

Linear axes & linear axis systems

Linear modules HM-S

6. Linear modules HM-S

6.1 Properties of linear modules HM-S with ballscrew

The HIWIN linear axes with ballscrew are compact positioning modules that can be used flexibly. They are especially suitable for applications where high loads have to be moved with high precision.



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 HM060S, HM080S and HM120S sizes.



Motor connection and belt drive

The motor adapters are made up of several parts that offer an extremely flexible drive interface for attaching and modifying the drive installation. Optionally, a belt transmission can be used to turn the motor attachment through 180°, reducing the total length to a considerable extent.



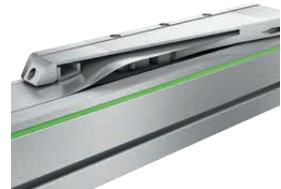
Ballscrew

The integrated HIWIN ballscrews ensure precise positioning thanks to their high pitch accuracy and rigidity. Different shaft pitches are available for each size in order to optimally meet the requirements for feed force and dynamics.



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.



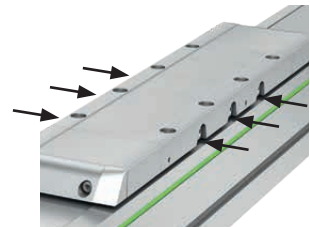
Carriage

HIWIN spindle axes are available with two 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

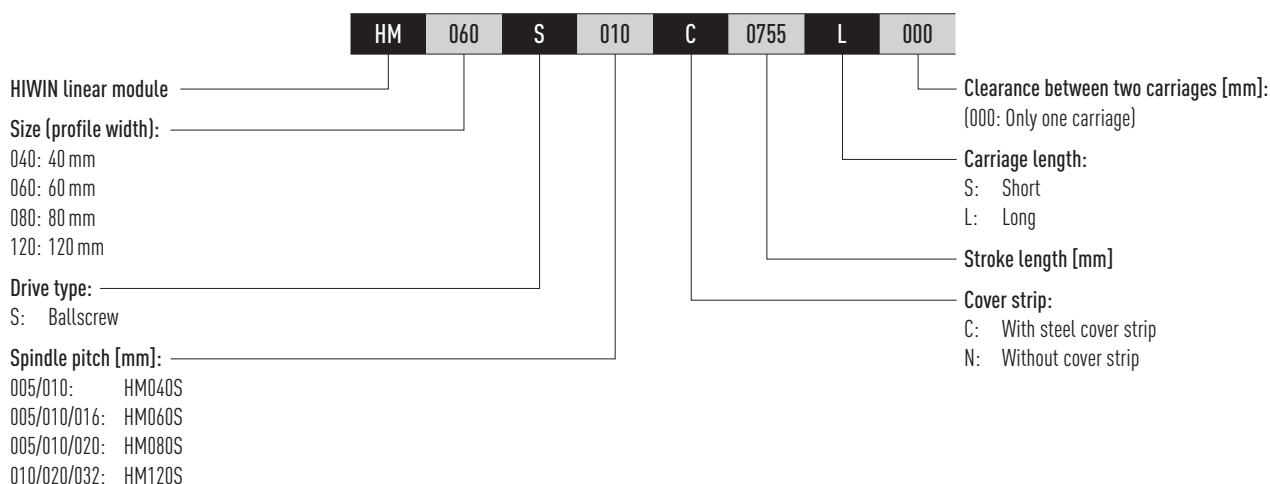
For convenient maintenance of the linear axis, a separate grease nipple is fitted to the left and right of the carriage for each lubrication point. This ensures optimum accessibility for relubrication, even under difficult installation conditions.



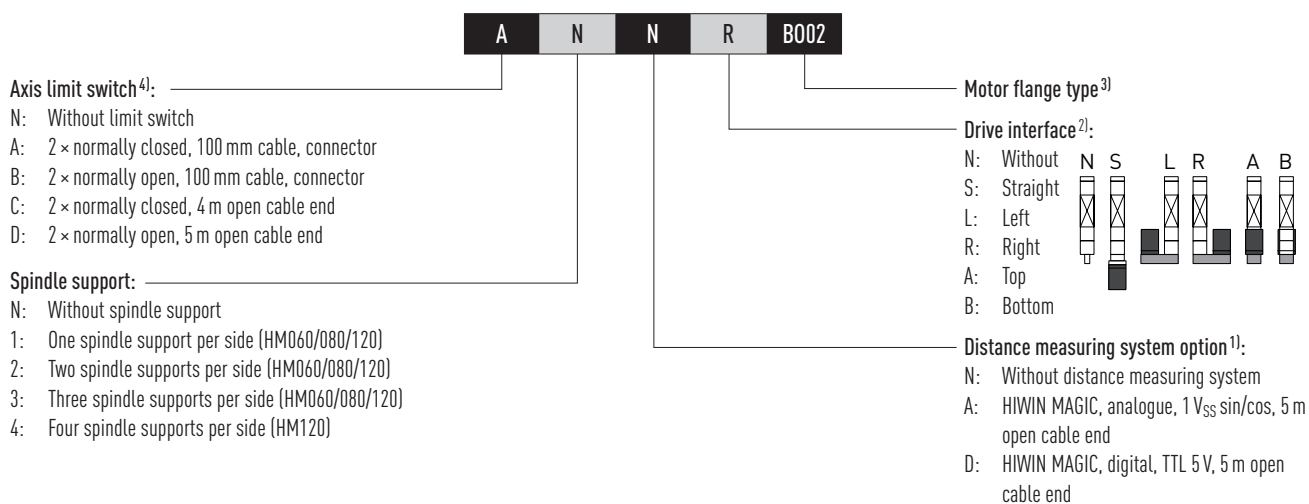
Spindle support

In applications with long travel distances and high velocity, the critical speed of the shaft is quickly reached, meaning an appropriate support is required to prevent the shaft from swinging up. In HIWIN spindle drive axes, up to three travelling shaft supports can be installed on each side of the carriage. This allows driving at full speed, even with large strokes.

