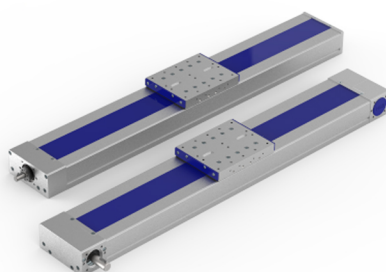


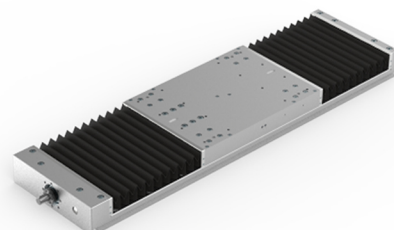
Mechanical Linear Drives

HSB-beta®



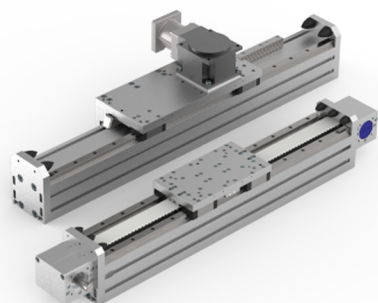
Compact Modules

HSB-delta®



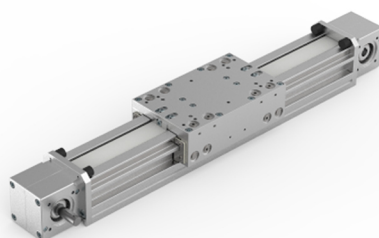
Linear Tables

HSB-alpha®



Portal Linear Drives

HSB-gamma®



Portal Linear Drives

HSB-sigma®



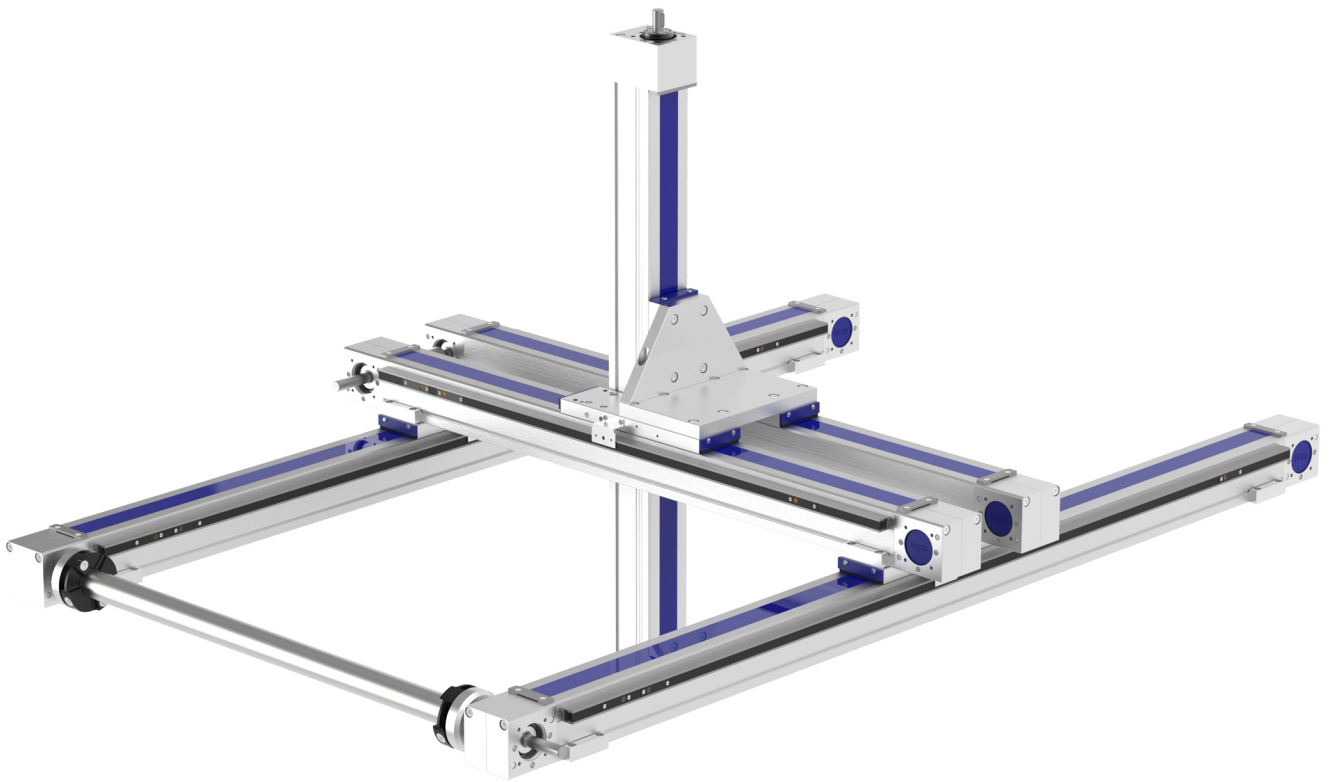
Ball Screws

HSB-kgt®



Complete Catalogue

Handling Systems



This 3-axis system consists of:

4x HSB-beta[®] 80-ZSS and
1x HSB-beta[®] 80-SSS

Complete Catalogue

Print: April 2021

All specifications are subject to change without prior notice.

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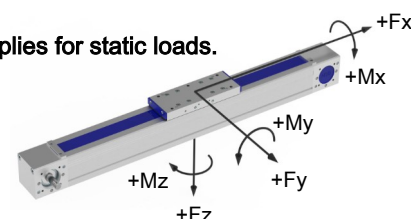
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Performance Overview of Mechanical Linear Drives and Compact Modules with Toothed Belt Drive

Description	Toothed belt	F _x [N]	F _y [N]	F _z [N]	-F _z [N]	M _x [Nm]	M _y [Nm]	M _z [Nm]	M _{idle} [Nm]	d _s [mm]	s _{max} [mm]	L _{max} [mm]
Beta 40-ZGS	16 AT5-E	500	80	150	75	6	6	8	0.30	0.08	2780	3000
Beta 40-ZSS	16 AT5-E	500	500	600	300	12	30	30	0.30	0.08	1850	2070
Beta 50-C-ZRS	20 AT5-E	700	300	600	400	30	50	50	0.40	0.08	7710	8000
Beta 50-C-ARS	20 AT5-E	700	300	600	400	30	50	50	1.50	0.08	7710	8000
Beta 60-ZSS	25 AT5-E	850	500	1400	800	50	160	100	1.10	0.08	7620	8000
Beta 70-C-ZRS	32 AT5-E	1100	300	1000	400	35	120	50	1.20	0.08	7640	8000
Beta 70-C-ZSS	32 AT5-E	1100	600	1800	1200	60	180	120	1.20	0.08	6840	7200
Beta 70-C-ARS	32 AT5-E	900	300	1000	400	35	120	50	1.00	0.08	7640	8000
Beta 70-C-ASS	32 AT5-E	900	600	1800	1200	60	180	120	1.00	0.08	7640	8000
Beta 80-ZRS	32 AT5-E	1350	500	1500	800	50	180	100	1.50	0.08	7600	8000
Beta 80-ZSS	32 AT5-E	1350	800	3000	2000	100	250	250	1.50	0.08	7600	8000
Beta 80-C-ZRS	32 AT10	2200	1000	2500	1500	100	300	180	1.80	0.08	7600	8000
Beta 80-C-ZSS	32 AT10	2200	1600	4000	3000	300	500	500	1.80	0.08	7600	8000
Beta 80-C-ARS	32 AT10-E	1300	1000	2500	1500	100	300	180	1.80	0.08	7590	8000
Beta 80-C-ASS	32 AT10-E	1300	1600	4000	3000	300	500	500	1.80	0.08	7590	8000
Beta 100-ZRS	40 AT10	2800	1000	2500	1200	200	250	200	2.50	0.08	7420	7900
Beta 100-ZSS	40 AT10	2800	1000	3000	2000	200	300	300	2.50	0.08	7420	7900
Beta 100-D-ZSS	40 AT10-E	1500	1800	4000	3000	350	750	750	5.00	0.08	7720	8100
Beta 100-D-ASS	40 AT10-E	2200	1800	4000	3000	350	950	950	2.50	0.08	7680	8100
Beta 110-ZRS	50 ATL10	4000	2000	5000	2500	300	600	450	3.50	0.08	7520	8100
Beta 110-ZSS	50 ATL10	4000	3000	8000	4000	400	800	600	3.50	0.08	7520	8100
Beta 110-ARS	50 AT10-E	2000	2000	5000	2500	300	600	450	3.50	0.08	7440	8100
Beta 110-ASS	50 AT10-E	2000	3000	8000	4000	400	800	600	3.50	0.08	7440	8100
Beta 120-ZRS	50 ATL10	4000	2500	5000	3000	350	700	500	3.20	0.08	7520	8100
Beta 120-ZSS	50 ATL10	4000	3000	8000	4000	400	1200	600	3.20	0.08	7520	8100
Beta 120-C-ZSS	60ATL10	4800	4000	12000	6000	600	1500	1000	4.50	0.08	7500	8100
Beta 140-ZRS	50 AT10-E	4000	2500	5000	3000	350	700	500	3.50	0.08	7540	8100
Beta 140-ZSS	50 AT10-E	4000	2500	6000	4000	500	1000	1000	3.50	0.08	7540	8100
Beta 140-ARS	50 AT10-E	2500	2500	5000	3000	350	700	500	3.50	0.08	7380	8100
Beta 140-ASS	50 AT10-E	2500	2500	6000	4000	500	1000	1000	3.50	0.08	7470	8100
Beta 140-C-ZSS	50 AT10-E	4000	3200	7500	5000	600	1200	1200	3.50	0.08	7470	8100
Beta 140-C-ASS	50 AT10-E	2500	3200	7500	5000	600	1200	1200	3.50	0.08	7470	8100
Beta 165-ZSS	75 ATS15	10000	5000	15000	8000	700	1400	1100	12.00	0.08	6920	7700
Beta 180-ZSS	75 AT10	6000	6000	12000	6000	1500	3000	1500	8.00	0.08	5500	6200
Beta 180-ASS	75 AT10	3500	6000	12000	6000	1500	3000	1500	8.00	0.08	5470	6200
Beta 180-C-ZSS	75 AT10	6000	8000	15000	8000	1800	3600	1800	8.00	0.08	5500	6200
Beta 180-C-ASS	75 AT10	3500	8000	15000	8000	1800	3600	1800	8.00	0.08	5470	6200
Delta 90-ZRS	32 AT5-E	800	500	1000	1000	60	80	80	1.50	0.08	3720	4000
Delta 110-C-ZSS	50 AT5-E	950	1200	3000	1500	500	550	550	2.00	0.08	7820	8100
Delta 145-C-ZSS	60 AT5-E	2000	2500	5000	3000	800	1000	1000	3.00	0.08	7700	8100
Delta 200-ZSS	75 AT10	6000	5000	8000	5000	3500	4300	3200	6.80	0.08	1520	2000
Delta 240-ZSS	50 AT10-E	2500	6000	12000	8000	4500	6000	4500	5.50	0.08	2550	3000
Delta 240-C-ZSS	60 ATL10	3800	6000	12000	8000	4500	6000	4500	5.50	0.08	7340	8000

For mechanical linear drives with roller guides, the static load rating (C_{stat} page TL11) applies for static loads.

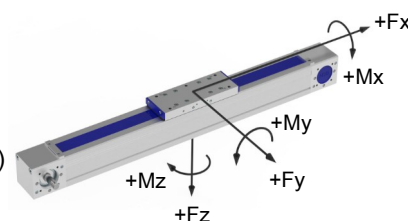
- M_{idle} = Idle torque ±30 %
- d_s = Repeat accuracy ±
- s_{max} = Maximum standard stroke length (longer on request)
- L_{max} = Maximum standard length (longer on request)



Description	Screw Drive	F _x [N]	F _y [N]	F _z [N]	-F _z [N]	M _x [Nm]	M _y [Nm]	M _z [Nm]	M _{idle} [Nm]	d _{pn/ps} [mm]	d _s [mm]	SA	s _{max} [mm]	L _{max} [mm]
Beta 40-SGS	1205 / 1210	1000	80	150	75	6	6	8	0,30	0,08 / 0,03	0,03	2	1840	2040
Beta 40-SSS		1000	500	600	300	12	30	30	0,30	0,08 / 0,03	0,03	2	1840	2040
Beta50-C-SRS	1205 / 1210	1000	300	600	400	30	60	50	0,30	0,08 / 0,03	0,03	-	860	1090
Beta 60-SSS	2005 / 2010	4000	600	1800	1200	60	180	120	0,70	0,08 / 0,03	0,03	8	5220	5500
Beta 60-SGV	2020 / 2050	4000	-	-	-	-	-	-	0,70	0,08 / 0,03	0,03	8	5220	5500
Beta 70-C-SRS	1605 / 1610	2000	300	1000	400	35	120	60	0,35	0,08 / 0,03	0,03	8	3725	4000
Beta 70-C-SSS	1620 / 1640	2000	600	1800	1200	60	180	120	0,40	0,08 / 0,03	0,03	8	3725	4000
Beta 80-SRS	2005 / 2010	4000	500	1500	800	50	180	100	0,60	0,08 / 0,03	0,03	8	5220	5600
Beta 80-SSS	2020 / 2050	4000	800	3000	2000	100	250	250	0,80	0,08 / 0,03	0,03	8	5220	5600
Beta 80-SGV	2505 / 2510 2525 / 2550	6000	-	-	-	-	-	-	1,00	0,1 / 0,04	0,03	8	5220	5600
Beta 100-D-SSS	2005 / 2010 2020 / 2050	4000	1800	4000	3000	350	750	750	1,30	0,08 / 0,03	0,03	8	5260	5600
Beta 110-SRS	2505 / 2510	6000	3000	5000	2500	400	800	600	1,00	0,1 / 0,04	0,03	10	5120	5600
Beta 110-SSS	2525 / 2550	6000	2000	8000	4000	300	600	450	1,50	0,1 / 0,04	0,03	10	5120	5600
Beta 110-C-SGV	4005 / 4010 4020 / 4040	16000	-	-	-	-	-	-	1,50	0,1 / 0,04	0,03	6	5120	5600
Beta 120-C-SSS	3205 / 3210 3220 / 3240 3260	12000	4000	12000	6000	600	1500	1000	2,00	0,1 / 0,04	0,03	10	5120	5600
Beta 140-SRS	2505 / 2510 2525 / 2550	6000	2500	5000	3000	350	700	500	1,00	0,1 / 0,04	0,03	10	5120	5600
Beta 140-SSS		6000	2500	6000	4000	500	1000	1000	1,50	0,1 / 0,04	0,03	10	5120	5600
Beta 140-C-SSS		6000	3200	7500	5000	600	1200	1200	1,50	0,1 / 0,04	0,03	10	5120	5600
Beta 165-SSS	4005 / 4010	18000	5000	15000	8000	700	1400	1100	3,00	0,1 / 0,04	0,03	8	5010	5600
Beta 165-SGV	4020 / 4040	18000	-	-	-	-	-	-	3,00	0,1 / 0,04	0,03	8	5020	5600
Beta 165-C-SGV	5010 / 5020	25000	-	-	-	-	-	-	3,20	0,1 / 0,04	0,03	6	5020	5600
Beta 165-C-SSF	5010 / 5020	25000	5000	15000	8000	800	1800	1400	3,20	0,1 / 0,04	0,03	6	5010	5600
Beta 180-SSS	3205 / 3210 3220 / 3240	12000	6000	12000	6000	1500	3000	1500	2,50	0,1 / 0,04	0,03	8	5030	5600
Beta 180-C-SSS	3260	12000	8000	15000	8000	1800	3600	1800	2,50	0,1 / 0,04	0,03	8	5030	5600
Delta 90-SRS	1205 / 1210	1000	500	1000	1000	60	80	80	0,80	0,08 / 0,03	0,03	2	1185	1500
Delta 110-C-SSS	1605 / 1610 1620 / 1640	2000	1200	3000	1500	500	550	550	1,00	0,08 / 0,03	0,03	8	5455	5600
Delta 145-C-SSS	2005 / 2010 2020 / 2050	4000	2500	5000	3000	800	1000	1000	1,00	0,08 / 0,03	0,03	8	5275	5600
Delta 200-SSS	3205 / 3210	10000	5000	8000	5000	3500	4300	3200	2,80	0,1 / 0,04	0,03	4	1620	2000
Delta 240-SSS	3220 / 3240	12000	6000	12000	8000	4500	6000	4500	2,80	0,1 / 0,04	0,03	4	2600	3000
Delta 240-C-SSS	3260	12000	6000	12000	8000	4500	6000	4500	2,80	0,1 / 0,04	0,03	4	5400	5600
Alpha 15-B-155	2005 / 2010 2020 / 2050	4000	2000	20000	15000	1000	900	400	0,35	0,08 / 0,03	0,03	4	1235	1500
Alpha 20-B-225	2505 / 2510 2525 / 2550	6000	5000	58000	40000	4000	3000	1200	1,20	0,1 / 0,04	0,03	4	1645	2000
Alpha 30-B-325	3205 / 3210 3220 / 3240	12000	11000	95000	63000	6300	75000	3750	1,60	0,1 / 0,04	0,03	4	2540	3000
Alpha 35-B-455	4005 / 4010 4020 / 4040	18000	14000	120000	80000	12000	10000	5000	2,50	0,1 / 0,04	0,03	4	2420	3000

For mechanical linear drives with roller guides, the static load rating (C_{stat} page TL11) applies for static loads.

- M_{idle} = Idle torque ±30 %
d_{pn/ps} = Axial clearance (normal/low backlash)
d_s = Repeat accuracy ±
SA = Maximum number of spindle supports
s_{max} = Maximum standard stroke length without spindle support (longer on request)
L_{max} = Maximum standard length (longer on request)

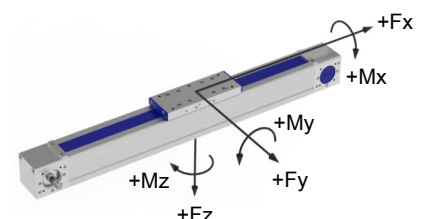


Performance Overview of Portal Linear Drives with Toothed Belt Drive or Rack-and-Pinion Drive

HSB-gamma®
HSB-sigma®

Description	Toothed belt/ Rack and pinion	F_x [N]	F_y [N]	F_z [N]	$-F_z$ [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]	M_{leer} [Nm]	d_s [mm]	s_{max} [mm]	L_{max} [mm]
Gamma 90-ZSS	32AT10	2300	2500	3000	3000	500	1200	1000	3,20	0,08	7650	8100
Gamma 90-ZSSD	16AT10	1150	2500	3000	500	800	700	700	2,90	0,08	7560	8100
Gamma 90-ASH	32AT10	2300	2500	3000	3000	500	2300	1900	3,20	0,08	7560	8000
Gamma 90-AZ..	M2	1300 - 1800	3000	3000	3000	600	1800	1800	2,50	0,08	7600	8000
Gamma 120-ZSS	40 AT10-E	2800	6000	8000	8000	1200	3000	2500	3,00	0,08	7685	8200
Gamma 120-ZSSD	2 x 25 ATL10	1800	6000	8000	8000	1200	1300	1100	3,00	0,08	7638	8200
Gamma 120-ASH	40 AT10-E	2800	6000	8000	8000	1200	5000	4200	3,60	0,08	7450	8000
Gamma 120-AZ..	M 2	1500 - 2200	8000	8000	8000	1500	4000	4000	4,80	0,05	7470	8000
Gamma 160-ZSS	50 ATL10	4000	10000	16000	16000	1800	5000	4000	4,00	0,08	7580	8200
Gamma 160-ZSSD	2 x 32 AT10	2200	10000	16000	16000	1800	5000	4000	4,00	0,08	7240	8200
Gamma 160-ASH	50 AT10-E	4000	10000	16000	16000	1800	8000	7000	4,00	0,08	7350	8000
Gamma 160-AZ..	M 2	1500 - 4000	12000	12000	12000	2500	7000	7000	5,80	0,05	7370	8000
Gamma 220-ZSS	75 ATL10	6000	12000	20000	20000	2500	8000	6500	7,00	0,08	11520	12200
Gamma 220-ZSSD	2 x 40 AT10	2800	12000	20000	20000	2500	8000	6500	5,25	0,08	11200	12200
Gamma 220-ASS	75 AT10-E	6000	12000	20000	20000	2500	12000	10000	7,00	0,08	11380	12000
Gamma 220-AZ..	M 2	3000 - 6000	20000	20000	20000	4000	8000	8000	7,20	0,05	11320	12000
Gamma 220-AZ..	M 3	3000 - 7500	20000	20000	20000	4000	8000	8000	7,20	0,05	11320	12000
Gamma 280-ZSS	75 ATS15	10000	20000	30000	30000	4000	15000	12000	11,00	0,08	9280	10200
Gamma 280-ZSSD	2 x 50 ATL10	4000	20000	30000	30000	4000	15000	12000	11,00	0,08	8940	10200
Gamma 280-AZ..	M 3	3000 - 7500	25000	25000	25000	8000	16000	16000	8,60	0,05	9220	10000
Sigma 70-ZRS	25 AT5-E	1050	1350	1850	1200	50	70	80	0,85	0,08	7805	8100
Sigma 70-ARH	25 AT5-E	1050	1350	1850	1200	50	120	110	0,85	0,08	7700	8000
Sigma 70-ARS	25 AT5-E	1050	1350	1850	1200	50	70	80	0,85	0,08	7775	8000
Sigma 90-ZRS	32 AT5-E	1300	2000	2500	1500	120	160	150	3,20	0,08	7760	8100
Sigma 90-ZRSD	2 x 16 AT5-E	650	2000	2500	1500	120	160	150	3,20	0,08	7595	8100
Sigma 90-ARH	32 AT5-E	1300	2000	2500	1500	120	230	200	2,30	0,08	7745	8000
Sigma 90-ARS	32 AT5-E	1300	2000	2500	1500	120	160	150	2,30	0,08	7740	8000
Sigma 120-ZRS	40 AT10-E	2800	2300	3000	1800	170	270	270	3,00	0,08	7660	8100
Sigma 120-ZRSD	2 x 25 ATL10	1800	2300	3000	1800	170	270	270	3,00	0,08	7420	8100
Sigma 120-ARH	40 AT10-E	3200	2300	3000	1800	170	400	400	3,80	0,08	7510	8000
Sigma 120-ARS	40 AT10-E	3200	2300	3000	1800	170	270	270	3,80	0,08	7600	8000
Sigma 160-ZRS	50 ATL10	4000	4500	6000	4000	500	700	700	4,00	0,08	5670	6200
Sigma 160-ZRSD	2 x 32 AT10	2300	4500	6000	4000	500	700	700	3,50	0,08	5390	6200
Sigma 160-ARH	50 AT10-E	4000	4500	6000	4000	500	1000	1000	4,20	0,08	5430	6000
Sigma 160-ARS	50 AT10-E	4000	4500	6000	4000	500	700	700	4,20	0,08	5580	6000

M_{idle} = Idle torque $\pm 30\%$
 d_s = Repeat accuracy $\pm$
 s_{max} = Maximum standard stroke length (longer on request)
 L_{max} = Maximum standard length (longer on request)

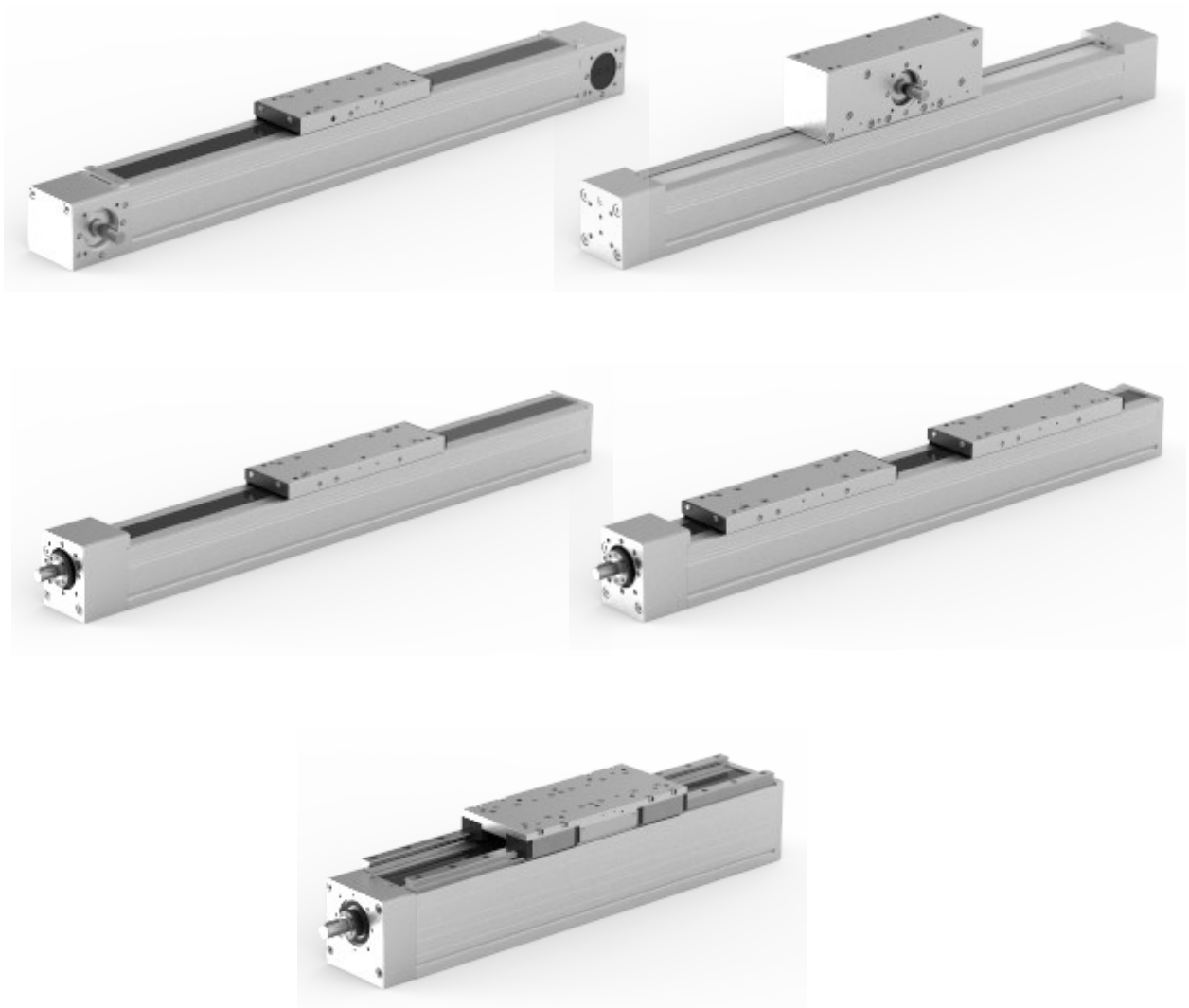


Notes and drawing

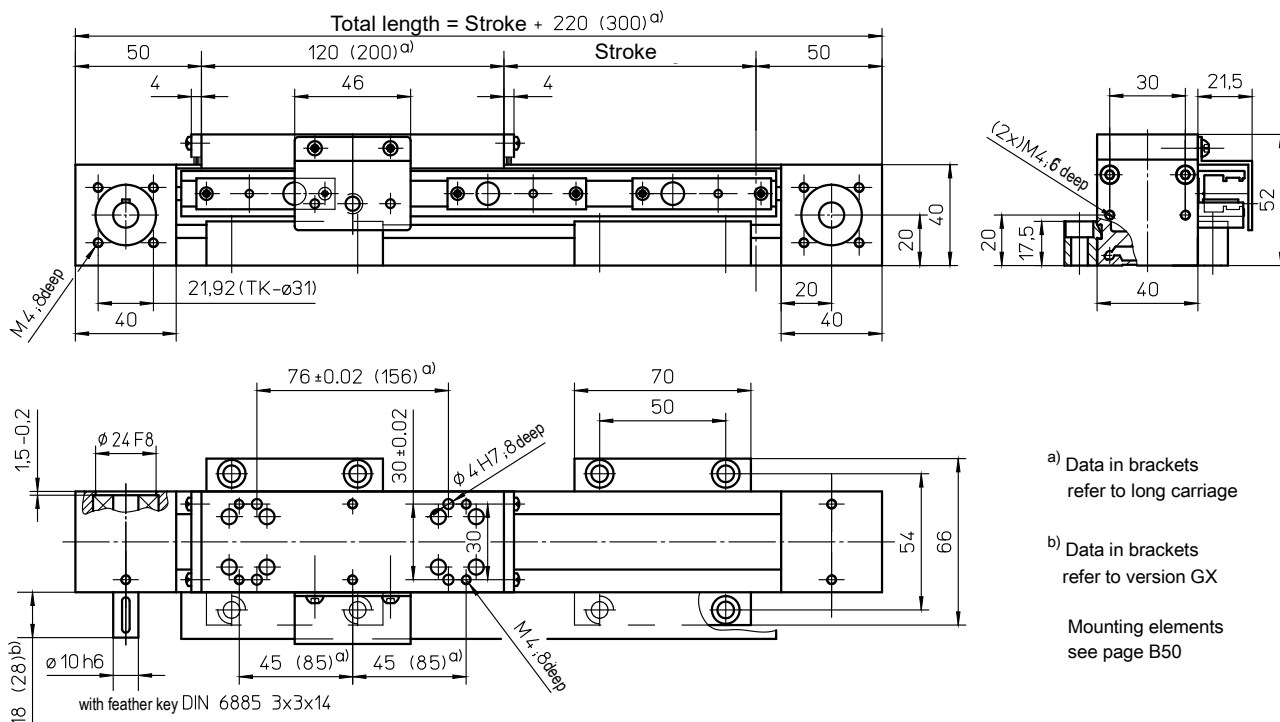
Chapter B

Mechanical Linear Drive

HSB-beta[®]



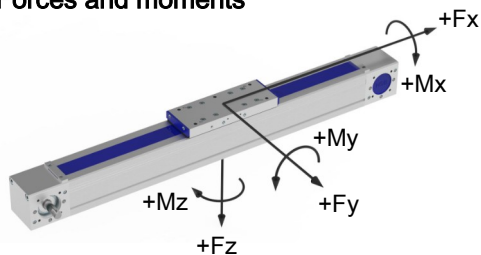
with toothed belt drive and sliding guide (ZGS) or rail guide (ZSS)



Weights	ZGS	ZSS
Basic length without stroke:	1.50 kg	1.70 kg
100 mm stroke:	0.20 kg	0.30 kg
Entire carriage 120 mm:	0.30 kg	
Entire carriage 200 mm:	0.50 kg	
Max. total length:	3000 mm	2070 mm

Technical Data	ZGS	ZSS
Max. speed:	1.00 m/s	3.00 m/s
Max. acceleration:	20 m/s ²	30 m/s ²
Repeat accuracy:	± 0.08 mm	
Idle torque:	0.30 Nm	
Moment of inertia:	2.00 · 10 ⁻⁴ kgm ²	
Drive element:	Toothed belt 16 AT5-E	
Stroke per revolution:	100 mm	

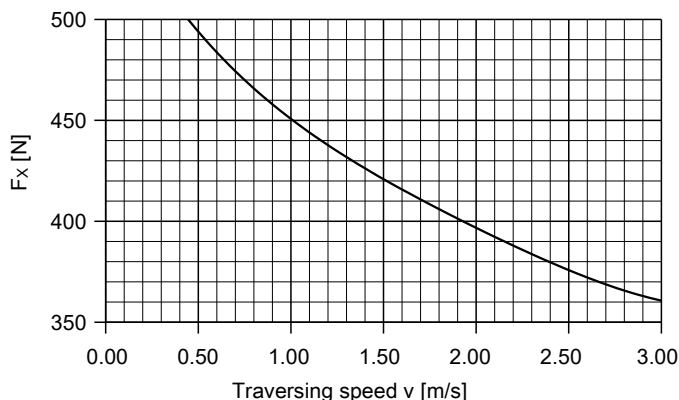
Forces and moments



	ZGS	ZSS
Forces	Dynamic [N]	
F_x ^{d)}	500	
F_y	80	500
F_z	150	600
-F_z	75	300
Moments	Dynamic [Nm]	
M_x	6	12
M_y	6	30 (50)
M_z	8	30 (50)

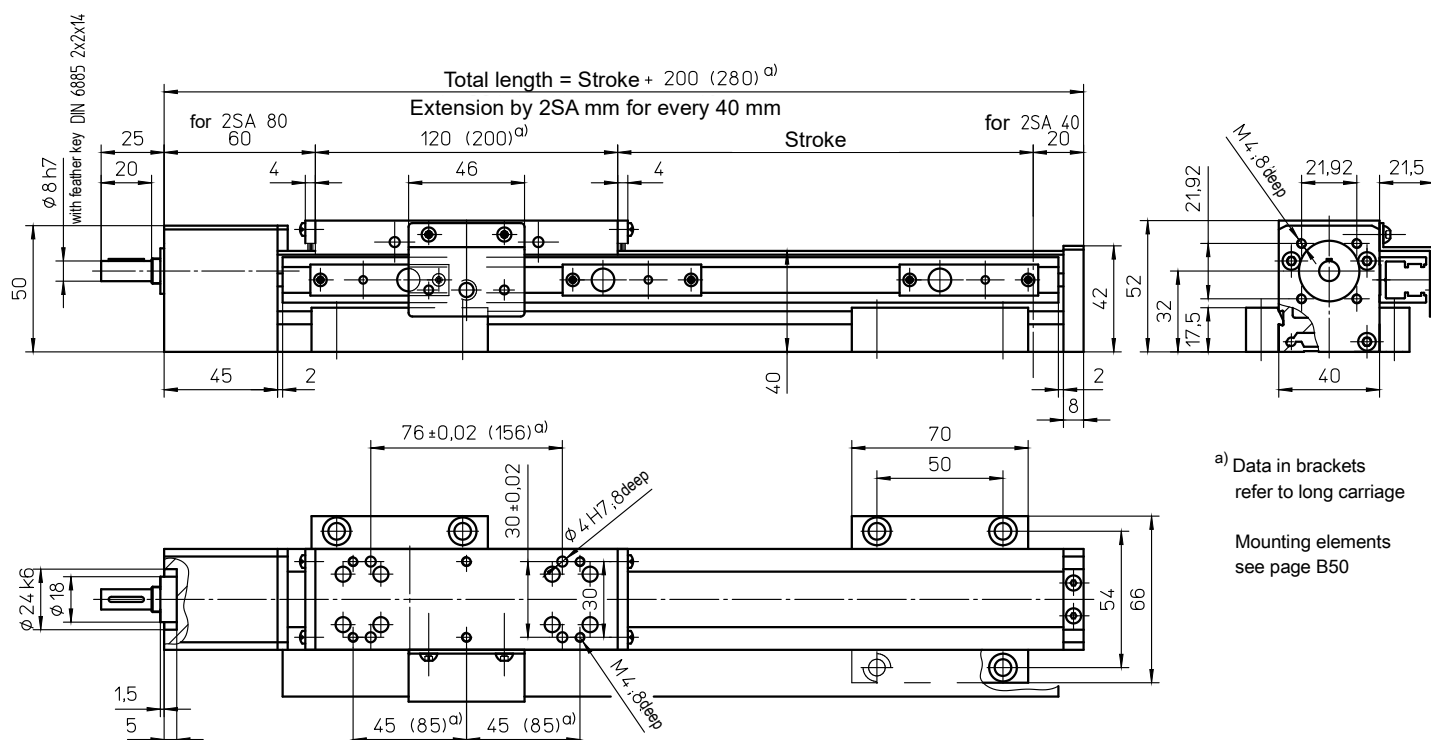
^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage (200)

F_x - v - Diagram



>> **Note** << Drive shaft is not changeable
Please define position, e.g. "AZ1"! (See Ordering Code)

with ball screw (KGT) and sliding guide (SGS) or rail guide (SSS)



a) Data in brackets refer to long carriage

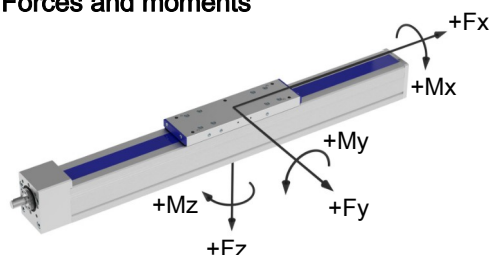
Mounting elements see page B50

Weights	SGS	SSS
Basic length without stroke:	1.50 kg	1.70 kg
100 mm stroke:	0.30 kg	0.40 kg
Entire carriage 120 mm:	0.30 kg	0.40 kg
Entire carriage 200 mm:	0.50 kg	0.65 kg

Max. total length: 2040 mm

Technical Data	SGS	SSS
Max. speed:	0.5 m/s	
Max. acceleration:	20 m/s ²	
Repeat accuracy:	± 0.03 mm (KGT)	
Idle torque:	0.30 Nm	0.4 Nm

Forces and moments



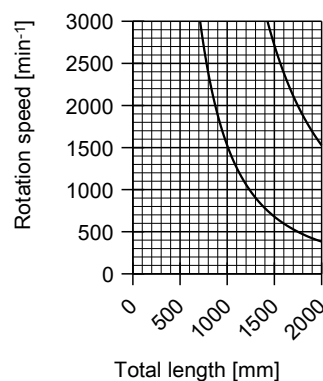
Drive element KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	12 mm
Pitch:	5 / 10 mm
Moment of inertia:	1.20 · 10 ⁻⁵ kgm ² /m

Spindle support (SA)
(only available with SSS)

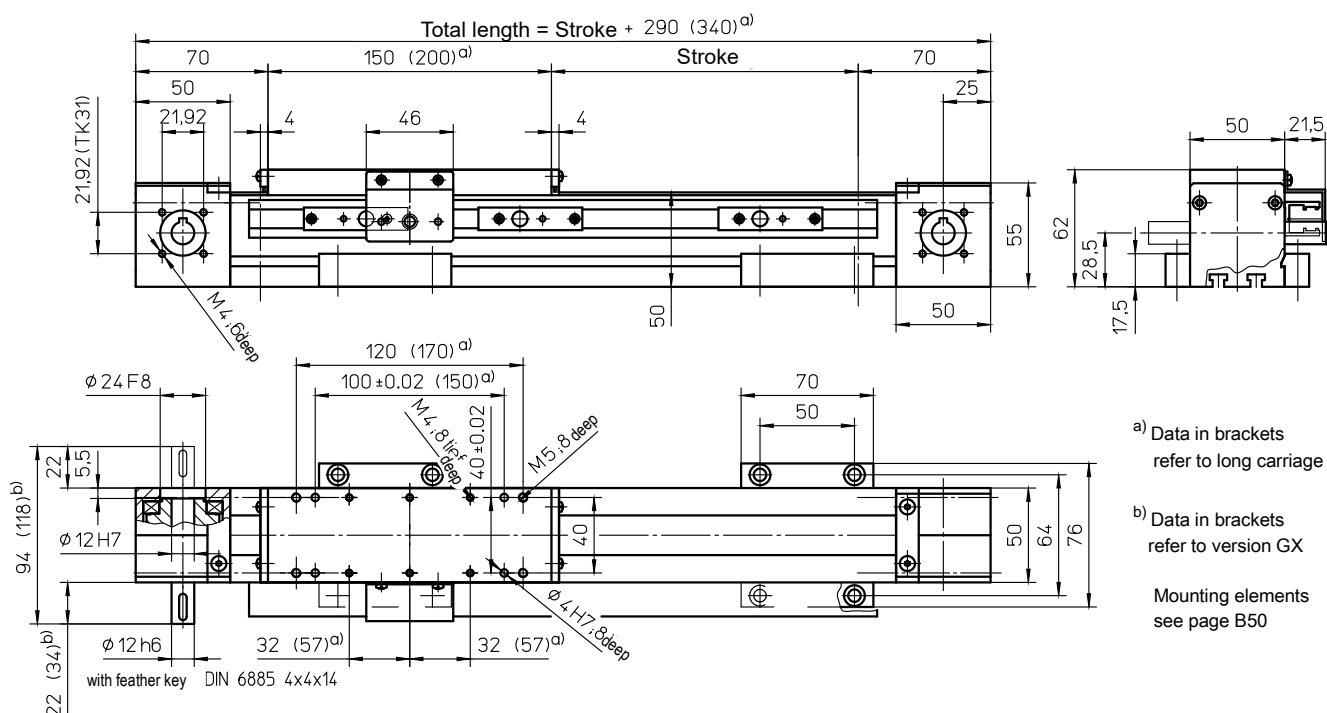
	SGS	SSS
Forces	Dynamic [N]	
F _x	1000	
F _y	80	500
F _z	150	600
-F _z	75	300
Moments	Dynamic [Nm]	
M _x	6	12
M _y	6	30 (50)
M _z	8	30 (50)

Data in brackets refer to long carriage (200)



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

with toothed belt drive and roller guide (ZRS)



a) Data in brackets refer to long carriage

b) Data in brackets refer to version GX

Mounting elements see page B50

Weights

ZRS

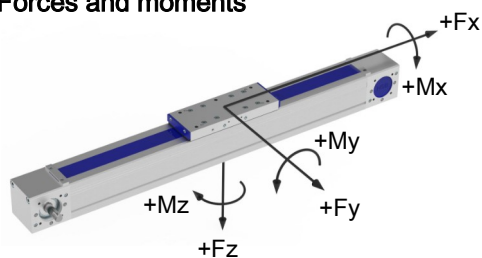
Basic length without stroke:	1.45 kg
100 mm stroke:	0.35 kg
Entire carriage 150 mm:	0.45 kg
Entire carriage 200 mm:	0.60 kg
Max. total length: (longer on request)	8000 mm

Technical Data

ZRS

Max. total speed:	3.00 m/s
Max. acceleration:	30 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	0.40 Nm
Moment of inertia:	3.00 • 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 20 AT5-E
Stroke per revolution:	110 mm

Forces and moments

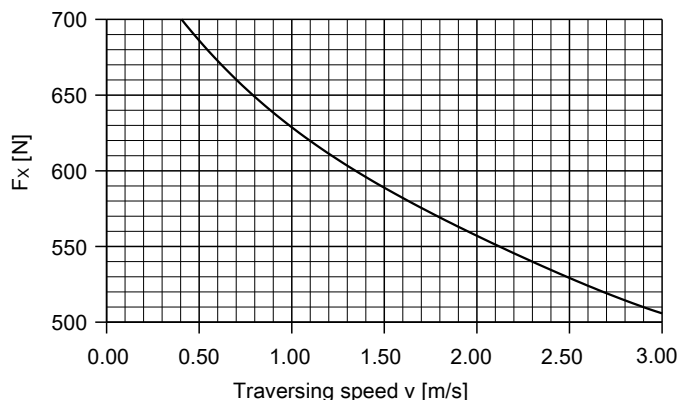


	ZRS
Forces	Dynamic [N]
F_x^{d)}	700
F_y	300
F_z	600
-F_z	400
Moments	Dynamic [Nm]
M_x	30
M_y	50 (65)
M_z	50 (65)

^{d)} Maximum value (see diagram "F_x-v-Diagram")

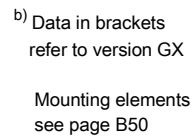
Data in brackets refer to long carriage (200)

F_x - v - Diagram

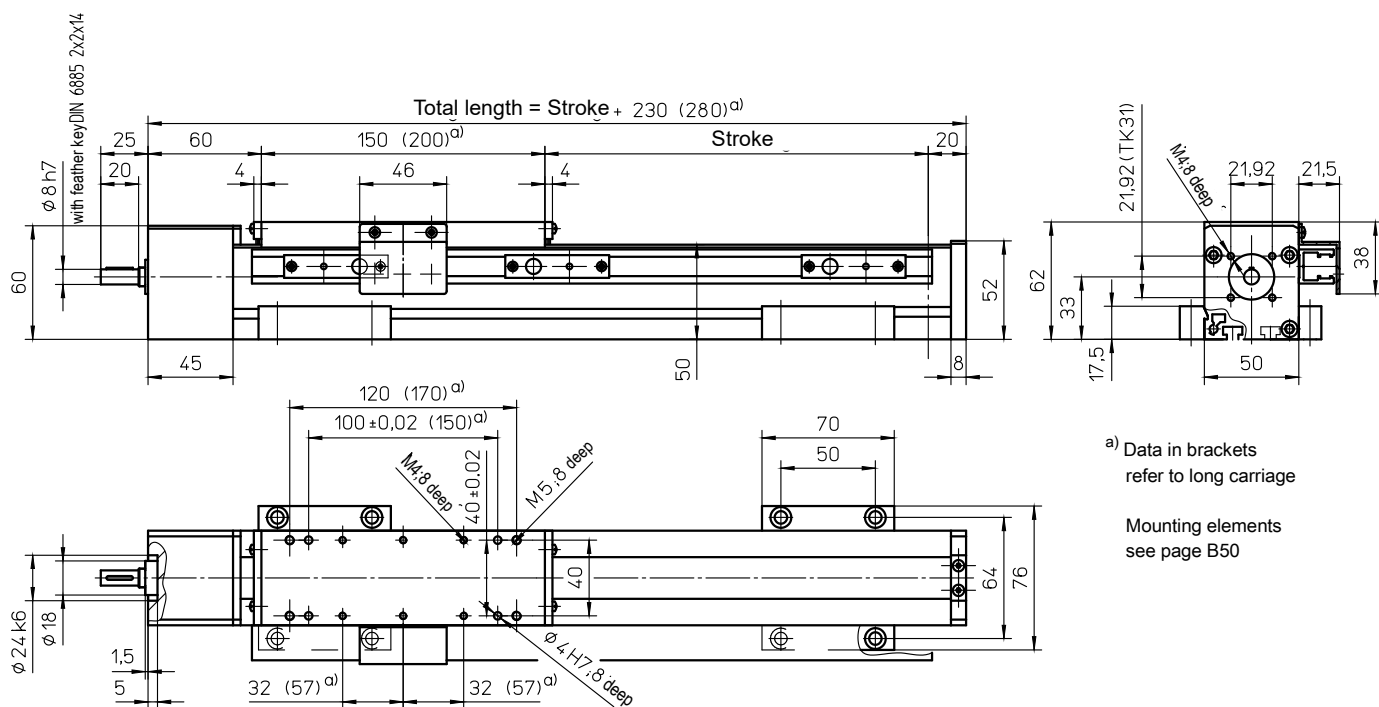


For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL11) applies for static loads.

with toothed belt drive and roller guide (ARS)

Page B4

with ball screw (KGT) and roller guide (SRS)



Weights

SRS

Basic length without stroke:	1.50 kg
100 mm stroke:	0.40 kg
Entire carriage 150 mm:	0.45 kg
Entire carriage 200 mm:	0.60 kg

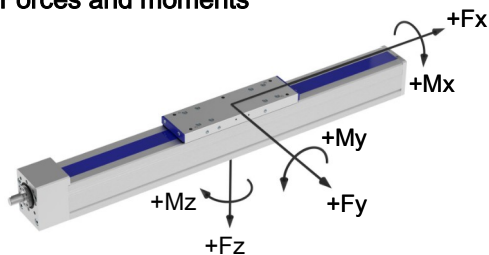
Max. total length: 1090 mm

Technical Data

SRS

Max. speed:	0.5 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	0.30 Nm

Forces and moments



Drive element

KGT

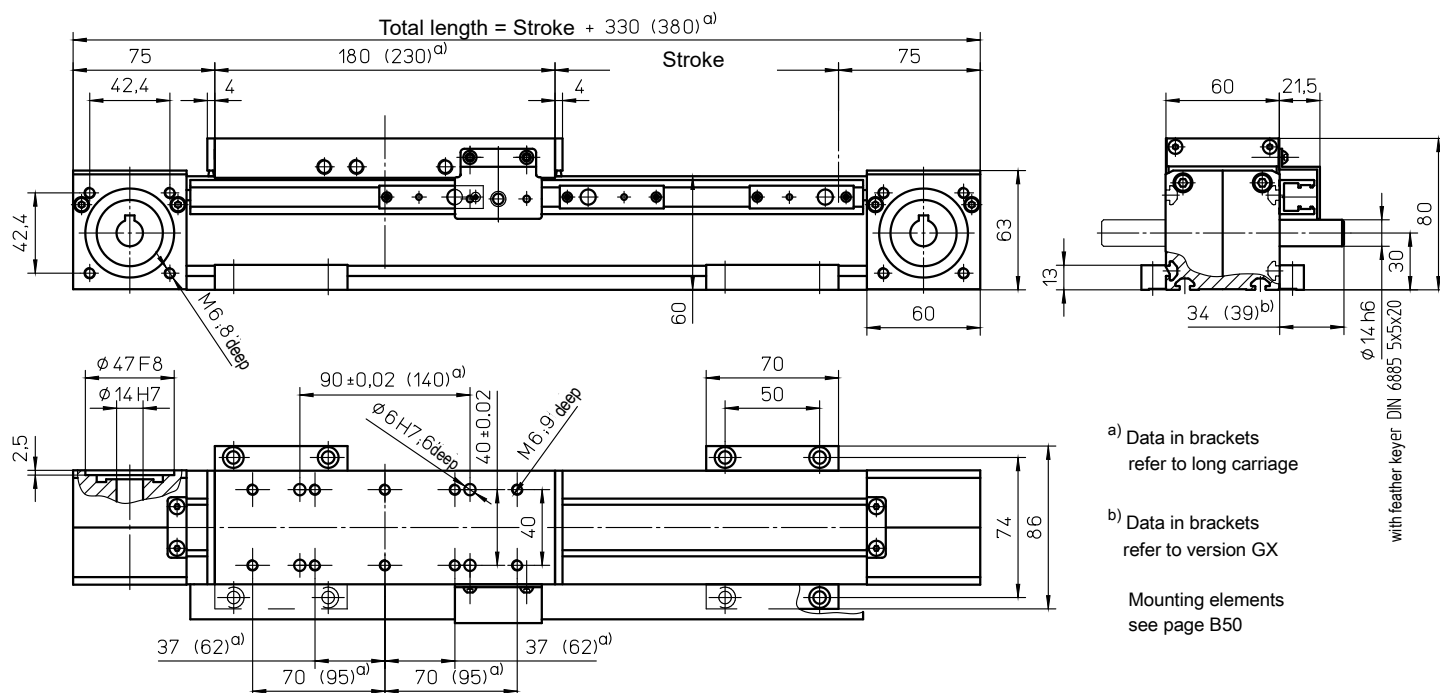
Max. rotation speed:	3000 min ⁻¹
Diameter:	12 mm
Pitch:	5 / 10 mm
Moment of inertia:	1.20 · 10 ⁻⁵ kgm ² /m

	SRS
Forces	Dynamic [N]
F _x	1000
F _y	300
F _z	600
-F _z	400
Moments	Dynamic [Nm]
M _x	30
M _y	50 (65)
M _z	50 (65)

Data in brackets refer to long carriage (200)

For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

with toothed belt drive and rail guide (ZSS)



Weights

ZSS

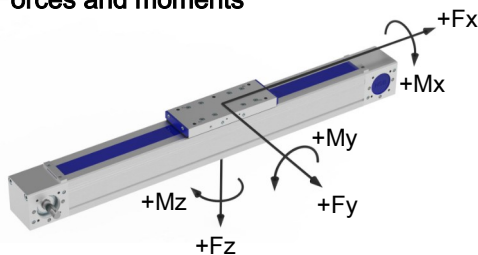
Basic length without stroke:	4.55 kg
100 mm stroke:	0.59 kg
Entire carriage 180 mm:	1.22 kg
Entire carriage 230 mm:	1.72 kg
Max. total length: (longer on request)	8000 mm

Technical Data

ZSS

Max. speed:	5.00 m/s
Max. acceleration:	30 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	1.10 Nm
Moment of inertia:	2.00 · 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 25 AT5-E
Stroke per revolution:	160 mm

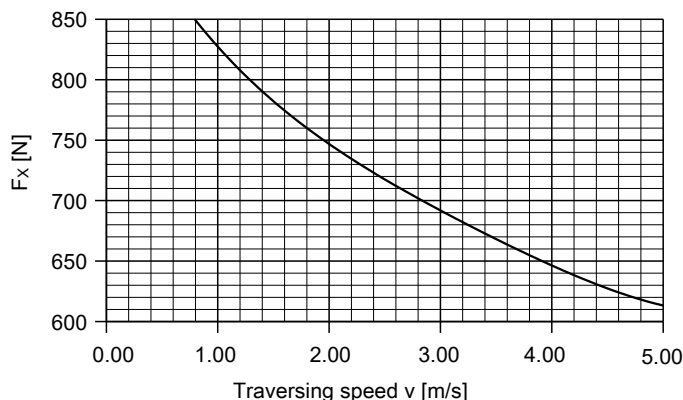
Forces and moments



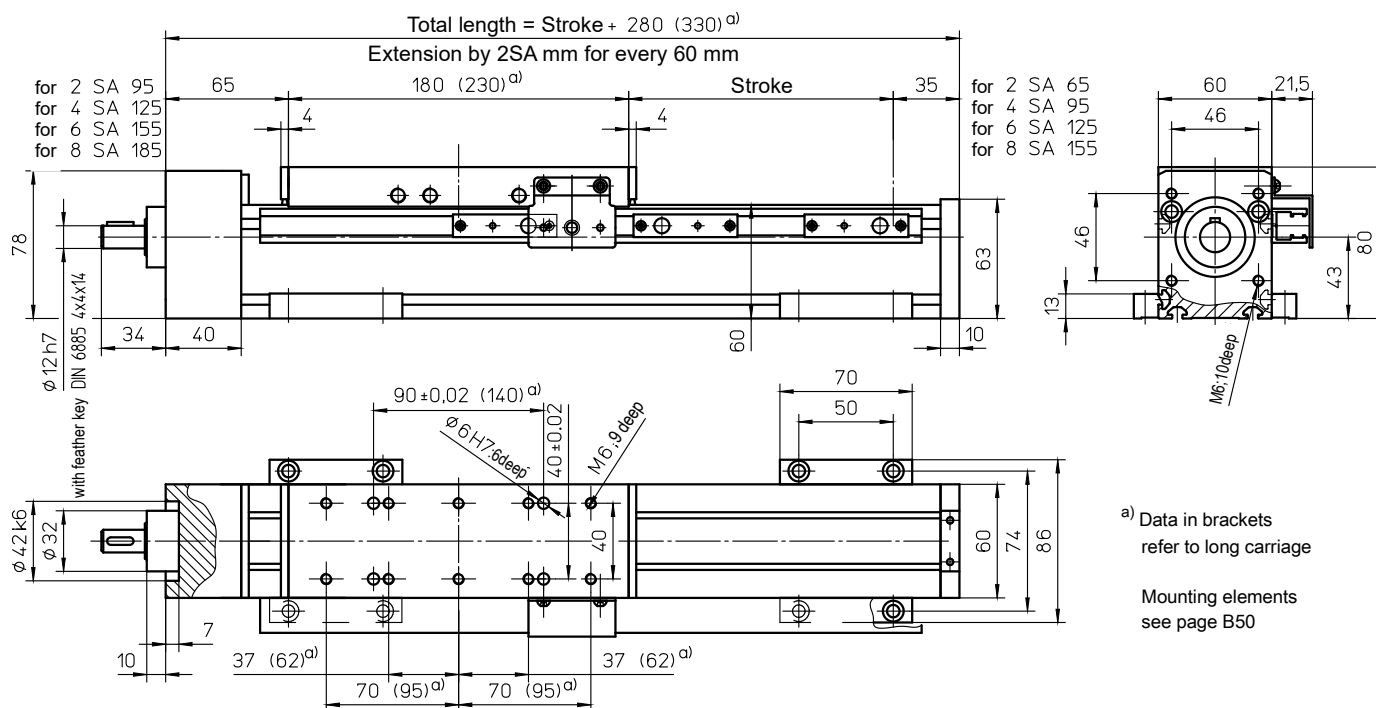
	ZSS
Forces	Dynamic [N]
F_x ^{d)}	850
F_y	500
F_z	1400
-F_z	800
Moments	Dynamic [Nm]
M_x	50
M_y	160 (200)
M_z	100 (140)

^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage (230)

F_x - v - Diagram



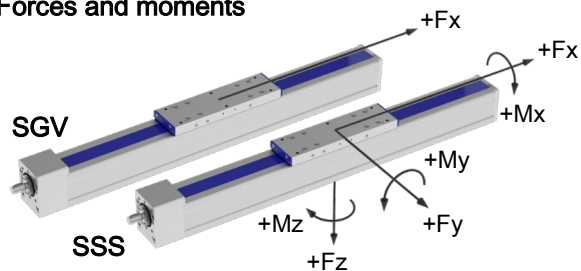
with ball screw (KGT) and sliding guide (SGV) or rail guide (SSS)



Weights	SGV	SSS
Basic length without stroke:	3.65 kg	4.30 kg
100 mm stroke:	0.65 kg	0.80 kg
Entire carriage 180 mm:	1.15 kg	1.50 kg
Entire carriage 230 mm:	-	1.80 kg

Max. total length: 5500 mm
(longer on request)

Forces and moments



	SGV	SSS
Forces	Dynamic [N]	
F _x	4000	
F _y	-	600
F _z	-	1800
-F _z	-	1200
Moments	Dynamic [Nm]	
M _x	-	60
M _y	-	180 (220)
M _z	-	120 (150)

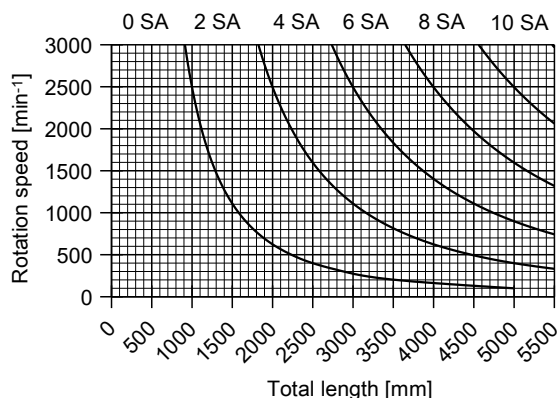
"-" => Must have an external guide.

