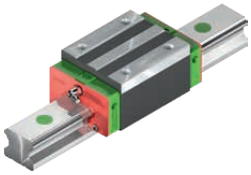
5. Linear modules HM-B

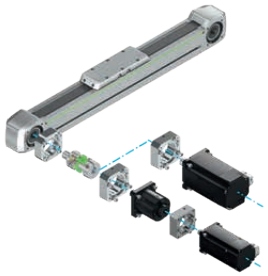
5.1 Properties of linear modules HM-B with toothed belt drive

The HIWIN linear axes with toothed belt drive are compact positioning modules that can be used flexibly. They are ideal in particular for applications requiring high dynamic responses and high speeds. In addition, large travel distances can be realised with these linear axes.

Linear guideway
High-quality HIWIN linear guideways safely transfer forces and torques from the carriage to the axis profile. Two blocks are used per carriage, which are guided on a high-precision profile rail. The SynchMotion™ technology with ball chain also ensures good synchronisation and smooth running in the HM060B, HM080B and HM120B sizes.

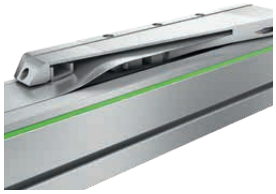


Drive connection
Thanks to its symmetrical design, the HIWIN toothed belt axis allows motors and gears to be mounted on all four sides of the drive blocks.
Additional journals, which are available as accessories (see Page 199), can be used to mount additional drives and outputs at any point.



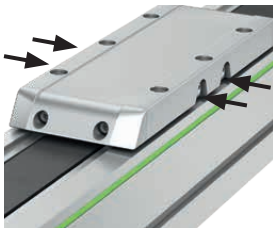
Toothed belt
The toothed belt with modern high performance profiles (HTD shape) and reinforced steel tension members enables high power transmission while offering high skip resistance.

Cover strip
The steel cover strip prevents dirt and dust from entering the axis interior. In addition, the cover strip allows the axes to be used in areas with coarse, sharp-edged or hot foreign bodies. The magnetic strips integrated in the axis profile hold the belt securely in position and increase the sealing effect.



Carriage
HIWIN toothed belt modules are available with three different carriage lengths depending on the size and dimensions of the load to be transported. In order to ensure ideal, reproducible alignment of the adjacent structure, each threaded hole has an additional bore hole via which the load capacity can be fixed with centring sleeves. You will find the matching centring sleeves in the accessories on Page 192.

Lubrication
For convenient maintenance of the linear axis, a separate grease nipple is fitted to the left and right of the carriage for each lubrication point. This ensures optimum accessibility for relubrication, even under difficult installation conditions.



5.2 Order code for linear modules HM-B

HM	060	B	155	N	0755	S	000

HIWIN linear module

Size (profile width):
040: 40 mm
060: 60 mm
080: 80 mm
120: 120 mm

Drive type:
B: Toothed belt drive

Feed constant [mm/rev]:
111: HM040B
155: HM060B
190: HM080B
288: HM120B

Clearance between two carriages [mm]:
(000: Only one carriage)

Carriage length:
E: Extra short [6]
S: Short
M: Medium
L: Long
H: Long – Heavy load [7]

Stroke length [mm]

Cover strip:
N: Without cover strip
C: With steel cover strip

Continuation, order code for linear modules HM-B

A	N	N	R	BR07	G0605

Axis limit switch [5]:
N: Without limit switch
A: 2 × normally closed, 100 mm cable, connector
B: 2 × normally open, 100 mm cable, connector
C: 2 × normally closed, 4 m open cable end
D: 2 × normally open, 5 m open cable end

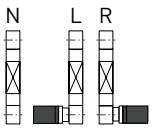
Toothed belt:
N: Standard belt

Distance measuring system option [1]:
N: Without distance measuring system
A: HIWIN MAGIC, analogue, 1 V_{SS} sin/cos, 5 m open cable end
D: HIWIN MAGIC, digital, TTL 5 V, 5 m open cable end

Gearbox [4]