6.2 Order code for linear modules HM-S



Continuation, order code for linear modules HM-S



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.

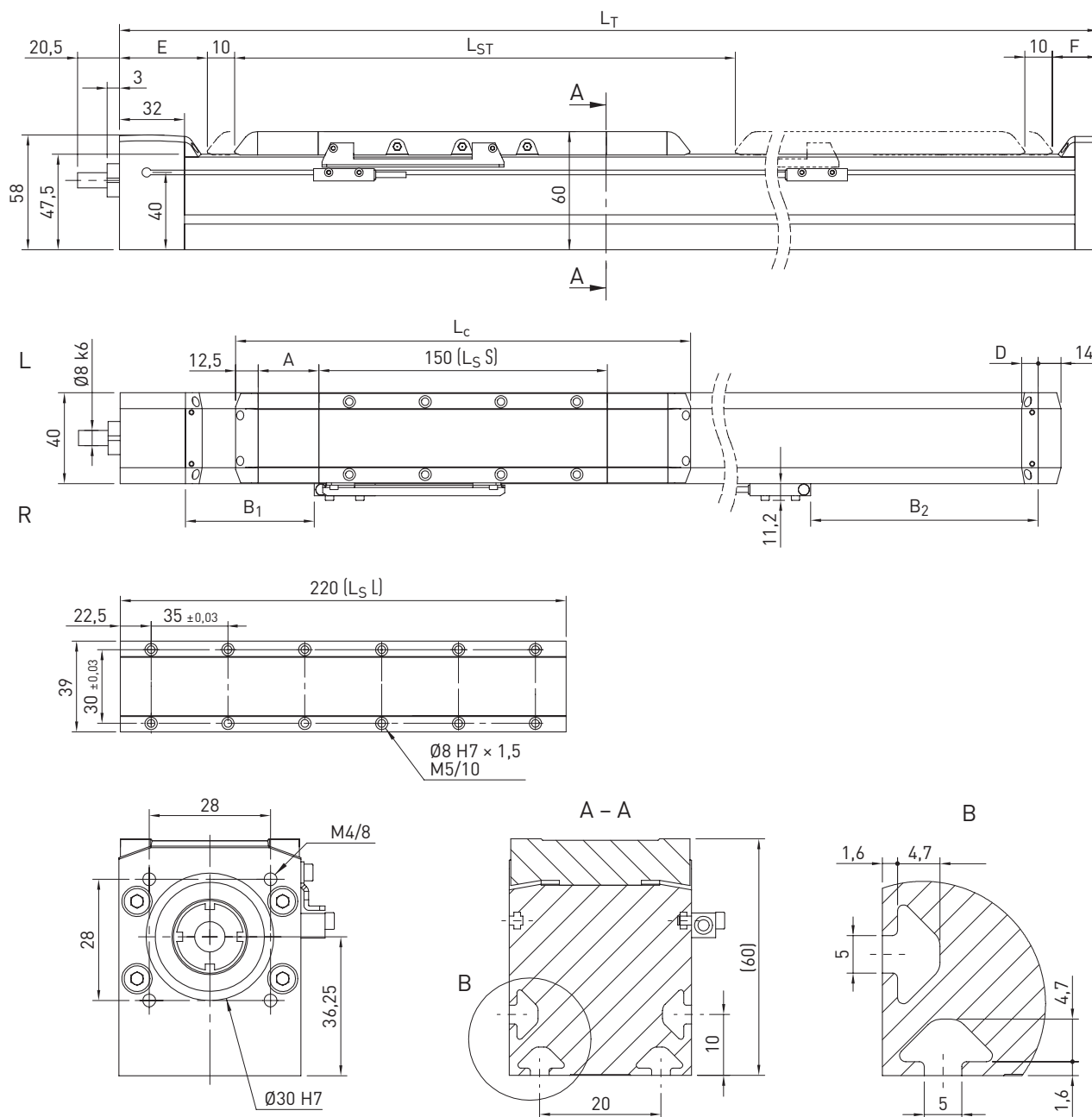
³⁾ You can find all flange types in Table 22.15 from page 175. If no gearbox is selected, the order code ends after this digit.

⁴⁾ Additional reference switches on request.

Linear axes & linear axis systems

Linear modules HM-S

6.3 Dimensions and specifications of HM040S



L_S Carriage plate
 L Left
 R Right

Table 6.1 HM040S dimensions

	Variant without cover		Variant with cover	
Sledge type	S	L	S	L
Total carriage length L_C [mm]	175	245	255	325
Cover strip deflection A [mm]	0	0	40	40
Switch distance B_1 [mm]	33.5	33.5	83.5	83.5
Switch distance B_2 [mm]	42.5	112.5	92.5	162.5
Terminal box D [mm]	0	0	10	10
End position at mechanical zero E [mm]	37.5	37.5	47.5	47.5
End position at mechanical zero F [mm]	19.5	19.5	29.5	29.5
Max. stroke length L_{ST} [mm]	1,231	1,161	1,131	1,061
Total length L_T [mm]	$L_T = L_{ST} + 253$	$L_T = L_{ST} + 323$	$L_T = L_{ST} + 353$	$L_T = L_{ST} + 423$

