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.

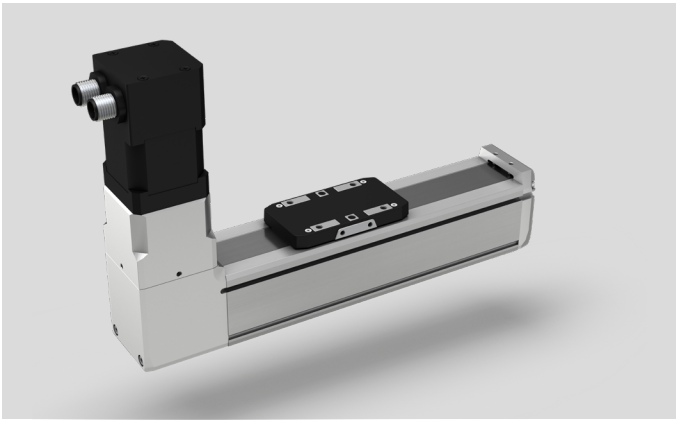
Mini linear units MGTB can be easily assembled into a multi-axis system with other MGTB or MGBS linear units and/or mini electrical cylinders MCE or mini electrical sliders MSCE.

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

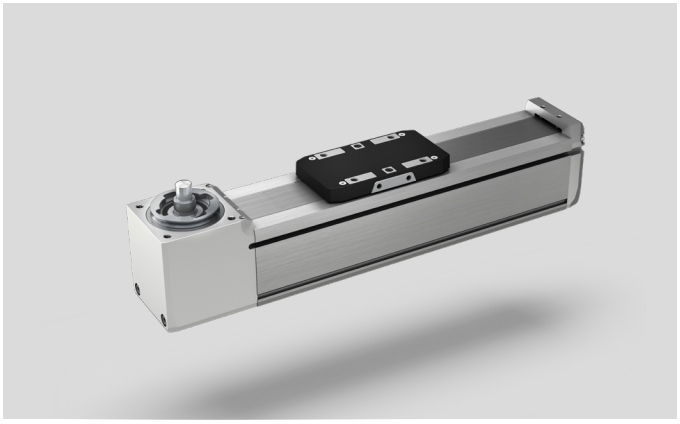
Each MGTB is optimally pre-lubricated and ready for a maintenance-free operating process.

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

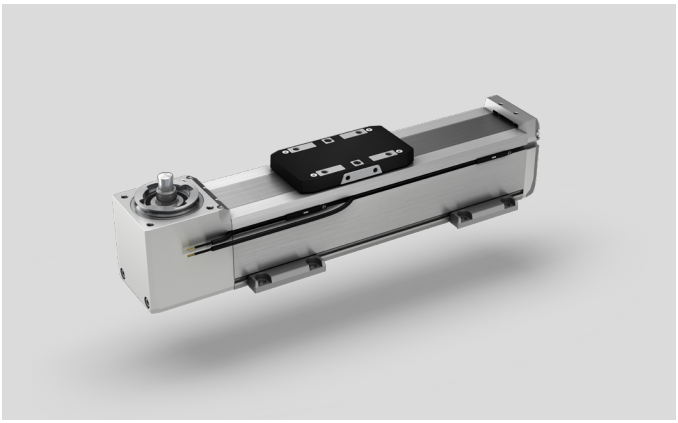
The aluminium profiles are manufactured according to the EN 12020-2 standard



Motor adapter VK with a coupling and a motor



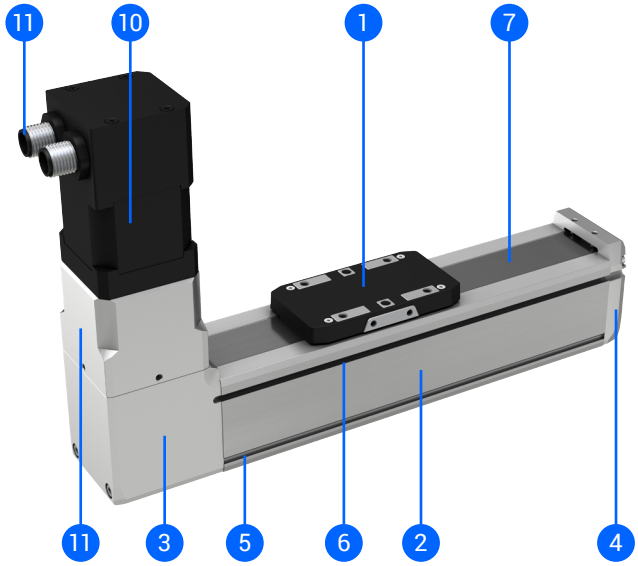
MGTB without a preassembled motor



Accessories, MGTB without a preassembled motor

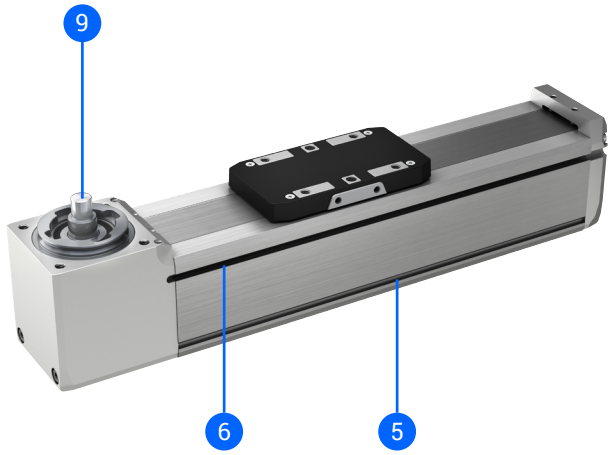
STRUCTURAL DESIGN

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

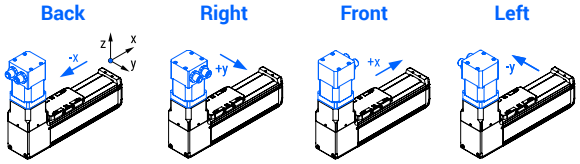
Mounting option:
– A: With a motor adapter VK

