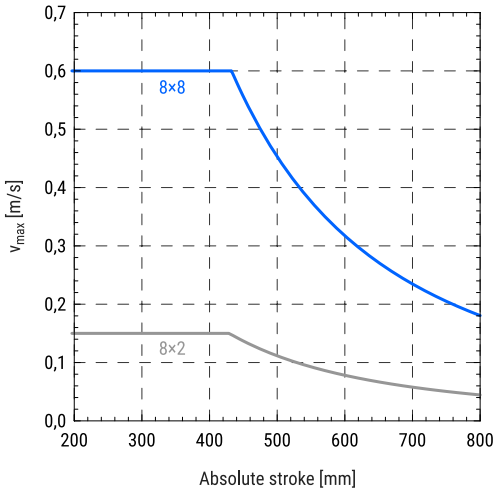
MGBS 60





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

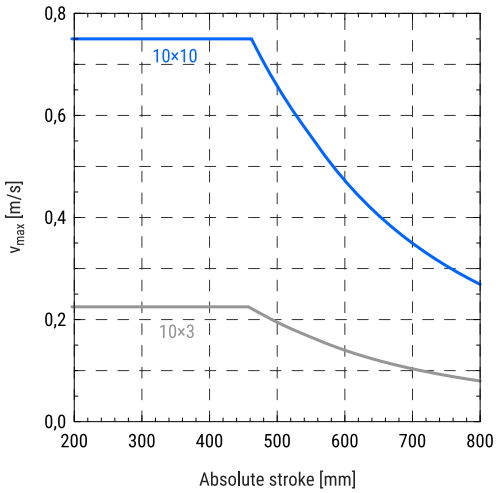
MGBS 32



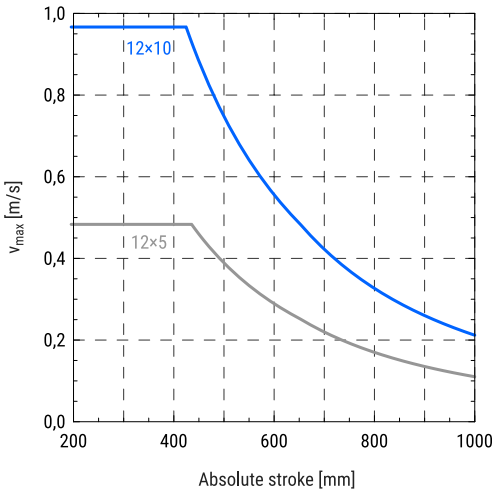
In the following diagrams, the maximum travel speed of the carriage as a function of absolute stroke for a different ball screw lead is presented.

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

MGBS 45

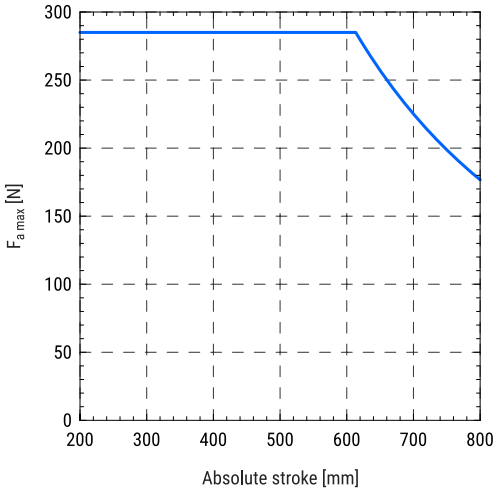


MGBS 60



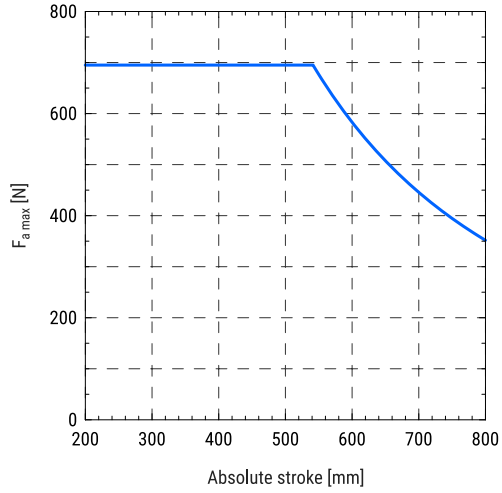
Maximum axial load as a function of absolute stroke

MGBS 32

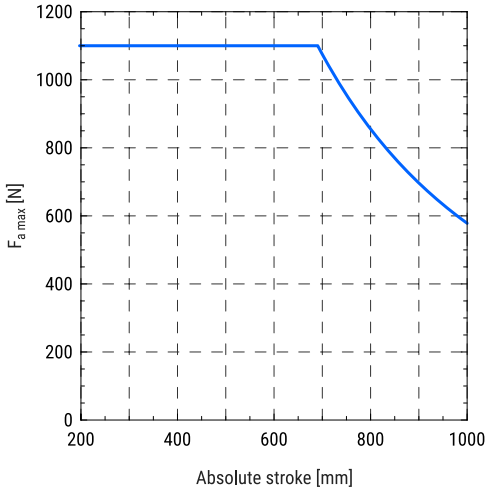


In the following diagrams, the maximum axial load applied to the carriage of the linear unit as a function of absolute stroke is presented.

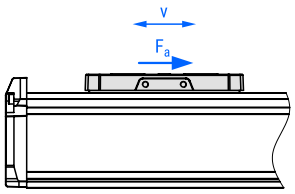
MGBS 45



MGBS 60



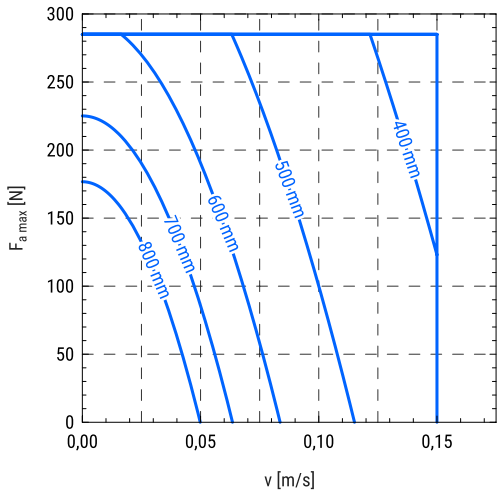
Maximum axial load as a function of the travel speed of the carriage



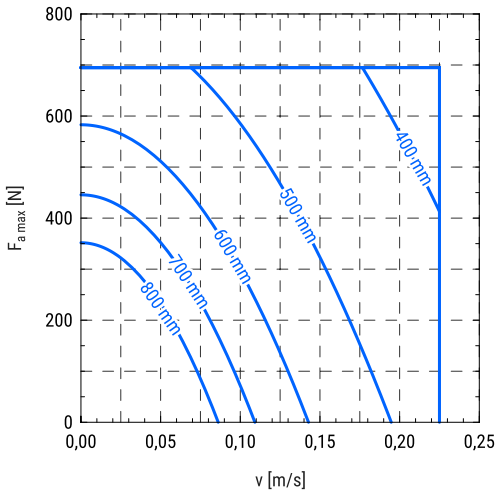
In the following diagrams, the maximum axial loads applied to the carriage as a function of travel speed for a different values of the absolute stroke are presented.

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

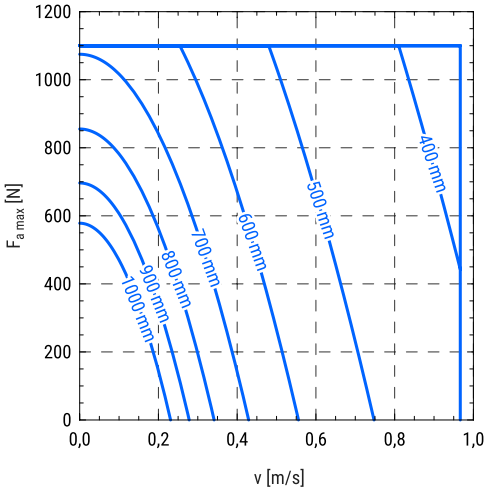
MGBS 32



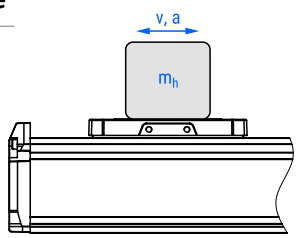
MGBS 45



MGBS 60



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



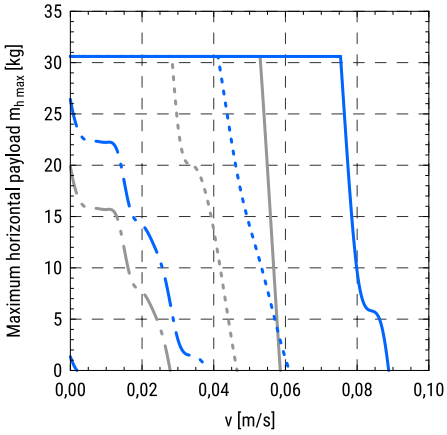
In the following diagrams, maximum horizontal payloads applied to the carriage as a function of the travel speed for different accelerations, different ball screw leads and different combinations of the standard motors are presented. Motor adapter VK and a motor side drive MSD are also considered.

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.

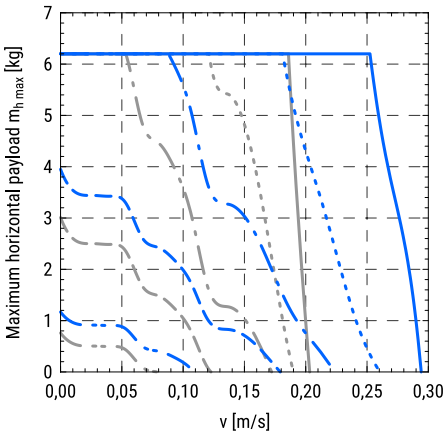
For more information please refer to the diagrams on pages 16–18.

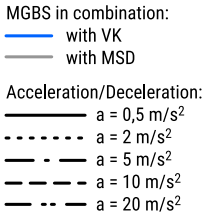
MGBS 32

8 × 2 with a stepper motor □28

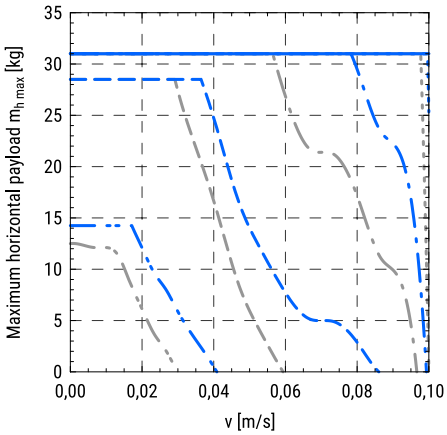


8 × 8 with a stepper motor □28

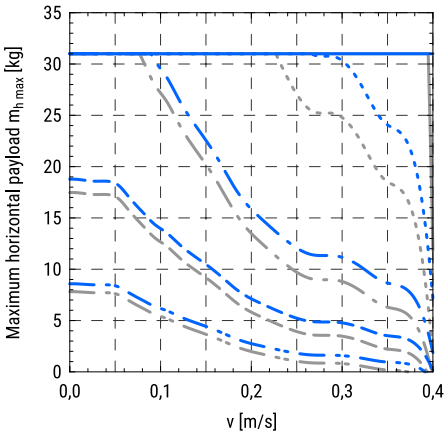


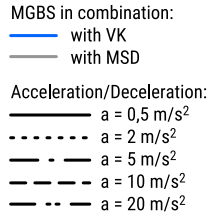


8 × 2 with a stepper motor □42



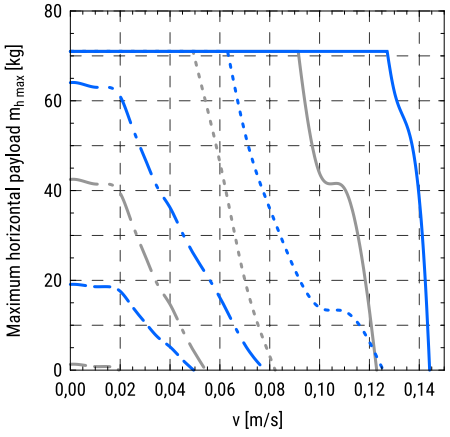
8 × 8 with a stepper motor □42



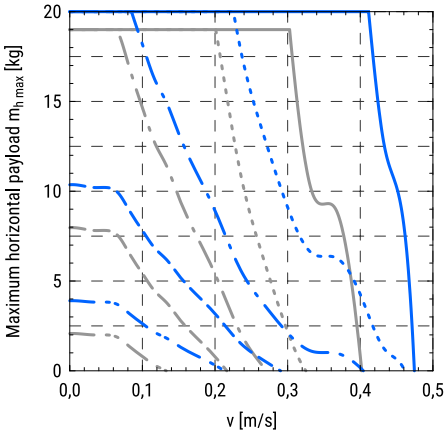


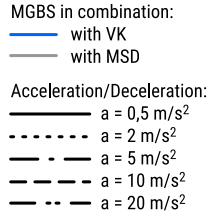
MGBS 45

10 × 3 with a stepper motor □42

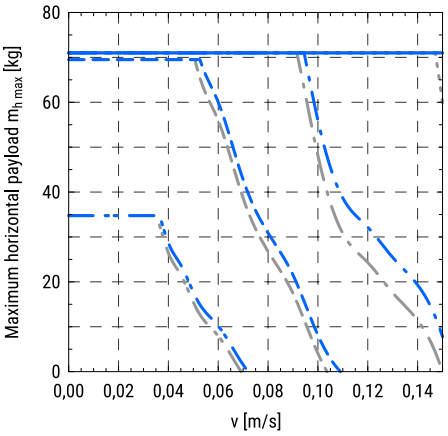


10 × 10 with a stepper motor □42

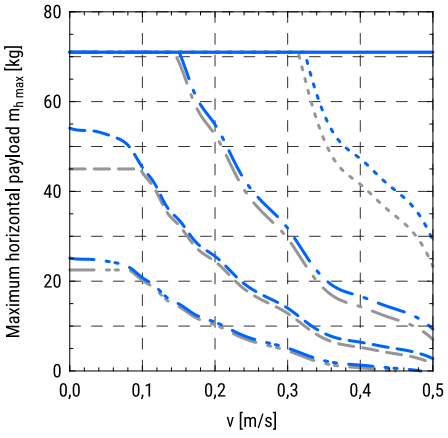




10 × 3 with a stepper motor ☐56



10 × 10 with a stepper motor ☐56

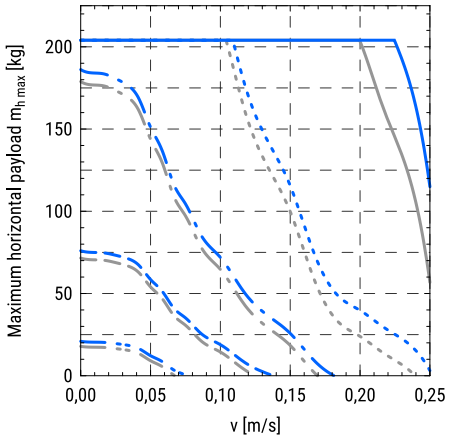


MGBS in combination:
with VK
with MSD

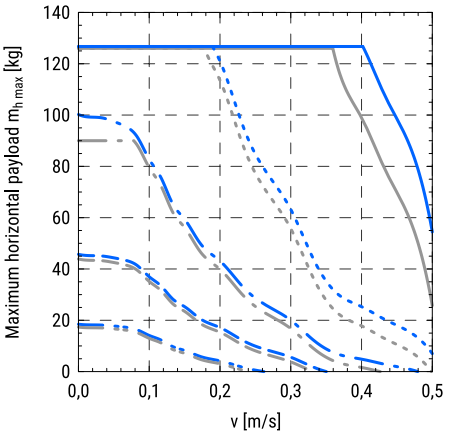
Acceleration/Deceleration:
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGBS 60

12 × 5 with a stepper motor ☐56



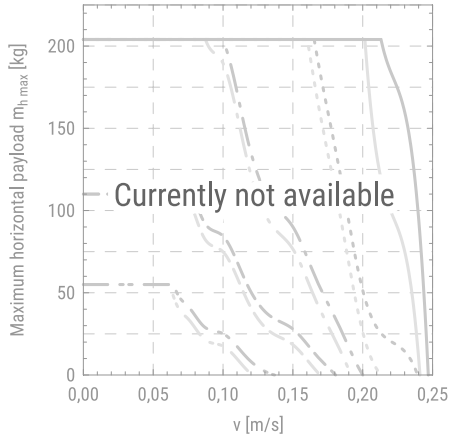
12 × 10 with a stepper motor ☐56



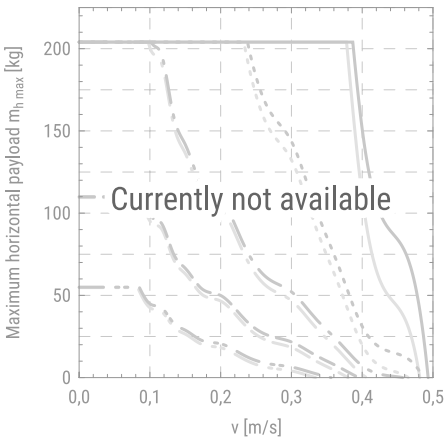
MGBS in combination:
with VK
with MSD

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

12 × 5 with a stepper motor ☐86



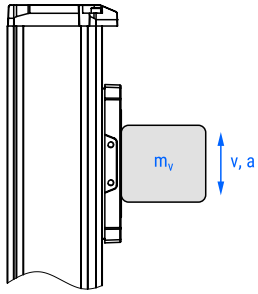
12 × 10 with a stepper motor ☐86



MGBS in combination:
with VK
with MSD

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



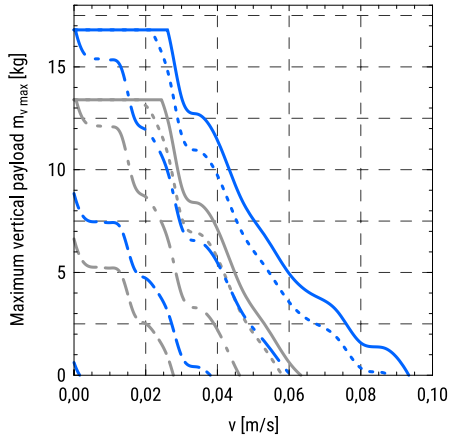
In the following diagrams, maximum vertical payloads applied to the carriage as a function of the travel speed for different accelerations, different ball screw leads and different combinations of the standard motors are presented. Motor adapter VK and a motor side drive MSD are also considered.

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.

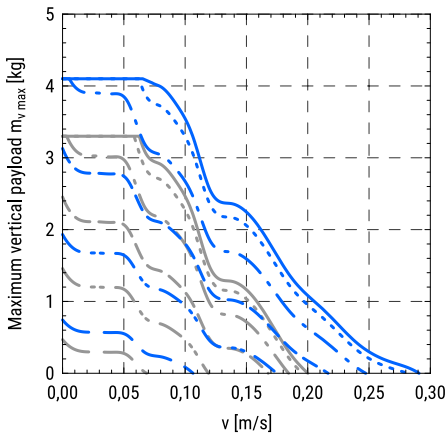
For more information please refer to the diagrams on pages 16–18.

MGBS 32

8 × 2 with a stepper motor □28



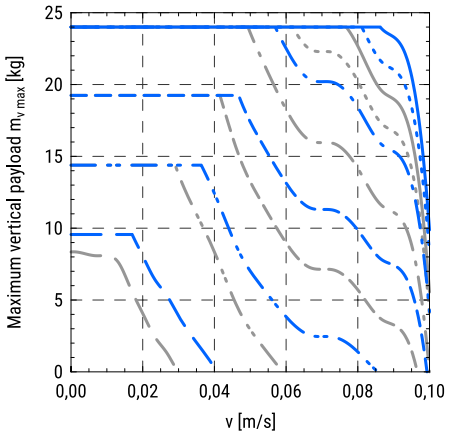
8 × 8 with a stepper motor □28



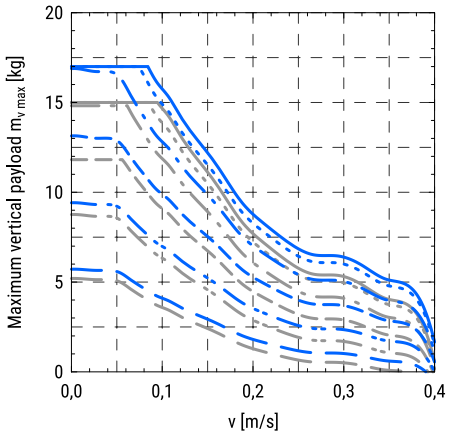
MGBS in combination:
with VK
with MSD

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

8 × 2 with a stepper motor □42



8 × 8 with a stepper motor □42

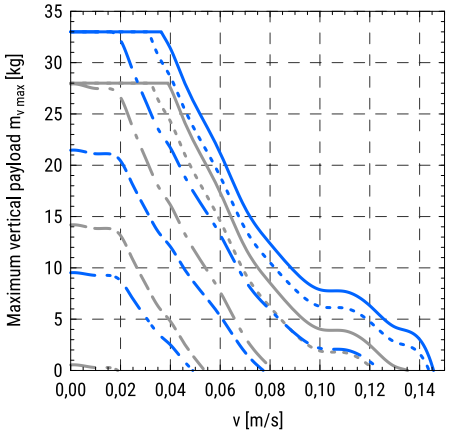


MGBS in combination:
with VK
with MSD

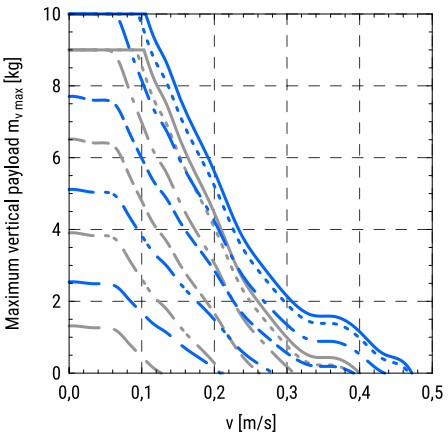
Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGBS 45

10 × 3 with a stepper motor □42



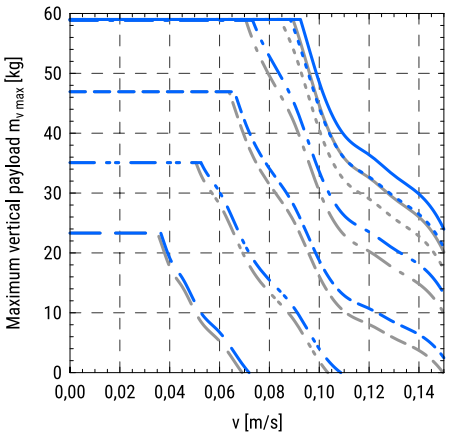
10 × 10 with a stepper motor □42



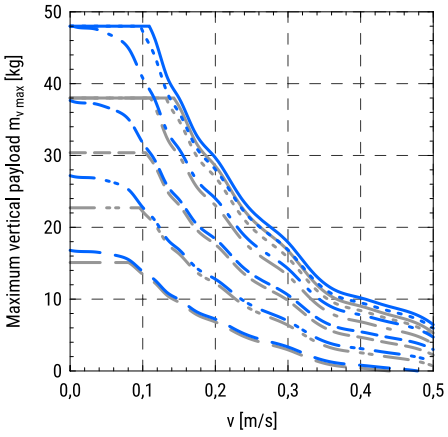
MGBS in combination:
with VK
with MSD

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

10 × 3 with a stepper motor □56



10 × 10 with a stepper motor □56

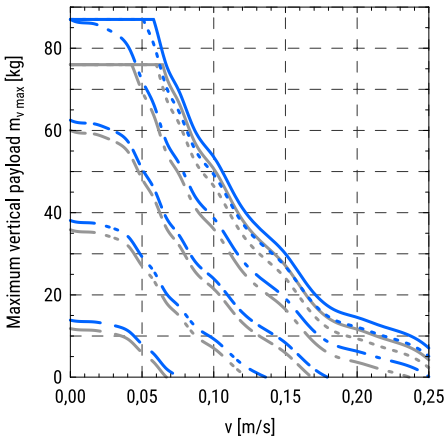


MGBS in combination:
with VK
with MSD

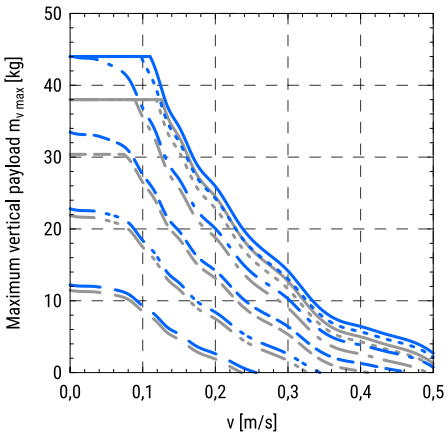
Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGBS 60

12 × 5 with a stepper motor □56



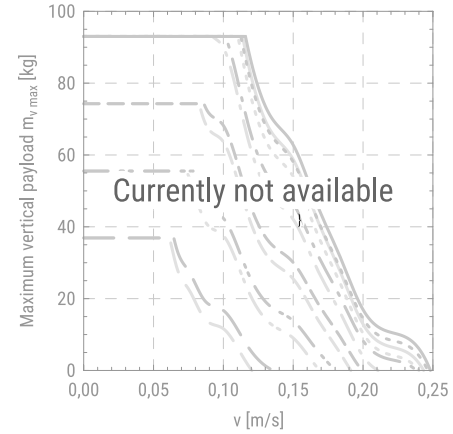
12 × 10 with a stepper motor □56



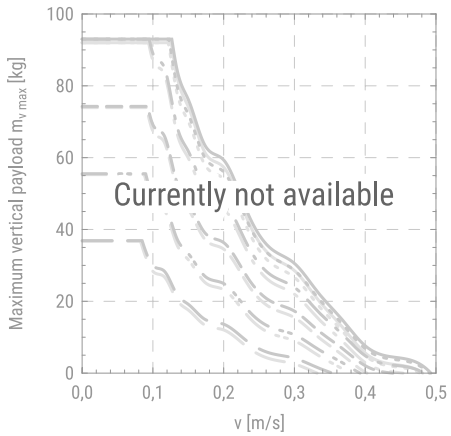
MGBS in combination:
with VK
with MSD

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

12 × 5 with a stepper motor □86



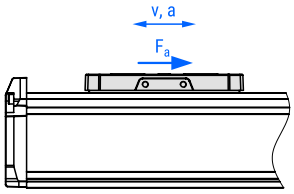
12 × 10 with a stepper motor □86



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



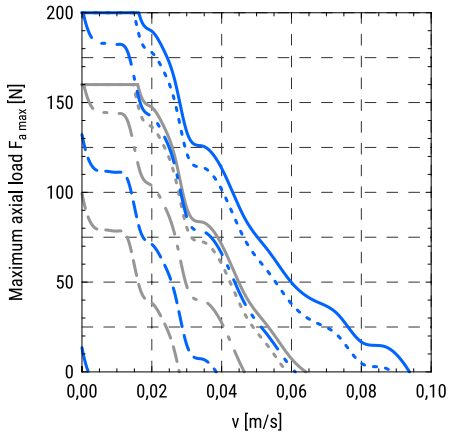
In the following diagrams, maximum axial load applied to the carriage as a function of the travel speed for different accelerations, different ball screw leads and different combinations of the standard motors is presented. Motor adapter VK and a motor side drive MSD are also considered.