Data in brackets refer to long carriage (230)

Technical Data	SGV	SSS
Max. speed:	2.50 m/s	
Max. acceleration:	20 m/s ²	
Repeat accuracy:	± 0.03 mm (KGT)	
Idle torque:	0.70 Nm	

Drive element	KGT
Max. rotation speed:	3000 min ⁻¹
Diameter:	20 mm
Pitch:	5 / 10 / 20 / 50 mm
Moment of inertia:	8.50 · 10 ⁻⁵ kgm ² /m

Spindle support (SA)

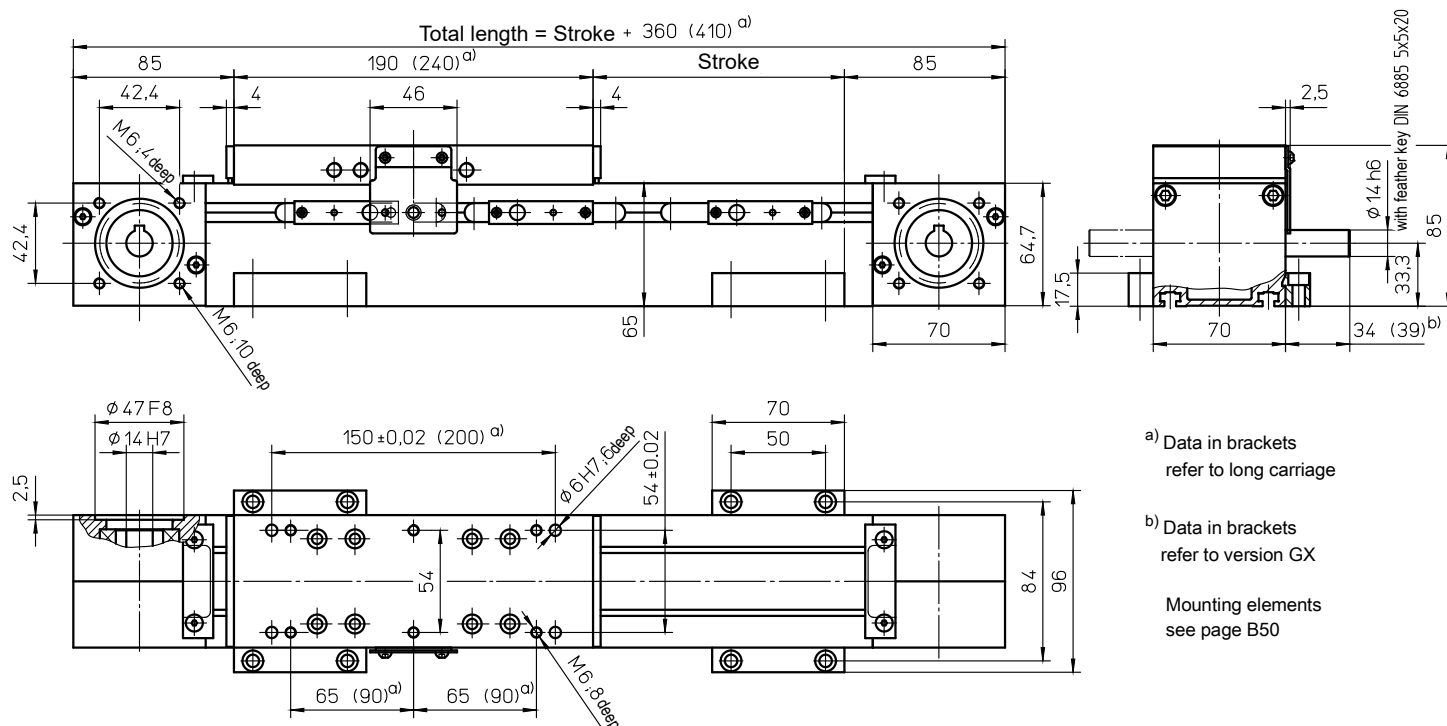


Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

Design with double nut („MM“) is only available with carriage plate 230 mm and pitch „5“, „10“ oder „20“.

Design with single nut („M“) and pitch „50“ is only available with carriage plate 230 mm.

with toothed belt drive and roller guide (ZRS) or rail guide (ZSS)



a) Data in brackets refer to long carriage

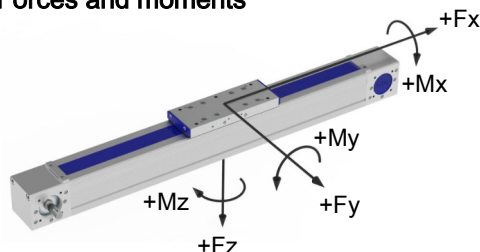
b) Data in brackets refer to version GX

Mounting elements see page B50

Weights	ZRS	ZSS
Basic length without stroke:	3.10 kg	3.40 kg
100 mm stroke:	0.59 kg	0.38 kg
Entire carriage 190 mm:	1.30 kg	1.65 kg
Entire carriage 240 mm:	1.65 kg	2.10 kg
Max. total length: (longer on request)	8000 mm	7200 mm

Technical Data	ZRS	ZSS
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	30 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	1.20 Nm	
Moment of inertia:	4.00 · 10 ⁻⁴ kgm ²	2.00 · 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 32 AT5-E	
Stroke per revolution:	175 mm	

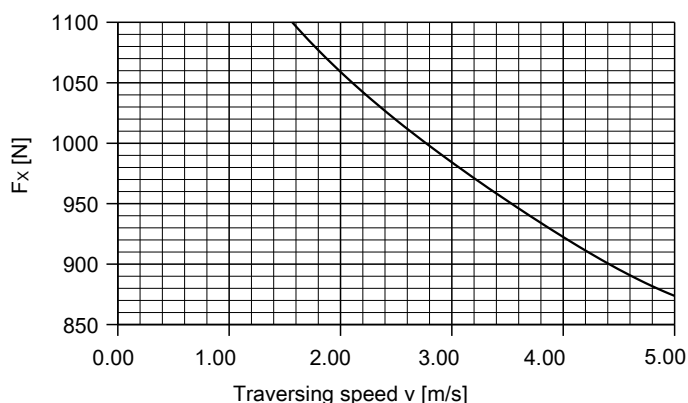
Forces and moments



	ZRS	ZSS
Forces	Dynamic [N]	
F_x ^{d)}	1100	
F_y	300	600
F_z	1000	1800
-F_z	400	1200
Moments	Dynamic [Nm]	
M_x	35	60
M_y	120 (150)	180 (230)
M_z	50 (60)	120 (150)

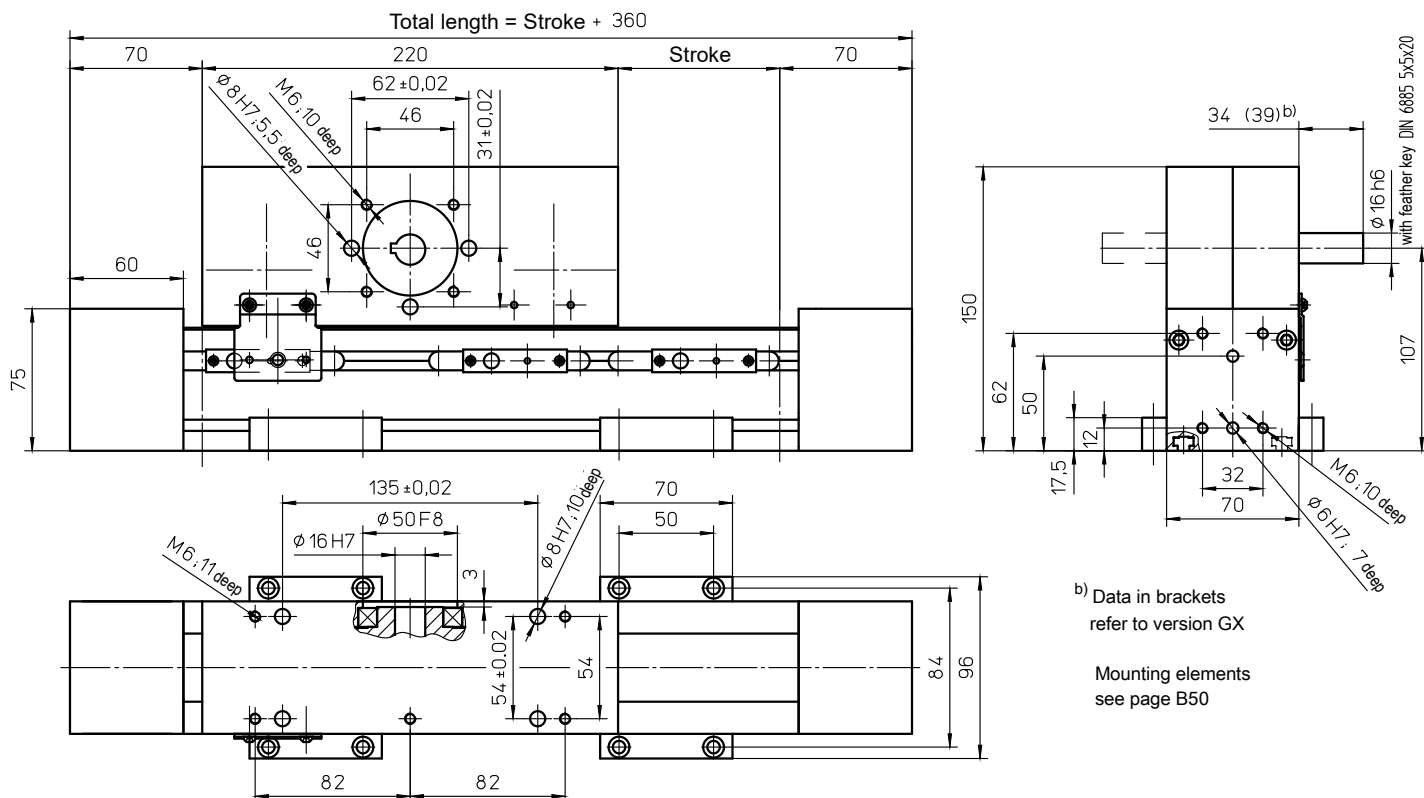
^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (240)

F_x - v - Diagram



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

with toothed belt drive and roller guide (ARS) or rail guide (ASS)

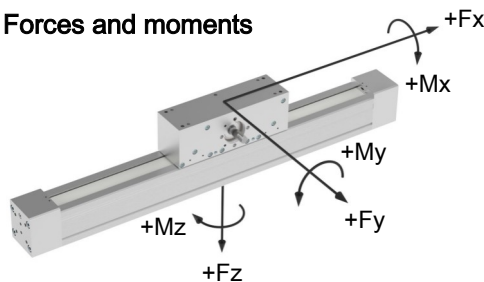


Weights	ARS	ASS
Basic length without stroke:	7.50 kg	7.90 kg
100 mm stroke:	0.38 kg	0.60 kg
Carriage drive 220 mm:	5.00 kg	5.50 kg

Max. total length: 8000 mm
(longer on request)

Technical Data	ARS	ASS
Max. speed:	5.00 m/s	
Max. acceleration:	30 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	1.00 Nm	
Moment of inertia:	6.10 · 10 ⁻³ kgm ²	
Drive element:	Toothed belt 32 AT5-E	
Stroke per revolution:	220 mm	

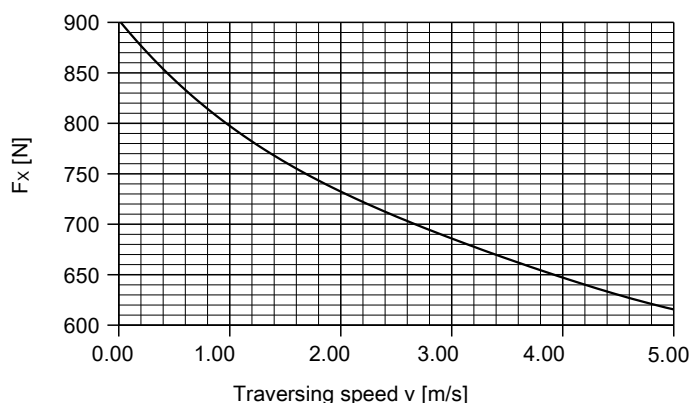
Forces and moments



	ARS	ASS
Forces	Dynamic [N]	
F_x^{d)}	900	
F_y	300	600
F_z	1000	1800
-F_z	400	1200
Moments	Dynamic [Nm]	
M_x	35	60
M_y	120	180
M_z	50	120

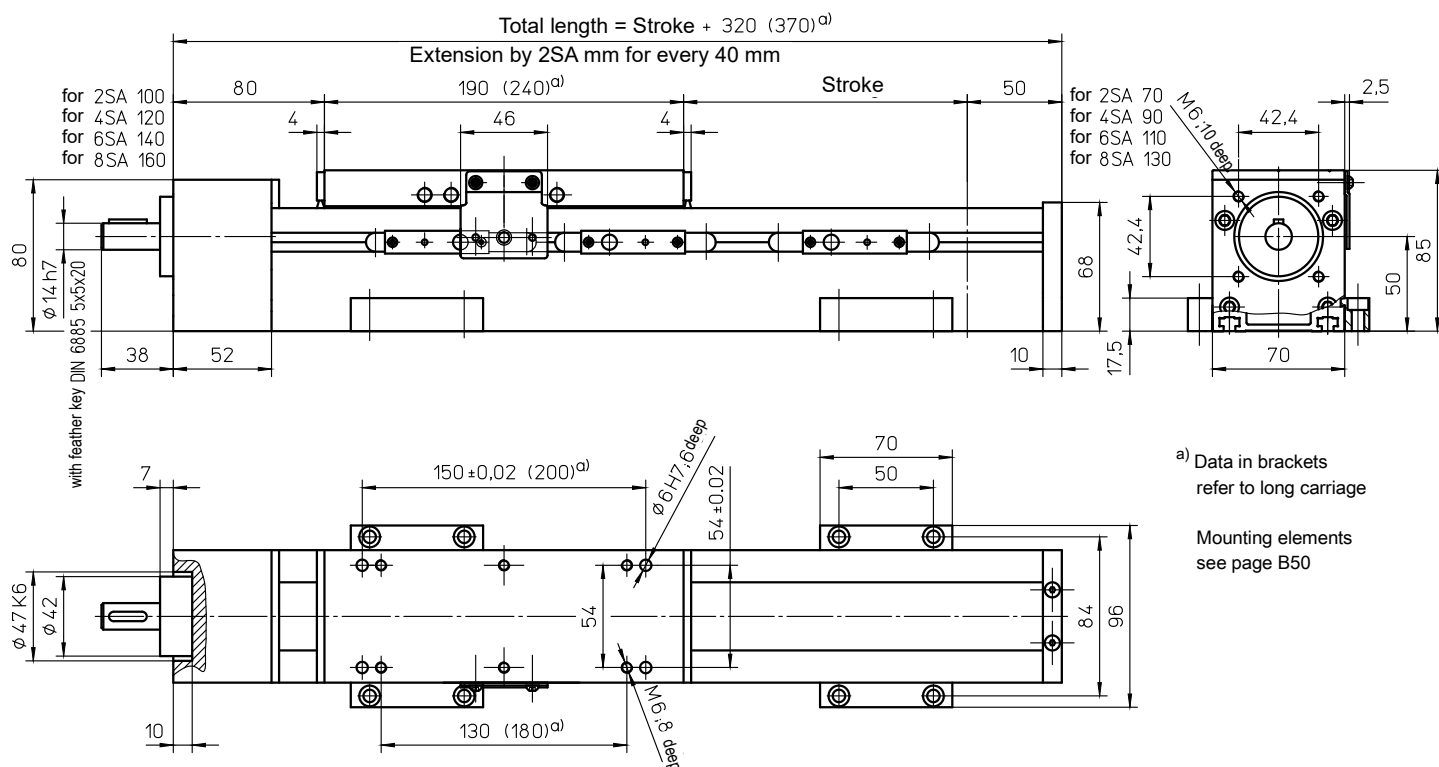
^{d)} Maximum value (see diagram "F_x-v-Diagram")

F_x - v - Diagram



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

with ball screw (KGT) and roller guide (SRS) or rail guide (SSS)



a) Data in brackets refer to long carriage

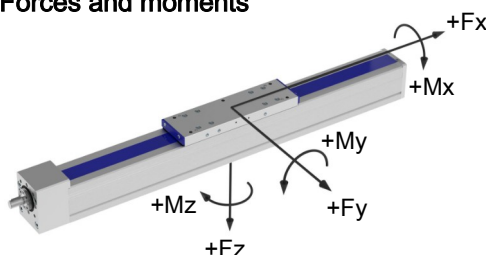
Mounting elements see page B50

Weights	SRS	SSS
Basic length without stroke:	3.65 kg	3.50 kg
100 mm stroke:	0.45 kg	0.60 kg
Entire carriage 190 mm:	1.60 kg	1.25 kg
Entire carriage 240 mm:	2.02 kg	1.60 kg

Max. total length: 4000 mm
(longer on request)

Technical Data	SRS	SSS
Max. speed:	2.00 m/s	
Max. acceleration:	20 m/s ²	
Repeat accuracy:	± 0.03 mm (KGT)	
Idle torque:	0.35 Nm	0.40 Nm

Forces and moments



	SRS	SSS
Forces	Dynamic [N]	
F _x	2000	
F _y	300	600
F _z	1000	1800
-F _z	400	1200
Moments	Dynamic [Nm]	
M _x	35	60
M _y	120 (150)	180 (220)
M _z	60 (70)	120 (150)

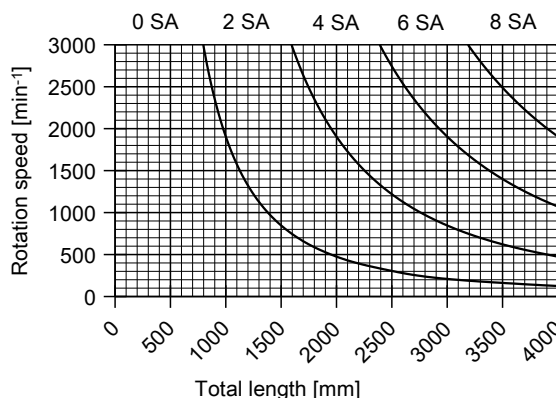
Data in brackets refer to long carriage plate (240)

Drive element

KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	16 mm
Pitch:	5 / 10 / 20 / 40 mm
Moment of inertia:	3.25 · 10 ⁻⁵ kgm ² /m

Spindle support (SA)

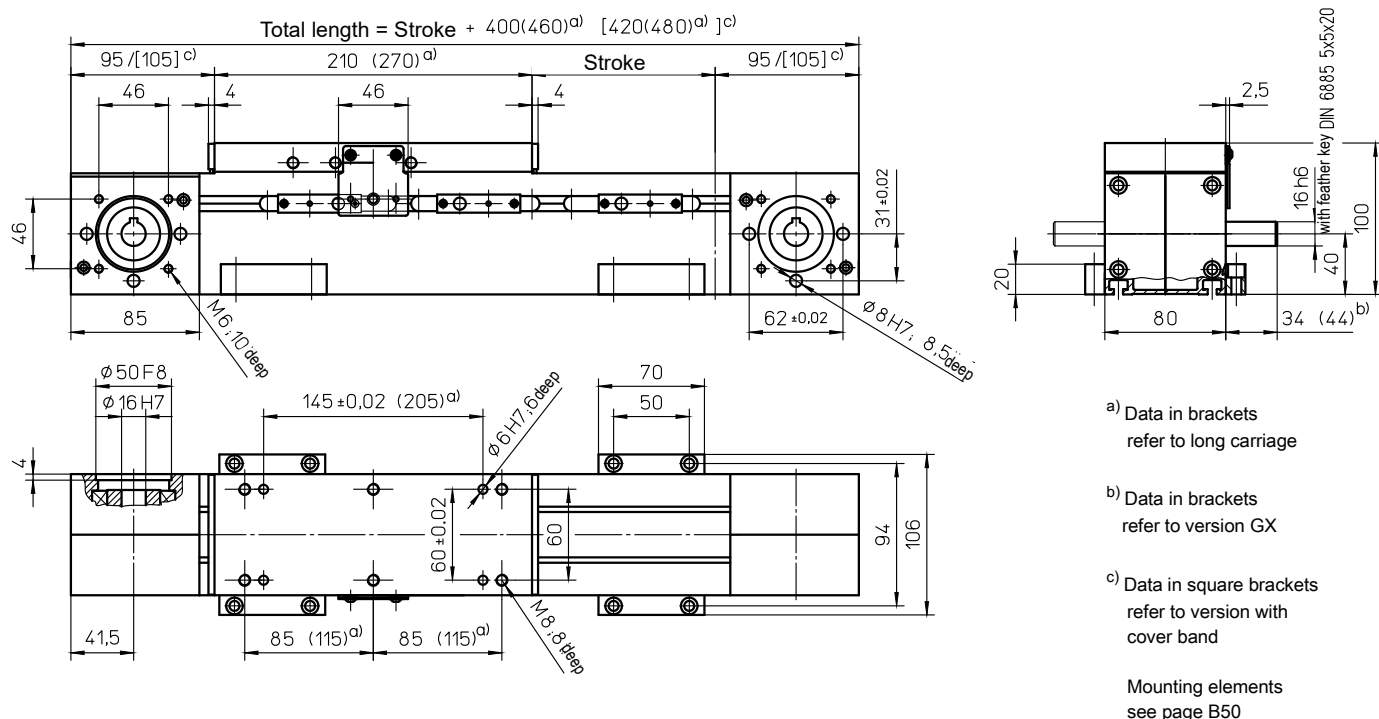


For version "SRS" only 6 SA possible.

For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

with toothed belt drive and roller guide (ZRS) or rail guide (ZSS)

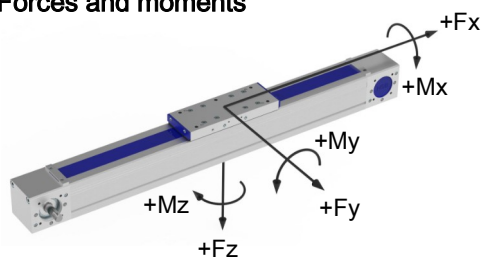


Weights	ZRS	ZSS
Basic length without stroke:	5.50 kg	6.10 kg
100 mm stroke:	0.60 kg	0.85 kg
Entire carriage 210 mm:	2.10 kg	1.80 kg
Entire carriage 270 mm:	2.70 kg	2.30 kg

Max. total length: 8000 mm
(longer on request)

Technical Data	ZRS	ZSS
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	40 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	1.50 Nm	
Moment of inertia:	3.30 • 10 ⁻³ kgm ²	3.00 • 10 ⁻³ kgm ²
Drive element:	Toothed belt 32 AT5-E	
Stroke per revolution:	220 mm	

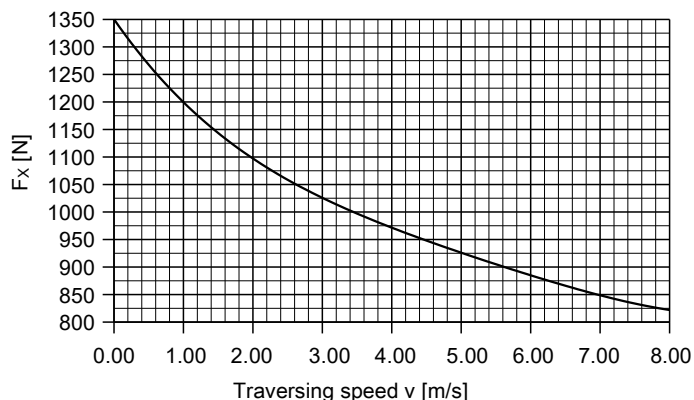
Forces and moments



	ZRS	ZSS
Forces	Dynamic [N]	
F_x ^{d)}	1350	
F_y	500	800
F_z	1500	3000
-F_z	800	2000
Moments	Dynamic [Nm]	
M_x	50	100
M_y	180 (220)	250 (300)
M_z	100 (130)	250 (300)

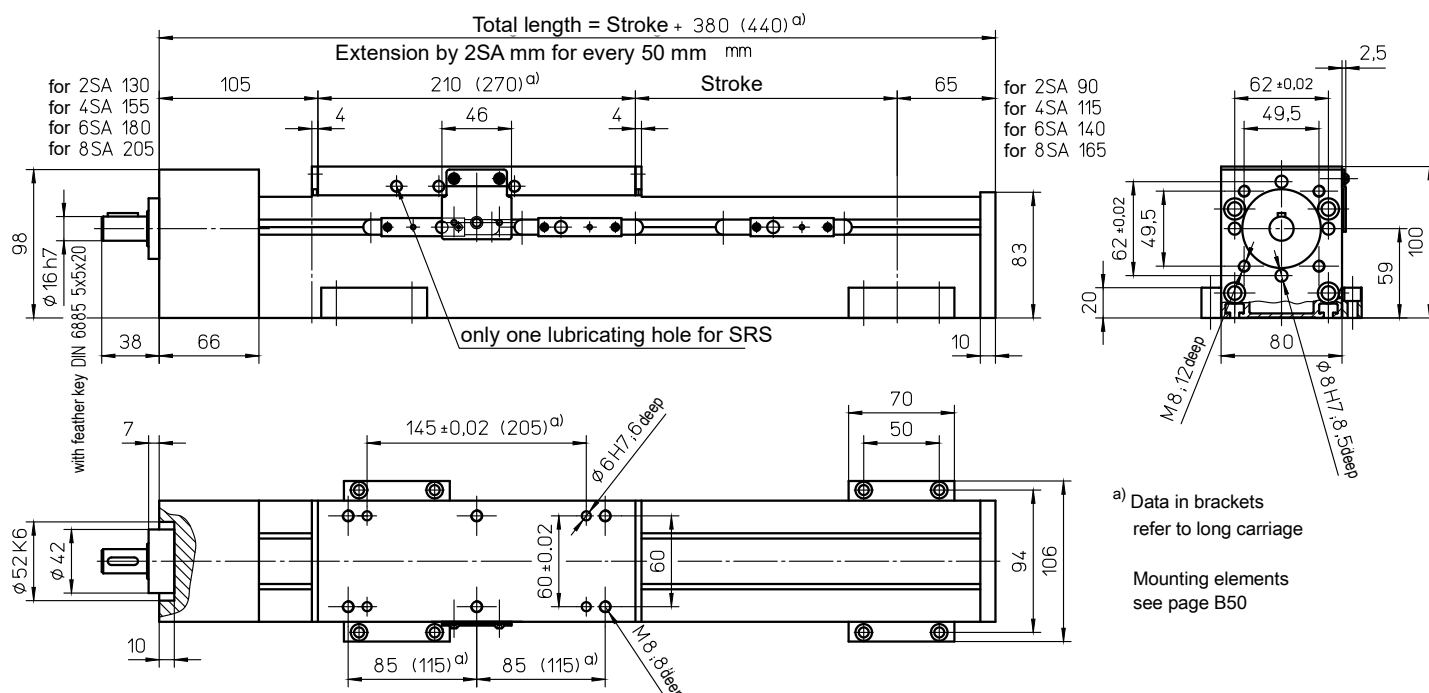
^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (270)

F_x - v - Diagram



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL11) applies for static loads.

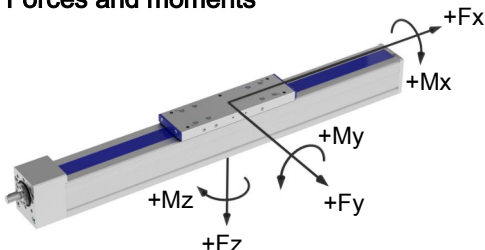
with ball screw (KGT) and roller guide (SRS) or rail guide (SSS)



Weights	SRS	SSS
Basic length without stroke:	5.40 kg	6.20 kg
100 mm stroke:	0.70 kg	1.10 kg
Entire carriage 210 mm:	2.20 kg	1.90 kg
Entire carriage 270 mm:	2.80 kg	2.40 kg

Max. total length:
(longer on request) 5600 mm

Forces and moments



	SRS	SSS
Forces	Dynamic [N]	
F_x	4000	
F_y	500	800
F_z	1500	3000
$-F_z$	800	2000
Moments	Dynamic [Nm]	
M_x	50	100
M_y	180 (270)	250 (300)
M_z	100 (130)	250 (300)

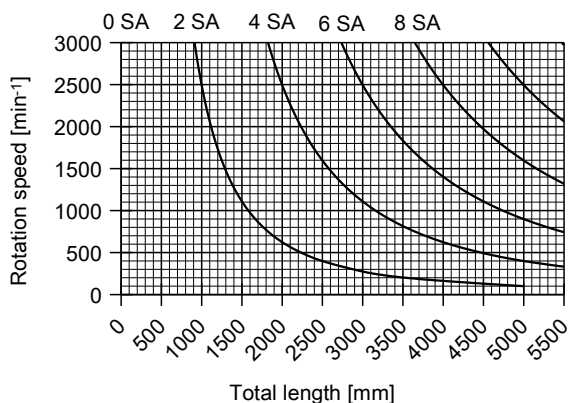
Data in brackets refer to long carriage plate (270)

Technical Data	SRS	SSS
Max. speed:	2.50 m/s	
Max. acceleration:	20 m/s ²	
Repeat accuracy:	± 0.03 mm (KGT)	
Idle torque:	0.60 Nm	0.80 Nm

Drive element KGT

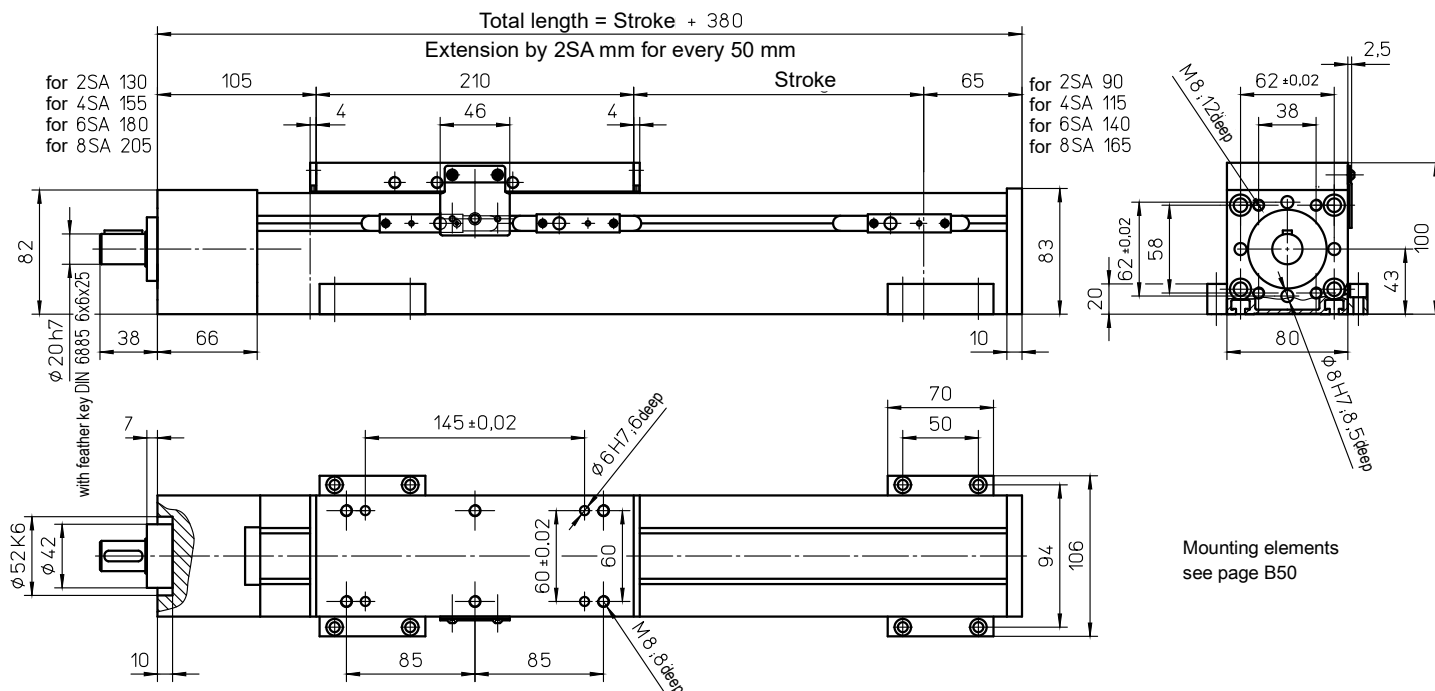
Max. rotation speed:	3000 min ⁻¹
Diameter:	20 mm
Pitch:	5 / 10 / 20 / 50 mm
Moment of inertia:	8.50 · 10 ⁻⁵ kgm ² /m

Spindle support (SA)



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.
Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)
Design with double nut („MM“) is only available with long carriage plate 270 mm and pitch „5“, „10“ oder „20“.

with ball screw (KGT) and sliding guide (SGV)



Mounting elements
see page B50

Weights

SGV

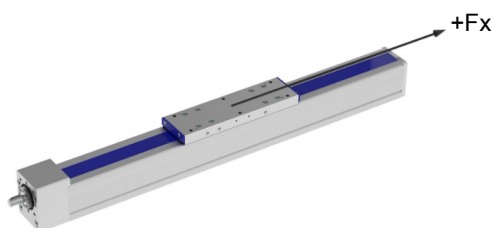
Basic length without stroke:	6.40 kg
100 mm stroke:	0.95 kg
Entire carriage 210 mm:	1.60 kg
Max. total length:	5600 mm
(longer on request)	

Technical Data

SGV

Max. speed:	2.50 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	1.00 Nm

Forces and moments



	SGV
Forces	Dynamic [N]
F _x	6000
F _y	-
F _z	-
-F _z	-
Moments	Dynamic [Nm]
M _x	-
M _y	-
M _z	-

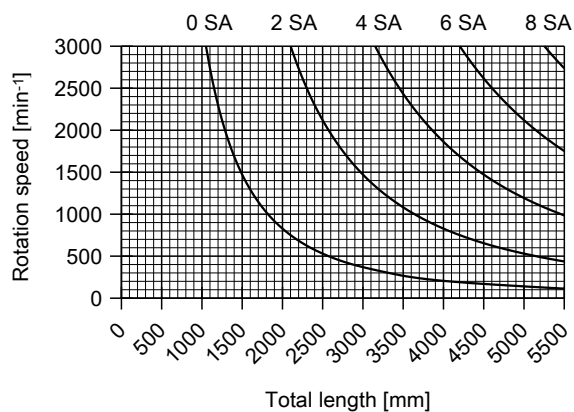
"-" => Must have an external guide.

Drive element

KGT

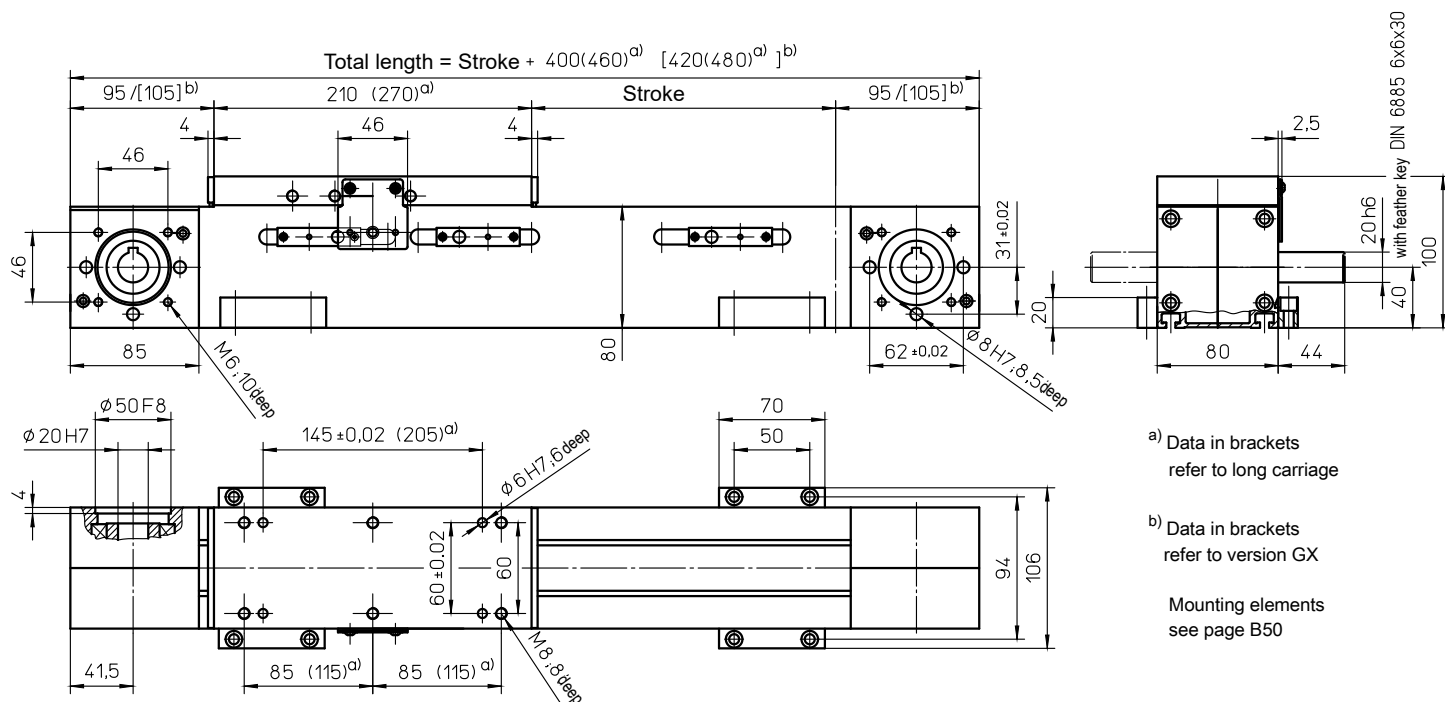
Max. rotation speed:	3000 min ⁻¹
Diameter:	25 mm
Pitch:	5 / 10 / 25 / 50 mm
Moment of inertia:	2.25 · 10 ⁻⁴ kgm ² /m

Spindle support (SA)



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

with toothed belt drive and roller guide (ZRS) or rail guide (ZSS)

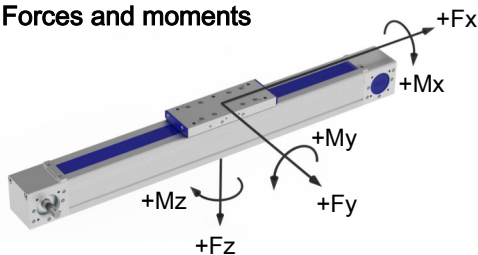


Weights	ZRS	ZSS
Basic length without stroke:	5.03 kg	7.80 kg
100 mm stroke:	0.65 kg	0.98 kg
Entire carriage 210 mm:	3.00 kg	2.75 kg
Entire carriage 270 mm:	3.70 kg	3.25 kg

Max. total length: 8000 mm
(longer on request)

Technical Data	ZRS	ZSS
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	40 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	1.80 Nm	
Moment of inertia:	4.20 • 10 ⁻³ kgm ² 4.00 • 10 ⁻³ kgm ²	
Drive element:	Toothed belt 32 AT10	
Stroke per revolution:	210 mm	

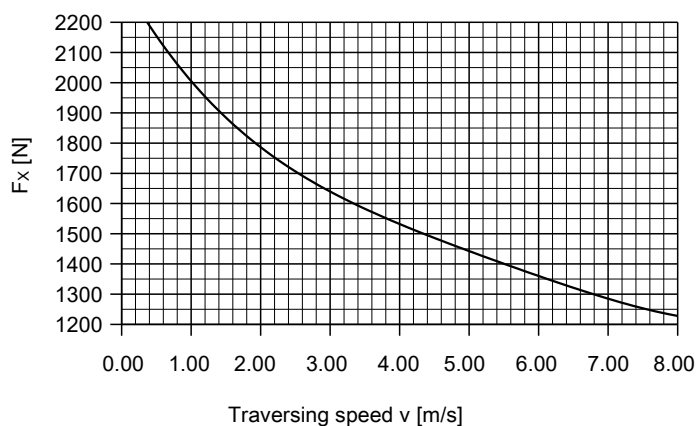
Forces and moments



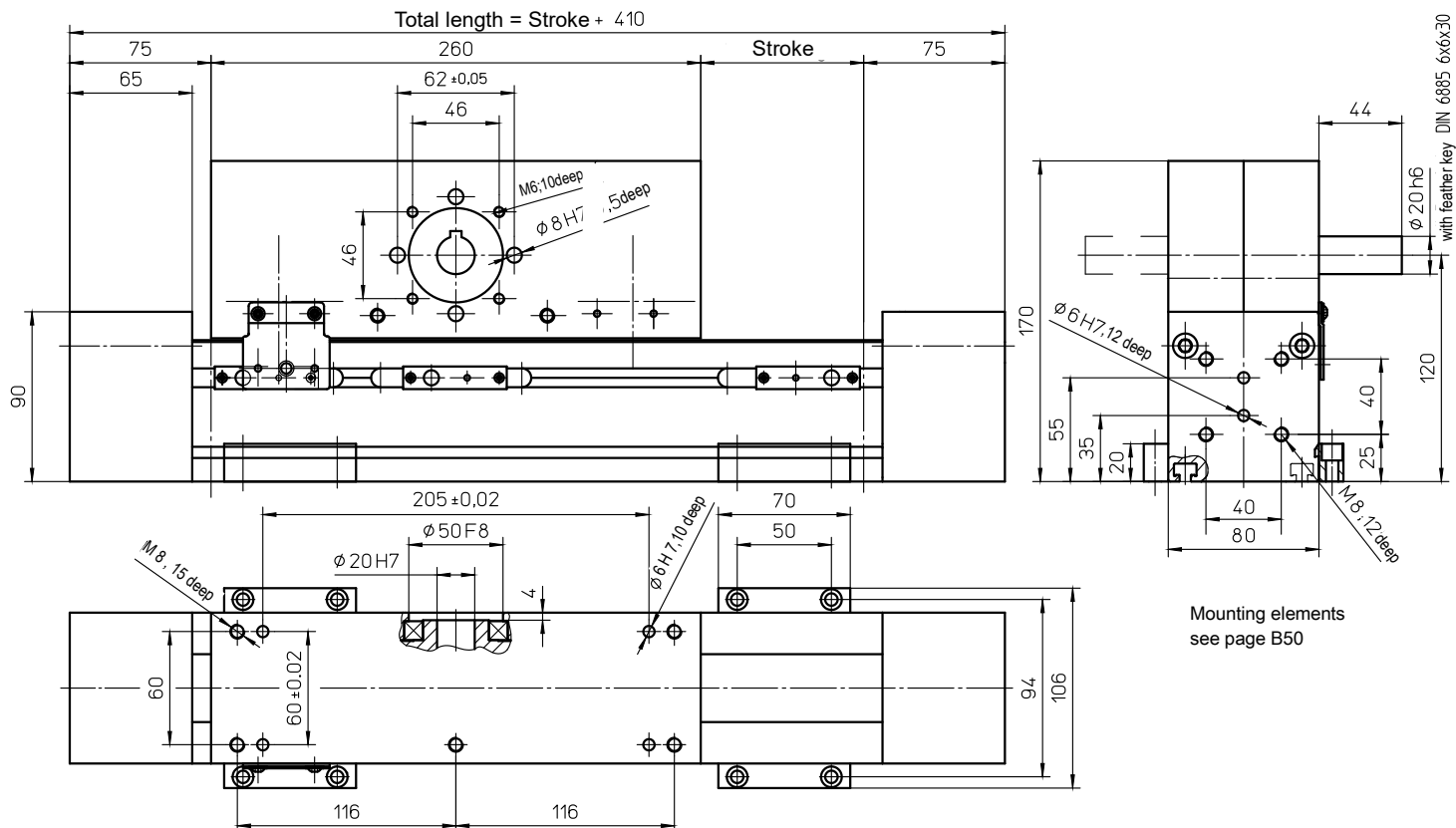
	ZRS	ZSS
Forces	Dynamic [N]	
F_x ^{d)}	2200	
F_y	1000	1600
F_z	2500	4000
-F_z	1500	3000
Moments	Dynamic [Nm]	
M_x	100	300
M_y	300 (400)	500 (640)
M_z	180 (250)	500 (640)

^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (270)

F_x - v - Diagram



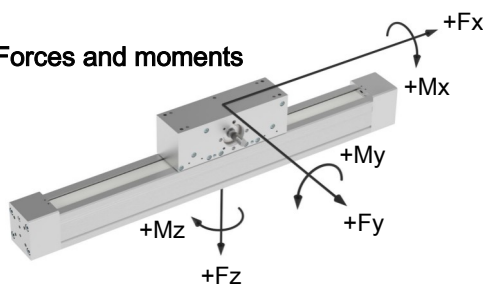
with toothed belt drive and roller guide (ARS) or rail guide (ASS)



Weights	ARS	ASS
Basic length without stroke:	10.80 kg	12.10 kg
100 mm stroke:	0.63 kg	0.96 kg
Entire carriage 260 mm:	6.30 kg	6.30 kg

Max. total length: 8000 mm
(longer on request)

Forces and moments



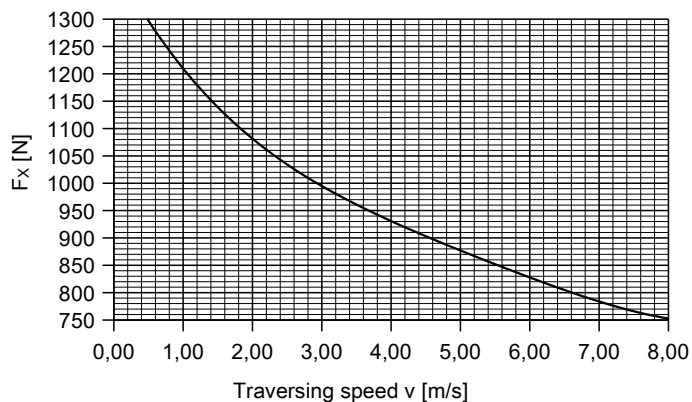
	ARS	ASS
Forces	Dynamic [N]	
F_x^d	1300	
F_y	1000	1600
F_z	2500	4000
-F_z	1500	3000
Moments	Dynamic [Nm]	
M_x	100	300
M_y	300	500
M_z	180	500

d) Maximum value (see diagram "F_x-v-Diagram")

Technical Data	ARS	ASS
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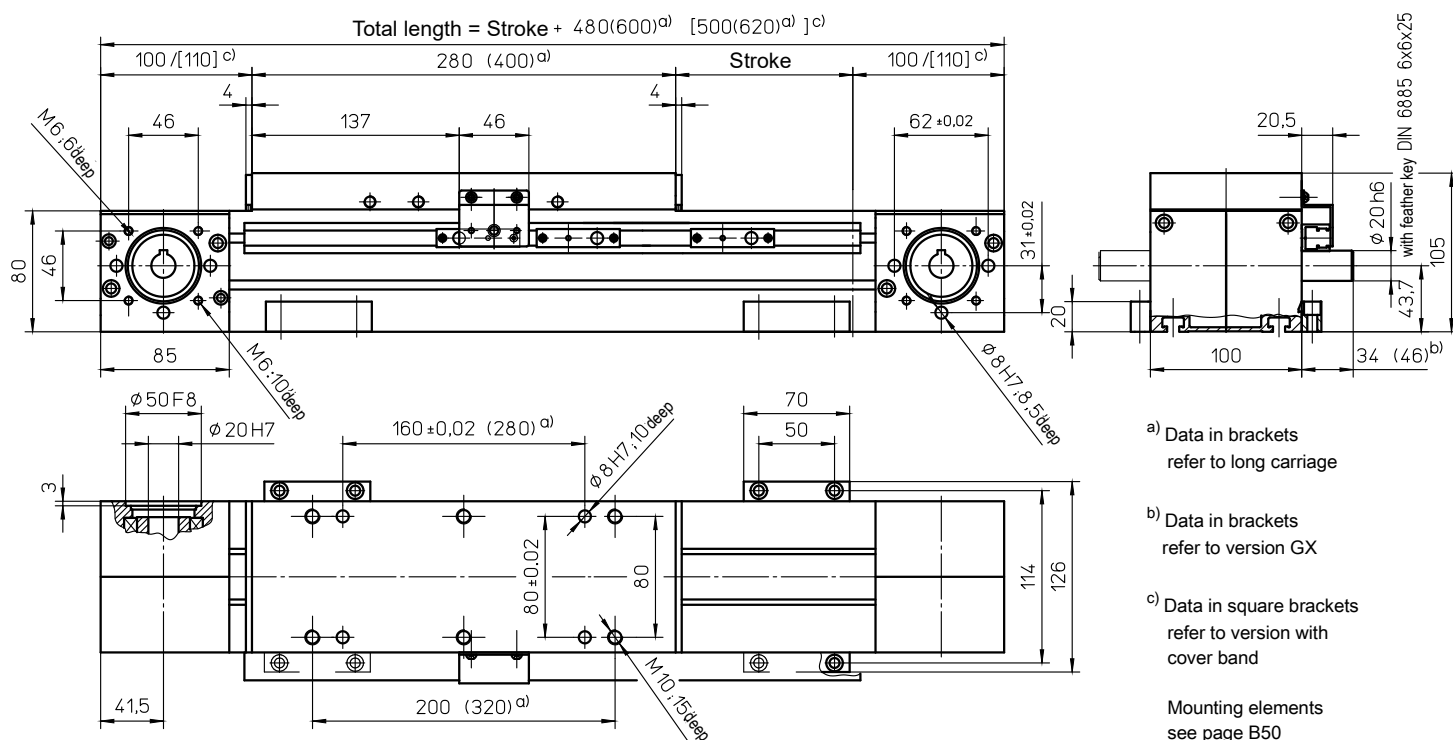
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	40 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	1.80 Nm	
Moment of inertia:	9.20 • 10 ⁻³ kgm ²	8.60 • 10 ⁻³ kgm ²
Drive element:	Toothed belt 32 AT10	
Stroke per revolution:	220 mm	

$F_x - v$ - Diagram



For mechanical linear drives with roller guide, the static load rating “C_{stat}” (page TL 11) applies for static loads.