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

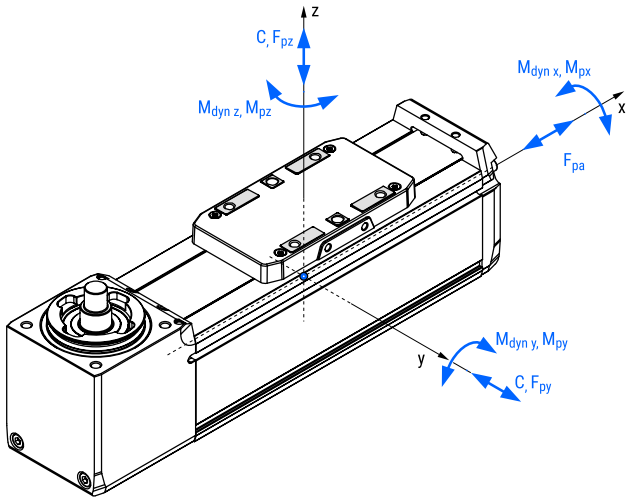
For more details, please refer to the section "Electrical data → Drive types"

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	

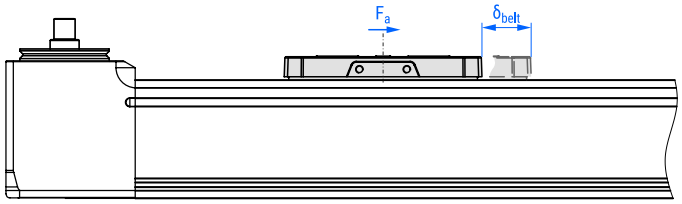
Planar moment of inertia

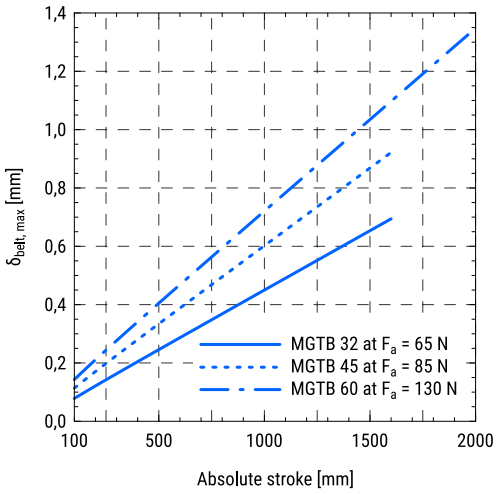
MGTB	Profile	
	I_y [cm⁴]	I_z [cm⁴]
32	4,3	4,6
45	14,3	15,9
60	43,8	50,3

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



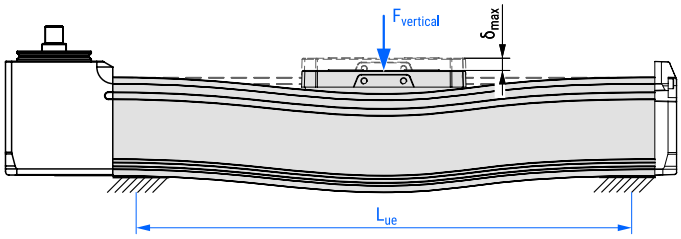


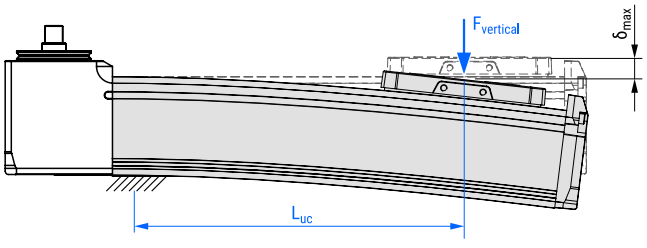
In the following diagram, the maximal toothed belt elongation in respect of the absolute stroke and a given axial load is presented.

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”.

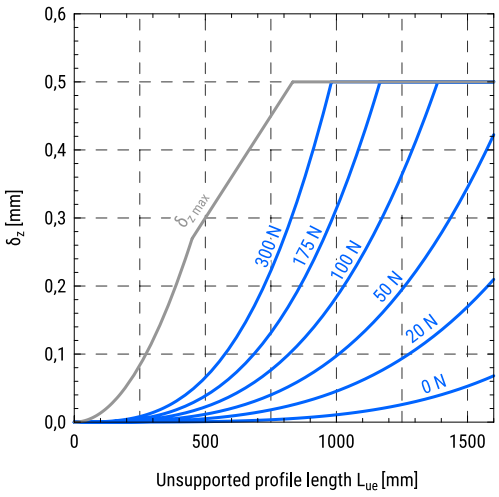
Deflection of the linear unit as a function of a vertical force and the unsupported profile length

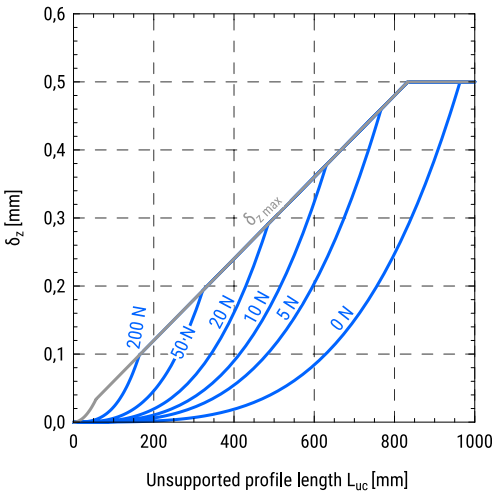




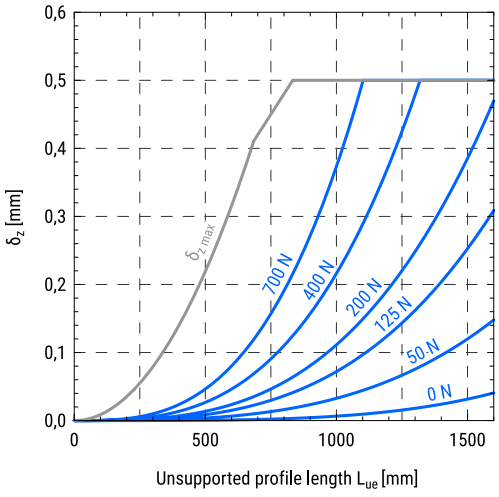
In the following diagrams, the deflection of the linear unit as a function of a vertical force and unsupported profile length is presented. For the case of both ends of the profile are supported and for the case of a console mounting the left and the right diagrams below should be considered, respectively.

