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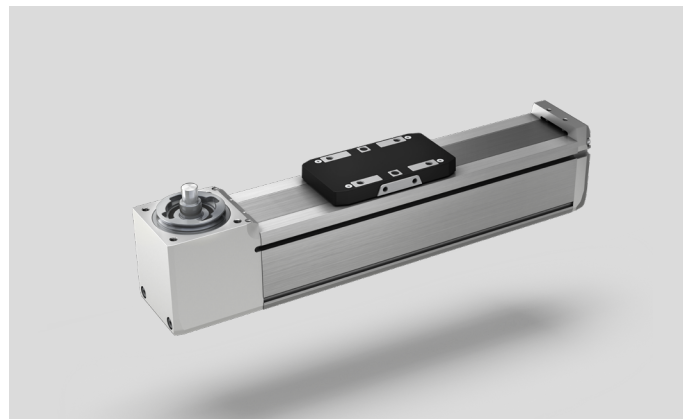
Each MGTB is optimally pre-lubricated and ready for a maintenance-free operating process.

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

ℹ️ The aluminium profiles are manufactured according to the EN 12020-2 standard
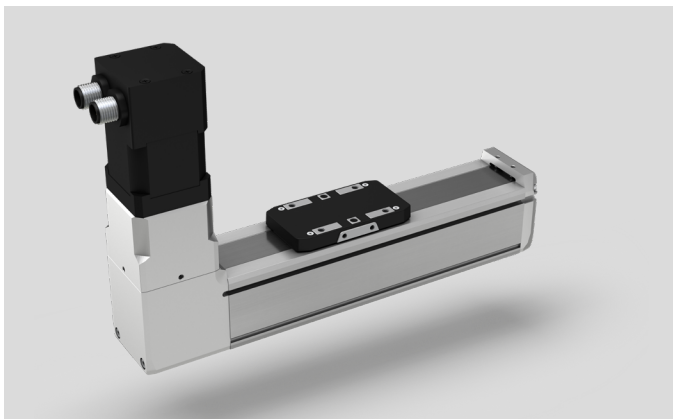
Motor adapter VK with a coupling and a motor
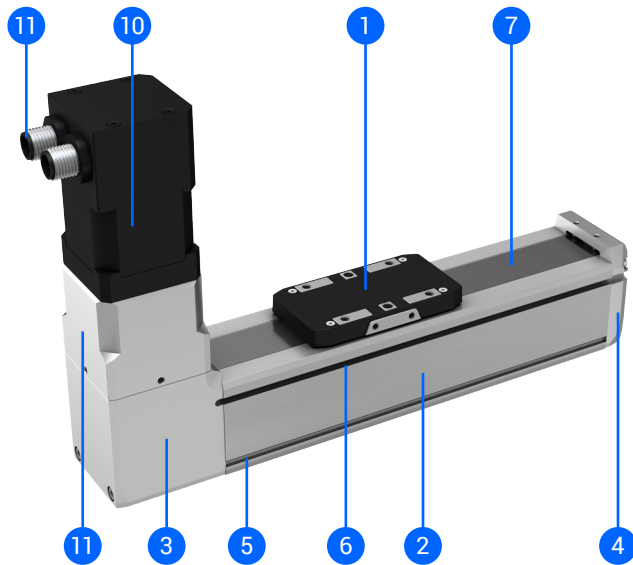
MGTB without a preassembled motor

Accessories, MGTB without a preassembled motor

In order to improve the products in this catalogue the specifications are subject to change without notice.

UNIMOTION   35

STRUCTURAL DESIGN

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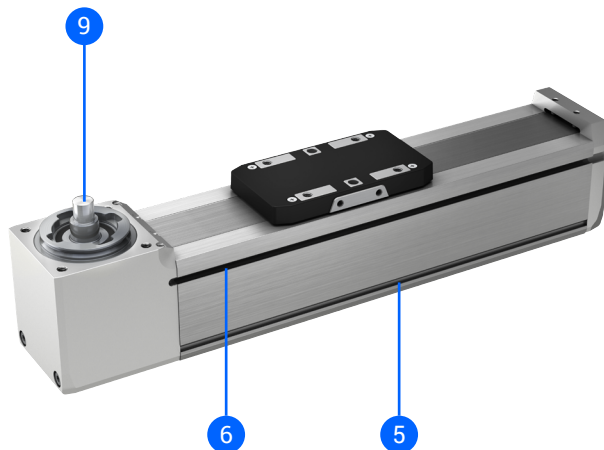
1 – Carriage
2 – Aluminium profile
3 – Drive block with a pulley
4 – End block
5 – Mounting slots
6 – Slot for the magnetic field sensors
7 – Corrosion-resistance protection strip
8 – Motor adapter VK with a coupling
9 – The Drive shaft of the pulley
10 – Preassembled motor (with/without a brake)
11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

Without a motor

In order to improve the products in this catalogue the specifications are subject to change without notice.

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"

In order to improve the products in this catalogue the specifications are subject to change without notice.

UNIMOTION   37

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.
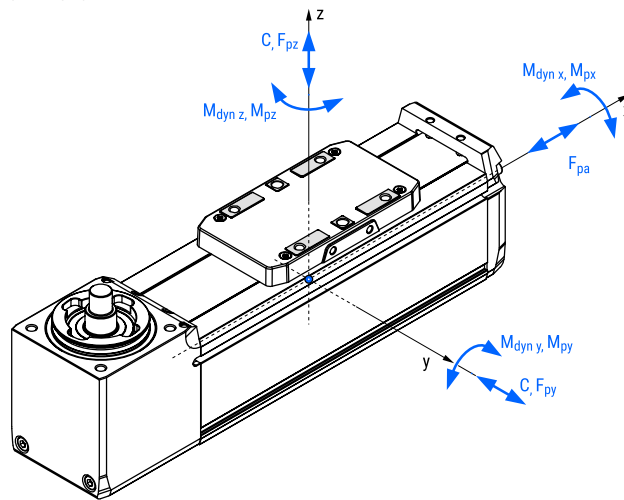
Drive data

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
			Type	Size □ [mm]		Horizontal	Vertical			
	[mm/rev]	[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
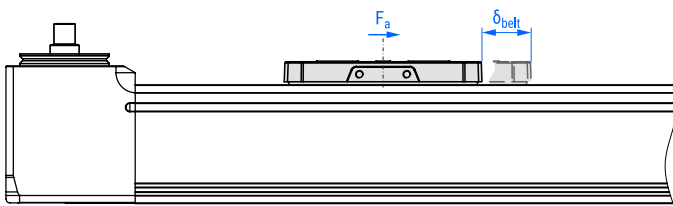
ℹ️ In the following diagram, the maximal toothed belt elongation in respect of the absolute stroke and a given axial load is presented.