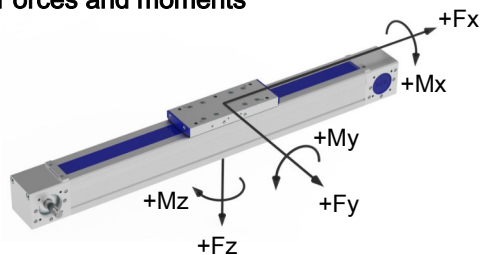
with toothed belt drive and roller guide (ZRS) or rail guide (ZSS)



Weights	ZRS	ZSS
Basic length without stroke:	9.50 kg	9.10 kg
100 mm stroke:	1.10 kg	1.45 kg
Entire carriage 280 mm:	4.10 kg	3.80 kg
Entire carriage 400 mm:	5.85 kg	5.43 kg
Max. total length: (longer on request)	7900 mm	

Technical Data	ZRS	ZSS
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	40 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	2.50 Nm	
Moment of inertia:	1.30 · 10 ⁻² kgm ² 1.26 · 10 ⁻² kgm ²	
Drive element:	Toothed belt 40 AT10	
Stroke per revolution:	200 mm	

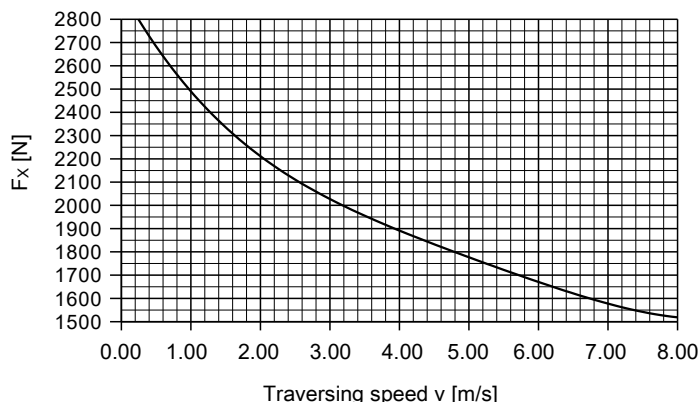
Forces and moments



	ZRS	ZSS
Forces	Dynamic [N]	
F_x ^{d)}	2800	
F_y	1000	
F_z	2500	3000
-F_z	1200	2000
Moments	Dynamic [Nm]	
M_x	200	200
M_y	250 (350)	300 (420)
M_z	200 (280)	300 (420)

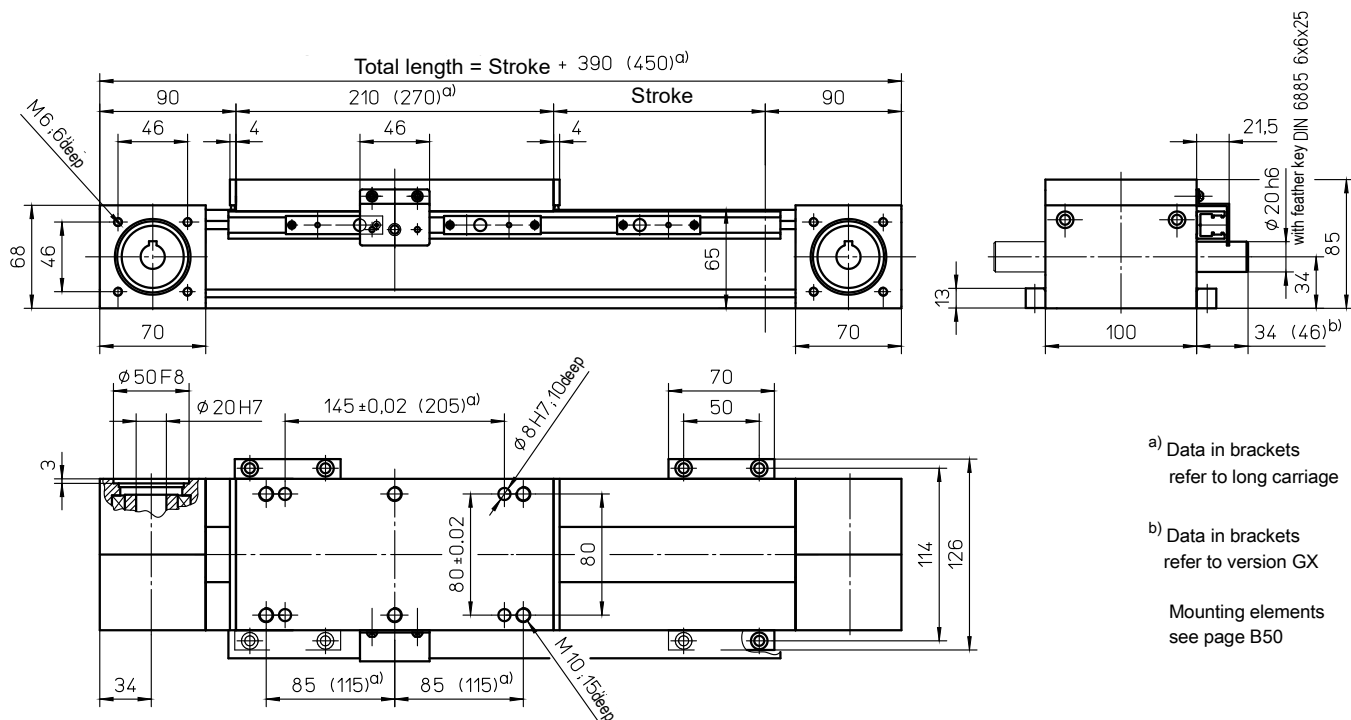
^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (400)

F_x - v - Diagram



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

with toothed belt drive and double linear guide (ZSS)



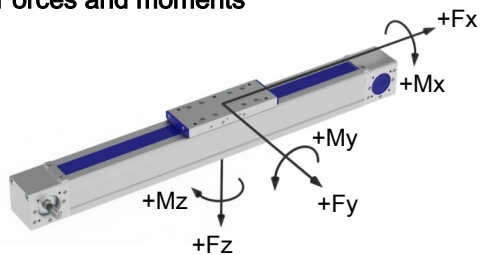
Weights ZSS

Basic length without stroke:	6.80 kg
100 mm stroke:	0.75 kg
Entire carriage 210 mm:	3.50 kg
Entire carriage 270 mm:	4.10 kg
Max. total length: (longer on request)	8100 mm

Technical Data ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	5.00 Nm
Moment of inertia:	2.80 · 10 ⁻³ kgm ²
Drive element:	Toothed belt 40 AT10-E
Stroke per revolution:	160 mm

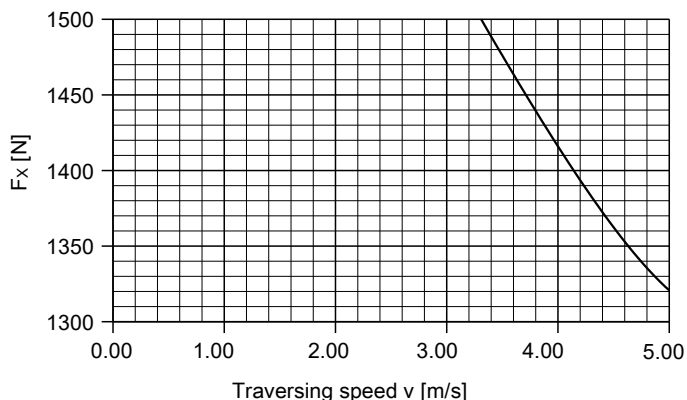
Forces and moments

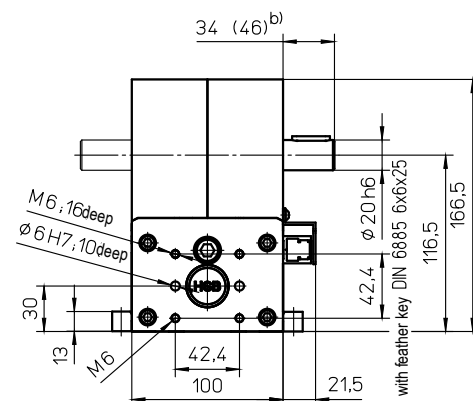


ZSS	
Forces	Dynamic [N]
$F_x^{d)}$	1500
F_y	1800
F_z	4000
$-F_z$	3000
Moments	Dynamic [Nm]
M_x	350
M_y	750 (1000)
M_z	750 (1000)

^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (270)

F_x - v - Diagram



[illegible]

Mounting elements
see page B50

ASS

Basic length without stroke:	14.00 kg
100 mm stroke:	0.90 kg
Carriage drive 260 mm:	8.60 kg
Max. total length:	8100 mm
(longer on request)	

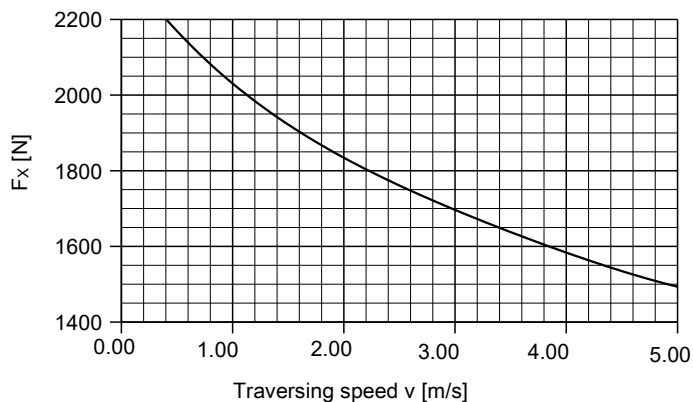
ASS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	2.50 Nm
Moment of inertia:	1.20 • 10 ⁻² kgm ²
Drive element:	Toothed belt 40 AT10-E
Stroke per revolution:	240 mm

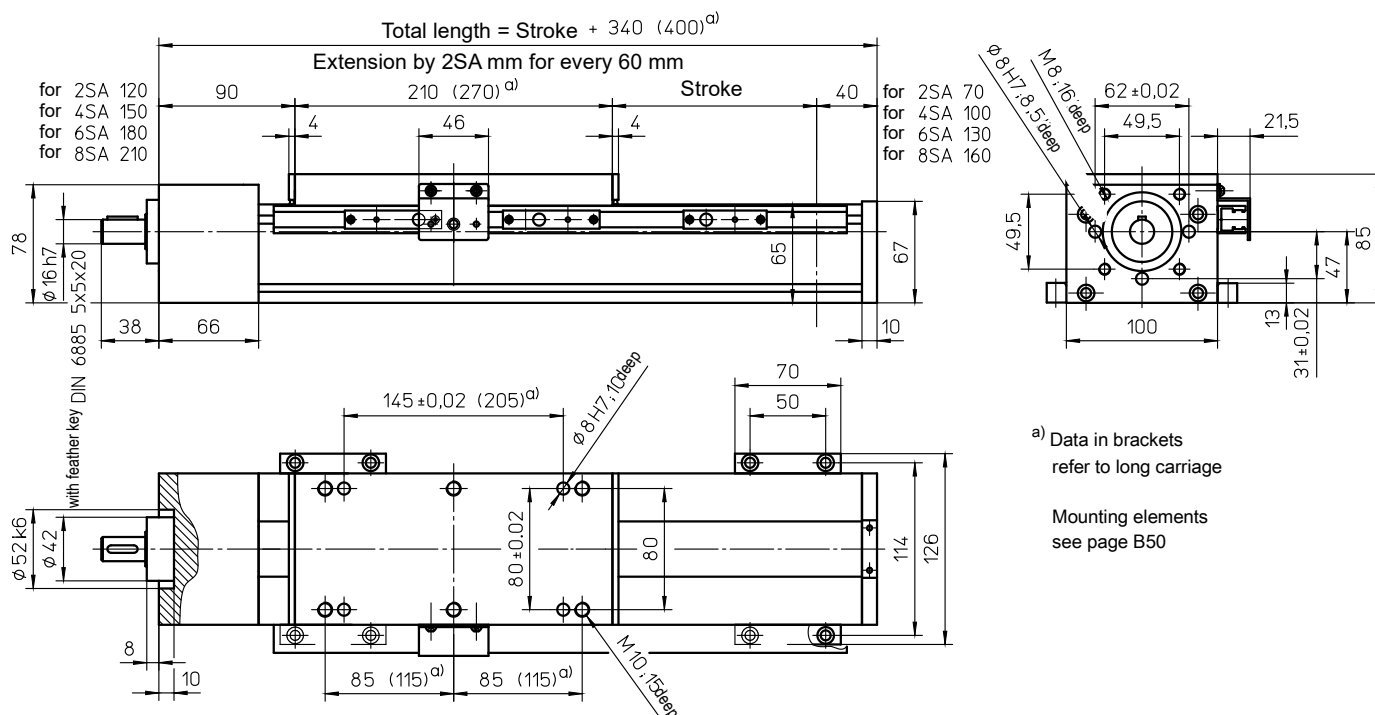
Diagram illustrating forces and moments acting on a beam element. The forces shown are $+F_x$, $+F_y$, and $+F_z$. The moments shown are $+M_x$, $+M_y$, and $+M_z$.

	ASS
Forces	Dynamic [N]
$F_x^{(d)}$	2200
F_y	1800
F_z	4000
$-F_z$	3000
Moments	Dynamic [Nm]
M_x	350
M_y	950
M_z	950

$F_x - v$ - Diagram



with ball screw (KGT) and double linear guide (SSS)



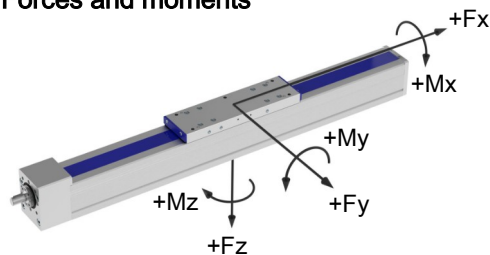
Weights

SSS

Basic length without stroke:	6.20 kg
100 mm stroke:	0.75 kg
Entire carriage 210 mm:	3.40 kg
Entire carriage 270 mm:	4.00 kg

Max. total length: 5600 mm
(longer on request)

Forces and moments



	SSS
Forces	Dynamic [N]
F_x	4000
F_y	1800
F_z	4000
-F_z	3000
Moments	Dynamic [Nm]
M_x	350
M_y	750 (1000)
M_z	750 (1000)

Data in brackets refer to long carriage plate (270)

Technical Data

SSS

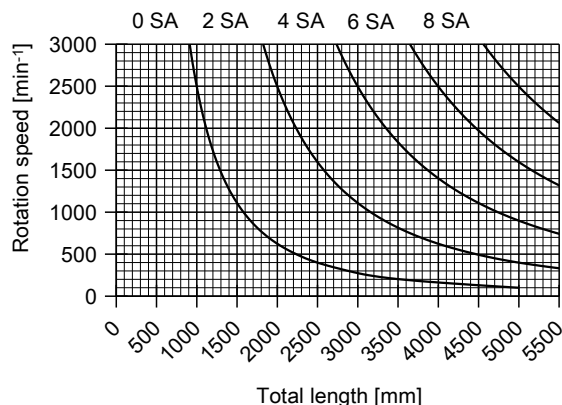
Max. speed:	2.50 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	1.30 Nm

Drive element

KGT

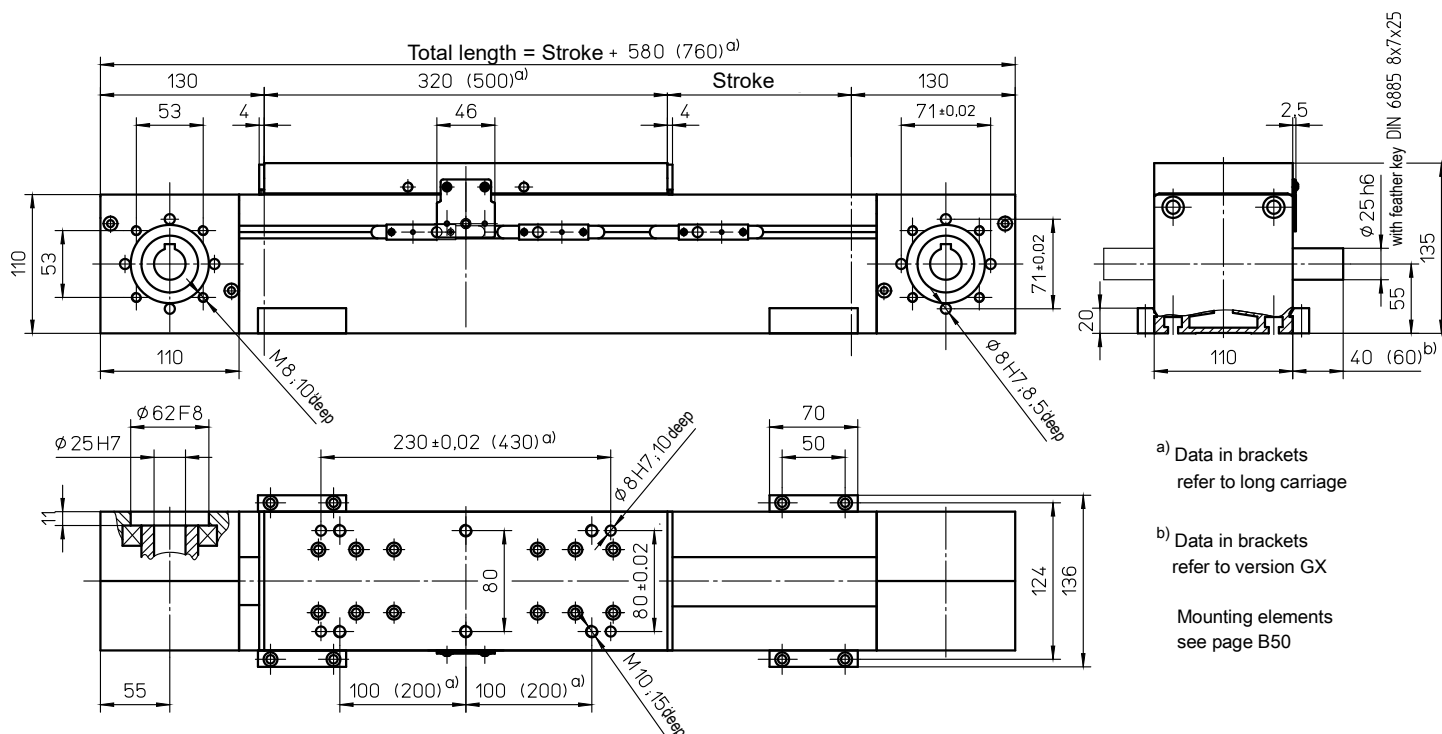
Max. rotation speed:	3000 min ⁻¹
Diameter:	20 mm
Pitch:	5 / 10 / 20 / 50 mm
Moment of inertia:	8.50 · 10 ⁻⁵ kgm ² /m

Spindle support (SA)



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

with toothed belt drive and roller guide (ZRS) or rail guide (ZSS)

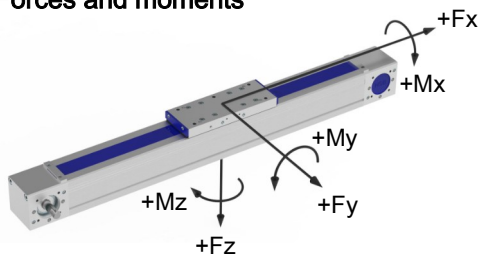


Weights	ZRS	ZSS
Basic length without stroke:	15.70 kg	18.00 kg
100 mm stroke:	1.50 kg	2.10 kg
Entire carriage 320 mm:	4.80 kg	5.20 kg
Entire carriage 500 mm:	7.50 kg	8.20 kg

Max. total length: 8100 mm
(longer on request)

Technical Data	ZRS	ZSS
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	60 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	3.50 Nm	
Moment of inertia:	1.80 · 10 ⁻² kgm ²	1.60 · 10 ⁻² kgm ²
Drive element:	Toothed belt 50 ATL10	
Stroke per revolution:	300 mm	

Forces and moments

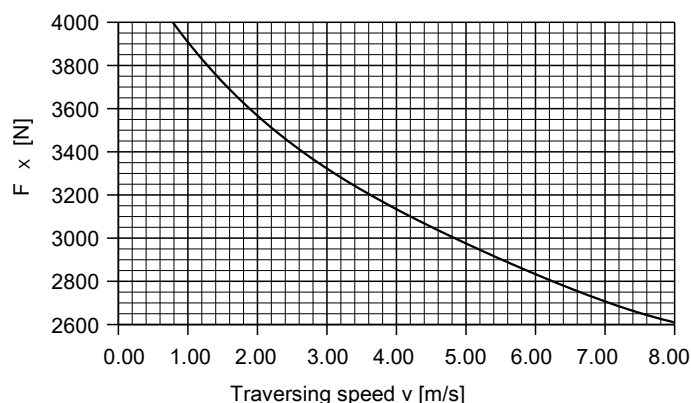


	ZRS	ZSS
Forces	Dynamic [N]	
F_x^{d)}	4000	
F_y	2000	3000
F_z	5000	8000
-F_z	2500	4000
Moments	Dynamic [Nm]	
M_x	300	400
M_y	600 (800)	800 (1200)
M_z	450 (550)	600 (800)

^{d)} Maximum value (see diagram "F_x - v-Diagram")

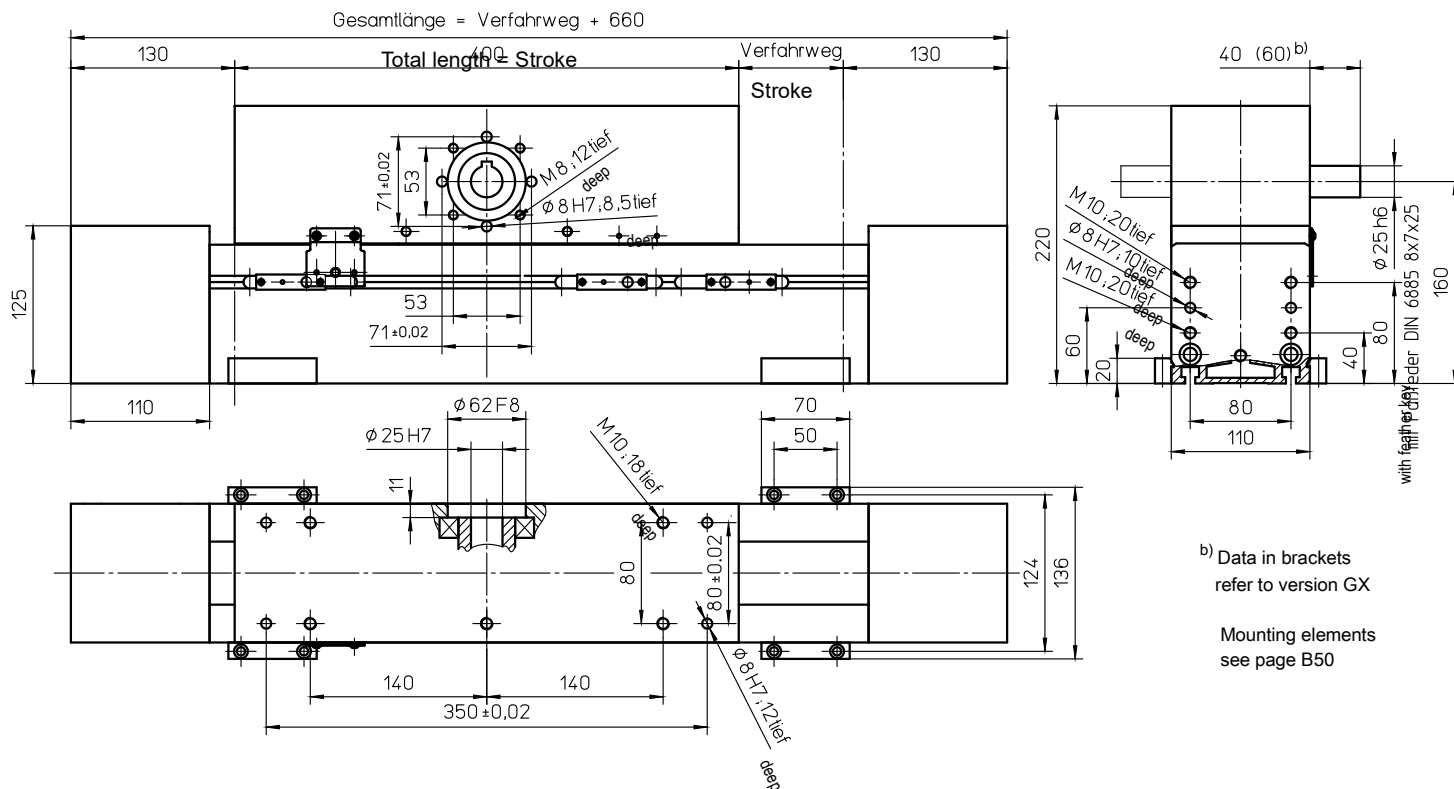
Data in brackets refer to long carriage plate (500)

F_x - v - Diagram



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

with toothed belt drive and roller guide (ARS) or rail guide (ASS)



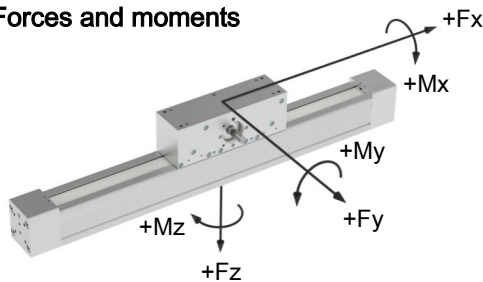
b) Data in brackets refer to version GX

Mounting elements see page B50

Weights	ARS	ASS
Basic length without stroke:	27.00 kg	29.00 kg
100 mm stroke:	1.20 kg	1.40 kg
Carriage drive 400 mm:	15.00 kg	16.00 kg
Max. total length: (longer on request)	8100 mm	

Technical Data	ARS	ASS
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	60 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	3.50 Nm	
Moment of inertia:	3.50 · 10 ⁻² kgm ²	3.70 · 10 ⁻² kgm ²
Drive element:	Toothed belt 50 AT10-E	
Stroke per revolution:	300 mm	

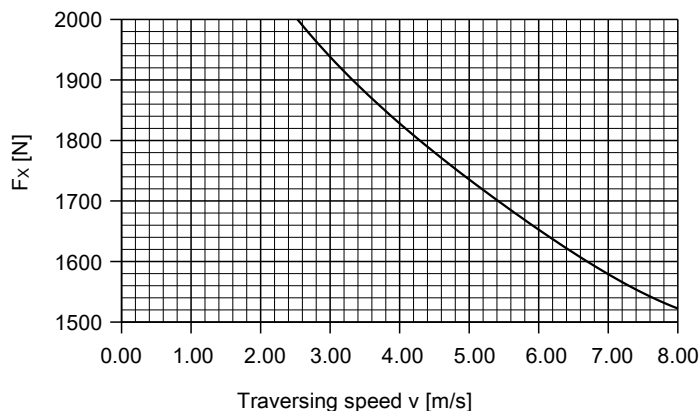
Forces and moments



	ARS	ASS
Forces	Dynamic [N]	
$F_x^{d)}$	2000	
F_y	2000	3000
F_z	5000	8000
$-F_z$	2500	4000
Moments	Dynamic [Nm]	
M_x	300	400
M_y	600	800
M_z	450	600

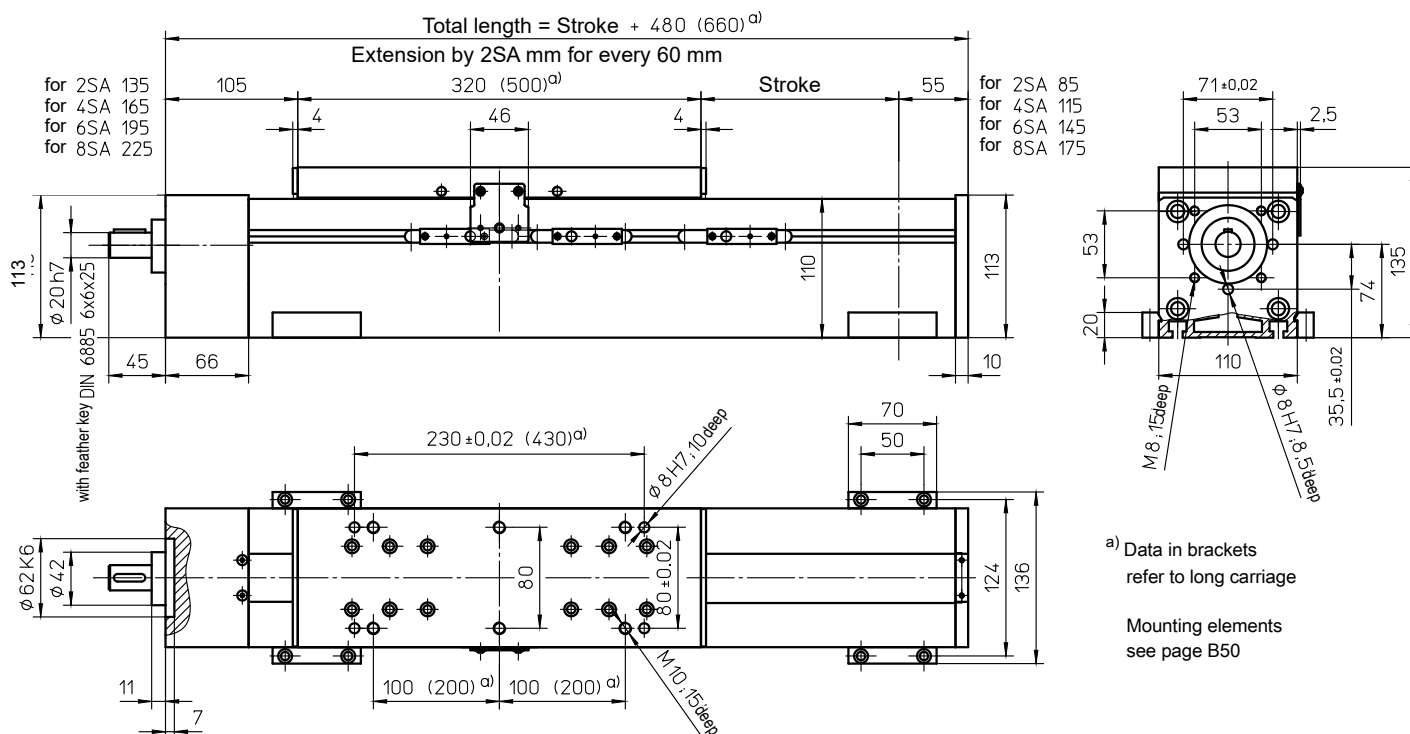
^{d)} Maximum value (see diagram "F_x-v-Diagram")

F_x - v - Diagram



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

with ball screw (KGT) and roller guide (SRS) or rail guide (SSS)

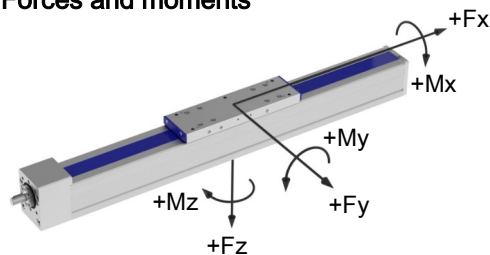


Weights	SRS	SSS
Basic length without stroke:	12.50 kg	13.50 kg
100 mm stroke:	1.40 kg	1.70 kg
Entire carriage 320 mm:	5.80 kg	5.30 kg
Entire carriage 500 mm:	9.10 kg	8.30 kg

Max. total length: 5600 mm
(longer on request)

Technical Data	SRS	SSS
Max. speed:	2.50 m/s	
Max. acceleration:	20 m/s ²	
Repeat accuracy:	± 0.03 mm (KGT)	
Idle torque:	1.00 Nm	1.50 Nm

Forces and moments



	SRS	SSS
Forces	Dynamic [N]	
F_x	6000	
F_y	2000	3000
F_z	5000	8000
-F_z	2500	4000
Moments	Dynamic [Nm]	
M_x	300	400
M_y	600 (800)	800 (1200)
M_z	450 (550)	600 (800)

Data in brackets refer to long carriage plate (500)

For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

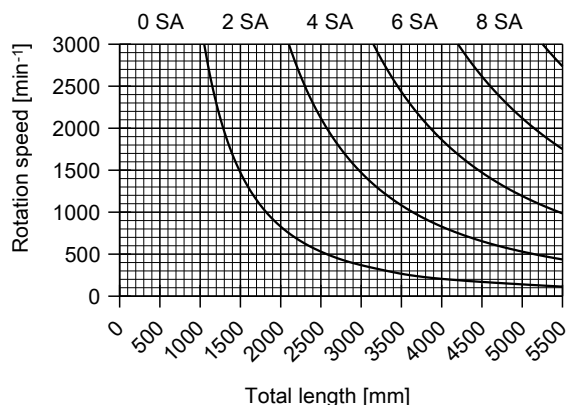
Version with double nut ("MM") only available with pitch "5", "10" and "25".

Drive element

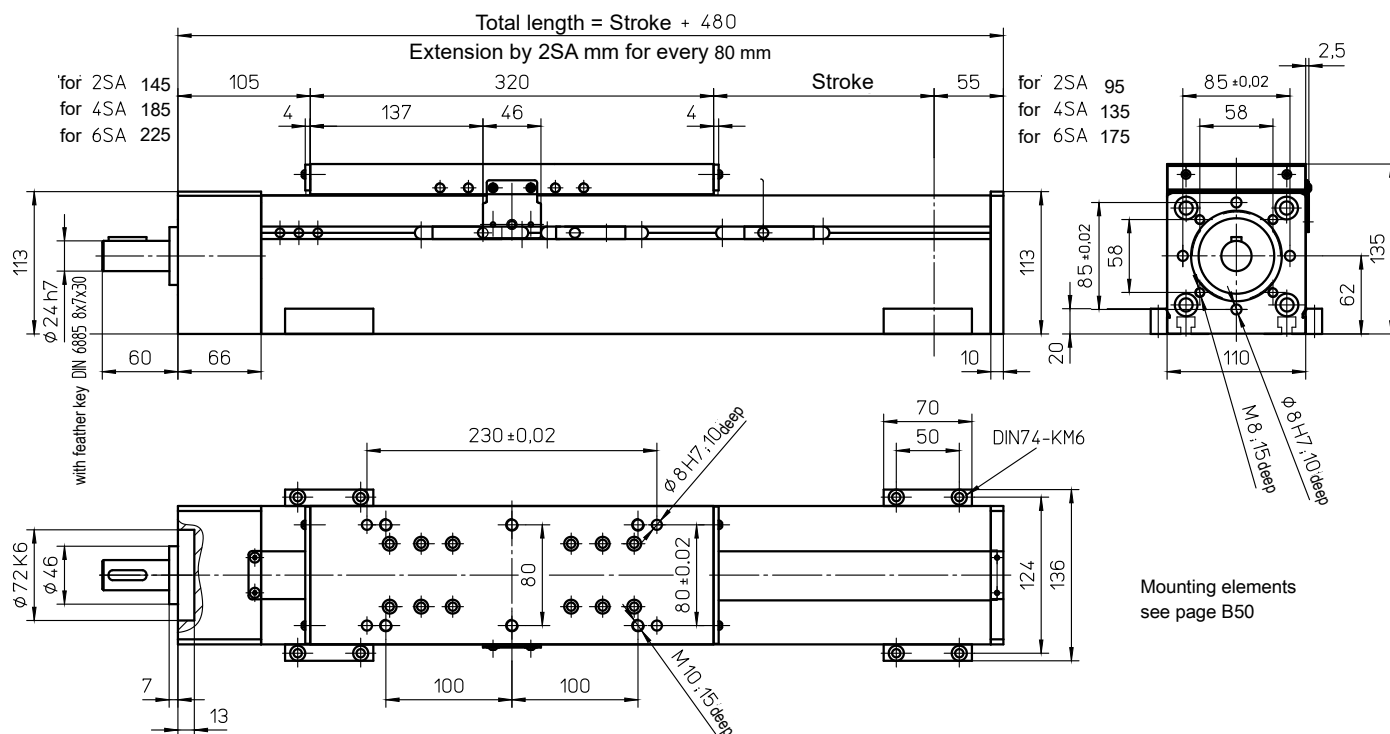
KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	25 mm
Pitch:	5 / 10 / 25 / 50 mm
Moment of inertia:	2.25 • 10 ⁻⁴ kgm ² /m

Spindle support (SA)



with ball screw (KGT) and sliding guide (SGV)



Weights

SGV

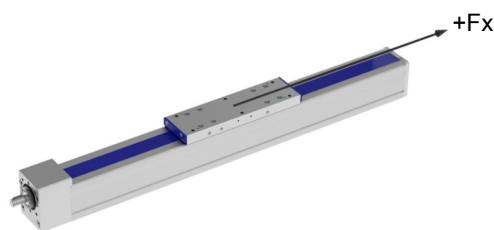
Basic length without stroke:	15.40 kg
100 mm stroke:	2.25 kg
Entire carriage 320 mm:	6.00 kg
Max. total length:	5600 mm

Technical Data

SGV

Max. speed:	3.0 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	1.50 Nm

Forces and moments



	SGV
Forces	Dynamic [N]
F_x	16000*
F_y	-
F_z	-
$-F_z$	-
Moments	Dynamic [Nm]
M_x	-
M_y	-
M_z	-

* "-" => Must have an external guide.

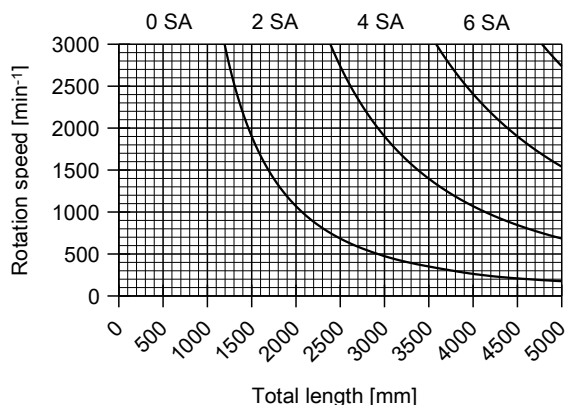
Drive element

KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	32 / 40 mm
Pitch:	5 / 10 / 20 / 40 / 60* mm
Moment of inertia:	6.45 • 10 ⁻⁴ kgm ² /m (32)
	1.41 • 10 ⁻³ kgm ² /m (40)

* only ø32

Spindle support (SA)



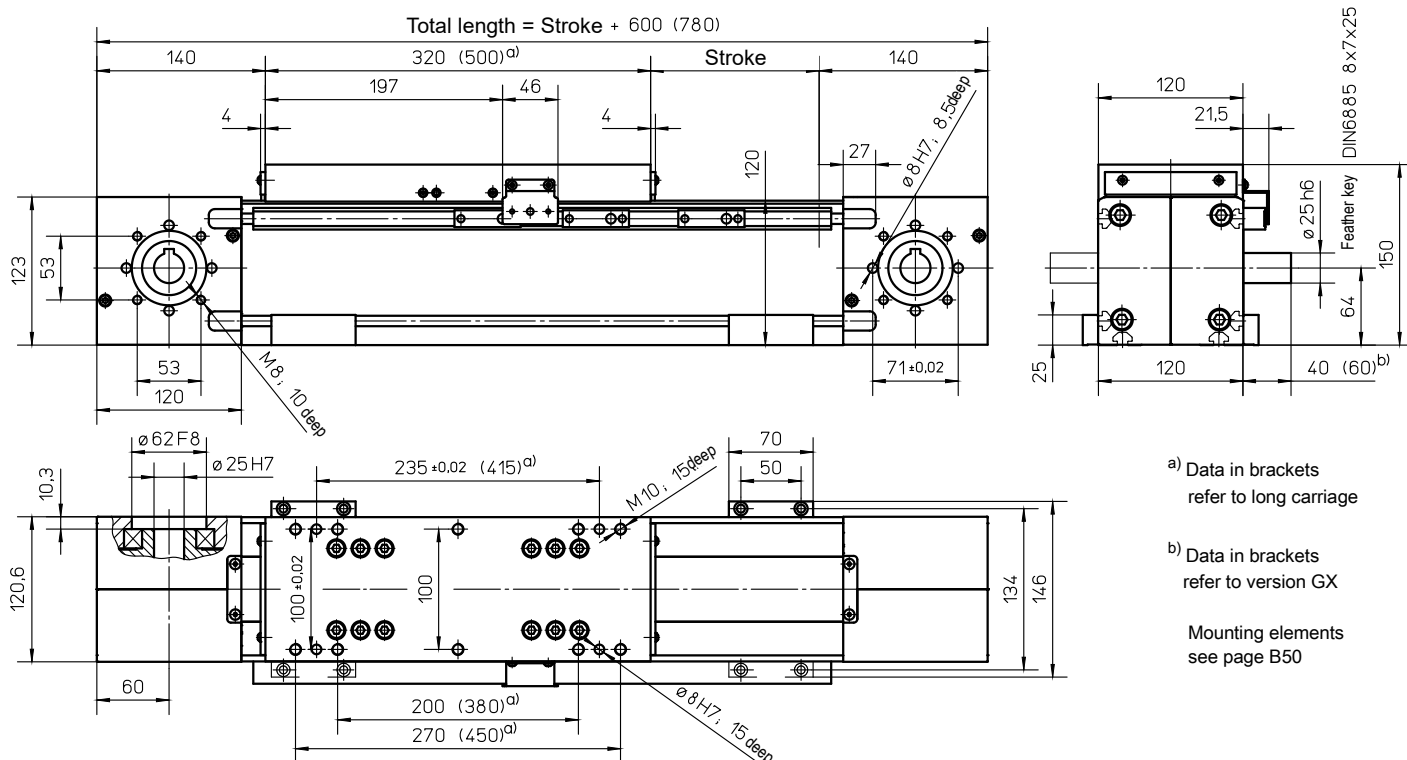
* at KGT 3240 and 3260: 8000 N

Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

Only single nut design ("M") possible.

[illegible]Page B24

with toothed belt drive and rail guide (ZSS)



Weights

ZSS

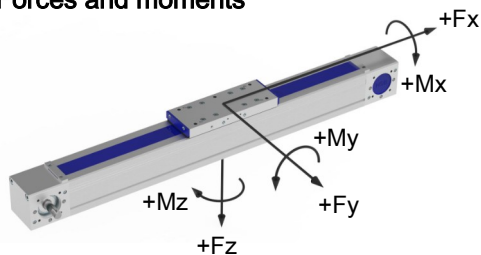
Basic length without stroke:	21.0 kg
100 mm stroke:	2.40 kg
Entire carriage 320 mm:	8.00 kg
Entire carriage 500 mm:	12.00 kg
Max. total length: (longer on request)	8100 mm

Technical Data

ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	4.50 Nm
Moment of inertia:	2.10 · 10 ⁻² kgm ²
Drive element:	Toothed belt 60 ATL10
Stroke per revolution:	300 mm

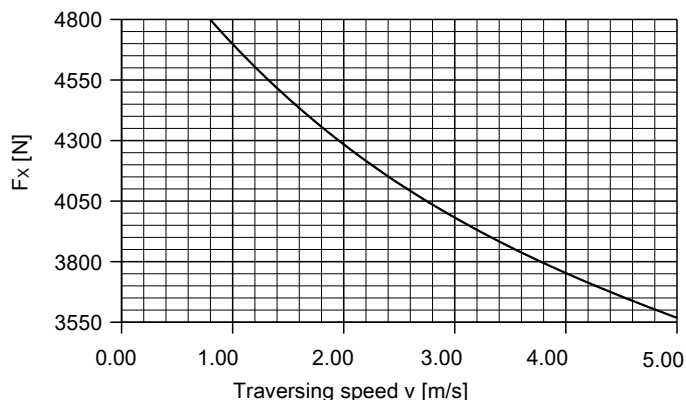
Forces and moments



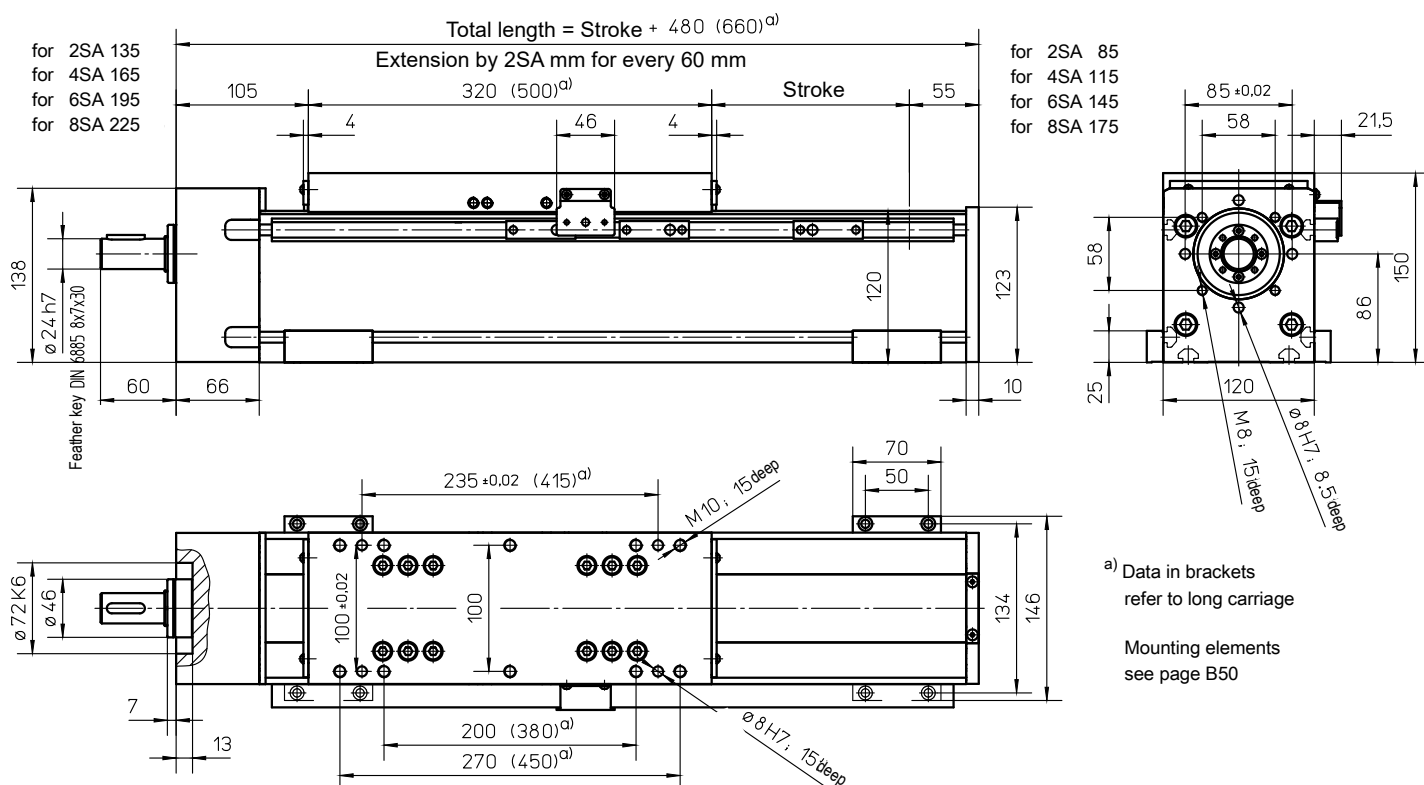
	ZSS
Forces	Dynamic [N]
F_x^{d)}	4800
F_y	4000
F_z	12000
-F_z	6000
Moments	Dynamic [Nm]
M_x	600
M_y	1500 (2800)
M_z	1000 (1800)

^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (500)

F_x - v - Diagram



with ball screw (KGT) or rail guide (ZSS)



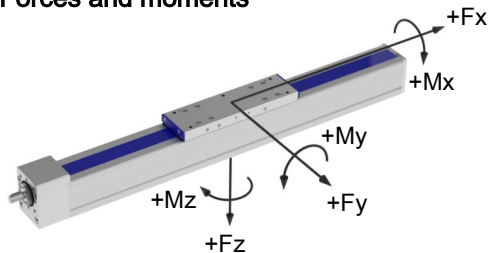
Weights

	SSS
Basic length without stroke:	22.00 kg
100 mm stroke:	2.70 kg
Entire carriage 320 mm:	8.00 kg
Entire carriage 500 mm:	12.00 kg
Max. total length: (longer on request)	5600 mm

Technical Data

	SSS
Max. speed:	3.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	2.00 Nm

Forces and moments



	SSS
Forces	Dynamic [N]
F_x	12000 *
F_y	4000
F_z	12000
$-F_z$	6000
Moments	Dynamic [Nm]
M_x	600
M_y	1500 (2800)
M_z	1000 (1800)

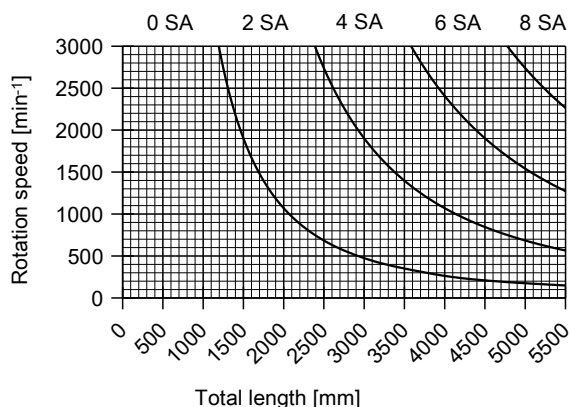
Data in brackets refer to long carriage plate (500)

* at KGT3240 and 3260: 8000 N

Drive element

	KGT
Max. rotation speed:	3000 min ⁻¹
Diameter:	32 mm
Pitch:	5 / 10 / 20 / 40 / 60 mm
Moment of inertia:	$6.45 \cdot 10^{-4}$ kgm ² /m

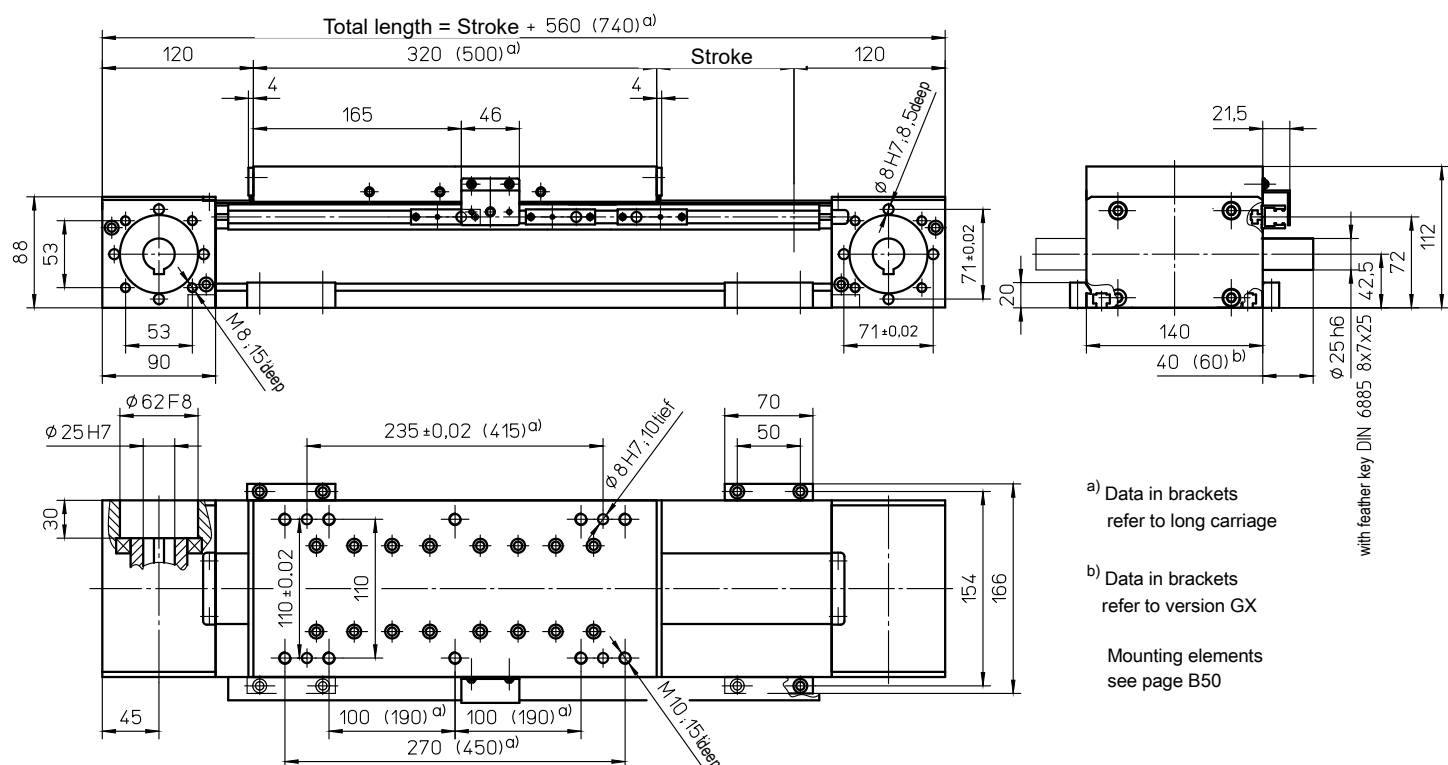
Spindle support (SA)



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

Version with double nut ("MM") only available with long carriage (500 mm) and pitch "5", "10" or "20".

with toothed belt drive and roller guide (ZRS) or double linear guide (ZSS)

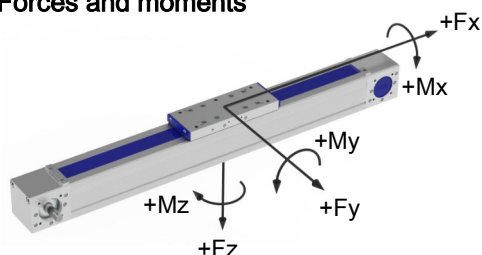


Weights	ZRS	ZSS
Basic length without stroke:	13.50 kg	15.00 kg
100 mm stroke:	1.30 kg	1.70 kg
Entire carriage 320 mm:	7.00 kg	7.50 kg
Entire carriage 500 mm:	11.00 kg	11.70 kg

Max. total length: 8100 mm
(longer on request)

Technical Data	ZRS	ZSS
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	60 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	3.50 Nm	
Moment of inertia:	1.90 · 10 ⁻² kgm ²	2.00 · 10 ⁻² kgm ²
Drive element:	Toothed belt 50 AT10-E	
Stroke per revolution:	220 mm	

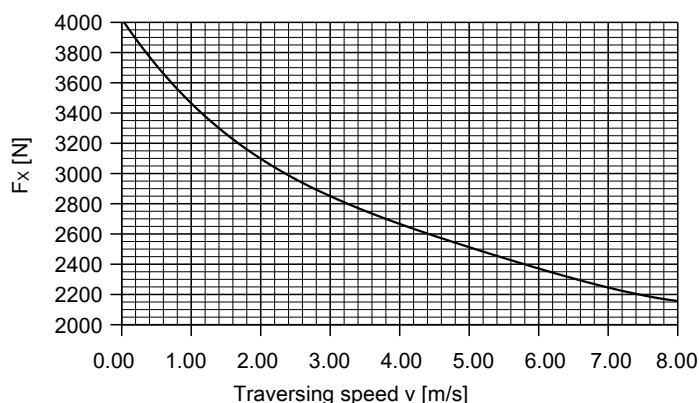
Forces and moments



	ZRS	ZSS
Forces	Dynamic [N]	
$F_x^{d)}$	4000	
F_y	2500	
F_z	5000	6000
$-F_z$	3000	4000
Moments	Dynamic [Nm]	
M_x	350	500
M_y	700 (900)	1000 (1300)
M_z	500 (900)	1000 (1300)

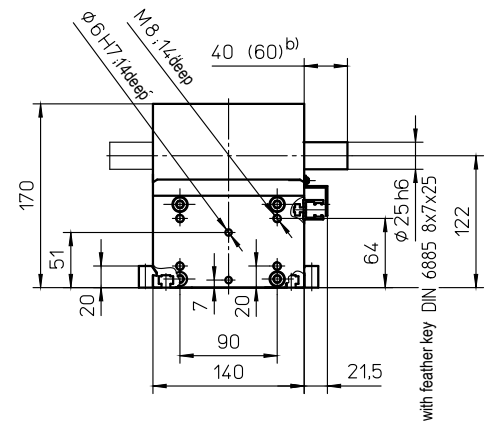
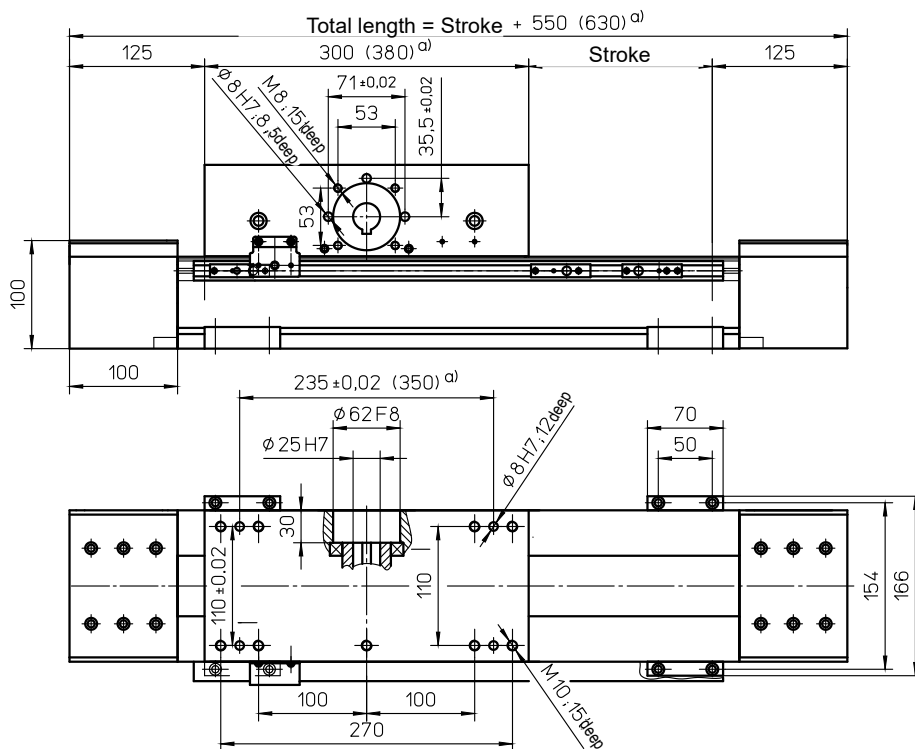
d) Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (500)

F_x - v - Diagram



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

with toothed belt drive and roller guide (ARS) or double linear guide (ASS)



a) Data in brackets refer to long carriage

b) Data in brackets refer to version GX

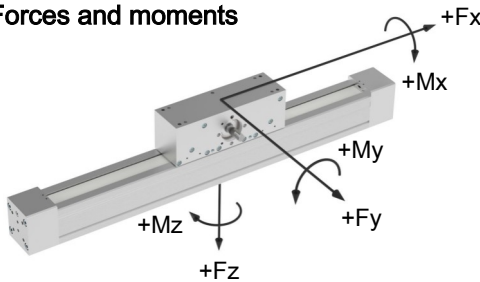
Mounting elements see page B50

Weights	ARS	ASS
Basic length without stroke:	28.00 kg	30.00 kg
100 mm stroke:	1.20 kg	1.50 kg
Carriage drive 300 mm:	10.70 kg	11.70 kg
Carriage drive 380 mm:	13.00 kg	14.00 kg

Max. total length: 8100 mm
(longer on request)

Technical Data	ARS	ASS
Max. speed:	8.00 m/s	5.00 m/s
Max. acceleration:	60 m/s ²	
Repeat accuracy:	± 0.08 mm	
Idle torque:	3.50 Nm	
Moment of inertia:	3.50 · 10 ⁻² kgm ²	3.70 · 10 ⁻² kgm ²
Drive element:	Toothed belt 50 AT10-E	
Stroke per revolution:	240 mm	

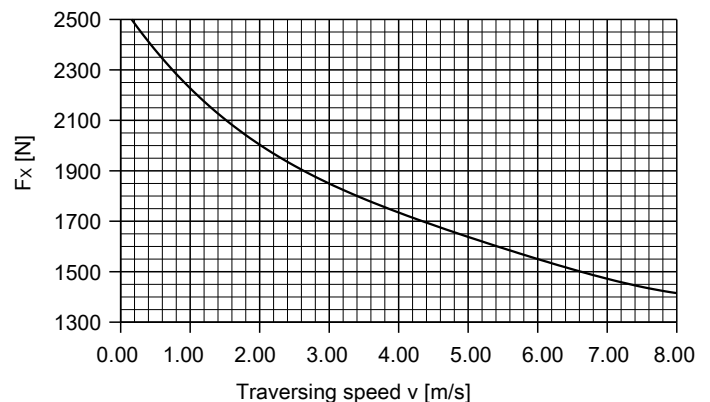
Forces and moments



	ARS	ASS
Forces	Dynamic [N]	
F _x ^{d)}	2500	
F _y	2500	
F _z	5000	6000
-F _z	3000	4000
Moments	Dynamic [Nm]	
M _x	350	500
M _y	(700)	1000 (1300)
M _z	(500)	1000 (1300)

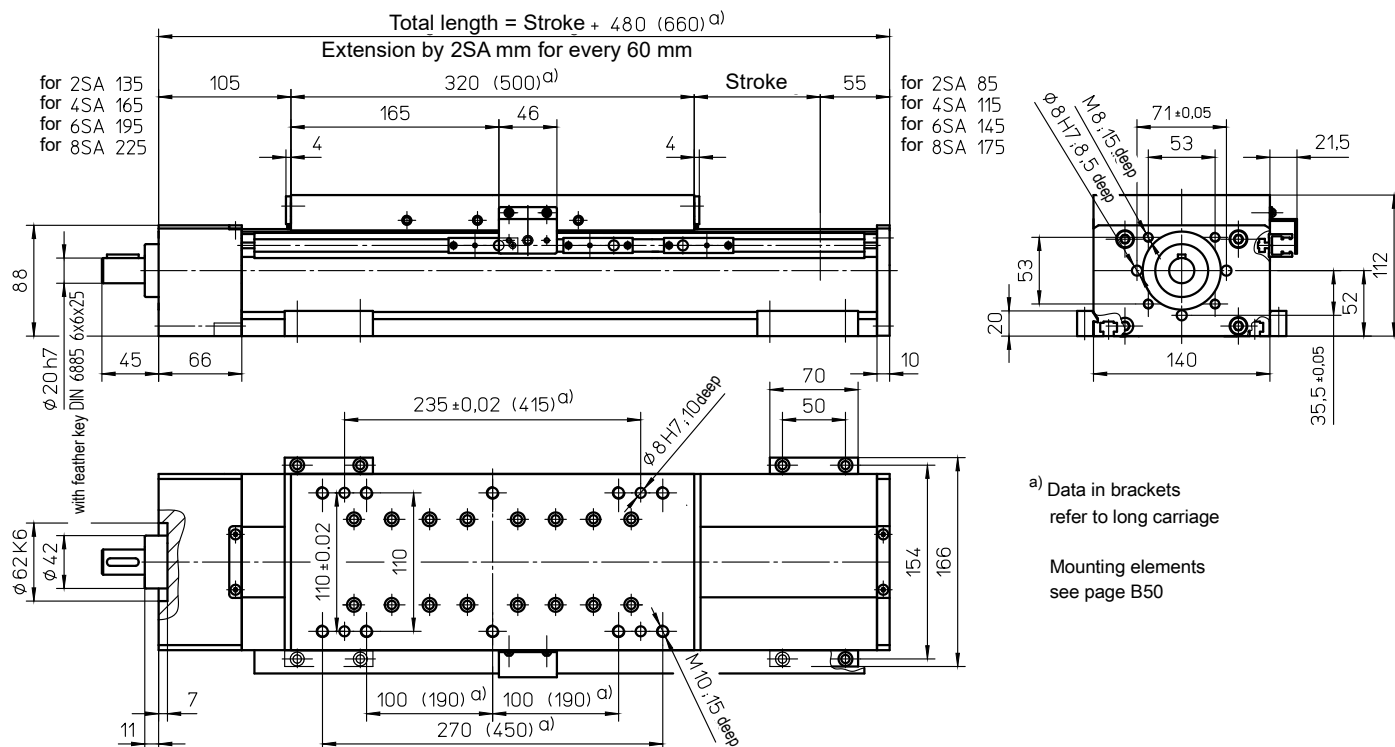
^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage (380)
Only long carriage (380) possible with "ARS"!