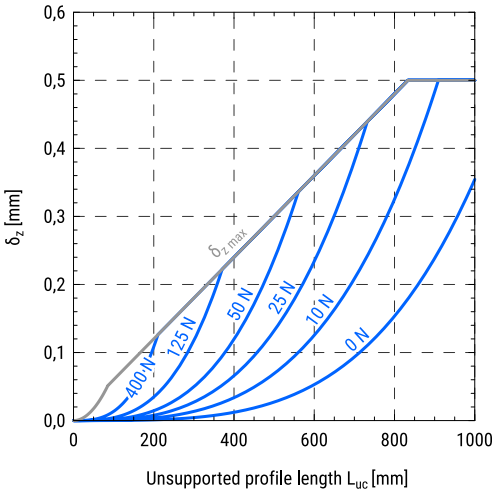
MGTB 32



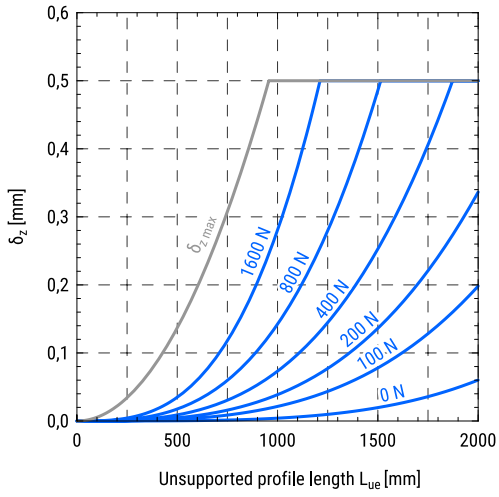


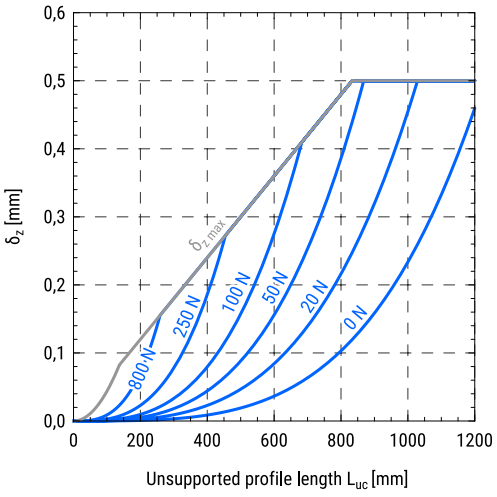
MGTB 45



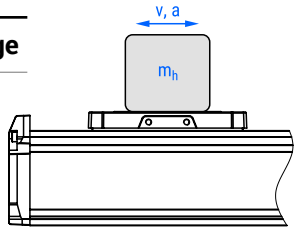


MGTB 60





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

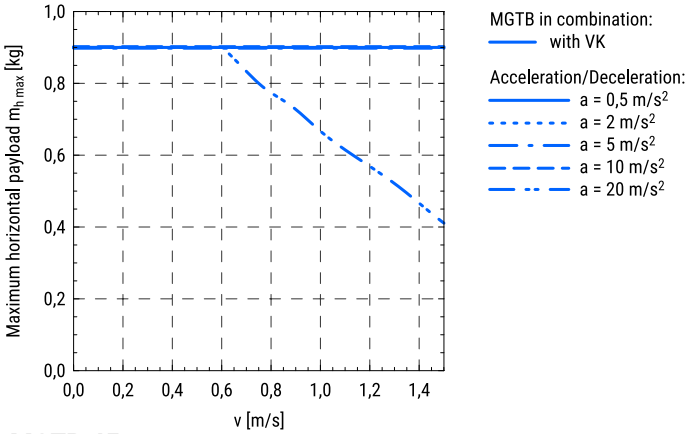


In the following diagrams, maximum horizontal payloads applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors are presented. Motor adapter VK is considered.