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.

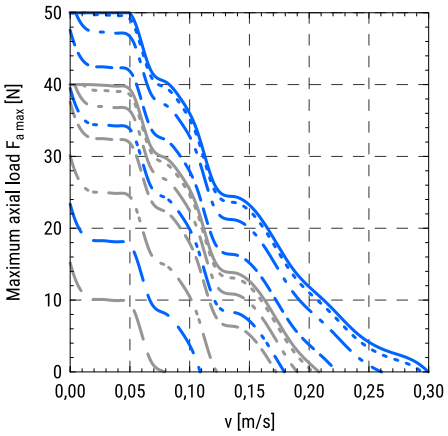
For more information please refer to the diagrams on pages 16–18.

MGBS 32

8 × 2 with a stepper motor □28



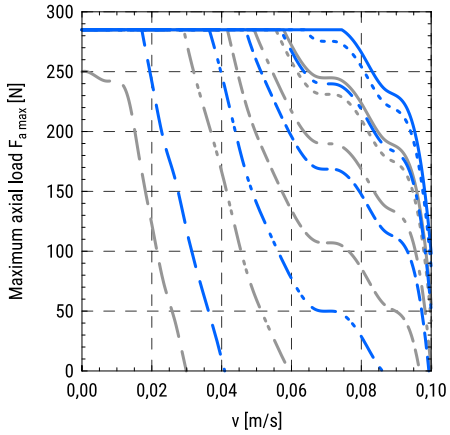
8 × 8 with a stepper motor □28



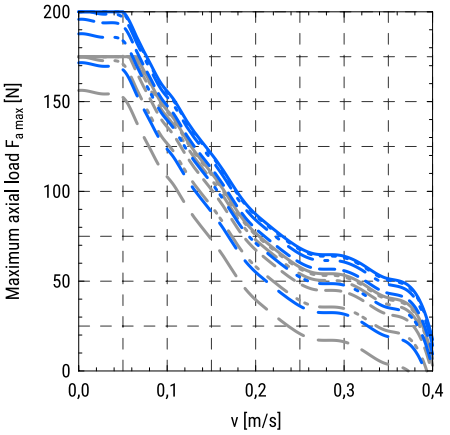
MGBS in combination:
- with VK
- with MSD

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

8 × 2 with a stepper motor □42



8 × 8 with a stepper motor □42

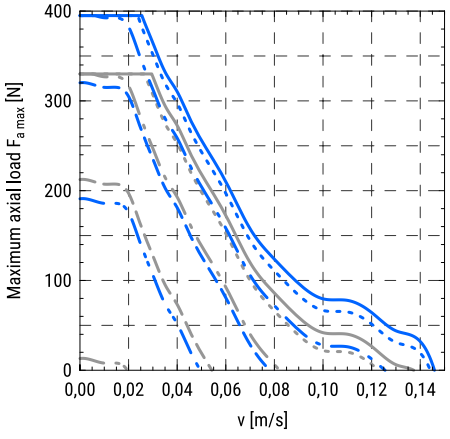


MGBS in combination:
- with VK
- with MSD

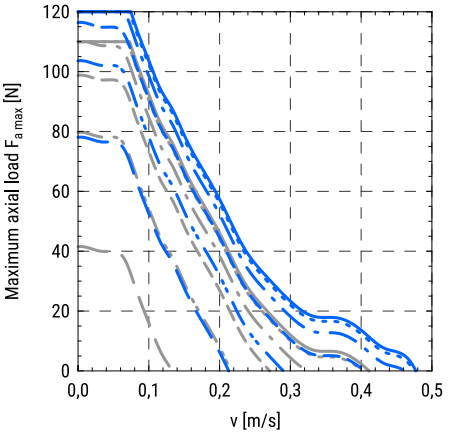
Acceleration/Deceleration:
- a = 0 m/s²
- a = 0,5 m/s²
- a = 2 m/s²
- a = 5 m/s²
- a = 10 m/s²
- a = 20 m/s²

MGBS 45

10 × 3 with a stepper motor □42



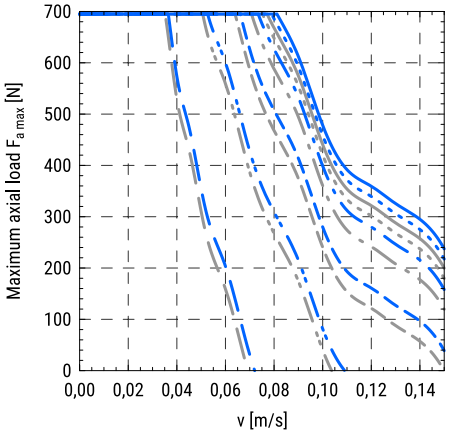
10 × 10 with a stepper motor □42



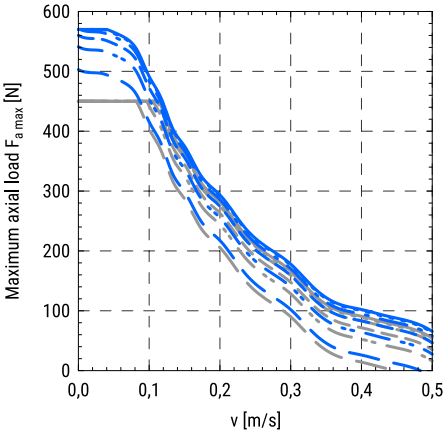
MGBS in combination:
- with VK
- with MSD

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

10 × 3 with a stepper motor □56



10 × 10 with a stepper motor □56

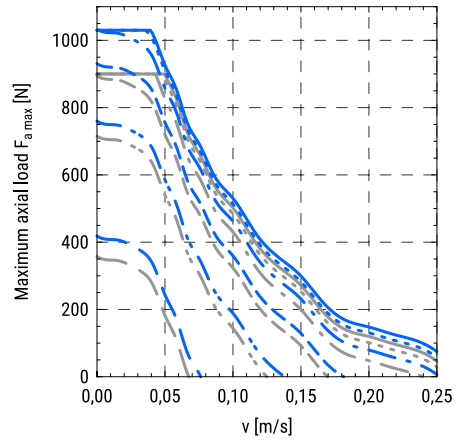


MGBS in combination:
with VK
with MSD

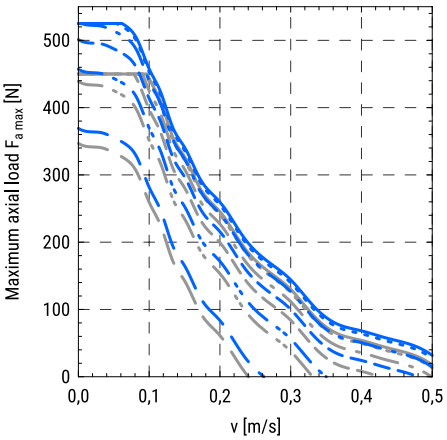
Acceleration/Deceleration:
a = 0 m/s²
a = 0,5 m/s²
a = 2 m/s²
a = 5 m/s²
a = 10 m/s²
a = 20 m/s²

MGBS 60

12 × 5 with a stepper motor □56



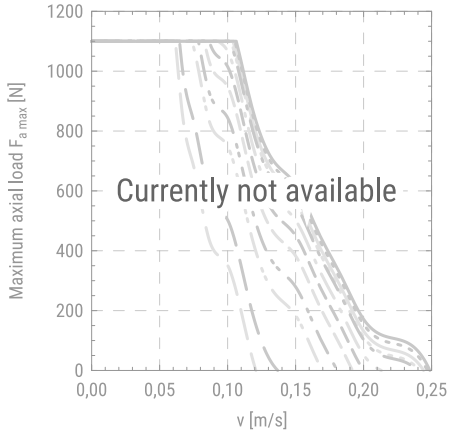
12 × 10 with a stepper motor □56



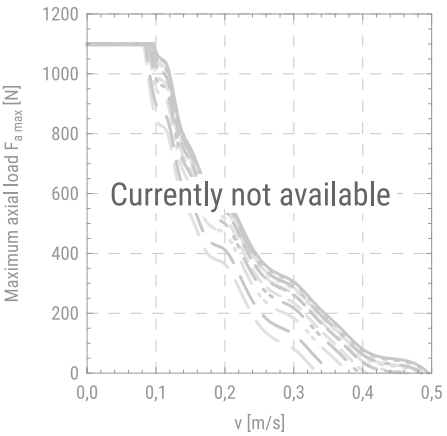
MGBS in combination:
with VK
with MSD

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

12 × 5 with a stepper motor □86



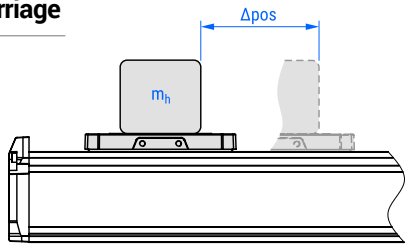
12 × 10 with a stepper motor □86



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 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.

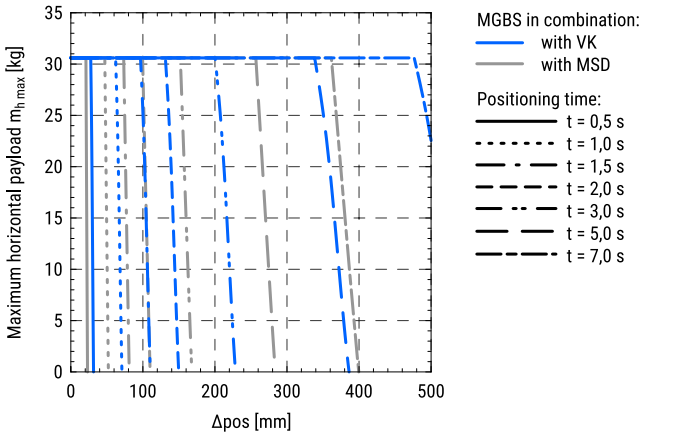
Diagrams depend on the ball screw leads and different combinations of the standard motors. Motor adapter VK and a motor side drive MSD are also considered

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.

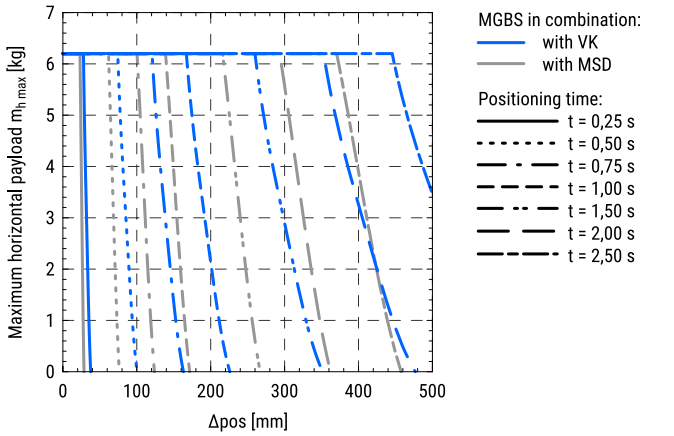
For more information please refer to the diagrams on pages 16–18.

MGBS 32

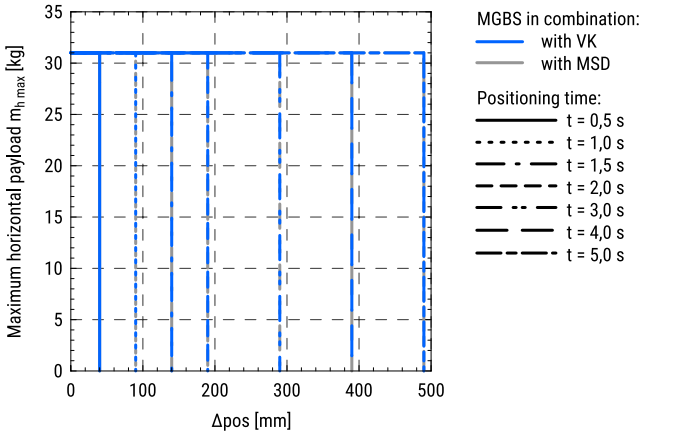
8 × 2 with a stepper motor □28



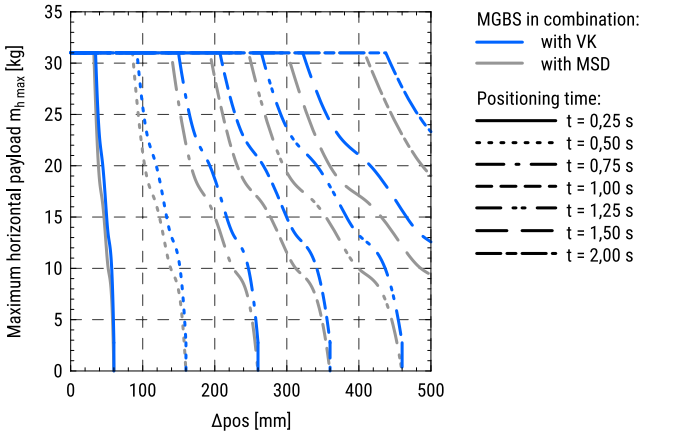
8 × 8 with a stepper motor □28



8 × 2 with a stepper motor □42

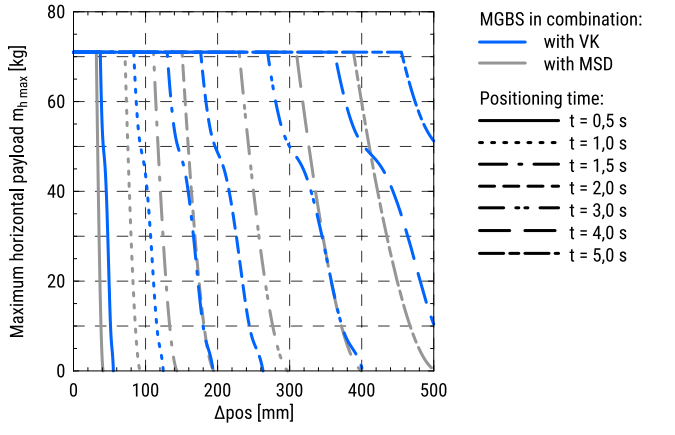


8 × 8 with a stepper motor □42

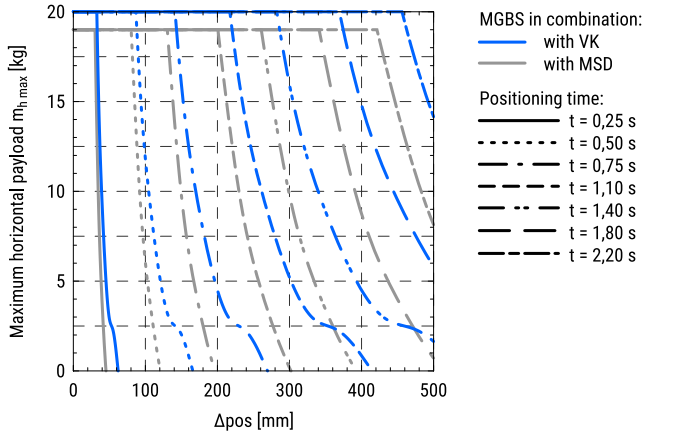


MGBS 45

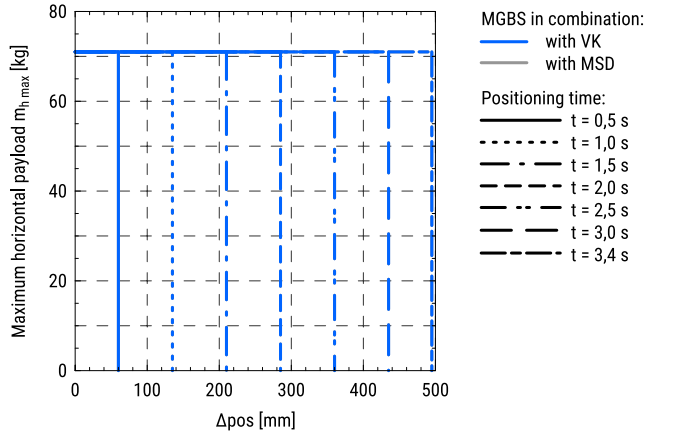
10 × 3 with a stepper motor □42



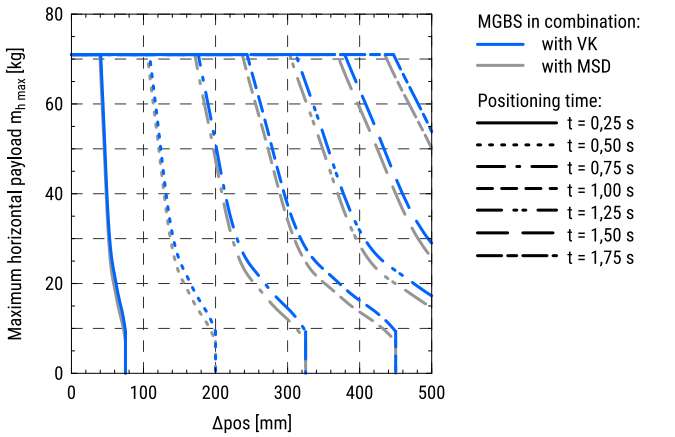
10 × 10 with a stepper motor □42



10 × 3 with a stepper motor ☐56

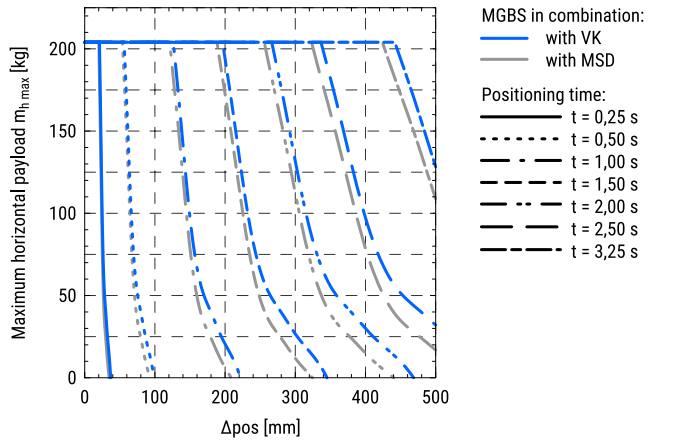


10 × 10 with a stepper motor ☐56

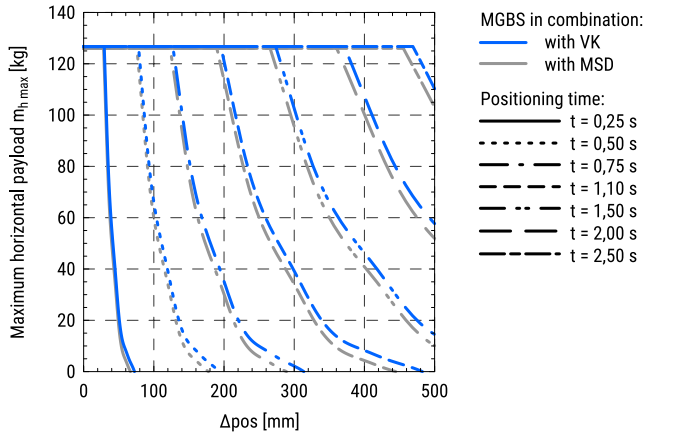


MGBS 60

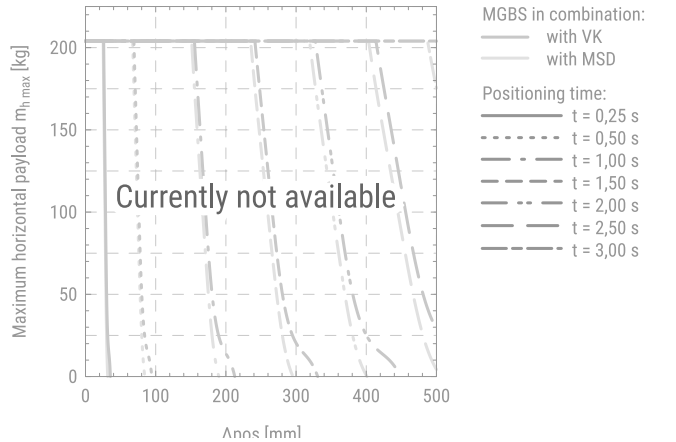
12 × 5 with a stepper motor ☐56



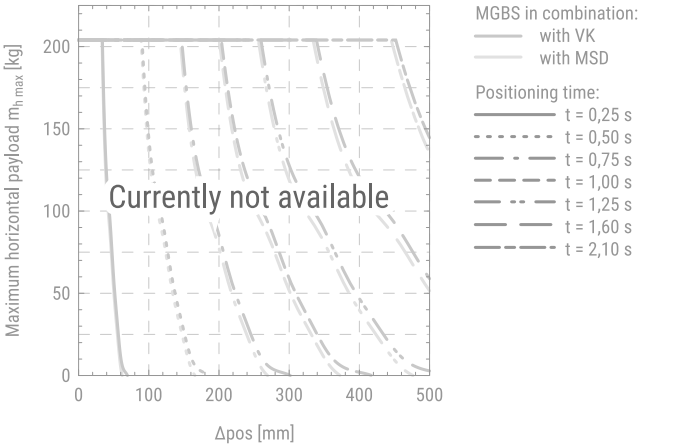
12 × 10 with a stepper motor ☐56

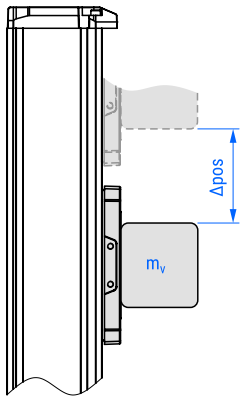


12 × 5 with a stepper motor ☐86



12 × 10 with a stepper motor ☐86





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.