F_x - v - Diagram



For mechanical linear drives with roller guide,
the static load rating "C_{stat}" (page TL 11) applies for static loads.

with ball screw (KGT) and roller guide (SRS) or double linear guide (SSS)

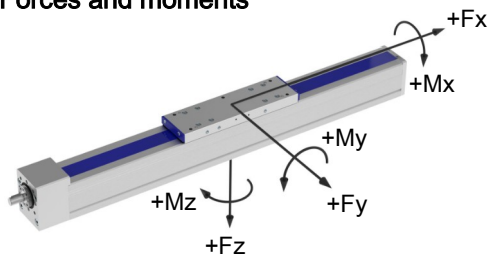


Weights

	SRS	SSS
Basic length without stroke:	14.00 kg	15.00 kg
100 mm stroke:	1.40 kg	1.90 kg
Entire carriage 320 mm:	6.20 kg	7.00 kg
Entire carriage 500 mm:	9.70 kg	10.90 kg

Max. total length: 5600 mm
(longer on request)

Forces and moments



	SRS	SSS
Forces	Dynamic [N]	
F _x	6000	
F _y	2500	
F _z	5000	6000
-F _z	3000	4000
Moments	Dynamic [Nm]	
M _x	350	500
M _y	700 (900)	1000 (1400)
M _z	500 (900)	1000 (1400)

Data in brackets refer to long carriage plate (500)

Technical Data

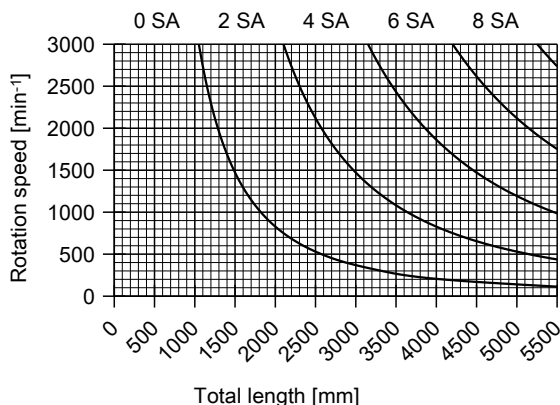
	SRS	SSS
Max. speed:	2.50 m/s	
Max. acceleration:	20 m/s ²	
Repeat accuracy:	± 0.03 mm (KGT)	
Idle torque:	1.00 Nm	1.50 Nm

Drive element

KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	25 mm
Pitch:	5 / 10 / 25 / 50 mm
Moment of inertia:	3000 min ⁻¹

Spindle support (SA)

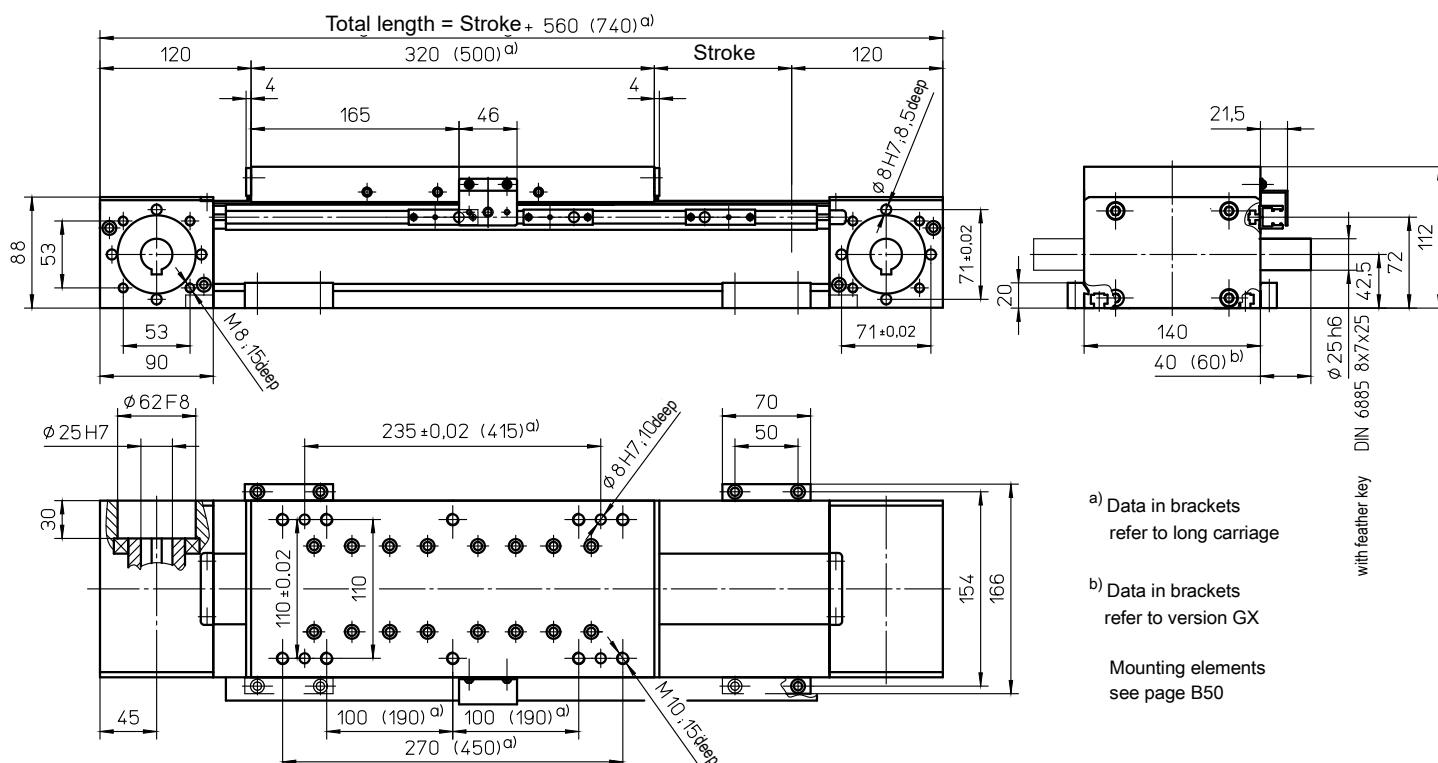


For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

Version with double nut ("MM") only available with long carriage (500) and not with pitch "50".

with toothed belt drive and double linear guide (ZSS)



Weights

ZSS

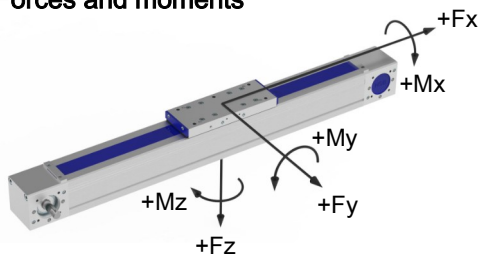
Basic length without stroke:	15.00 kg
100 mm stroke:	1.70 kg
Entire carriage 320 mm:	7.50 kg
Entire carriage 500 mm:	11.70 kg
Max. total length: (longer on request)	8100 mm

Technical Data

ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	3.50 Nm
Moment of inertia:	2.00 · 10 ⁻² kgm ²
Drive element:	Toothed belt 50 AT10-E
Stroke per revolution:	220 mm

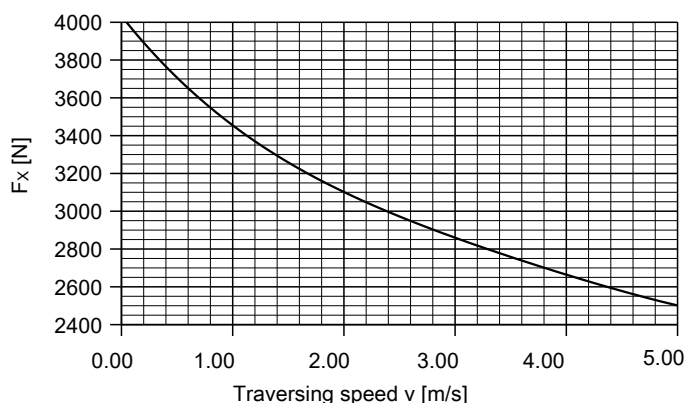
Forces and moments



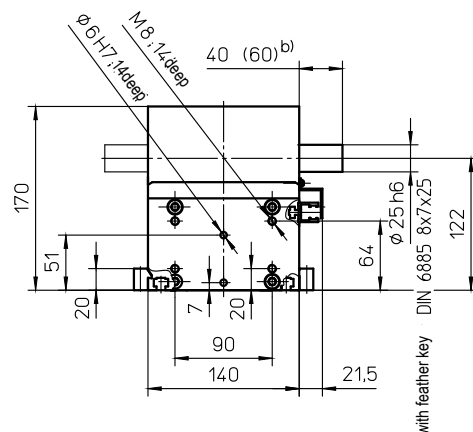
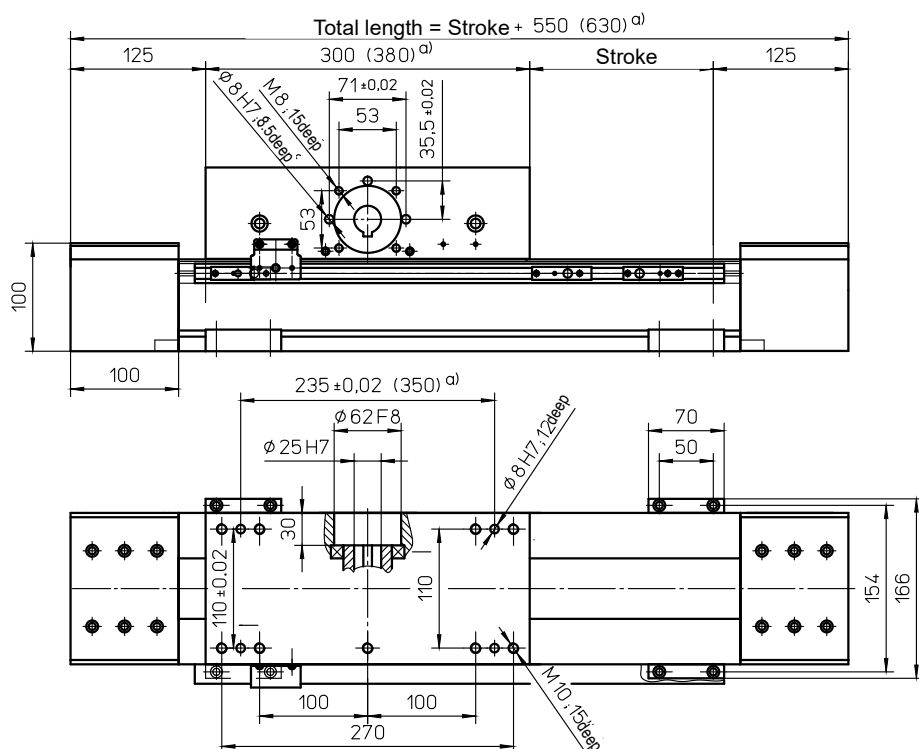
ZSS	
Forces	Dynamic [N]
F _x ^{d)}	4000
F _y	3200
F _z	7500
-F _z	5000
Moments	Dynamic [Nm]
M _x	600
M _y	1200 (1700)
M _z	1200 (1700)

^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (500)

F_x - v - Diagram



with toothed belt drive and double linear guide (ASS)



a) Data in brackets refer to long carriage

b) Data in brackets refer to version GX

Mounting elements see page B50

Weights

ASS

Basic length without stroke:	30.00 kg
100 mm stroke:	1.50 kg
Carriage drive 300 mm:	11.70 kg
Carriage drive 380 mm:	14.00 kg

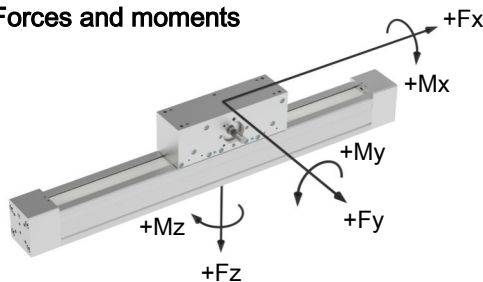
Max. total length: 8100 mm
(longer on request)

Technical Data

ASS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	3.50 Nm
Moment of inertia:	3.70 · 10 ⁻² kgm ²
Drive element:	Toothed belt 50 AT10-E
Stroke per revolution:	240 mm

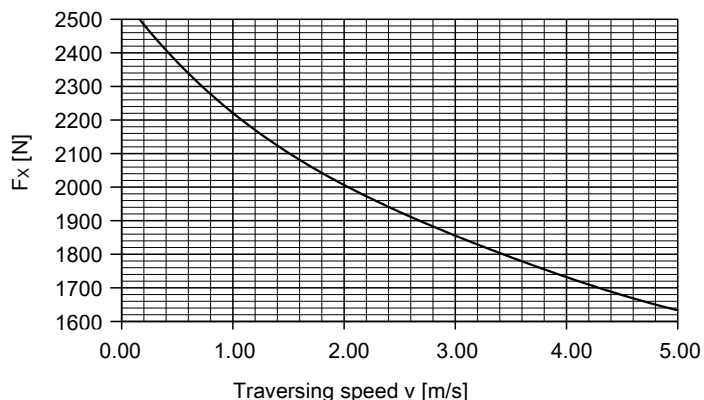
Forces and moments



	ASS
Forces	Dynamic [N]
$F_x^{d)}$	2500
F_y	3200
F_z	7500
$-F_z$	5000
Moments	Dynamic [Nm]
M_x	600
M_y	1200 (1600)
M_z	1200 (1600)

^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (380)

F_x - v - Diagram



Technical drawing of the B50 linear guide system, showing side, front, and end views with dimensions and mounting details.

Side View Dimensions:

- Total length = Stroke + 480 (660)^{a)}
- Extension by 2SA mm for every 60 mm
- Stroke
- Dimensions: 105, 320 (500)^{a)}, 46, 4, 4, 55
- For 2SA 135, 4SA 165, 6SA 195, 8SA 225
- For 2SA 85, 4SA 115, 6SA 145, 8SA 175
- 88, 45, 66, 10, 70, 50

Front View Dimensions:

- 235 ± 0.02 (415)^{a)}
- 110 ± 0.02, 110
- 154, 166
- 100 (190)^{a)}, 100 (190)^{a)}
- 270 (450)^{a)}
- 7, 11

End View Dimensions:

- 71 ± 0.05, 53, 21.5
- 53, 20, 140, 52, 112
- 35.5 ± 0.05

Mounting Details:

- Ø 20 h7, with feather key DIN 6885 6x6x25
- Ø 62 K6, Ø 4.2
- Ø 8 H7 / 8 deep
- M 8 : 15 deep
- M 10 : 15 deep

Notes:

- a) Data in brackets refer to long carriage
- Mounting elements see page B50

Mounting elements
see page B50

SSS

Max. speed:	2.50 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	1.50 Nm

Drive element	KGT
---------------	-----

A 3D diagram of a beam element of length Δx . The beam is oriented along the x-axis. At the right end of the beam, several forces and moments are shown acting on it: a horizontal force $+F_x$ pointing in the positive x-direction, a vertical force $+F_y$ pointing in the positive y-direction, a vertical force $+F_z$ pointing in the positive z-direction, a moment $+M_x$ about the x-axis, a moment $+M_y$ about the y-axis, and a moment $+M_z$ about the z-axis. The beam has a blue top surface and a grey bottom surface.

	SSS
Forces	Dynamic [N]
F_x	6000
F_y	3200
F_z	7500
-F_z	5000
Moments	Dynamic [Nm]
M_x	600
M_y	1200 (1700)
M_z	1200 (1700)

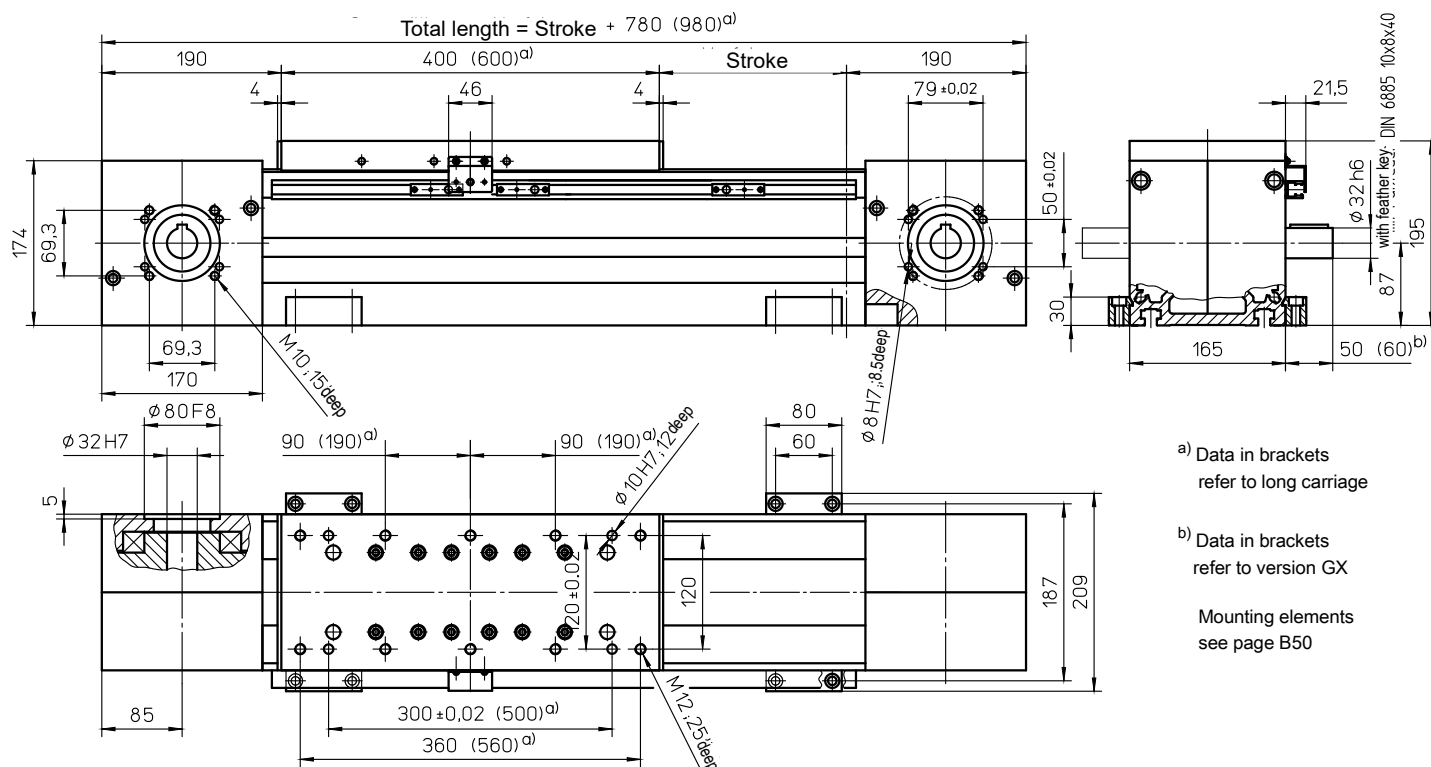
Max. rotation speed: 3000 min⁻¹
 Diameter: 25 mm
 Pitch: 5 / 10 / 25 / 50 mm
 Moment of inertia: 2.25 • 10⁻⁴ kgm²/m

The graph plots Rotation speed [min⁻¹] on the y-axis (0 to 3000) against Total length [mm] on the x-axis (0 to 5500). Five curves are shown, labeled 0 SA, 2 SA, 4 SA, 6 SA, and 8 SA at the top. The curves show that for a fixed total length, the rotation speed decreases as the number of segments (SA) increases. Conversely, for a fixed rotation speed, the total length must increase as the number of segments increases.

Total length [mm]	0 SA [min ⁻¹]	2 SA [min ⁻¹]	4 SA [min ⁻¹]	6 SA [min ⁻¹]	8 SA [min ⁻¹]
1200	3000	-	-	-	-
1500	2000	3000	-	-	-
2000	1000	1800	3000	-	-
2500	500	1000	1800	3000	-
3000	300	600	1000	1800	3000
3500	200	400	600	1000	1800
4000	150	300	400	600	1000
4500	120	250	300	400	600
5000	100	200	250	300	400
5500	80	150	200	250	300

Version with double nut ("MM") only available with long carriage (500) and not with pitch "50".

with toothed belt drive and rail guide (ZSS)



a) Data in brackets refer to long carriage

b) Data in brackets refer to version GX

Mounting elements see page B50

Weights

ZSS

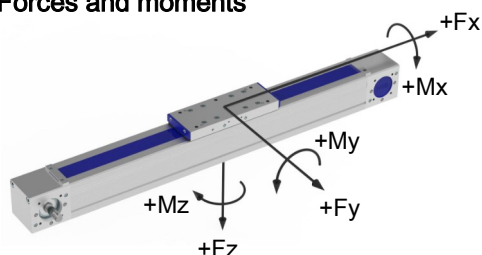
Basic length without stroke:	38.40 kg
100 mm stroke:	3.00 kg
Entire carriage 400 mm:	11.90 kg
Entire carriage 600 mm:	17.90 kg
Max. total length: (longer on request)	7700 mm

Technical Data

ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	12.00 Nm
Moment of inertia:	8.50 • 10 ⁻² kgm ²
Drive element:	Toothed belt 75 ATS 15
Stroke per revolution:	450 mm

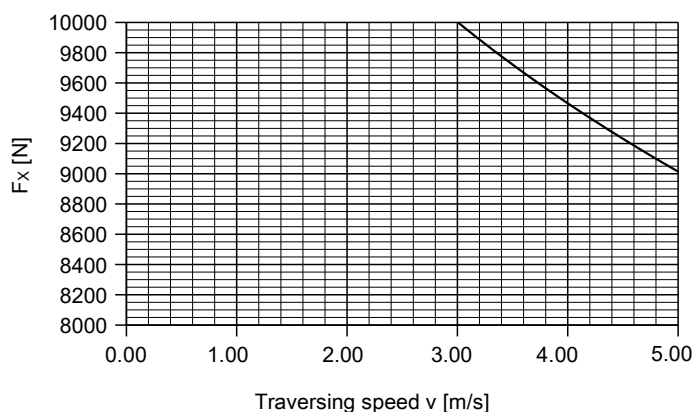
Forces and moments



	ZSS
Forces	Dynamic [N]
F_x^{d)}	10000
F_y	5000
F_z	15000
-F_z	8000
Moments	Dynamic [Nm]
M_x	700
M_y	1400 (2000)
M_z	1100 (1500)

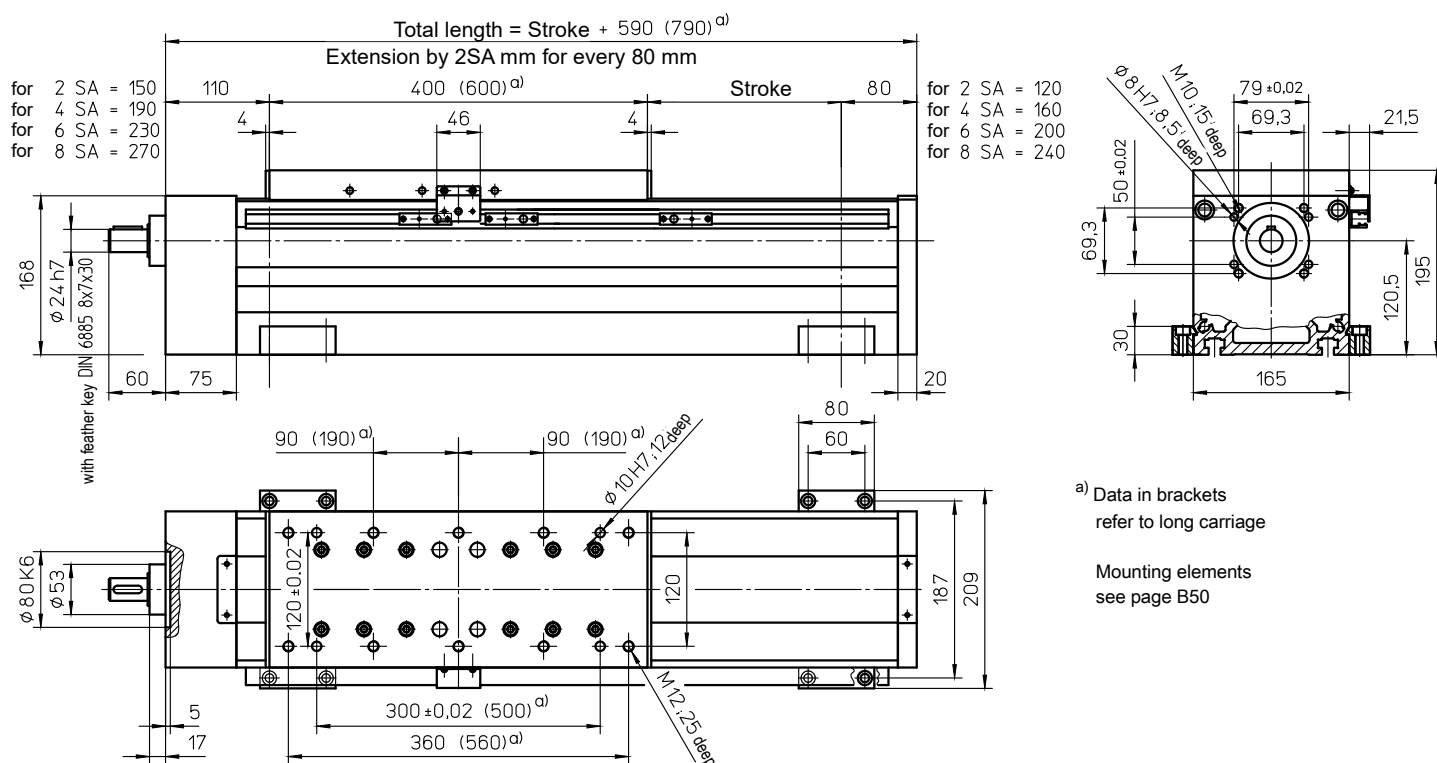
^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (600)

F_x - v - Diagram



Profile design „S“ at max. total length 5840 mm to 7700 mm (page B49)

with ball screw (KGT) and rail guide (SSS)



Weights

SSS

Basic length without stroke:	33.90 kg
100 mm stroke:	3.70 kg
Entire carriage 400 mm:	11.50 kg
Entire carriage 600 mm:	17.25 kg

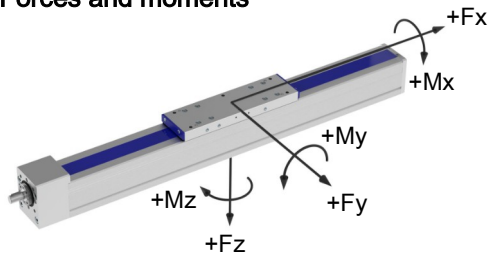
Max. total length: 5600 mm
(longer on request)

Technical Data

SSS

Max. speed:	2.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	3.00 Nm

Forces and moments



	SSS
Forces	Dynamic [N]
F_x	18000
F_y	5000
F_z	15000
-F_z	8000
Moments	Dynamic [Nm]
M_x	800
M_y	1800 (3000)
M_z	1400 (2000)

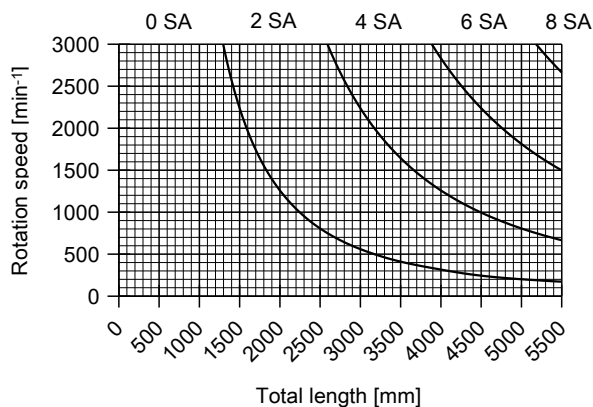
Data in brackets refer to long carriage plate (600)

Drive element

KGT

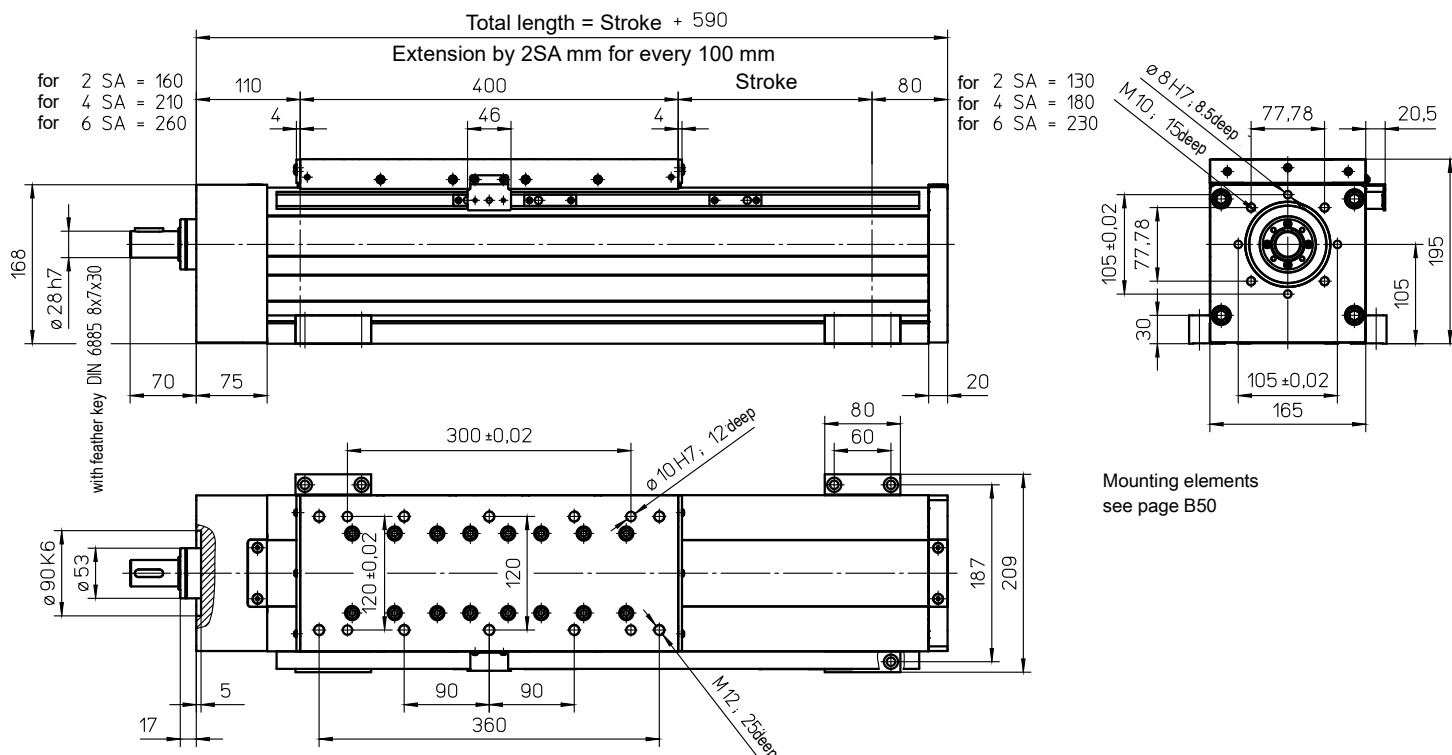
Max. rotation speed:	3000 min ⁻¹
Diameter:	40 mm
Pitch:	5 / 10 / 20 / 40 mm
Moment of inertia:	1.65 • 10 ⁻³ kgm ² /m

Spindle support (SA)



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

with ball screw (KGT) and sliding guide (SGV)



Mounting elements
see page B50

Weights

SGV

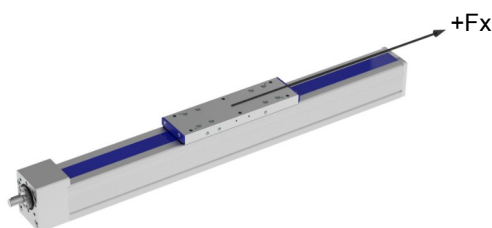
Basic length without stroke:	34.00 kg
100 mm stroke:	3.75 kg
Entire carriage 400 mm:	10.80 kg
Max. total length: (longer on request)	5600 mm

Technical Data

SGV

Max. total speed:	1.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	3.20 Nm

Forces and moments



Drive element

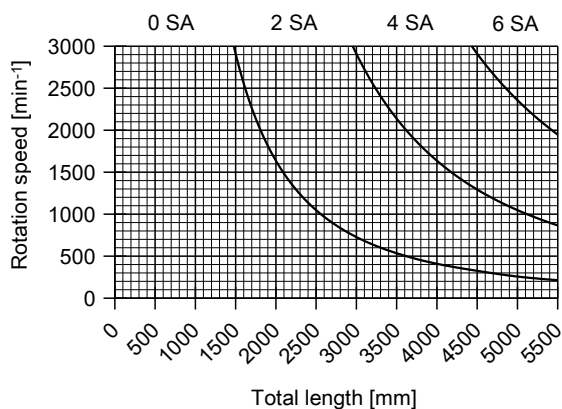
KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	50 mm
Pitch:	10 / 20 mm
Moment of inertia:	3.45 • 10 ⁻³ kgm ² /m

Spindle support (SA)

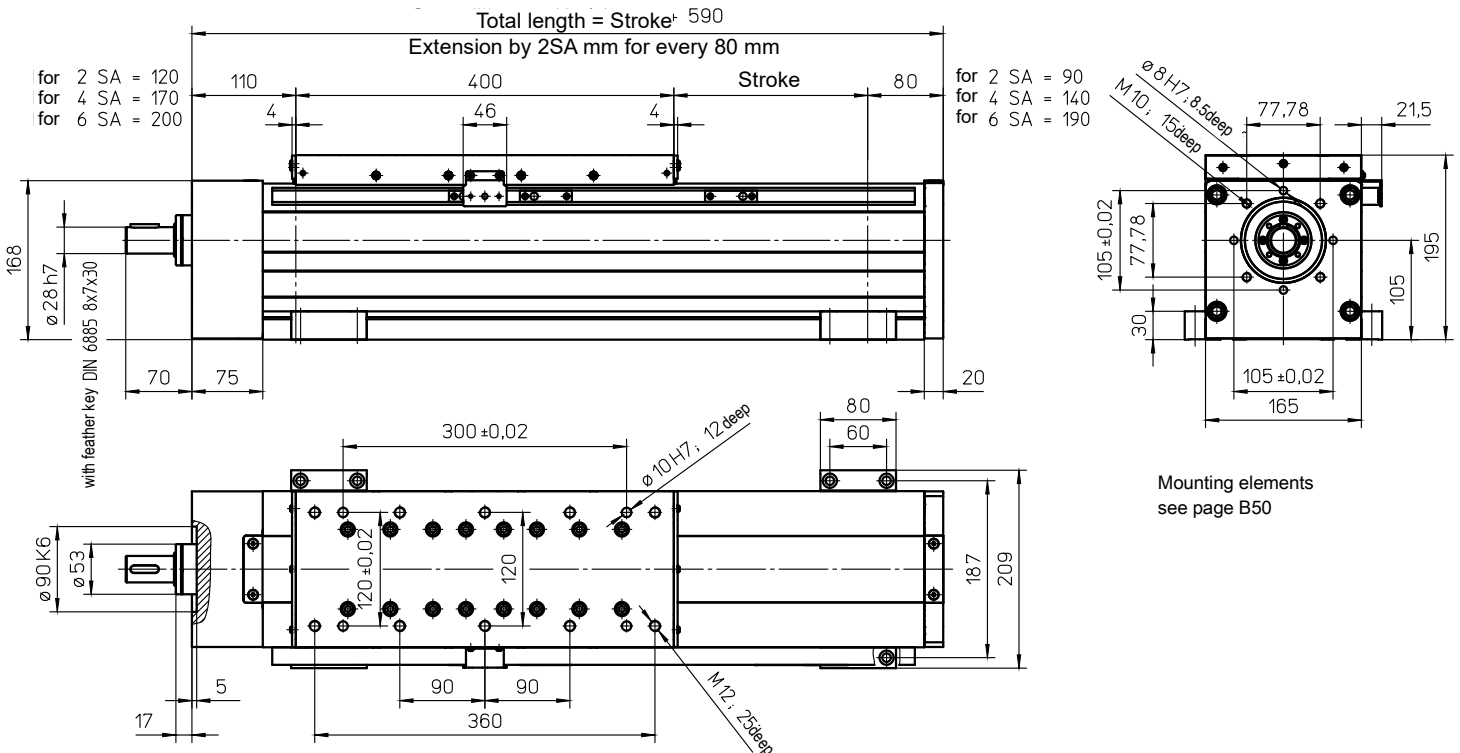
	SGV
Forces	Dynamic [N]
F _x	25000
F _y	-
F _z	-
-F _z	-
Moments	Dynamic [Nm]
M _x	-
M _y	-
M _z	-

"-" => Must have an external guide.



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

with ball screw (KGT) and sliding guide (SGV)



Weights

SGV

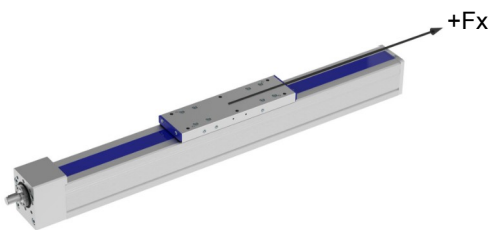
Basic length without stroke:	33.00 kg
100 mm stroke:	3.30 kg
Entire carriage 400 mm:	10.50 kg
Max. total length: (longer on request)	5600 mm

Technical Data

SGV

Max. speed:	2.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	3.00 Nm

Forces and moments



Drive element

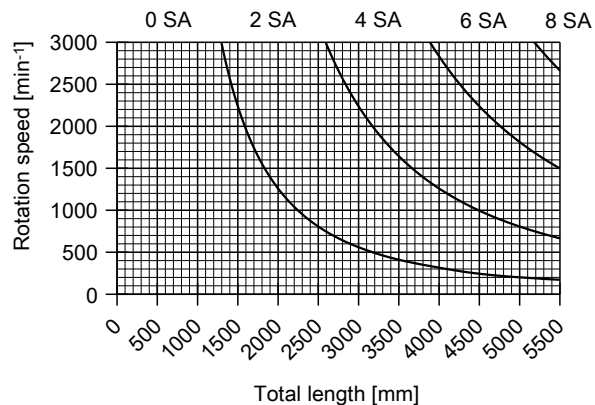
KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	40 mm
Pitch:	5 / 10 / 20 / 40 mm
Moment of inertia:	1.65 · 10 ⁻³ kgm ² /m

Spindle support (SA)

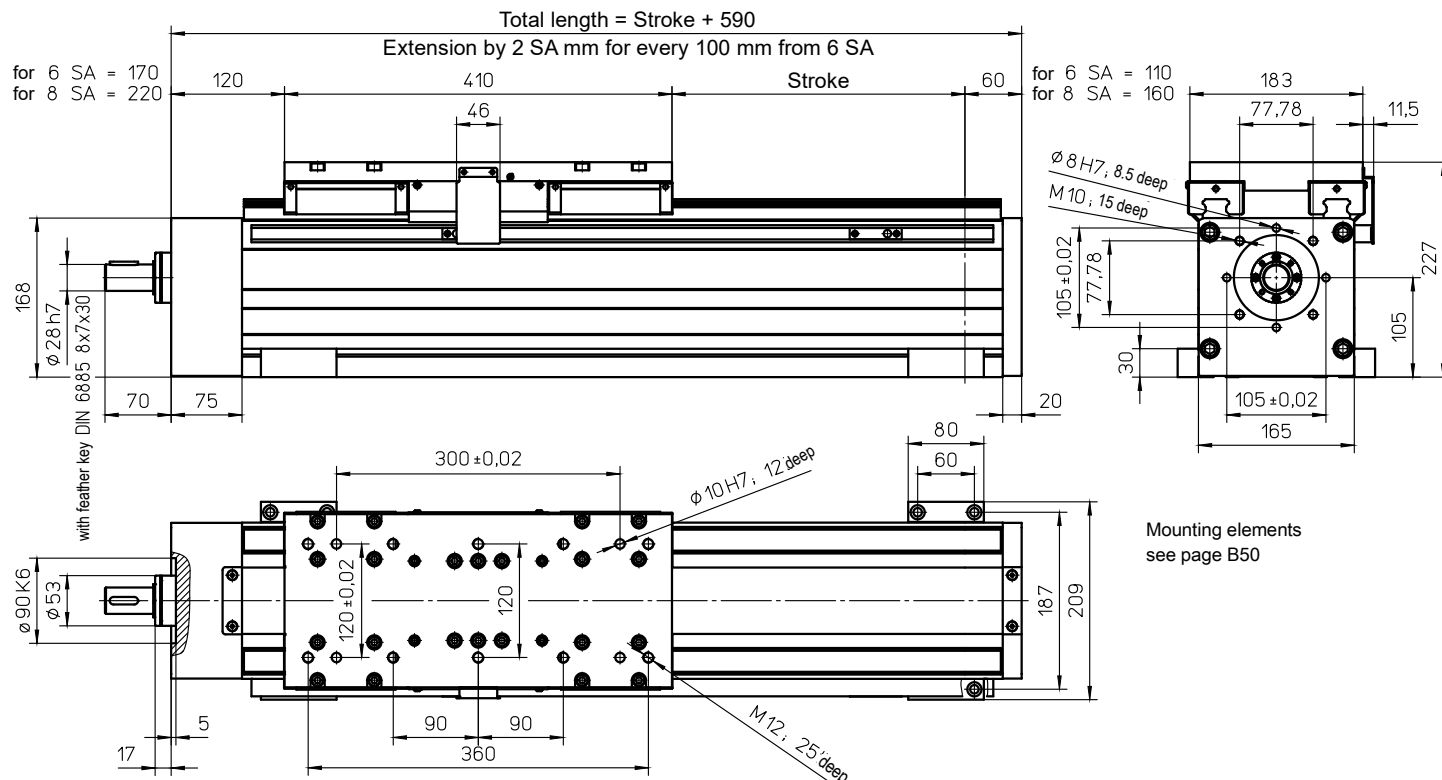
Forces	SGV Dynamic [N]
F _x	18000
F _y	-
F _z	-
-F _z	-
Moments	Dynamic [Nm]
M _x	-
M _y	-
M _z	-

"-" => Must have an external guide.



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

with ball screw (KGT) and rail guide (SSF)



Weights

SSF

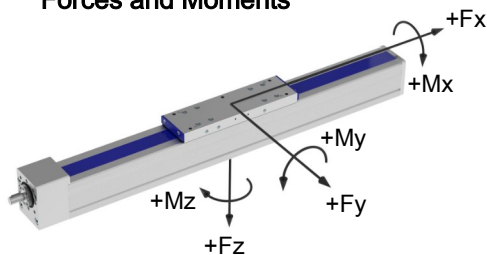
Basic length without stroke:	38.90 kg
100 mm stroke:	4.40 kg
Entire carriage 410 mm:	25.20 kg
Max. total length:	5600 mm
(longer on request)	

Technical Data

SSF

Max. total speed:	1.00 m/s
Max. acceleration:	20 m/s²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	3.20 Nm

Forces and Moments



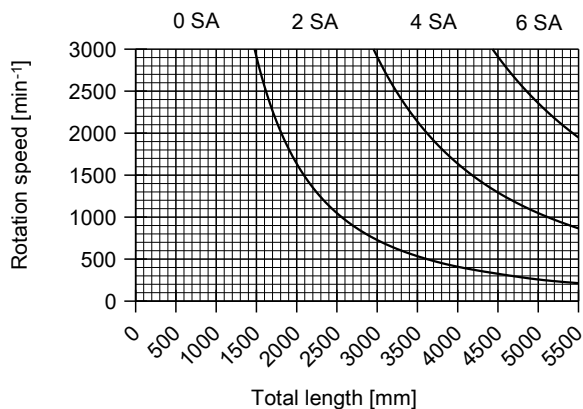
	SSF
Forces	Dynamic [N]
F_x	25000
F_y	5000
F_z	15000
$-F_z$	8000
Moments	Dynamic [Nm]
M_x	800
M_y	1800
M_z	1400

Drive element

KGT

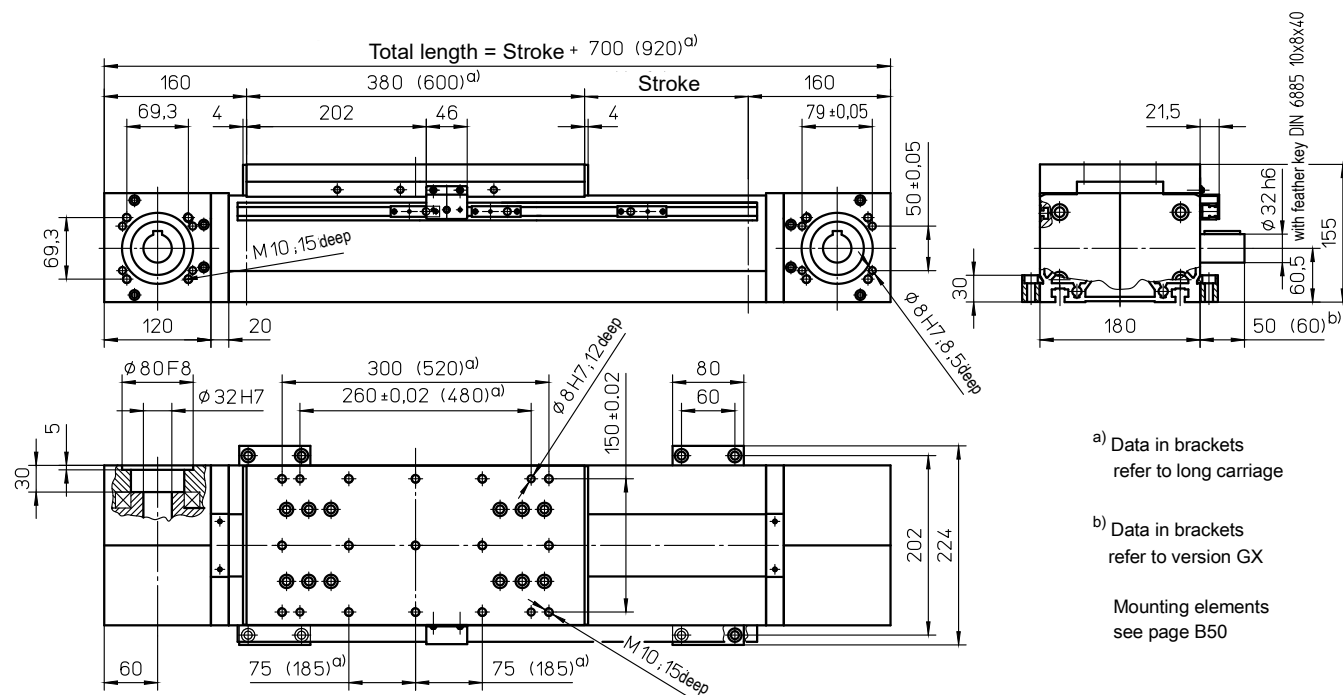
Max. rotation speed:	3000 min⁻¹
Diameter:	50 mm
Pitch:	10 / 20 mm
Moment of inertia:	$3.45 \cdot 10^{-3} \text{ kgm}^2/\text{m}$

Spindle support (SA)



Special design: Spindle support with damping ring (from 4SA: extension of total length: 10 mm for every 2 SA)

with toothed belt drive and double linear guide (ZSS)



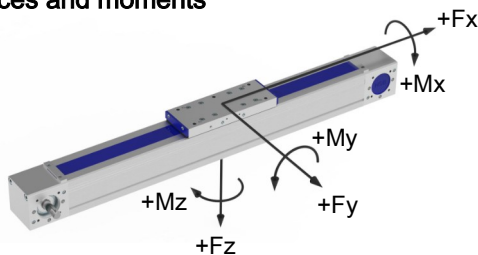
Weights ZSS

Basic length without stroke:	37.70 kg
100 mm stroke:	2.40 kg
Entire carriage 380 mm:	11.20 kg
Entire carriage 600 mm:	15.70 kg
Max. total length:	6200 mm
(longer on request)	

Technical Data ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	8.00 Nm
Moment of inertia:	5.60 · 10 ⁻² kgm ²
Drive element:	Toothed belt 75 AT10
Stroke per revolution:	320 mm

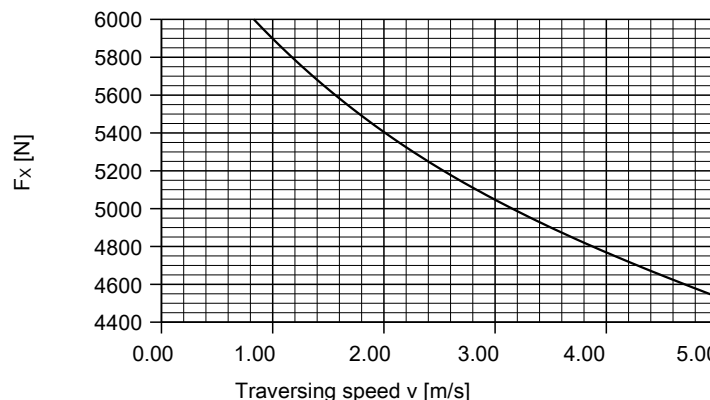
Forces and moments



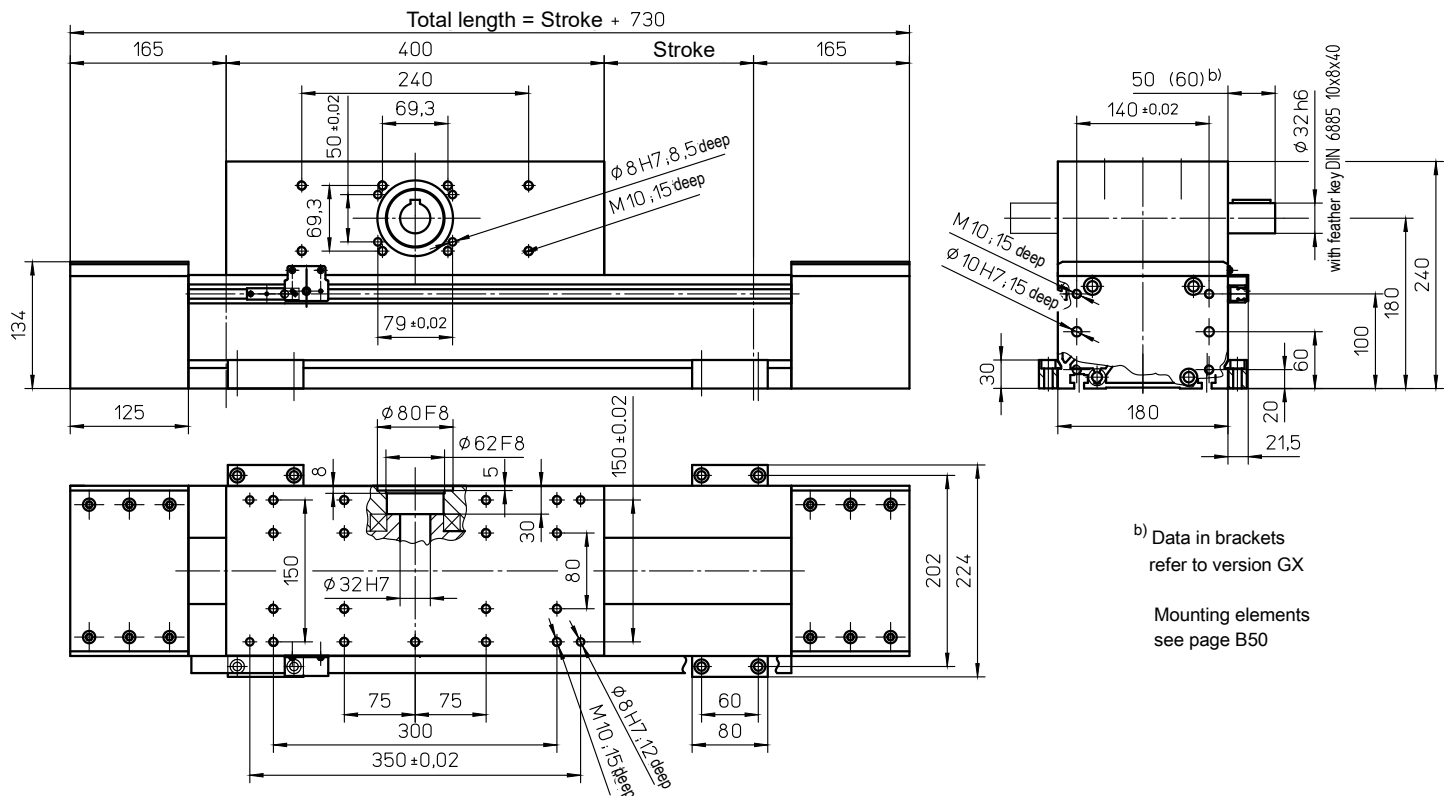
	ZSS
Forces	Dynamic [N]
F_x^{d)}	6000
F_y	6000
F_z	12000
-F_z	6000
Moments	Dynamic [Nm]
M_x	1500
M_y	3000 (4000)
M_z	1500 (2000)

^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage plate (600)

F_x - v - Diagram



with toothed belt drive and double linear guide (ASS)



Weights

ASS

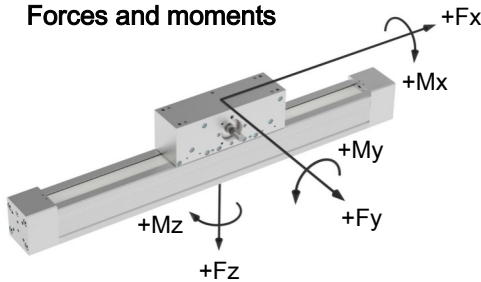
Basic length without stroke:	48.90 kg
100 mm stroke:	2.80 kg
Carriage drive 400 mm:	25.60 kg
Max. total length: (longer on request)	6200 mm

Technical Data

ASS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	8.00 Nm
Moment of inertia:	6.20 •10 ⁻² kgm ²
Drive element:	Toothed belt 75 AT10
Stroke per revolution:	320 mm

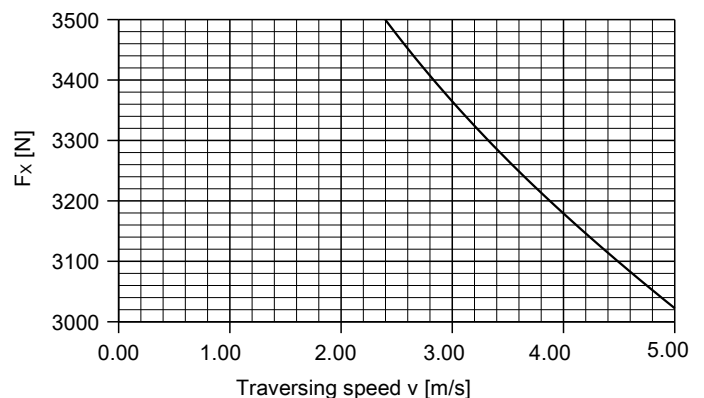
Forces and moments



	ASS
Forces	Dynamic [N]
$F_x^{(d)}$	3500
F_y	6000
F_z	12000
$-F_z$	6000
Moments	Dynamic [Nm]
M_x	1500
M_y	3000
M_z	1500

d) Maximum value (see diagram "F_x-v-Diagram")

$F_x - v$ - Diagram



Technical drawing of a shaft-hub assembly, showing front and side views with dimensions and tolerances.

Front View (Top):

- Total length = Stroke + 570 (790)^{a)}**
- Extension by 2SA mm for every 80 mm**
- Stroke**
- Dimensions:** 110, 380 (600)^{a)}, 80, 4, 202, 46, 4.
- Left side dimensions:** 123, $\phi 24 \text{ h7}$, 60, 75.
- Right side dimensions:** 120, 20.