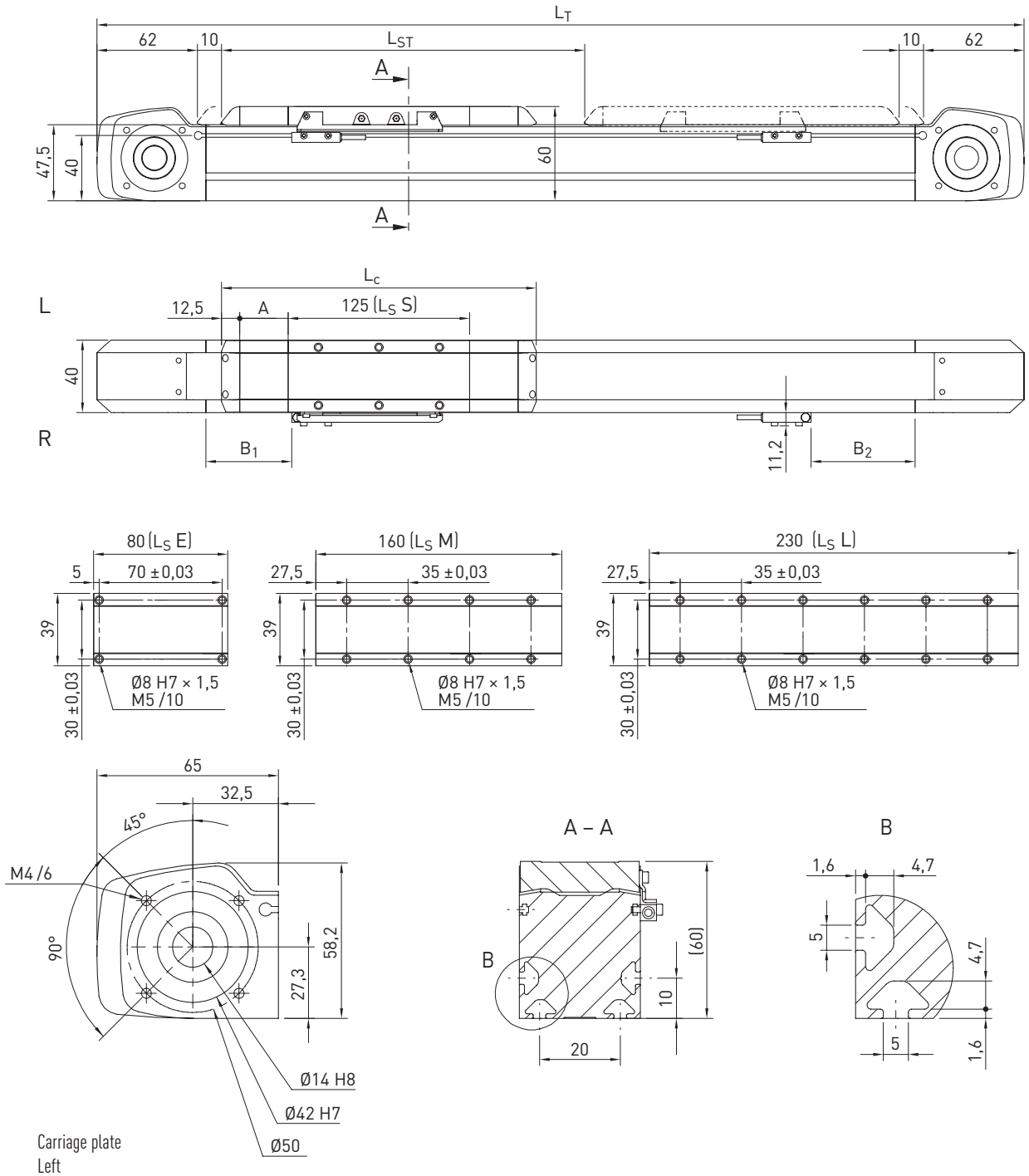
Flange type [3]

Drive interface [2]:
N: Without
L: Left
R: Right



[1] More detailed information in chapter 21 from page 156 or in the "HIWIN MAGIC Distance Measuring Systems" assembly instructions".
[2] If no drive interface is selected, the order code ends after this digit.
[3] You can find all flange types in Table 22.1 from page 160. If no gearbox is selected, the order code ends after this digit.
[4] You can find the right gearbox for the HIWIN axes in section 22.1.5.5 from page 170.
[5] Additional reference switches on request.
[6] Only available for HM040B.
[7] Only available for HM120B.

5.3 Dimensions and specifications of HM040B



L_s Carriage plate
L Left
R Right

Table 5.1 **HM040B dimensions**

	Variant without cover				Variant with cover		
Sledge type	E	S	M	L	S	M	L
Total carriage length L_c [mm]	105	150	185	255	230	265	335
Cover strip deflection A [mm]	0	0	0	0	40	40	40
Switch distance B_1 [mm]	23	24	24	24	64	64	64
Switch distance B_2 [mm]	23	9	44	114	49	84	154
Max. stroke length L_{ST} [mm]	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Total length L_T [mm]	$L_T = L_{ST} + 249$	$L_T = L_{ST} + 294$	$L_T = L_{ST} + 329$	$L_T = L_{ST} + 399$	$L_T = L_{ST} + 374$	$L_T = L_{ST} + 409$	$L_T = L_{ST} + 479$

Table 5.2 **Load data**

	Permissible load data				Theoretical load data			
Lifetime reference value	20,000 km				100 km			
Sledge type	E	S	M	L	E	S	M	L
$F_{ydynmax}$ [1] [N]	665	963	963	963	5,056	7,318	7,318	7,318
$F_{zdynmax}$ [1] [N]	665	963	963	963	5,056	7,318	7,318	7,318
$M_{xdynmax}$ [Nm]	5.4	7.8	7.8	7.8	41	59	59	59
$M_{ydynmax}$ [Nm]	4.2	35	51	85	32	263	392	648
$M_{zdynmax}$ [Nm]	4.2	35	51	85	32	263	392	648
Load distance z [mm]	34	34	34	34	34	34	34	34

[1] Force must only act free of torque

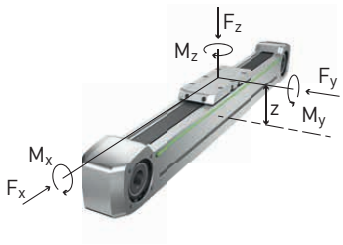


Table 5.3 **General technical data**

Repeatability [mm]	± 0.05
Max. feed force F_{x_max} [N]	300
Max. speed [m/s]	5
Max. acceleration [m/s²]	30
Max. drive torque M_{A_max} [Nm]	5.3
Typical load capacity [kg]	10 [1]
Maximum total length [mm]	3,479
Area moment of inertia of profile cross section I_x [mm⁴]	117,795
Area moment of inertia of profile cross section I_y [mm⁴]	122,922

[1] Carriage type E: 4 kg

Table 5.4 **Guide**

Sledge type	E	S/M/L
Type of carriage	MGN15H × 1	MGN15C × 2
Static load rating C_0 [N]	9,110 × 1	5,590 × 2
Dynamic load rating $C_{dyn\ 50\ km}$ [N]	6,370 × 1	4,610 × 2