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

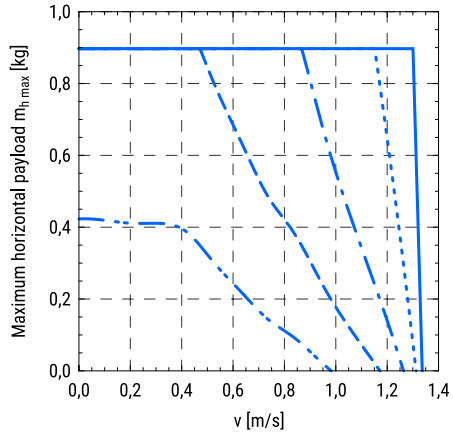
MGTB 32

With a stepper motor ☐42

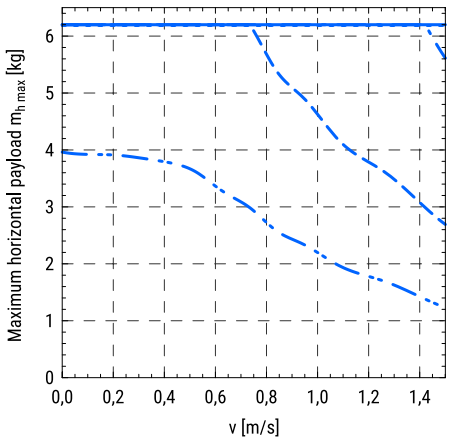


MGTB 45

With a stepper motor ☐42

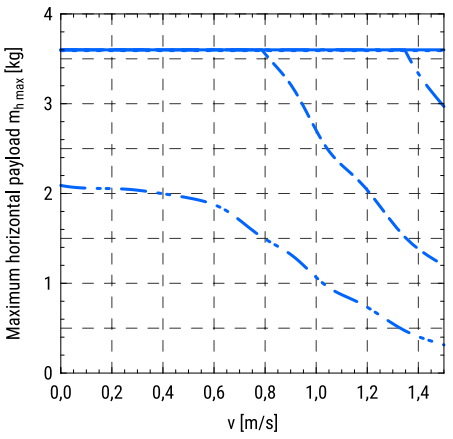


With a stepper motor ☐56

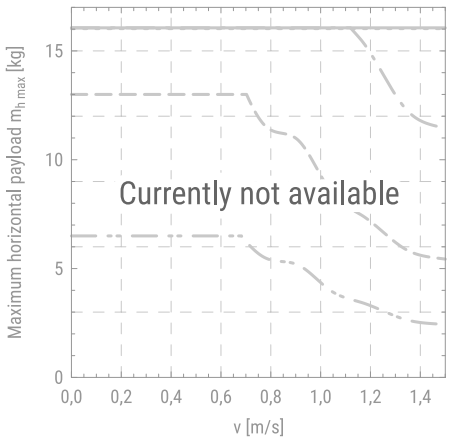


MGTB 60

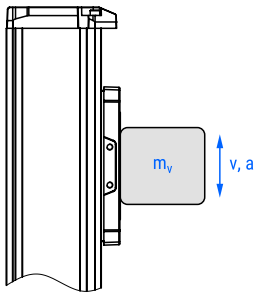
With a stepper motor ☐56



With a stepper motor ☐86



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

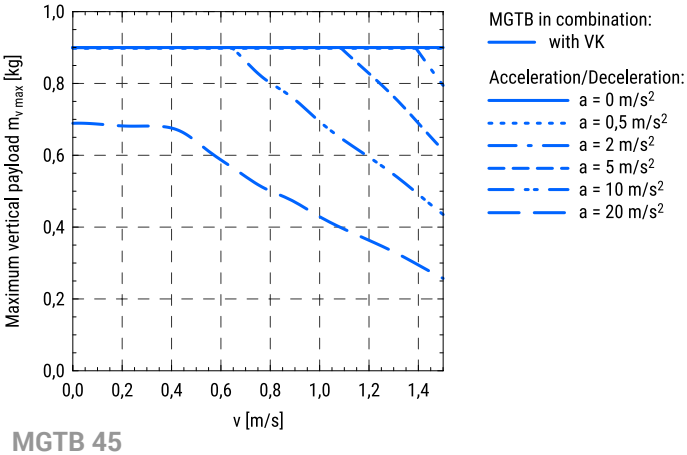


In the following diagrams, the maximum vertical payloads applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors are presented. Motor adapter VK is considered.

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

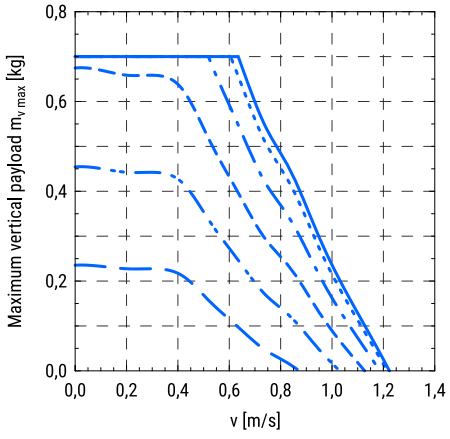
MGTB 32

With a stepper motor ☐42

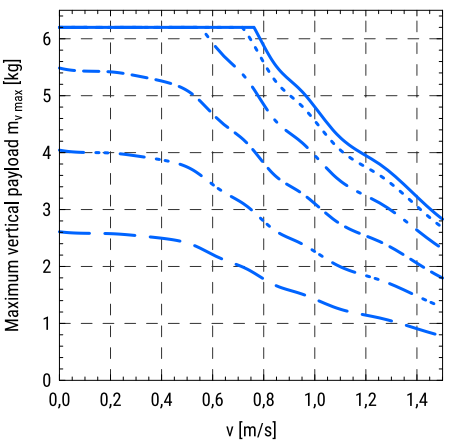


MGTB 45

With a stepper motor ☐42

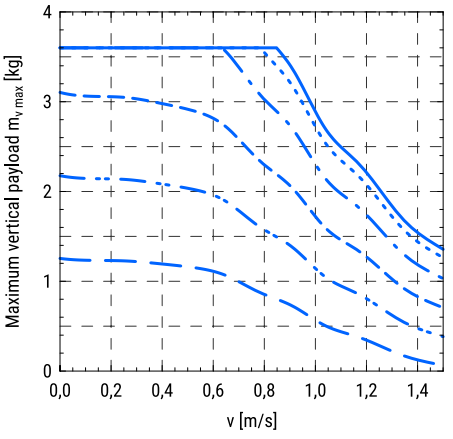


With a stepper motor ☐56

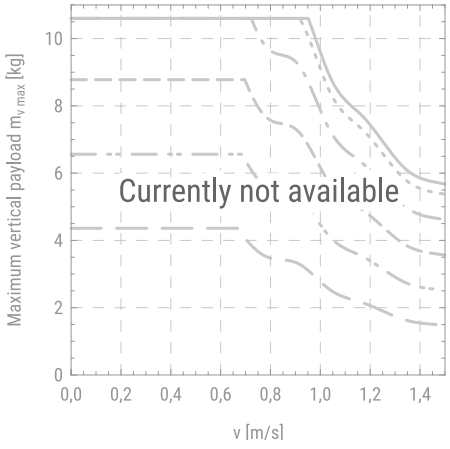


MGTB 60

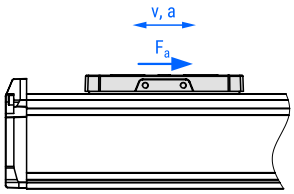
With a stepper motor ☐56



With a stepper motor ☐86



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

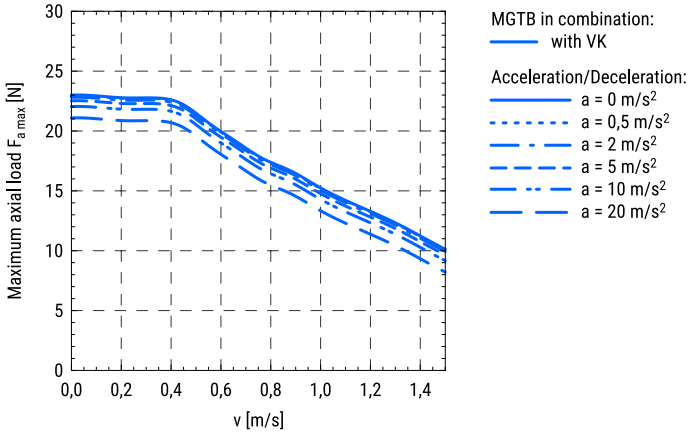


In the following diagrams, the maximum axial load applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors is presented. Motor adapter VK is considered.