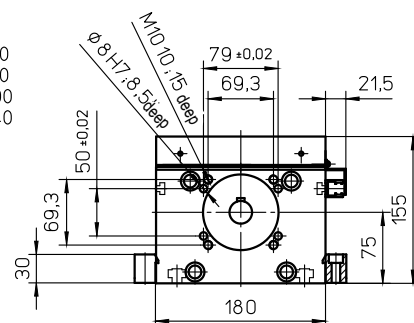
Side View (Bottom):

- Dimensions:** 300 (520)^{a)}, 260 $\pm 0,02$ (480)^{a)}, 80, 60, 150 $\pm 0,02$, 202, 224, 75 (185)^{a)}, 75 (185)^{a)}, 5, 17.
- Left side dimensions:** $\phi 80 \text{ k6}$, $\phi 53$, with feather key DIN 6885 8x7x30.
- Internal features:** $\phi 8 \text{ H7 } 12 \text{ deep}$, $M10, 15 \text{ deep}$.

Tables:

for 2SA =	for 4SA =	for 6SA =	for 8SA =
150	190	230	270

for 2SA =	for 4SA =	for 6SA =	for 8SA =
120	160	200	240



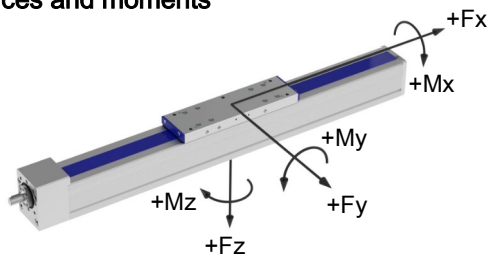
Mounting elements
see page B50

SSS

Max. speed:	3.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	2.50 Nm

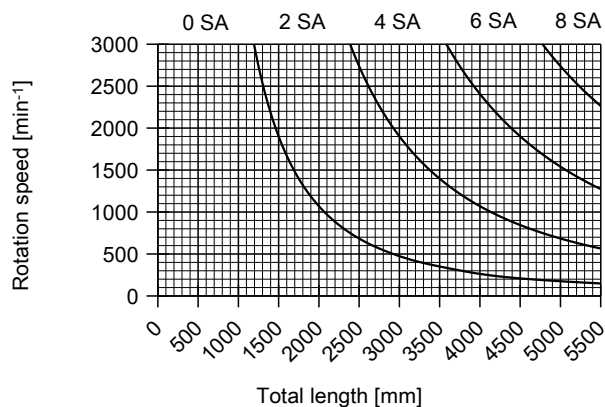
Drive element	KGT
---------------	-----

Max. rotation speed:	3000 min ⁻¹
Diameter:	32 mm
Pitch:	5 / 10 / 20 / 40 / 60 mm
Moment of inertia:	6.45 · 10 ⁻⁴ kgm ² /m



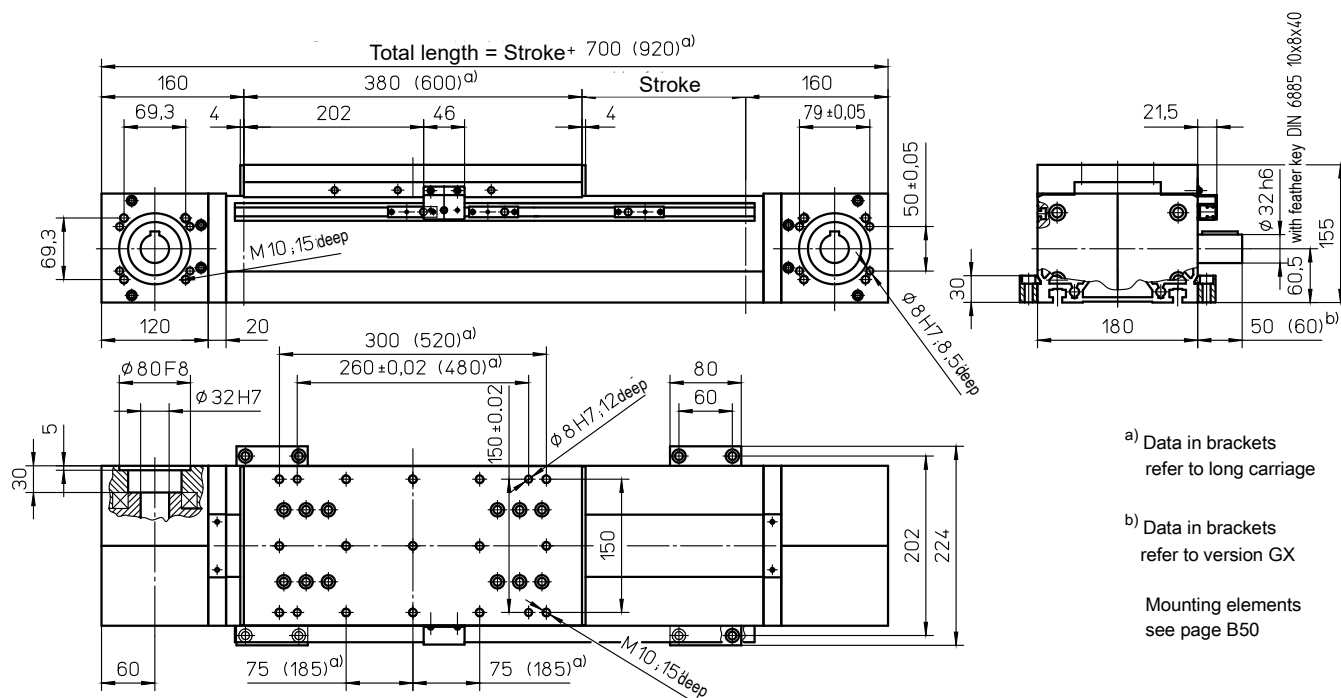
	SSS
Forces	Dynamic [N]
F_x	12000
F_y	6000
F_z	12000
$-F_z$	6000
Moments	Dynamic [Nm]
M_x	1500
M_y	3000 (4000)
M_z	1500 (2000)

Spindle support (SA)



Page B40

with toothed belt drive and double linear guide (ZSS)



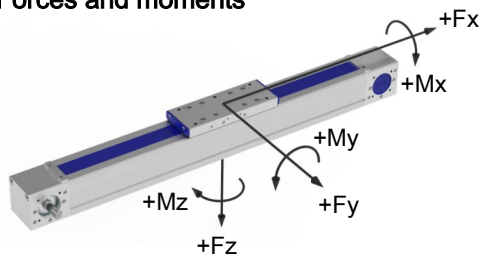
Weights

ZSS

Basic length without stroke:	39.70 kg
100 mm stroke:	2.60 kg
Entire carriage 380 mm:	14.65 kg
Entire carriage 600 mm:	15.75 kg

Max. total length: 6200 mm
(longer on request)

Forces and moments



Forces	ZSS Dynamic [N]
$F_x^d)$	6000
F_y	8000
F_z	15000
$-F_z$	8000
Moments	ZSS Dynamic [Nm]
M_x	1800
M_y	3600 (4800)
M_z	1800 (2400)

^{d)} Maximum value (see diagram "F_x-v-Diagram")

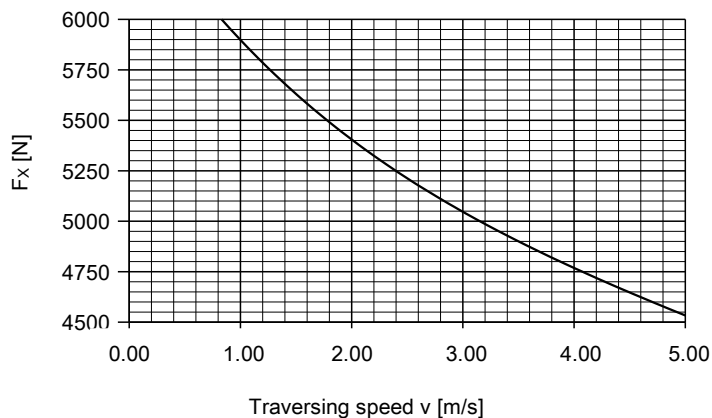
Data in brackets refer to long carriage plate (600)

Technical Data

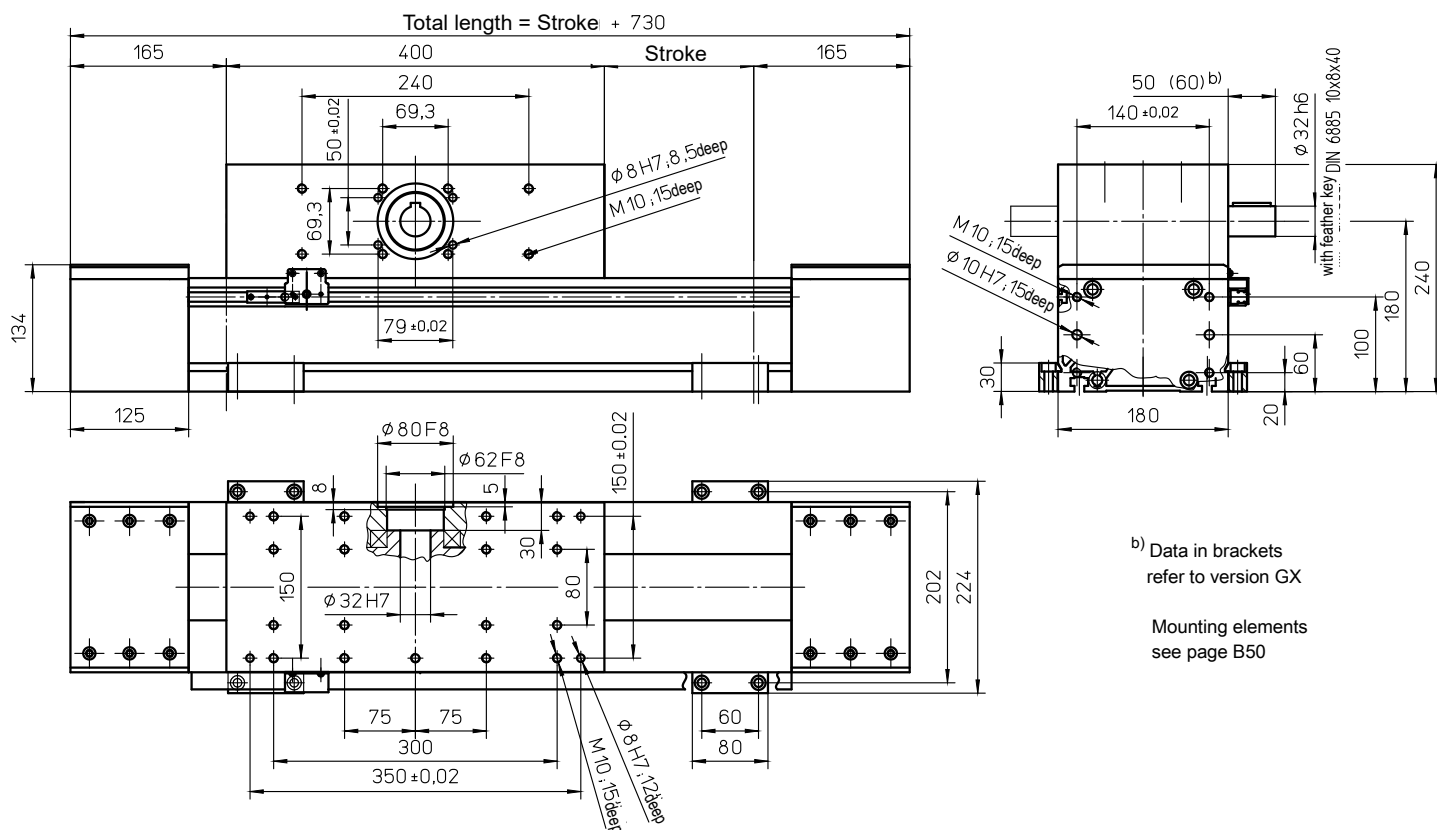
ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	8.00 Nm
Moment of inertia:	4.65 • 10 ⁻² kgm ²
Drive element:	Toothed belt 75 AT10
Stroke per revolution:	320 mm

F_x - v - Diagram



with toothed belt drive and double linear guide (ASS)



b) Data in brackets refer to version GX

Mounting elements see page B50

Weights ASS

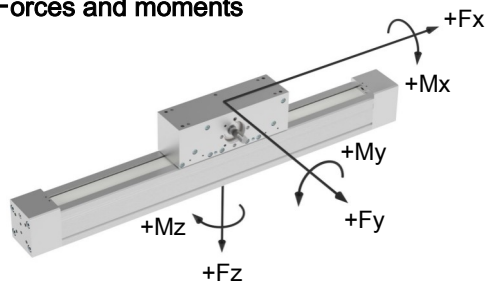
Basic length without stroke:	51.50 kg
100 mm stroke:	3.60 kg
Carriage drive 400 mm:	27.35 kg

Max. total length: 6200 mm
(longer on request)

Technical Data ASS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	8.00 Nm
Moment of inertia:	7.75 • 10 ⁻² kgm ²
Drive element:	Toothed belt 75 AT10
Stroke per revolution:	320 mm

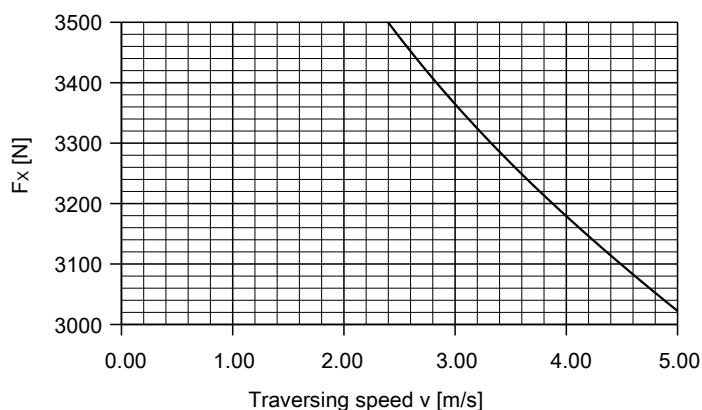
Forces and moments



	ASS
Forces	Dynamic [N]
F_x^{d)}	3500
F_y	8000
F_z	15000
-F_z	8000
Moments	Dynamic [Nm]
M_x	1800
M_y	3600 (4800)
M_z	1800 (2400)

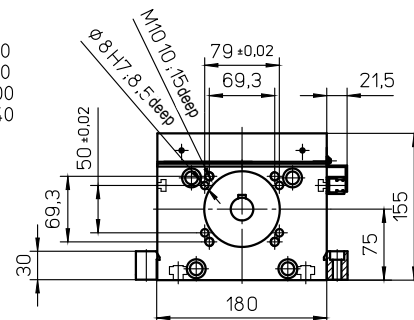
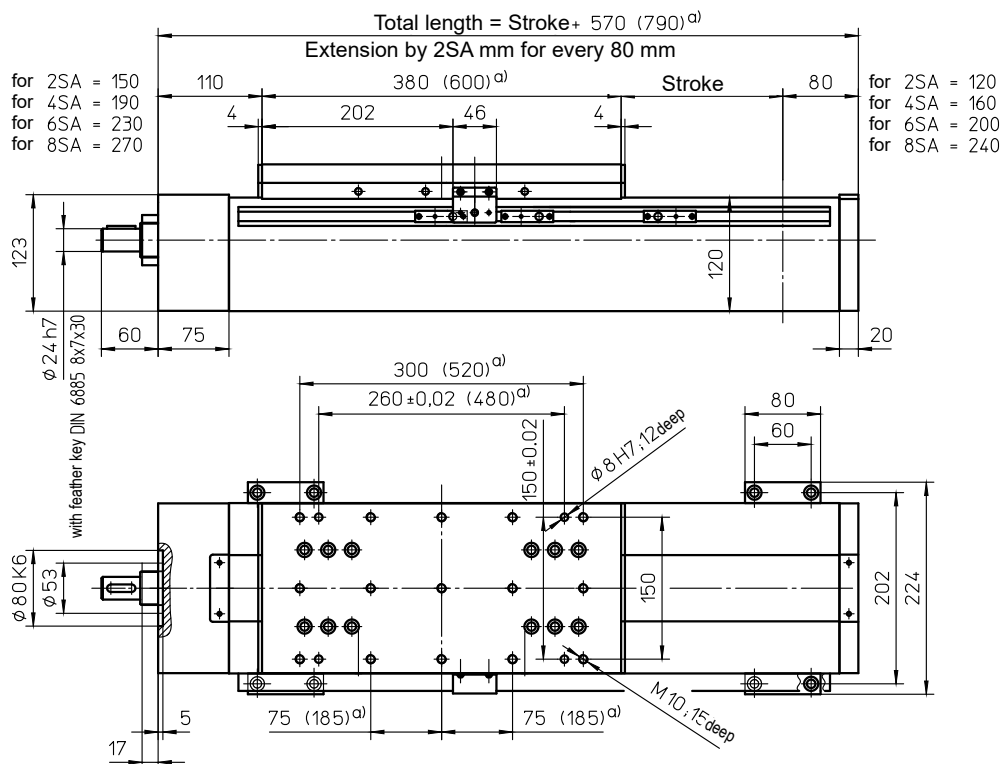
^{d)} Maximum value (see diagram "F_x-v-Diagram")

F_x - v - Diagram



For mechanical linear drives with roller guide, the static load rating "C_{stat}" (page TL 11) applies for static loads.

with ball screw (KGT) and double linear guide (SSS)



a) Data in brackets refer to long carriage

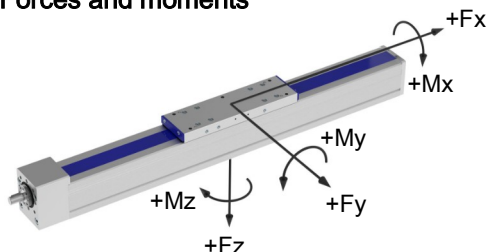
Mounting elements see page B50

Weights SSS

Basic length without stroke:	37.00 kg
100 mm stroke:	3.00 kg
Entire carriage drive 380 mm:	14.30 kg
Entire carriage drive 600 mm:	15.40 kg

Max. total length: 5600 mm
(longer on request)

Forces and moments



Forces	SSS Dynamic [N]
F_x^d	12000 *
F_y	8000
F_z	15000
$-F_z$	8000
Moments	Dynamic [Nm]
M_x	1800
M_y	3600 (4800)
M_z	1800 (2400)

Data in brackets refer to long carriage plate (600)

* at KGT 3240 and 3260: 8000 N

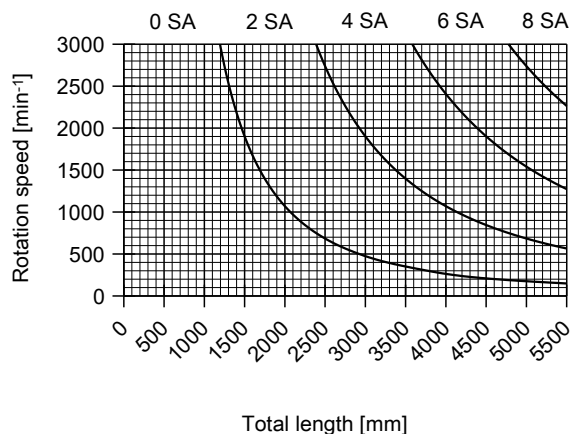
Technical Data SSS

Max. total speed:	3.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	2.50 Nm

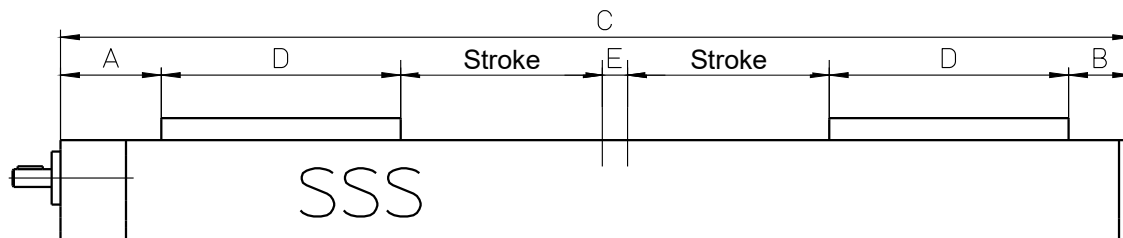
Drive element KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	32 mm
Pitch:	5 / 10 / 20 / 40 / 60 mm
Moment of inertia:	$6.45 \cdot 10^{-4} \text{ kgm}^2/\text{m}$

Spindle support (SA)



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

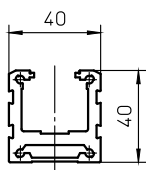


Unit size	A [mm]	B [mm]	Total length C [mm]	D [mm]	E [mm]	Screw drive
Beta 60-SGV Beta 60-SSS	65	35	2 x stroke + 460 (560) ^{a)} + E 120 mm extension for every 4 SA	180 (230) ^{a)}	min. 40 without SA	Tr 20x4 or KGT 2005
Beta 70-C-SRS Beta 70-C-SSS	80	50	2 x stroke + 510 (610) ^{a)} + E 80 mm extension for every 4 SA	190 (240) ^{a)}	min. 30 without SA min. 30 ^{b)} without SA	Tr 16x4 or KGT 1605
Beta 80-SRS Beta 80-SSS	105	65	2 x stroke + 590 (710) ^{a)} + E 100 mm extension for every 4 SA	210 (270) ^{a)}	min. 30 without SA min. 30 ^{b)} without SA	Tr 20x4 or KGT 2005
Beta 110-SRS Beta 110-SSS	105	55	2 x stroke + 800 (1160) ^{a)} + E 120 mm extension for every 4 SA	320 (500) ^{a)}	min. 50 without SA min. 30 without SA	Tr 24x5 or KGT 2505

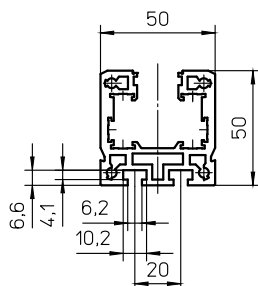
For detailed measurements, see main data sheet for respective size (version).

a) Data in brackets apply to long carriage plate.

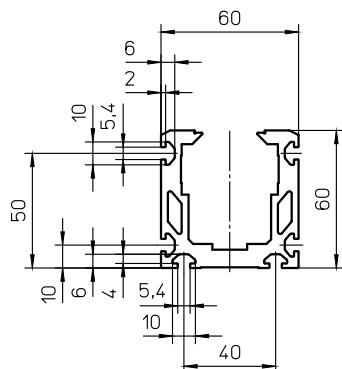
b) Value applies to guide Bosch-Rexroth. For guide THK applies value 40.


Profile Beta 40

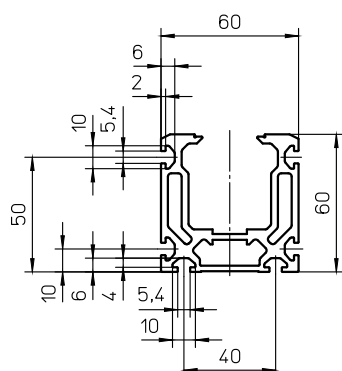
Specific mass [kg/m]	1.71
Surface measure [mm ²]	635
Geometrical moment of inertia I _y [mm ⁴]	88917
Geometrical moment of inertia I _z [mm ⁴]	133350
Section modulus W _y [mm ³]	3757
Section modulus W _z [mm ³]	6665


Profile Beta 50-C

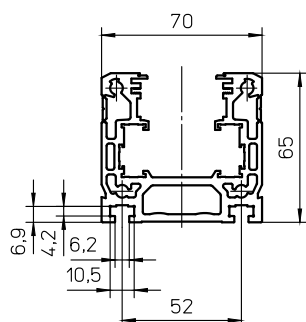
Specific mass [kg/m]	2.45
Surface measure [mm ²]	908
Geometrical moment of inertia I _y [mm ⁴]	236683
Geometrical moment of inertia I _z [mm ⁴]	295187
Section modulus W _y [mm ³]	8622
Section modulus W _z [mm ³]	11804


Profile Beta 60-SGV-SSS

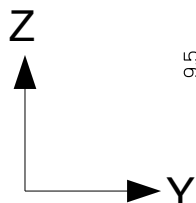
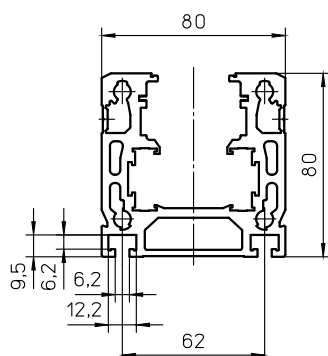
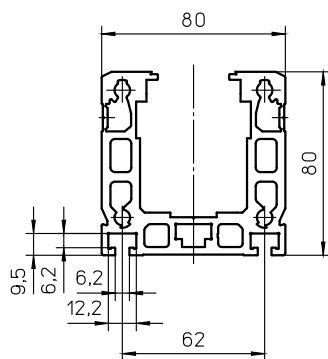
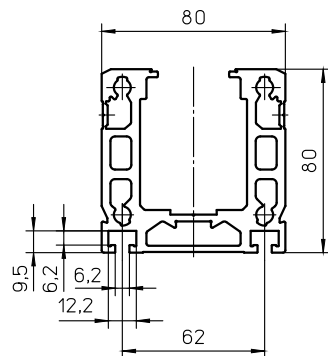
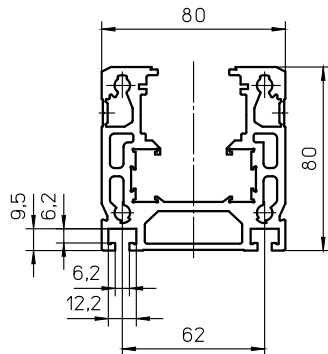
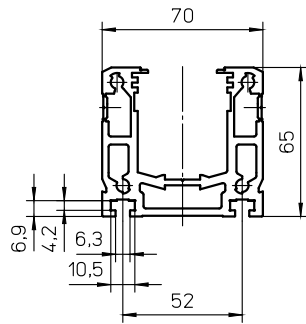
Specific mass [kg/m]	3.35
Surface measure [mm ²]	1242
Geometrical moment of inertia I _y [mm ⁴]	473055
Geometrical moment of inertia I _z [mm ⁴]	577258
Section modulus W _y [mm ³]	13624
Section modulus W _z [mm ³]	19236


Profile Beta 60-ZSS

Specific mass [kg/m]	3.02
Surface measure [mm ²]	1117
Geometrical moment of inertia I _y [mm ⁴]	400283
Geometrical moment of inertia I _z [mm ⁴]	521983
Section modulus W _y [mm ³]	11929
Section modulus W _z [mm ³]	17380


Profile Beta 70-C-ZRS-SRS

Specific mass [kg/m]	3.70
Surface measure [mm ²]	1370
Geometrical moment of inertia I _y [mm ⁴]	583502
Geometrical moment of inertia I _z [mm ⁴]	852344
Section modulus W _y [mm ³]	15714
Section modulus W _z [mm ³]	24348



Profile Beta 70-C-ZSS-SSS

Specific mass [kg/m]	3.70
Surface measure [mm ²]	1370
Geometrical moment of inertia I _y [mm ⁴]	563059
Geometrical moment of inertia I _z [mm ⁴]	852507
Section modulus W _y [mm ³]	14743
Section modulus W _z [mm ³]	24335

Profile Beta 80-ZRS-SRS

Specific mass [kg/m]	5.64
Surface measure [mm ²]	2090
Geometrical moment of inertia I _y [mm ⁴]	1294343
Geometrical moment of inertia I _z [mm ⁴]	1732340
Section modulus W _y [mm ³]	30263
Section modulus W _z [mm ³]	43258

Profile Beta 80-ZSS

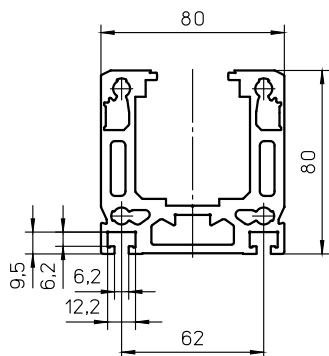
Specific mass [kg/m]	5.46
Surface measure [mm ²]	2040
Geometrical moment of inertia I _y [mm ⁴]	1326597
Geometrical moment of inertia I _z [mm ⁴]	1693634
Section modulus W _y [mm ³]	30448
Section modulus W _z [mm ³]	42340

Profile Beta 80-SGV-SSS

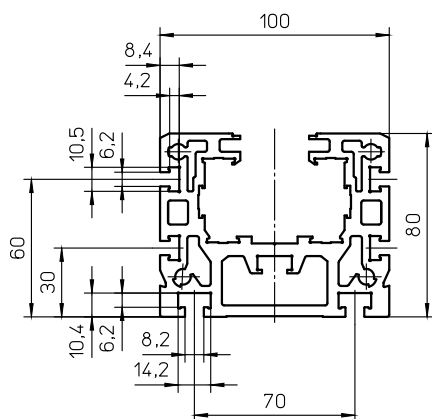
Specific mass [kg/m]	5.60
Surface measure [mm ²]	2057
Geometrical moment of inertia I _y [mm ⁴]	1372019
Geometrical moment of inertia I _z [mm ⁴]	1677956
Section modulus W _y [mm ³]	30572
Section modulus W _z [mm ³]	41846

Profile Beta 80-C-ZRS

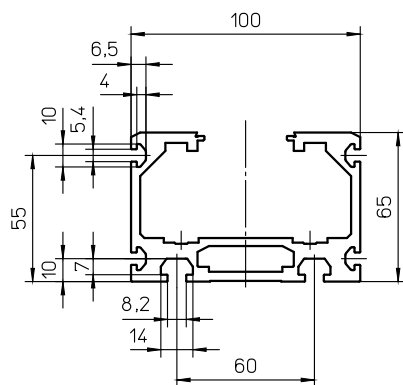
Specific mass [kg/m]	5.68
Surface measure [mm ²]	2105
Geometrical moment of inertia I _y [mm ⁴]	1299969
Geometrical moment of inertia I _z [mm ⁴]	1759672
Section modulus W _y [mm ³]	30981
Section modulus W _z [mm ³]	43990


Profile Beta 80-C-ZSS

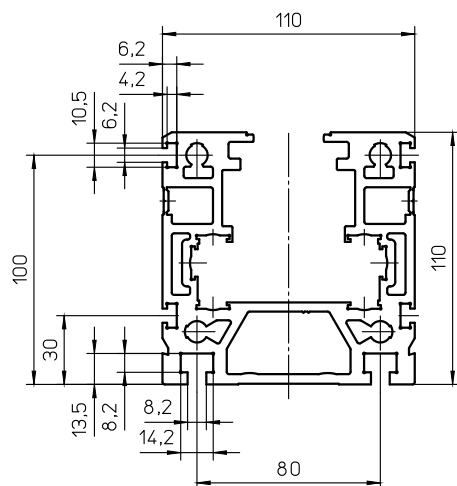
Specific mass [kg/m]	5.92
Surface measure [mm ²]	2191
Geometrical moment of inertia I _y [mm ⁴]	1376276
Geometrical moment of inertia I _z [mm ⁴]	1772609
Section modulus W _y [mm ³]	30375
Section modulus W _z [mm ³]	44315


Profile Beta 100

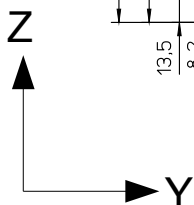
Specific mass [kg/m]	7.97
Surface measure [mm ²]	2950
Geometrical moment of inertia I _y [mm ⁴]	1782959
Geometrical moment of inertia I _z [mm ⁴]	3507213
Section modulus W _y [mm ³]	40598
Section modulus W _z [mm ³]	70137

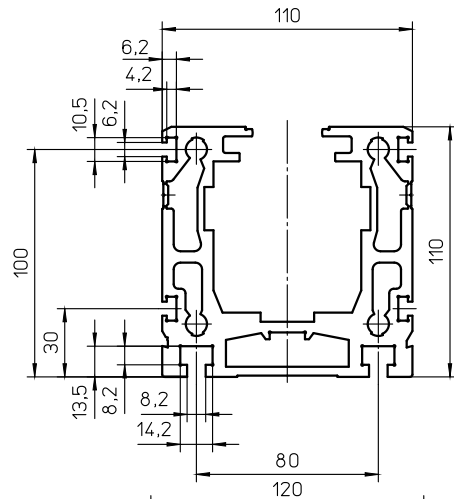

Profile Beta 100-D

Specific mass [kg/m]	4.87
Surface measure [mm ²]	1804
Geometrical moment of inertia I _y [mm ⁴]	917779
Geometrical moment of inertia I _z [mm ⁴]	2328911
Section modulus W _y [mm ³]	23869
Section modulus W _z [mm ³]	46578


Profile Beta 110-ZRS-SRS

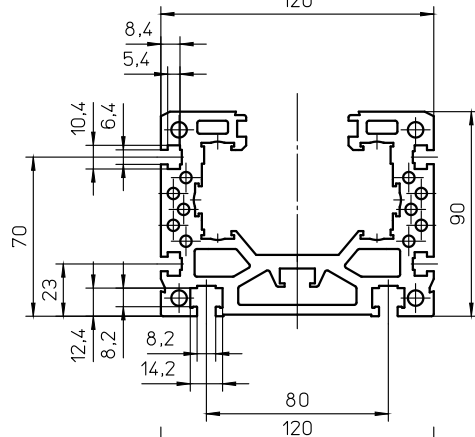
Specific mass [kg/m]	10.51
Surface measure [mm ²]	3891
Geometrical moment of inertia I _y [mm ⁴]	5000778
Geometrical moment of inertia I _z [mm ⁴]	6042980
Section modulus W _y [mm ³]	85615
Section modulus W _z [mm ³]	109862





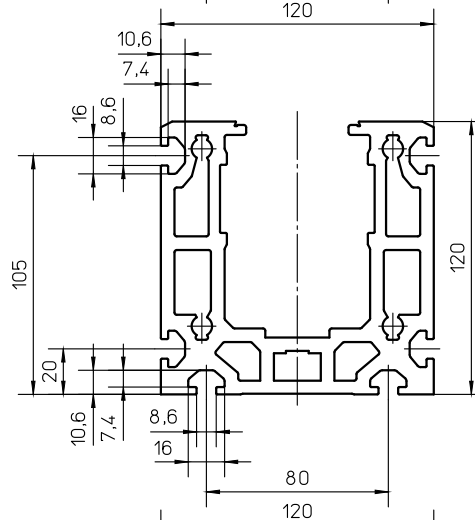
Profile Beta 110-ZSS-SSS / 110-C-SGV

Specific mass [kg/m]	10.54
Surface measure [mm ²]	3902
Geometrical moment of inertia I _y [mm ⁴]	4974348
Geometrical moment of inertia I _z [mm ⁴]	5898662
Section modulus W _y [mm ³]	79469
Section modulus W _z [mm ³]	106973



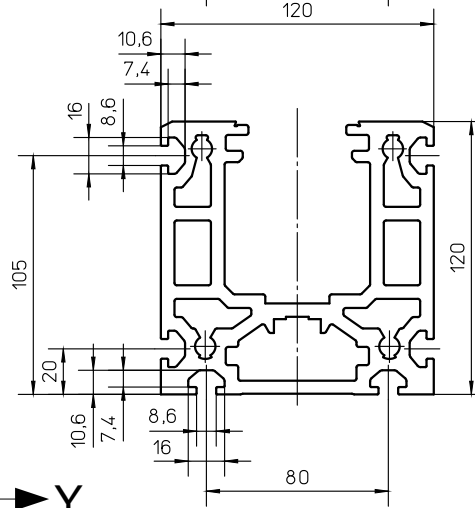
Profile Beta 120

Specific mass [kg/m]	10.47
Surface measure [mm ²]	3876
Geometrical moment of inertia I _y [mm ⁴]	3095671
Geometrical moment of inertia I _z [mm ⁴]	7114115
Section modulus W _y [mm ³]	62753
Section modulus W _z [mm ³]	118478



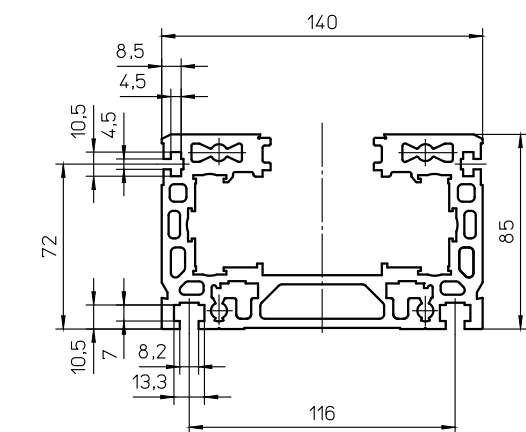
Profile Beta 120-C-SSS

Specific mass [kg/m]	13.24
Surface measure [mm ²]	4902
Geometrical moment of inertia I _y [mm ⁴]	7217779
Geometrical moment of inertia I _z [mm ⁴]	8754150
Section modulus W _y [mm ³]	104573
Section modulus W _z [mm ³]	145902

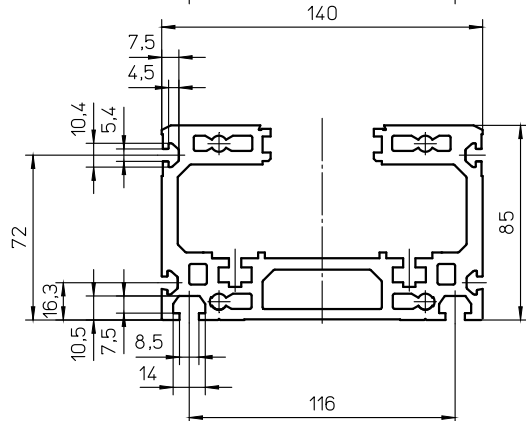


Profile Beta 120-C-ZSS

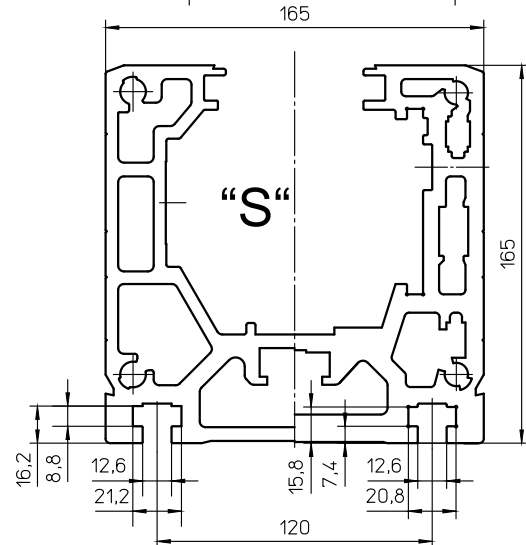
Specific mass [kg/m]	13.77
Surface measure [mm ²]	5100
Geometrical moment of inertia I _y [mm ⁴]	7149181
Geometrical moment of inertia I _z [mm ⁴]	8947351
Section modulus W _y [mm ³]	109336
Section modulus W _z [mm ³]	149123


Profile Beta 140

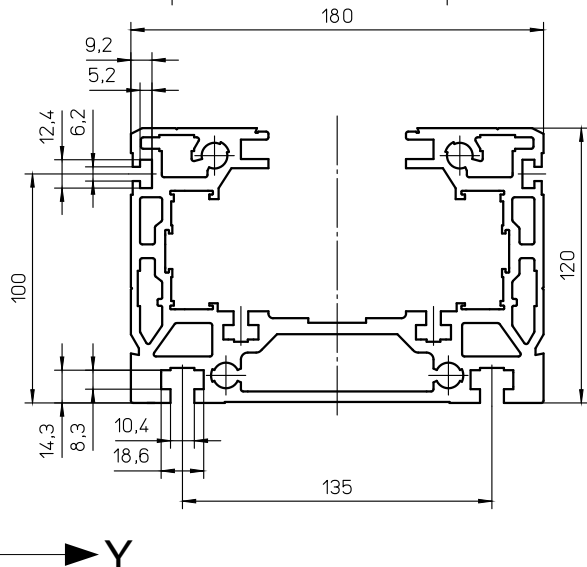
Specific mass [kg/m]	10.68
Surface measure [mm ²]	3955
Geometrical moment of inertia I _y [mm ⁴]	3159202
Geometrical moment of inertia I _z [mm ⁴]	9975915
Section modulus W _y [mm ³]	69334
Section modulus W _z [mm ³]	184852


Profile Beta 140-C

Specific mass [kg/m]	10.11
Surface measure [mm ²]	3743
Geometrical moment of inertia I _y [mm ⁴]	3127894
Geometrical moment of inertia I _z [mm ⁴]	9071334
Section modulus W _y [mm ³]	67067
Section modulus W _z [mm ³]	129589

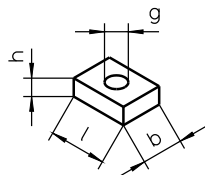

Profile Beta 165 (-C)

	"S"	
Specific mass [kg/m]	19.95	25.13
Surface measure [mm ²]	7388	9308
Geometrical moment of inertia I _y [mm ⁴]	21396126	25391136
Geometrical moment of inertia I _z [mm ⁴]	25983180	31673479
Section modulus W _y [mm ³]	228529	264686
Section modulus W _z [mm ³]	314947	383919

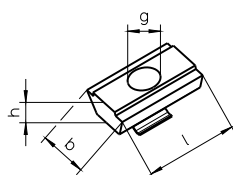

Profile Beta 180 (-C)

Specific mass [kg/m]	15.85
Surface measure [mm ²]	5870
Geometrical moment of inertia I _y [mm ⁴]	9351063
Geometrical moment of inertia I _z [mm ⁴]	24300411
Section modulus W _y [mm ³]	137689
Section modulus W _z [mm ³]	269902

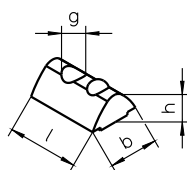
NS 1 - 7 / 11



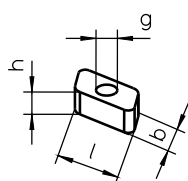
NS 4.1 / 10



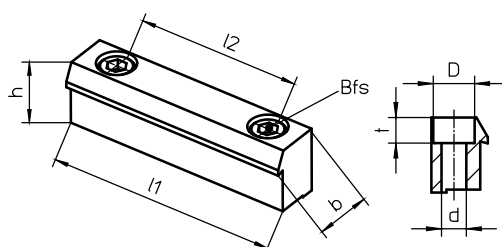
NS 8 / 9 / 12 -14



RM 2 / 4 / 6



BL 1..7



* For further information on page C..E,
see catalogue page Z1.

Bfs = Mounting screw DIN 912 / ISO 4762

Lineardrive	Page*	NS	ID No.	l [mm]	b [mm]	h [mm]	g
Beta 40	C and D	7	12649	16	5.9	1.5	M3
Beta 50-C	E	2	10557	16	10	4	M5
		RM2	15370	10	6	4	M4
Beta 60	C, D And E	8	14644	12	8	4.5	M5
		9	14652	12	8	4.5	M4
		12	16280	12	8	4.5	M3
Beta 70-C	E	2	10557	16	10	4	M5
		RM2	15370	10	6	4	M4
Beta 80(-C)	E	3	10558	20	12	5	M6
		RM4	15371	13	8	6	M5
Beta 100	E	4	10559	18	14	6	M8
		4.1	16552	20	13	6	M8
		10	16499	20	13	6	M6
		RM4	15371	13	8	6	M5
	C and D	1	10556	12	10	4	M4
		2	10557	16	10	4	M5
Beta 100-D Beta 140-C	E	RM2	15370	10	6	4	M4
		4.1	16552	20	13	6	M8
	C and D	10	16499	20	13	6	M6
		8	14644	12	8	4.5	M5
		9	14652	12	8	4.5	M4
		12	16280	12	8	4.5	M3
Beta 110(-C)	E	4.1	16552	20	13	6	M8
		5	10560	20	14	8	M8
		10	16499	20	13	6	M6
	C and D	1	10556	12	10	4	M4
		2	10557	16	10	4	M5
		11	13510	12	10	3.5	M4
Beta 120	E	RM2	15370	10	6	4	M4
		4.1	16552	20	13	6	M8
		5	10560	20	14	8	M8
	C and D	10	16499	20	13	6	M6
		1	10556	12	10	4	M4
		2	10557	16	10	4	M5
Beta 120-C	C, D and E	RM2	15370	10	6	4	M4
		14	18481	22	13.5	7.6	M8
Beta 140	E	13	18479	22	13.5	7.6	M4
		3	10558	20	12	5	M6
		4.1	16552	20	13	6	M8
		10	16499	20	13	6	M6
	C and D	RM4	15371	13	8	6	M5
		1	10556	12	10	4	M4
Beta 165(-C)	E	RM2	15370	10	6	4	M4
		6	10561	25	18	8	M10
Beta 180(-C)	E	RM6	15372	18	10	8	M6
		6	10561	25	18	8	M10
	C and D	RM6	15372	18	10	8	M6
		3	10558	20	12	5	M6
		RM2	15370	10	6	4	M4

Linear drive	BL	ID No.	l1 [mm]	l2 [mm]	b [mm]	h [mm]	Bfs	D [mm]	d [mm]	t [mm]
Beta 40	1	10552	70	50	15	17,5	M6	11	6,6	6,8
Beta 50-C	1	10552	70	50	15	17,5	M6	11	6,6	6,8
Beta 60	5	14489	70	50	15	13	M6	11	6,6	6,8
Beta 70-C	1	10552	70	50	15	17,5	M6	11	6,6	6,8
Beta 80(-C)	2	10553	70	50	15	20	M6	11	6,6	6,8
Beta 100	2	10553	70	50	15	20	M6	11	6,6	6,8
Beta 100-D	5	14489	70	50	15	13	M6	11	6,6	6,8
Beta 110(-C)	2	10553	70	50	15	20	M6	11	6,6	6,8
Beta 120	1	10552	70	50	15	17,5	M6	11	6,6	6,8
Beta 120-C	7	18430	70	50	16	25	M6	11	6,6	7
Beta 140(-C)	2	10553	70	50	15	20	M6	11	6,6	6,8
Beta 165(-C)	3	10554	80	60	25	30	M8	15	9	9
Beta 180(-C)	3	10554	80	60	25	30	M8	15	9	9

Example:

Beta 80-ZRS-32 AT5-E-220-1000-1420-AK-AZ1-8RM4-1

Product

Size (version*)

Drive

Z = Toothed belt drive

0 = Without drive

A = Powered carriage

Guide system

R = Roller guide

S = Rail guide

G = Sliding guide

0 = Without guide

Model

S = Standard

Drive specifications

Width and type of toothed belt

Stroke per revolution

Stroke

Total length

Cover

AK = Cover band (Note: Total length is greater for Beta 80 and Beta 100)

Accessories

AZ1 = Drive shaft short, mounting side **C**

AZ1-GX = Drive shaft long without feather key groove, mounting side **C**

AZ2 = Drive shaft short, mounting side **D**

AZ2-GX = Drive shaft long without feather key groove, mounting side **D**

AZ6 = Drive shaft short, mounting side **C** and **D**

AZ6-GX/C = Drive shaft short, mounting side **D** and
Drive shaft long without feather key groove, mounting side **C**

AZ6-GX/D = Drive shaft short, mounting side **C** and
Drive shaft long without feather key groove, mounting side **D**
Further arrangements for drive shaft, see **page Z1**

AZx-S = Drive shaft special (x=1 side **C**, x=2 side **D**, x=6 side **C** und **D**)

EO2 / EO10 = Inductive limit switch NC with 2 m / 10 m cable fitted

ES2 / ES10 = Inductive limit switch NO with 2 m / 10 m cable fitted

EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted

BL = Mounting bracket

NS / RM = Sliding block 1 .. 14 / Rhomb nut 2 .. 6 (See Table on **page B50**)

Special design

0 = Standard

1 = Special (add specification description)

Further accessories (separate position)

MGK = Motor mounting and coupling (according to dimension sheet)

URT = Deflection belt drive (according to dimension sheet)

* e.g. Beta 80-ZSS or Beta 80-C-ZSS

Example:

Beta 80-SRS-M-2020-1000-1430-2SA-2ES2-0

Product

Size (version*)

Drive

S = Spindle

0 = Without drive

Guide system

R = Roller guide

S = Rail guide

G = (Auxiliary) sliding guide

0 = Without guide

Model

S = Standard

V = Feed axis

F = Guide outside

Type of drive

M = Single nut (ball screw)

MM = Double nut (ball screw)

(TR = Trapezoidal nut - optional)

Drive specifications

Diameter and pitch (ball screw)

(Diameter x pitch (trapezoidal screw) - optional)

Stroke

Total length

Spindle support (SA)

(quantity)

Accessories

EO2 / EO10 = Inductive limit switch NC with 2m / 10m cable fitted

EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted

ES2 / ES10 = Inductive limit switch NO with 2m / 10m cable fitted

BL = Mounting bracket

NS / RM = Sliding block 1 .. 14 / Rhomb nut 2 .. 6 (see Table on page B50)

Special design

0 = Standard

1 = Special (add specification description)

Further accessories (separate position)

MGK = Motor mounting and coupling (according to dimension sheet)

URT = Deflection belt drive (according to dimension sheet)

KRG = Bevel gear directly mounted

For mounting of limit switches and lubrication points, see page Z1

Cover band comes as standard for screw drive

Further drives available on request:

MK or TK (= single nut made of plastic), KK (= double nut made of plastic)

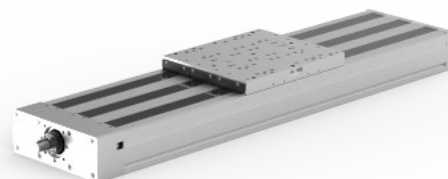
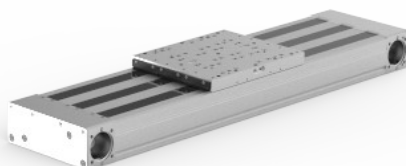
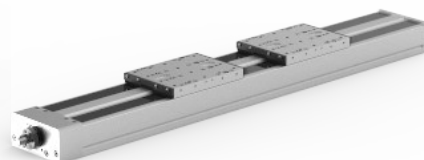
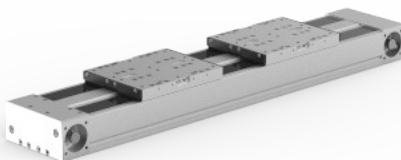
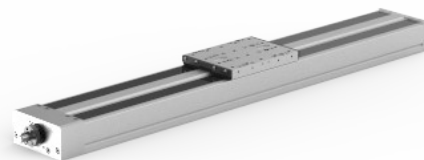
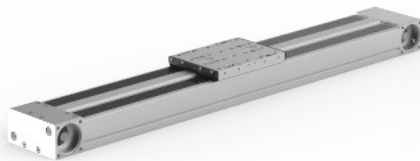
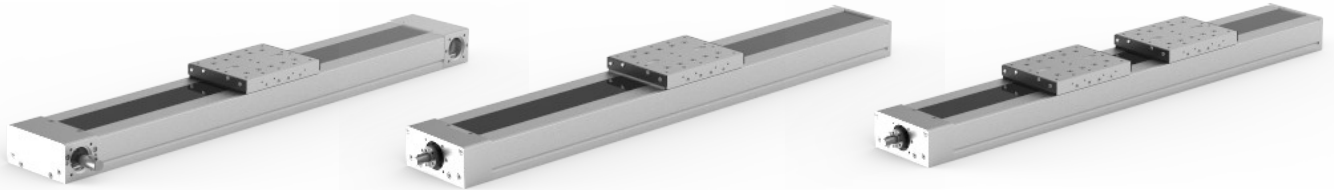
* e.g. Beta 70-A-SRS or Beta 70-C-SRS

Notes and drawing

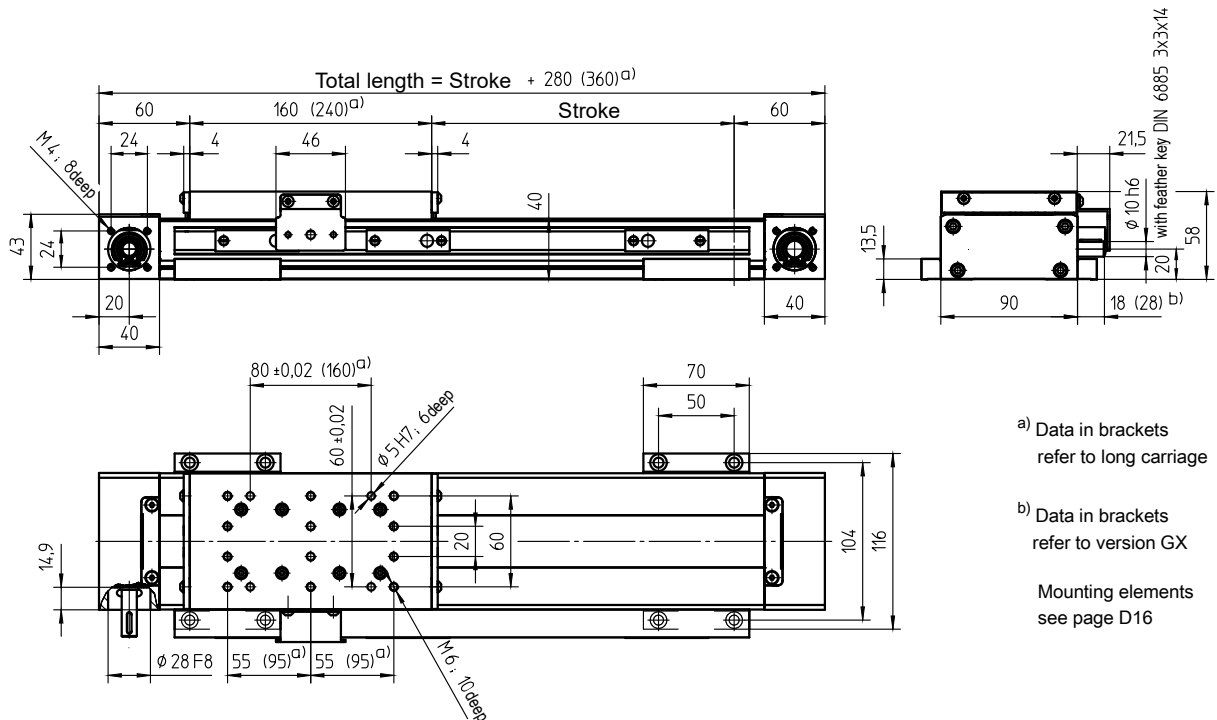
Chapter D

Compact Module

HSB-delta[®]



with toothed belt drive and roller guide (ZRS)



a) Data in brackets refer to long carriage

b) Data in brackets refer to version GX

Mounting elements see page D16

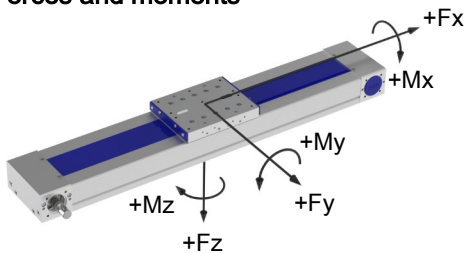
Weights ZRS

Basic length without stroke:	2.95 kg
100 mm stroke:	0.42 kg
Entire carriage 160 mm:	1.30 kg
Entire carriage 240 mm:	1.85 kg
Max. total length:	4000 mm

Technical Data ZRS

Max. total speed:	5.00 m/s
Max. acceleration:	30 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	2.00 Nm
Moment of inertia:	4.65 • 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 32 AT5-E
Stroke per revolution:	100 mm

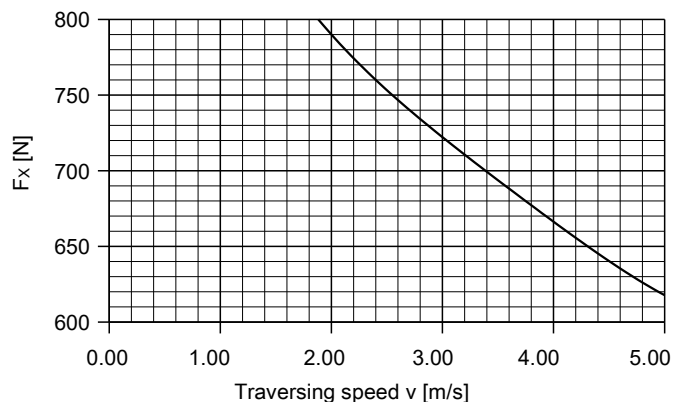
Forces and moments



Forces	ZRS Dynamic [N]
F _x ^{d)}	800
F _y	500
F _z	1000
-F _z	1000
Moments	ZRS Dynamic [Nm]
M _x	60
M _y	80 (110)
M _z	80 (110)

^{d)} Maximum value (see diagram "F_x - v - Diagram")
Data in brackets refer to long carriage (240)

F_x - v - Diagram



>> **Note** << Drive shaft is not changeable

Please define position, e.g. "AZ1"! (See Ordering Code)

Technical drawing of the D16 carriage showing three views: side, front, and end view.

Side View: Shows the profile of the carriage. Dimensions include a total length of $\text{Stroke} + 255 (335)^a$, a central slot width of Stroke , and a mounting hole diameter of $\phi 24 \text{ K6}$. The carriage is equipped with a feather key (DIN 6885 3x3x14).