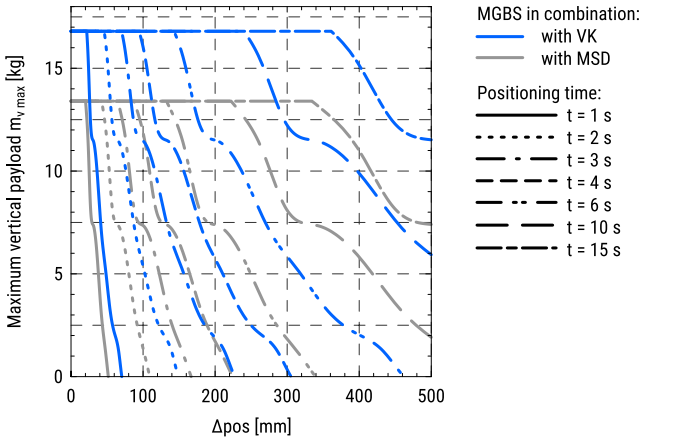
Diagrams depend on the ball screw leads and combinations of standard motors. Motor adapter VK and a motor side drive MSD are also considered.

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.

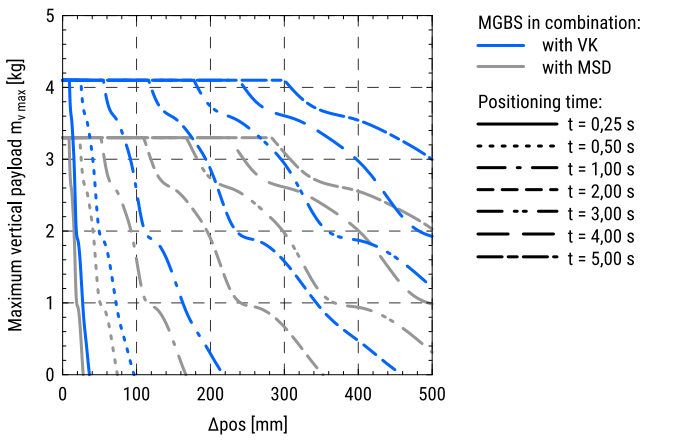
For more information please refer to the diagrams on pages 16–18.

MGBS 32

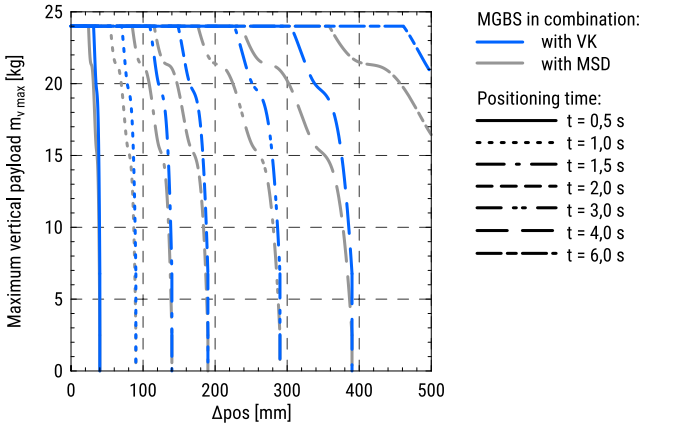
8 × 2 with a stepper motor □28



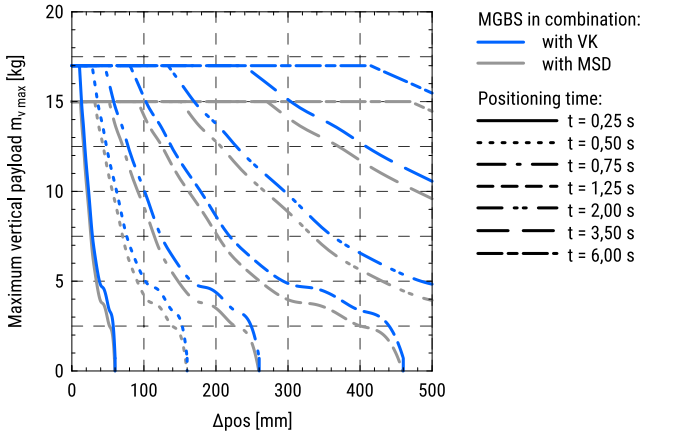
8 × 8 with a stepper motor □28



8 × 2 with a stepper motor □42

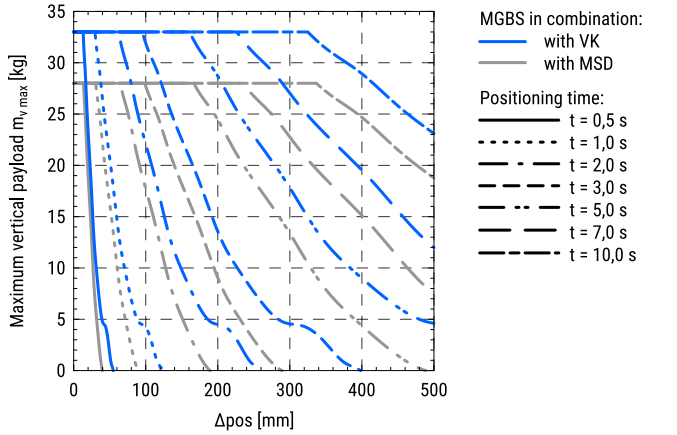


8 × 8 with a stepper motor □42

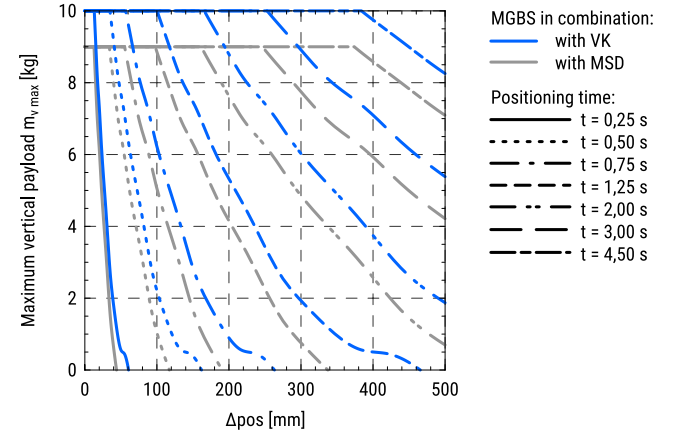


MGBS 45

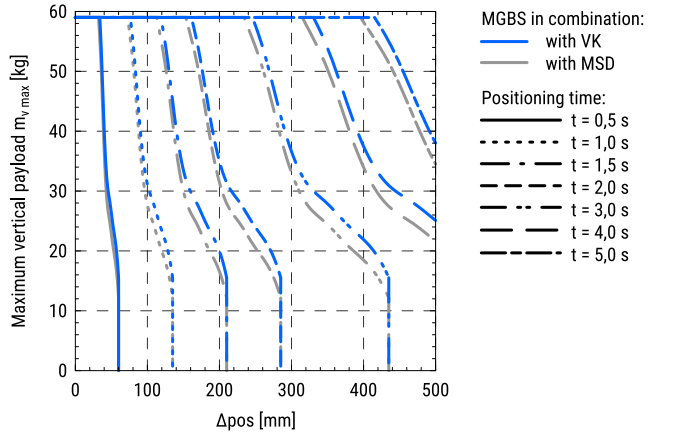
10 × 3 with a stepper motor □42



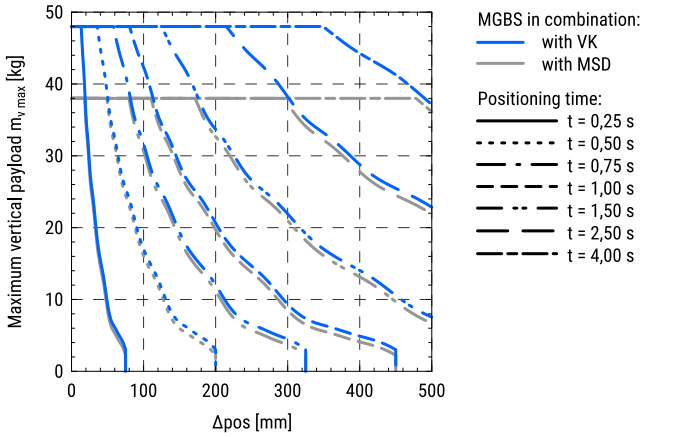
10 × 10 with a stepper motor □42



10 × 3 with a stepper motor ☐56

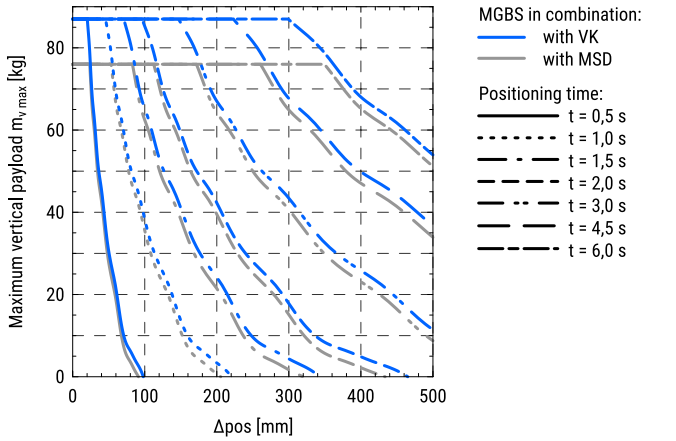


10 × 10 with a stepper motor ☐56

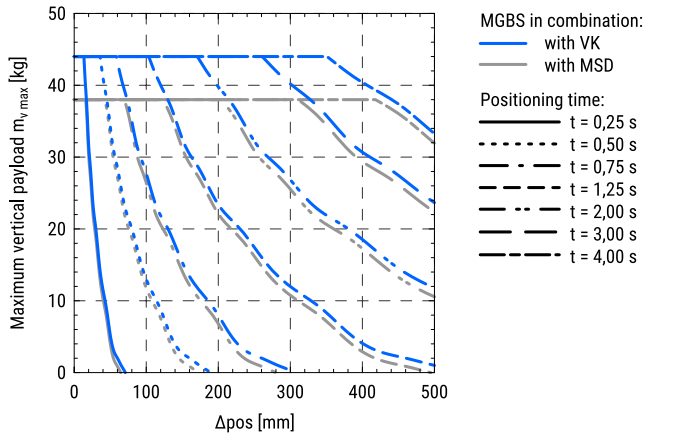


MGBS 60

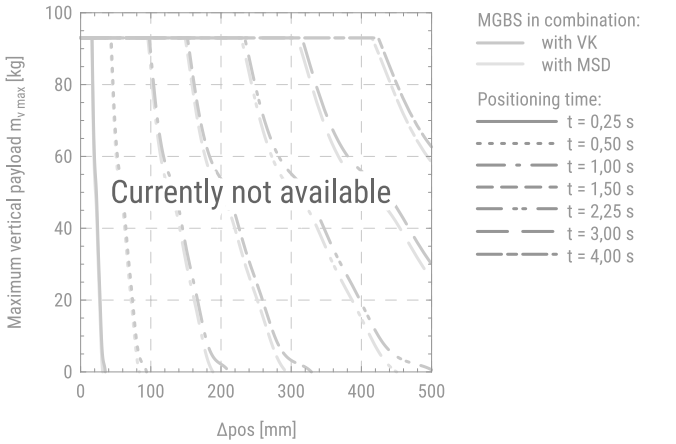
12 × 5 with a stepper motor ☐56



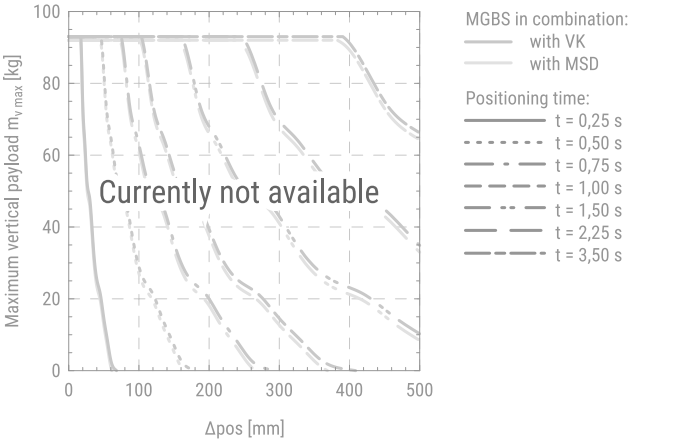
12 × 10 with a stepper motor ☐56



12 × 5 with a stepper motor ☐86



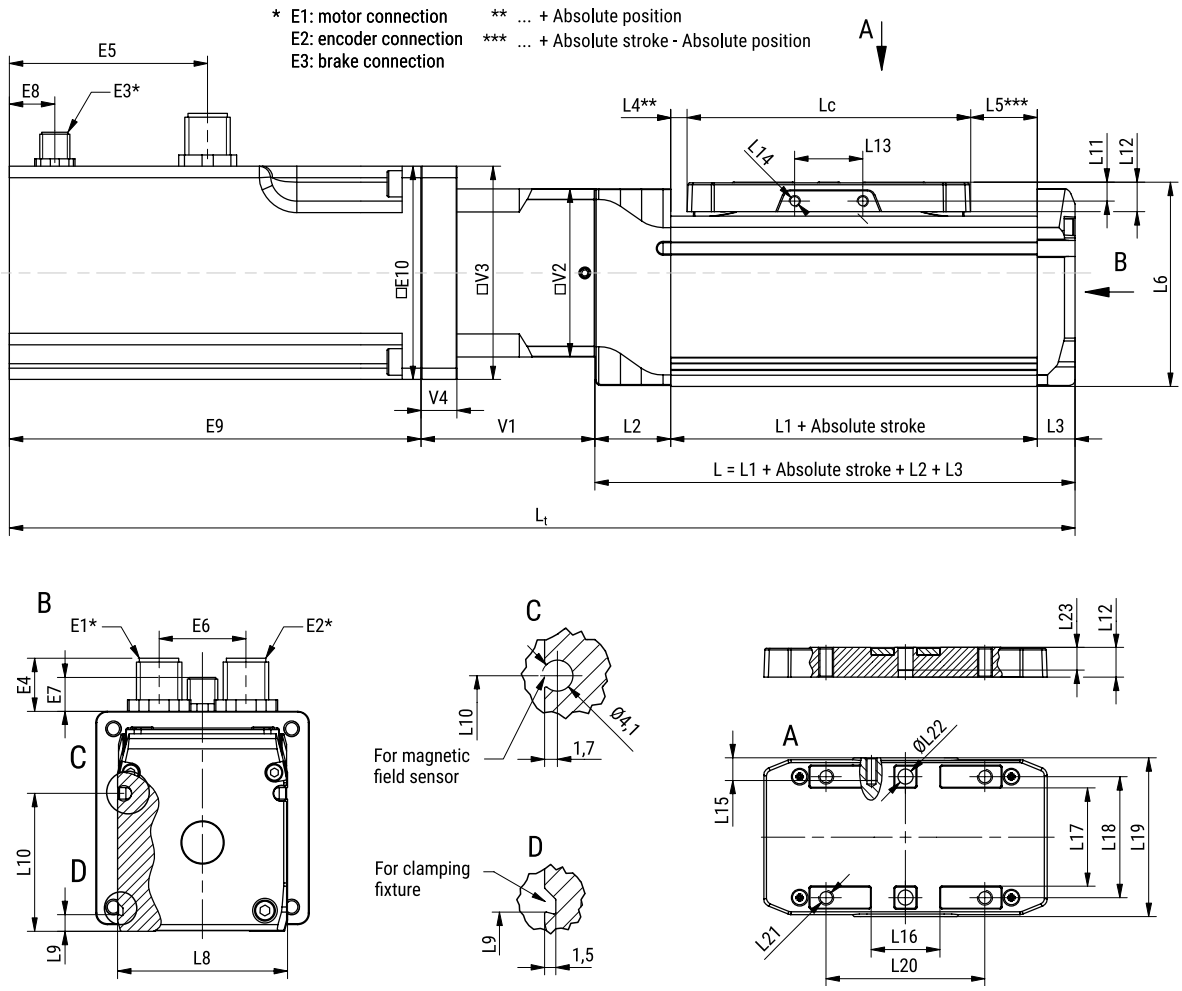
12 × 10 with a stepper motor ☐86



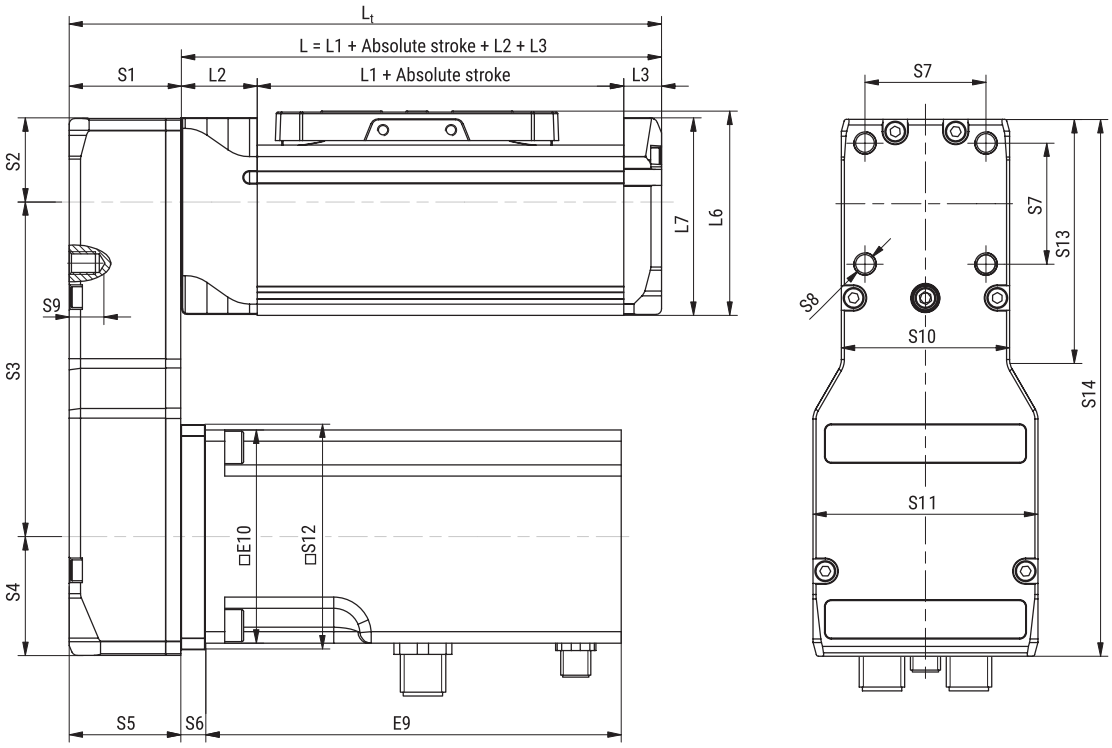
DIMENSIONS

All dimensions are in mm. The scale of the drawings may not be equal.

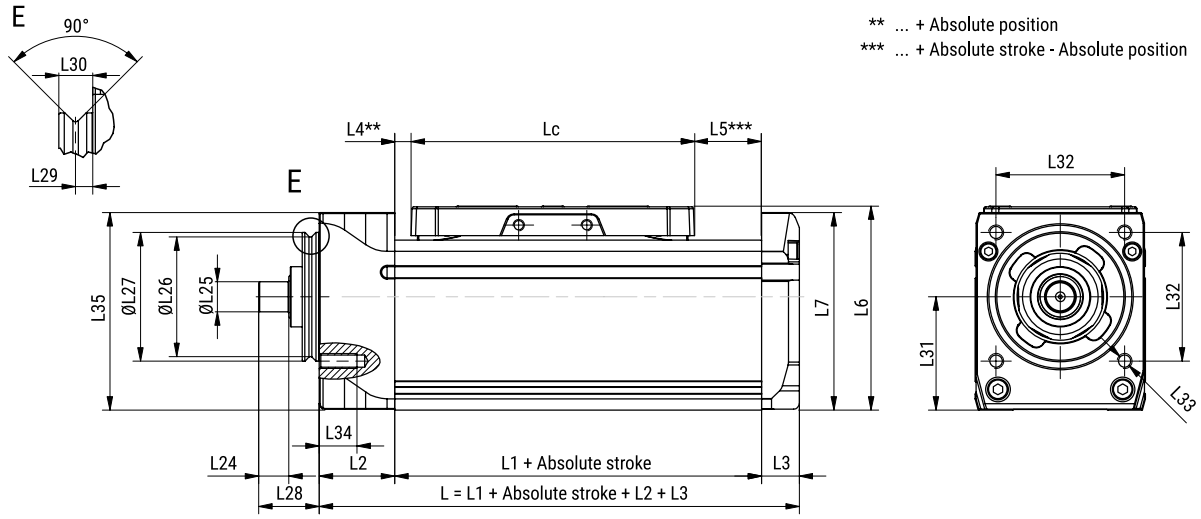
MGBS in combination with a standard motor and a motor adapter VK



MGBS in combination with a standard motor and a motor side drive MSD



MGBS without a motor



MGBS dimensions

MGBS	Lc	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	ØL22 (H7)
32	65	81,5	16	8	2,5	14	38,5	35,75	32	4,4	23,7	4	5,9	18	M2	4	14,6	18,4	22,5	30	35	M3	2
45	75	97	20	10	4,3	17,7	54	52,25	45	4,4	36,5	5	7,8	18	M3	6	18,6	26,4	32	42	42	M4	4
60	90	133	24	12	3,2	39,8	72	68,75	60	4,4	45	6	11	30	M4	6	25,4	38,4	45	57	55	M5	5

MGBS	L23	L24	ØL25 (h7)	ØL26	ØL27 (h7)	L 28	L29	L30	L31	L32	L33	L34	L35
32	5	7	5	22,6	25	14	2,3	4,5	20	24,5	M3	6	35,75
45	6	8	8	31,6	34	16	2,3	4,5	30	34	M4	10	52,25
60	8	10	10	39,6	42	20	2,3	4,5	39	48	M5	10	68,75

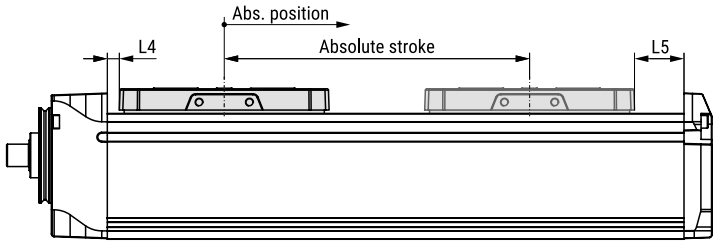
Motor adapter VK and a motor side drive MSD dimensions

MGBS	Motor		V1	□V2	□V3	V4	S1	S2	S3 (±0,5)	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14
	Type	Size □ [mm]																		
32	Stepper	28	36	31,5	31,5	0	22	15,75	52,5	17,25	22	4	22	M5	6	31,5	31,5	44,5	0	85,5
		42	40	31,5	42	5,5	22	15,75	70,5	23,75	22	4,5	22	M5	6,5	31,5	44,5	44,5	48	110
45		42	42	44,5	44,5	0	27,5	22,25	81	23,75	27,5	4,5	32	M6	8,5	44,5	44,5	59,5	0	127
		56	46	44,5	56,4	9,5	27,5	22,25	88,5	31,25	27,5	6,5	32	M6	8,5	44,5	59,5	59,5	63,5	142
60		56	52,5	59,5	59,5	0	33	29,75	96	31,25	33	6,5	38	M6	8	59,5	59,5	85,5	0	157
		86	69	59,5	86	9,5	33	29,75	121,5	44,25	33	8,5	38	M6	8	59,5	85,5	86,5	81,5	195,5

Motor dimensions

Motor			E1	E2	E3	E4 (±1)	E5 (±0,3)	E6	E7 (±1)	E8 (±0,3)	E9 (±1)	□ E10
Type	Size □ [mm]	Brake										
Stepper	28	–	Currently not available									
	28	with										
	42	–	M12 5-pole	M12 8-pole	–	14	14	19,5	–	–	70,4	42,3
	42	with	M12 5-pole	M12 8-pole	M8 3-pole	14	14	19,5	9	27	106,4	42,3
	56	–	M12 5-pole	M12 8-pole	–	14	13,4	23	–	–	98	56,4
	56	with	M12 5-pole	M12 8-pole	M8 3-pole	14	52,4	23	9	12	138	56,4
	86	–	Currently not available									
	86	with										

Absolute stroke of the MGBS definition



Dimensions L4 and L5 are presented in the dimensional drawing table above.

Absolute stroke definition

Absolute stroke = Effective stroke + 2 × Safety stroke

Mini linear unit MGBS does not include any safety stroke.
The absolute stroke is the distance between the two positions of the carriage that are as far apart as it is physically possible.