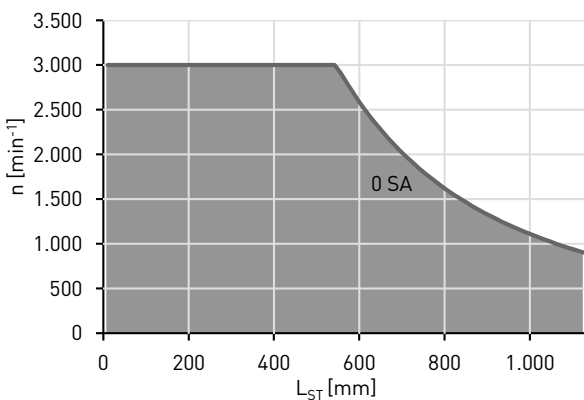
Table 6.2 Load data

	Permissible load data		Theoretical load data	
Lifetime reference value	6,000 km		100 km	
Sledge type	S	L	S	L
$F_{y\text{dynmax}}^{1)} \text{ [N]}$	1.438	1.438	7.318	7.318
$F_{z\text{dynmax}}^{1)} \text{ [N]}$	1.438	1.438	7.318	7.318
$M_{x\text{dynmax}} \text{ [Nm]}$	12	12	59	59
$M_{y\text{dynmax}} \text{ [Nm]}$	80	130	406	662
$M_{z\text{dynmax}} \text{ [Nm]}$	80	130	406	662
Load distance z [mm]	40	40	40	40

¹⁾ Force must only act free of torque

Table 6.3 General technical data

Repeatability [mm]	± 0.02
Max. acceleration [m/s ²]	15
Typical load capacity [kg]	10
Maximum total length [mm]	1,484
Area moment of inertia of profile cross section $I_x \text{ [mm}^4\text{]}$	111,032
Area moment of inertia of profile cross section $I_y \text{ [mm}^4\text{]}$	116,769



SA Spindle support

Fig. 6.1 Critical speed n over axis stroke length L_{ST}

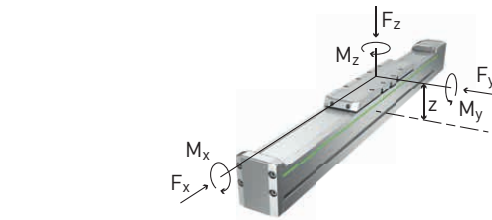


Table 6.4 Guide

Type of carriage	MGN15C × 2
Static load rating $C_0 \text{ [N]}$	5,590 × 2
Dynamic load rating $C_{\text{dyn}} \text{ 50 km [N]}$	4,610 × 2

Table 6.5 Drive

	Spindle lead	
	5 mm	10 mm
Spindle diameter [mm]	12	
Axial play [mm]	0.02	
Max. feed force $F_{x\text{max}} \text{ [N]}$	1,271	792
Max. speed [m/s]	0.25	0.50
Max. drive torque $M_{A\text{max}} \text{ [Nm]}$	1.16	1.41
Static load rating ballscrew $C_0 \text{ [N]}$	12,000	6,500
Dynamic load rating ballscrew $C_{\text{dyn}} \text{ [N]}$	6,900	4,300

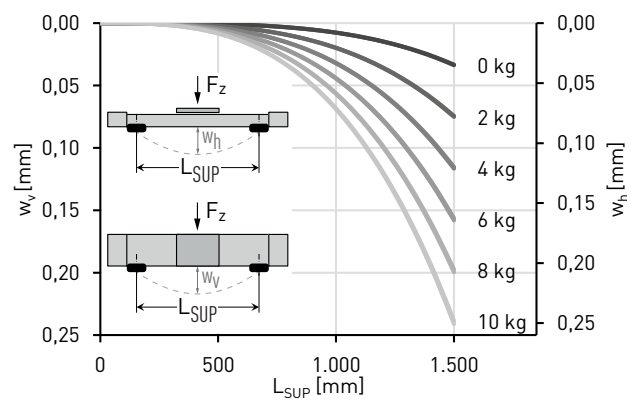


Fig. 6.2 Deflection w over unsupported axis length L_{SUP} under load capacity F_z

Table 6.6 Mechanical properties

Sledge type	Variant without cover				Variant with cover			
	S		L		S		L	
Spindle pitch [mm]	5	10	5	10	5	10	5	10
Mass of the carriage [kg]	0.44	0.44	0.56	0.56	0.51	0.51	0.63	0.63
Mass at 0-stroke ²⁾ [kg]	1.58	1.57	1.95	1.95	2.06	2.05	2.43	2.43
Mass per 1 m stroke [kg/m]	3.65	3.65	3.65	3.65	3.71	3.71	3.71	3.71
$J_{\text{rot.}}^{1)} \text{ at 0-stroke [kgcm}^2\text{]}$	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09
$J_{\text{rot.}}^{1)} \text{ Per 1 m stroke [kgcm}^2\text{/m]}$	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Idle torque at 0-stroke [Nm]	0.15	0.15	0.15	0.15	0.20	0.20	0.20	0.20