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".
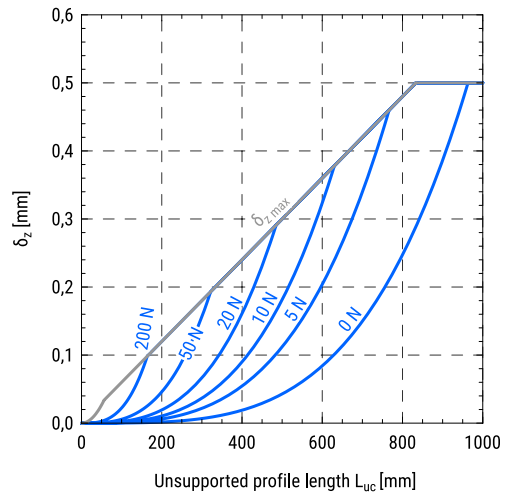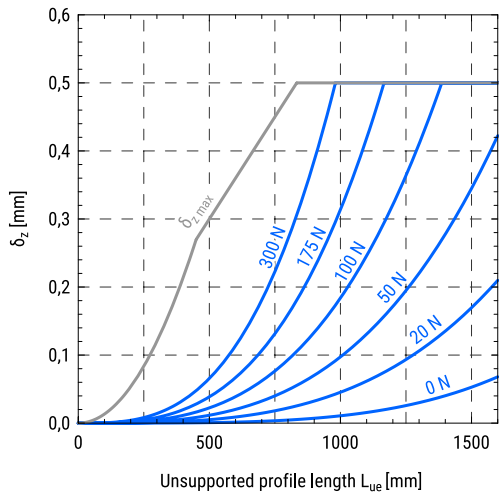

MGTB 32 at F_a = 65 N
MGTB 45 at F_a = 85 N
MGTB 60 at F_a = 130 N
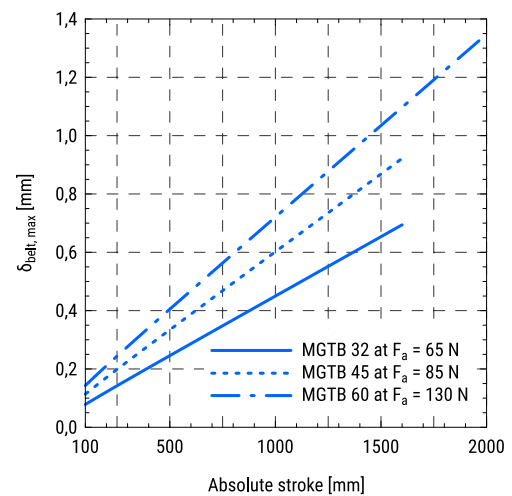
Deflection of the linear unit as a function of a vertical force and the unsupported profile length
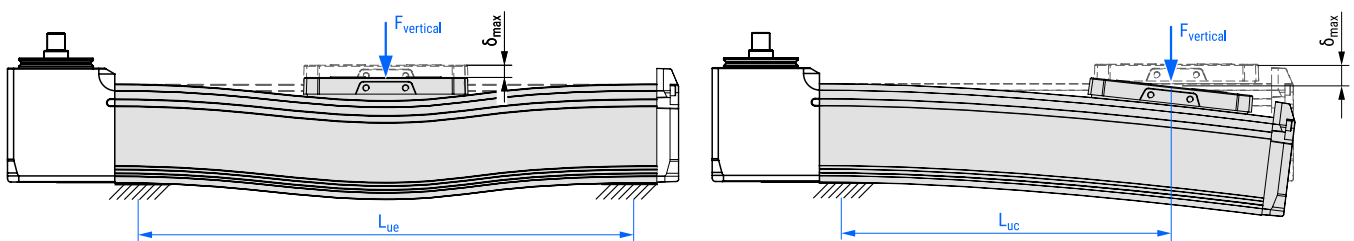
ℹ️ In the following diagrams, the deflection of the linear unit as a function of a vertical force and unsupported profile length is presented. For the case of both ends of the profile are supported and for the case of a console mounting the left and the right diagrams below should be considered, respectively.
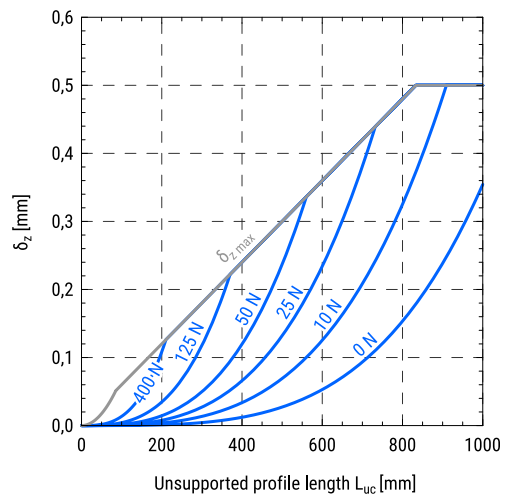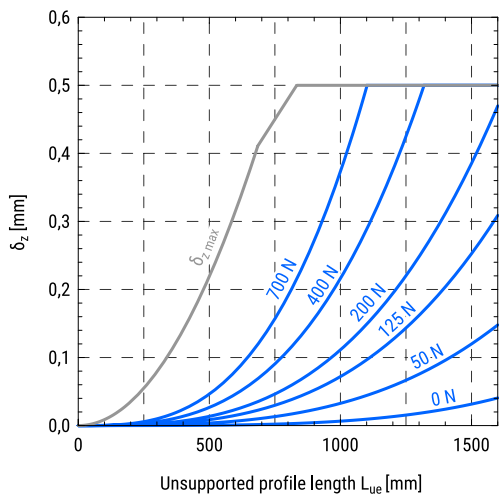
In order to improve the products in this catalogue the specifications are subject to change without notice.

MGTB 32

MGTB 45

MGTB 60

In order to improve the products in this catalogue the specifications are subject to change without notice.

UNIMOTION   41

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

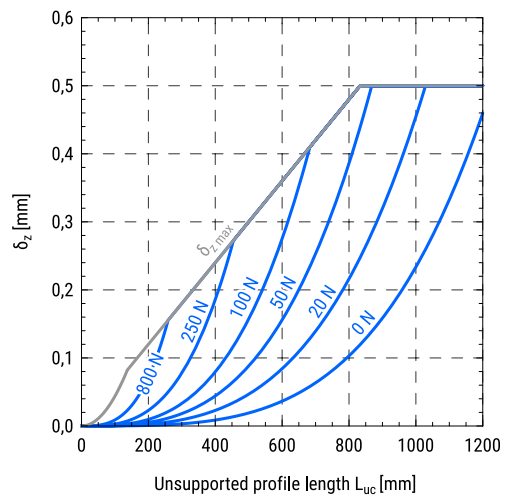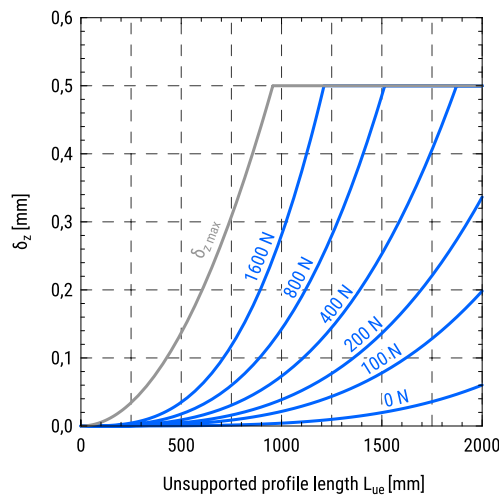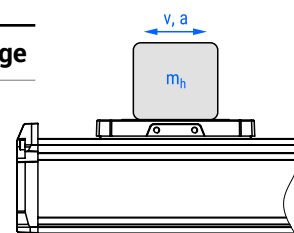ℹ️ In the following diagrams, maximum horizontal payloads applied to the carriage as a function of the travel speed for different accelerations and different combinations of the standard motors are presented. Motor adapter VK is considered.