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

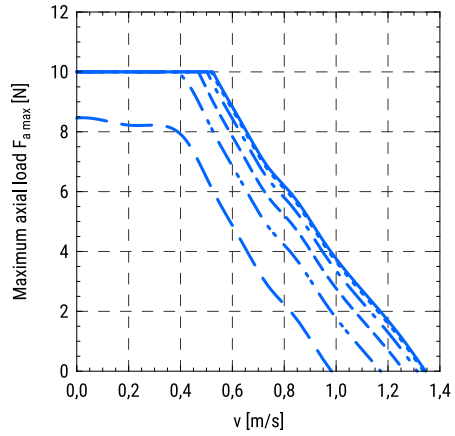
MGTB 32

With a stepper motor ☐42

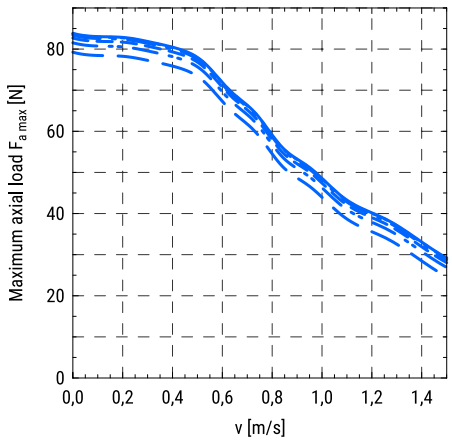


MGTB 45

With a stepper motor ☐42

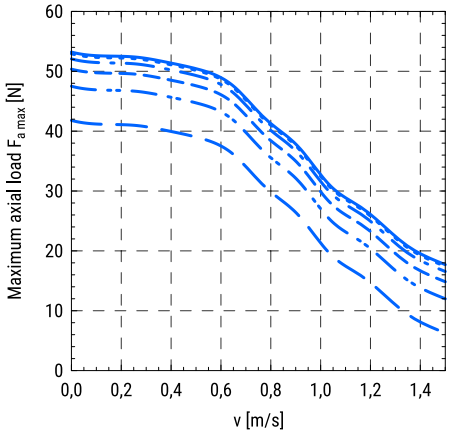


With a stepper motor ☐56

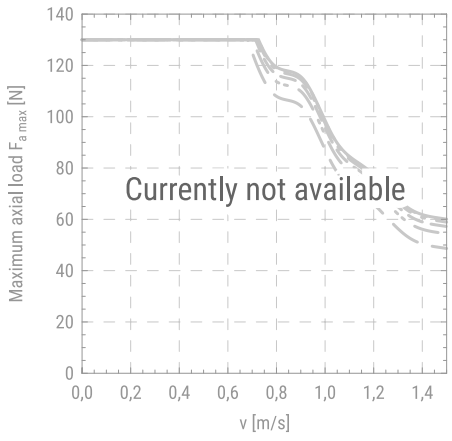


MGTB 60

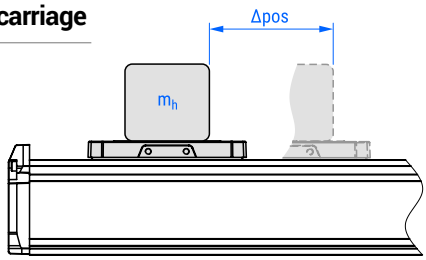
With a stepper motor ☐56



With a stepper motor ☐86



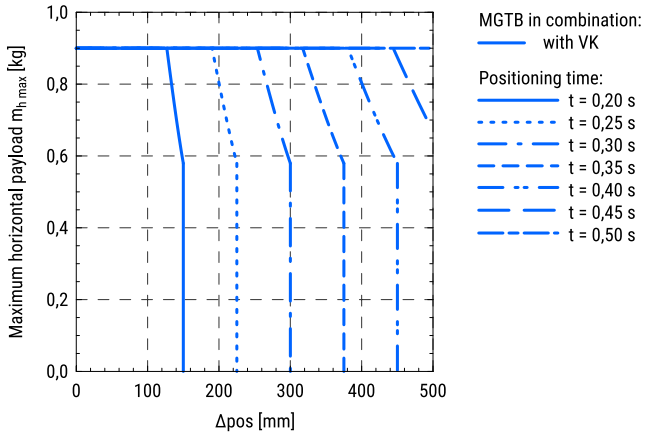
Maximum horizontal payload as a function of position change and positioning time of the carriage



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.