Table 5.5 **Drive**

Drive element	b15HTD3
Feed constant [mm/U]	111
Toothed belt effective diameter [mm]	35.332

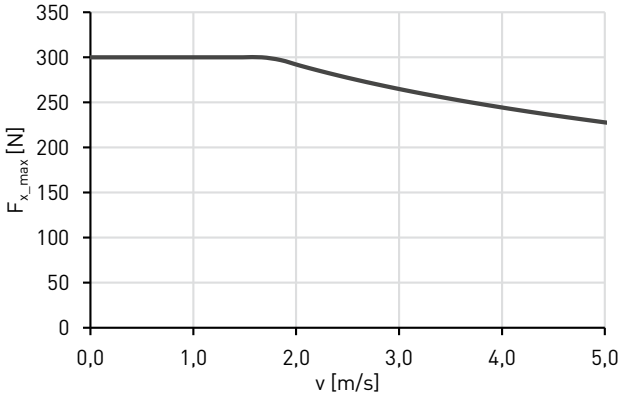


Fig. 5.1 **Max. feed force F_{x_max} as a function of axis speed v**

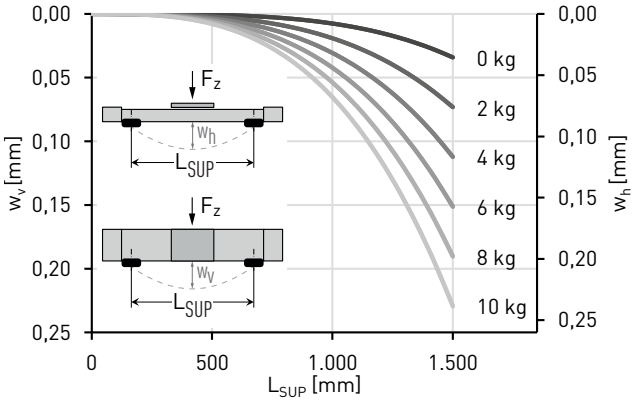


Fig. 5.2 **Deflection w over unsupported axis length L_{SUP} under load capacity F_z**