Length definition

With VK and a motor:
L_t = L + E9 + V1

With MSD and a motor:
L_t = L + S1

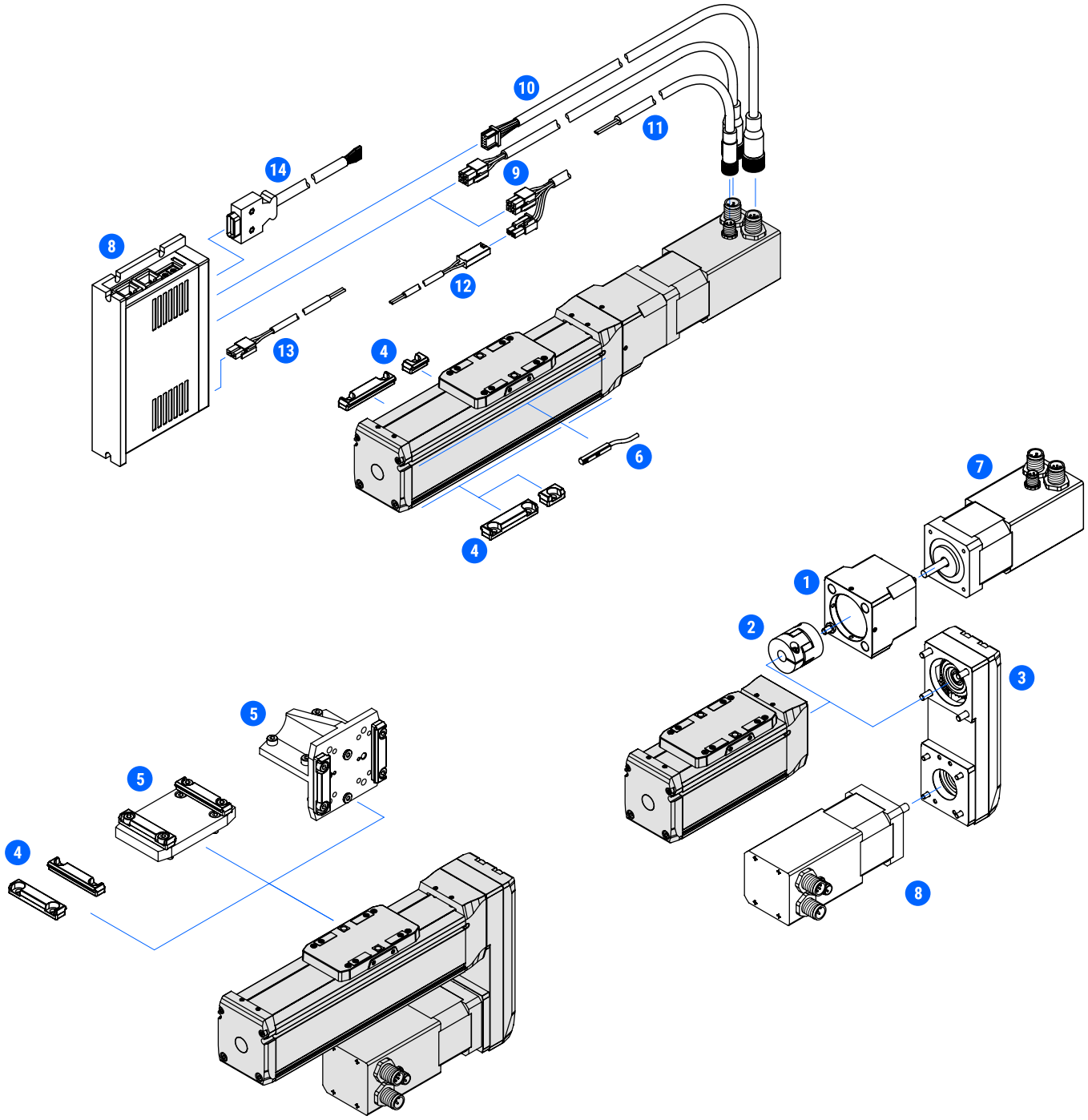
Without a motor:
L_t = L

L = L1 + Abs. stroke + L2 + L3

Lengths L and L_t are defined as it is presented in the dimensional drawings above, where the lengths of the motor, motor adapter VK and motor side drive MSD are also considered.

Abs. stroke	Absolute stroke	[mm]
Abs. position	Absolute position	[mm]
L	Length	[mm]
L_t	Total length	[mm]

ACCESSORIES



ACCESSORIES

#	Accessories	Compatible with MGBS size			Page	
		32	45	60		
1	Motor adapter VK	●	●	●	59	Motor adapters
2	Coupling	●	●	●	60	Elastomer couplings
3	Motor side drive MSD	●	●	●	61	Motor side drives
4	Clamping fixture	●	●	●	63	Mounting attachement
5	Connection plate	●	●	●	64	
6	Magnetic field sensor	●	●	●	66	Limit switches
7	Motor	●	●	●	67	Motors
8	Drive	●	●	●	68	Drives
9	Motor cable[1]	●[1]	●	●	69	Cables
10	Encoder cable	●	●	●	69	
11	Brake cable[1]	●[1]	●	●	69	
12	Brake to terminal cable[1]	●	—	—	69	
13	Power cable	●	●	●	71	
14	Signal cable	●	●	●	71	

[1] 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

Mini linear unit – MGTB

CHARACTERISTICS

The MGTB is a toothed belt driven mini linear unit where the rotary motion (rotation) of the drive shaft is converted to the linear motion (translation) of the carriage with high mechanical efficiency and low internal friction.

High-performance features such as high speed, good positioning accuracy, and high repeatability are ensured through a zero-backlash toothed belt drive and a linear guiding system.

A preassembled standard motor (with a motor adapter and a coupling) together with the standard drive, makes the system plug and drive ready. Compact dimensions and optimally selected motor combinations cover a wide range of applications.

The aluminium profile body includes side slots for clamping fixtures as well as slots for the magnetic field sensors.

Options, such as different motor sizes, together with a wide range of accessories and possible multi axis sistem combinations make this product highly flexible.

There is also an option of the mini linear unit without the preassembled motor if an individual motor is required.

There are prepared connection and centering holes on the carriage of the mini linear unit that allow mounting of the clamping fixtures, connection plates or custom applications.

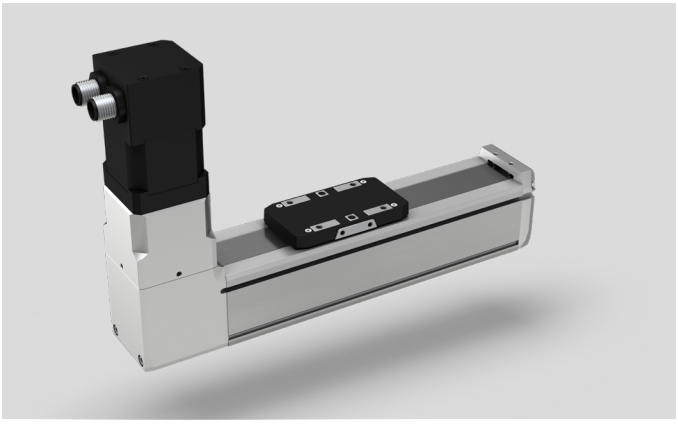
Mini linear units MGTB can be easily assembled into a multi-axis system with other MGTB or MGBS linear units and/or mini electrical cylinders MCE or mini electrical sliders MSCE.

Excellent price-performance ratio and a quick delivery time, due to standard lengths, are ensured.

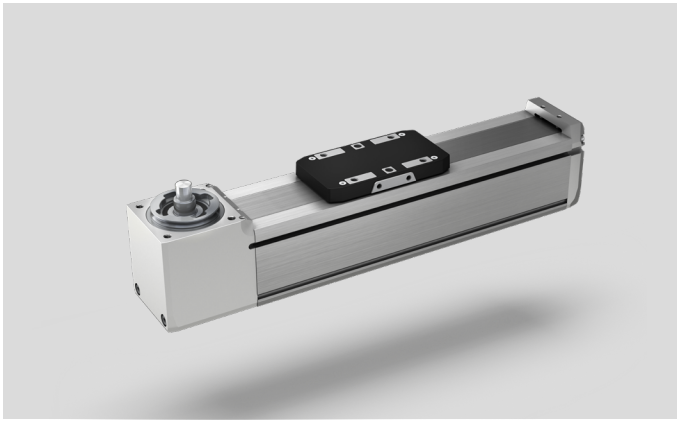
Each MGTB is optimally pre-lubricated and ready for a maintenance-free operating process.

MGTB allows relatively high load capacities and optimal cycles for moving payloads at high speeds in both horizontal and vertical directions.

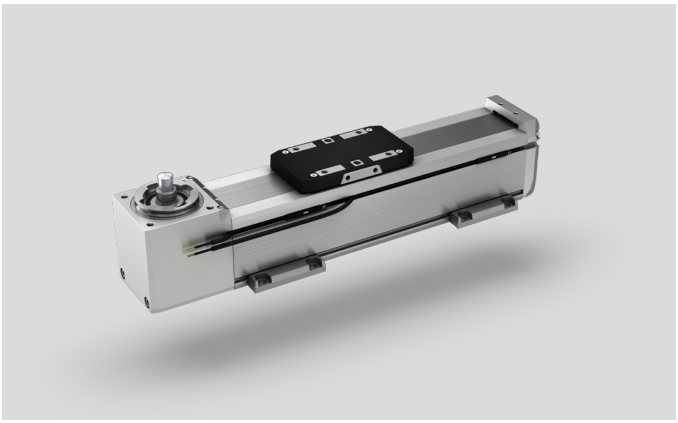
The aluminium profiles are manufactured according to the EN 12020-2 standard



Motor adapter VK with a coupling and a motor



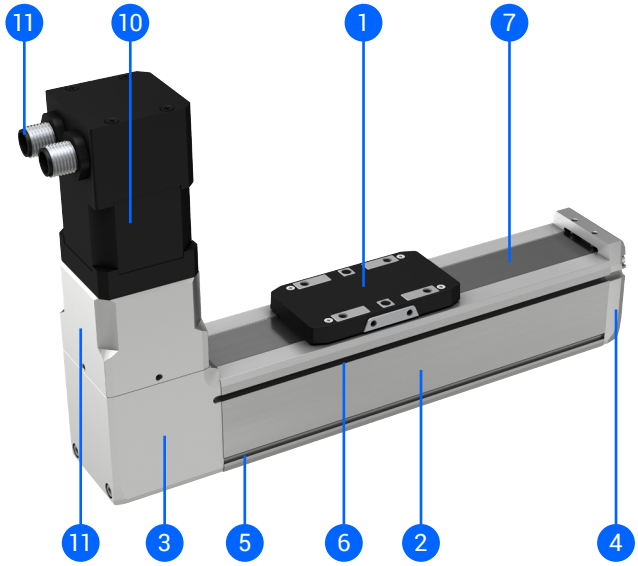
MGTB without a preassembled motor



Accessories, MGTB without a preassembled motor

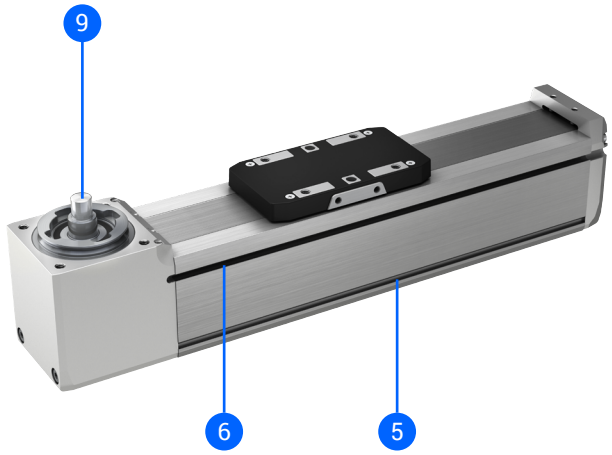
STRUCTURAL DESIGN

Combination with a standard motor and a motor adapter VK



1 – Carriage
2 – Aluminium profile
3 – Drive block with a pulley
4 – End block
5 – Mounting slots
6 – Slot for the magnetic field sensors
7 – Corrosion-resistance protection strip
8 – Motor adapter VK with a coupling
9 – The Drive shaft of the pulley
10 – Preassembled motor (with/without a brake)
11 – Standard connectors (motor, encoder and brake – optionally)

Without a motor



HOW TO ORDER

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

Absolute stokes of 1800 and 2000 mm are only available for the MGTB 60 unit.

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

For more details please refer to the section "Electrical data → Motor types and sizes"

Motor mounting option:
– Leave blank: Without a motor

A B

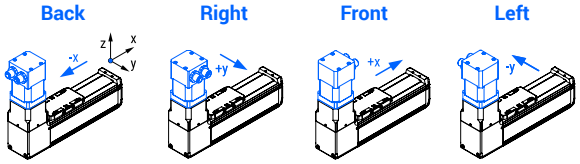
Mounting option:
– A: With a motor adapter VK

If a motor is selected only the option with a motor adapter VK is available.

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

In combination with motor adapter VK

Back Right Front Left



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

Length of cable = 2 m
For more details, please refer to section "Electrical data → Power and signal cables"

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

Length of the cable = 2 m
Signal cable is mandatory for the following cases:
– If a motor with brake is used
– If a pulse-direction drive control is used
– If the limit switches are used
For more details, please refer to the section "Electrical data → Power and signal cables"

Drive-motor cables option:
– Leave blank: Without 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

For more details, please refer to the section "Electrical data → Drive-motor cables"

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

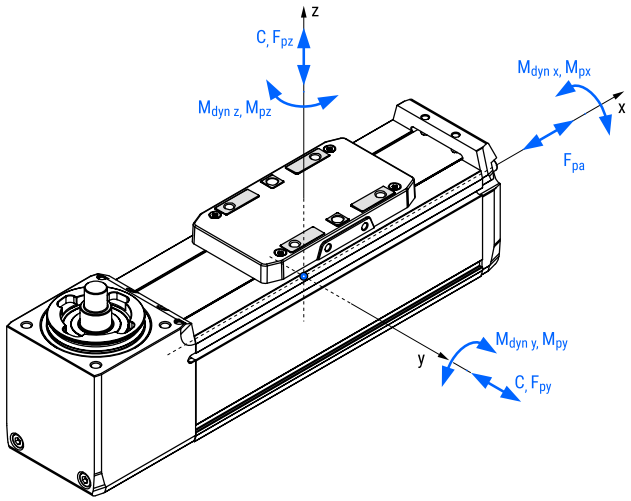
For more details, please refer to the section "Electrical data → Drive types"

TECHNICAL DATA

General technical data

MGTB	Dynamic load capacity[1]	Dynamic moments[1]			Max. permissible loads					Max. repeatability[2]	Absolute stroke
					Forces		Moments				
	C [N]	$M_{dyn\,x}$ [Nm]	$M_{dyn\,y}$ [Nm]	$M_{dyn\,z}$ [Nm]	F_{py} [N]	F_{pz} [N]	M_{px} [Nm]	M_{py} [Nm]	M_{pz} [Nm]	[mm]	[mm]
32	1310	4,8	4,1		200	300	2,0	1,8	1,3	±0,08	100, 200, 300, 400, 500, 600, 700, 800, 1000, 1200, 1400, 1600
45	3240	20,1	17,4		400	700	7,4	6,3	4,7	±0,08	100, 200, 300, 400, 500, 600, 700, 800, 1000, 1200, 1400, 1600
60	11190	77,4	79,8		850	2000	29,2	30,8	31,8	±0,08	100, 200, 300, 400, 500, 600, 700, 800, 1000, 1200, 1400, 1600, 1800, 2000

[1] Dynamic load capacity and dynamic moments of the linear guiding system.
These values are the basis for calculating the service life.
[2] Valid for one-directional axial load.



Drive data

In Combination with a standard motor and a motor adapter VK

MGTB + motor and VK	Pulley-drive ratio	Pulley diameter	Motor		Max. permissible axial load[1, 3]	Max. permissible payload[1, 3]		Max. travel speed[2]	Max. rotational speed[2]	Max. acceleration
						Horizontal	Vertical			
	[mm/rev]	[mm]	Type	Size □ [mm]	F_{pa} [N]	m_{ph} [kg]	m_{pv} [kg]	v_{max} [m/s]	n_{max} [rev/min]	a_{max} [m/s²]
32	66	21,00	Stepper	42	25	0,9	0,9	1,500	1365	20
45	63	20,05		42	10	0,9	0,7	1,344	1280	20
				56	85	6,2	6,2	1,500	1430	
60	78	24,83		56	55	3,6	3,6	1,500	1155	20
				86	Currently not available					

[1] This value depends on the selected motor, travel speed and acceleration of the carriage (see the following diagrams relating to the combinations with the standard motors). MGTB with an absolute stroke of 500 mm is considered.
[2] Valid for the entire stroke range.
[3] Cariage acceleration of 2 m/s² is considered.

Without a motor

MGTB without a motor	Pulley-drive ratio	Pulley diameter	Max. permissible axial load[1]	Max. permissible payload[1,2]		Max. drive torque	No load torque	Max. permissible radial load on shaft	Max. travel speed[1]	Max. rotational speed[1]	Max. acceleration
				Horizontal	Vertical						
	[mm/rev]	[mm]	F_{pa} [N]	m_{ph} [kg]	m_{pv} [kg]	M_p [Nm]	M_0 [Nm]	F_{pr} [N]	v_{max} [m/s]	n_{max} [rev/min]	a_{max} [m/s²]
32	66	21,00	65	31	5,4	0,68	0,07	50	1,500	1365	20
45	63	20,05	85	42	7,1	0,85	0,20	100	1,500	1430	20
60	78	24,83	130	65	11	1,61	0,40	200	1,500	1155	20

[1] Valid for the entire stroke range.
[2] Cariage acceleration of 2 m/s² is considered.

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

Recommended values of loads:

All the data of the dynamic load capacities (of the linear guiding system) stated in the tables above are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety and service life.

We recommend a minimum dynamic safety factor of 5,0 or more. Please refer to page 75, where the calculation of the safety factor of the linear guiding system and how the applied load affects the service life are presented.

Mass and mass moment of inertia

MGTB without a motor	Moved mass[1]	Mass of the linear unit[2]	Mass moment of inertia
	$m_{m,\ MGTB}$ [kg]	m_{MGTB} [kg]	J_{MGTB} [10^{-2} kg cm²]
32	0,06	0,37 + 0,0012 × Abs. stroke	9,19 + 0,0024 × Abs. stroke + 110,339 × m_{load}
45	0,15	0,92 + 0,0023 × Abs. stroke	18,80 + 0,0022 × Abs. stroke + 100,536 × m_{load}
60	0,45	2,12 + 0,0041 × Abs. stroke	81,72 + 0,0040 × Abs. stroke + 154,110 × m_{load}

[1] The moved mass is already considered in the equation for calculating the mass of the linear unit m_{MGTB} and the mass moment of inertia J_{MGTB}. The moved mass includes the mass of the carriage.
[2] For combination with standard motor and motor adapter VK the mass m_{MGTB} should be increased by m_{VK+m}, see the table below.

Abs. stroke	Absolute stroke	[mm]
m_{load}	Applied mass to be moved	[kg]

Additional mass of the linear unit when combining the motor with the motor adapter VK

MGTB	Motor		Motor without a brake	Motor with a brake
			Mass of the motor and motor adapter VK	
	Type	Size □ [mm]	m_{VK+m} [kg]	
32	Stepper	42	0,52	0,65
45		42	0,57	0,70
		56	1,31	1,50
60		56	1,50	1,69
		86	Currently not available	

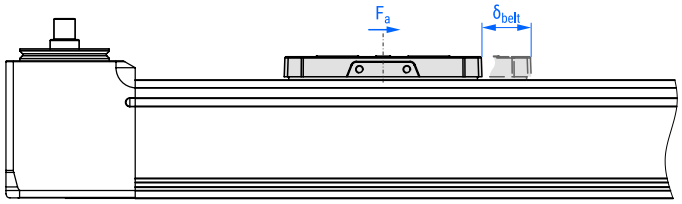
Planar moment of inertia

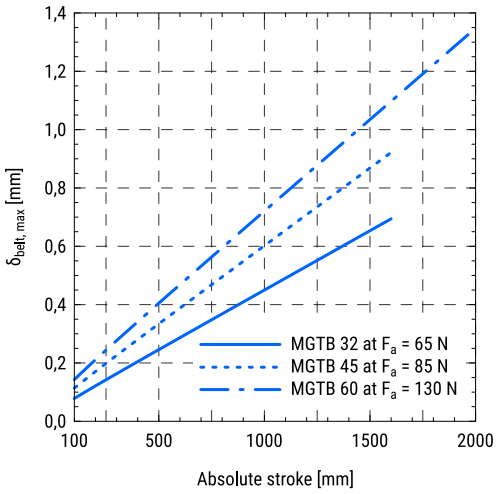
MGTB	Profile	
	I_y [cm⁴]	I_z [cm⁴]
32	4,3	4,6
45	14,3	15,9
60	43,8	50,3

Holding torque of a motor brake

Motor		Holding torque (brake) [Nm]
Type	Size □ [mm]	
Stepper	42	0,4
	56	1,0
	86	Currently not available

Deformation of the toothed belt under an axial load



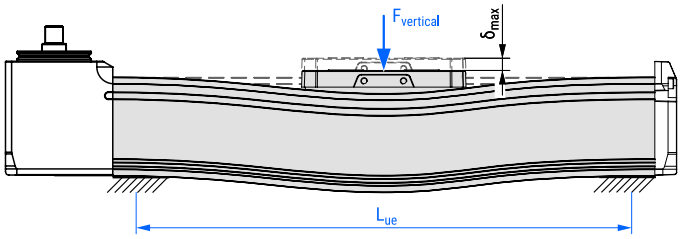


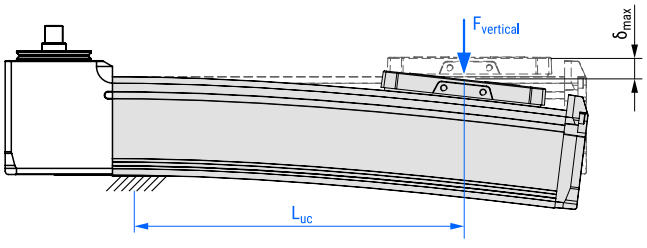
In the following diagram, the maximal toothed belt elongation in respect of the absolute stroke and a given axial load is presented.

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.

For more information about the absolute stroke please refer to the section “Dimensions → Absolute stroke and length of the MGTB definition”.

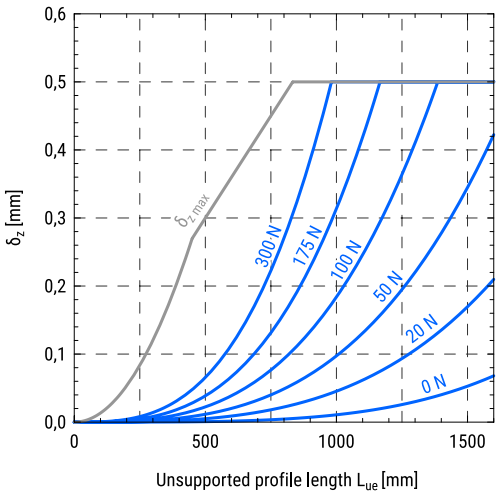
Deflection of the linear unit as a function of a vertical force and the unsupported profile length

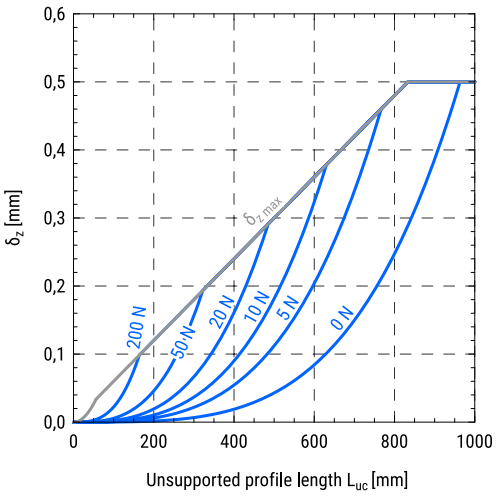




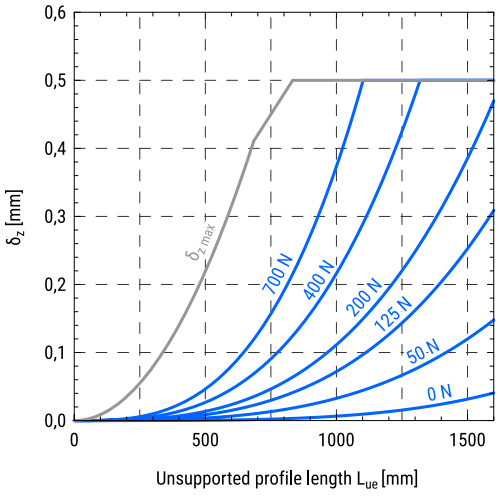
In the following diagrams, the deflection of the linear unit as a function of a vertical force and unsupported profile length is presented. For the case of both ends of the profile are supported and for the case of a console mounting the left and the right diagrams below should be considered, respectively.