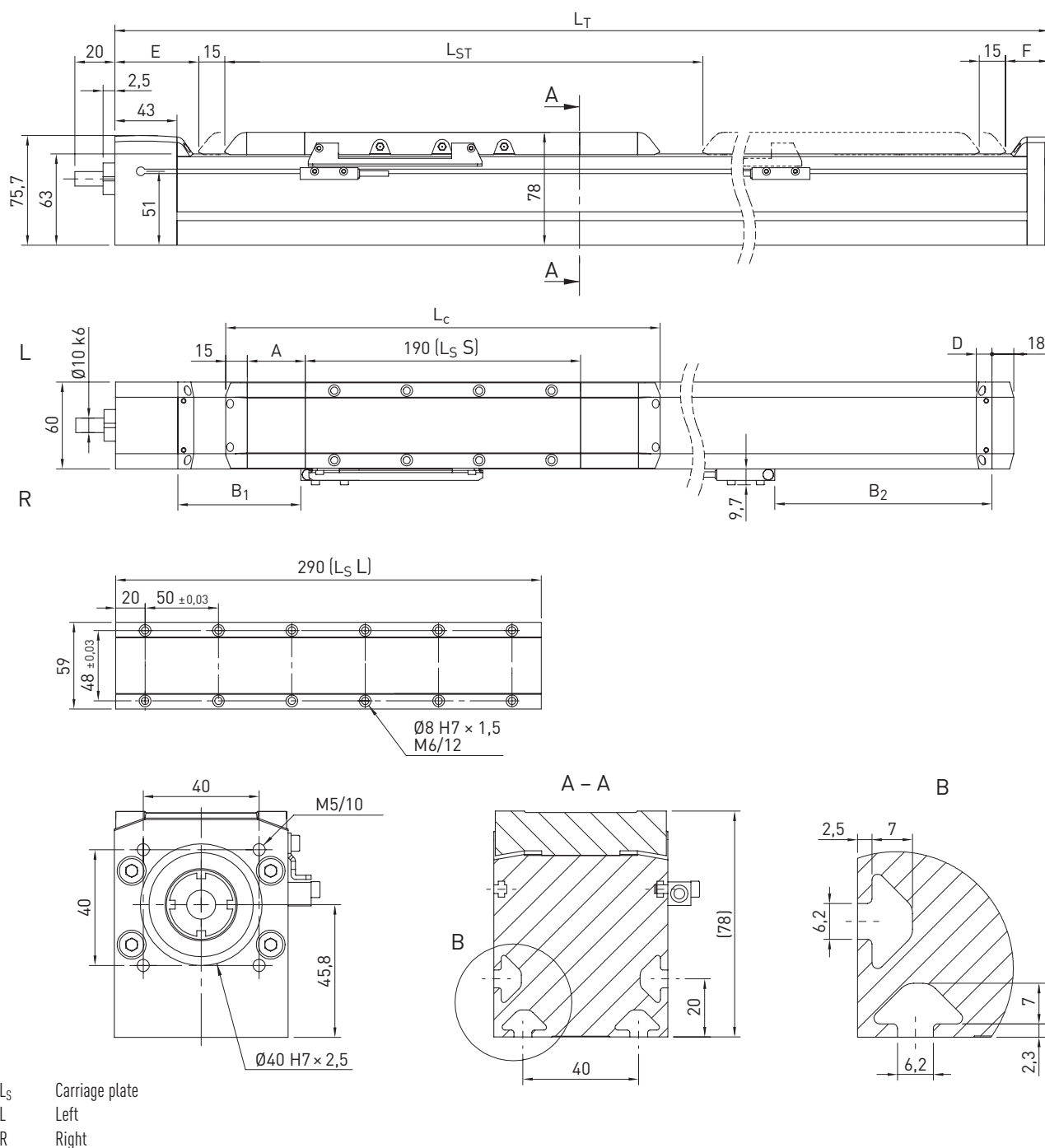
¹⁾ Rotational moment of inertia

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))

Linear axes & linear axis systems

Linear modules HM-S

6.4 Dimensions and specifications of HM060S



L_S Carriage plate
 L Left
 R Right

Table 6.7 HM060S dimensions

Sledge type	Variant without cover		Variant with cover	
	S	L	S	L
Total carriage length L_C [mm]	220	320	300	400
Cover strip deflection A [mm]	—	—	40	40
Switch distance B_1 [mm]	35	35	86	86
Switch distance B_2 [mm]	98	198	149	249
Terminal box D [mm]	—	—	11	11
End position at mechanical zero E [mm]	50	—	61	—
End position at mechanical zero F [mm]	25	—	36	—
Max. stroke length L_{ST} [mm]	2,961	2,861	2,859	2,759
Total length L_T [mm]	$L_T = L_{ST} + 325$	$L_T = L_{ST} + 425$	$L_T = L_{ST} + 427$	$L_T = L_{ST} + 527$

Table 6.8 Load data

	Permissible load data		Theoretical load data	
Lifetime reference value	7,500 km		100 km	
Sledge type	S	L	S	L
$F_{y\text{dynmax}}^{1)} [N]$	2.896	2.896	19.890	19.890
$F_{z\text{dynmax}}^{1)} [N]$	3.628	3.628	19.890	19.890
$M_{x\text{dynmax}} [Nm]$	28	28	156	156
$M_{y\text{dynmax}} [Nm]$	239	421	1313	2307
$M_{z\text{dynmax}} [Nm]$	191	336	1313	2307
Load distance z [mm]	57,3	57,3	57,3	57,3

¹⁾ Force must only act free of torque

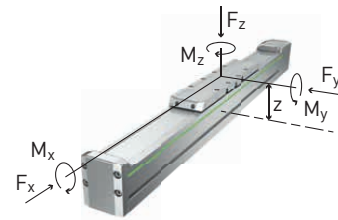


Table 6.9 Guide

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

Table 6.10 General technical data

Repeatability [mm]	± 0.02
Max. acceleration [m/s^2]	15
Typical load capacity [kg]	25
Maximum total length [mm]	3,286
Area moment of inertia of profile cross section $I_x [mm^4]$	431,907
Area moment of inertia of profile cross section $I_y [mm^4]$	539,706