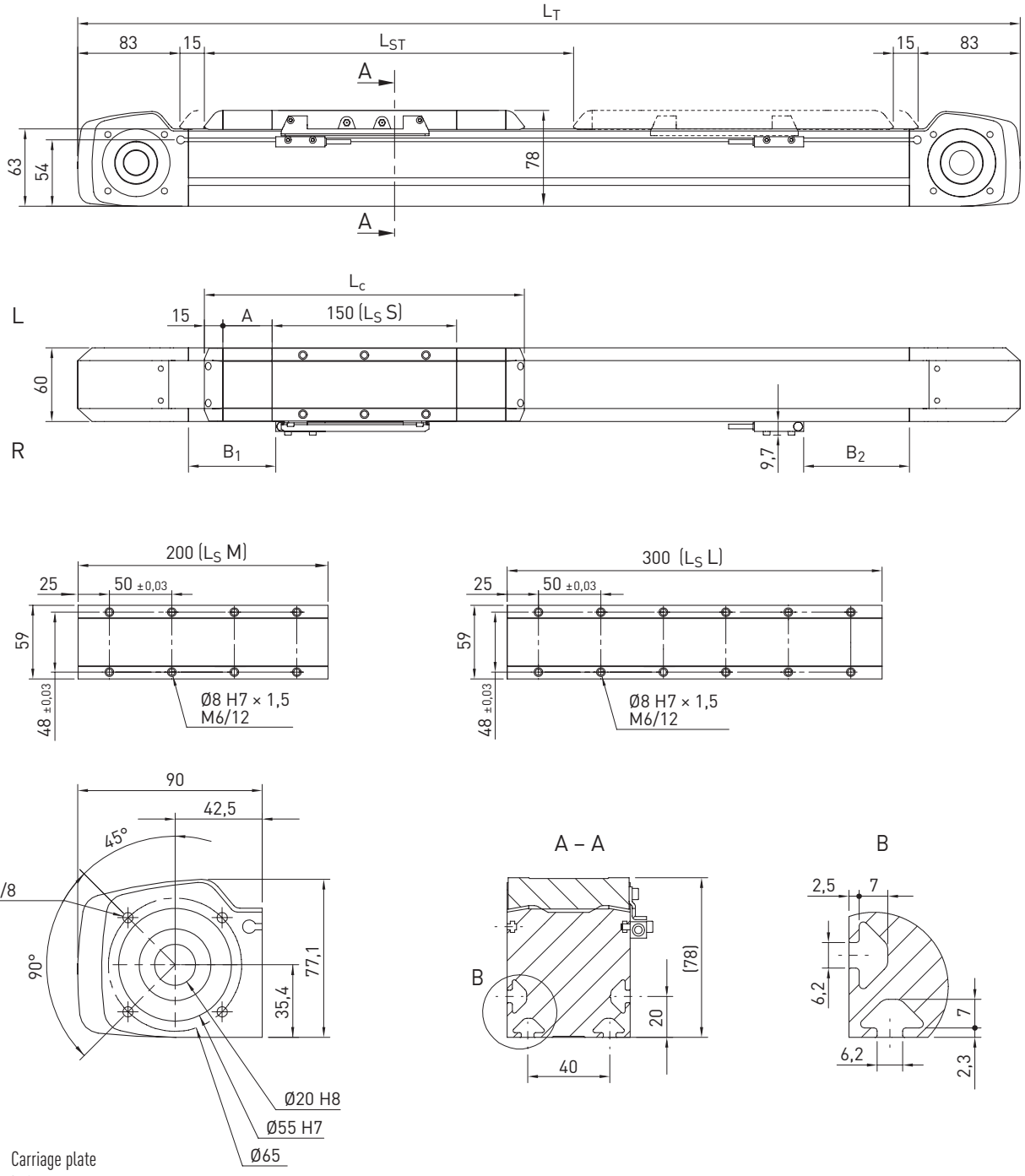
Table 5.6 **Mechanical properties**

	Variant without cover				Variant with cover		
Sledge type	E	S	M	L	S	M	L
Mass of the carriage [kg]	0.25	0.35	0.41	0.52	0.42	0.48	0.59
Mass at 0-stroke [2] [kg]	1.21	1.45	1.62	1.95	1.82	1.99	2.32
Mass per 1 m stroke [kg/m]	3.10	3.10	3.10	3.10	3.16	3.16	3.16
$J_{rot.}$ [1] [kgcm²]	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Idle torque at 0-stroke [Nm]	0.15	0.18	0.18	0.18	0.25	0.25	0.25

[1] Rotational moment of inertia

[2] The values apply to axes with one carriage. For axes with 2 carriages, add the following: Mass of carriage + mass per 1 m stroke x (Clearance between the carriages (in m) + carriage length L_C (in m))

5.4 Dimensions and specifications of HM060B



L_S Carriage plate
L Left
R Right

Table 5.7 **HM060B dimensions**

	Variant without cover			Variant with cover		
Sledge type	S	M	L	S	M	L
Total carriage length L_c [mm]	180	230	330	260	310	410
Cover strip deflection A [mm]	0	0	0	40	40	40
Switch distance B_1 [mm]	25	25	25	65	65	65
Switch distance B_2 [mm]	40	90	190	80	130	230
Max. stroke length L_{ST} [mm]	5,704	5,654	5,554	5,624	5,574	5,474
Total length L_T [mm]	$L_T = L_{ST} + 376$	$L_T = L_{ST} + 426$	$L_T = L_{ST} + 526$	$L_T = L_{ST} + 456$	$L_T = L_{ST} + 506$	$L_T = L_{ST} + 606$

Table 5.8 **Load data**

	Permissible load data			Theoretical load data		
Lifetime reference value	20,000 km			100 km		
Sledge type	S	M	L	S	M	L
$F_{ydynmax}$ [1] [N]	2,152	2,152	2,152	19,890	19,890	19,890
$F_{zdynmax}$ [1] [N]	2,616	2,616	2,616	19,890	19,890	19,890
$M_{xdynmax}$ [Nm]	21	21	21	156	156	156
$M_{ydynmax}$ [Nm]	98	164	294	746	1,243	2,238
$M_{zdynmax}$ [Nm]	81	135	242	746	1,243	2,238
Load distance z [mm]	45,5	45,5	45,5	45,5	45,5	45,5

[1] Force must only act free of torque

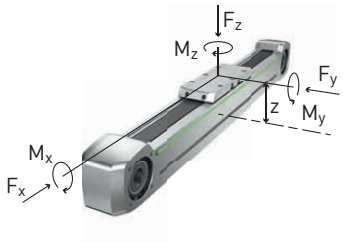


Table 5.9 **General technical data**

Repeatability [mm]	± 0.05
Max. feed force F_{x_max} [N]	895
Max. speed [m/s]	5
Max. acceleration [m/s²]	30
Max. drive torque M_{A_max} [Nm]	22
Typical load capacity [kg]	25
Maximum total length [1] [mm]	6,080
Area moment of inertia of profile cross section I_x [mm⁴]	507,521
Area moment of inertia of profile cross section I_y [mm⁴]	625,920

[1] Long axes on request

Table 5.10 **Guide**

Type of carriage	QEH15CA × 2
Static load rating C_0 [N]	15,280 × 2
Dynamic load rating $C_{dyn\ 50\ km}$ [N]	12,530 × 2

Table 5.11 **Drive**

Drive element	b25HTD5
Feed constant [mm/U]	155
Toothed belt effective diameter [mm]	49:338

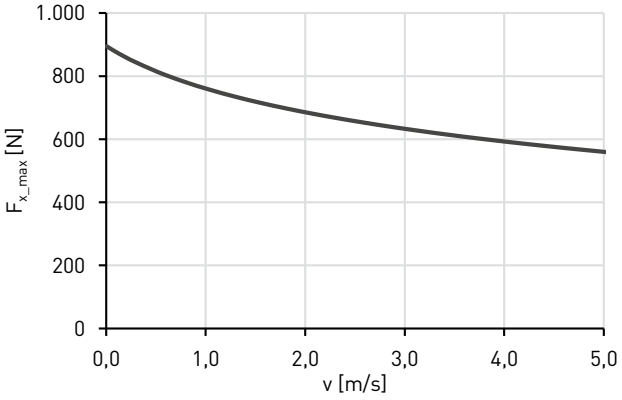


Fig. 5.3 **Max. feed force F_{x_max} as a function of axis speed v**

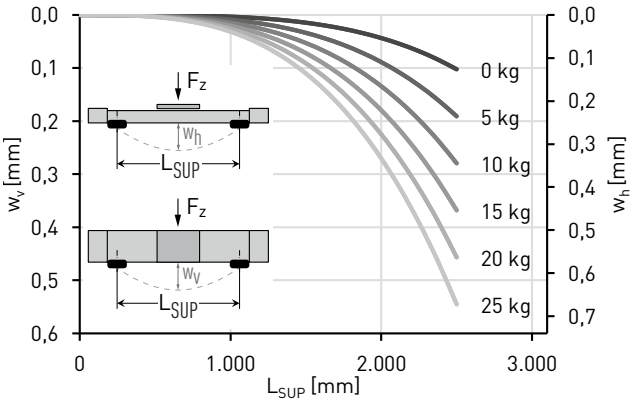


Fig. 5.4 **Deflection w over unsupported axis length L_{SUP} under load capacity F_z**