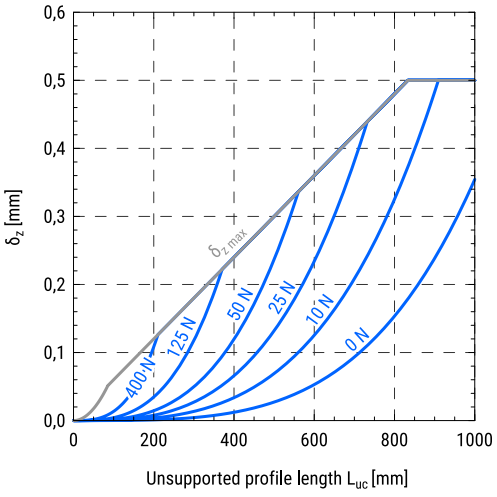
MGTB 32



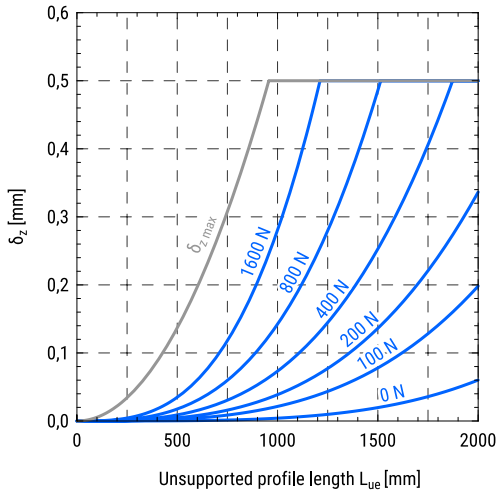


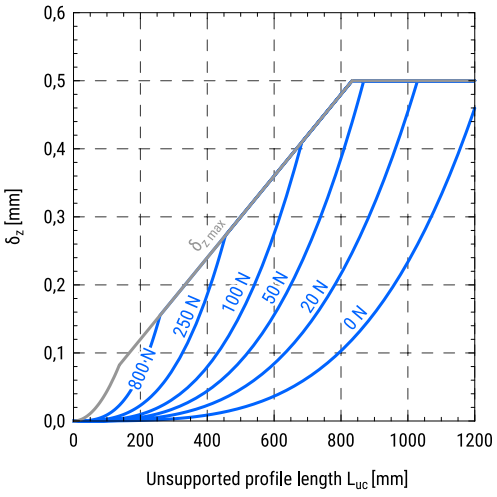
MGTB 45



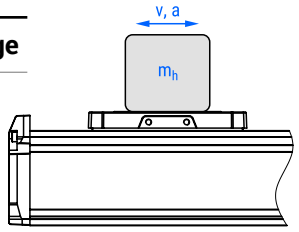


MGTB 60





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

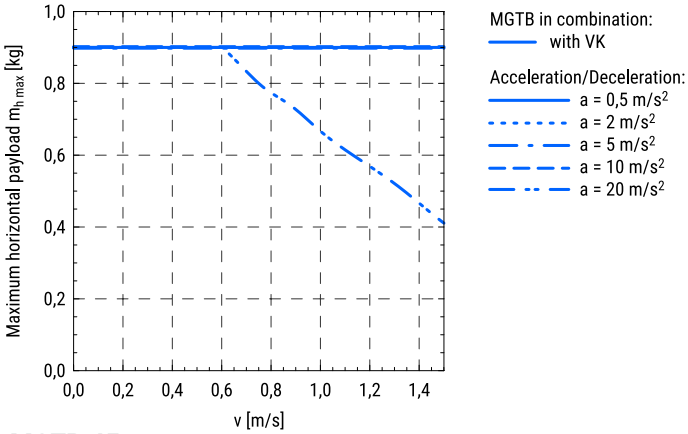


In the following diagrams, maximum horizontal payloads applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors are presented. Motor adapter VK is considered.

The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.

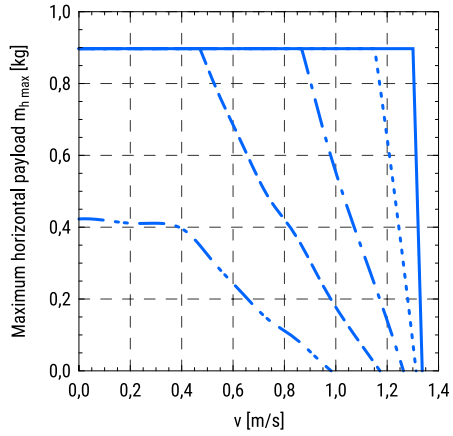
MGTB 32

With a stepper motor ☐42

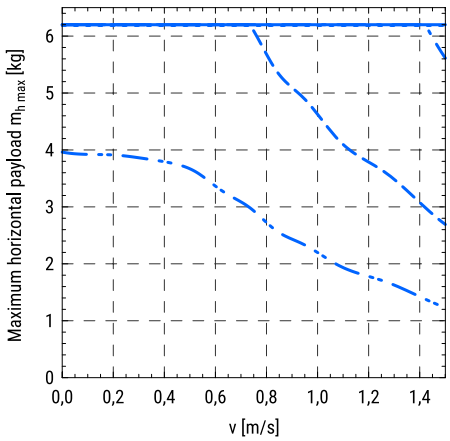


MGTB 45

With a stepper motor ☐42

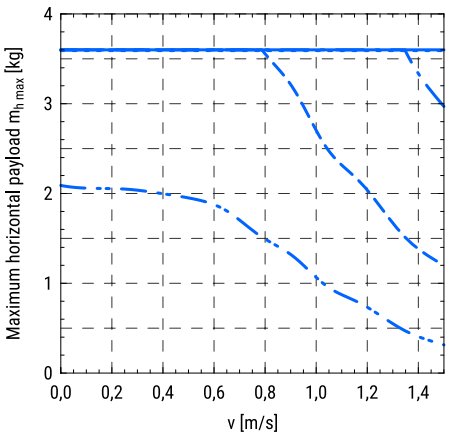


With a stepper motor ☐56

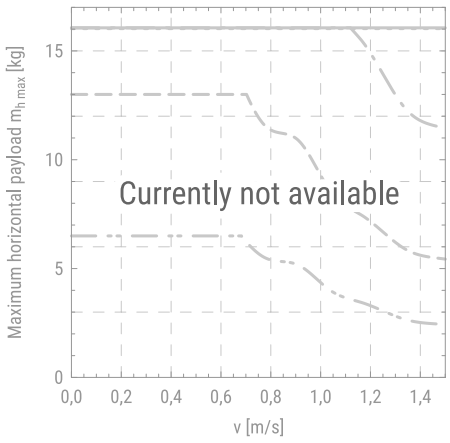


MGTB 60

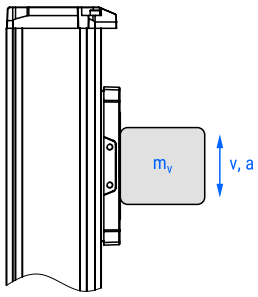
With a stepper motor ☐56



With a stepper motor ☐86



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

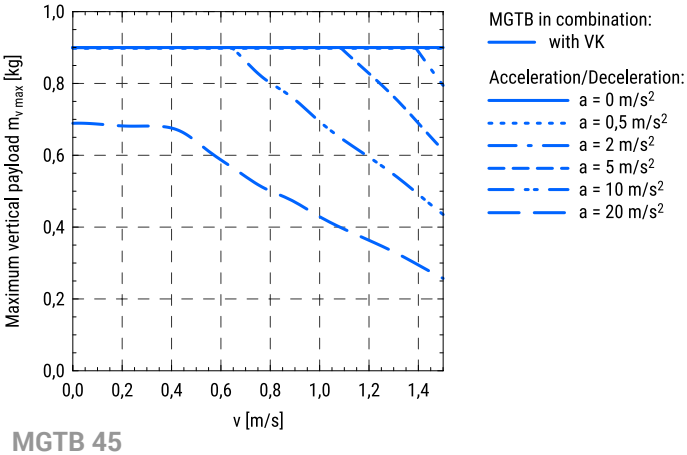


In the following diagrams, the maximum vertical payloads applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors are presented. Motor adapter VK is considered.

The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.

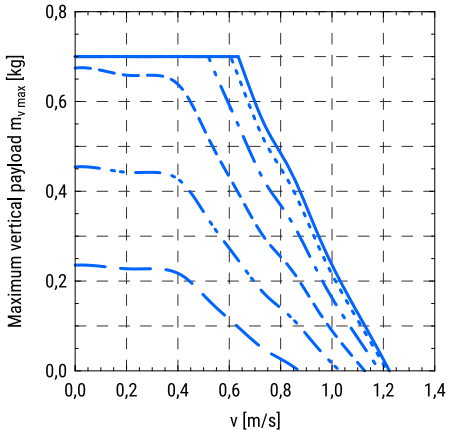
MGTB 32

With a stepper motor ☐42

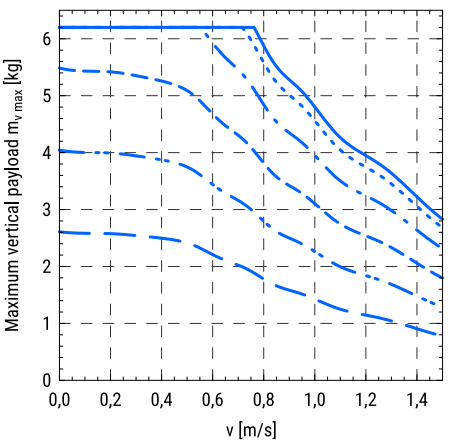


MGTB 45

With a stepper motor ☐42

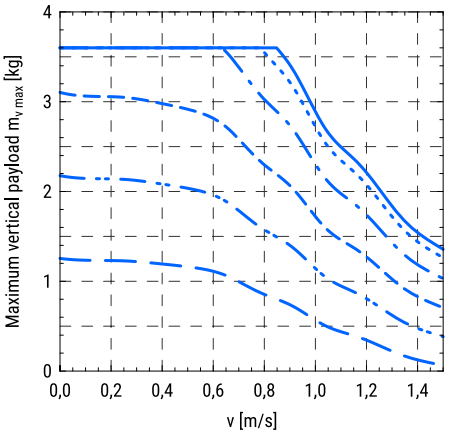


With a stepper motor ☐56

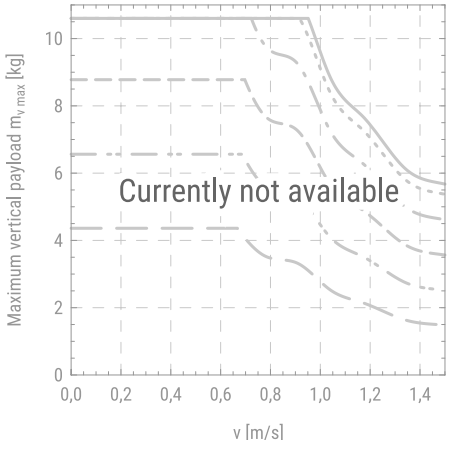


MGTB 60

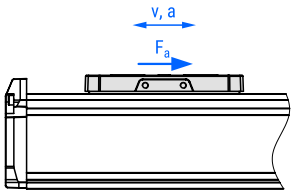
With a stepper motor ☐56



With a stepper motor ☐86



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

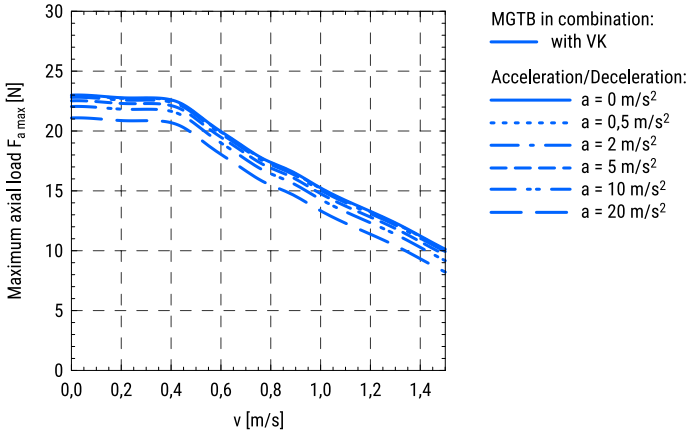


In the following diagrams, the maximum axial load applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors is presented. Motor adapter VK is considered.

The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.

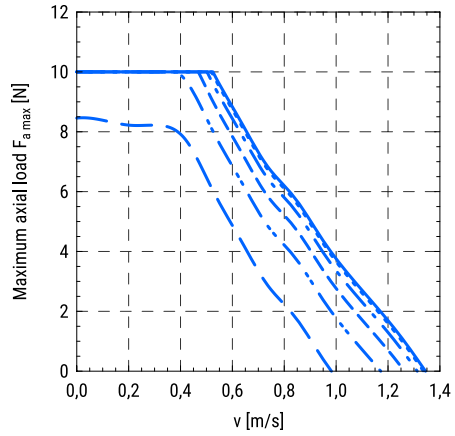
MGTB 32

With a stepper motor ☐42

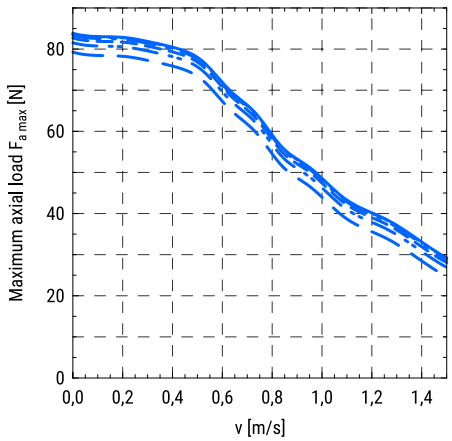


MGTB 45

With a stepper motor ☐42

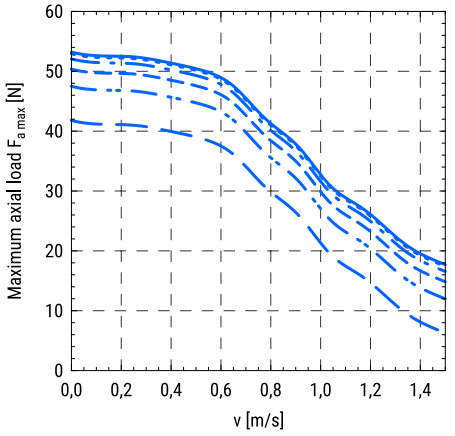


With a stepper motor ☐56

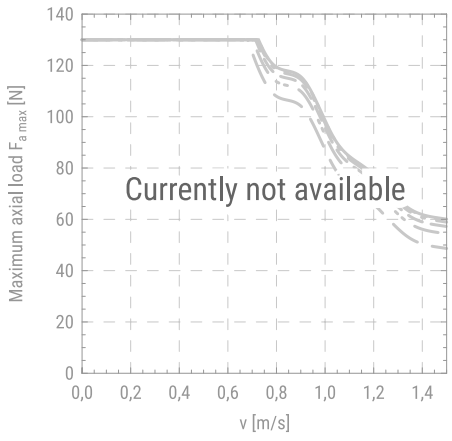


MGTB 60

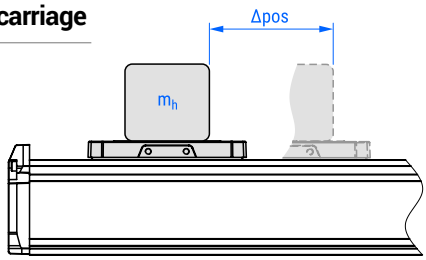
With a stepper motor ☐56



With a stepper motor ☐86



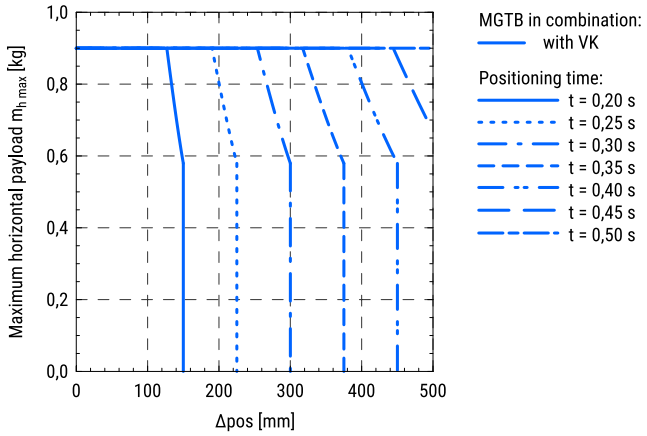
Maximum horizontal payload as a function of position change and positioning time of the carriage



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.

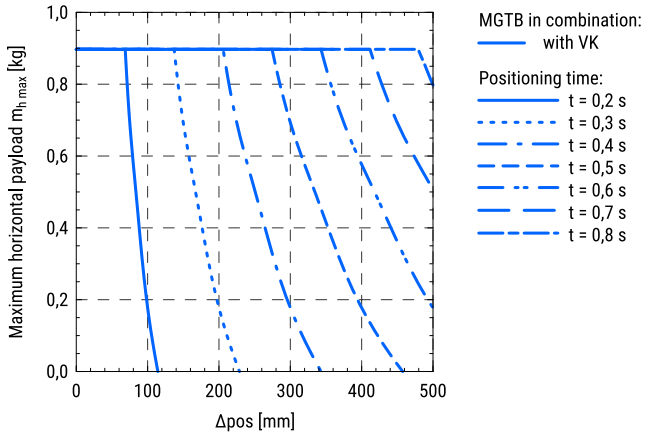
MGTB 32

With a stepper motor ☐42

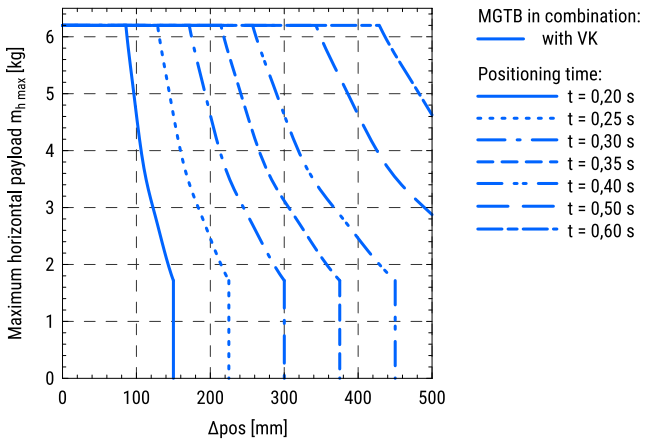


MGTB 45

With a stepper motor ☐42

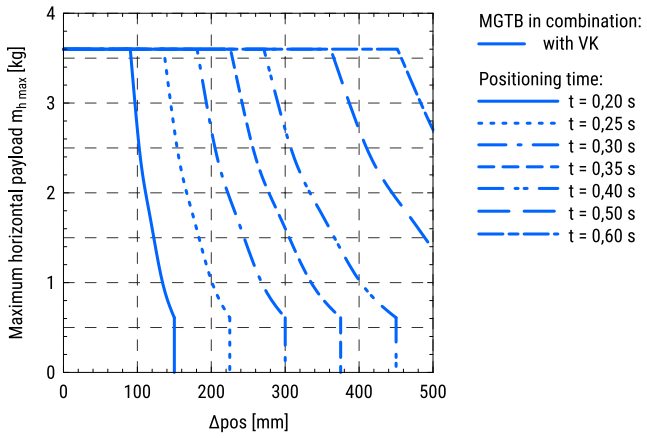


With a stepper motor ☐56

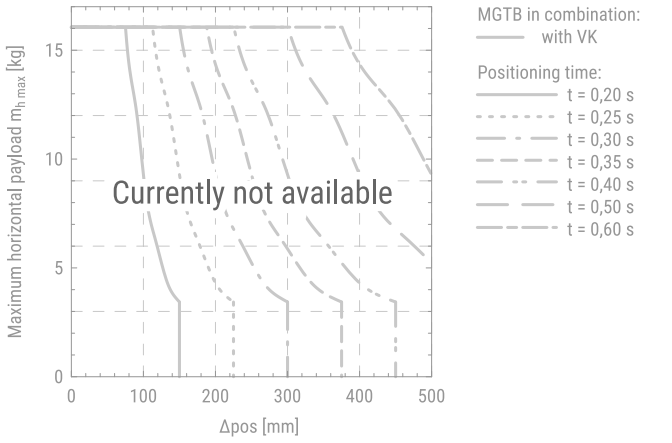


MGTB 60

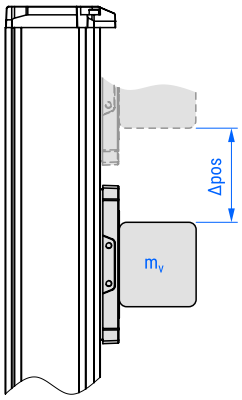
With a stepper motor ☐56



With a stepper motor ☐86



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



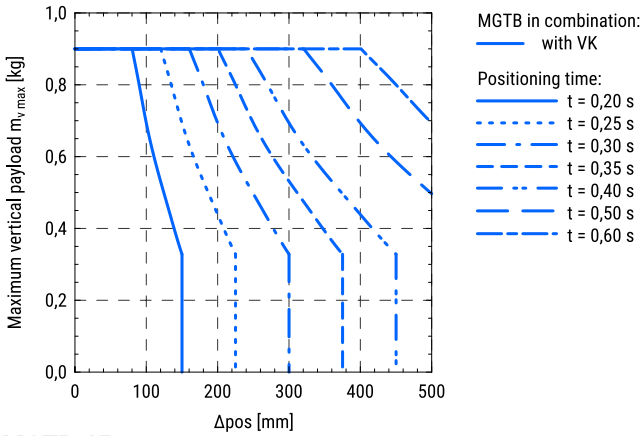
The following diagrams show the maximum payload that can be moved by a certain vertical distance within a positioning time frame. Acceleration/deceleration time of 100 ms is taken into account.

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.