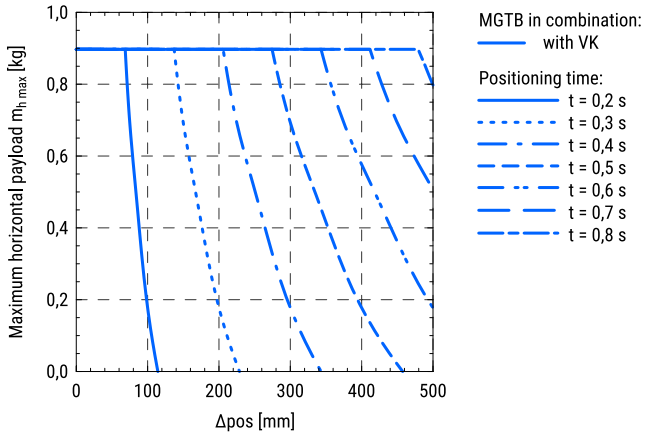
MGTB 32

With a stepper motor ☐42

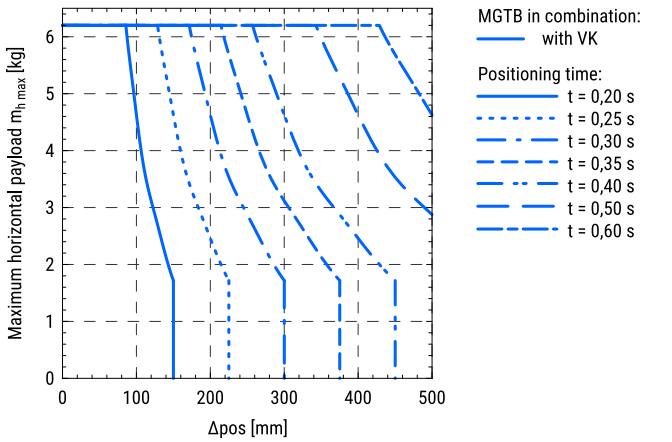


MGTB 45

With a stepper motor ☐42

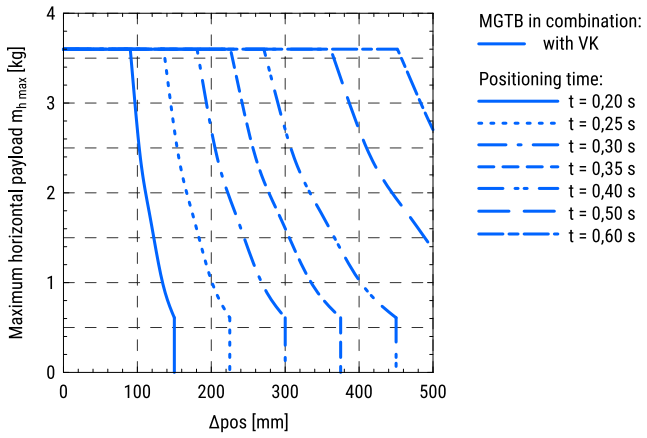


With a stepper motor ☐56

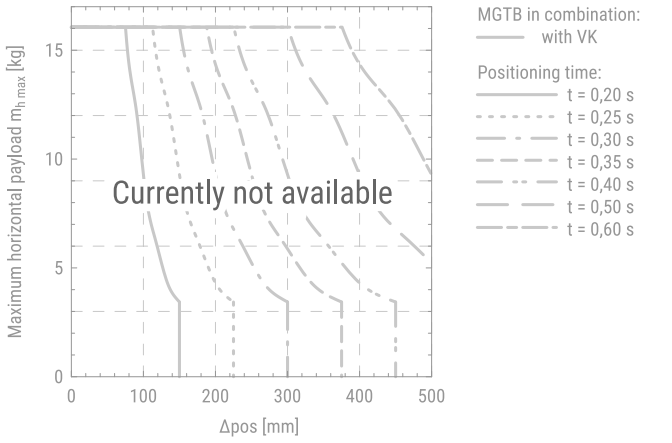


MGTB 60

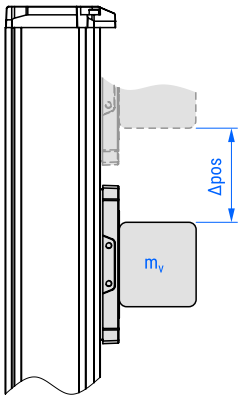
With a stepper motor ☐56



With a stepper motor ☐86



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



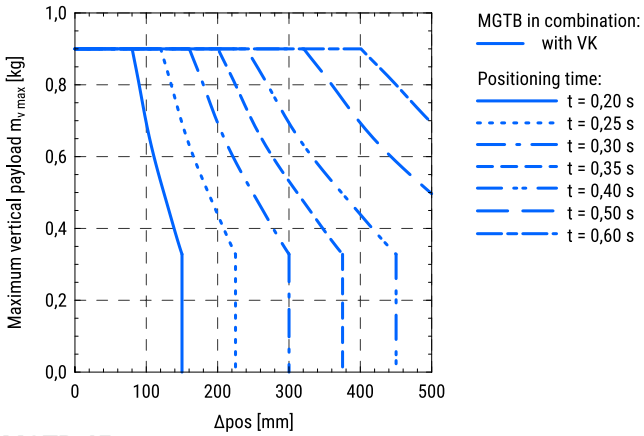
The following diagrams show the maximum payload that can be moved by a certain vertical distance within a positioning time frame. Acceleration/deceleration time of 100 ms is taken into account.

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.