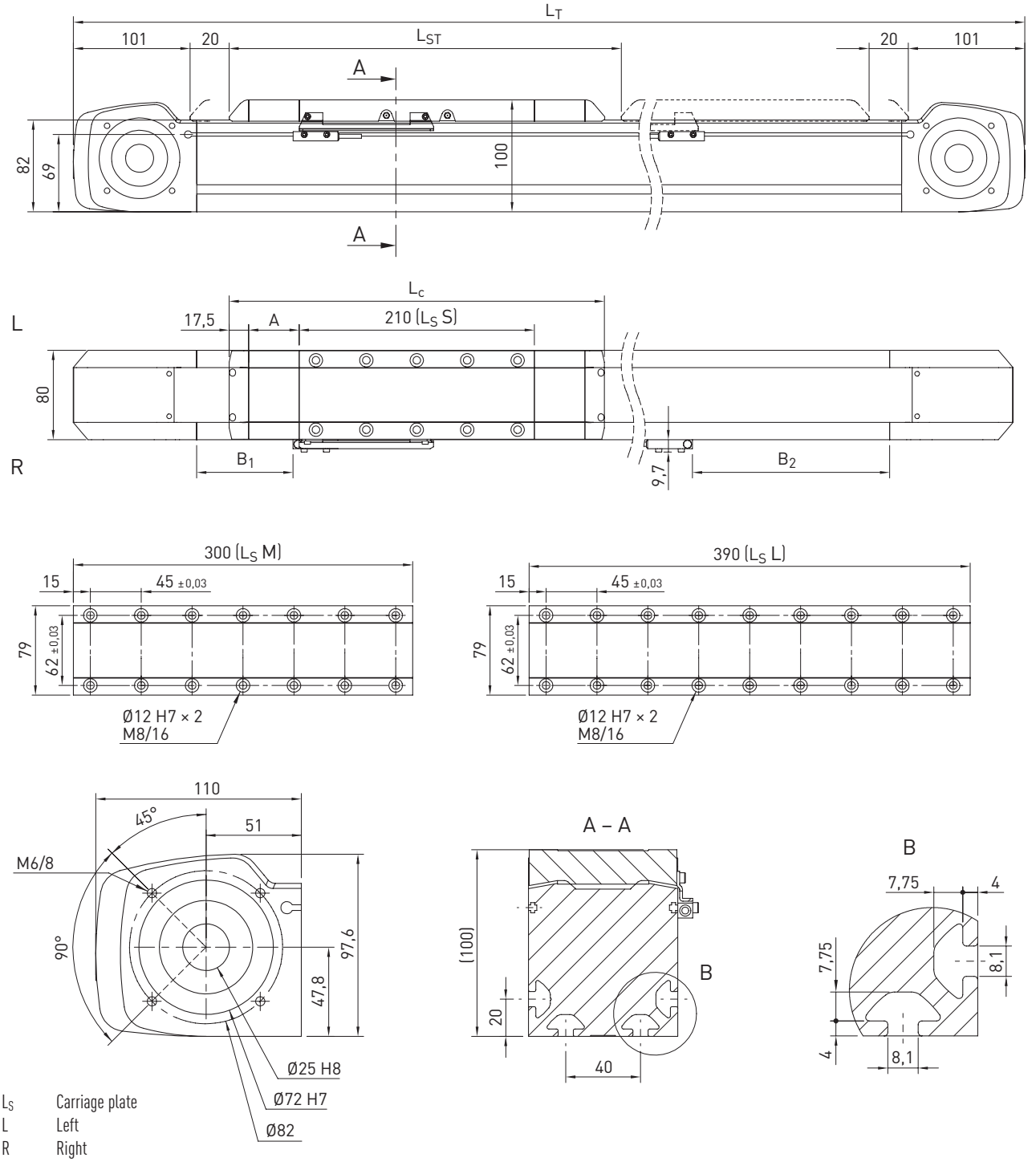
Table 5.12 **Mechanical properties**

	Variant without cover			Variant with cover		
Sledge type	S	M	L	S	M	L
Mass of the carriage [kg]	0.79	0.93	1.22	0.89	1.03	1.32
Mass at 0-stroke [2] [kg]	3.48	3.90	4.74	4.07	4.50	5.34
Mass per 1 m stroke [kg/m]	5.48	5.48	5.48	5.58	5.58	5.58
$J_{rot.}$ [1] [kgcm²]	1.92	1.92	1.92	1.92	1.92	1.92
Idle torque at 0-stroke [Nm]	0.47	0.47	0.47	0.80	0.80	0.80

[1] Rotational moment of inertia

[2] The values apply to axes with one carriage. For axes with 2 carriages, add the following: Mass of carriage + mass per 1 m stroke x (Clearance between the carriages (in m) + carriage length L_C (in m))