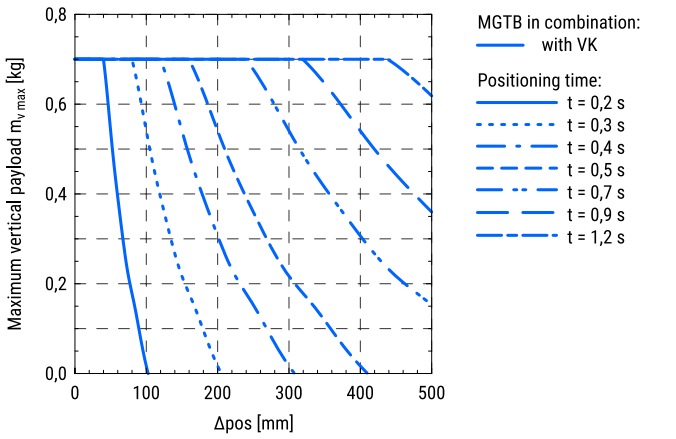
MGTB 32

With a stepper motor ☐42

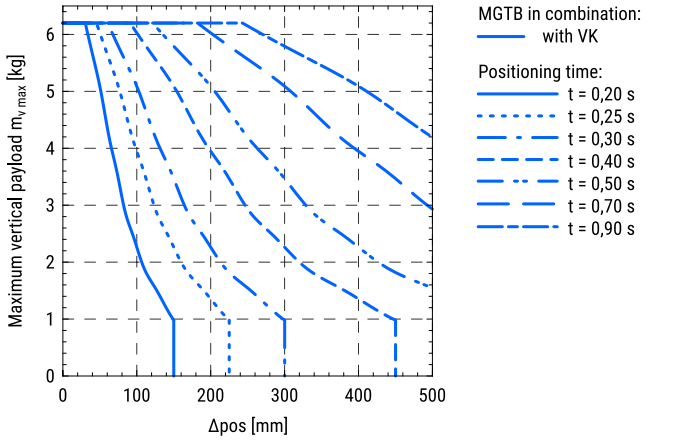


MGTB 45

With a stepper motor ☐42

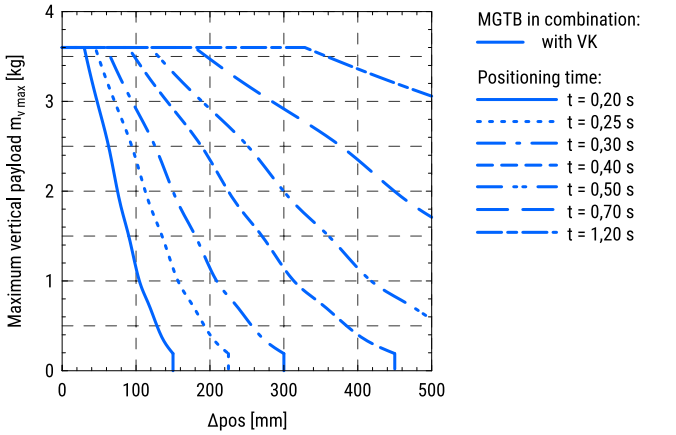


With a stepper motor ☐56

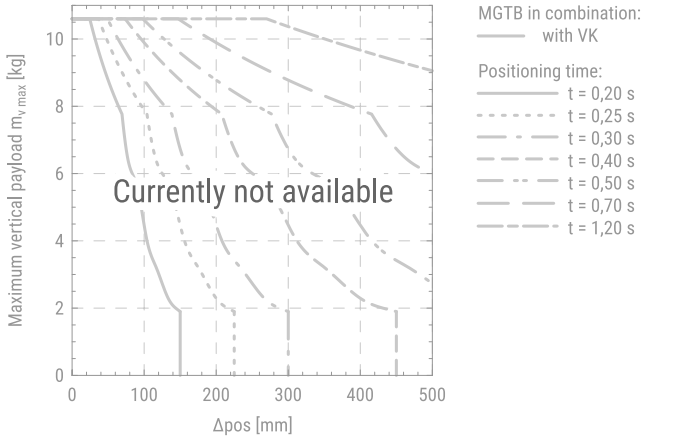


MGTB 60

With a stepper motor ☐56



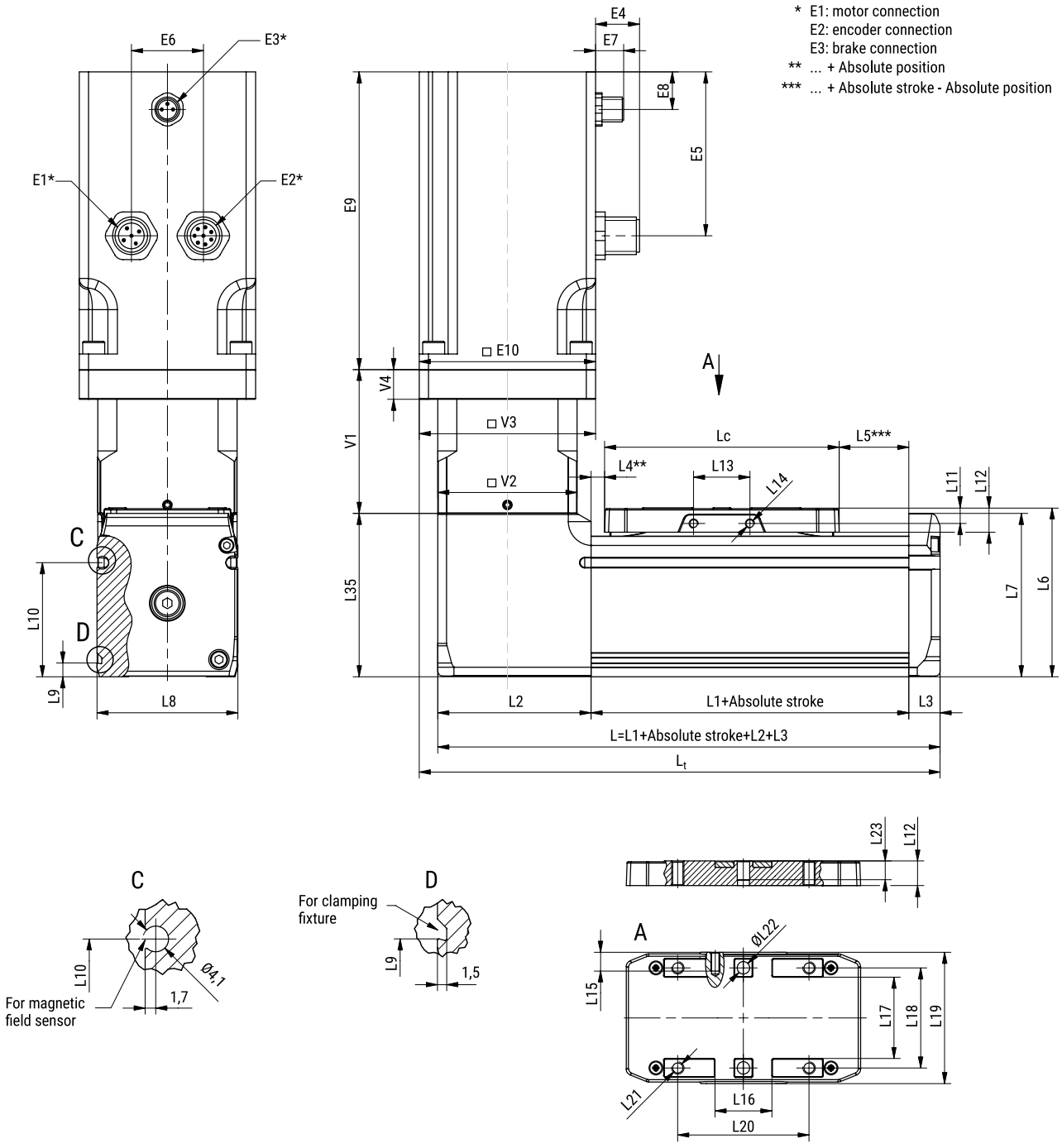
With a stepper motor ☐86



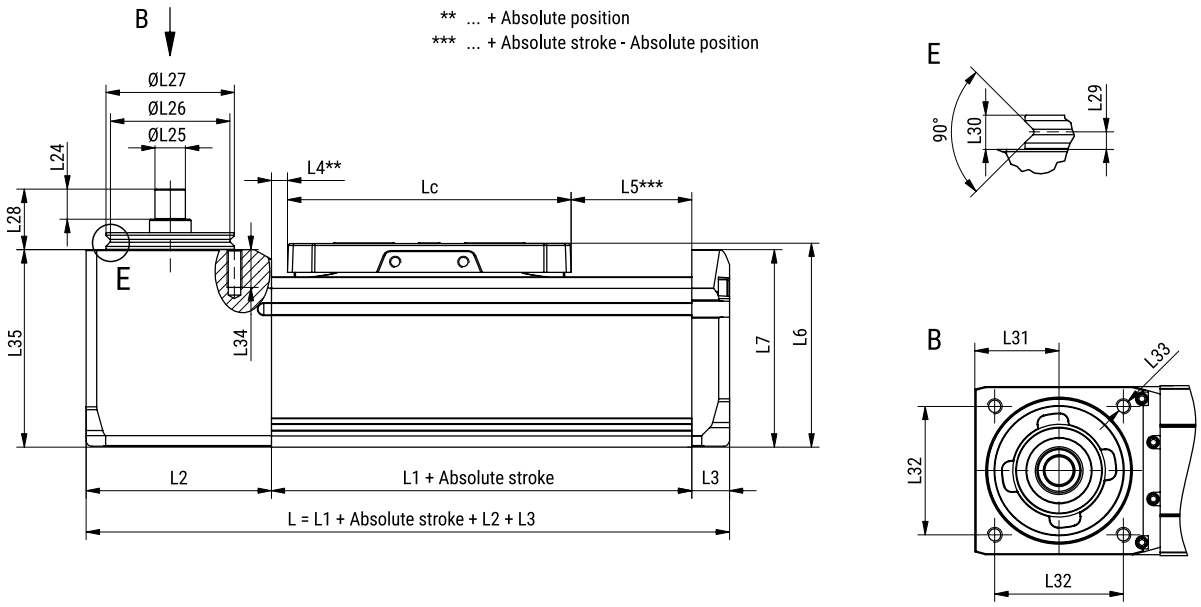
DIMENSIONS

All dimensions are in mm. Drawing scales may not be equal.

MGTB in combination with a standard motor and a motor adapter VK



MGTB without the motor



MGTB dimensions

MGTB	Lc	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	ØL22 (H7)
32	65	104	32,75	8	2,5	36,5	38,5	35,75	32	4,4	23,7	4	5,9	18	M2	4	14,6	18,4	22,5	30	35	M3	2
45	75	124	49	10	4,3	44,7	54	52,25	45	4,4	36,5	5	7,8	18	M3	6	18,6	16,4	32	42	42	M4	4
60	90	139	64	12	3,2	45,8	72	68,75	60	4,4	45	6	11	30	M4	6	25,4	38,4	45	57	55	M5	5

MGTB	L23	L24	ØL25 (h7)	ØL26	ØL27 (h7)	L28	L29	L30	L31	L32	L33	L34	L35
32	5	7	5	22,6	25	14	2,3	4,5	15,75	24,5	M3	3	37,75
45	6	8	8	31,6	34	16	2,3	4,5	22,25	34	M4	10	54,85
60	8	10	10	39,6	42	20	2,3	4,5	29,75	48	M5	10	72,50

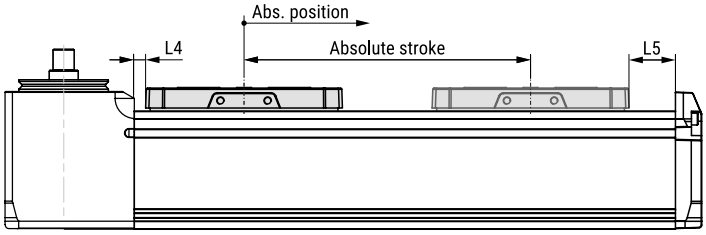
Motor adapter VK dimensions

MGTB	Motor		V1	□V2	□V3	V4
	Type	Size □ [mm]				
32	Stepper	28	36	31,5	31,5	0
		42	40	31,5	42	5,5
45		42	42	44,5	44,5	0
		56	46	44,5	56,4	9,5
60		56	52,5	59,5	59,5	0
		86	69	59,5	86	9,5

Motor dimensions

Motor			E1	E2	E3	E4 (±1)	E5 (±0,3)	E6	E7 (±1)	E8 (±0,3)	E9 (±1)	□E10
Type	Size □ [mm]	Brake										
Stepper	28	–	Currently not available									
	28	with										
	42	–	M12 5-pole	M12 8-pole	–	14	14	19,5	–	–	70,4	42,3
	42	with	M12 5-pole	M12 8-pole	M8 3-pole	14	14	19,5	9	27	106,4	42,3
	56	–	M12 5-pole	M12 8-pole	–	14	13,4	23	–	–	98	56,4
	56	with	M12 5-pole	M12 8-pole	M8 3-pole	14	52,4	23	9	12	138	56,4
	86	–	Currently not available									
	86	with										

Absolute stroke of the MGBS definition



Dimensions L4 and L5 are presented in the dimensional drawing table above.

Absolute stroke definition

Absolute stroke = Effective stroke + 2 × Safety stroke

Mini linear unit MGTB does not include any safety stroke.
The absolute stroke is the distance between the two positions of the carriage that are as far apart as it is physically possible.

Length definition

With VK and a motor:

$$L_t = L + \frac{(V3 - V2)}{2}$$

Without a motor:

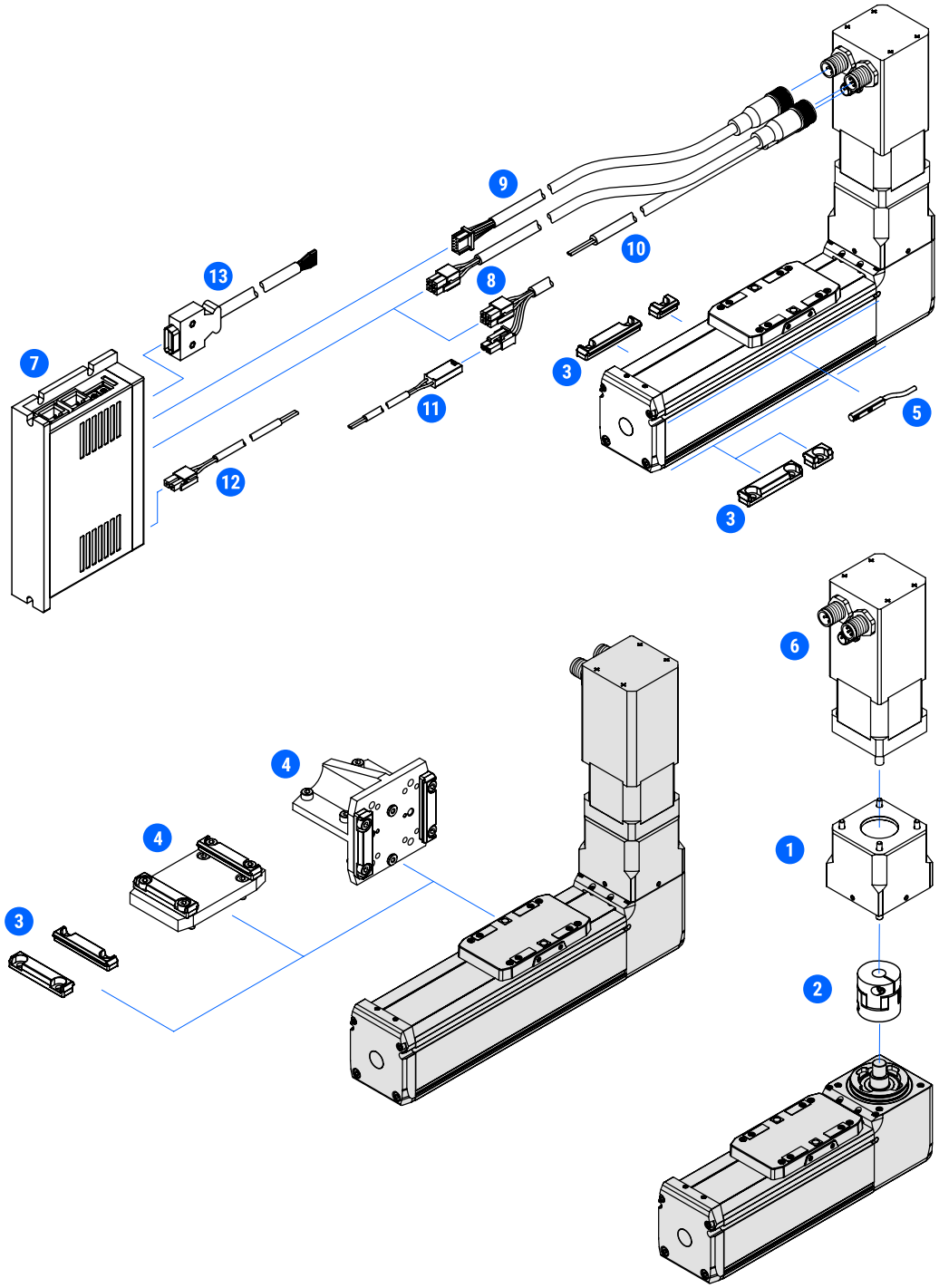
$L_t = L$

L = L2 + L1 + Abs. stroke + L3

Lengths L and L_t are defined as it is presented on the dimensional drawings above, where the lengths of the motor and motor adapter VK are also considered.

Abs. stroke	Absolute stroke	[mm]
Abs. position	Absolute position	[mm]
L	Length	[mm]
L_t	Total length	[mm]

ACCESSORIES



ACCESSORIES

#	Accessories	Compatible with MGBS size			Page	
		32	45	60		
1	Motor adapter VK	●	●	●	59	Motor adapeters
2	Coupling	●	●	●	60	Elastomer couplings
3	Clamping fixture	●	●	●	63	Mounting attachement accessories
4	Connection plate	●	●	●	64	
5	Magnetic field sensor	●	●	●	66	Limit switches
6	Motor	●	●	●	67	Motors
7	Drive	●	●	●	68	Drives
8	Motor cable[1]	●[1]	●	●	69	Cables
9	Encoder cable	●	●	●	69	
10	Brake cable[1]	●[1]	●	●	69	
11	Brake to terminal cable[1]	●	—	—	69	
12	Power cable	●	●	●	71	
13	Signal cable	●	●	●	71	

[1] 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

Electrical data

MOTOR TYPES AND SIZES

Motor identification

Motor			Motor code
Type	Size □ [mm]	Brake	
Stepper	28	–	**STMN-28-L-E**[1]
		with	**STMN-28-L-E-B**[1]
	42	–	**STMN-42-L-E**
		with	**STMN-42-L-E-B**
	56	–	**STMN-56-L-E**
		with	**STMN-56-L-E-B**
	86	–	**STMN-86-L-E**[1]
		with	**STMN-86-L-E-B**[1]

[1] Currently not available.

Motor pin allocation

Stepper motor size of 28 mm and 86 mm

Currently not available

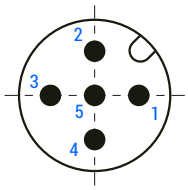
Stepper motor size of 42 and 56 mm

Valid for the stepper motors:

- STMN-42-…
- STMN-56-…

Motor connector

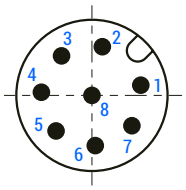
Connector type: M12 5-pole



Pin	Function
1	A–
2	A+
3	B+
4	B–
5	Housing

Encoder connector

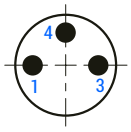
Connector type: M12 8-pole



Pin	Function
1	A+
2	A–
3	B+
4	B–
5	GND
6	I–
7	I+
8	VCC (5 V)
Housing	GND/shielding

Brake connector

Connector type: M8 3-pole



Pin	Function
1	Brake +24 V
3	Brake/GND
4	NC

Valid only for motors with brake:

- STMN-…-B

Technical data

Motor

Motor	Motor				
	Type	Stepper			
	Size □ [mm]	28	42	56	86
	Code	STMN-28-L-…	STMN-42-L-…	STMN-56-L-…	STMN-86-L-…
Voltage	[V DC]	Currently not available	3,15	2,4	Currently not available
Current per phase	[A]		1,8	4,2	
Mass moment of inertia	[kg cm²]		0,082 (0,095[1])	0,480 (0,501[1])	
Holding torque	[Nm]		0,5	1,87	
Step angle	[°]		1,8 ± 5 %	1,8 ± 5 %	
Resistance per phase	[Ohm]		1,75 ± 15 %	0,58 ± 15 %	
Inductance per phase	[mH]		3,3 ± 20 %	1,9 ± 20 %	
Voltage constant	[mV/min⁻¹]		23	32,5	
Mass	[kg]		0,44 (0,57[1])	1,14 (1,33[1])	

[1] Valid for a motor with a brake.

Encoder

Encoder	Motor				
	Type	Stepper			
	Size □ [mm]	28	42	56	86
	Code	STMN-28-L-…	STMN-42-L-…	STMN-56-L-…	STMN-86-L-…
Type		Currently not available	Incremental		Currently not available
Measuring principle			Opto-electrical		
Interface			Line drive		
Resolution	[cpr/ppr]		500/2000		
Operating voltage	[V DC]		5		

Brake

Brake	Motor				
	Type	Stepper			
	Size □ [mm]	28	42	56	28
	Code	STMN-28-L-…-B	STMN-42-L-…-B	STMN-56-L-…-B	STMN-28-L-…-B
Operating voltage	[V DC]	Currently not available	24 (+6/–10 %)		Currently not available
Rated output	[W]		8	10	
Holding torque	[Nm]		0,4	1,0	
Mass moment of inertia	[kg cm²]		0,013	0,021	

Operating conditions

Ambient temperature	–10 °C ~ +50 °C
Ambient humidity	max. 85 % (non-condensing)
Protection class[1]	IP65
Duty cycle	100 %

[1] Except for the shaft output.

Dimensions

Please refer to the section “Mini linear unit MGBS → Dimensions” or “Mini linear unit MGTB → Dimensions”.

Detailed informations

Please refer to the Unimotion documentation related to the motors.

DRIVE TYPES

Drive identification and compatibility

Drive		Motor			Drive code
Type	Protocol/control	Type	Size □ [mm]	Code	
Stepper	EtherCAT	Stepper	28	STMN-28-L-...	**STDF-28-A-EC**[1]
			42	STMN-42-L-...	**STDF-42-A-EC**
			56	STMN-56-L-...	**STDF-56-A-EC**
			86	STMN-86-L-...	**STDF-86-B-EC**[1]
	Ethernet based communication		28	STMN-28-L-...	**STDF-28-A-EN**[1]
			42	STMN-42-L-...	**STDF-42-A-EN**
			56	STMN-56-L-...	**STDF-65-A-EN**
			86	STMN-86-L-...	**STDF-86-B-EN**[1]
	Pulse/direction control		28	STMN-28-L-...	**STDF-28-A-PD**[1]
			42	STMN-42-L-...	**STDF-42-A-PD**
			56	STMN-56-L-...	**STDF-56-A-PD**
			86	STMN-86-L-...	**STDF-86-B-PD**[1]

[1] Currently not available.

Technical data

Operating conditions

		Drive		
	Type	Stepper		
	Protocol/control	EtherCAT	Ethernet based communication	Pulse/direction control
	Code	STDF-...-EC	STDF-...-EN	STDF-...-PD
Operating voltage	[V DC]	24 ± 10 % [40 ~ 70][3]		
Current consumption[1]	[mA]	max. 500		
Rotational speed	[rpm]	0 ~ 3000		
Supported resolution[2]	[ppr]	500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000		
Input signals		3 dedicated inputs (LIMIT+, LIMIT–, ORIGIN)		Position command pulse
		7 user inputs (Photocoupler)	9 Programmable inputs (Photocoupler)	Servo on/off
				Alarm reset (Photocoupler input)
Output signals		6 user outputs (Photocoupler)	1 dedicated output (Compare out)	In-position
			9 programmable outputs (Photocoupler)	Alarm (Photocoupler output)
		Brake	Brake	Encoder signal, brake

[1] Except the motor current.
[2] For the case that the resolution is higher than the encoder's resolution, the motor shall operate by micro-step between pulses.
[2] Valid for drives STDF-86-...

Ambient temperature	0 °C ~ +50 °C
Ambient humidity	35 % ~ 85 % (non-condensing)
Vibration resistance	0,5 G
Duty cycle	1

Dimensions

Please refer to the section “Accessories → Drive”.

Detailed informations

Please refer to the Unimotion documentation related to drives.

DRIVE-MOTOR CABLES

Drive to motor cables in general consist of:

- a motor cable,
- an encoder cable,
- a brake cable (only if a motor with a brake is used).

For the stepper motor size of 28 motor and brake cables are combined in one cable.
Additional cable, i.e. brake to terminal cable is included for the case of the motor (□28) with the brake.

Cables identification and compatibility

Motor				Drive			Drive to motor cable code			
Type	Size □ [mm]	Brake	Code	Type	Protoc,5ntrol	Code	Motor	Brake	Encoder	Brake to terminal
Stepper	28	–	STMN-28-...	Stepper	• EtherCAT, • Ethernet based communication, • Pulse/direction control	STDF-...	STCF-M-_8-... [1]		STCF-E-_8-...[1]	–
		with	STMN-28-...-B							STCF-BT-02[1]
	42	–	STMN-42-...				STCF-M-_12-...	–	STCF-E-_12-...	–
		with	STMN-42-...-B					STCF-B-_8-...		
	56	–	STMN-56-...					–		
		with	STMN-56-...-B					STCF-B-_8-...		
	86	–	STMN-86-...				Currently not available			
		with	STMN-86-...-B							

[1] Currently not available.

Technical data

Stepper motor size of 28 and 86 mm

Currently not available.

Stepper motor size of 42 and 56 mm

Cable	Drive to motor cable			
	Type	Motor	Brake	Encoder
	Code	STCF-M-_12-...	STCF-B-_8-...	STCF-E-_12-...
Length	[m]	3, 5, 10		
Cable diameter D	[mm]	5,1	4,5	6,7
Material, color		TPE, black		
Bending radius (dyn.)	[mm]	min. 7,5 × D		
Shielded?		yes		

Operating conditions

Ambient temperature (fixed laying)	–40 °C ~ +70 °C
Ambient temperature (flexible application)	5 °C ~ +70 °C

Dimensions

Please refer to the section "Accessories → Drive-motor cables".

POWER AND SIGNAL CABLES

Power cable is used for supplying the power from power supply to the drive.
Signal cable is mandatory for the following cases:

- if a motor with a brake is used,
- if a pulse/direction drive control is used,
- if the limit switches are used.