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

MGTB 32

With a stepper motor □42

MGTB in combination:
— with VK

Acceleration/Deceleration:
— $a = 0{,}5$ m/s^2
···· $a = 2$ m/s^2
—·— $a = 5$ m/s^2
— — $a = 10$ m/s^2
—··— $a = 20$ m/s^2

MGTB 45

With a stepper motor □42

With a stepper motor □56

MGTB in combination:
— with VK

Acceleration/Deceleration:
— $a = 0{,}5$ m/s^2
···· $a = 2$ m/s^2
—·— $a = 5$ m/s^2
— — $a = 10$ m/s^2
—··— $a = 20$ m/s^2

MGTB 60

With a stepper motor □56

With a stepper motor □86

Currently not available

MGTB in combination:
— with VK

Acceleration/Deceleration:
— $a = 0{,}5$ m/s^2
···· $a = 2$ m/s^2
—·— $a = 5$ m/s^2
— — $a = 10$ m/s^2
—··— $a = 20$ m/s^2

In order to improve the products in this catalogue the specifications are subject to change without notice.

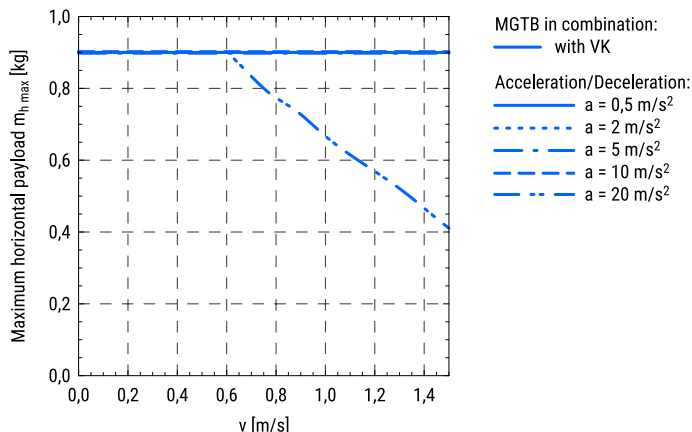## Maximum vertical payload as a function of the travel speed and acceleration of the carriage

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

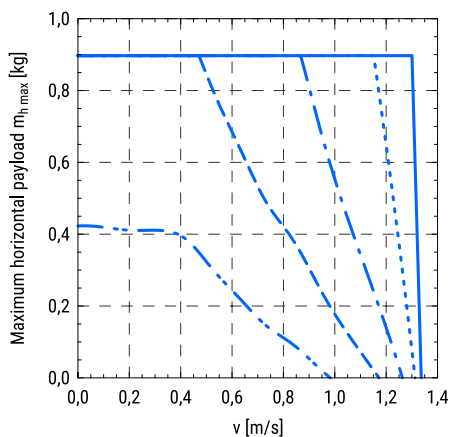The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.
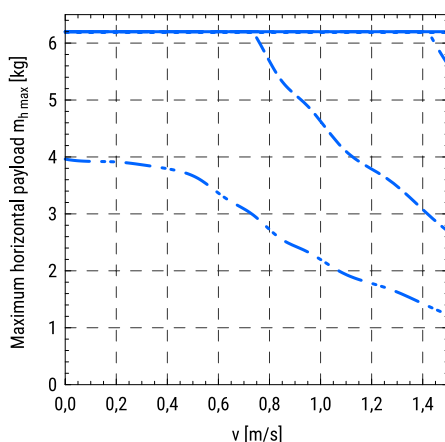
MGTB 32

With a stepper motor □42

MGTB in combination:
— with VK

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

MGTB 45

With a stepper motor □42

With a stepper motor □56

MGTB in combination:
— with VK

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

MGTB 60

With a stepper motor □56

With a stepper motor □86

Currently not available

MGTB in combination:
— with VK

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

In order to improve the products in this catalogue the specifications are subject to change without notice.

UNIMOTION   43

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

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

The diagrams shown below are valid for the linear units with an absolute stroke of 500 mm.
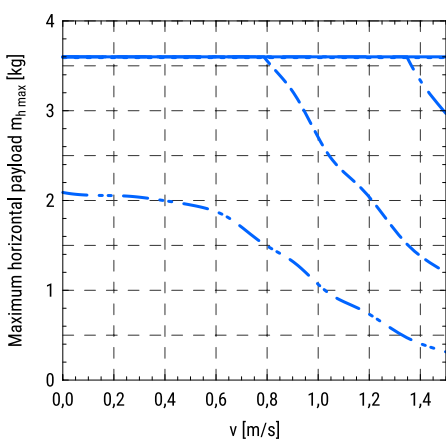
MGTB 32

With a stepper motor □42

MGTB in combination:
— with VK

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

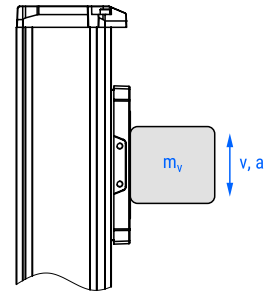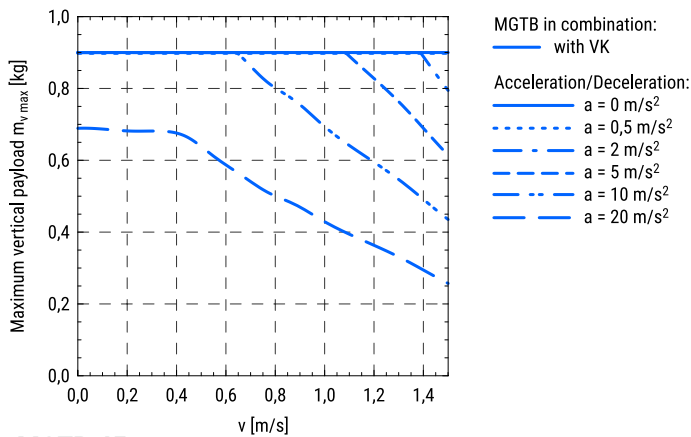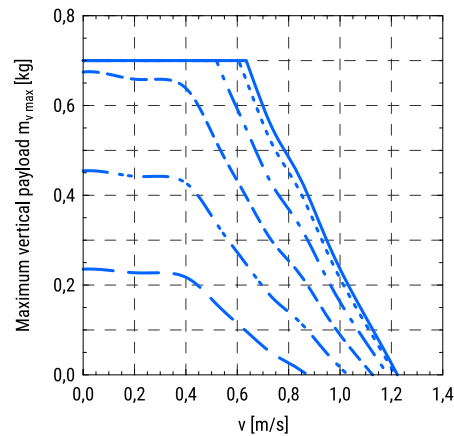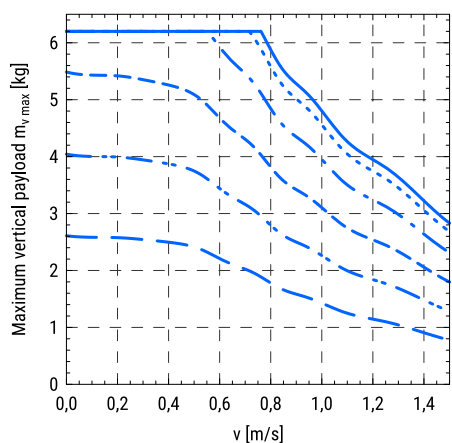### MGTB 45