5.5 Dimensions and specifications of HM080B



L_S Carriage plate
L Left
R Right

Table 5.13 **HM080B dimensions**

	Variant without cover			Variant with cover		
Sledge type	S	M	L	S	M	L
Total carriage length L_c [mm]	245	335	425	335	425	515
Cover strip deflection A [mm]	0	0	0	45	45	45
Switch distance B_1 [mm]	23	23	23	68	68	68
Switch distance B_2 [mm]	113	203	293	158	248	338
Max. stroke length L_{ST} [mm]	5,633	5,543	5,453	5,543	5,453	5,363
Total length L_T [mm]	$L_T = L_{ST} + 487$	$L_T = L_{ST} + 577$	$L_T = L_{ST} + 667$	$L_T = L_{ST} + 577$	$L_T = L_{ST} + 667$	$L_T = L_{ST} + 757$

Table 5.14 **Load data**

	Permissible load data			Theoretical load data		
Lifetime reference value	20,000 km			100 km		
Sledge type	S	M	L	S	M	L
$F_{ydynmax}$ [1] [N]	3,855	3,855	3,855	47,622	47,622	47,622
$F_{zdynmax}$ [1] [N]	6,264	6,264	6,264	47,622	47,622	47,622
$M_{xdynmax}$ [Nm]	48	48	48	366	366	366
$M_{ydynmax}$ [Nm]	357	639	921	2,714	4,857	7,000
$M_{zdynmax}$ [Nm]	220	393	567	2,714	4,857	7,000
Load distance z [mm]	53.4	53.4	53.4	53.4	53.4	53.4

[1] Force must only act free of torque

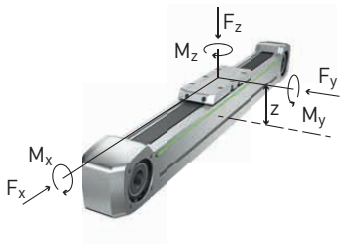


Table 5.15 **General technical data**

Repeatability [mm]	± 0.05
Max. feed force F_{x_max} [N]	1,253
Max. speed [m/s]	5
Max. acceleration [m/s²]	30
Max. drive torque M_{A_max} [Nm]	38
Typical load capacity [kg]	60
Maximum total length [1] [mm]	6,120
Area moment of inertia of profile cross section I_x [mm⁴]	1,522,057
Area moment of inertia of profile cross section I_y [mm⁴]	2,081,321

[1] Long axes on request

Table 5.16 **Guide**

Type of carriage	QHH20CA × 2
Static load rating C_0 [N]	33,860 × 2
Dynamic load rating $C_{dyn\ 50\ km}$ [N]	30,000 × 2

Table 5.17 **Drive**

Drive element	b35HTD5
Feed constant [mm/U]	190
Toothed belt effective diameter [mm]	60.479

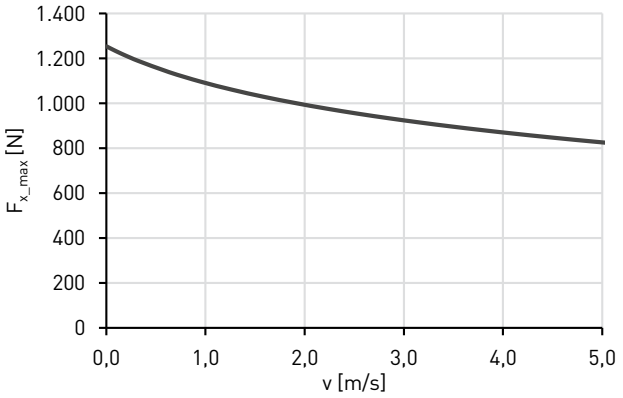


Fig. 5.5 **Max. feed force F_{x_max} as a function of axis speed v**

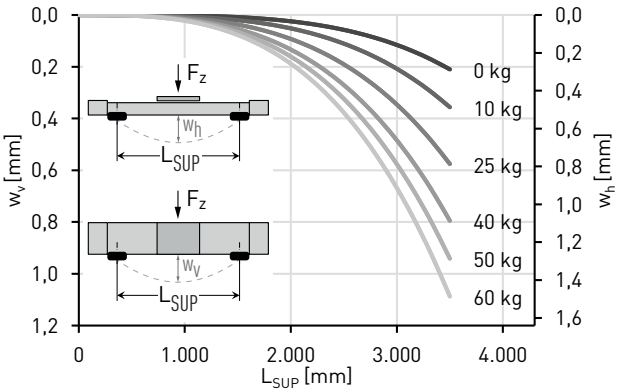


Fig. 5.6 **Deflection w over unsupported axis length L_{SUP} under load capacity F_z**