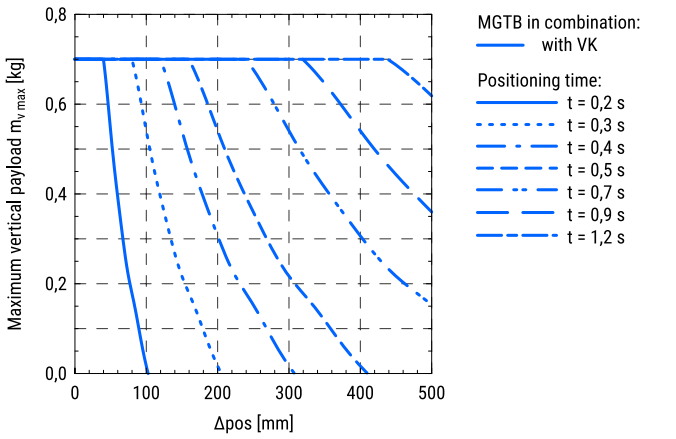
MGTB 32

With a stepper motor ☐42

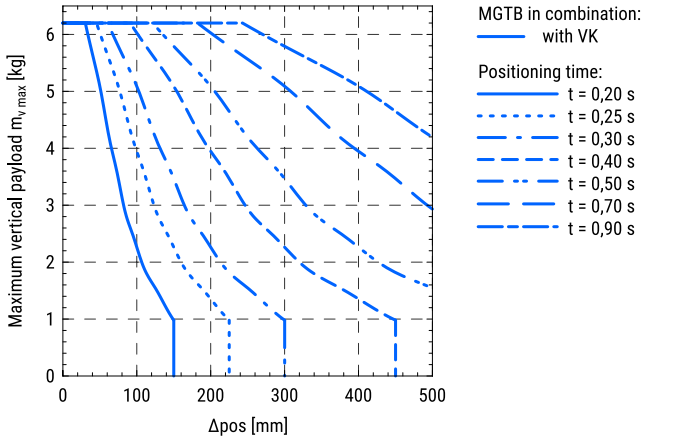


MGTB 45

With a stepper motor ☐42

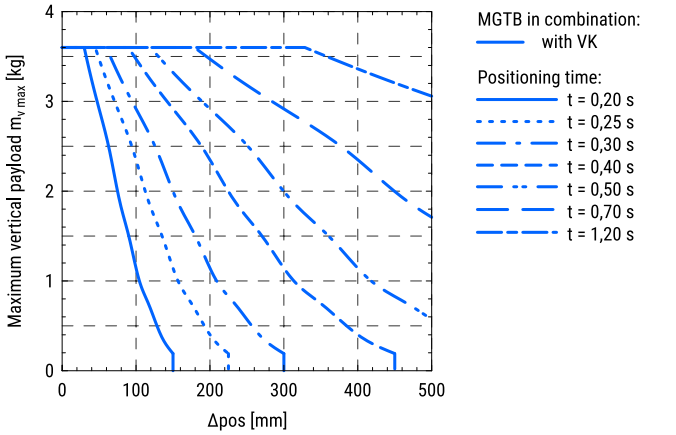


With a stepper motor ☐56

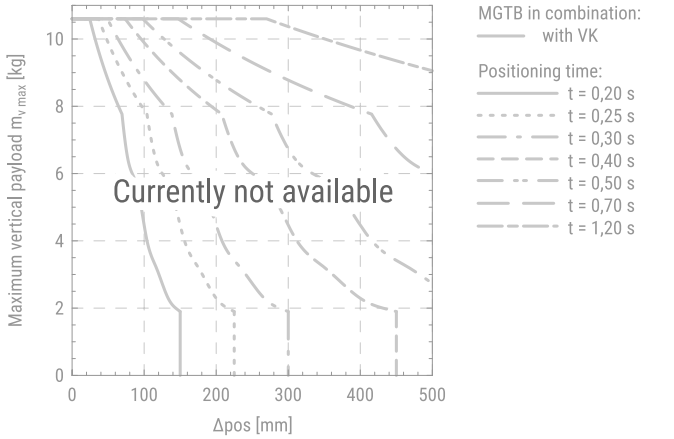


MGTB 60

With a stepper motor ☐56



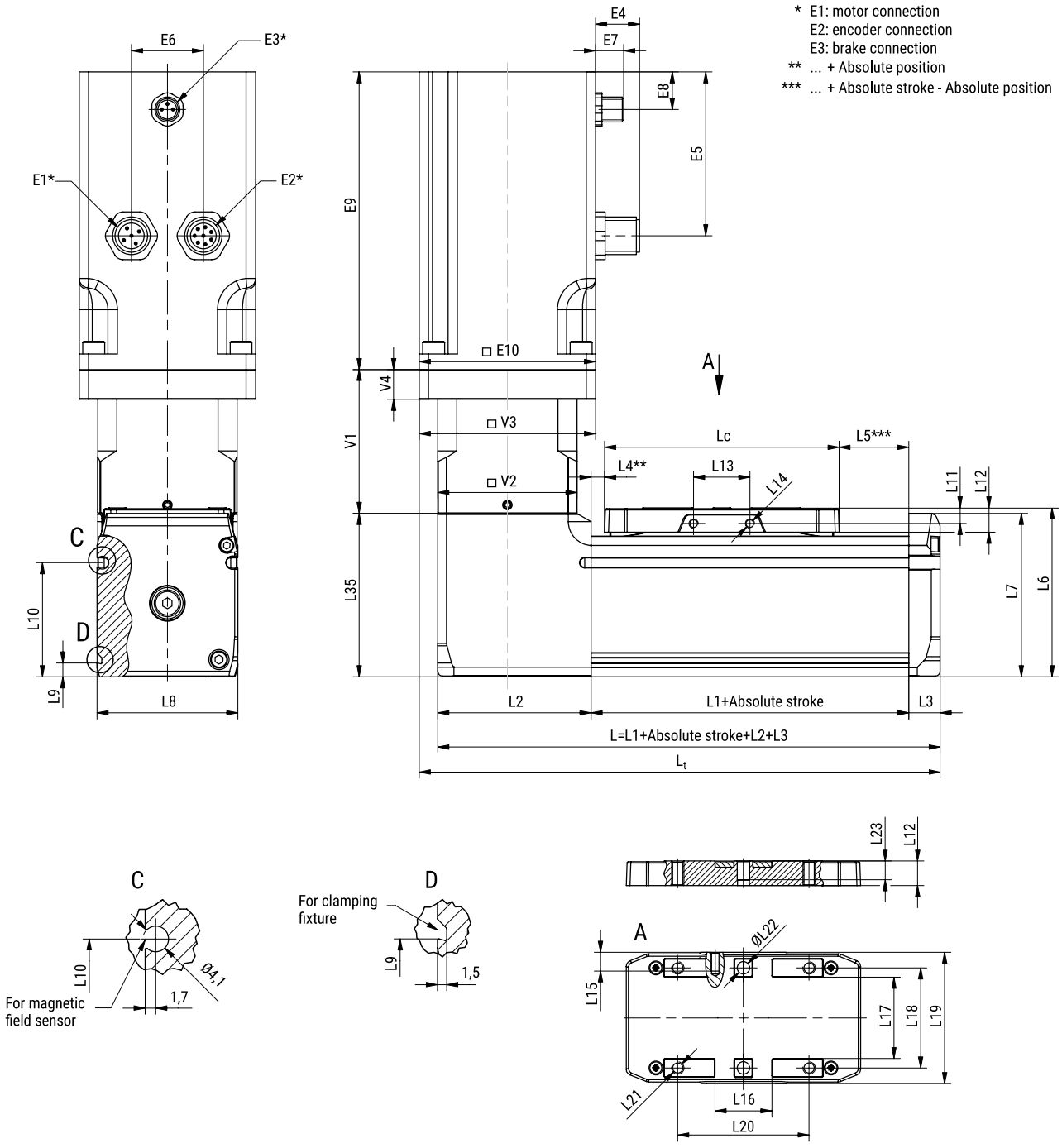