Table 6.11 Drive

	Spindle lead		
	5 mm	10 mm	16 mm
Spindle diameter [mm]	15		
Axial play [mm]	0.02		
Max. feed force $F_{x\text{max}} [N]$	2,541	1,989	1,915
Max. speed [m/s]	0.25	0.50	0.80
Max. drive torque $M_{A\text{max}} [Nm]$	2.29	3.44	5.15
Static load rating ballscrew $C_0 [N]$	23,800	18,300	17,900
Dynamic load rating ballscrew $C_{\text{dyn}} [N]$	13,800	10,800	10,400

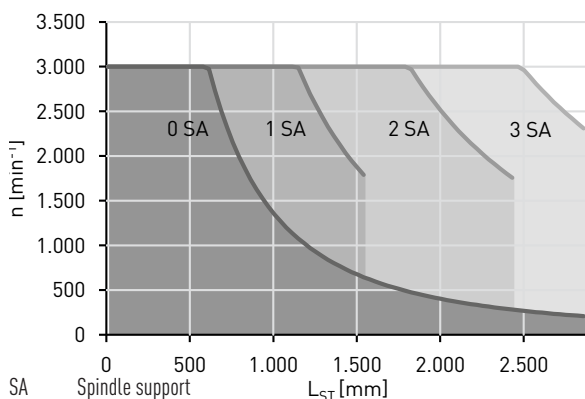


Fig. 6.3 Critical speed n over axis stroke length L_{ST}

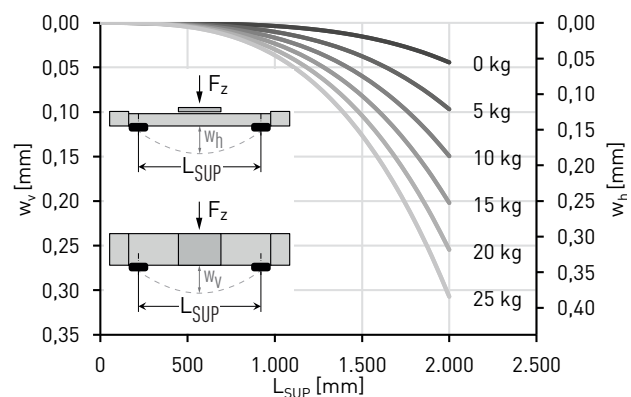


Fig. 6.4 Deflection w over unsupported axis length L_{SUP} under load capacity F_z

Table 6.12 Mechanical properties

	Variant without cover						Variant with cover					
Sledge type	S			L			S			L		
Spindle pitch [mm]	5	10	16	5	10	16	5	10	16	5	10	16
Mass of the carriage [kg]	1.05	1.05	1.14	1.37	1.37	1.46	1.15	1.15	1.24	1.47	1.47	1.56
Mass at 0-stroke ²⁾ [kg]	3.51	3.51	3.60	4.43	4.43	4.51	4.29	4.29	4.38	5.22	5.21	5.30
Mass per 1 m stroke [kg/m]	5.92						6.02					
J _{rot.} ¹⁾ at 0-stroke [kgcm²]	0.19			0.23			0.23			0.27		
J _{rot.} ¹⁾ Per 1 m stroke [kgcm²/m]	0.39						0.39					
Idle torque at 0-stroke [Nm]	0.27						0.28					