Front View: Shows the top of the carriage. Dimensions include a width of 80 ± 0.02 , a central slot width of 60 ± 0.02 , and a total width of 116 . Mounting holes are specified as $M4, 8 \text{ deep}$ and $M6, 10 \text{ deep}$.

End View: Shows the side of the carriage. Dimensions include a width of 90 , a height of 13.5 , and a total height of 58 . Mounting holes are specified as $M4, 8 \text{ deep}$.

Annotations:

- with feather key DIN 6885 3x3x14
- $M4, 8 \text{ deep}$
- $M6, 10 \text{ deep}$

Notes:

- $a)$ Data in brackets refer to long carriage
- Mounting elements see page D16

Technical Data	SRS
Max. total speed:	0.50 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	0.30 Nm

Diagram illustrating a beam element with forces and moments acting on it. The forces shown are $+F_x$, $+F_y$, and $+F_z$. The moments shown are $+M_x$, $+M_y$, and $+M_z$.

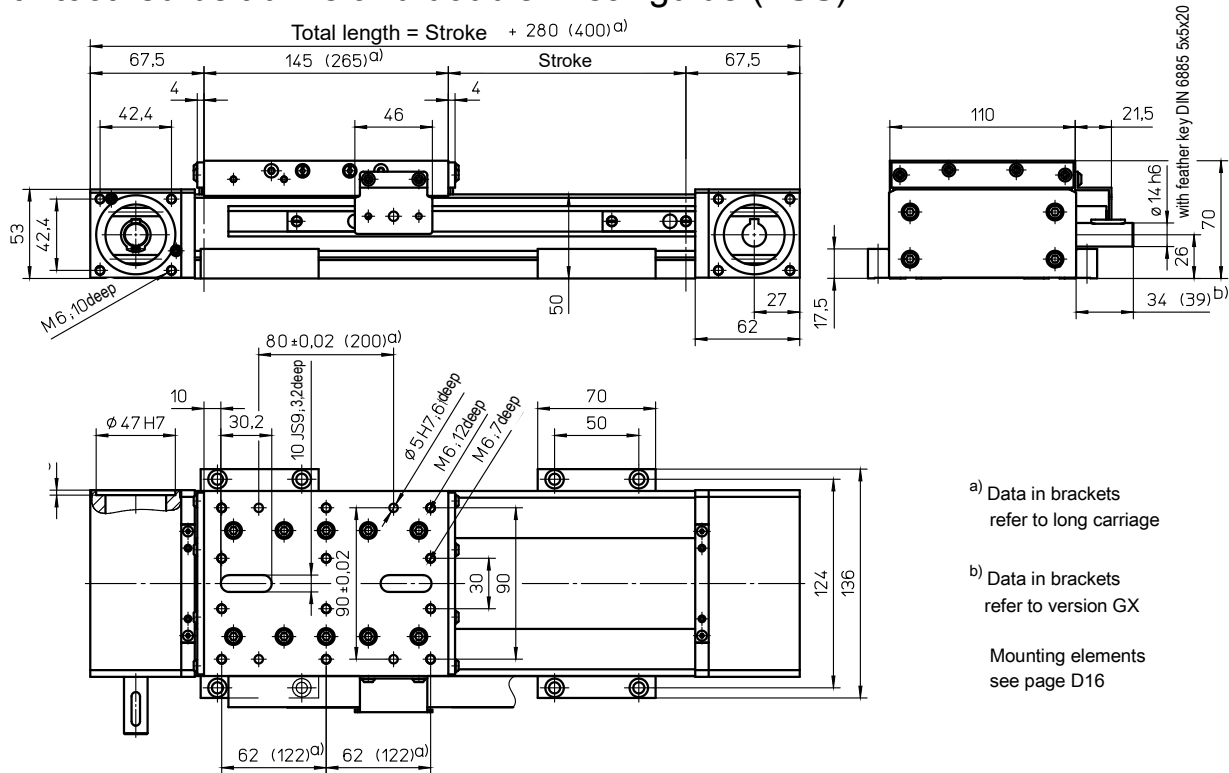
Drive element	KGT
Max. rotation speed:	3000 min ⁻¹
Diameter:	12 mm
Pitch:	5 / 10 mm
Moment of inertia:	1.20 • 10 ⁻⁵ kgm ² /m

A line graph showing the relationship between rotation speed and total length for two different SA conditions. The y-axis is labeled 'Rotation speed [min⁻¹]' and ranges from 0 to 3000 with major grid lines every 500 units and minor grid lines every 100 units. The x-axis is labeled 'Total length [mm]' and ranges from 0 to 1500 with major grid lines every 500 units and minor grid lines every 100 units. Two curves are plotted: one for '0 SA' and one for '2 SA'. The '0 SA' curve starts at approximately (750, 3000) and decreases to (1500, 700). The '2 SA' curve starts at approximately (850, 3000) and decreases to (1500, 600).

Total length [mm]	Rotation speed [min ⁻¹] (0 SA)	Rotation speed [min ⁻¹] (2 SA)
750	3000	-
850	2200	3000
950	1700	2200
1050	1400	1700
1150	1200	1400
1250	1050	1200
1350	950	1050
1450	850	950
1500	700	600

Release: 25..03.2021

with toothed belt drive and double linear guide (ZSS)



a) Data in brackets
refer to long carriage

b) Data in brackets
refer to version GX

Mounting elements
see page D16

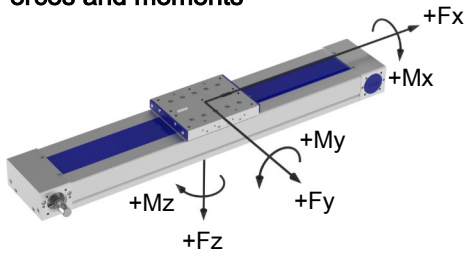
Weights ZSS

Basic length without stroke:	5.10 kg
100 mm stroke:	0.80 kg
Entire carriage 145 mm:	2.20 kg
Entire carriage 265 mm:	3.15 kg
Max. total length:	8100 mm

Technical Data ZSS

Max. total speed:	5.00 m/s
Max. acceleration:	40 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	2.0 Nm
Moment of inertia:	7.60 · 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 50 AT5-E
Stroke per revolution:	110 mm

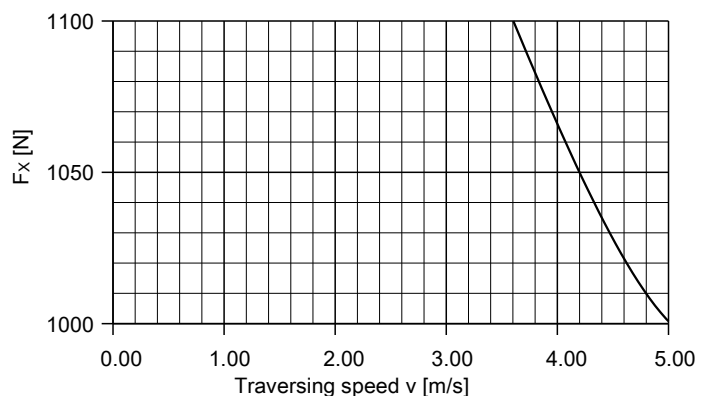
Forces and moments



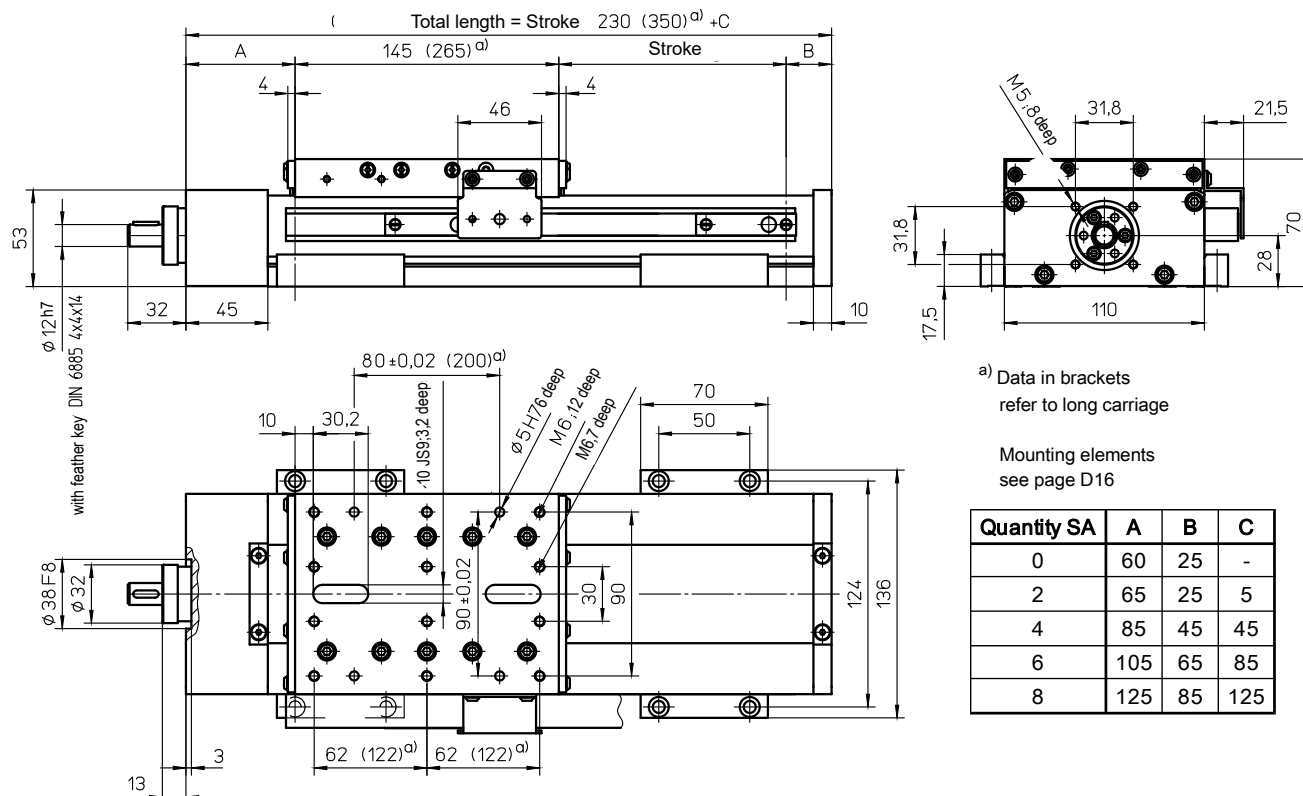
ZSS	
Forces	Dynamic [N]
F_x^{Φ}	1100
F_y	1200
F_z	3000
$-F_z$	1500
Moments	Dynamic [Nm]
M_x	500
M_y	550 (1000)
M_z	550 (1000)

^Φ Maximum value (see diagram "Fx - v-Diagram")
Data in brackets refer to long carriage (265)

Fx - v - Diagram



with ball screw (KGT) and double linear guide (SSS)



Weights

SSS

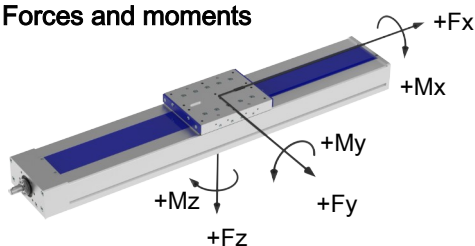
Basic length without stroke:	4.90 kg
100 mm stroke:	0.90 kg
Entire carriage 145 mm:	2.30 kg
Entire carriage 265 mm:	3.25 kg
Max. total length:	5600 mm

Technical Data

SSS

Max. total speed:	2.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	1.0 Nm

Forces and moments



Drive element

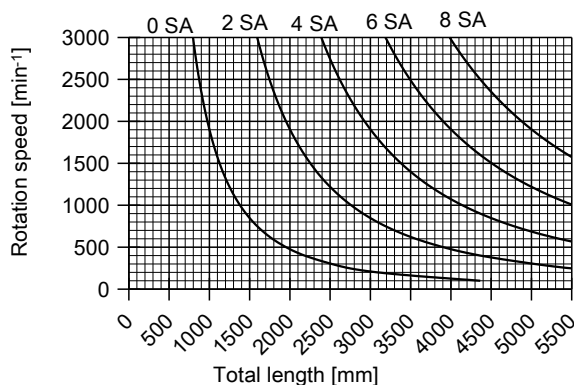
KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	16 mm
Pitch:	5 / 10 / 20 / 40 mm
Moment of inertia:	3.25 · 10 ⁻⁵ kgm ² /m

Spindle support (SA)

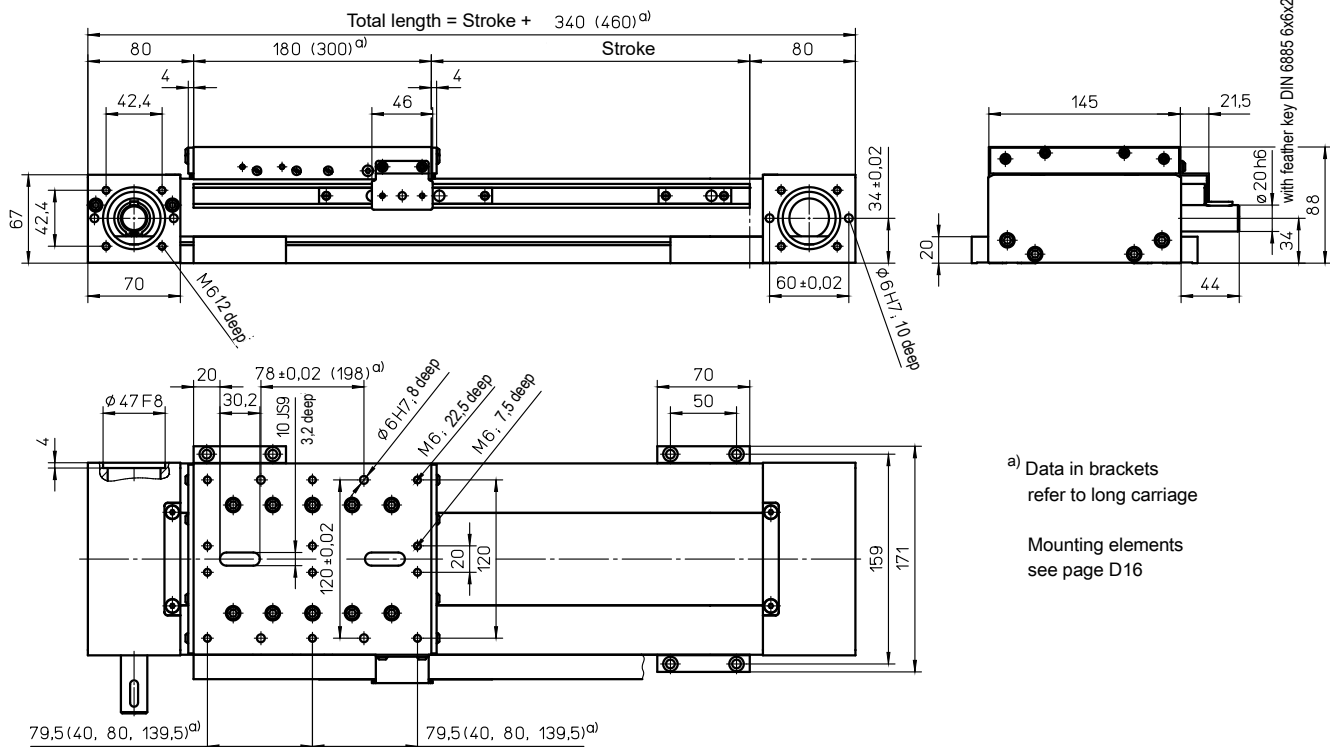
	SSS
Forces	Dynamic [N]
F _x	2000
F _y	1200
F _z	3000
-F _z	1500
Moments	Dynamic [Nm]
M _x	500
M _y	550 (1100)
M _z	550 (1100)

Data in brackets refer to long carriage (265)



Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

with toothed belt drive and double linear guide (ZSS)



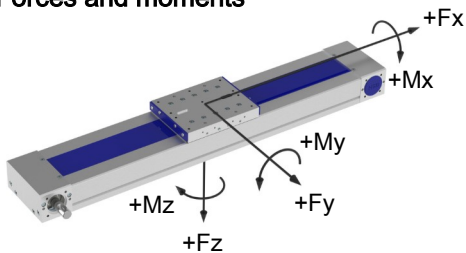
Weights ZSS

Basic length without stroke	10.40 kg
100 mm stroke:	1.30 kg
Entire carriage 180 mm:	4.50 kg
Entire carriage 300 mm:	6.10 kg
Max. total length:	8100 mm

Technical Data ZSS

Max. total speed:	5.00 m/s
Max. acceleration:	40 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	3.00 Nm
Moment of inertia:	2.85 • 10 ⁻³ kgm ²
Drive element:	Toothed belt 60 AT5-E
Stroke per revolution:	150 mm

Forces and moments

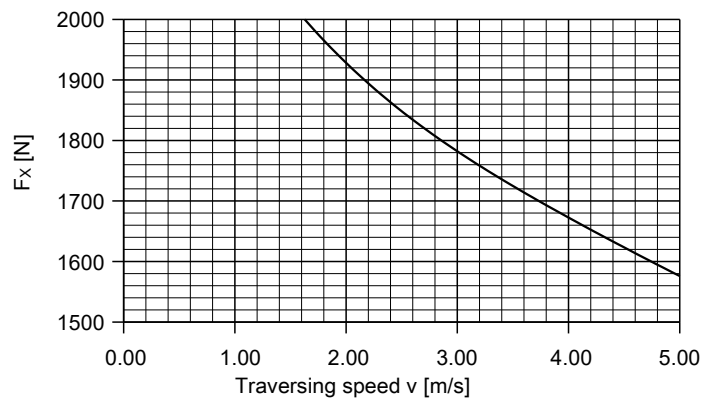


Forces	ZSS Dynamic [N]
$F_x^{d)}$	2000
F_y	2500
F_z	5000
$-F_z$	3000
Moments	ZSS Dynamic [Nm]
M_x	800
M_y	1000 (1600)
M_z	1000 (1600)

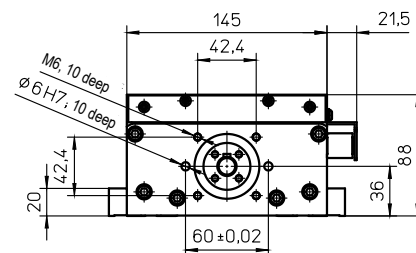
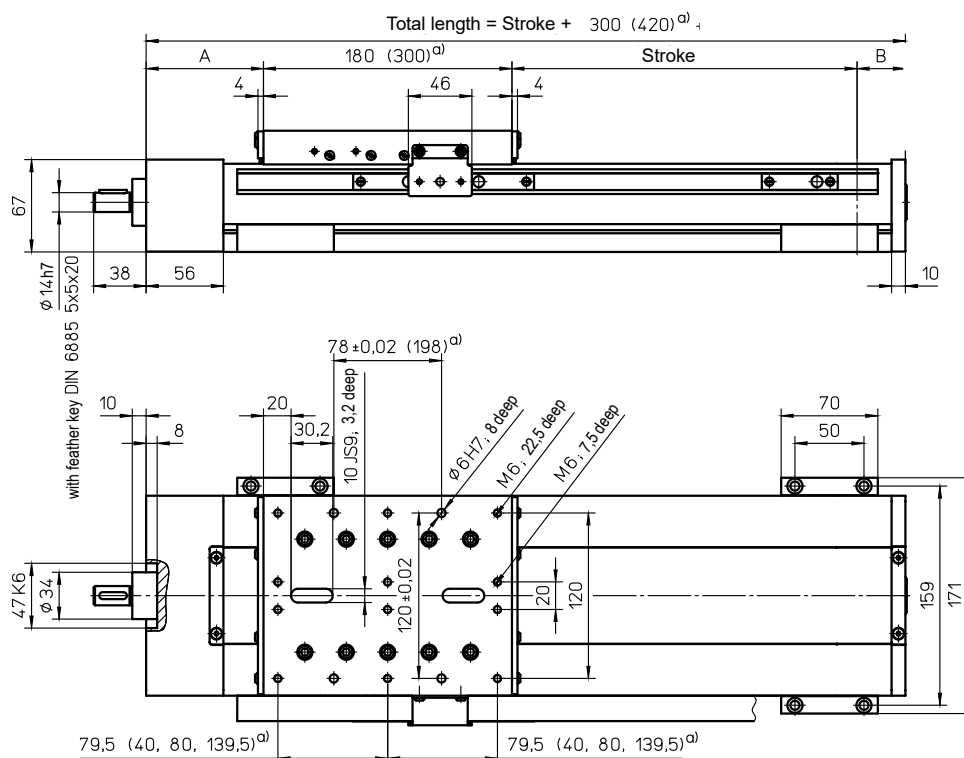
Data in brackets refer to long carriage (300)

Compact module is available in two profile versions:
 Stop angle and position of guide support milled = Standard (Delta 145-C-ZSS)
 Unmachined = Alternative (Delta 145-C-ZSA)

Fx - v - Diagram



with ball screw (KGT) and double linear guide (SSS)



a) Data in brackets refer to long carriage

Shorter carriage
L=120 on request

Mounting elements
see page D16

Quantity SA	A	B	C
0	85	35	-
2	85	35	-
4	115	65	60
6	145	95	120
8	175	125	180

Weights

SSS

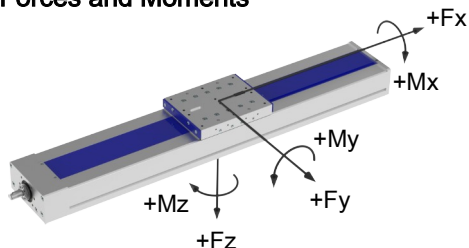
Basic length without stroke:	10.30 kg
100 mm stroke:	1.50 kg
Entire carriage 180 mm:	4.90 kg
Entire carriage 300 mm:	6.50 kg
Max. total length:	5600 mm

Technical Data

SSS

Max. total speed:	2.50 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	$\pm 0.03 \text{ mm (KGT)}$
Idle torque:	1.00 Nm

Forces and Moments



	SSS
Forces	Dynamic [N]
F_x	6000
F_y	2500
F_z	5000
$-F_z$	3000
Moments	Dynamic [Nm]
M_x	800
M_y	1000 (1600)
M_z	1000 (1600)

Data in brackets refer to long carriage (300)

Compact module is available in two profile versions:

Stop angle and position of guide support milled = Standard (Delta 145-C-SSS)

Unmachined = Standard (Delta 145-C-SSA)

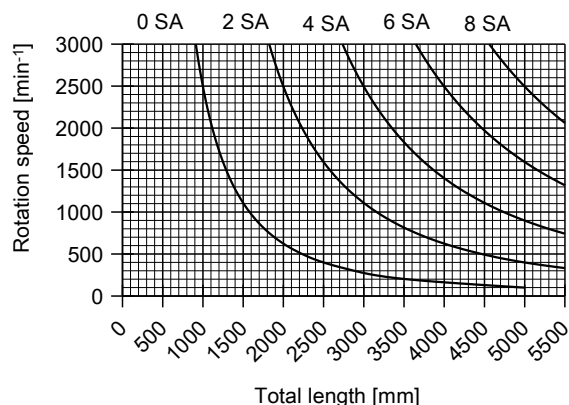
Special design: Spindle support with damping ring (extension of total length: 10 mm for every 2 SA)

Drive element

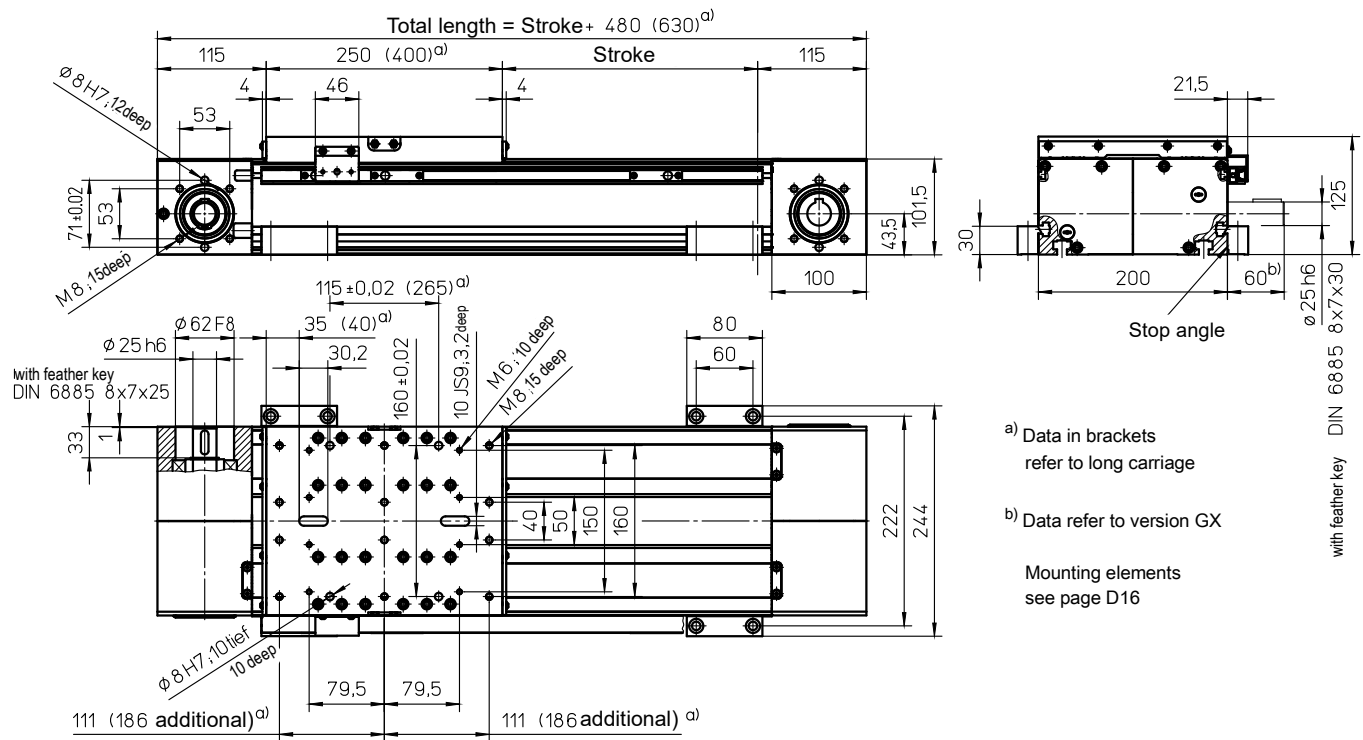
KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	20 mm
Pitch:	5 / 10 / 20 / 50 mm
Moment of inertia:	$8.50 \cdot 10^{-5} \text{ kgm}^2/\text{m}$

Spindle support SA



with toothed belt drive and double linear guide (ZSS)



Weights

ZSS

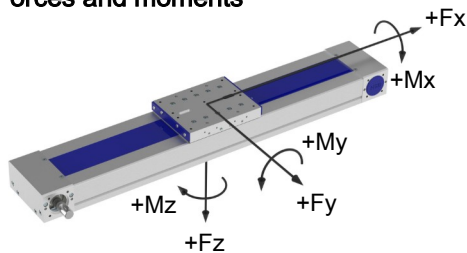
Basic length without stroke:	25.00 kg
100 mm stroke:	2.00 kg
Entire carriage 250 mm:	8.20 kg
Entire carriage 400 mm:	10.50 kg
Max. total length:	2000 mm

Technical Data

ZSS

Max. total speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	$\pm 0.08 \text{ mm}$
Idle torque:	6.80 Nm
Moment of inertia:	$1.20 \cdot 10^{-2} \text{ kgm}^2$
Drive element:	Toothed belt 75 AT10
Stroke per revolution:	220 mm

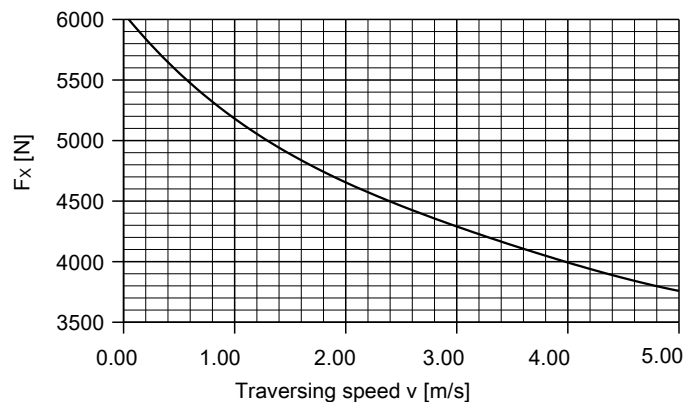
Forces and moments



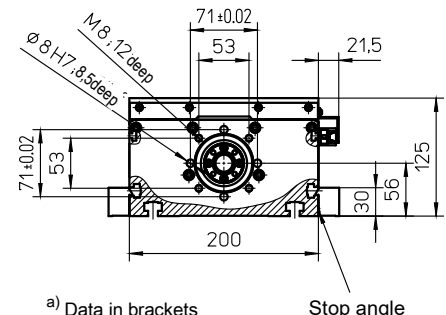
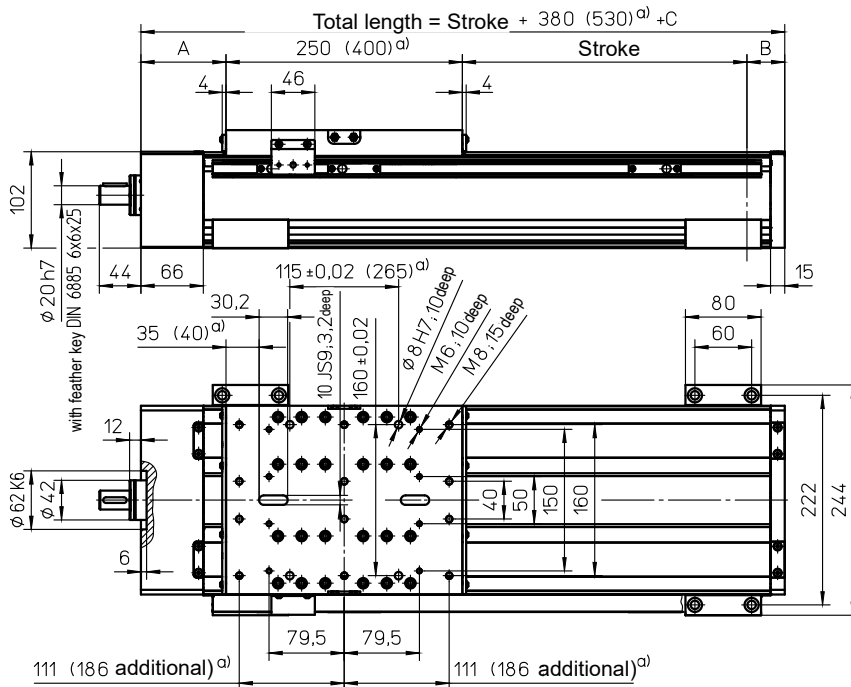
Forces	ZSS
	Dynamic [N]
$F_x^{d)}$	6000
F_y	5000
F_z	8000
$-F_z$	5000
Moments	Dynamic [Nm]
M_x	3500
M_y	4300 (6000)
M_z	3200 (4500)

^{d)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refers to long carriage (400)

F_x - v - Diagram



with ball screw (KGT) and double linear guide (SSS)



a) Data in brackets refer to long carriage

Stop angle

Mounting elements see page D16

Quantity SA	Version			MM		
	A	B	C	A	B	C
0	90	40	-	90	40	-
2						

"0 SA" applies for long carriage

Weights

SSS

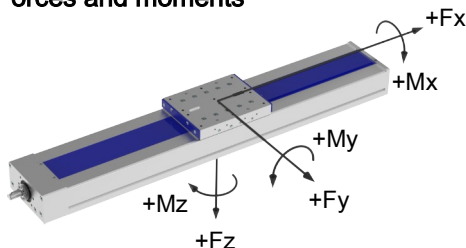
Basic length without stroke:	22.00 kg
100 mm stroke:	2.60 kg
Entire carriage 250 mm:	8.40 kg
Entire carriage 400 mm:	11.00 kg
Max. total length:	2000 mm

Technical Data

SSS

Max. total speed:	3.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	2.80 Nm

Forces and moments



SSS	
Forces	Dynamic [N]
F_x	10000 *
F_y	5000
F_z	8000
$-F_z$	5000
Moments	Dynamic [Nm]
M_x	3500
M_y	4300 (6000)
M_z	3200 (4500)

Data in brackets refer to long carriage (400)

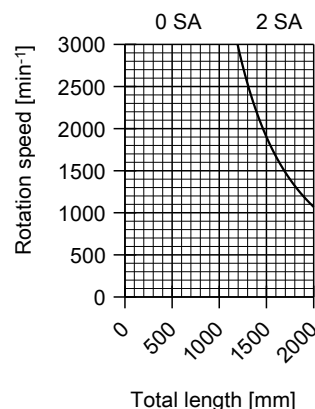
* at KGT 3240 and 3260: 8000 N

Drive element

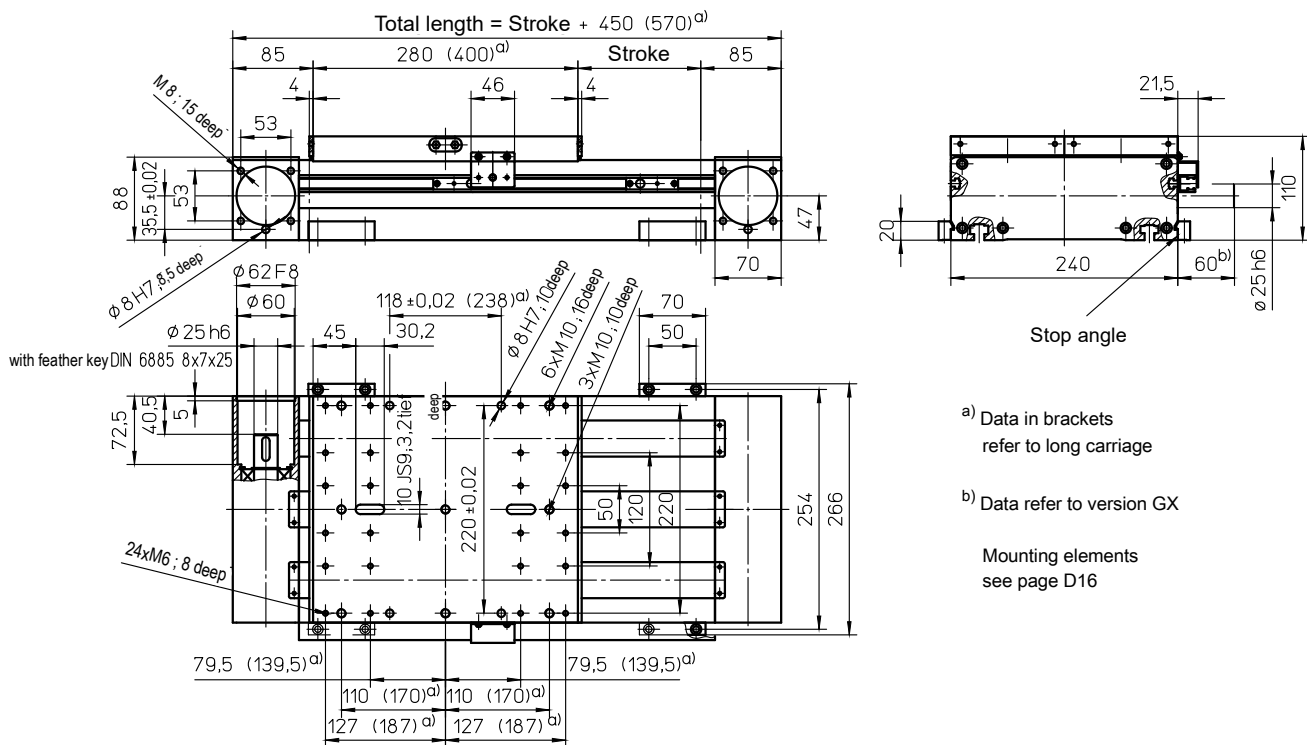
KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	32 mm
Pitch:	5 / 10 / 20 / 40 / 60 mm
Moment of inertia:	$6.45 \cdot 10^{-4} \text{ kgm}^2/\text{m}$

Spindle support (SA)



with toothed belt drive and double linear guide (ZSS)



a) Data in brackets refer to long carriage

b) Data refer to version GX

Mounting elements see page D16

Weights

ZSS

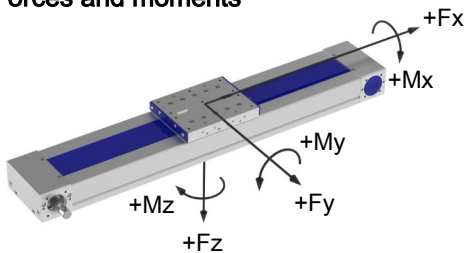
Basic length without stroke:	27.00 kg
100 mm stroke:	3.40 kg
Entire carriage 280 mm:	9.80 kg
Entire carriage 400 mm:	14.00 kg
Max. total length:	3000 mm

Technical Data

ZSS

Max. total speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	5.50 Nm
Moment of inertia:	2.00 • 10 ⁻² kgm ²
Drive element:	Toothed belt 50 AT10-E
Stroke per revolution:	150 mm

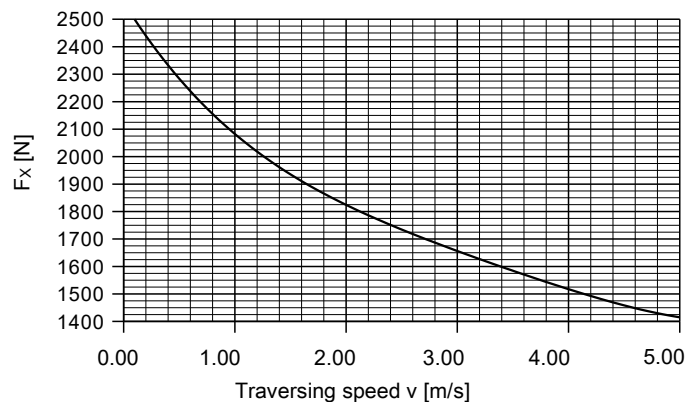
Forces and moments



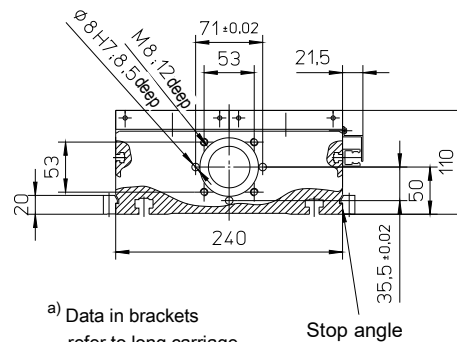
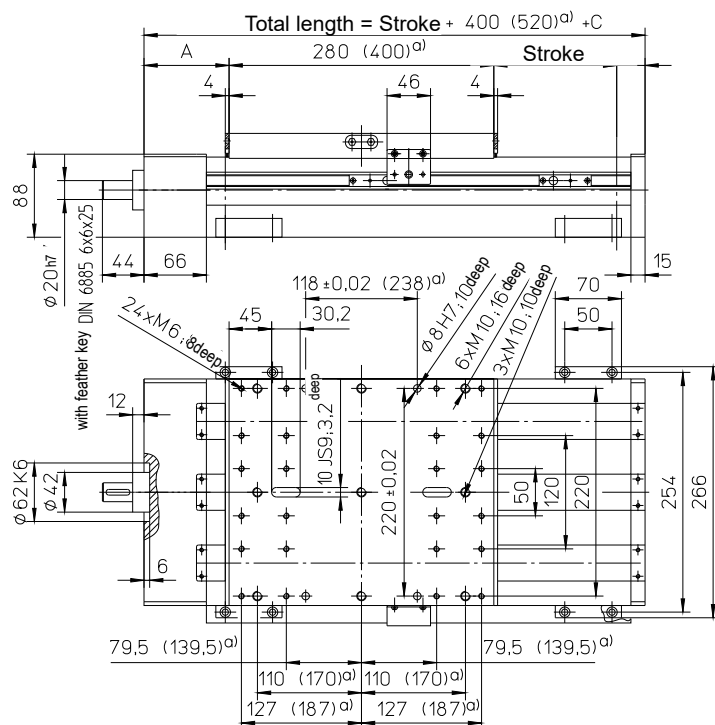
	ZSS
Forces	Dynamic [N]
F _x ^{d)}	2500
F _y	6000
F _z	12000
-F _z	8000
Moments	Dynamic [Nm]
M _x	4500
M _y	6000 (8500)
M _z	4500 (6400)

^{d)} Maximum value (see diagram "F_x - v - Diagram")
Data in brackets refers to long carriage (400)

F_x - v - Diagram



with ball screw (KGT) and double linear guide (SSS)



a) Data in brackets refer to long carriage

Stop angle

Mounting elements see page D16

Quantity SA	Version			Version		
	A	B	C	A	B	C
0	90	30	-	90	30	-
2	130	70	80	130	70	80
4	130	70	80	130	70	80

"0 SA" applies for long carriage

Weights

SSS

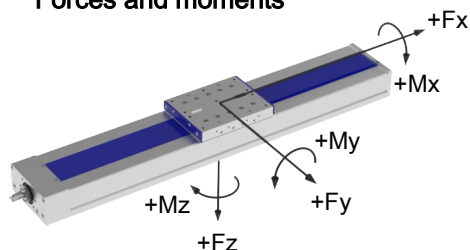
Basic length without stroke:	26.00 kg
100 mm stroke:	3.90 kg
Entire carriage 280 mm:	10.20 kg
Entire carriage 400 mm:	14.60 kg
Max. total length:	3000 mm

Technical Data

SSS

Max. total speed:	3.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	2.80 Nm

Forces and moments



SSS	
Forces	Dynamic [N]
F _x	12000 *
F _y	6000
F _z	12000
-F _z	8000
Moments	Dynamic [Nm]
M _x	4500
M _y	6000 (8500)
M _z	4500 (6400)

Data in brackets refer to long carriage (400)

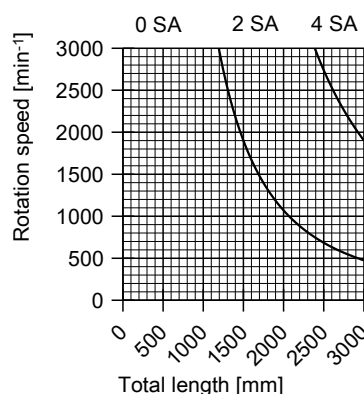
* at KGT3240 and 3260: 8000 N

Drive element

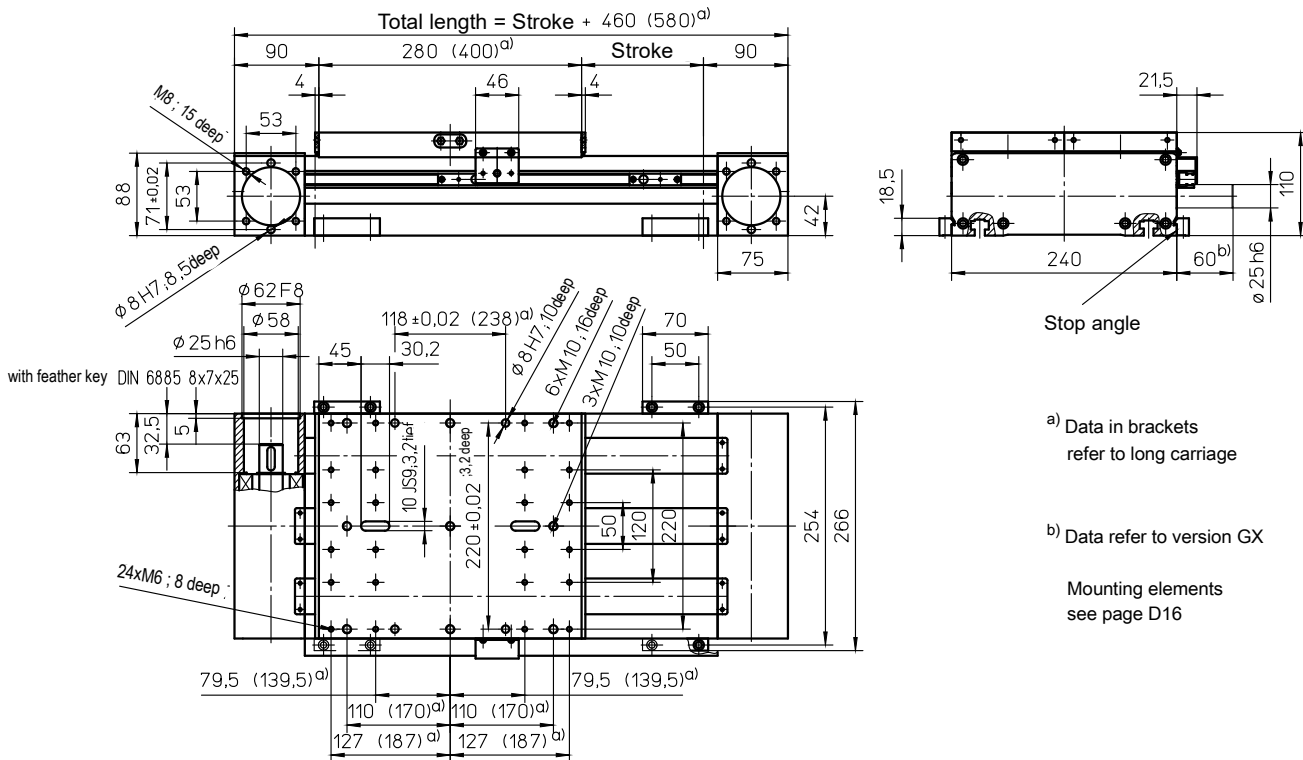
KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	32 mm
Pitch:	5 / 10 / 20 / 40 / 60 mm
Moment of inertia:	6.45 · 10 ⁻⁴ kgm ² /m

Spindle support (SA)



with toothed belt drive and double linear guide (ZSS)



Weights

ZSS

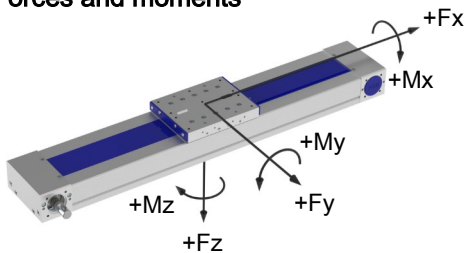
Basic length without stroke:	25.50 kg
100 mm stroke:	2.75 kg
Entire carriage 280 mm:	9.80 kg
Entire carriage 400 mm:	14.00 kg
Max. total length:	8000 mm

Technical Data

ZSS

Max. total speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	5.50 Nm
Moment of inertia:	2.60 • 10 ⁻² kgm ²
Drive element:	Toothed belt 60 ATL10
Stroke per revolution:	180 mm

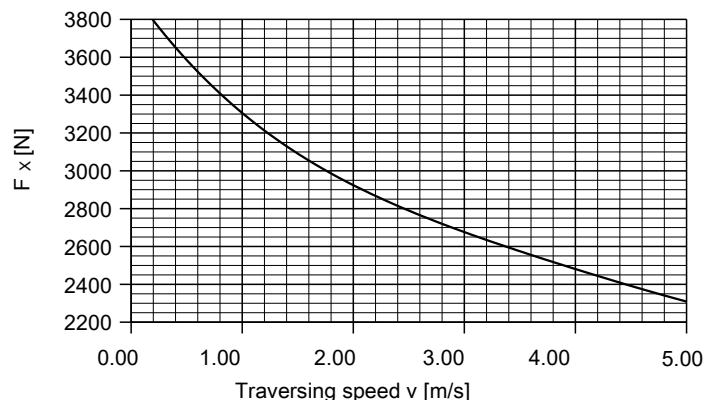
Forces and moments



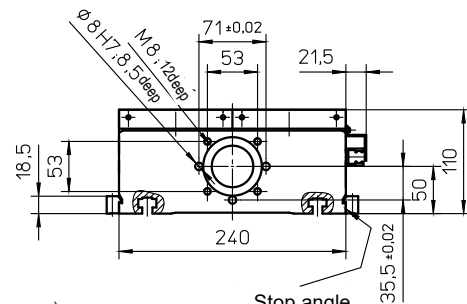
Forces	ZSS
	Dynamic [N]
$F_x^{d)}$	3800
F_y	6000
F_z	12000
$-F_z$	8000
Moments	Dynamic [Nm]
M_x	4500
M_y	6000 (8500)
M_z	4500 (6400)

d) Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage (400)

F_x - v - Diagram



Technical drawing of a 1000 mm long, 266 mm wide, 8 mm high extruded aluminum profile. The drawing shows a side view and a top view. The side view shows a T-shaped profile with a 4 mm wide top flange and a 66 mm wide base. The top view shows a rectangular profile with a 45 mm wide top flange and a 66 mm wide base. The drawing includes dimensions for the total length (1000 mm), stroke (280 mm), and various internal features like holes and slots. The drawing is labeled "Total length = Stroke + 400 (520)^a + C" and "Stroke".



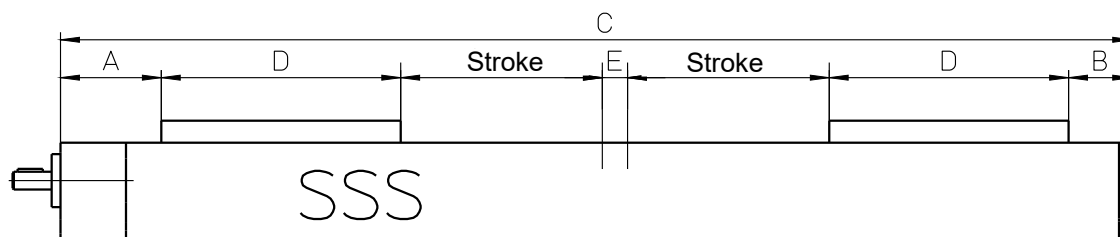
Mounting elements
see page D16

	Version					
	M			MM		
Quantity SA	A	B	C	A	B	C
0	90	30	-	90	30	-
2						
4	130	70	80	130	70	80



Diagram illustrating a beam element with forces and moments applied. The forces shown are $+F_x$, $+F_y$, and $+F_z$. The moments shown are $+M_x$, $+M_y$, and $+M_z$.

Page D12

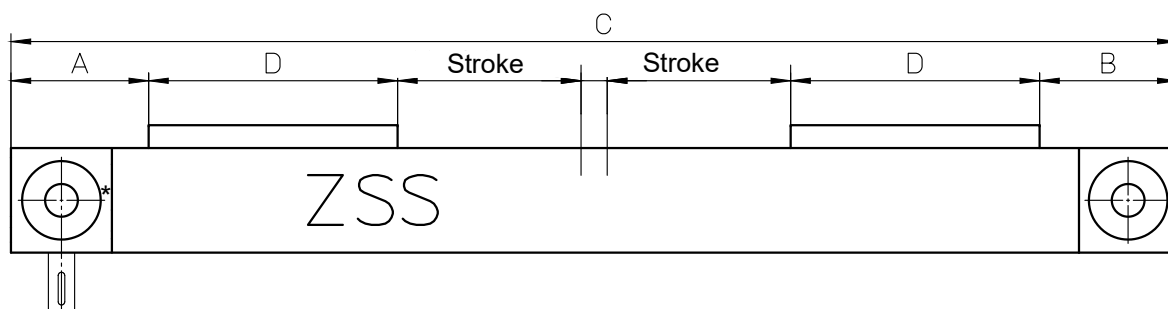


Unit size	A [mm]	B [mm]	Total length C [mm]	D [mm]	E [mm]	Screw drive *
Delta 110-C-SSS	60	25	2 x stroke + 375 (615) ^{a)} + E 80 mm extension for every 4 SA	145 (265) ^{a)}	min. 20 without SA	KGT 1605
Delta 145-C-SSS	85	35	2 x stroke + 480 (720) ^{a)} + E 120 mm extension for every 4 SA	180 (300) ^{a)}	min. 20 without SA	KGT 2005
Delta 200	90	40	2 x stroke + 630 (930) ^{a)} + E 120 mm extension for every 4 SA	250 (400) ^{a)}	Min. 30 ohne SA	KGT 3205
Delta 240(-C)	90	30	2 x stroke + 680 (920) ^{a)} + E 120 mm extension for every 4 SA	280 (400) ^{a)}	Min. 30 ohne SA	KGT 3205

For detailed measurements, see main dimensions sheet for respective size (version).

* Design only available with pitch 50

a) Data in brackets apply to long carriage

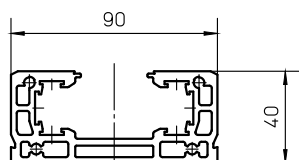


Unit size	A [mm]	B [mm]	Total length C [mm]	D [mm]	E [mm]
Delta 110-ZSS *	77,5	77,5	2 x stroke + 445 (685) ^{a)} + E	145 (265) ^{a)}	min. 20
Delta 145-ZSS on request	80	80	2 x stroke + 520 (760) ^{a)} + E	180 (300) ^{a)}	min. 25

For detailed measurements, see main dimensions sheet for respective size (version).

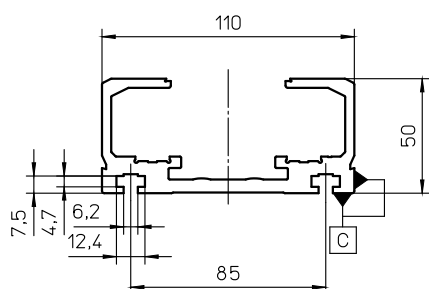
a) Data in brackets apply to long carriage

* Drive shaft downward



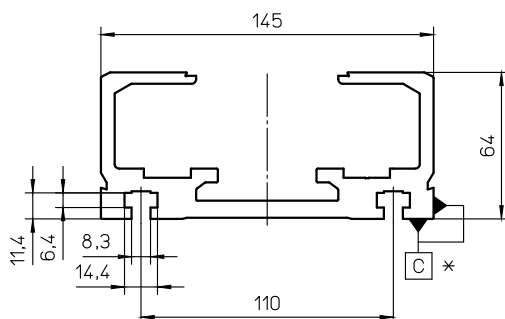
Profile Delta 90

Specific mass [kg/m]	3.36
Surface measure [mm ²]	1206
Geometrical moment of inertia I _y [mm ⁴]	223758
Geometrical moment of inertia I _z [mm ⁴]	1203307
Section modulus W _y [mm ³]	10038
Section modulus W _z [mm ³]	26740



Profil Delta 110-C

Specific mass [kg/m]	4,16
Surface measure [mm ²]	1540
Geometrical moment of inertia I _y [mm ⁴]	431083
Geometrical moment of inertia I _z [mm ⁴]	2400513
Section modulus W _y [mm ³]	13230
Section modulus W _z [mm ³]	43638

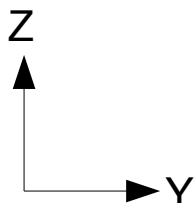


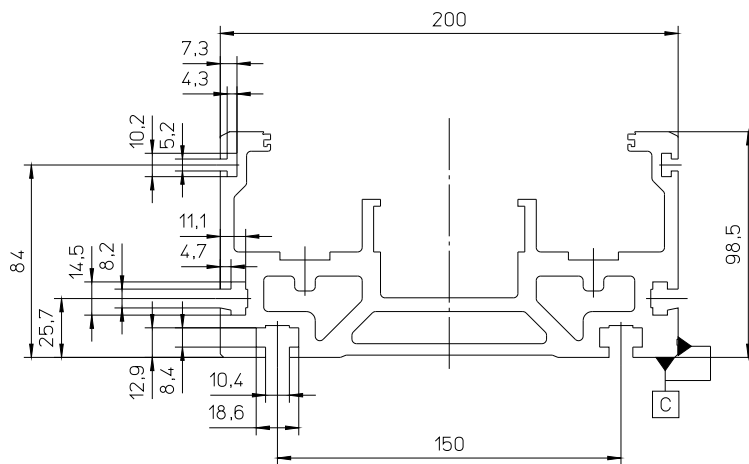
Profile Delta 145-C

Specific mass [kg/m]	7,6
Surface measure [mm ²]	2814
Geometrical moment of inertia I _y [mm ⁴]	1222896
Geometrical moment of inertia I _z [mm ⁴]	7494306
Section modulus W _y [mm ³]	29324
Section modulus W _z [mm ³]	103345

* Valid for version with machined profile.