With a stepper motor □42

With a stepper motor □56

MGTB in combination:
— with VK

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

MGTB 60

With a stepper motor □56

With a stepper motor □86

Currently not available
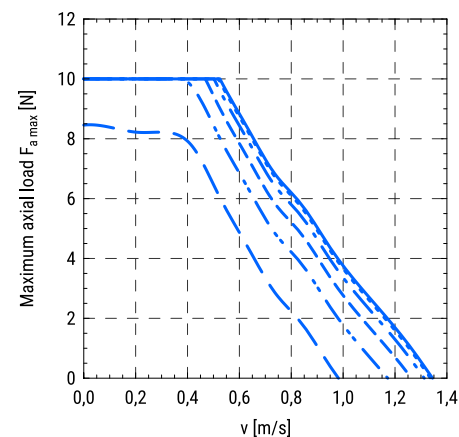
MGTB in combination:
— with VK

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

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

ℹ 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 in combination:
with VK

Positioning time:
t = 0,20 s
t = 0,25 s
t = 0,30 s
t = 0,35 s
t = 0,40 s
t = 0,45 s
t = 0,50 s

MGTB 45

With a stepper motor □42

MGTB in combination:
with VK

Positioning time:
t = 0,2 s
t = 0,3 s
t = 0,4 s
t = 0,5 s
t = 0,6 s
t = 0,7 s
t = 0,8 s

With a stepper motor □56

MGTB in combination:
with VK

Positioning time:
t = 0,20 s
t = 0,25 s
t = 0,30 s
t = 0,35 s
t = 0,40 s
t = 0,50 s
t = 0,60 s

MGTB 60

With a stepper motor □56

MGTB in combination:
with VK

Positioning time:
t = 0,20 s
t = 0,25 s
t = 0,30 s
t = 0,35 s
t = 0,40 s
t = 0,50 s
t = 0,60 s

With a stepper motor □86

Currently not available

MGTB in combination:
with VK

Positioning time:
t = 0,20 s
t = 0,25 s
t = 0,30 s
t = 0,35 s
t = 0,40 s
t = 0,50 s
t = 0,60 s

In order to improve the products in this catalogue the specifications are subject to change without notice.

UNIMOTION   45
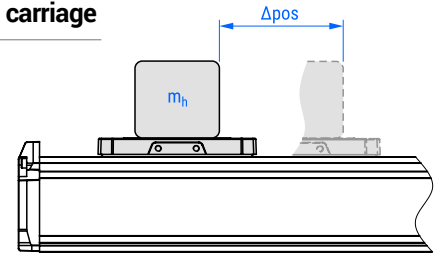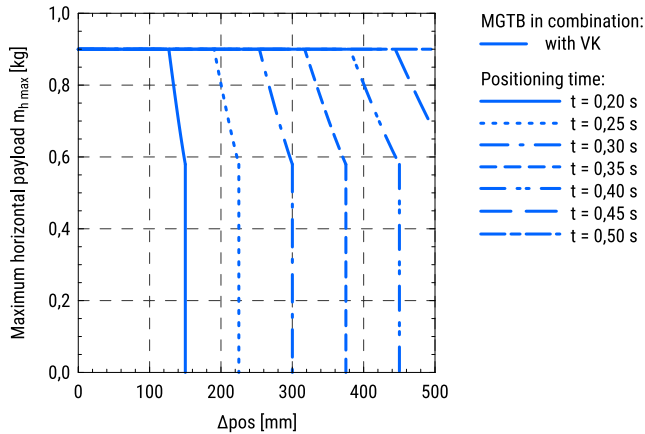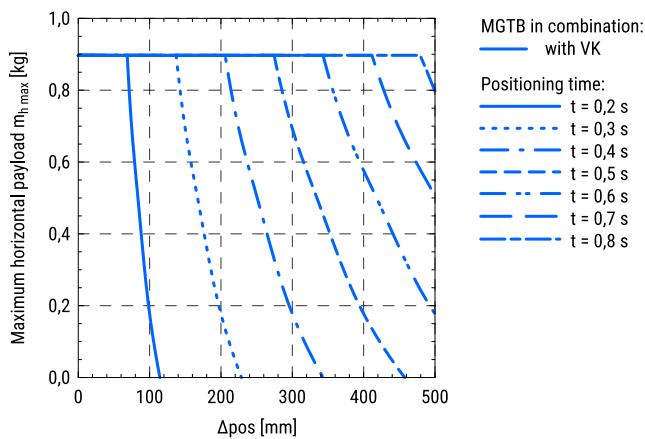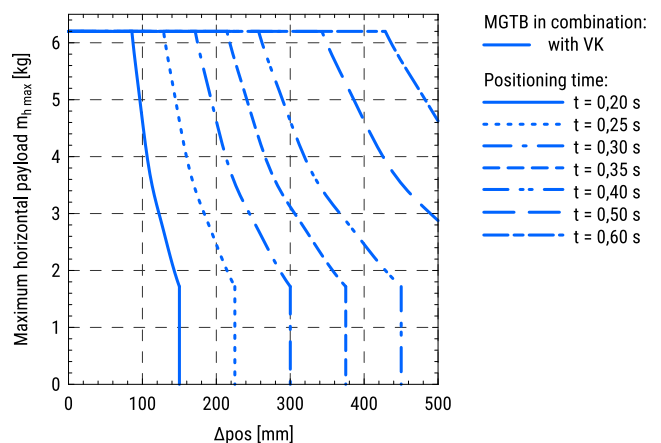
Maximum vertical payload as a function of position change and positioning time of the carriage

ℹ️ 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

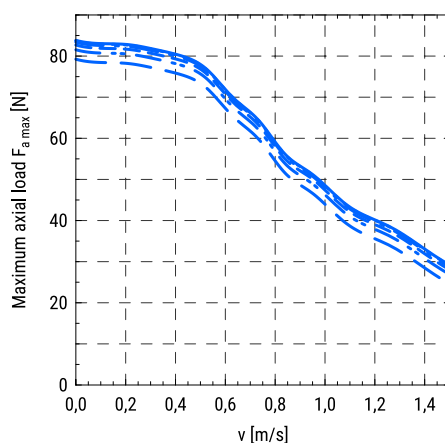**With a stepper motor ☐42**

MGTB in combination:
— with VK

Positioning time:
— t = 0,20 s
···· t = 0,25 s
—·— t = 0,30 s
— — t = 0,35 s
—··— t = 0,40 s
— — t = 0,50 s
—·— t = 0,60 s

MGTB 45

With a stepper motor ☐42

MGTB in combination:
— with VK

Positioning time:
— t = 0,2 s
···· t = 0,3 s
—·— t = 0,4 s
— — t = 0,5 s
—··— t = 0,7 s
— — t = 0,9 s
—·— t = 1,2 s