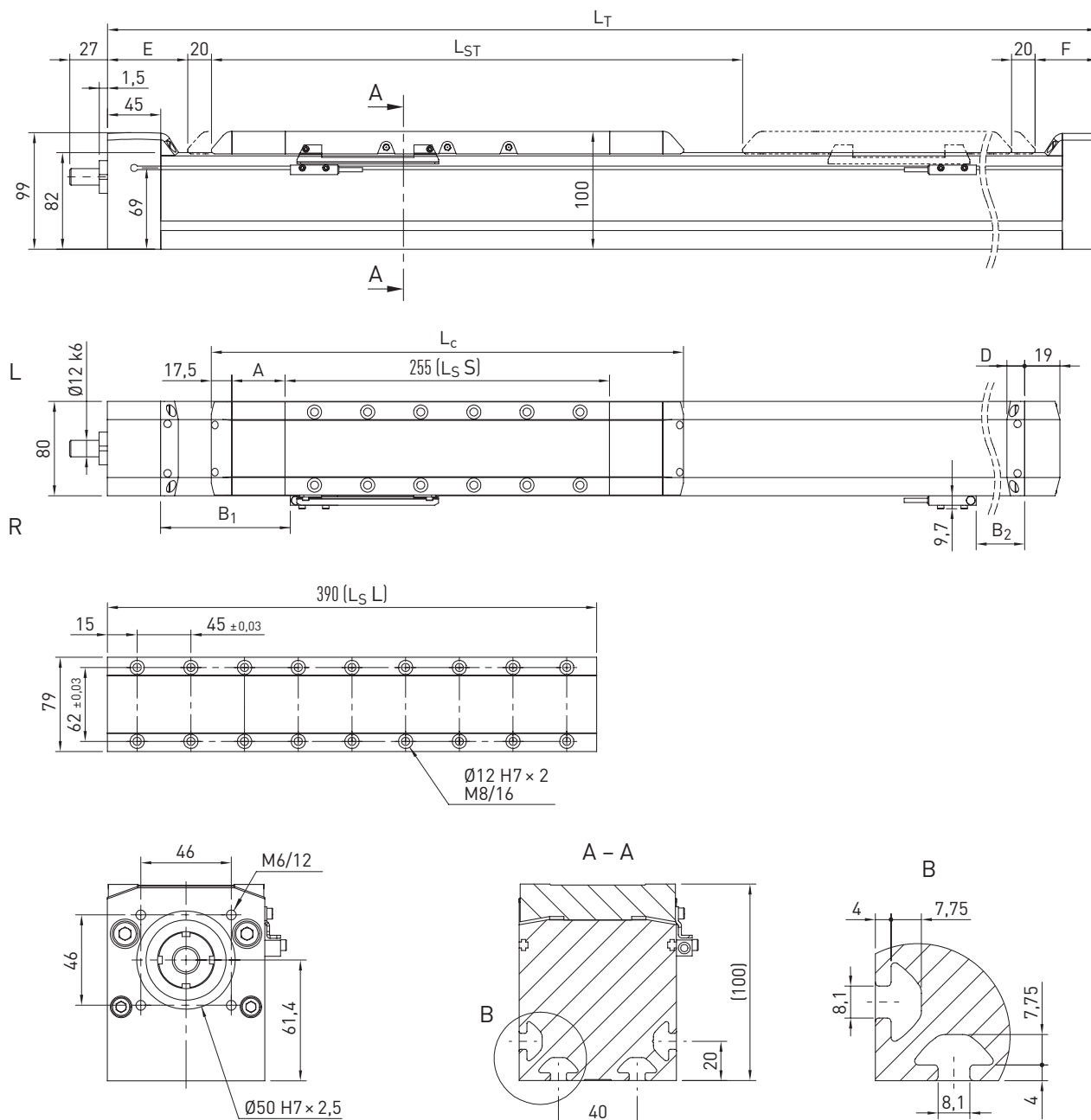
¹⁾ Rotational moment of inertia

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))

Linear axes & linear axis systems

Linear modules HM-S

6.5 Dimensions and specifications of HM080S



L_S Carriage plate
 L Left
 R Right

Table 6.13 HM080S dimensions

Sledge type	Variant without cover		Variant with cover	
	S	L	S	L
Total carriage length L_C [mm]	290	425	380	515
Cover strip deflection A [mm]	—	—	45	45
Switch distance B_1 [mm]	40	40	100	100
Switch distance B_2 [mm]	175	310	235	370
Terminal box D [mm]	—	—	15	15
End position at mechanical zero E [mm]	53		68	
End position at mechanical zero F [mm]	27		42	
Max. stroke length L_{ST} [mm]	4,090	3,955	3,970	3,835
Total length L_T [mm]	$L_T = L_{ST} + 410$	$L_T = L_{ST} + 545$	$L_T = L_{ST} + 530$	$L_T = L_{ST} + 665$

Table 6.14 Load data

	Permissible load data		Theoretical load data	
Lifetime reference value	7,500 km		100 km	
Sledge type	S	L	S	L
$F_{y\text{dynmax}}^{1)}$ [N]	4,000	4,000	47,622	47,622
$F_{z\text{dynmax}}^{1)}$ [N]	8,686	8,686	47,622	47,622
$M_{x\text{dynmax}}$ [Nm]	67	67	366	366
$M_{y\text{dynmax}}$ [Nm]	766	1,352	4,198	7,412
$M_{z\text{dynmax}}$ [Nm]	353	623	4,198	7,412
Load distance z [mm]	68.5	68.5	68.5	68.5

¹⁾ Force must only act free of torque

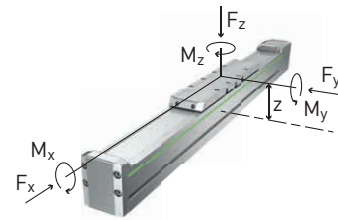


Table 6.15 Guide

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

Table 6.16 General technical data

Repeatability [mm]	± 0.02
Max. acceleration [m/s²]	15
Typical load capacity [kg]	60
Maximum total length [mm]	4,500
Area moment of inertia of profile cross section I_x [mm⁴]	1,293,796
Area moment of inertia of profile cross section I_y [mm⁴]	1,759,898

Table 6.17 Drive

	Spindle lead		
	5 mm	10 mm	20 mm
Spindle diameter [mm]	20		
Axial play [mm]	0.02		
Max. feed force $F_{x\text{max}}$ [N]	3,186	3,149	1,620
Max. speed [m/s]	0.25	0.50	1.00
Max. drive torque $M_{A\text{max}}$ [Nm]	2.89	5.36	5.51
Static load rating ballscrew C_0 [N]	33,800	33,600	16,000
Dynamic load rating ballscrew C_{dyn} [N]	17,300	17,100	8,800

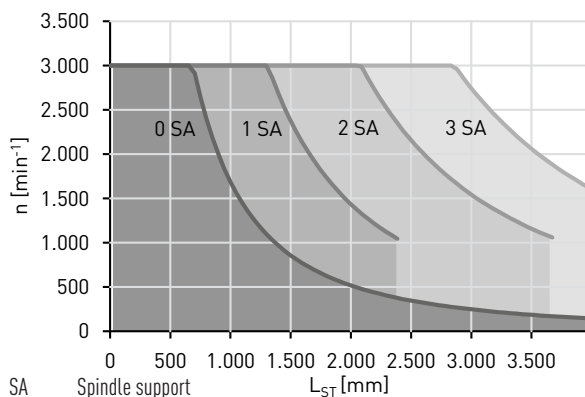


Fig. 6.5 Critical speed n over axis stroke length L_{ST}

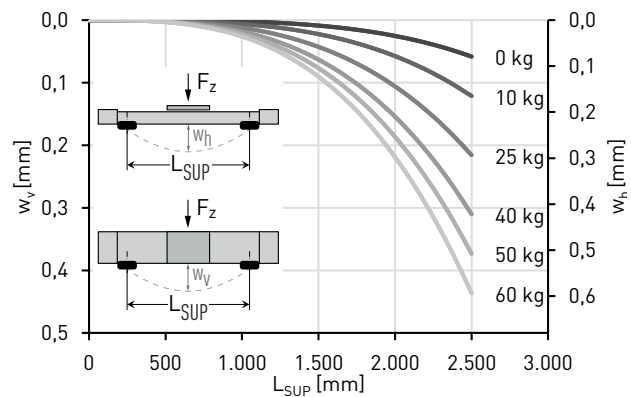


Fig. 6.6 Deflection w over unsupported axis length L_{SUP} under load capacity F_z