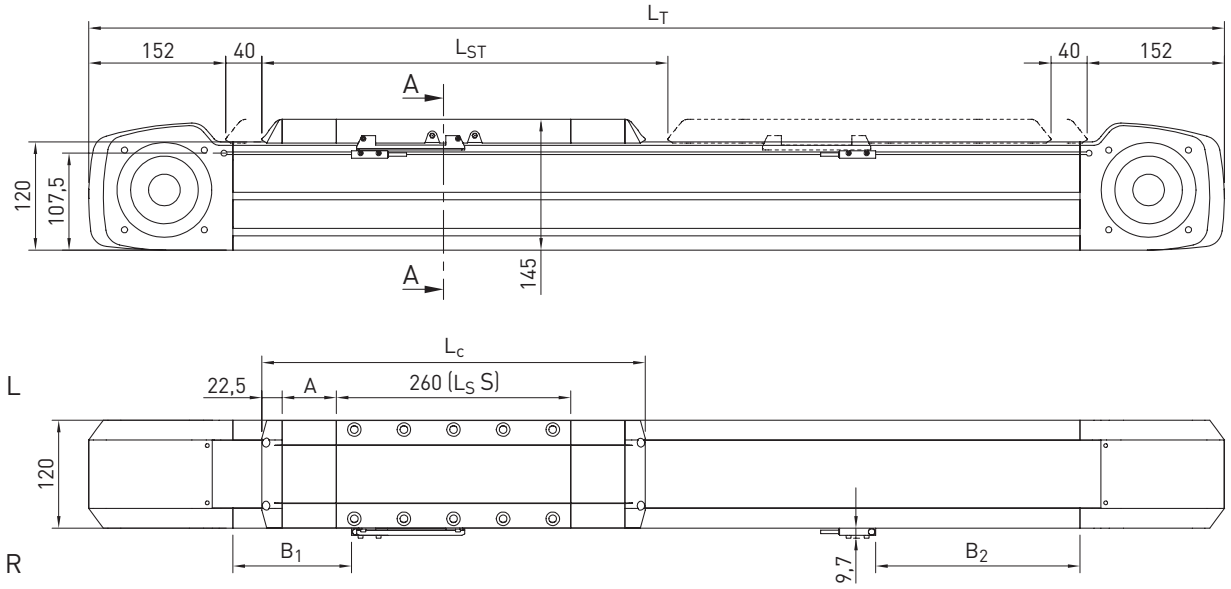
Table 5.18 **Mechanical properties**

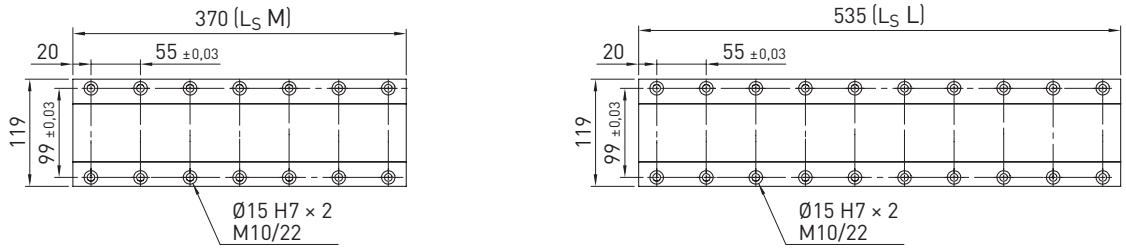
	Variant without cover			Variant with cover		
Sledge type	S	M	L	S	M	L
Mass of the carriage [kg]	1.61	2.02	2.43	1.81	2.22	2.63
Mass at 0-stroke [2] [kg]	7.46	8.76	10.07	8.72	10.03	11.34
Mass per 1 m stroke [kg/m]	9.94	9.94	9.94	10.08	10.08	10.08
$J_{rot.}$ [1] [kgcm²]	6.03	6.03	6.03	6.03	6.03	6.03
Idle torque at 0-stroke [Nm]	1.20	1.20	1.20	1.30	1.30	1.30

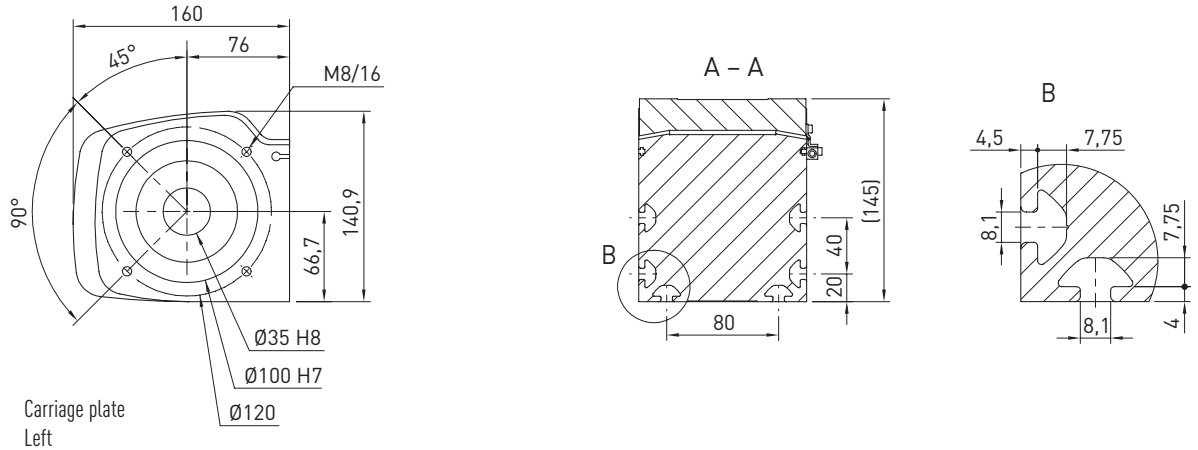
[1] Rotational moment of inertia

[2] The values apply to axes with one carriage. For axes with 2 carriages, add the following: Mass of carriage + mass per 1 m stroke x (Clearance between the carriages (in m) + carriage length L_C (in m))

5.6 Dimensions and specifications of HM120B







L_S Carriage plate
L Left
R Right

Table 5.19 **HM120B dimensions**

	Variant without cover			Variant with cover		
Sledge type	S	M	L/H	S	M	L/H
Total carriage length L_c [mm]	305	415	580	425	535	700
Cover strip deflection A [mm]	0	0	0	60	60	60
Switch distance B_1 [mm]	71.5	71.5	71.5	131.5	131.5	131.5
Switch distance B_2 [mm]	166.5	276.5	441.5	226.5	336.5	501.5
Max. stroke length L_{ST} [mm]	5,531	5,421	5,256	5,411	5,301	5,136
Total length L_T [mm]	$L_T = L_{ST} + 689$	$L_T = L_{ST} + 799$	$L_T = L_{ST} + 964$	$L_T = L_{ST} + 809$	$L_T = L_{ST} + 919$	$L_T = L_{ST} + 1,084$