With a stepper motor ☐56

MGTB in combination:
— with VK

Positioning time:
— t = 0,20 s
···· t = 0,25 s
—·— t = 0,30 s
— — t = 0,40 s
—··— t = 0,50 s
— — t = 0,70 s
—·— t = 0,90 s

MGTB 60

With a stepper motor ☐56

MGTB in combination:
— with VK

Positioning time:
— t = 0,20 s
···· t = 0,25 s
—·— t = 0,30 s
— — t = 0,40 s
—··— t = 0,50 s
— — t = 0,70 s
—·— t = 1,20 s

With a stepper motor ☐86

Currently not available

MGTB in combination:
— with VK

Positioning time:
— t = 0,20 s
···· t = 0,25 s
—·— t = 0,30 s
— — t = 0,40 s
—··— t = 0,50 s
— — t = 0,70 s
—·— t = 1,20 s

DIMENSIONS

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

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

* E1: motor connection
  E2: encoder connection
  E3: brake connection
** ... + Absolute position
*** ... + Absolute stroke - Absolute position

L=L1+Absolute stroke+L2+L3

For magnetic field sensor

For clamping fixture

In order to improve the products in this catalogue the specifications are subject to change without notice.

UNIMOTION   47

MGTB without the motor

** ... + Absolute position
*** ... + Absolute stroke - Absolute position

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	Currently not available									
	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	Currently not available									

Absolute stroke of the MGBS definition
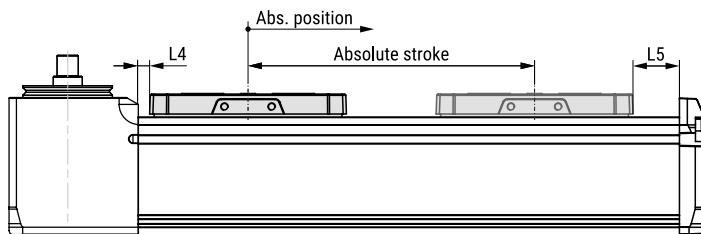
ⓘ Dimensions L4 and L5 are presented in the dimensional drawing table above.

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]

In order to improve the products in this catalogue the specifications are subject to change without notice.

UNIMOTION 49

ACCESSORIES

In order to improve the products in this catalogue the specifications are subject to change without notice.
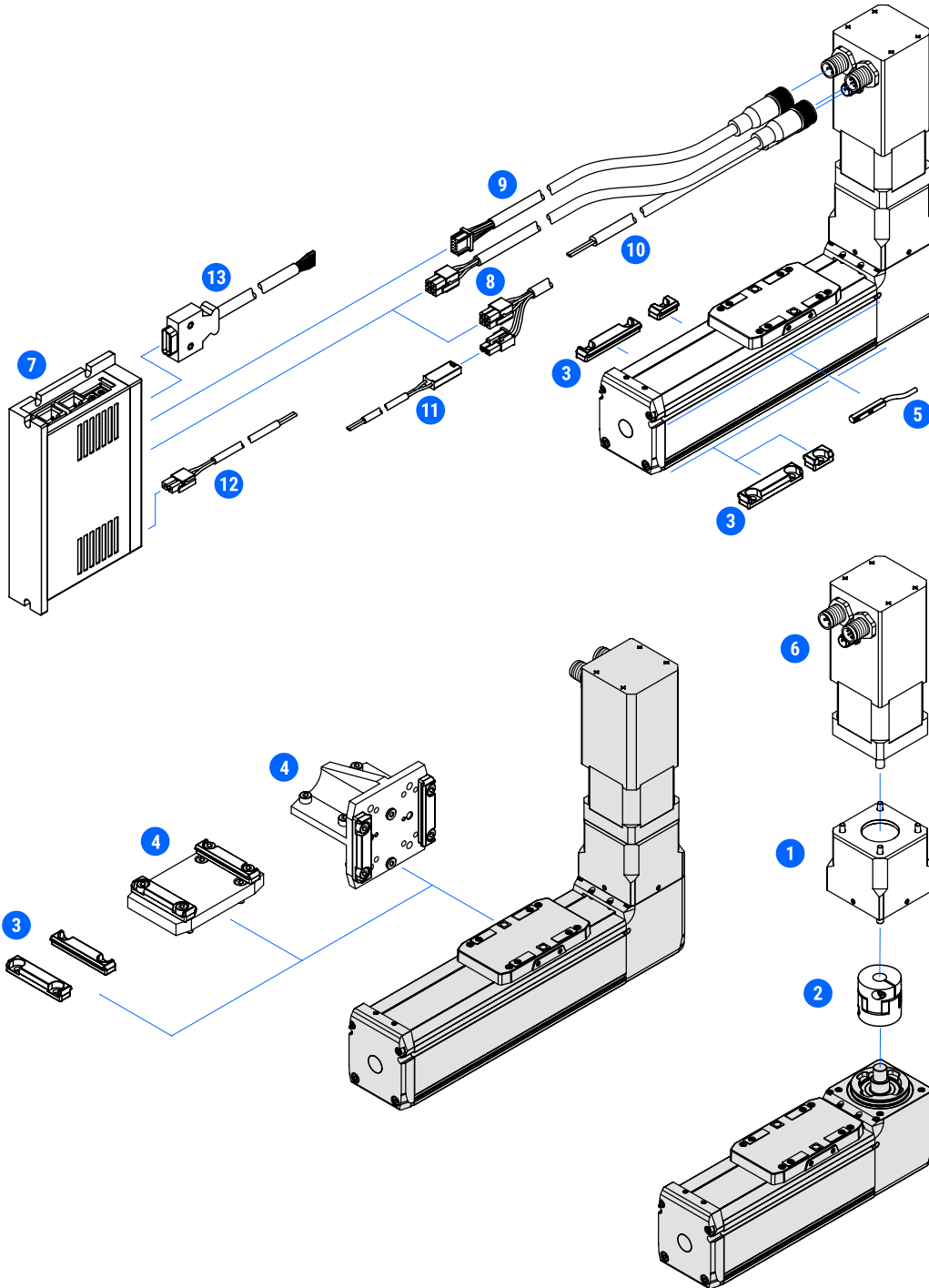
ACCESSORIES

#	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

ℹ Valid for the stepper motors:
- STMN-42-…
- STMN-56-…

Motor connector	Encoder connector	Brake connector
Connector type: M12 5-pole	Connector type: M12 8-pole	Connector type: M8 3-pole
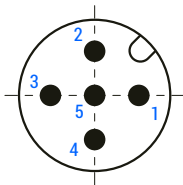
Pin	Function
1	A–
2	A+
3	B+
4	B–
5	Housing
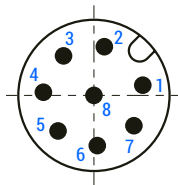
Pin	Function
1	A+
2	A–
3	B+
4	B–
5	GND
6	I–
7	I+
8	VCC (5 V)
Housing	GND/shielding
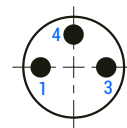
Pin	Function
1	Brake +24 V
3	Brake/GND
4	NC

ℹ Valid only for motors with brake:
- STMN-…-B

In order to improve the products in this catalogue the specifications are subject to change without notice.