C: Anschlaakante Standard Seite C
Stop angle standard page C





Profile Delta 200

Specific mass [kg/m]	15.4
Surface measure [mm ²]	5705
Geometrical moment of inertia I _y [mm ⁴]	3774514
Geometrical moment of inertia I _z [mm ⁴]	27532601
Section modulus W _y [mm ³]	57567
Section modulus W _z [mm ³]	274653

Profile Delta 240

Specific mass [kg/m]	27.2
Surface measure [mm ²]	10074
Geometrical moment of inertia I _y [mm ⁴]	6382473
Geometrical moment of inertia I _z [mm ⁴]	61720897
Section modulus W _y [mm ³]	119554
Section modulus W _z [mm ³]	511233

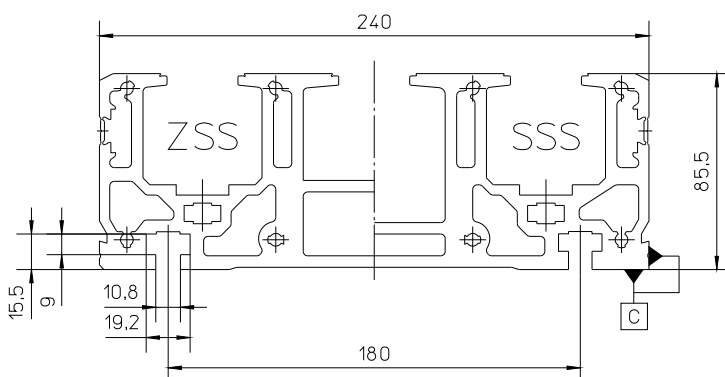
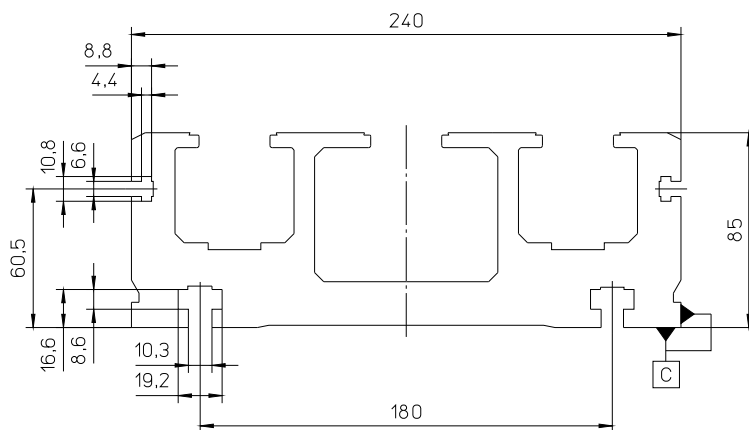
Profil Delta 240-C

ZSS

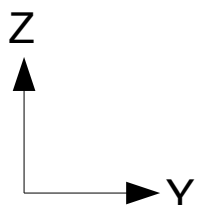
Specific mass [kg/m]	18,5
Surface measure [mm ²]	6849
Geometrical moment of inertia I _y [mm ⁴]	4852964
Geometrical moment of inertia I _z [mm ⁴]	38448444
Section modulus W _y [mm ³]	97499
Section modulus W _z [mm ³]	320403

SSS

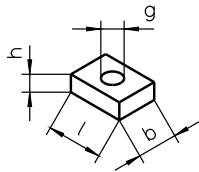
Specific mass [kg/m]	18,8
Surface measure [mm ²]	6962
Geometrical moment of inertia I _y [mm ⁴]	4985287
Geometrical moment of inertia I _z [mm ⁴]	39550055
Section modulus W _y [mm ³]	98152
Section modulus W _z [mm ³]	329583



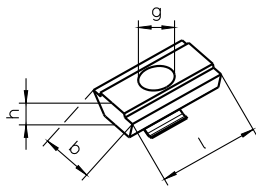
C : Stop angle standard page C



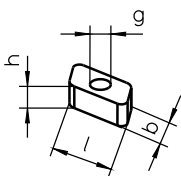
NS 1 / 2 / 4 / 6 / 22 / 23



NS 4.1 / 10

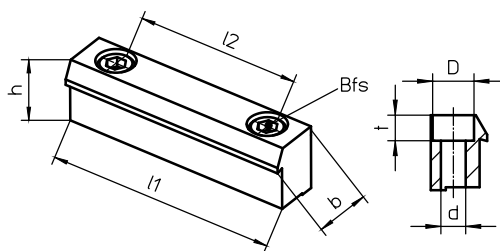


RM 2 / 4 / 6



Linear drive	Page *	NS	ID No.	l [mm]	b [mm]	h [mm]	g
Delta 110-C	E	23	28914	18	12	4,5	M6
		22	27352	18	12	4,5	M5
		RM2	15370	10	6	4	M4
Delta 110-C	E	4	10559	18	14	6	M8
		4.1	16552	20	13	6	M8
		10	16499	20	13	6	M6
		RM4	15371	13	8	6	M5
Delta 200	E	6	10561	25	18	8	M10
		RM6	15372	18	10	8	M6
	C and D below	4	10559	18	14	6	M8
		4.1	16552	20	13	6	M8
		10	16499	20	13	6	M6
		RM4	15371	13	8	6	M5
	C and D below	1	10556	12	10	4	M4
		2	10557	16	10	4	M5
	E	6	10561	25	18	8	M10
		RM6	15372	18	10	8	M6
Delta 240	C and D	1	10556	12	10	4	M4
		2	10557	16	10	4	M5
	E	RM2	15370	10	6	4	M4
Delta 240-C	E	6	10561	25	18	8	M10
		RM6	15372	18	10	8	M6

BL 1..4 / 8 / 10



Linear drive	BL	ID No.	l1 [mm]	l2 [mm]	b [mm]	h [mm]	Bfs	D [mm]	d [mm]	t [mm]
Delta 90	8	18447	70	50	15	13,5	M6	11	6,6	6,8
Delta 110-C	1.1	13224	49	30	15	17,5	M6	11	6,6	6,8
	1	10552	70	50	15	17,5	M6	11	6,6	6,8
Delta 145-C	2	10553	70	50	15	20	M6	11	6,6	6,8
Delta 200	3	10554	80	60	25	30	M8	15	9	9
Delta 240	4	10555	70	50	16	20	M6	11	6,6	6,8
Delta 240-C	10	17326	70	50	15	18,5	M6	11	6,6	6,8

* For further information on pages C..E, see catalogue page Z1
Bfs = Mounting screw DIN 912 / ISO 4762

Example:

Delta 145-C-ZSS-50 AT5-E-110-1000-1340-AK-AZ1-8RM4-1

Product

Unit size (version*)

Drive

Z = Toothed belt drive

0 = Without drive

Guide system

S = Rail guide

R = Roller guide

Model

S = Standard ; A = Alternative (profile unmachined)

Drive specifications

Width and type of toothed belt

Stroke per revolution

Stroke

Total length

Cover

AK = Cover band

Accessories

AZ1 = Drive shaft short, mounting side **C**

AZ2 = Drive shaft short, mounting side **D**

AZ6 = Drive shaft long, mounting side **C** and **D**

AZX = Integrated drive shaft (standard, not Delta 110-C and 145-C)

Further arrangements for drive shaft, see **page Z1**

EO2 / EO10 = Inductive limit switch NC with 2 m / 10 m cable fitted

ES2 / ES10 = Inductive limit switch NO with 2 m / 10 m cable fitted

EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted

BL = Mounting bracket

NS / RM = Sliding block 1 .. 21 / Rhomb nut 2 .. 6 (see Table on **page D16**)

Special design

0 = Standard

1 = Special (add specification description)

Further accessories (separate position)

MGK = Motor mounting and coupling (according to dimension sheet)

URT = Deflection belt drive (according to dimension sheet)

* e.g. Delta 240-ZSS or Delta 240-C-ZSS

Example:**Delta 145-C-SSS-M-2010-1000-1360-2SA-2ES2-6BL2-0****Product****Unit size (version*)****Drive**

S = Spindle

0 = Without drive

Guide system

S = Rail guide

R = Roller guide

Model

S = Standard ; A = Alternative (profile unmachined)

Type of drive

M = Single nut (ball screw)

MM = Double nut (ball screw)

(TR = Trapezoidal screw - optional)

Drive specifications

Diameter and pitch (ball screw)

(Diameter x pitch (trapezoidal screw) - optional)

Stroke**Total length****Spindle support (SA)**

(quantity)

Accessories

EO2 / EO10 = Inductive limit switch NC with 2m / 10m cable fitted

ES2 / ES10 = Inductive limit switch NO with 2m / 10m cable fitted

EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted

BL = Mounting bracket

NS / RM = Sliding block 1 .. 21 / Rhomb nut 2 .. 6 (see Table on page D16)

Special design

0 = Standard

1 = Special (add specification description)

Further accessories (separate position)

MGK = Motor mounting and coupling (according to dimension sheet)

URT = Deflection belt drive (according to dimension sheet)

For mounting of limit switches and lubrication points, see **page Z1**

Cover band comes as standard for screw drive

Further drives available on request:

MK or TK (= single nut made of plastic), KK (= double nut made of plastic)

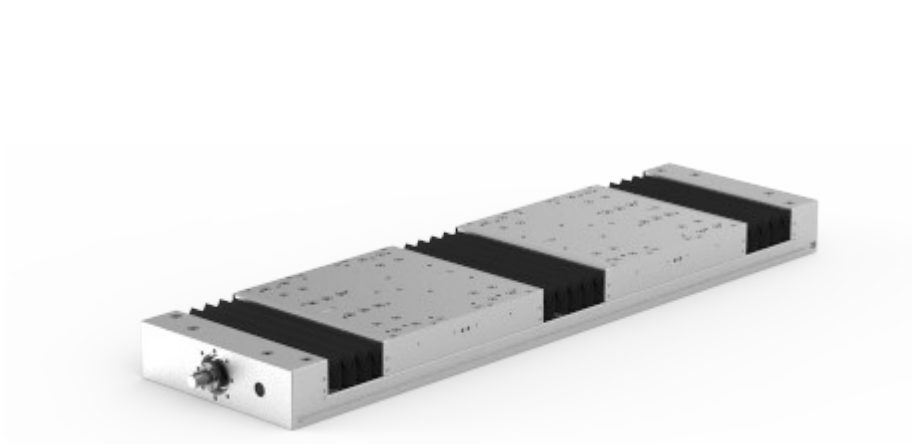
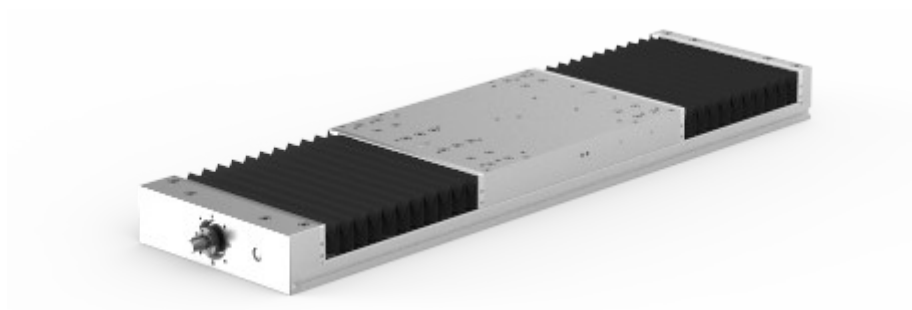
* e.g. Delta 240-SSS or Delta 240-C-SSS

Notes and drawing

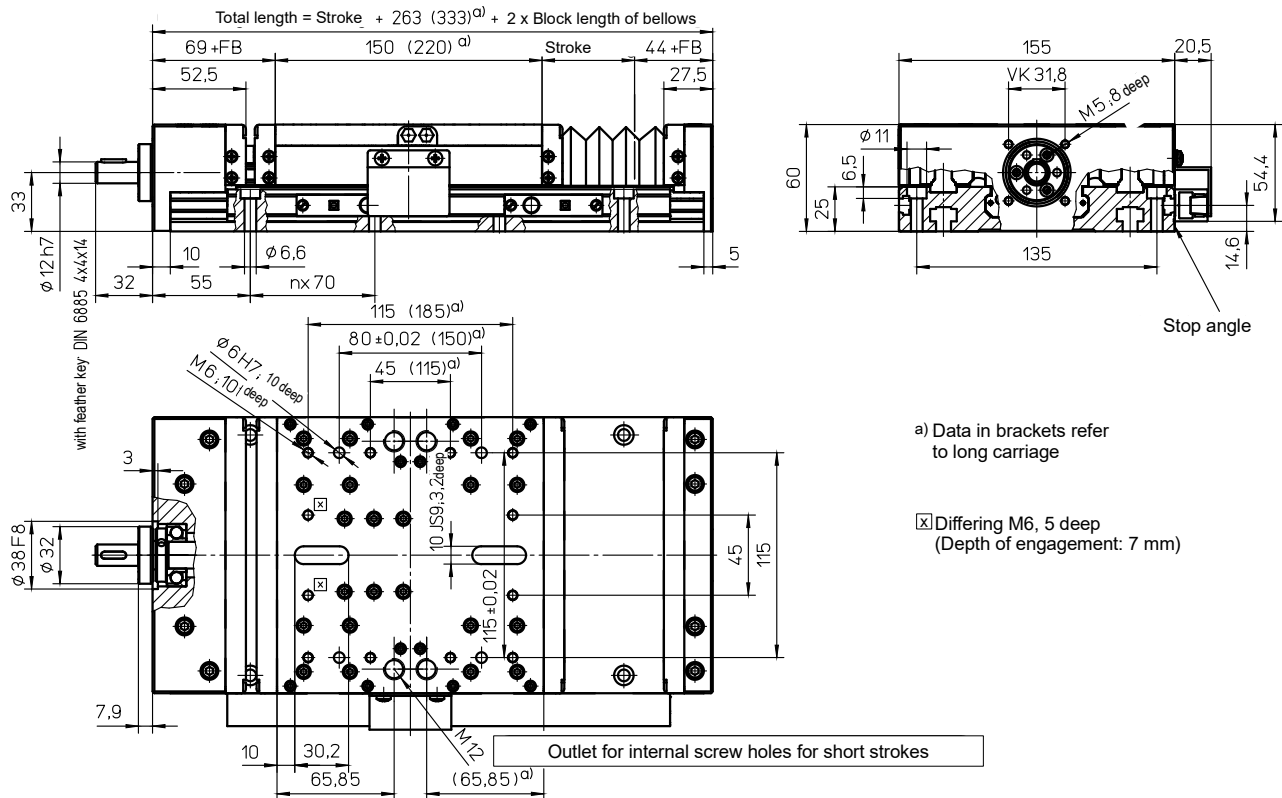
Chapter A

Linear Table

HSB-alpha[®]



with ball screw (KGT) and double linear guide (SSS)



Weights

SSS

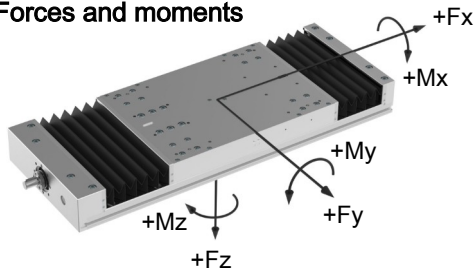
Basic length without stroke:	7.80 kg
100 mm stroke:	0.95 kg
Entire carriage 150 mm:	2.80 kg
Entire carriage 220 mm:	4.10 kg
Max. total length:	1500 mm

Technical Data

SSS

Max. total speed:	2.50 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	0.35 Nm

Forces and moments



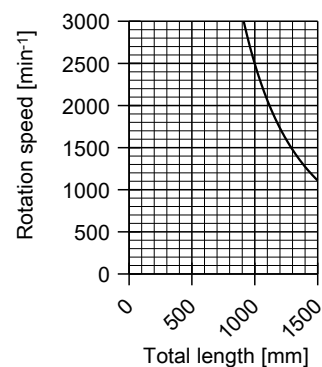
Forces	Dynamic [N]
F_x	4000
F_y	2000
F_z	20000
$-F_z$	15000
Moments	Dynamic [Nm]
M_x	1000
M_y	900 (1300)
M_z	400 (580)

Data in brackets refer to long carriage (220)

Drive element

KG T

Max. rotation speed: 3000 min⁻¹
Diameter: 20 mm
Pitch: 5 / 10 / 20 / 50 mm
Moment of inertia: 8.50 • 10⁻⁵ kgm²/m



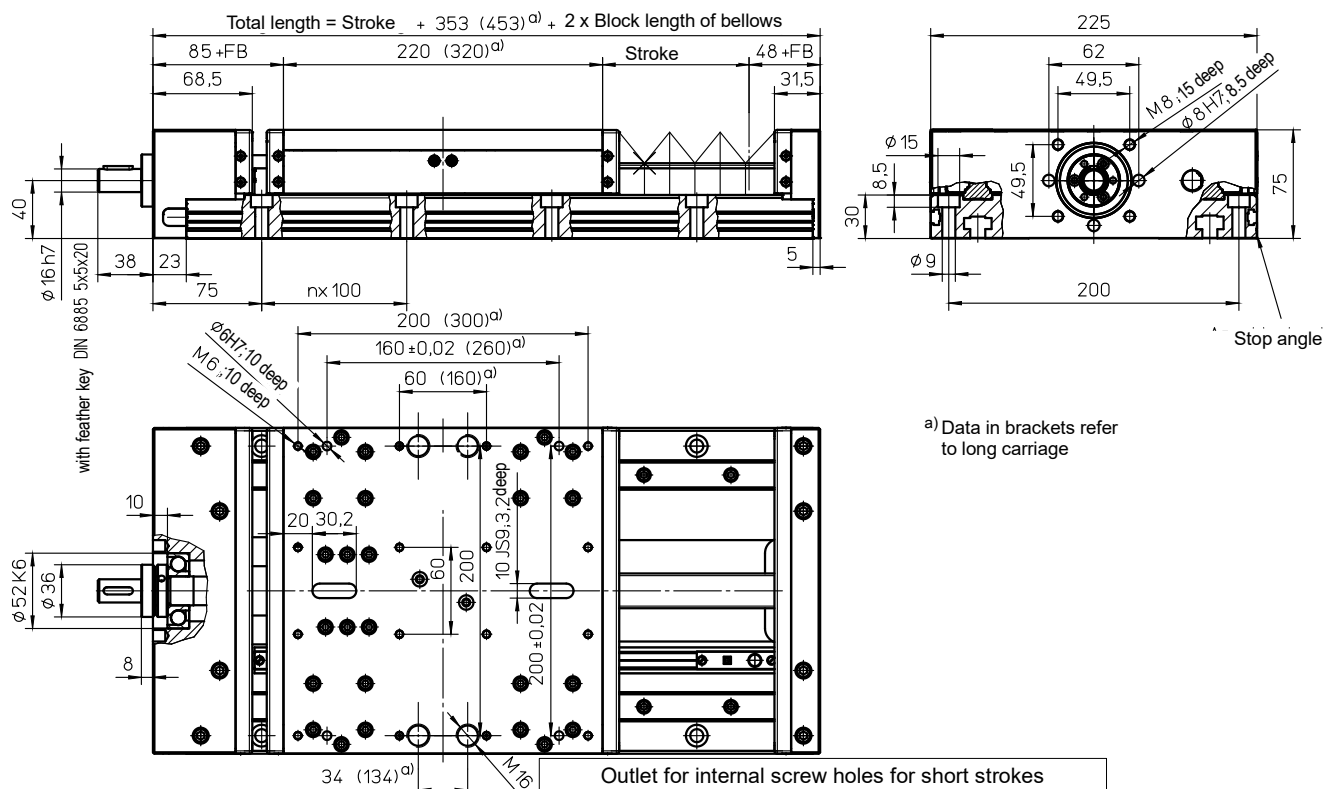
Calculation of block length of bellows (FB)

Stroke / 22 = Number of pleats
 Number of pleats • 3 – 2 = Block length of bellows (FB)

Example for stroke of 500 mm:

500 mm / 22 = 22.73 => **23** pleats (rounded up)
23 • 3 – 2 = **67** mm simple block length (FB)

with ball screw (KGT) and double linear guide (SSS)



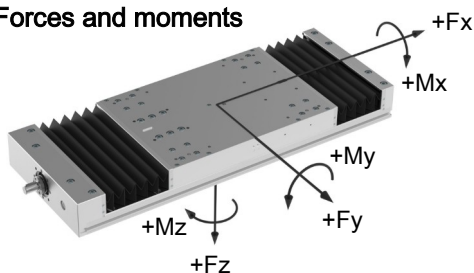
Weights

	SSS
Basic length without stroke:	17.60 kg
100 mm stroke:	2.70 kg
Entire carriage 220 mm:	6.20 kg
Entire carriage 320 mm:	9.00 kg
Max. total length:	2000 mm

Technical Data

	SSS
Max. total speed:	2.50 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	1.20 Nm

Forces and moments

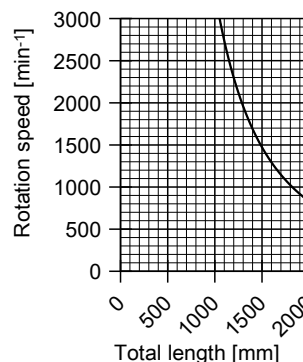


	SSS
Forces	Dynamic [N]
F _x	6000
F _y	5000
F _z	58000
-F _z	40000
Moments	Dynamic [Nm]
M _x	4000
M _y	3000 (4000)
M _z	1200 (1700)

Data in brackets refer to long carriage (320)

Drive element

	KGT
Max. rotation speed:	3000 min ⁻¹
Diameter:	25 mm
Pitch:	5 / 10 / 25 / 50 mm
Moment of inertia:	2.25 · 10 ⁻⁴ kgm ² /m



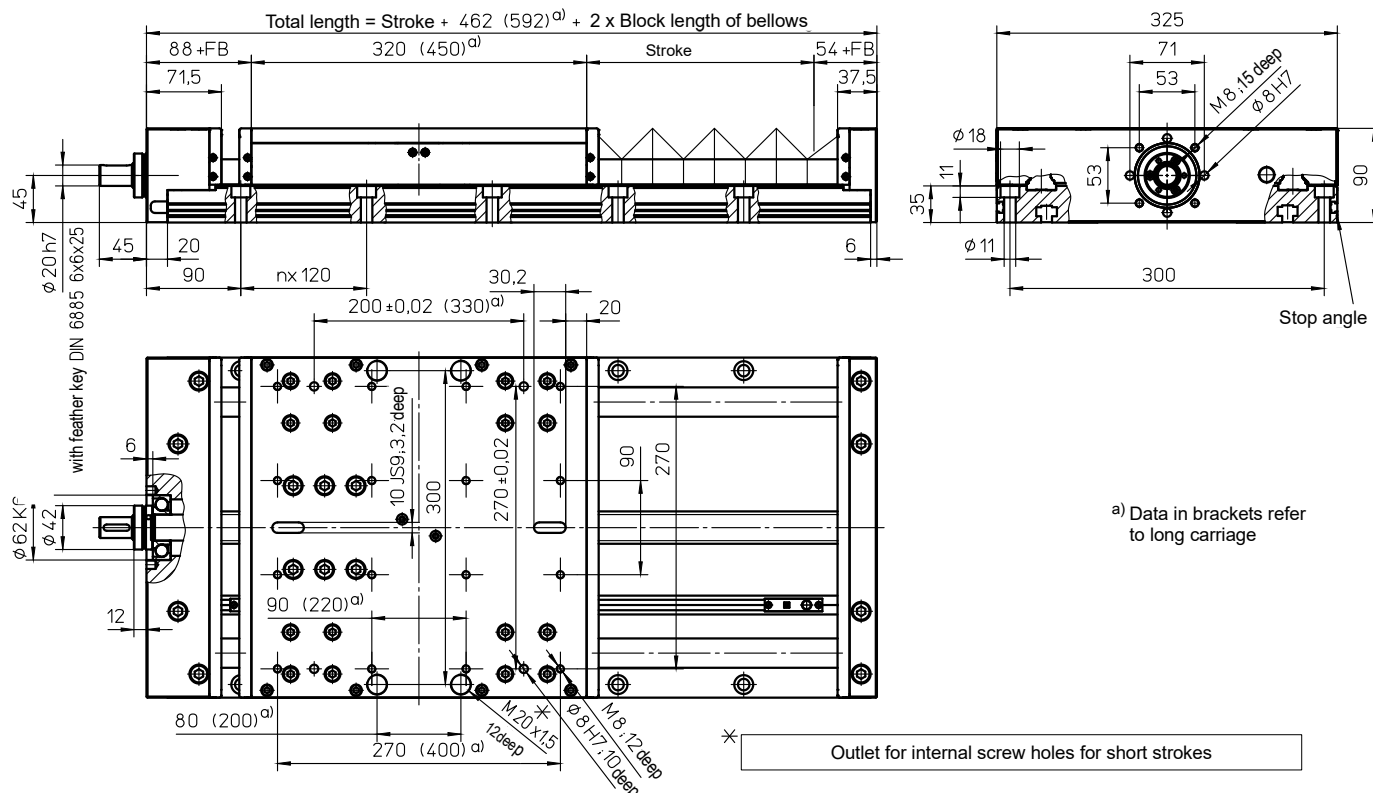
Calculation of block length of bellows (FB)

Stroke / 32 = Number of pleats
 Number of pleats · 3 – 2 = Block length of bellows (FB)

Example for stroke of 500 mm:

500 mm / 32 = 15.62 => 16 pleats (rounded up)
 16 · 3 – 2 = 46 mm simple block length (FB)

with ball screw (KGT) and double linear guide (SSS)



Weights

SSS

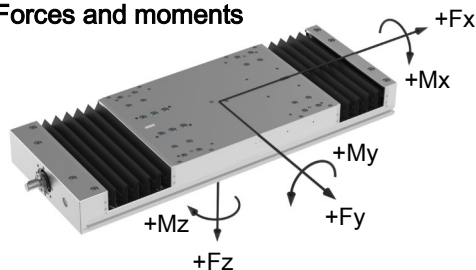
Basic length without stroke:	37.00 kg
100 mm stroke:	3.80 kg
Entire carriage 320 mm:	13.40 kg
Entire carriage 450 mm:	18.80 kg
Max. total length:	3000 mm

Technical Data

SSS

Max. total speed:	2.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.03 mm (KGT)
Idle torque:	1.60 Nm

Forces and moments



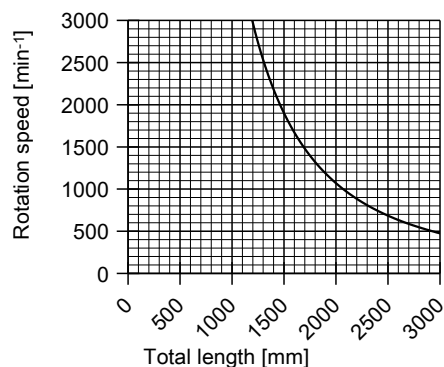
	SSS
Forces	Dynamic [N]
F_x	12000 *
F_y	11000
F_z	95000
-F_z	63000
Moments	Dynamic [Nm]
M_x	6300
M_y	7500 (9500)
M_z	3750 (5000)

Data in brackets refer to long carriage (450)

Drive element

KG T

Max. rotation speed: 3000 min⁻¹
Diameter: 32 mm
Pitch: 5 / 10 / 20 / 40 mm
Moment of inertia: 6.45 • 10⁻⁴ kgm²/m



Calculation of block length of bellows (FB)

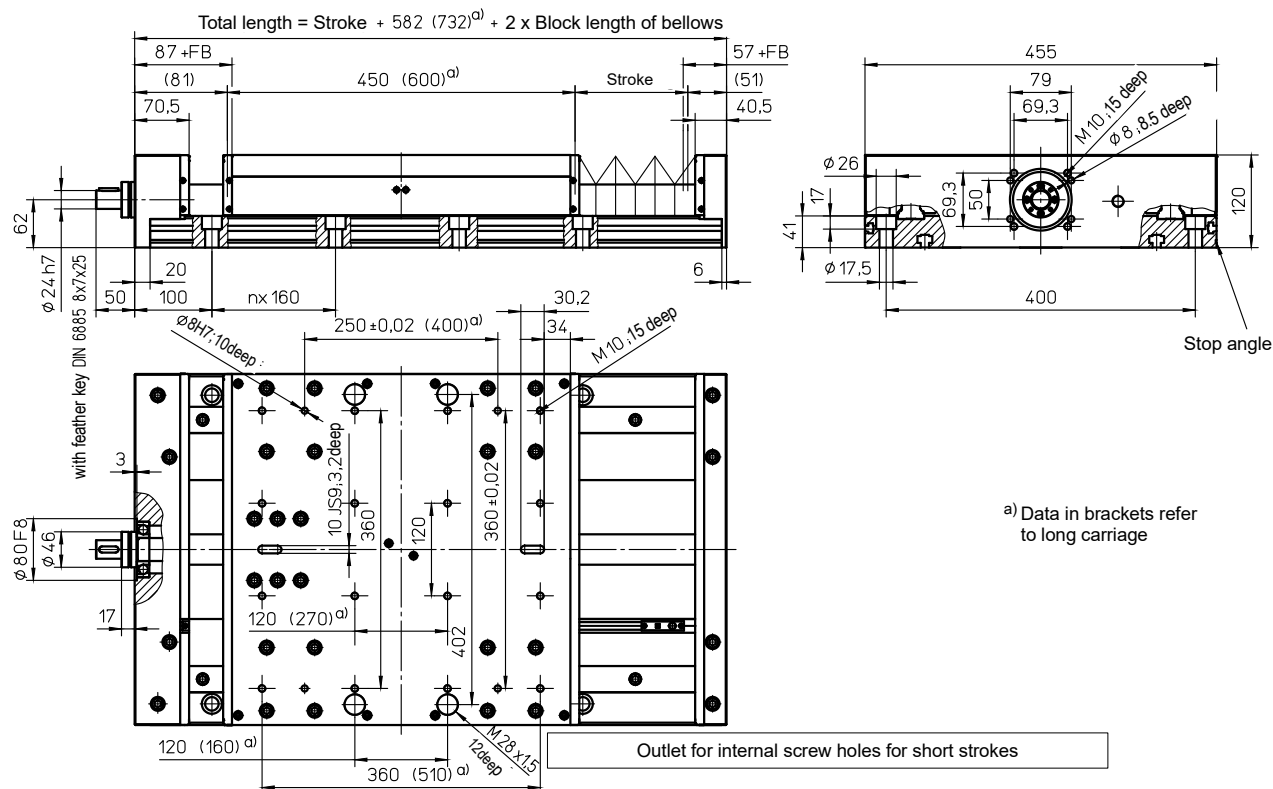
Stroke / 42 = Number of pleats
 Number of pleats • 3 – 2 = Block length of bellows (FB)

Example for stroke of 500 mm:

500 mm / 42 = 11.90 => **12** pleats (rounded up)
12 • 3 – 2 = 34 mm simple block length (FB)

* at KGT 3240 and 3260: 8000 N

with ball screw (KGT) and double linear guide (SSS)



Weights

SSS

Basic length without stroke:	65.20 kg
100 mm stroke:	5.20 kg
Entire carriage 450 mm:	26.20 kg
Entire carriage 600 mm:	33.80 kg

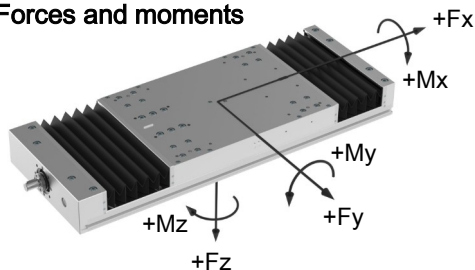
Max. total length: 3000 mm

Technical Data

SSS

Max. total speed:	2.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	$\pm 0.03 \text{ mm (KGT)}$
Idle torque:	2.50 Nm

Forces and moments



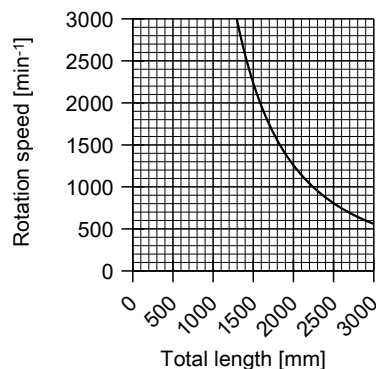
	SSS
Forces	Dynamic [N]
F_x	18000
F_y	14000
F_z	120000
$-F_z$	80000
Moments	Dynamic [Nm]
M_x	12000
M_y	10000 (13000)
M_z	5000 (6000)

Data in brackets refer to long carriage (600)

Drive element

KGT

Max. rotation speed:	3000 min ⁻¹
Diameter:	40 mm
Pitch:	5 / 10 / 20 / 40 mm
Moment of inertia:	$1.65 \cdot 10^{-3} \text{ kgm}^2/\text{m}$



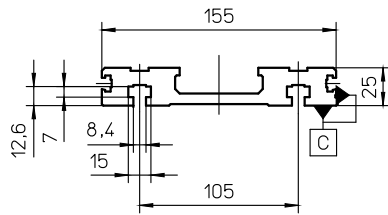
Calculation of block length of bellows (FB)

Stroke / 52 = Number of pleats
 Number of pleats • 3 – 2 = Block length of bellows (FB)

Example for stroke of 500 mm:

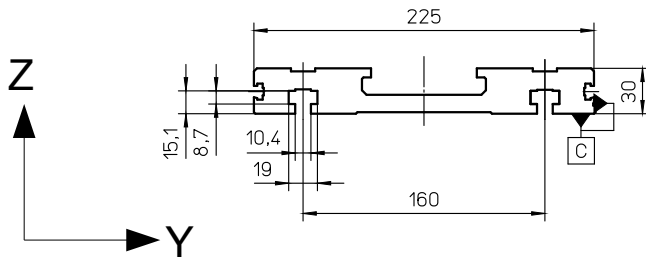
500 mm / 52 = 9.62 => 10 pleats (rounded up)
 10 • 3 – 2 = 28 mm simple block length (FB)

Profile Alpha-15-B-155



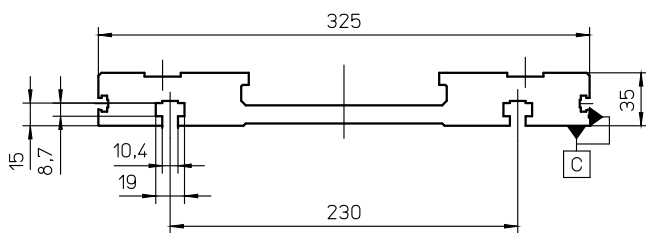
Specific mass [kg/m]	6.42
Surface measure [mm ²]	2377
Geometrical moment of inertia I _y [mm ⁴]	133830
Geometrical moment of inertia I _z [mm ⁴]	5816886
Section modulus W _y [mm ³]	9953
Section modulus W _z [mm ³]	74232

Profile Alpha-20-B-225



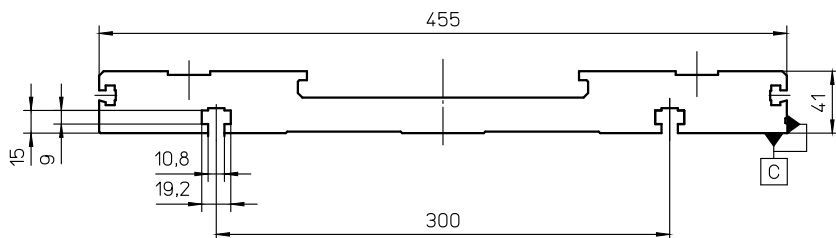
Specific mass [kg/m]	12.54
Surface measure [mm ²]	4644
Geometrical moment of inertia I _y [mm ⁴]	359736
Geometrical moment of inertia I _z [mm ⁴]	22821235
Section modulus W _y [mm ³]	22400
Section modulus W _z [mm ³]	201344

Profile Alpha-30-B-325



Specific mass [kg/m]	20.56
Surface measure [mm ²]	7615
Geometrical moment of inertia I _y [mm ⁴]	774301
Geometrical moment of inertia I _z [mm ⁴]	84507566
Section modulus W _y [mm ³]	40299
Section modulus W _z [mm ³]	517153

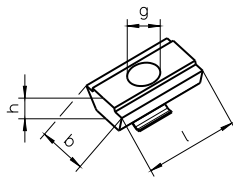
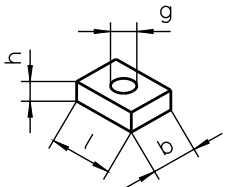
Profile Alpha-35-B-455



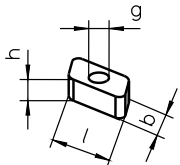
Specific mass [kg/m]	38.73
Surface measure [mm ²]	14346
Geometrical moment of inertia I _y [mm ⁴]	1810370
Geometrical moment of inertia I _z [mm ⁴]	284741450
Section modulus W _y [mm ³]	79280
Section modulus W _z [mm ³]	1243935

 Stop angle standard page C

NS 3 / 4 / 6 / 11 NS 4.1 / 10



RM 4 / 6



Linear unit	Page *	NS	ID No.	l [mm]	b [mm]	h [mm]	g
Alpha 15-B-155	E	4	10559	18	14	6	M8
		4.1	16552	20	13	6	M8
		10	16499	20	13	6	M6
		RM4	15371	13	8	6	M5
	C and D	11	13510	12	10	3,5	M4
Alpha 20-B-225	E	15	19211	25	18	8	M8
		RM6	15372	18	10	8	M6
	C and D	11	13510	12	10	3,5	M4
Alpha 30-B-325	E	6	10561	25	18	8	M10
		RM6	15372	18	10	8	M6
	C and D	11	13510	12	10	3,5	M4
Alpha 35-B-455	E	6	10561	25	18	8	M10
		RM6	15372	18	10	8	M6
	C and D	3	10558	20	12	5	M6

* For further information on page C – E, see catalogue page Z1

Example: Alpha 20-B-225-SSS-M-2505-1000-1660-FB-2EMS-0

Product _____

Size (version*) _____

Drive _____

S = Spindle

Guide system _____

S = Rail guide

Model _____

S = Standard

Type of drive _____

M = Single nut (ball screw)

MM = Double nut (ball screw)

(TR = Trapezoidal screw - optional)

Drive specifications _____

Diameter and pitch (ball screw)

(Diameter x pitch (trapezoidal screw) - optional)

Stroke _____

Total length _____

Cover _____

FB = Bellows

Accessories _____

EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted

EO2 / EO10 = Inductive limit switch NC with 2 m / 10 m cable fitted

ES2 / ES10 = Inductive limit switch NO with 2 m / 10 m cable fitted

NS / RM = Sliding block 1 .. 11 / Rhomb nut 4 .. 6 (see Table on **page A5**)

Special design _____

0 = Standard

1 = Special (add specification description)

Additional accessories (separate position)

MGK = Motor mounting and coupling (according to dimension sheet)

URT = Deflection belt drive (according to dimension sheet)

Further drives available on request:

MK or TK (= single nut made of plastic), KK (= double nut made of plastic)

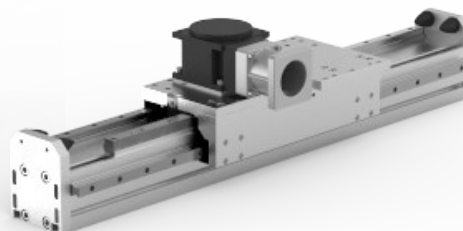
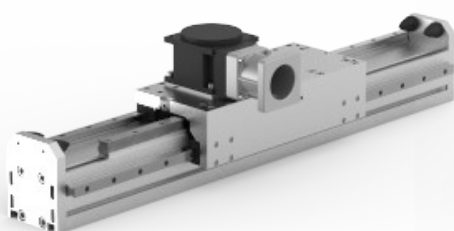
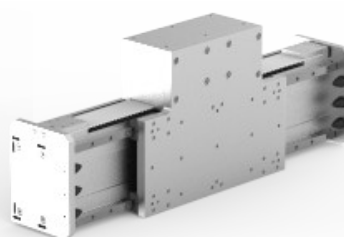
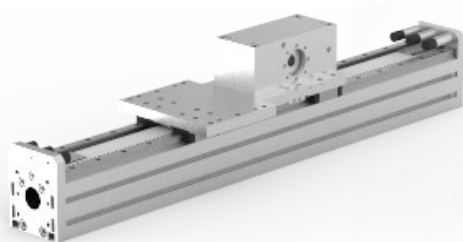
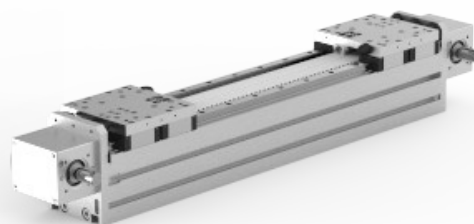
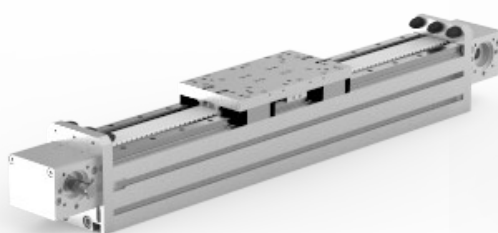
* currently only version „B“ available

Notes and drawing

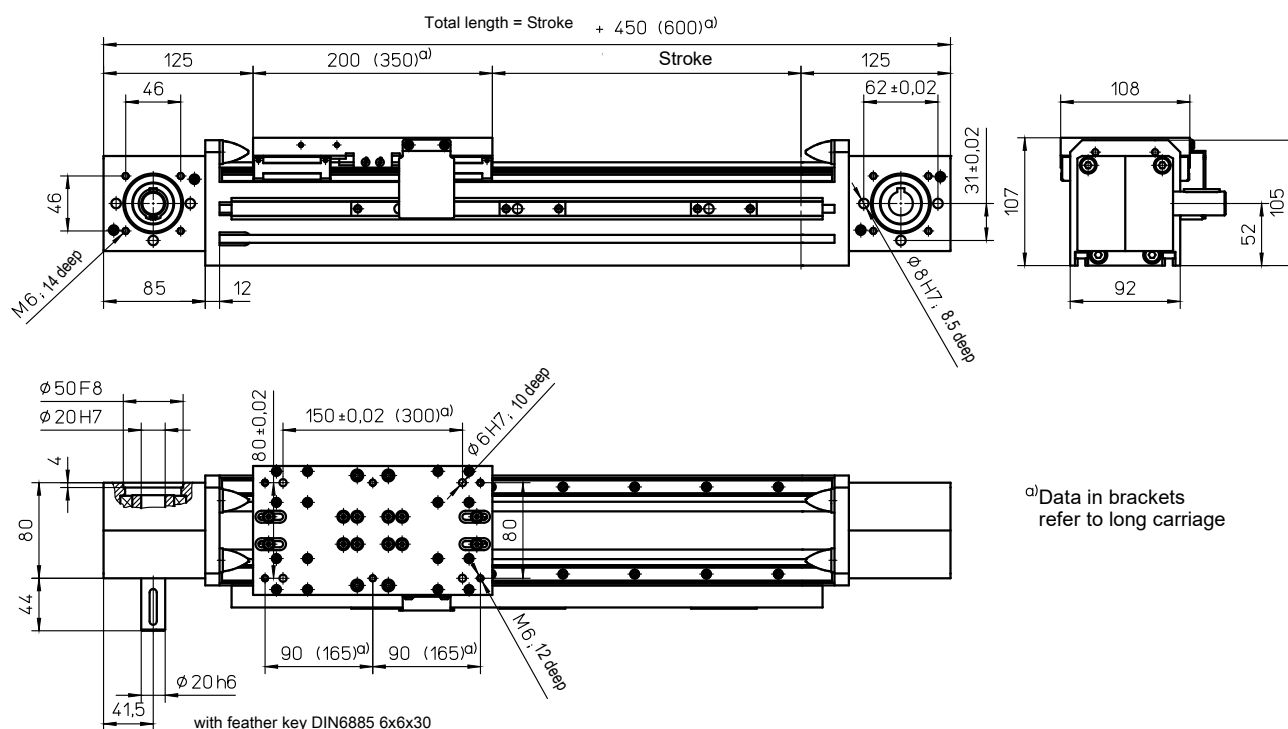
Chapter G

Portal Linear Drive

HSB-gamma[®]



with toothed belt drive and double linear guide (ZSS)



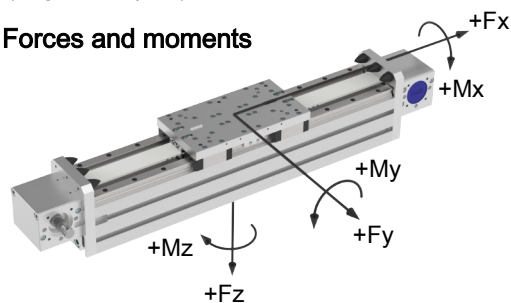
Weights

ZSS

Basic length without stroke:	10.90 kg
100 mm stroke:	1.00 kg
Entire carriage 200 mm:	2.30 kg
Entire carriage 350 mm:	3.00 kg

Max. total length: 8100 mm
(longer on request)

Forces and moments



	ZSS
Forces	Dynamic [N]
$F_x^{c)}$	2300
F_y	2500
F_z	3000
Moments	dynamic [Nm]
M_x	500
M_y	1200 (2500)
M_z	1000 (2100)

c) Maximum value (see diagram "Fx-v-Diagram")

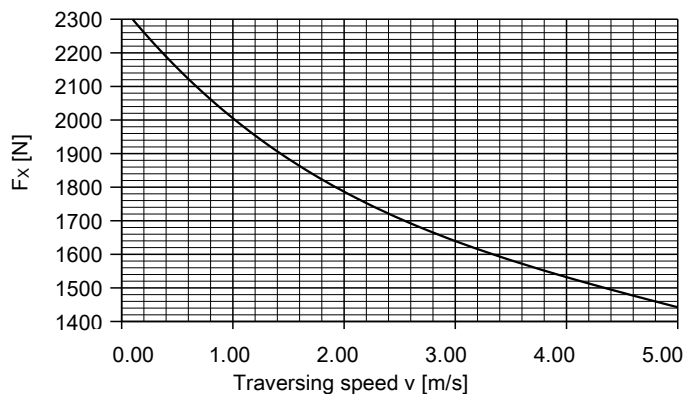
Data in brackets refer to long carriage (350)

Technical Data

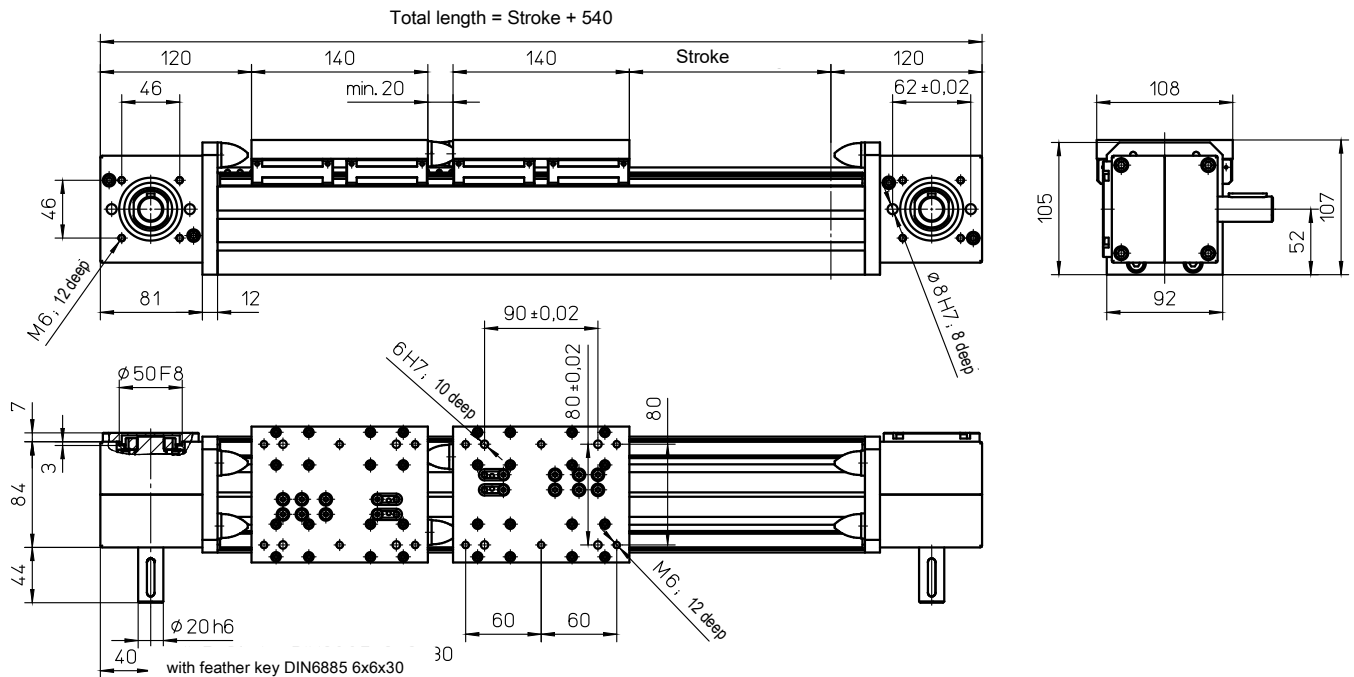
ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	3.20 Nm
Moment of inertia:	$3.15 \cdot 10^{-3} \text{ kgm}^2$
Drive element:	toothed belt 32 AT10
Stroke per revolution:	210 mm

Fx - v - Diagram



With toothed belt drive and double linear guide a second independently travelling carriage (ZSSD)



Weights

ZSSD

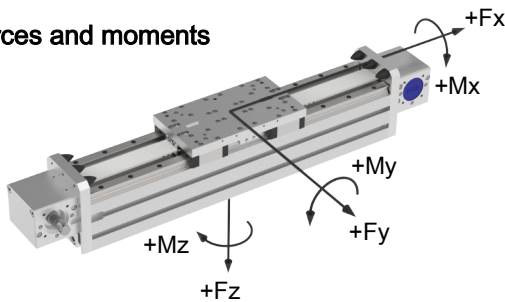
Basic length without stroke:	11.50 kg
100 mm stroke:	1.00 kg
Entire carriage 140 mm:	1.90 kg
Max. total length: (longer on request)	8100 mm

Technical Data

ZSSD

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	2.90 Nm
Moment of inertia:	2.20 · 10 ⁻³ kgm ²
Drive element:	2 x toothed belt 16 AT10
Stroke per revolution:	200 mm

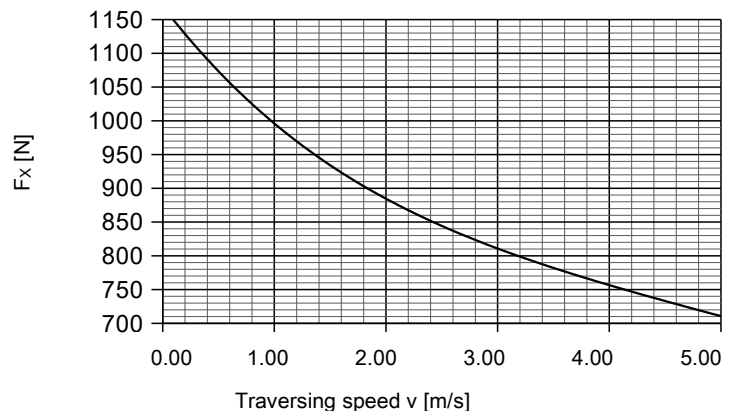
Forces and moments



	ZSSD
Forces	Dynamic [N]
F_x^{c)}	1150
F_y	2500
F_z	3000
Moments	Dynamic [Nm]
M_x	400
M_y	1000
M_z	800

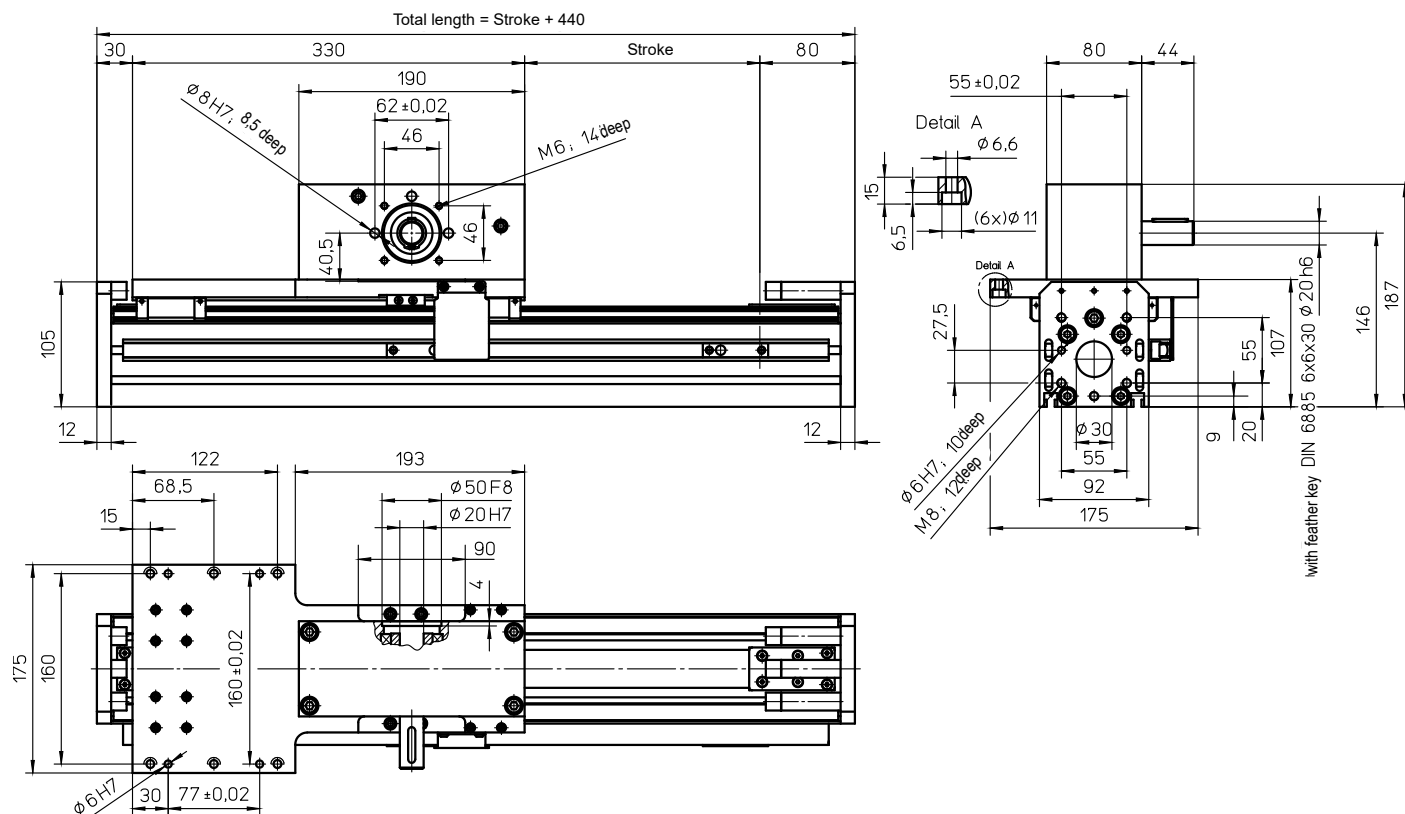
^{c)} Maximum value (see diagram "F_x-v-Diagram")

F_x - v - Diagram



These data apply to each carriage.

with toothed belt drive and double linear guide (ASH)



Weights

ASH

Basic length without stroke:	11.00 kg
100 mm stroke:	1.00 kg
Entire carriage 330 mm:	6.55 kg
Max. total length: (longer on request)	8000 mm

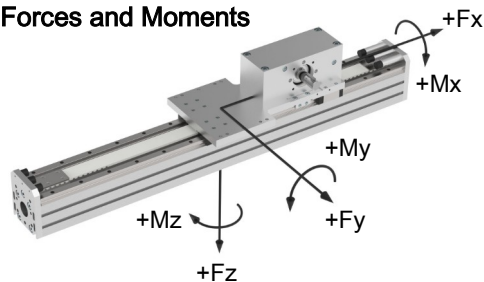
Technical Data

ASH

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	3.20 Nm
Moment of inertia: *	7.70 · 10 ⁻³ kgm ²
Drive element:	Toothed belt 32 AT10
Stroke per revolution:	210 mm

* (entire carriage traverses)