Table 5.20 **Load data**

	Permissible load data				Theoretical load data			
Lifetime reference value	20,000 km				100 km			
Sledge type	S	M	L	H	S	M	L	H
$F_{ydynmax}$ [1] [N]	12,165	12,165	12,165	12,165	92,482	92,482	92,482	111,626
$F_{zdynmax}$ [1] [N]	12,165	12,165	12,165	14,683	92,482	92,482	92,482	111,626
$M_{xdynmax}$ [Nm]	110	110	110	138	836	836	836	1,047
$M_{ydynmax}$ [Nm]	900	1,569	2,573	2,937	6,844	11,930	19,560	22,325
$M_{zdynmax}$ [Nm]	900	1,569	2,573	2,433	6,844	11,930	19,560	22,325
Load distance z [mm]	77	77	77	77	77	77	77	77

[1] Force must only act free of torque

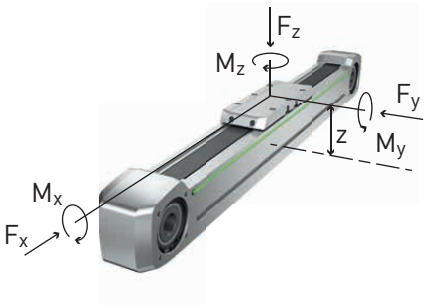


Table 5.21 **General technical data**

Repeatability [mm]	± 0.05
Max. feed force F_{x_max} [N]	4,000
Max. speed [m/s]	5
Max. acceleration [m/s²]	30
Max. drive torque M_{A_max} [Nm]	183
Typical load capacity [kg]	120
Maximum total length [1] [mm]	6,220
Area moment of inertia of profile cross section I_x [mm⁴]	6,791,541
Area moment of inertia of profile cross section I_y [mm⁴]	9,553,626

[1] Long axes on request

Table 5.22 **Guide**

Sledge type	**S/M/L**	**H**
Type of carriage	QHW30CC × 2	QHW30HC × 2
Static load rating C_0 [N]	66,340 × 2	88,450 × 2
Dynamic load rating $C_{dyn\ 50\,km}$ [N]	58,260 × 2	70,320 × 2

Table 5.23 **Drive**

Drive element	b60HTD8
Feed constant [mm/U]	288
Toothed belt effective diameter [mm]	91.673

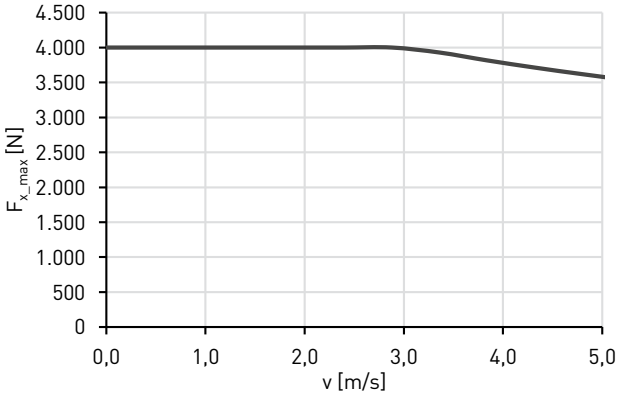


Fig. 5.7 **Max. feed force F_{x_max} as a function of axis speed v**

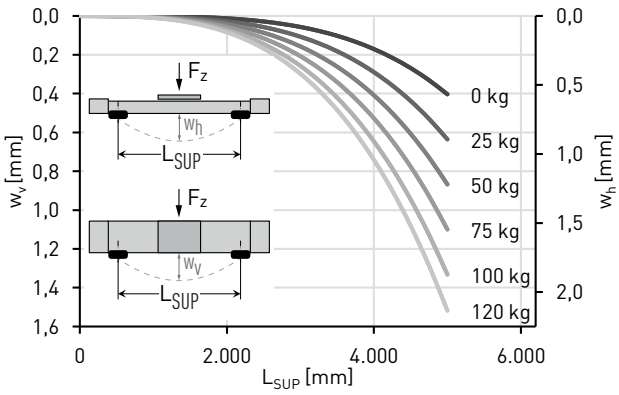


Fig. 5.8 **Deflection w over unsupported axis length L_{SUP} under load capacity F_z**

Table 5.24 **Mechanical properties**

	Variant without cover				Variant with cover			
Sledge type	S	M	L	H	S	M	L	H
Mass of the carriage [kg]	5.13	6.26	7.95	8.72	5.61	6.73	8.42	9.20
Mass at 0-stroke [2] [kg]	21.84	25.28	30.44	31.22	25.08	28.54	33.72	34.50
Mass per 1 m stroke [kg/m]	21.03	21.03	21.03	21.03	21.21	21.21	21.21	21.21
$J_{rot.}$ [1] [kgcm²]	42.42	42.42	42.42	46.42	42.42	42.42	42.42	46.42
Idle torque at 0-stroke [Nm]	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10

[1] Rotational moment of inertia

[2] The values apply to axes with one carriage. For axes with 2 carriages, add the following: Mass of carriage + mass per 1 m stroke x (Clearance between the carriages (in m) + carriage length L_C (in m))