Cables identification and compatibility

Drive			Cable code	
Type	Protocol/control	Code	Power	Signal
Stepper	EtherCAT	STDF-...-EC	**STCF-P-02**	**STCF-S-EC-02**
	Ethernet based communication	STDF-...-EN		**STCF-S-EN-02**
	Pulse/direction control	STDF-...-PD		**STCF-S-PD-02**

Technical data

Cable	Type	Power cable	Signal cable		
	Code	STCF-P-02	STCF-S-EC-02	STCF-S-EN-02	STCF-S-PD-02
Length	[m]	2			
Cable diameter	[mm]	4,6	6,4	6,9	6,4
Material, color		PVC, black			
Shielded?		yes			

Dimensions

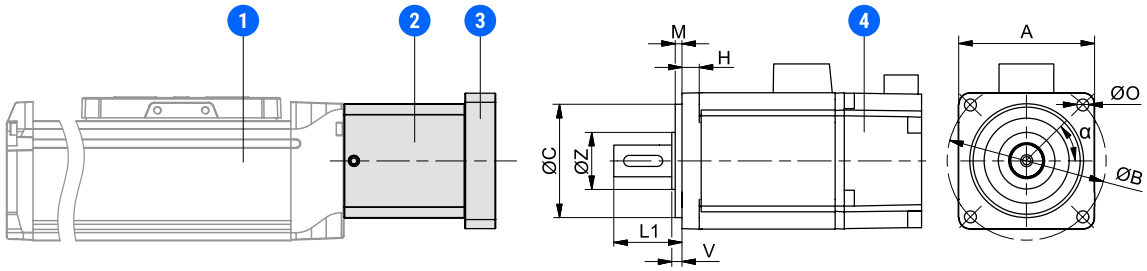
Please refer to the section "Accessories → Power and signal cables".

Detailed informations

Please refer to the Unimotion documentation related to the drives.

Accessories

MOTOR ADAPTER



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

Motor adapter VK

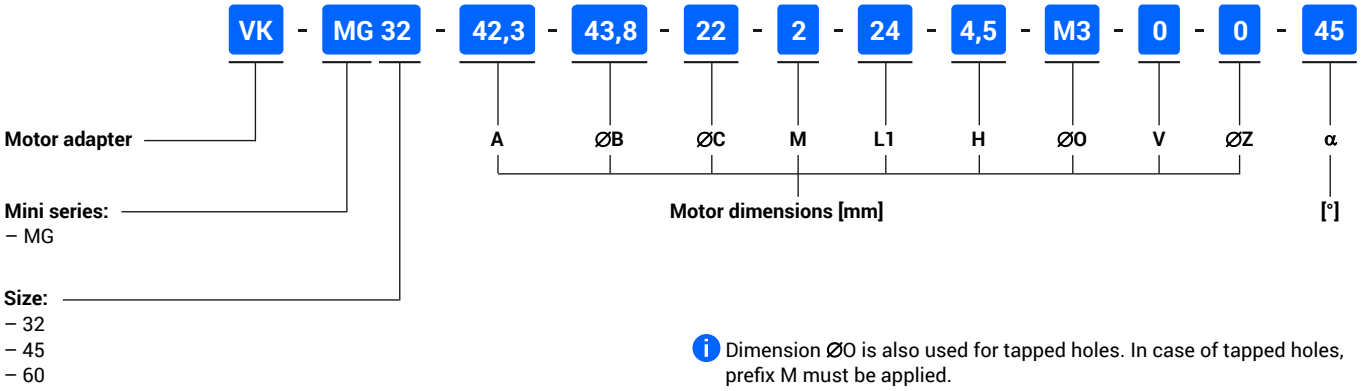
Coupling is not included.

Motor adapters VK are compatible with the following MGBS/MGTB and couplings sizes:

MGTB/MGBS	VK	Coupling
32	MG 32	EKL 2
45	MG 45	EKL 5
60	MG 60	EKL 10

For more information about the couplings, please refer to the section “Accessories → Couplings”.

How to order



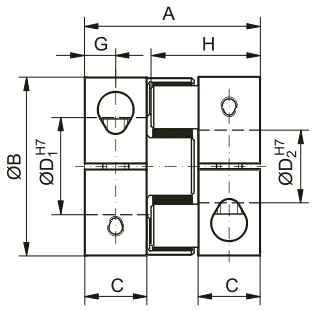
Dimension ØO is also used for tapped holes. In case of tapped holes, prefix M must be applied.

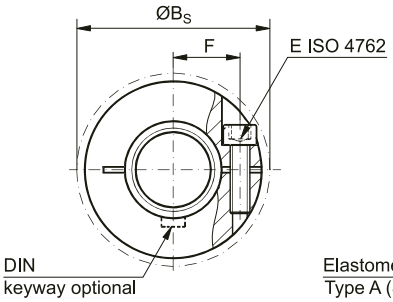
Compatibility of the standard motor adapters VK with the MGBS/MGTB and the standard motors

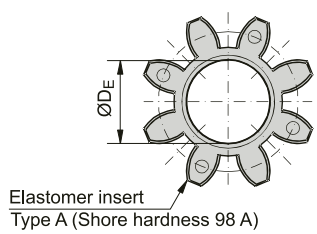
MGBS/MGTB	Motor			Motor shaft length		Motor shaft diameter [mm]	Motor mounting holes	Motor adapter VK	Code	Mass
Size	Type	Size □ [mm]	Standard	L1 [mm]			diameter × depth			m_{VK} [kg]
				min	max		ØO × H [mm]			
32	Stepper	28	NEMA 11	15	20	5,0	M2,5 × 2,5 (min.)	**VK MG 32 T1**	**108257**	0,06
		42	NEMA 17	20	25	5,0	M3 × 4,5 (min.)	**VK MG 32 T2**	**108258**	0,09
45								**VK MG 45 T1**	**108259**	0,14
		56	NEMA 23	20	25	6,35	5 × 9,0 (max.)	**VK MG 45 T2**	**108260**	0,18
60								**VK MG 60 T1**	**112537**	0,36
		86	NEMA 34	32	37	14	7 × 10,0 (max.)	**VK MG 60 T2**	**112536**	0,58

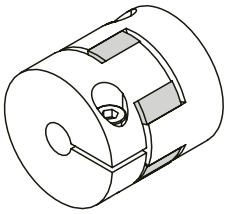
The standard motor adapter VK is made out of one piece. It is important to note when ordering it, that the coupling is included.
For information about the dimensions of the standard motor adapters VK please refer to the section “Mini linear unit MGBS → Dimensions” or “Mini linear unit MGTB → Dimensions”.

COUPLINGS









Technical data and dimensions

EKL			2	5	10
Rated torque	[Nm]	T_{KN}	2	9	12,5
Maximum torque[1]	[Nm]	T_{MAX}	4	18	25
Overall length	[mm]	A	20	26	32
Outside diameter	[mm]	B	16	25	32
Outside diameter with the screw head	[mm]	BS	17	25	32
Mounting length	[mm]	C	6	8	10,3
Inside diameter (H7)	[mm]	D_1, D_2	3–8	4–12,7	4–16
Inside diameter of the elastomer	[mm]	D_E	6,2	10,2	14,2
Clamping screw (ISO 4752)		E	M2	M3	M4
Tightening torque of the clamping screw	[Nm]		0,6	2	4
Distance between the centerlines	[mm]	F	5,5	8	10,5
Distance	[mm]	G	3	4	5
Hub length	[mm]	H	12	16,7	20,7
Moment of inertia per hub	[10^{-3} kg cm^2]	J_1, J_2	0,003	0,02	0,03
Approximate weight	[kg]		0,008	0,02	0,05
Speed standard	[min^{-1}]		15000	15000	13000

[1] Maximum transmittable torque of the clamping hub depends on the bore diameter.

Maximum transmittable and drive torque $M_{p,c}$ [Nm] depends on the bore diameter [mm]

EKL	Ø3	Ø4	Ø5	Ø6,35	Ø8	Ø10	Ø12,7	Ø14	Ø16
2	0,2	0,8	1,5	2	2,5	–	–	–	–
5	–	1,5	2	4,5	8	8	10	–	–
10	–	3,5	4	7	12	13	14	16	20

Maximum transmittable and drive torque $M_{p,c}$ [Nm] limited to the size of the MGBS/MGTB unit

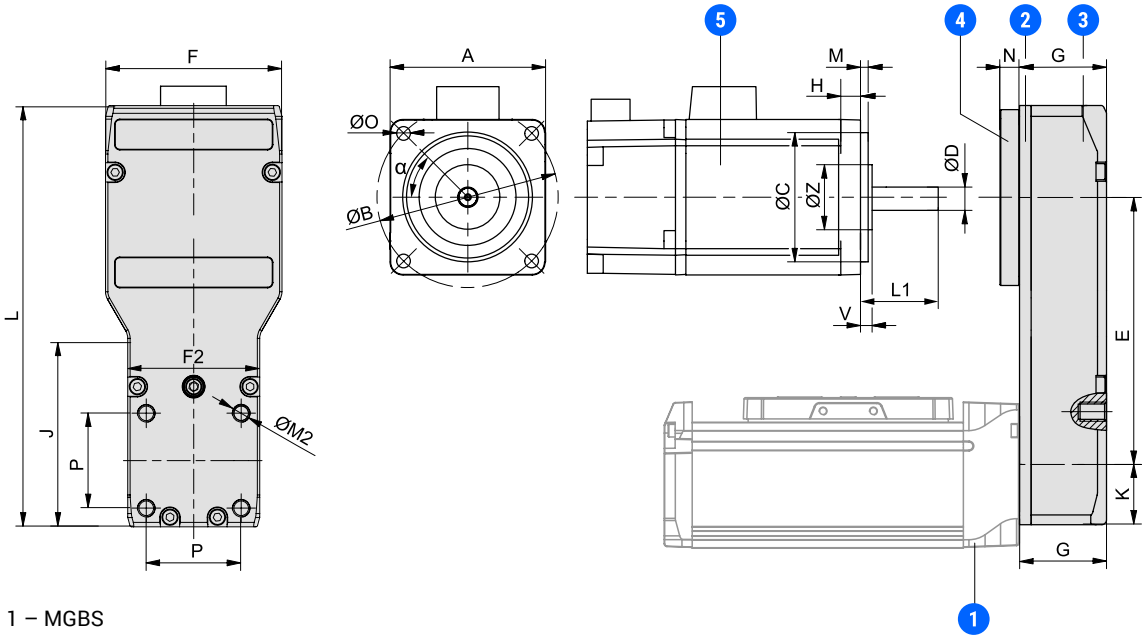
EKL	MGBS			MGTB		
	32	45	60	32	45	60
2	0,40	–	–	0,68	–	–
5	–	1,23	–	–	0,85	–
10	–	–	1,95	–	–	1,61

How to order

COUPLING - **EKL5** - **A** - **F5** - **F6PFN**

- **Coupling**
- **Coupling type/size:** – 2 – 5 – 10
- **Elastomer insert type:** – A
- **Hole diameter** [mm]
- **Option:** – PFN: with keyway – Leave blank: without keyway

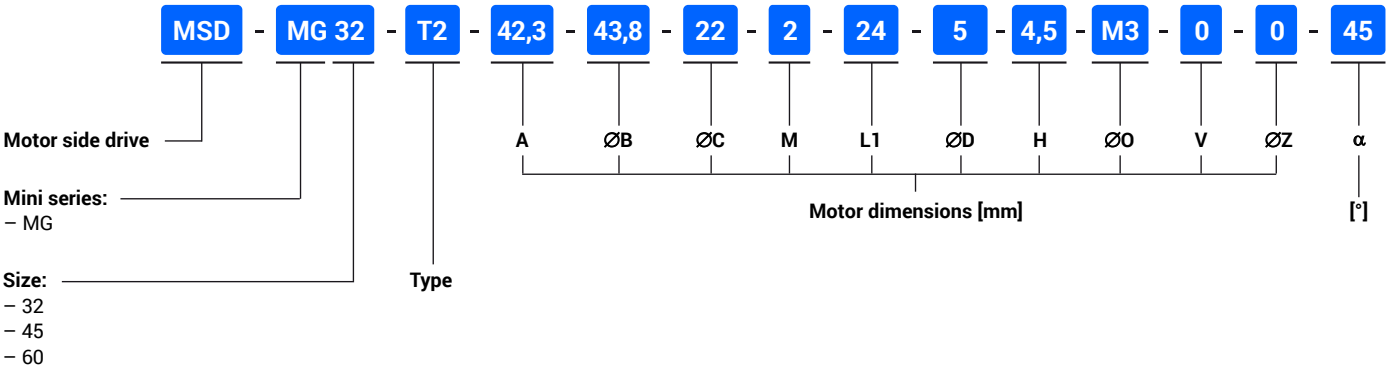
MOTOR SIDE DRIVE MSD WITH A TIMING BELT



1 – MGBS
2 – Motor side drive main panel
3 – Motor side drive cover
4 – Motor side drive tensioning plate
5 – Motor

Motor side drive MSD

How to order



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

Standard motor side drives MSD compatible with MGBS and standard motors

MGBS	Motor			Motor shaft length		Motor shaft diameter [mm]	Motor mounting holes	Motor side drive MSD	Code	Mass
Size	Type	Size □ [mm]	Standard	L1 [mm]			diameter × depth			m_{MSD} [kg]
				min	max		ØO × H [mm]			
32	Stepper	28	NEMA 11	14	20	5,0	M2,5 × 2,5 (min.)	**MSD MG 32 T1**	**108262**	0,12
		42	NEMA 17	17,5	24	5,0	M3 × 4,5 (min.)	**MSD MG 32 T2**	**108263**	0,18
45				20,5	28			**MSD MG 45 T1**	**108264**	0,28
		56	NEMA 23	20	28	6,35	5 × 4,5 (min.) ~ 5,5 (max.)	**MSD MG 45 T2**	**108265**	0,36
60				25	38			**MSD MG 60 T1**	**112515**	0,60
		86	NEMA 32	28,5	38	14	7 × 8,0 (min.) ~ 9,8 (max.)	**MSD MG 60 T2**	**112516**	0,88

Technical data

MSD MG	Type	Gear ratio	Max. drive torque	Max. radial load on shaft[1]	No load torque	Mass moment of inertia	Mass[3]	Motor size limits [mm]					
								A	ØB	ØC	L1		ØD
		i	$M_{p, MSD}$	$F_{r, MSD}$	$M_{0, MSD}$	J_{MSD}	m_{MSD}	max	max	max[5]	min[2]	max	max
			[Nm]	[N]	[Nm]	[10^{-2} kg cm^2]	[kg]	[mm]	[mm]	[mm]	Motor shaft[4]		
32	T1	1	0,10	15	0,015	0,39	0,12	34	35	25	15	23	5
	T2	1	0,25	15	0,015	1,04	0,18	46	50	36	14,5	25,5	6,35
45	T1	1	0,30	15	0,020	4,16	0,28	46	50	36	16,2	29	15
	T2	1	0,80	45	0,020	4,20	0,36	59,5	70	50	18	34	15
60	T1	1	0,80	35	0,025	7,52	0,60	59,5	70	50	18	35,5	9
	T2	1	1,94	90	0,035	10,30	0,88	85,5	100	75	24	37,5	19

[1] This is the load which is linearly dependent on the maximum drive torque $M_{p, MSD}$ and is generated by the correct pretension of the belt. This load needs to be reduced in accordance with the capabilities of the motor.
[2] Minimum dimension L1 depends on the belt drive pulley size.
[3] This is an average value. It could differ depending to the motor dimensions.
[4] Keyway is not valid.
[5] Higher value is also possible but only with a thicker tensioning plate (dimension N increases, dimension L1 increases acrodingly).

Dimensions

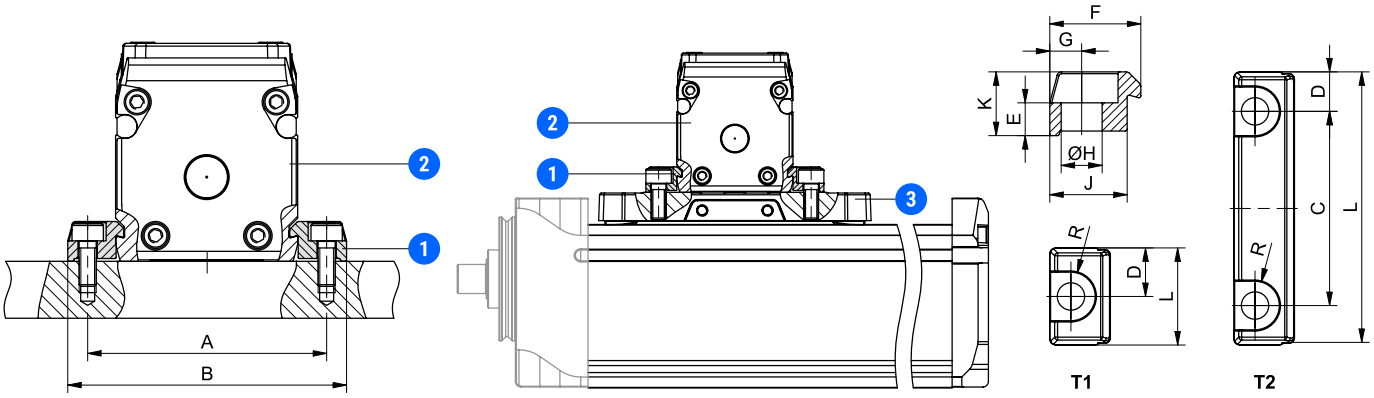
MSD MG	Type	Gear ratio	E (±0,5)	F	F2	G	N[1]	J	K	L	P	ØM2
		i	[mm]									
32	T1	1	52,5	31,5	31,5	22	4	0	15,75	85,5	22	M5 × 6
	T2	1	70,5	44,5	31,5	22	4,5	48	15,75	110	22	M5 × 6,5
45	T1	1	81	44,5	44,5	27,5	4,5	0	22,25	127	32	M6 × 8,5
	T2	1	88,5	59,5	44,5	27,5	6,5	63,5	22,25	142	32	M6 × 8,5
60	T1	1	96	59,5	59,5	33	6,5	0	29,75	157	38	M6 × 8
	T2	1	121,5	85,5	59,5	33	8,5	81,5	29,75	195,5	38	M6 × 8

[1] This is a standard value. It could differ depending to the motor dimensions M and L1.

CLAMPING FIXTURE

Mini linear units can be mounted by clamps, which are placed in the slot on the side of the profile. Clamps can also attach to the carriage of the mini linear unit, fixing another mini linear unit (or mini electric cylinder MCE or slider MSCE) to the carriage at an angle of 90° (i.e. for multi-axis systems).

Material: powder coated zinc alloy



1 – Clamping fixture
2 – Profile of the MGBS/MGTB
3 – Carriage of the MGBS/MGTB

Drawing scales may not be equal.

Dimensions and ordering codes

MGBS MGTB	Clamping fixture			Mounting distance [mm]		Dimensions [mm]										Mounting to the MGBS/ MGTB carriage[1]	m [g]	Code
	For screw	Type	L [mm]	A (±0,1)	B	C	D	E	F	G	ØH	J	K	R	Countersink for	For MGBS/ MGTB and MCE/MSCE		
32	M3	T1	16	42	49	–	8	3,6	10	3,5	3,4	8,5	7	3,25	DIN 912	25[2]	6	108216
	M3	T2	32			22,5	4,75										12	108218
	M4	T1	16			–	8	2,5			4,5			4		–	5	108217
	M4	T2	45			32	6,5										16	108219
	M5	T1	16		51	–	8	4	11	4,5	5,5	9,5	7,5	4,5		–	6	112526
	M5	T2	60			45	7,5										27	112527
45	M3	T1	16	55	62	–	8	3,6	10	3,5	3,4	8,5	7	3,25	DIN 912	–	6	108216
	M3	T2	32			22,5	4,75										12	108218
	M4	T1	16			–	8	2,5			4,5					32	5	108217
	M4	T2	45			32	6,5										16	108219
	M5	T1	16		64	–	8	4	11	4,5	5,5	9,5	7,5	4,5		–	6	112526
	M5	T2	60			45	7,5										27	112527
60	M3	T1	16	70	77	–	8	3,6	10	3,5	3,4	8,5	7	3,25	DIN 912	–	6	108216
	M3	T2	32			22,5	4,75										12	108218
	M4	T1	16			–	8	2,5			4,5					–	5	108217
	M4	T2	45			32	6,5										16	108219
	M5	T1	16		79	–	8	4	11	4,5	5,5	9,5	7,5	4,5		45	6	112526
	M5	T2	60			45	7,5										27	112527

[1] For more information, please refer to section “Mounting examples”.
[2] Valid only for MCE/MSCE series.

CONNECTION PLATES

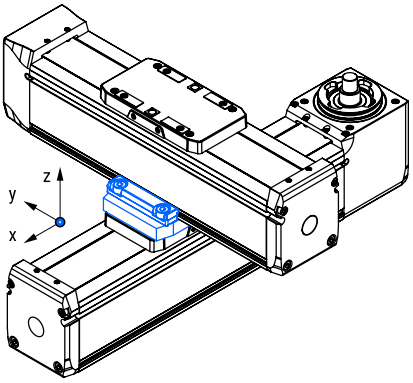
Mini linear units MGBS and MGTB can be mounted to one another using the standard connection plates CP.

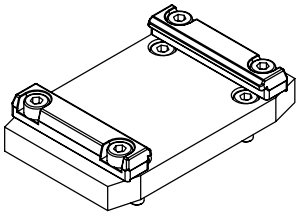
The standard connection plates support mounting with clamps (profile to carriage) or with screws (carriage to carriage).

Mounting of the mini electric cylinders MCE or the mini electric sliders MSCE is also possible. CP designations and ordering codes as well as mounting representations are shown in the tables below.

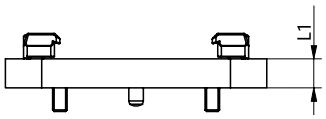
In the following drawings offset L1 represents the distance between the two linear units that are connected with it. For other dimensions needed for your application please refer to the section “Mini linear unit MGBS → Dimensions” or “Mini linear unit MGTB → Dimensions”.

Connection plates for the XY combinations (carriage-profile mounting)



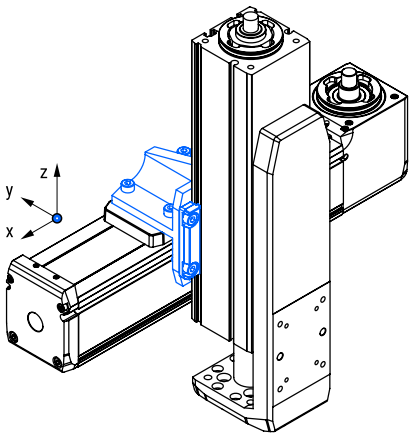


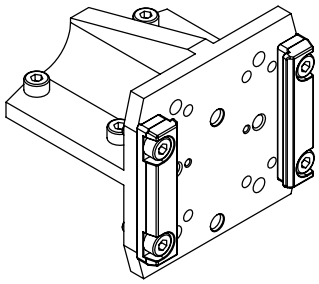
Components needed for mounting (i.e.: screws, clamping fixtures, centering rings) are included.



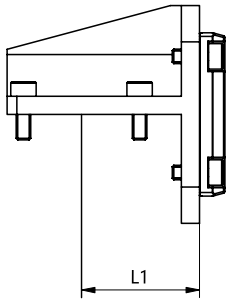
CP		X-axis		Y-axis		Mounting	m_{CP} [kg]	Offset
Name	Code	Linear unit	Size	Linear unit	Size			L1 [mm]
CP MG32 XY MG32 KPL	110994	MGTB/MGBS	32	MGBS/MGTB/MCE/MSCE	32	carriage-profile	0,057	8,0
CP MG45 XY MG45 KPL	111005		45	MGBS/MGTB/MCE/MSCE	45		0,115	
CP MG60 XY MG32 KPL	112563		60	MGBS/MGTB/MCE/MSCE	32		0,165	
CP MG60 XY MG60 KPL	112562			MGBS/MGTB	60		0,191	

Connection plates for the XZ combinations (carriage-profile mounting)



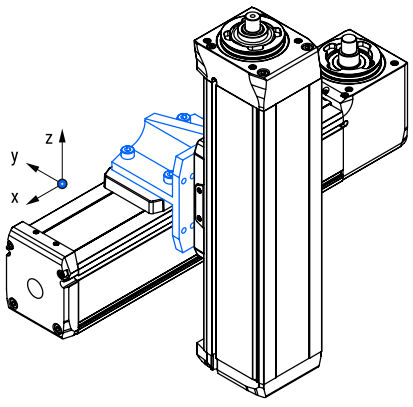


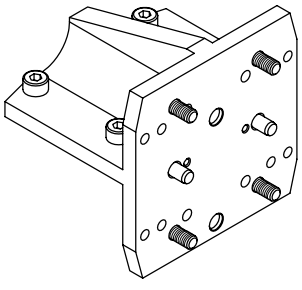
Components needed for mounting (i.e.: screws, clamping fixtures, centering rings) are included.