UNIMOTION 53

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

ℹ Please refer to the section "Accessories → Drive".

Detailed informations

ℹ 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".

In order to improve the products in this catalogue the specifications are subject to change without notice.

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".
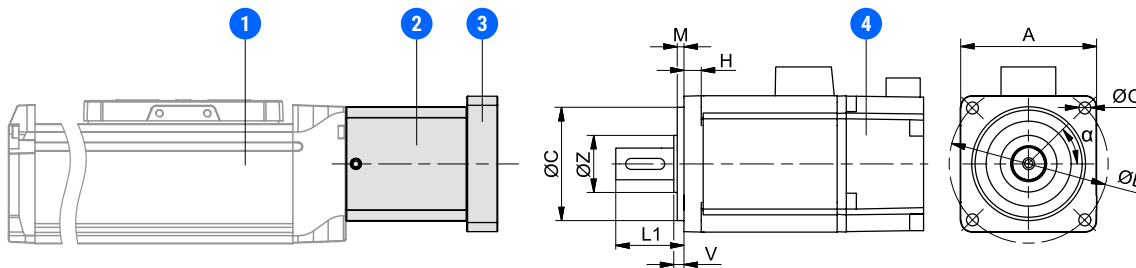
Detailed informations

ⓘ Please refer to the Unimotion documentation related to the drives.

Accessories

MOTOR ADAPTER

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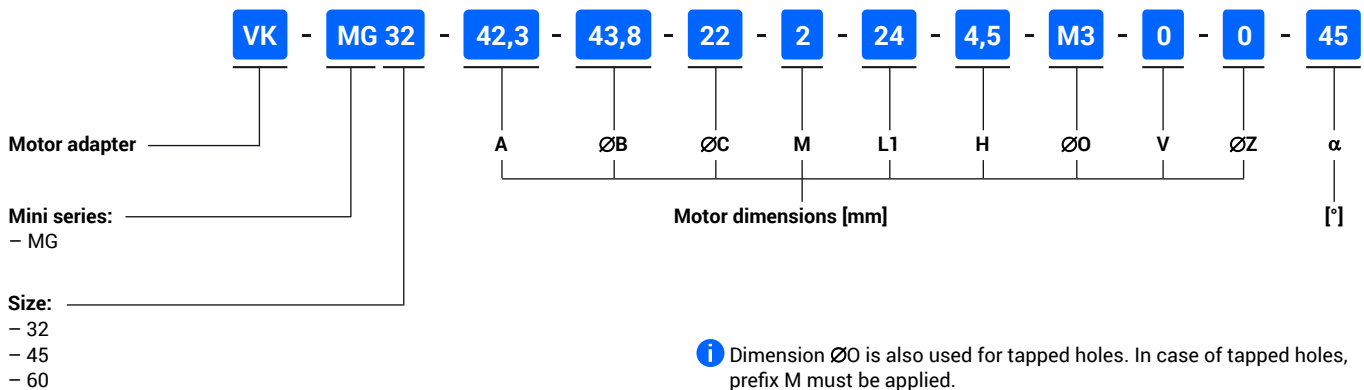3 – Motor adapter flange ⎦ Motor adapter VK
4 – Motor

ⓘ 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

Motor adapter

Mini series:
– MG

Size:
– 32
– 45
– 60

ⓘ Dimension ∅O 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
				L1 [mm]			diameter × depth			m$_{VK}$
Size	Type	Size □ [mm]	Standard	min	max		∅O × H [mm]			[kg]
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

DIN keyway optional

E ISO 4762

Elastomer insert Type A (Shore hardness 98 A)
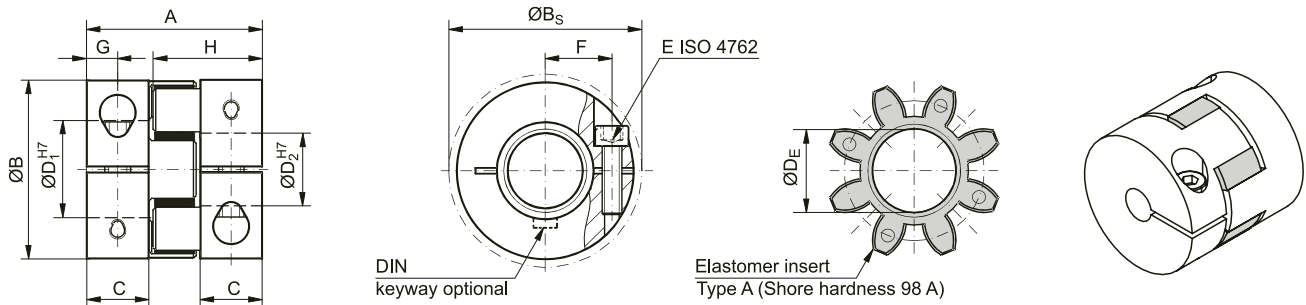
Technical data and dimensions

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
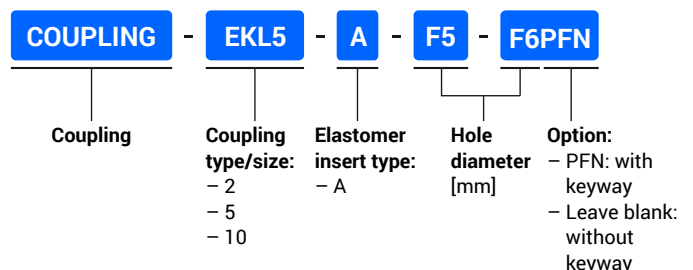
MOTOR SIDE DRIVE MSD WITH A TIMING BELT
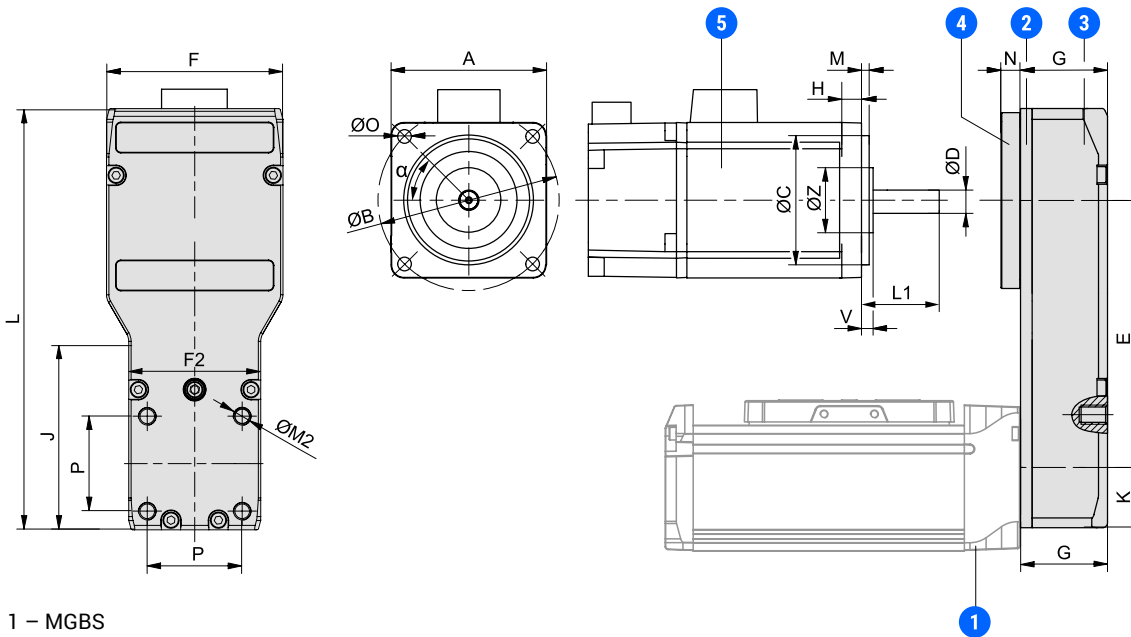
1 – MGBS
2 – Motor side drive main panel
3 – Motor side drive cover
4 – Motor side drive tensioning plate
5 – Motor