Table 6.18 Mechanical properties

	Variant without cover						Variant with cover					
Sledge type	S			L			S			L		
Spindle pitch [mm]	5	10	20	5	10	20	5	10	20	5	10	20
Mass of the carriage [kg]	1.97	2.11	2.20	2.65	2.79	2.87	2.17	2.31	2.39	2.85	2.99	3.07
Mass at 0-stroke ²⁾ [kg]	7.36	7.50	7.58	9.48	9.63	9.71	8.99	9.14	9.22	11.14	11.28	11.37
Mass per 1 m stroke [kg/m]	10.67						10.72					
J _{rot.} ¹⁾ at 0-stroke [kgcm²]	0.82			0.99			0.97			1.14		
J _{rot.} ¹⁾ Per 1 m stroke [kgcm²/m]	1.23						1.23					
Idle torque at 0-stroke [Nm]	0.35						0.52					

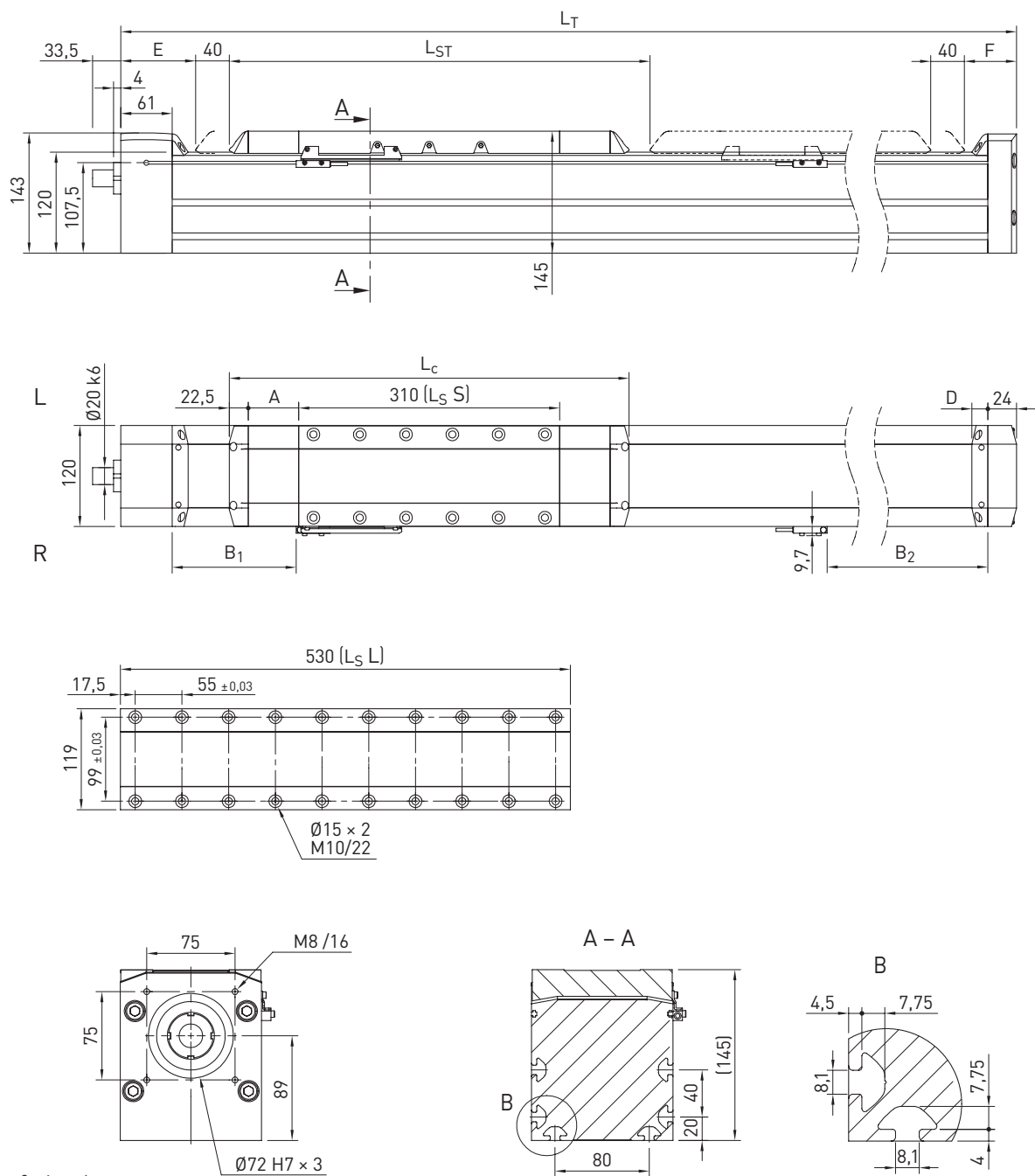
¹⁾ Rotational moment of inertia

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))