With a stepper motor ☐86



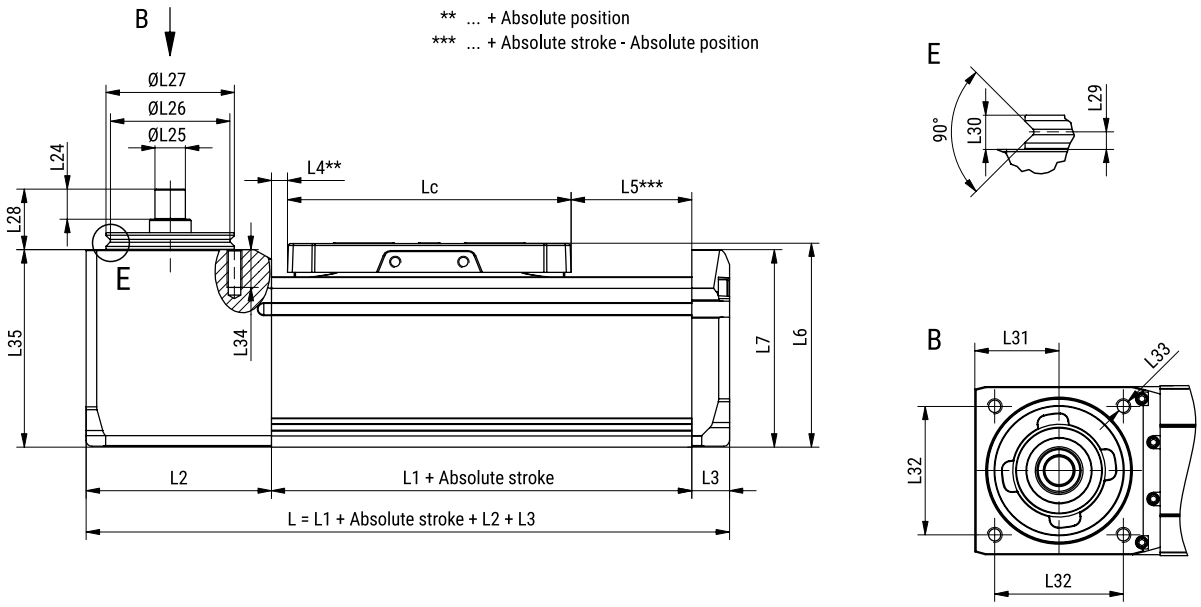
DIMENSIONS

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

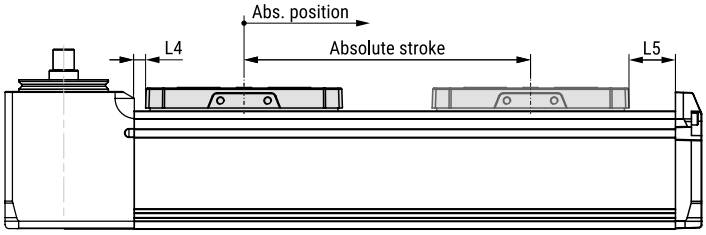
Motor adapter VK dimensions

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:

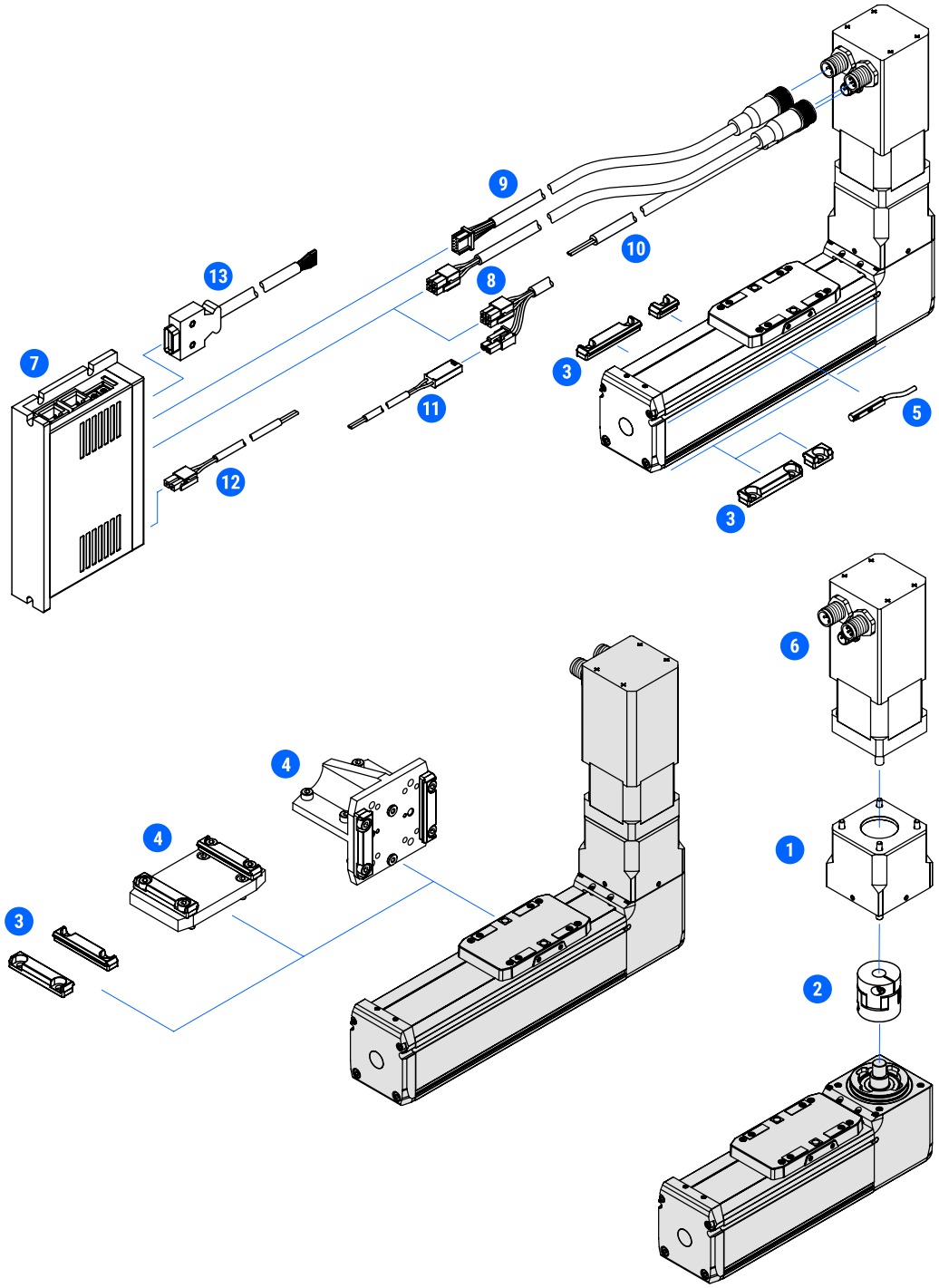
$L_t = L$

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