Motor side drive MSD

How to order

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

Motor side drive
Mini series:
– MG
Size:
– 32
– 45
– 60
Type
A   ØB   ØC   M   L1   ØD   H   ØO   V   ØZ   α
Motor dimensions [mm]
[°]

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

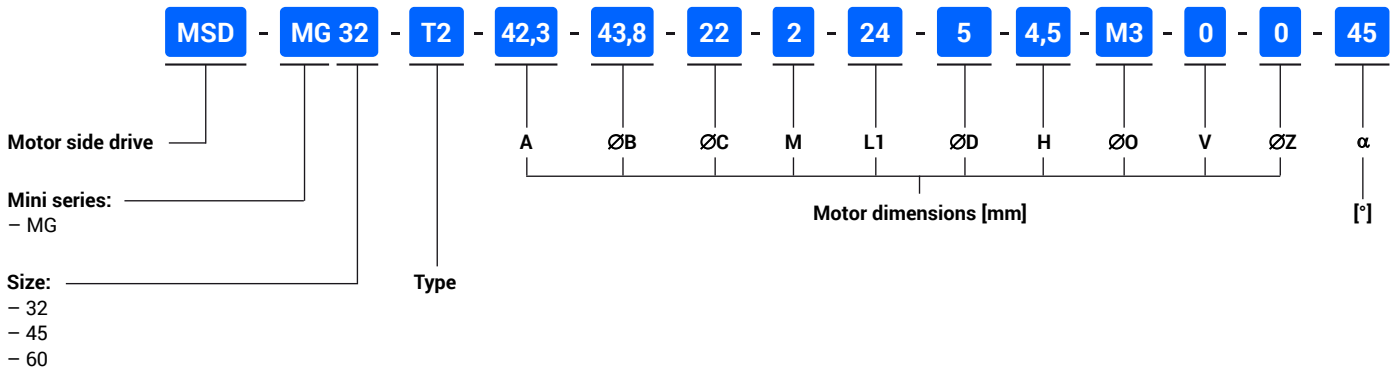### Standard motor side drives MSD compatible with MGBS and standard motors

MGBS	Motor			Motor shaft length		Motor shaft diameter [mm]	Motor mounting holes diameter × depth	Motor side drive MSD	Code	Mass
				L1 [mm]						m$_{MSD}$ [kg]
Size	Type	Size □ [mm]	Standard	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).
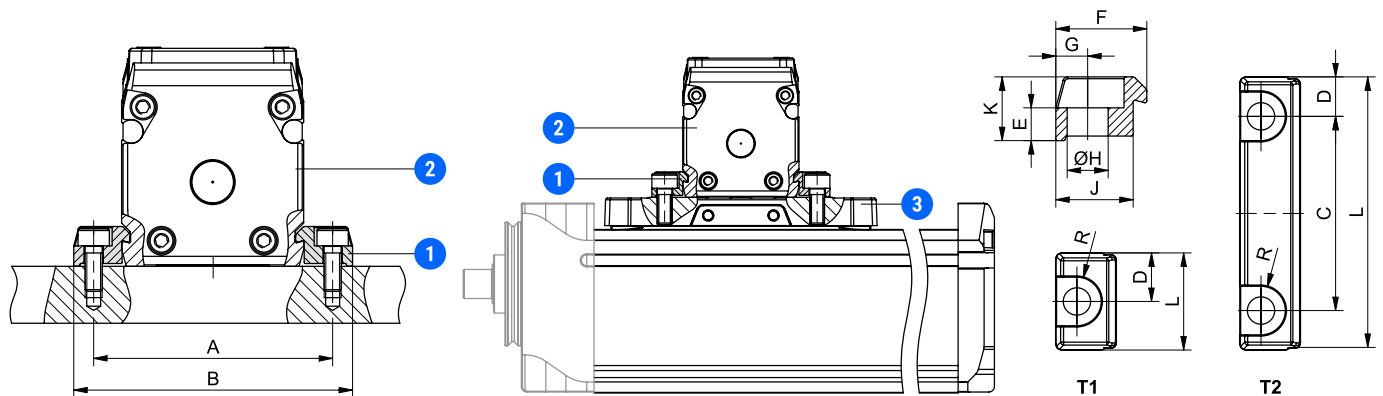
Dimensions

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.

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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

ℹ️ 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	25²	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			3,25		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			3,25		–	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.

In order to improve the products in this catalogue the specifications are subject to change without notice.

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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.

ℹ️ 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".

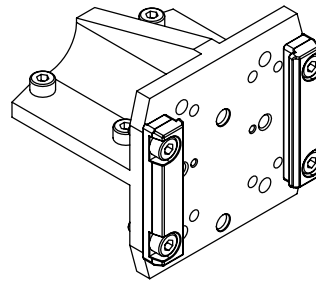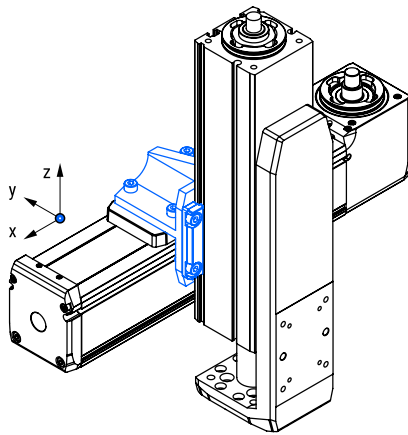## Connection plates for the XY combinations (carriage-profile mounting)
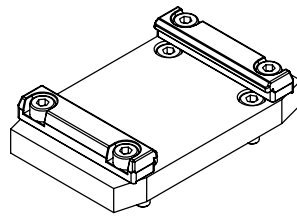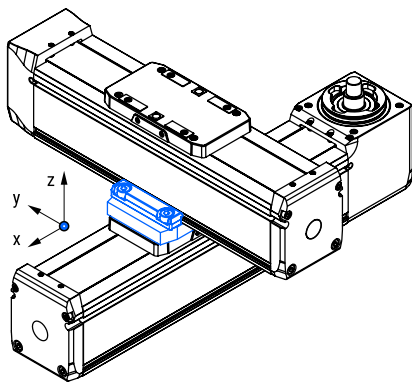
ℹ️ Components needed for mounting
(i.e.: screws, clamping fixtures, centering rings) are included.
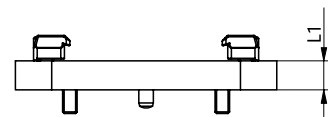
CP		X-axis		Y-axis		Mounting	m$_{CP}$ [kg]	Offset
Name	Code	Linear unit	Size	Linear unit	Size			L1 [mm]
CP MG32 XY MG32 KPL	110994	MGTB/MGBS	32	MGBS/MGTB/MCE/MSCE	32	carriage-profile	0,057	8,0
CP MG45 XY MG45 KPL	111005		45	MGBS/MGTB/MCE/MSCE	45		0,115	
CP MG60 XY MG32 KPL	112563		60	MGBS/MGTB/MCE/MSCE	32		0,165	
CP MG60 XY MG60 KPL	112562			MGBS/MGTB	60		0,191	