Linear axes & linear axis systems

Linear modules HM-S

6.6 Dimensions and specifications of HM120S



L_S Carriage plate
L Left
R Right

Table 6.19 HM120S dimensions

	Variant without cover		Variant with cover	
Sledge type	S	L	S	L
Total carriage length L _c [mm]	355	575	475	695
Cover strip deflection A [mm]	—	—	60	60
Switch distance B ₁ [mm]	68.5	68.5	147.5	147.5
Switch distance B ₂ [mm]	253.5	473.5	332.5	552.5
Terminal box D [mm]	—	—	19	19
End position at mechanical zero E [mm]	70		89	
End position at mechanical zero F [mm]	33		52	
Max. stroke length L _{ST} [mm]	4,936	4,716	4,778	4,558
Total length L _T [mm]	L _T = L _{ST} + 538	L _T = L _{ST} + 758	L _T = L _{ST} + 696	L _T = L _{ST} + 916

Table 6.20 Load data

	Permissible load data		Theoretical load data	
Lifetime reference value	10,000 km		100 km	
Sledge type	S	L	S	L
$F_{y\text{dynmax}}^{1)}$ [N]	15,327	15,327	92,482	92,482
$F_{z\text{dynmax}}^{1)}$ [N]	15,327	15,327	92,482	92,482
$M_{x\text{dynmax}}$ [Nm]	139	139	836	836
$M_{y\text{dynmax}}$ [Nm]	1,625	3,311	9,803	19,976
$M_{z\text{dynmax}}$ [Nm]	1,625	3,311	9,803	19,976
Load distance z [mm]	99	99	99	99

¹⁾ Force must only act free of torque

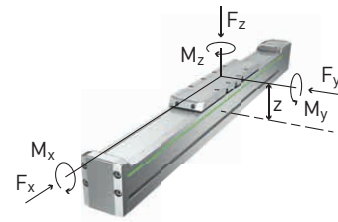


Table 6.21 Guide

Type of carriage	QHW30CC × 2
Static load rating C_0 [N]	66,340 × 2
Dynamic load rating C_{dyn} 50 km [N]	58,260 × 2

Table 6.22 General technical data

Repeatability [mm]	± 0.02
Max. acceleration [m/s ²]	15
Typical load capacity [kg]	120
Maximum total length [mm]	5,473
Area moment of inertia of profile cross section I_x [mm ⁴]	6,235,456
Area moment of inertia of profile cross section I_y [mm ⁴]	8,646,933

Table 6.23 Drive

	Spindle lead		
	10 mm	20 mm	32 mm
Spindle diameter [mm]	32		
Axial play [mm]	0.02		
Max. feed force $F_{x\text{max}}$ [N]	6,592	4,069	2,744
Max. speed [m/s]	0.5	1.0	1.6
Max. drive torque $M_{A\text{max}}$ [Nm]	11.34	13.80	14.82
Static load rating ballscrew C_0 [N]	88,000	50,600	32,800
Dynamic load rating ballscrew C_{dyn} [N]	35,800	22,100	14,900

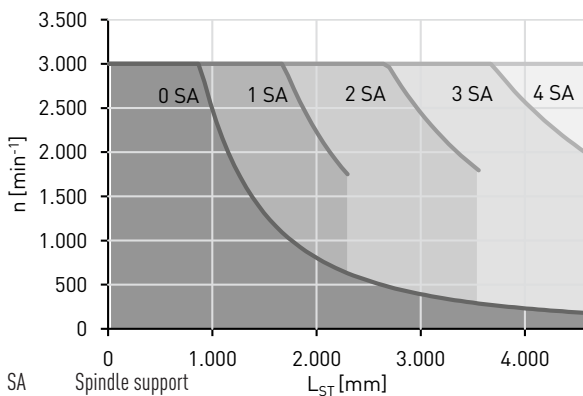


Fig. 6.7 Critical speed n over axis stroke length L_{ST}

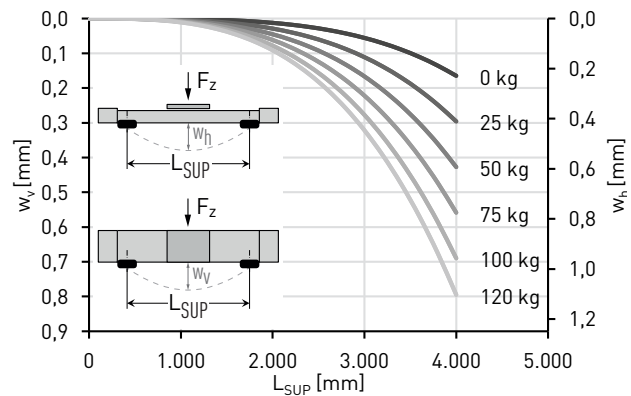


Fig. 6.8 Deflection w over unsupported axis length L_{SUP} under load capacity F_z

Table 6.24 Mechanical properties

	Variant without cover						Variant with cover					
Sledge type	S			L			S			L		
Spindle pitch [mm]	10	20	32	10	20	32	10	20	32	10	20	32
Mass of the carriage [kg]	6.04	6.18	6.19	8.41	8.56	8.57	6.52	6.67	6.68	8.91	9.05	9.07
Mass at 0-stroke ²⁾ [kg]	21.90	22.04	22.06	29.62	29.76	29.77	26.46	26.60	26.62	34.22	34.36	34.38
Mass per 1 m stroke [kg/m]	24.01						24.10					
J _{rot.} ¹⁾ at 0-stroke [kgcm ²]	5.77			7.55			7.05			8.83		
J _{rot.} ¹⁾ Per 1 m stroke [kgcm ² /m]	8.08						8.08					
Idle torque at 0-stroke [Nm]	0.85						0.90					

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))