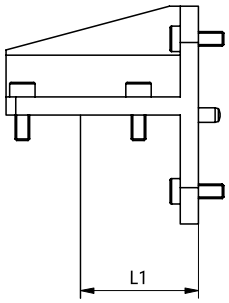
CP		X-axis		Z-axis		Mounting	m_{CP} [kg]	Offset
Name	Code	Linear unit	Size	Linear unit	Size			L1 [mm]
CP MG32 XZ MG32 KPL	111001	MGTB/MGBS	32	MGTB/MGBS	32	carriage-profile	0,095	26
CP MG45 XZ MG32 KPL	111006		45				0,161	32
CP MG45 XZ MG45 KPL	111008				45		0,161	
CP MG60 XZ MG32 KPL	112569		60		32		0,320	45
CP MG60 XZ MG45 KPL	112568				45		0,320	
CP MG60 XZ MG60 KPL	112567				60		0,346	
CP MG32 XZ MSCE25 KPL	111003		32	MCE/MSCE	25		0,095	26
CP MG32 XZ MSCE32 KPL	111004				32		0,095	
CP MG45 XZ MSCE32 KPL	111010		45				0,162	32
CP MG45 XZ MSCE45 KPL	111011				45		0,162	
CP MG60 XZ MSCE32 KPL	112570		60		32		0,320	45
CP MG60 XZ MSCE45 KPL	112571				60		0,321	

Connection plates for the XZ combinations (carriage-carriage mounting)





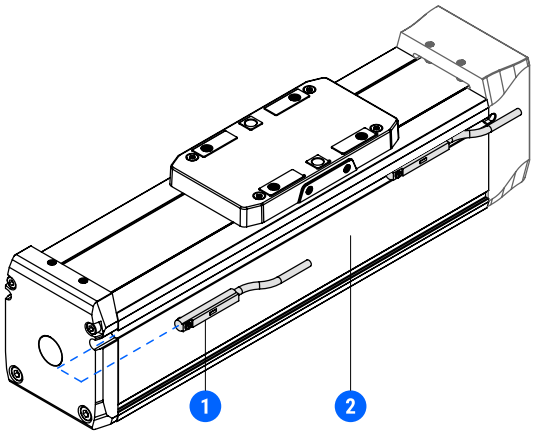
Components needed for mounting (i.e.: screws, clamping fixtures, centering rings) are included.



CP		X-axis		Z-axis		Mounting	m_{CP} [kg]	Offset
Name	Code	Linear unit	Size	Linear unit	Size			L1 [mm]
CP MG32 XZ MG32Z KPL	111002	MGTB / MGBS	32	MGBS/MGTB	32	carriage-carriage	0,071	26
CP MG45 XZ MG32Z KPL	111007		45				0,126	32
CP MG45 XZ MG45Z KPL	111009				45		0,131	
CP MG60 XZ MG32Z KPL	112566		60		32		0,285	45
CP MG60 XZ MG45Z KPL	112565				45		0,291	
CP MG60 XZ MG60Z KPL	112564				60		0,297	

MAGNETIC FIELD SENSOR

Magnetic field sensors can be mounted using the slot for the magnetic field sensor, placed on both sides of the MGBS / MGTB profile.



1 – Magnetic field sensor.
2 – Profile of the mini linear unit MGBS or MGTB.

Magnetic field sensors

Technical data

Characteristics	SMO 40 TP K NC	SMO 40 TP K NO
Function principle	Magnetic	
Switching function	NC-normally close	NO-normally open
Wiring method	3-wire type	
Sensor type	PNP current sourcing	
Operating voltage	5 ~ 30 V DC	
Switching current	200 mA max.	
Contact rating	6 W max.	
Voltage drop	0,5 V @ 200 mA max.	
Current consumption	6 mA @ 24 V DC max.	
Leakage current	0,01 mA max.	
Operating frequency	1000 Hz max.	
Ambient temperature	–10 ~ +70 °C	
Shock / Vibration	50 G / 9 G	
Protection class	IP67	
LED indicator	Green	
Electrical connection	M8, 3-pin	
Cable (diameter, material, length)	Ø2,8 mm, PUR, 150 mm	
Extension cable	Energy chain compliant	

Ordering codes and compatibility

Magnetic field sensor

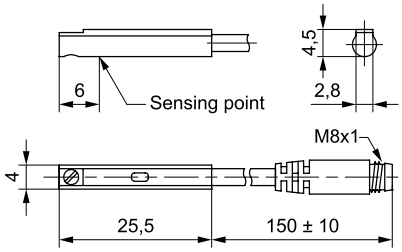
Type	Code	Compatibility
SMO 40 TP K NC	109125	MGBS/MGTB
SMO 40 TP K NO	12259	

Extension cable

Type	Connector	Length [m]	Code	Compatibility
Extension cable	**Straight**	**2**	**8146**	**SMO 40 TP K NC/NO**
		5	**8147**	
	Angled	**2**	**9017**	
		5	**9019**	

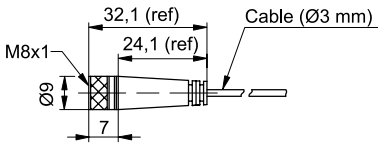
Dimensions

Magnetic field sensor SMO 40 TP K NO/NC

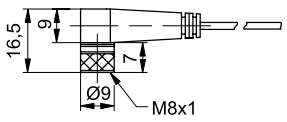


Extension cable

Straight connector



Angled connector



MOTOR

How to order

Stepper motors

STMN - 42 - L - E - B

Stepper motor series

Motor size □ [mm]:
– 28 (Currently not available)
– 42
– 56
– 86 (Currently not available)

Motor length:
– L: Long

Encoder:
– E: With

Brake:
– Leave blank: Without
– B: With

Dimensions

Please refer to the section “Mini linear unit – MGBS → Dimensions” or “Mini linear unit – MGTB → Dimensions”.

More information

Please refer to the section “Electrical data” or Unimotion documentation related to the motors.

DRIVE

How to order

Drives for the stepper motors (only for the STMN motors)

STDF - 42 - A - EC

Stepper drive series

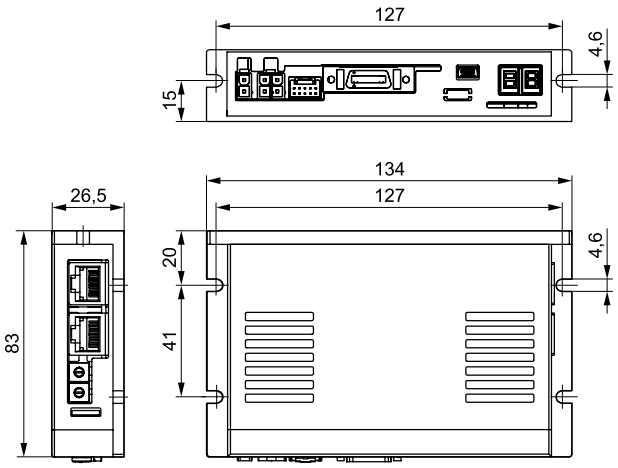
For motor size □ [mm]:
– 28 (Currently not available)
– 42
– 56
– 86 (Currently not available)

Operating voltage [V DC]:
– A: 24
– B: 40 ~ 70

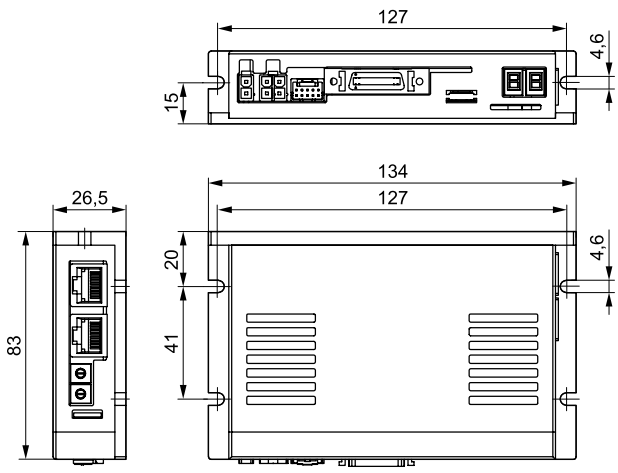
Protocol/control:
– EC: EtherCAT
– EN: Ethernet based communication
– PD: Pulse-direction control

Dimensions

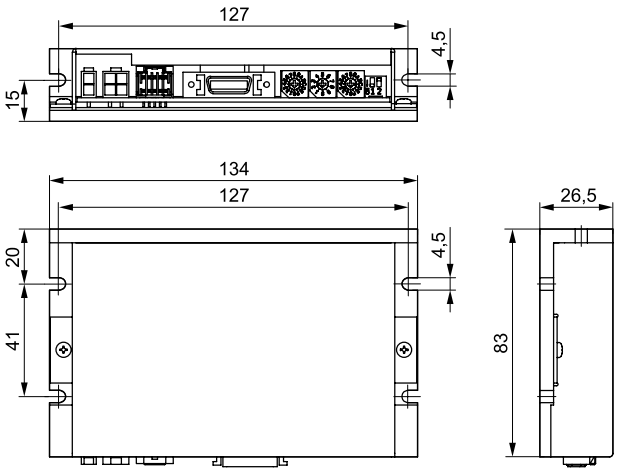
Stepper drive → EtherCAT protocol



Stepper drive → Ethernet based communication



Stepper drive → Pulse-direction control



Presented drives dimensions are valid for:
– STDF-28-...
– STDF-42-...
– STDF-56-...

More information

Please refer to the section “Electrical data” or the Unimotion documentation related to the drives.

DRIVE-MOTOR CABLES

How to order

Drive to motor cables for the stepper motors (only for the STDF and the STMN motors)

Motor, encoder and brake cables

STCF - E - A8 - 05

Stepper drive/motor cable series

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

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

Connector type and size:

A 8

Connector type:
– S: Straight
– A: Angled

Connector size:
– 8: M8
– 12: M12

Please see the following table, where the possible cable combinations and compatibility with the motors and the drives are presented.

Brake to terminal cables

STCF - BT - 02

Stepper drive/motor cable series

Type:
– BT: Brake to terminal cable

Cable length:
– 02: 2 m

Possible cable combinations and compatibility with the motors and the drives

Motor				Drive			Drive to motor cable code			
Type	Size □ [mm]	Brake	Code	Type	Protocol/control	Code	Motor	Brake	Encoder	Brake to terminal
Stepper	28	–	STMN-28-...	Stepper	• EtherCAT, • Ethernet based communication, • Pulse/direction control	STDF-...	STCF-M-_8-... [1]		STCF-E-_8-...[1]	–
		with	STMN-28-...-B							STCF-BT-02[1]
	42	–	STMN-42-...				STCF-M-_12-...	–	STCF-E-_12-...	–
		with	STMN-42-...-B					STCF-B-_8-...		
	56	–	STMN-56-...					–		
		with	STMN-56-...-B					STCF-B--_8-...		
	86	–	STMN-86-...				Currently not available			
		with	STMN-86-...-B							

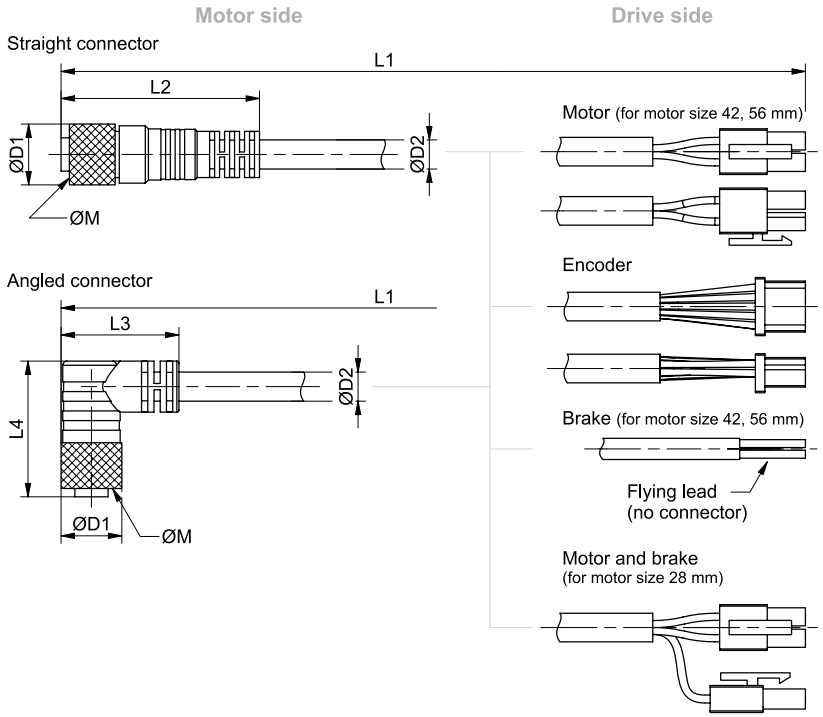
[1] Currently not available.

Dimensions

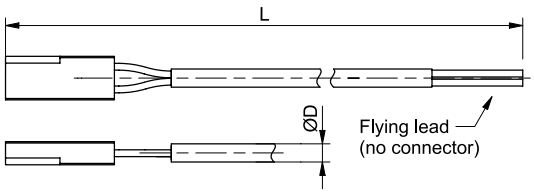
Drive to motor cables for the stepper motors (only for the STDF and the STMN motors)

Motor, encoder and brake cables

Dimensions	Drive to motor cable					
	Type	Motor		Brake	Encoder	
	Code	STCF-M-_8-…	STCF-M-_12-…	STCF-B-_8-…	STCF-E-_8-…	STCF-E-_12-…
L1	[m]	3, 5, 10				
L2	[mm]	Currently not available	47,7	41,7	Currently not available	47,7
L3	[mm]		28,4	30,9		28,4
L4	[mm]		32,6	25,2		32,6
ØD1	[mm]		14,6	9,9		14,6
ØD2	[mm]		5,1	4,5		6,7
ØM	[mm]		M12	M8		M12



Brake to terminal cables



Dimensions	Drive to motor cable	
	Type	Brake to terminal
	Code	STCF-BT-02
L	[m]	2
ØD	[mm]	Available soon

More information

Please refer to the section “Electrical data”.

POWER AND SIGNAL CABLES

How to order

Power cables for the stepper drives (only for the STDF drives)

STCF - P - 02

Stepper drive/motor cables series

Type:
– P: Power cable

Cable length:
– 02: 2 m

Signal cables for the stepper drives (only for the STDF drives)

STCF - S - EC - 02

Stepper drive/motor cables series

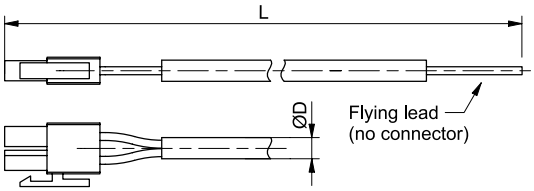
Type:
– S: Signal cable

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

Cable length:
– 02: 2 m

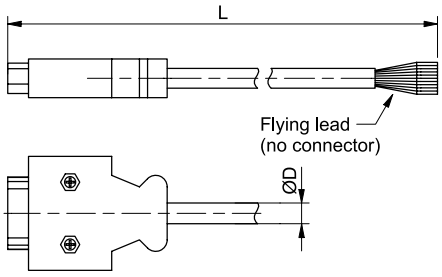
Dimensions

Power cables for the stepper motors (only for the STDF drives)



Dimensions	Type	Power cable
	Code	STCF-P-02
L	[m]	2
ØD	[mm]	4,6

Signal cables for the stepper motors (only for the STDF drives)



Dimensions	Type	Signal cable		
	Code	STCF-S-EC-02	STCF-S-EN-02	STCF-S-PD-02
L	[m]	2		
ØD	[mm]	6,4	6,9	6,4

More information

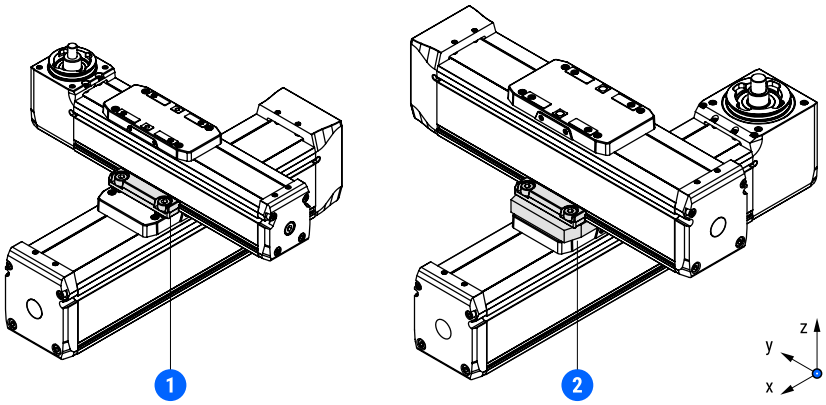
Please refer to the section “Electrical data”.

Mounting examples

MGBS and MGTB mini linear units can be combined into multi-axis systems. Prepared mounting holes in the carriage, mounting slots on the profile, and standard connection plates allow various combinations of MGBS and MGTB mini linear units and, furthermore, additional combinations with MCE and MSCE mini electric cylinders and sliders.

For the non-standard combinations, configurations or custom connection elements please contact us.

X–Y CONFIGURATION



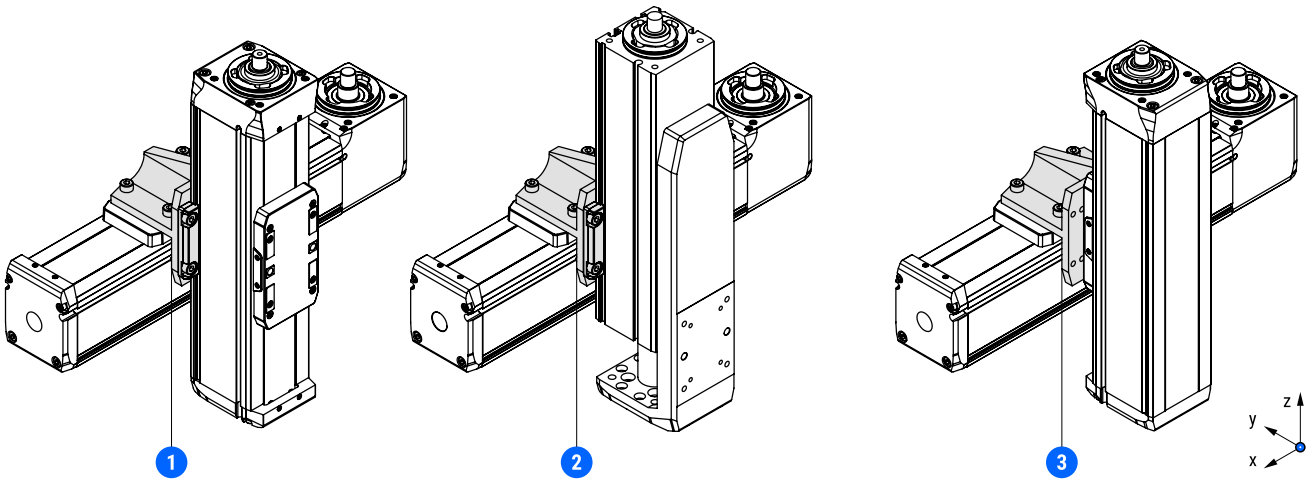
1 – X–Y combination connected with mounting clamps
2 – X–Y combination with a standard X–Y connection plate

Mini linear units MGBS/MGTB and mini electrical cylinders and sliders MCE/MSCE can be combined using clamps. Additional options are possible with the use of the standard connection plates and clamps.

Configuration			y-axis					
			MGBS / MGTB			MCE / MSCE		
		Size	32	45	60	25	32	45
x-axis	MGBS / MGTB	32	●[1]	—	—	●	●[1]	—
		45	●	●[1]	—	—	●	●[1]
		60	●[1]	●	●[1]	—	●[1]	●

[1] Combination possible only with an aditional standard connection plate.

X–Z CONFIGURATION



Configuration			z-axis profile connection						z-axis carriage connection		
			MGBS / MGTB			MCE / MSCE			MGBS / MGTB		
		Size	32	45	60	25	32	45	32	45	60
x-axis	MGBS / MGTB	32	●	—	—	●	●	—	●	—	—
		45	●	●	—	—	●	●	●	●	—
		60	●	●	●	—	●	●	●	●	●

1 – X–Z combination of the MG linear units with a standard X–Z connection plate.
2 – X–Z combination of the MG linear unit and a MSCE mini electric slider with a standard X–Z connection plate.
3 – X–Z combination of the MG linear units with a standard X–Z connection plate mounted in a carriage to carriage combination.

Mini linear units MGBS/MGTB and mini electrical cylinders MCE/MSCE can be combined using the standard connection plates and clamps. When combining a mini linear unit with a mini electrical cylinder only a profile connection is possible.

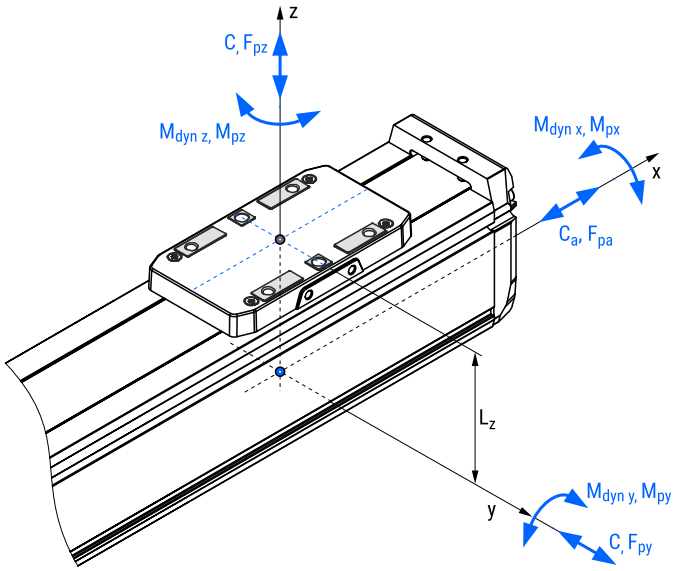
To find the desired connection plate and its order code please refer to the section “Accessories → Connection plates”.

Service life

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.



MGBS / MGTB	Attachment distances
	L_z [mm]
32	30,0
45	40,7
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 $f_{p\,g}$

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

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

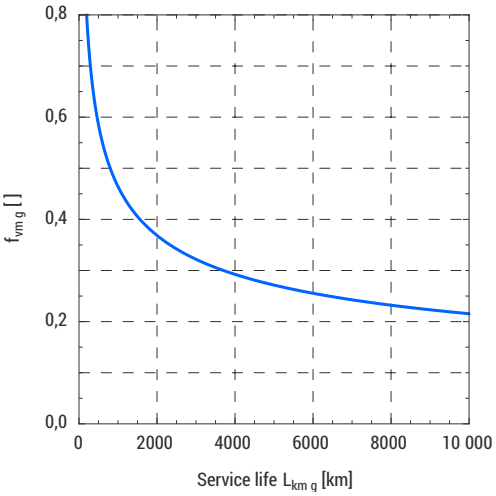
Service life

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.

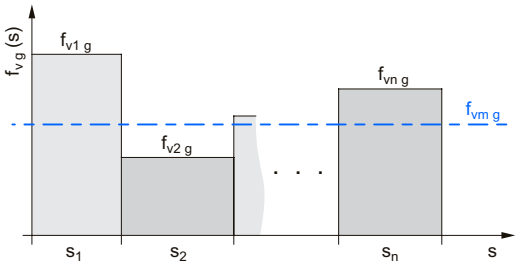
It should be noted that the application conditions may have a significant effect on the service life.

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 $f_{sm\,g}$

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

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

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

BALL SCREW DRIVE

Valid for the mini linear units MGBS.

Permissible load

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

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

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

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

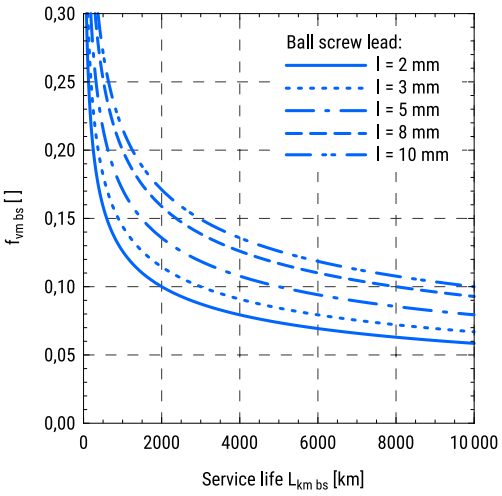
Service life

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.

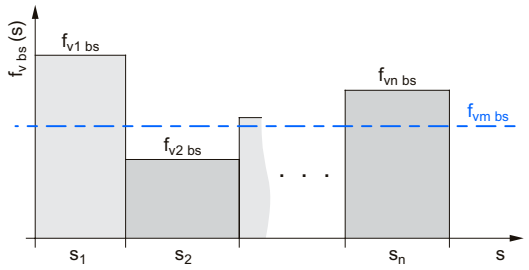
It should be noted that the application conditions may have a significant effect on the service life.

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 $f_{sm\,bs}$

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

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

$f_{sm\,bs}$	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 Lkm 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 linear unit MGBS	[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 linear unit MGTB	[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] Pulley-drive ratio[2]	[mm] [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).