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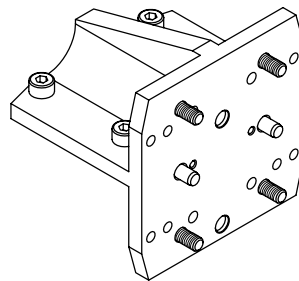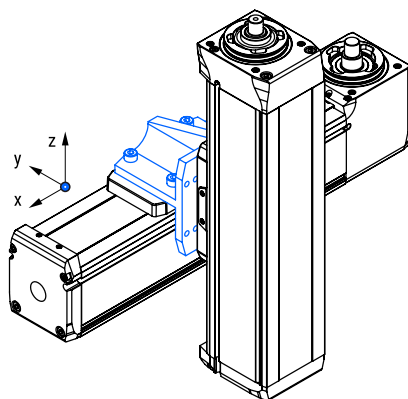## Connection plates for the XZ combinations (carriage-profile mounting)

ℹ Components needed for mounting
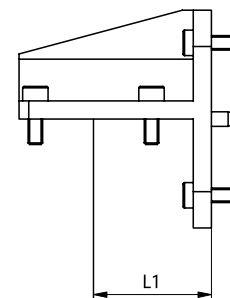(i.e.: screws, clamping fixtures, centering rings)
are included.
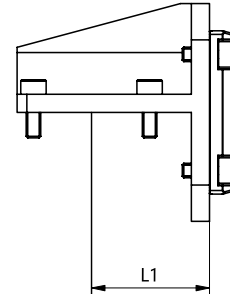
CP		X-axis		Z-axis		Mounting	m_{CP} [kg]	Offset
Name	Code	Linear unit	Size	Linear unit	Size			L1 [mm]
CP MG32 XZ MG32 KPL	111001	MGTB/MGBS	32	MGTB/MGBS	32	carriage-profile	0,095	26
CP MG45 XZ MG32 KPL	111006		45		32		0,161	32
CP MG45 XZ MG45 KPL	111008		45		45		0,161	32
CP MG60 XZ MG32 KPL	112569		60		32		0,320	45
CP MG60 XZ MG45 KPL	112568		60		45		0,320	45
CP MG60 XZ MG60 KPL	112567		60		60		0,346	45
CP MG32 XZ MSCE25 KPL	111003		32	MCE/MSCE	25		0,095	26
CP MG32 XZ MSCE32 KPL	111004		32		32		0,095	26
CP MG45 XZ MSCE32 KPL	111010		45		32		0,162	32
CP MG45 XZ MSCE45 KPL	111011		45		45		0,162	32
CP MG60 XZ MSCE32 KPL	112570		60		32		0,320	45
CP MG60 XZ MSCE45 KPL	112571		60		60		0,321	45

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

ℹ 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		32		0,126	32
CP MG45 XZ MG45Z KPL	111009		45		45		0,131	32
CP MG60 XZ MG32Z KPL	112566		60		32		0,285	45
CP MG60 XZ MG45Z KPL	112565		60		45		0,291	45
CP MG60 XZ MG60Z KPL	112564		60		60		0,297	45

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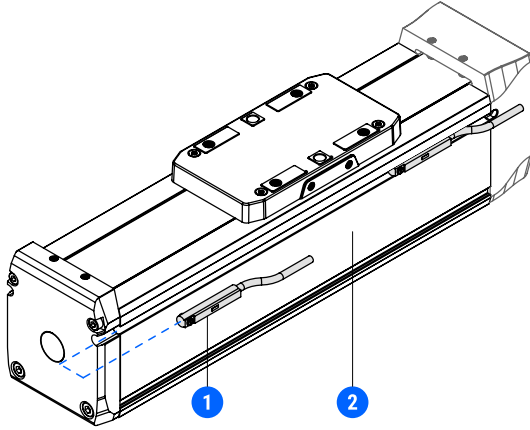
1 – Magnetic field sensor.
2 – Profile of the mini linear unit MGBS or MGTB.

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)	⌀2,8 mm, PUR, 150 mm	
Extension cable	Energy chain compliant	

In order to improve the products in this catalogue the specifications are subject to change without notice.

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
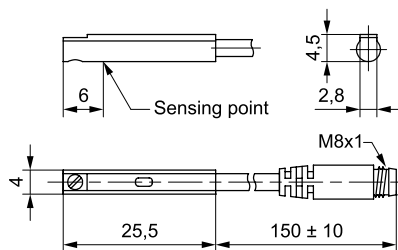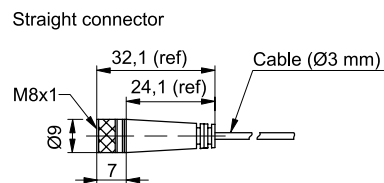
Angled connector
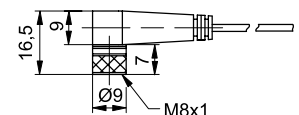
MOTOR

How to order

Stepper motors
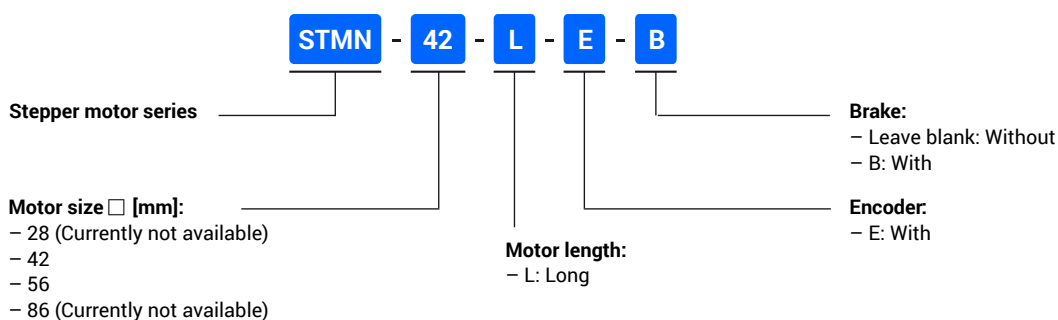
Stepper motor series

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

ℹ Please refer to the section "Mini linear unit – MGBS → Dimensions" or "Mini linear unit – MGTB → Dimensions".

More information

ℹ Please refer to the section "Electrical data" or Unimotion documentation related to the motors.

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