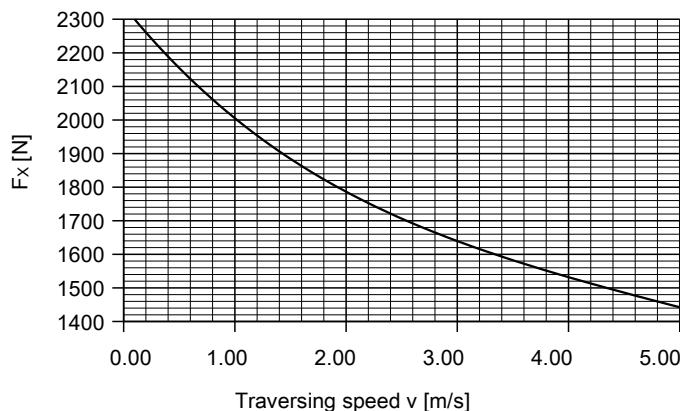
Forces and Moments



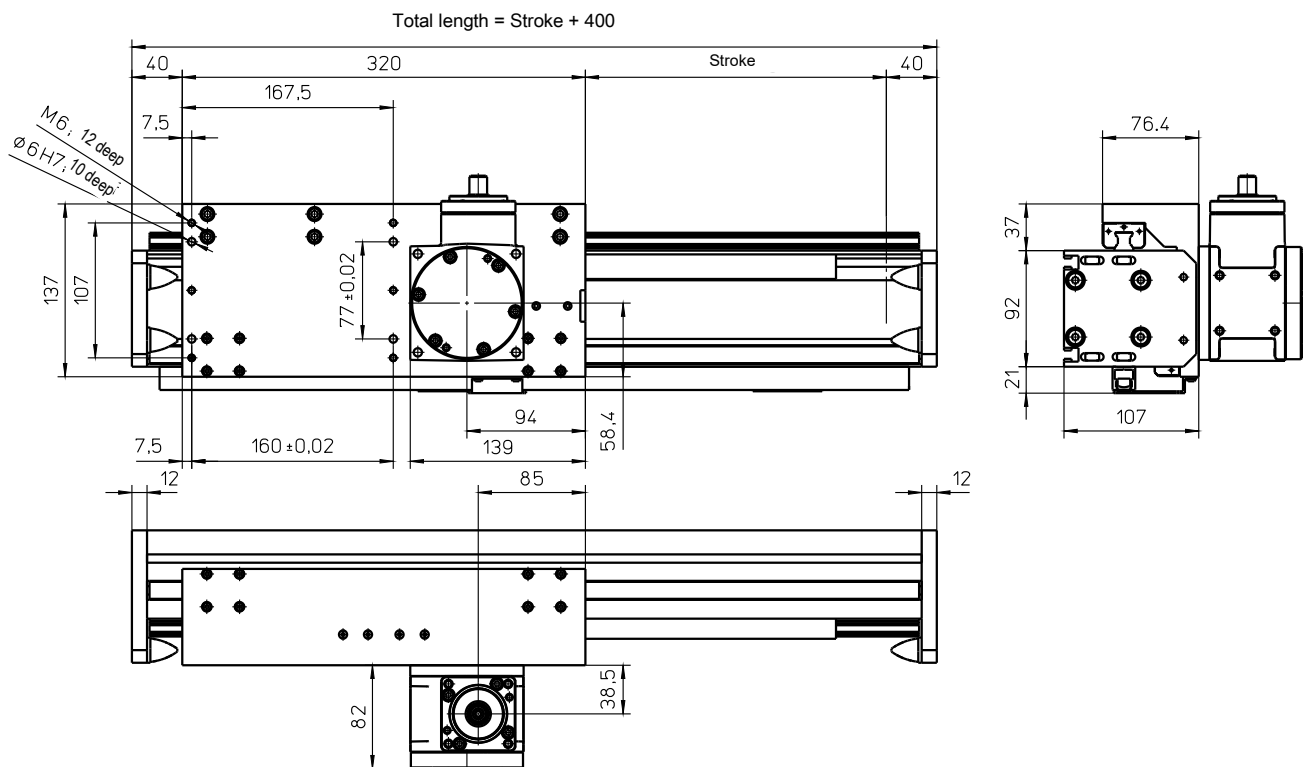
	ASH
Forces	Dynamic [N]
$F_x^{c)}$	2300
F_y	2500
F_z	3000
Moments	Dynamic [Nm]
M_x	500
M_y	2300
M_z	1900

c) Maximum value (see diagram "Fx-v-Diagram")

Fx - v - Diagram



with rack-and-pinion drive (helical) and double linear guide (AZSS)



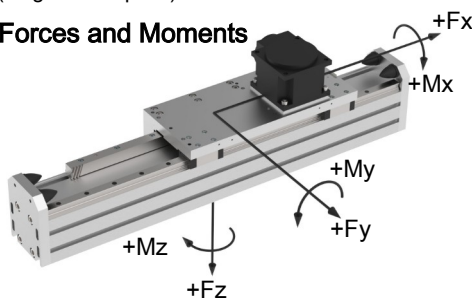
Weights

AZSS

Basic length without stroke:	14.85 kg*
100 mm stroke:	1.30 kg
Carriage 320 mm:	4.20 kg
Gear D55:	3.70 kg

Max. total length: 8000 mm
(longer on request)

Forces and Moments



AZSS-D55	
Forces	Dynamic [N]
F_x	1300-1800 **
F_y	3000
F_z	3000
Moments	Dynamic [Nm]
M_x	600
M_y	1800
M_z	1800

Technical Data

AZSS

Max. speed:	3.20 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	2.5 Nm
Rack and pinion:	Module 2 helical
Drive pinion:	Module 2, 18 teeth
Stroke per revolution:	120 mm
Servo-high-performance-gear:	DynaGear D55
Ratios:	5 / 10 / 15

D55	
Force F_x	Dynamic [N]
$i = 5:1$	1800
$i = 10:1$	
$i = 15:1$	1300

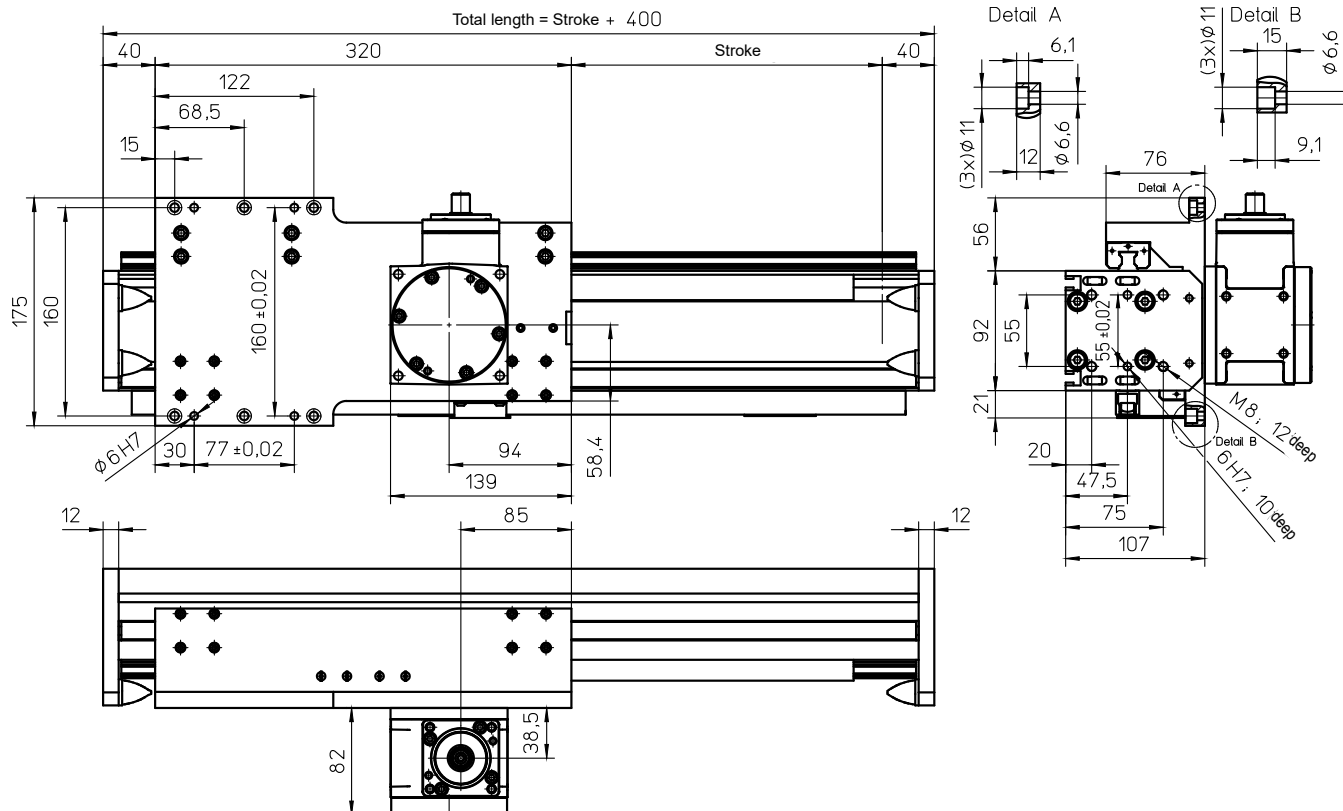
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive gear

** depending on gear ratio (see table to right)

with rack-and-pinion drive (helical) and double linear guide (AZSH)



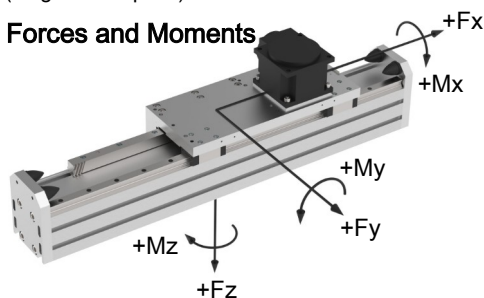
Weights

AZSH

Basic length without stroke:	15.00 kg*
100 mm stroke:	1.30 kg
Carriage 320 mm:	4.35 kg
Gear D55:	3.70 kg

Max. total length:
(longer on request) 8000 mm

Forces and Moments



	AZSH-D55
Forces	Dynamic [N]
F_x	1300-1800 **
F_y	3000
F_z	3000
Moments	Dynamic [Nm]
M_x	600
M_y	1800
M_z	1800

Technical Data

AZSH

Max. speed:	3.20 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	2.5 Nm
Rack and pinion:	Modul 2 helical
Drive pinion:	Modul 2, 18 teeth
Stroke per revolution:	120 mm
Servo-high-performance-gear:	DynaGear D55
Ratios:	5 / 10 / 15

	D55
Force F_x	Dynamic [N]
$i = 5:1$	1800
$i = 10:1$	
$i = 15:1$	1300

Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive gear

** depending on gear ratio (see table to right)

[illegible]

b) Data in brackets refer to version GX

ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	3.00 Nm
Moment of inertia:	4.90 · 10 ⁻³ kgm ²
Drive element:	Toothed belt 40 AT10-E
Stroke per revolution:	200 mm

Forces and moments

The diagram shows a robotic arm with a coordinate system at its end effector. The forces and moments are labeled as follows:

- $+F_x$: Force along the positive x-axis.
- $+M_x$: Moment about the positive x-axis.
- $+F_y$: Force along the positive y-axis.
- $+M_y$: Moment about the positive y-axis.
- $+F_z$: Force along the positive z-axis.
- $+M_z$: Moment about the positive z-axis.

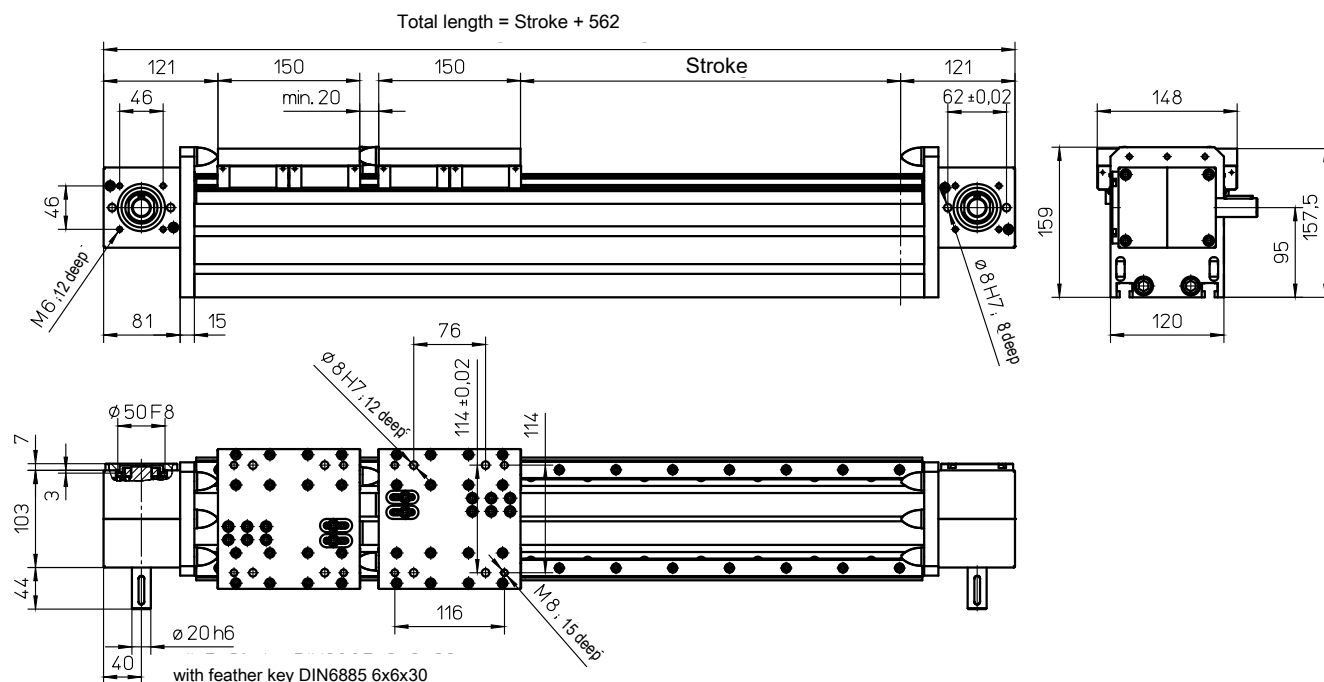
The graph shows the normal force F_x in Newtons (N) on the y-axis versus the traversing speed v in meters per second (m/s) on the x-axis. The y-axis ranges from 1700 to 2800 N with major grid lines every 100 N and minor grid lines every 20 N. The x-axis ranges from 0.00 to 5.00 m/s with major grid lines every 1.00 m/s and minor grid lines every 0.20 m/s. The curve starts at approximately (0.2, 2800) and decreases monotonically, passing through points such as (1.0, 2500), (2.0, 2200), (3.0, 2000), (4.0, 1850), and ending at (5.0, 1800).

Traversing speed v [m/s]	Normal force F_x [N]
0.2	2800
1.0	2500
2.0	2200
3.0	2000
4.0	1850
5.0	1800

	ZSS
Forces	Dynamic [N]
$F_x^c)$	2800
F_y	6000
F_z	8000
Moments	Dynamic [Nm]
M_x	1200
M_y	3000 (5000)
M_z	2500 (4200)

Release: 30.03.2021

with toothed belt drive and double linear guide and a second independently travelling carriage



Weights

ZSSD

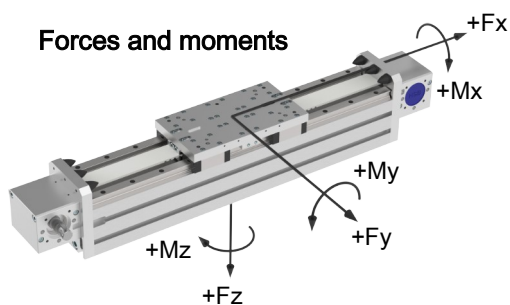
Basic length without stroke:	19.40 kg
100 mm stroke:	1.90 kg
Entire carriage 150 mm:	3.40 kg
Max. total length: (longer on request)	8200 mm

Technical Data

ZSSD

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	3.00 Nm
Moment of inertia:	3.90 • 10 ⁻³ kgm ²
Drive element:	2 x Toothed belt 25 ATL10
Stroke per revolution:	200 mm

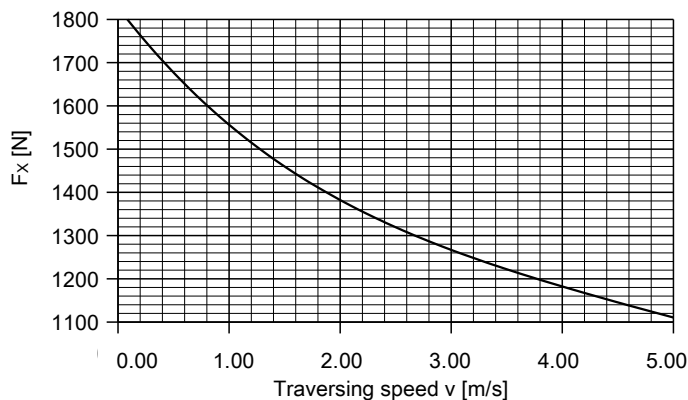
Forces and moments



	ZSSD
Forces	Dynamic [N]
F_x^{c)}	1800
F_y	6000
F_z	8000
Moments	Dynamic [Nm]
M_x	1200
M_y	1300
M_z	1100

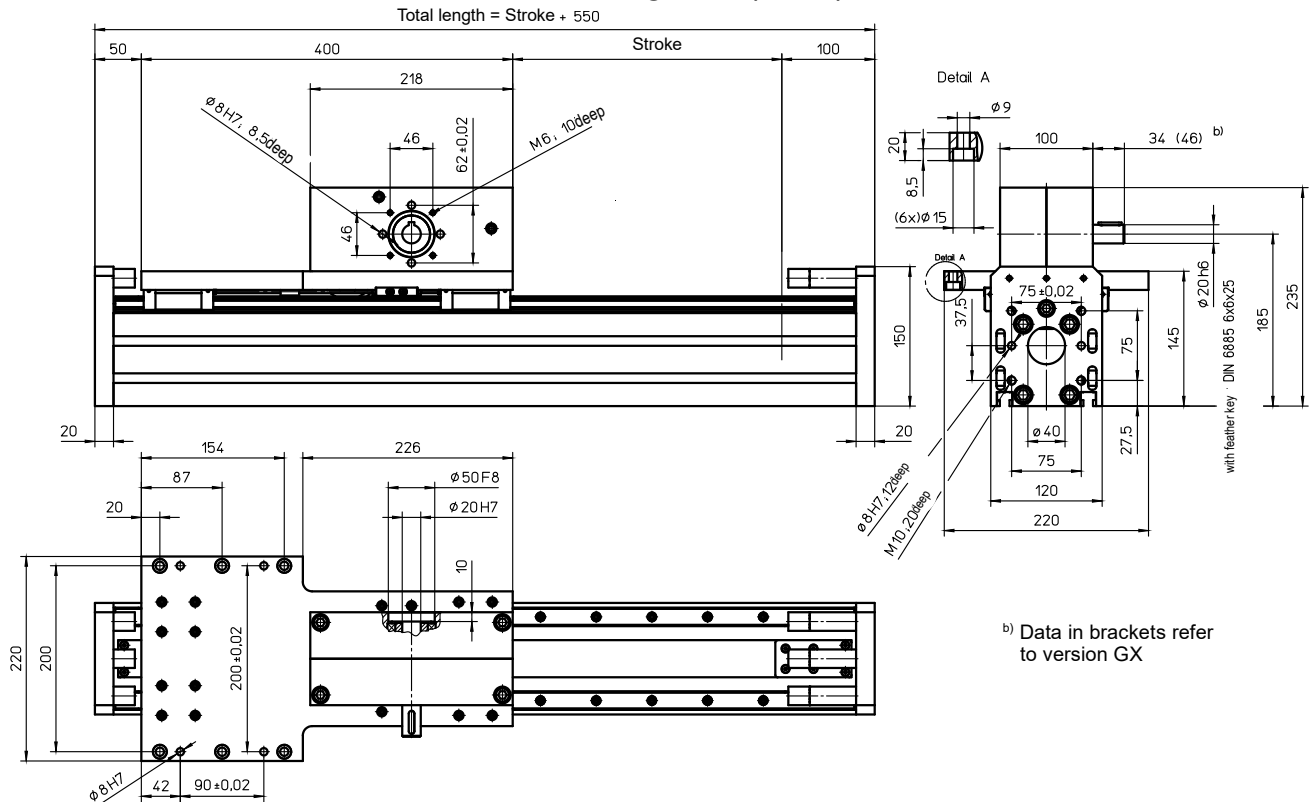
^{c)} Maximum value (see diagram "F_x-v-Diagram")

F_x - v - Diagram



These data apply to each carriage.

with toothed belt drive and double linear guide (ASH)



b) Data in brackets refer to version GX

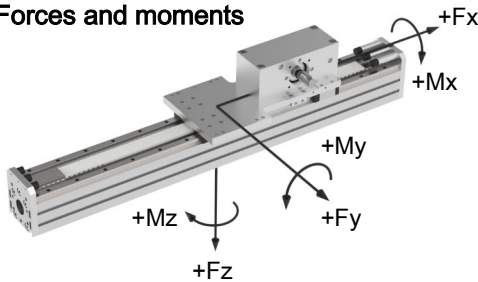
Weights

ASH

Basic length without stroke:	21.35 kg
100 mm stroke:	1.65 kg
Entire carriage 400 mm:	10.25 kg

Max. total length: (longer on request)	8000 mm
---	---------

Forces and moments



	ASH
Forces	Dynamic [N]
$F_x^{c)}$	3200
F_y	6000
F_z	8000
Moments	Dynamic [Nm]
M_x	1200
M_y	5000
M_z	4200

c) Maximum value (see diagram "F_x-v-Diagram")

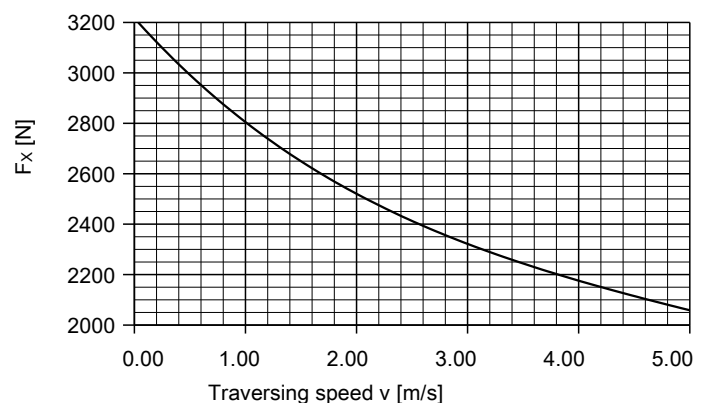
Technical Data

ASH

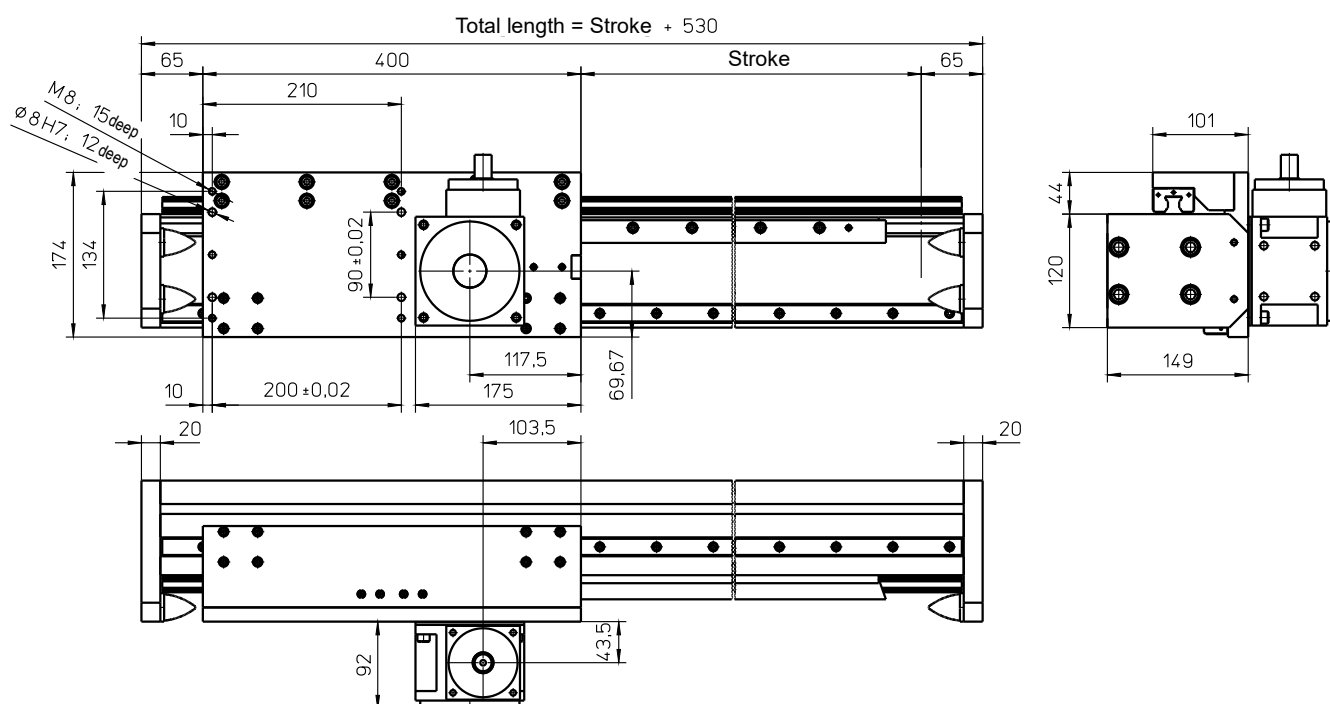
Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	3.60 Nm
Moment of inertia*:	$1.57 \cdot 10^{-2} \text{ kgm}^2$
Drive element:	Toothed belt 40 AT10-E
Stroke per revolution:	240 mm

* (entire carriage traverse)

F_x - v - Diagram



with rack-and-pinion drive (helical) and double linear guide (AZSS)

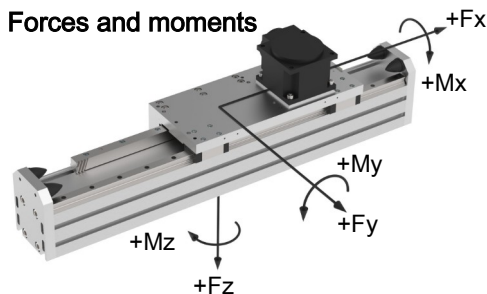


Weights

	AZSS
Basic length without stroke:	25.85 kg*
100 mm stroke:	2.10 kg
Carriage 400 mm:	8.20 kg
Gear D75:	6.30 kg

Max. total length: (longer on request)	8000 mm
---	---------

Forces and moments



	AZSS-D75
Forces	Dynamic [N]
F_x	1500-2200 **
F_y	8000
F_z	8000
Moments	Dynamic [Nm]
M_x	1500
M_y	4000
M_z	4000

Technical Data

	AZSS
Max. speed:	5.00 m/s
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	4.80 Nm
Rack and pinion:	Module 2 helical
Drive pinion:	Module 2, 30 teeth
Stroke per revolution:	200 mm
Servo-high-performance-gear:	DynaGear D75
Ratios:	5 / 10 / 15

	D75
Load F_x	Dynamic [N]
$i = 5:1$	2200
$i = 10:1$	
$i = 15:1$	1500

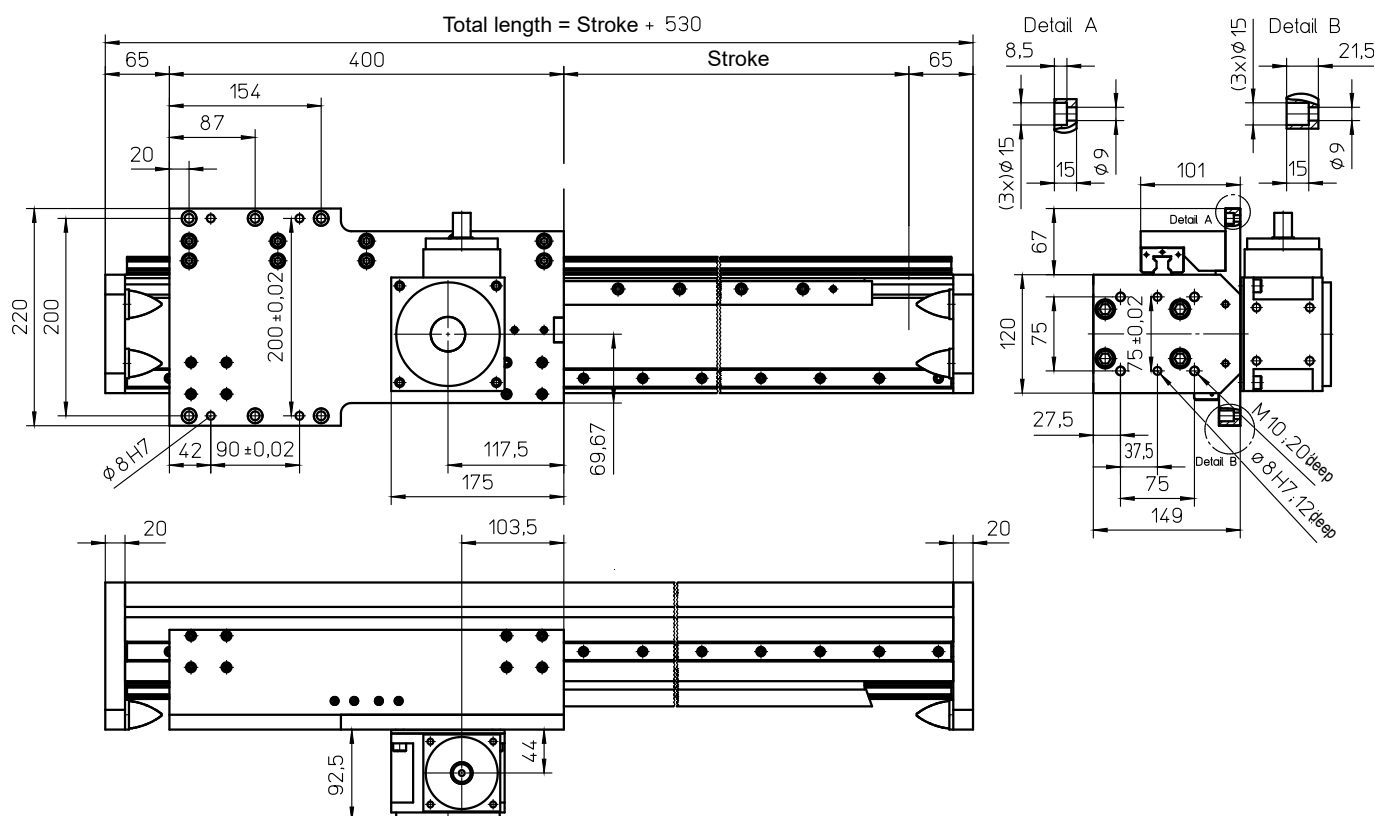
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive gear

** depending on gear ratio (see table to right)

with rack-and-pinion drive (helical) and double linear guide (AZSH)



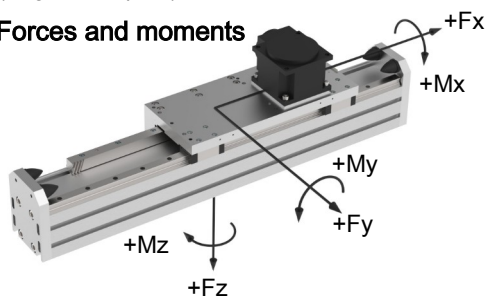
Weights

AZSH

Basic length without stroke:	26.10 kg*
100 mm stroke:	2.10 kg
Carriage 400 mm:	8.45 kg
Gear D75:	6.30 kg

Max. total length: 8000 mm
(longer on request)

Forces and moments



AZSH-D75	
Forces	Dynamic [N]
F_x	1500-2200 **
F_y	8000
F_z	8000
Moments	Dynamic [Nm]
M_x	1500
M_y	4000
M_z	4000

Technical Data

Max. speed:
Max. acceleration:
Repeat accuracy:
Idle torque at drive pinion:
Rack and pinion:
Drive pinion:
Stroke per revolution:
Servo-high-performance-gear:
Ratios:

AZSH

5.00 m/s
20 m/s²
± 0.05 mm
4.80 Nm
Module 2 helical
Module 2, 30 teeth
200 mm
DynaGear D75
5 / 10 / 15

D75	
Load F_x	Dynamic [N]
$i = 5:1$	2200
$i = 10:1$	
$i = 15:1$	1500

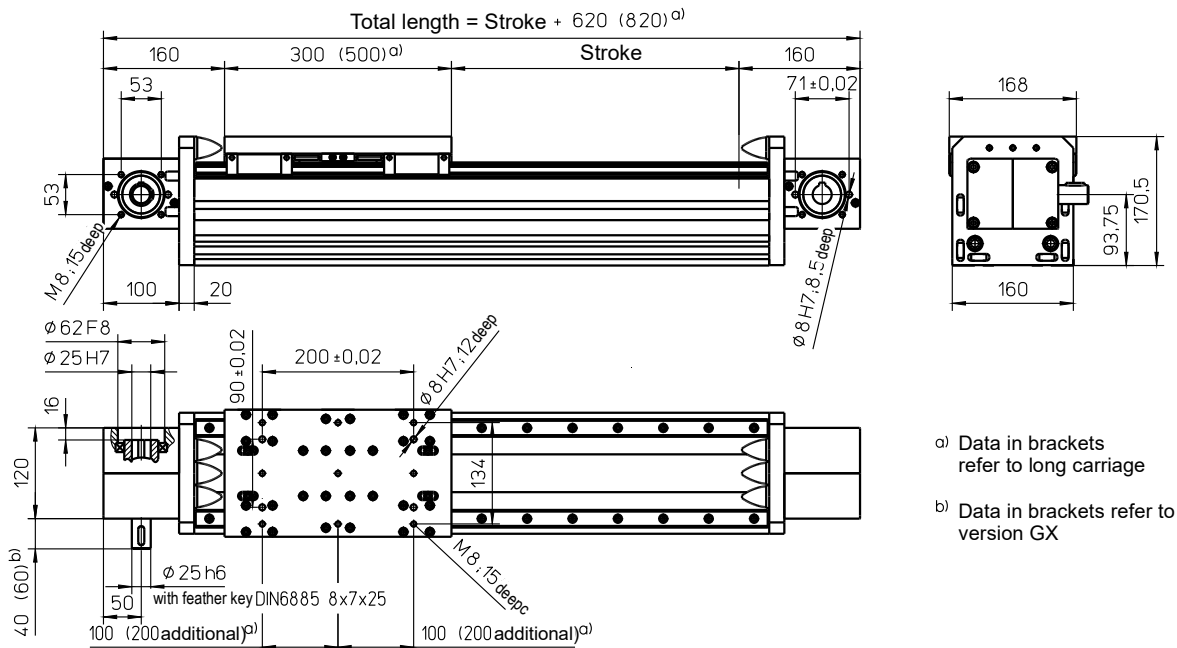
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive gear

** depending on gear ratio (see table to right)

with toothed belt drive and double linear guide (ZSS)

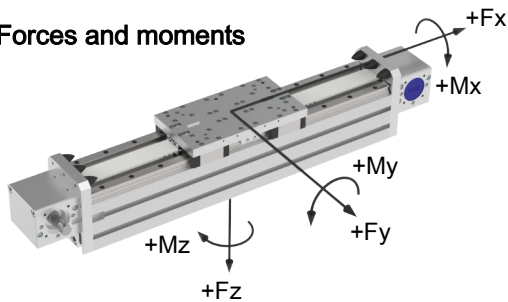


Weights ZSS

Basic length without stroke:	26.50 kg
100 mm stroke:	2.42 kg
Entire carriage 300 mm:	7.60 kg
Entire carriage 500 mm:	9.80 kg

Max. total length: 8200 mm
(longer on request)

Forces and moments



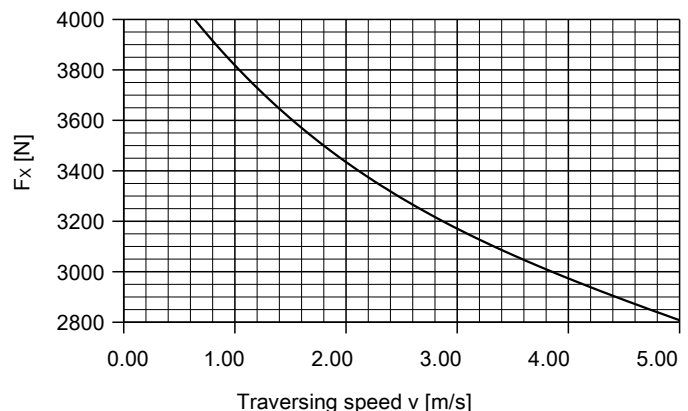
	ZSS
Forces	Dynamic [N]
$F_x^{c)}$	4000
F_y	10000
F_z	16000
Moments	Dynamic [Nm]
M_x	1800
M_y	5000 (8000)
M_z	4000 (7000)

^{c)} Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage (500)

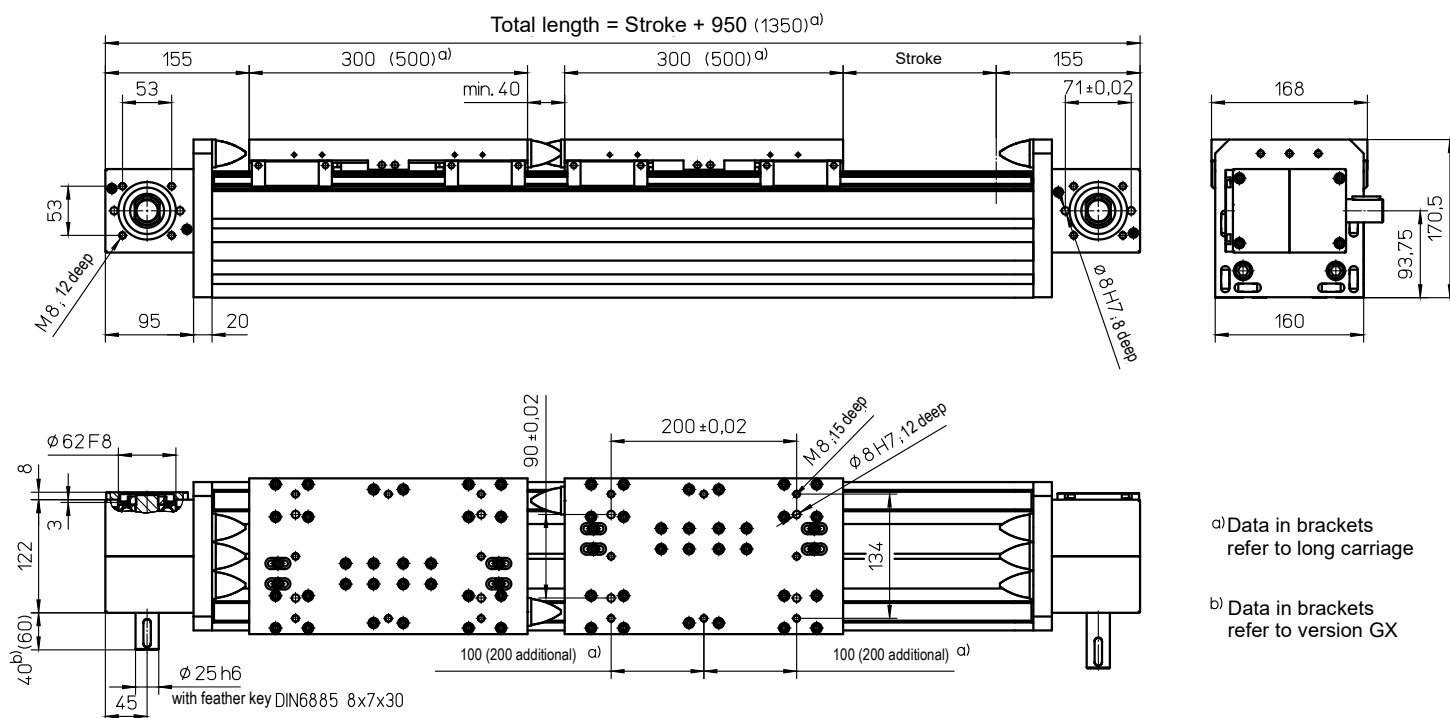
Technical Data ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	4.00 Nm
Moment of inertia:	1.80 • 10 ⁻² kgm ²
Drive element:	Toothed belt 50 ATL10
Stroke per revolution:	240 mm

F_x - v - Diagram



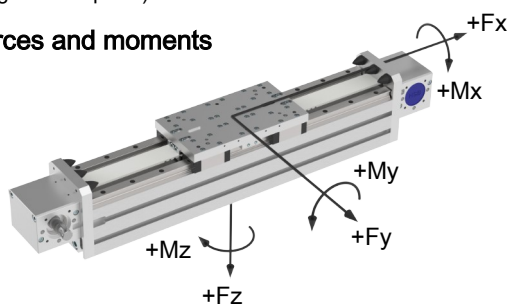
with toothed belt drive and double linear guide and a second independently travelling carriage (ZSSD)



Weights ZSSD

Basic length without stroke:	39.80 kg
100 mm stroke:	2.50 kg
Entire carriage 300 mm:	7.00 kg
Entire carriage 500 mm:	9.20 kg
Max. total length:	8200 mm
(longer on request)	

Forces and moments



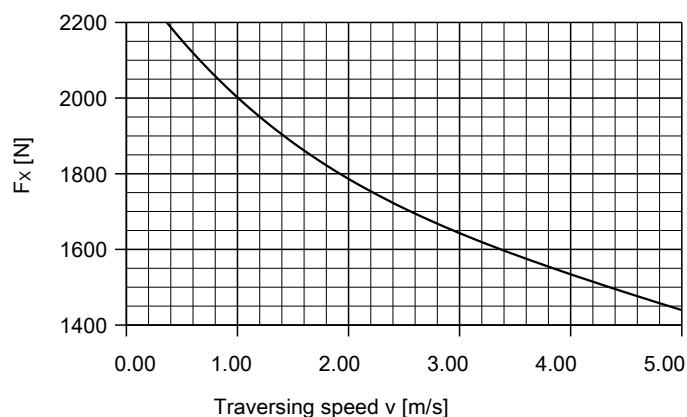
	ZSSD
Forces	Dynamic [N]
$F_x^c)$	2200
F_y	10000
F_z	16000
Moments	Dynamic [Nm]
M_x	1800
M_y	5000 (8000)
M_z	4000 (7000)

c) Maximum value (see diagram „ F_x -v-Diagram“)
Data in brackets refer to long carriage (500)

Technical Data ZSSD

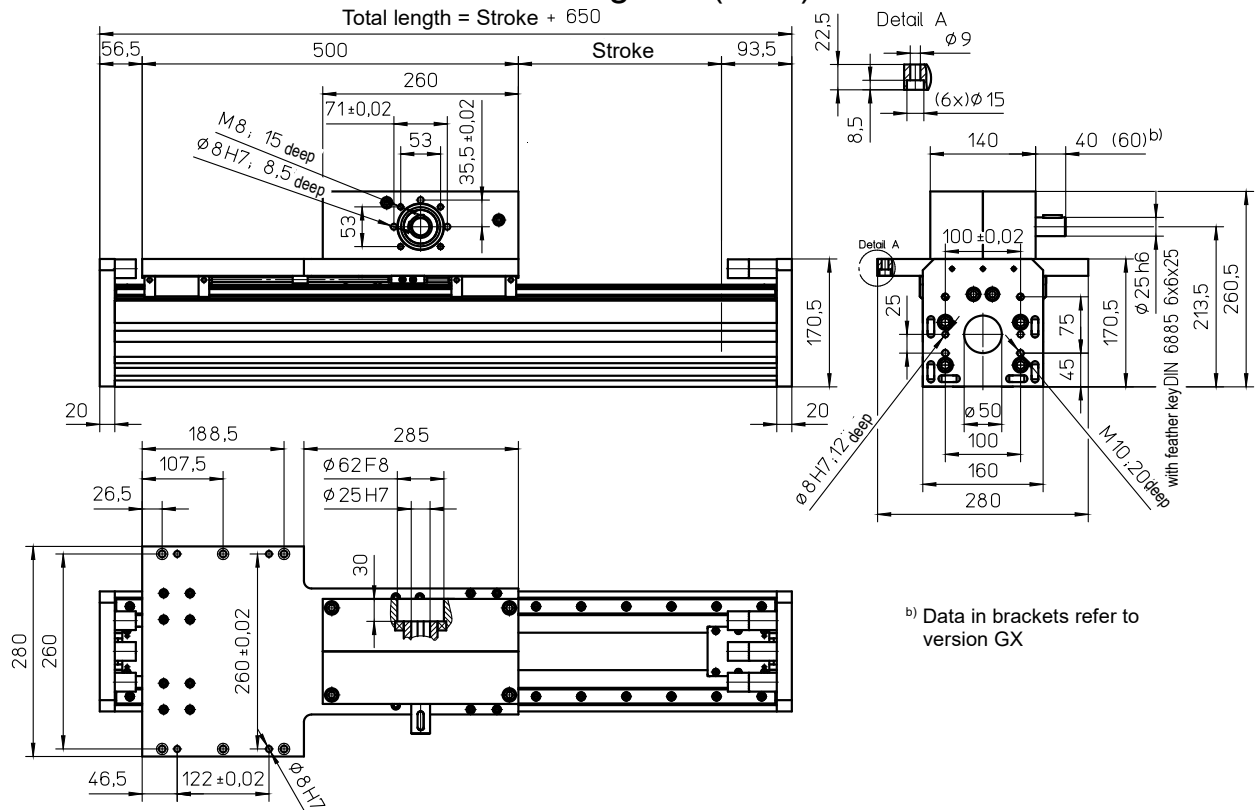
Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	4.00 Nm
Moment of inertia:	8.75 • 10 ⁻³ kgm ²
Drive element:	2 x Toothed belt 32 AT10
Stroke per revolution:	210 mm

F_x - v - Diagram



These data apply to each carriage.

with toothed belt drive and double linear guide (ASH)



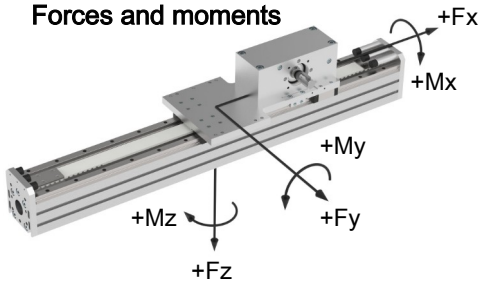
Weights

ASH

Basic length without stroke:	36.50 kg
100 mm stroke:	2.42 kg
Entire carriage 500 mm:	16.60 kg

Max. total length: (longer on request)	8000 mm
---	---------

Forces and moments



	ASH
Forces	Dynamic [N]
$F_x^{c)}$	4000
F_y	10000
F_z	16000
Moments	Dynamic [Nm]
M_x	1800
M_y	8000
M_z	7000

c) Maximum value (see diagram "F_x-v-Diagram")

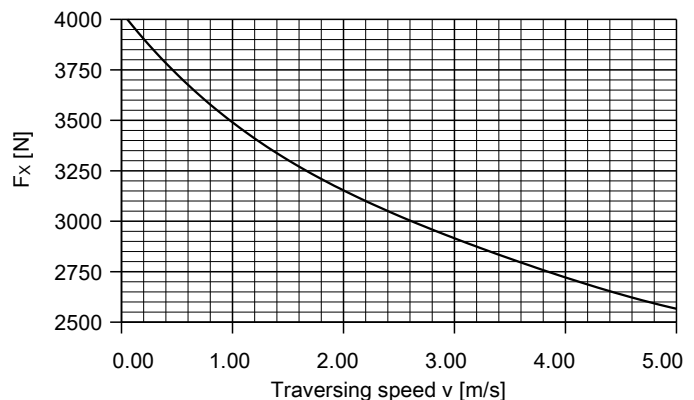
Technical Data

ASH

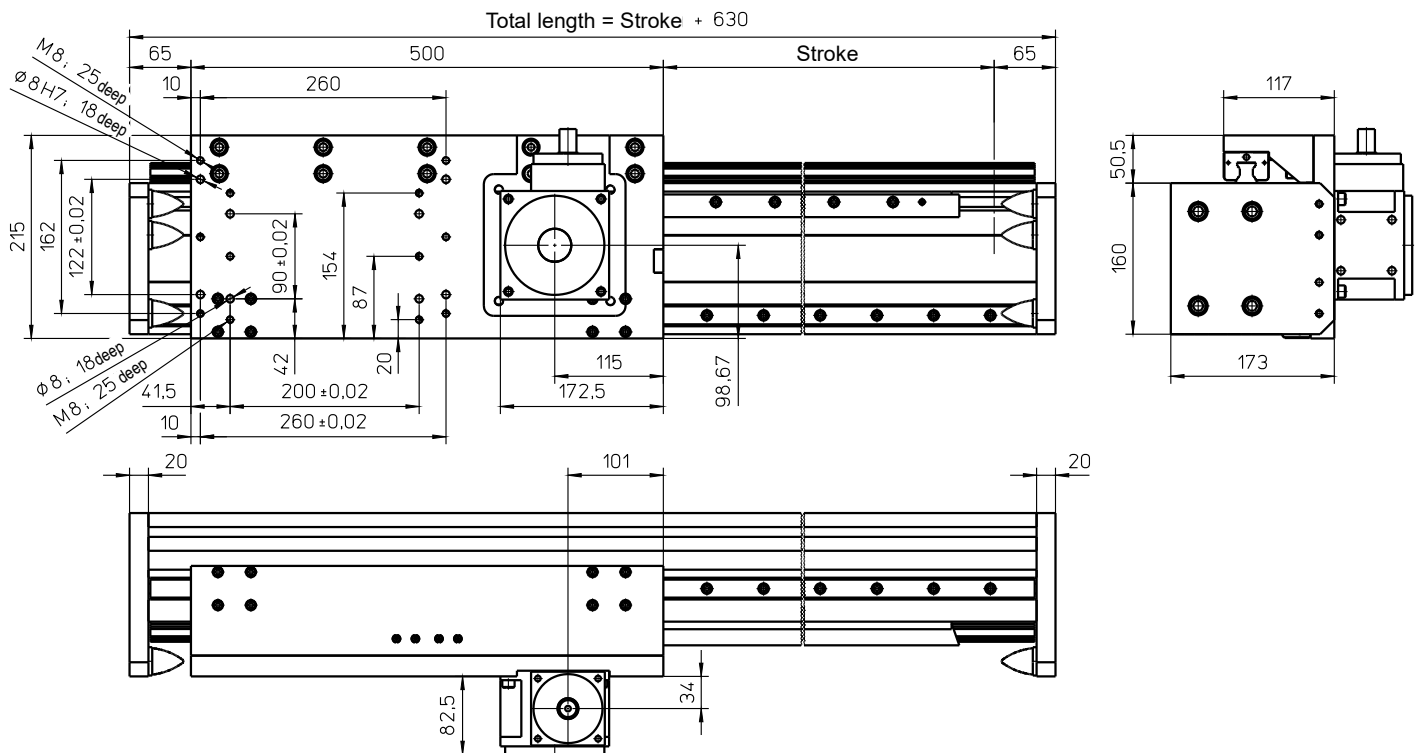
Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	4.00 Nm
Moment of inertia:*	$2.57 \cdot 10^{-2} \text{ kgm}^2$
Drive element:	Toothed belt 50 AT10-E
Stroke per revolution:	240 mm

* (entire carriage traverses)

F_x - v - Diagram



with rack-and-pinion drive (helical) and double linear guide (AZSS)



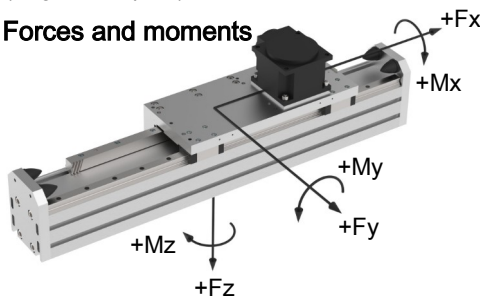
Weights

AZSS

Basic length without stroke:	33.25 kg*
100 mm stroke:	3.00 kg
Carriage 500 mm:	13.90 kg
Gears D75 / D90:	6.30 / 10.50 kg

Max. total length: 8000 mm
(longer on request)

Forces and moments



	AZSS-D75	AZSS-D90
Forces	Dynamic [N]	
F_x	1500-2200 **	3000-4000 **
F_y	12000	
F_z	12000	
Moments	Dynamic [Nm]	
M_x	2500	
M_y	7000	
M_z	7000	

Technical Data

AZSS

Max. speed:	5.00 m/s (D75) / 4.50 m/s (D90)
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	5.80 Nm
Rack and pinion:	Module 2 helical
Drive pinion:	Module 2, 30 teeth
Stroke per revolution:	200 mm
Servo-high-performance-gear:	DynaGear D75 / D 90
Ratios:	5 / 10 / 15

	D75	D90
Load F_x	Dynamic [N]	
i = 5:1	2200	4000
i = 10:1		
i = 15:1	1500	3000

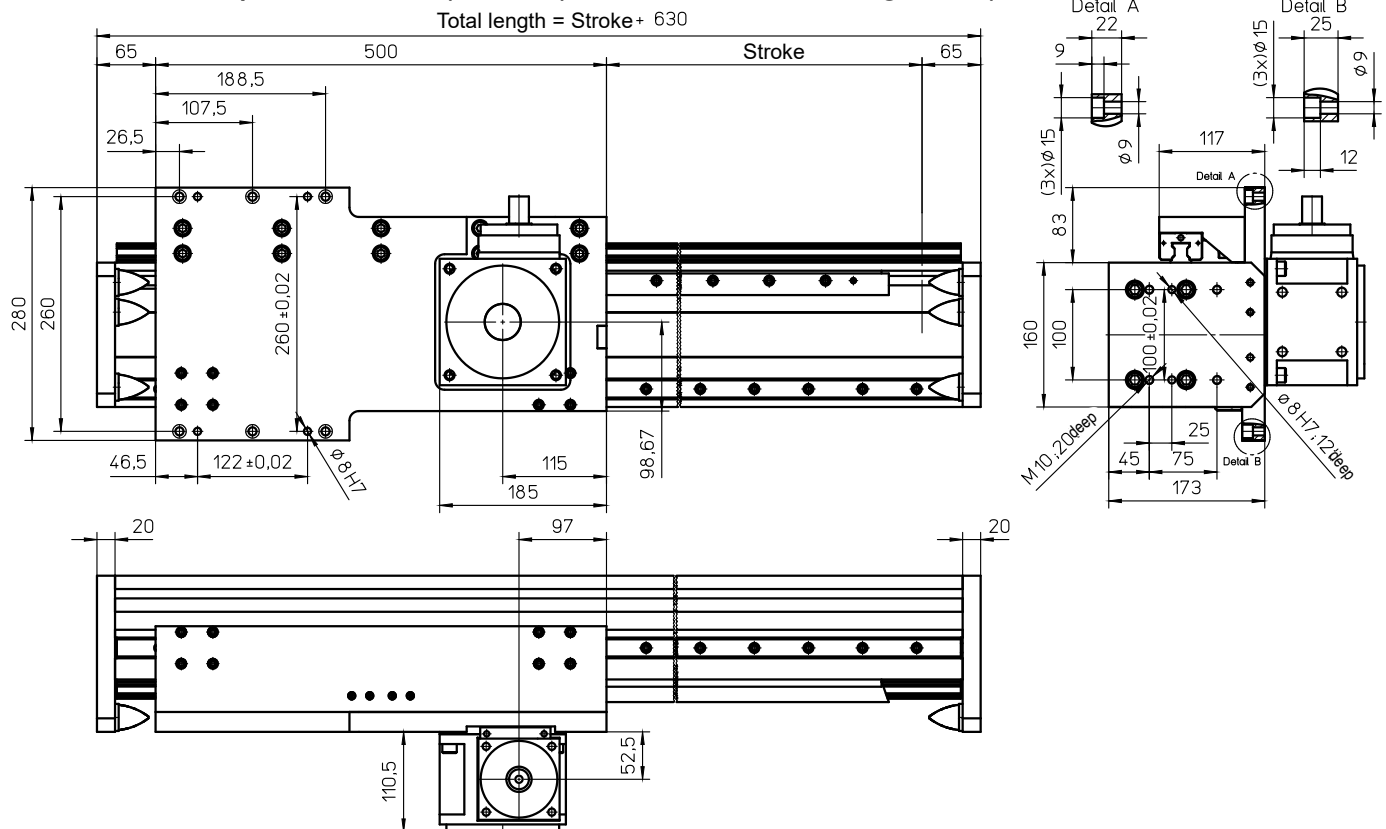
Preferred gear: D75
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive standard gear

** depending on gear ratio (see table to right)

with rack-and-pinion drive (helical) and double linear guide (AZSH)



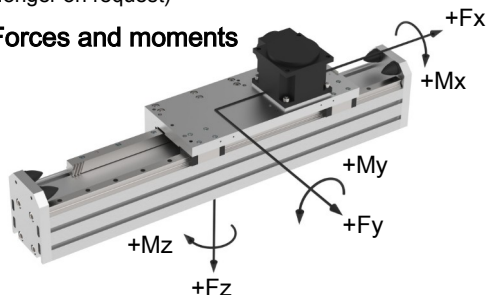
Weights

AZSH

Basic length without stroke:	34.05 kg*
100 mm stroke:	3.00 kg
Carriage 500 mm:	14.70 kg
Gears D75 / D90:	6.30 / 10.50 kg

Max. total length: 8000 mm
(longer on request)

Forces and moments



	AZSH-D75	AZSH-D90
Forces	Dynamic [N]	
F_x	1500-2200 **	3000-4000 **
F_y	12000	
F_z	12000	
Moments	Dynamic [Nm]	
M_x	2500	
M_y	7000	
M_z	7000	

Technical Data

AZSH

Max. speed:	5.00 m/s (D75) / 4.50 m/s (D90)
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	5.80 Nm
Rack and pinion:	Module 2 helical
Drive pinion:	Module 2, 30 teeth
Stroke per revolution:	200 mm
Servo-high-performance-gear:	DynaGear D75 / D 90
Ratios:	5 / 10 / 15

	D75	D90
Load F_x	Dynamic [N]	
$i = 5:1$	2200	4000
$i = 10:1$		
$i = 15:1$		

Preferred gear: D90

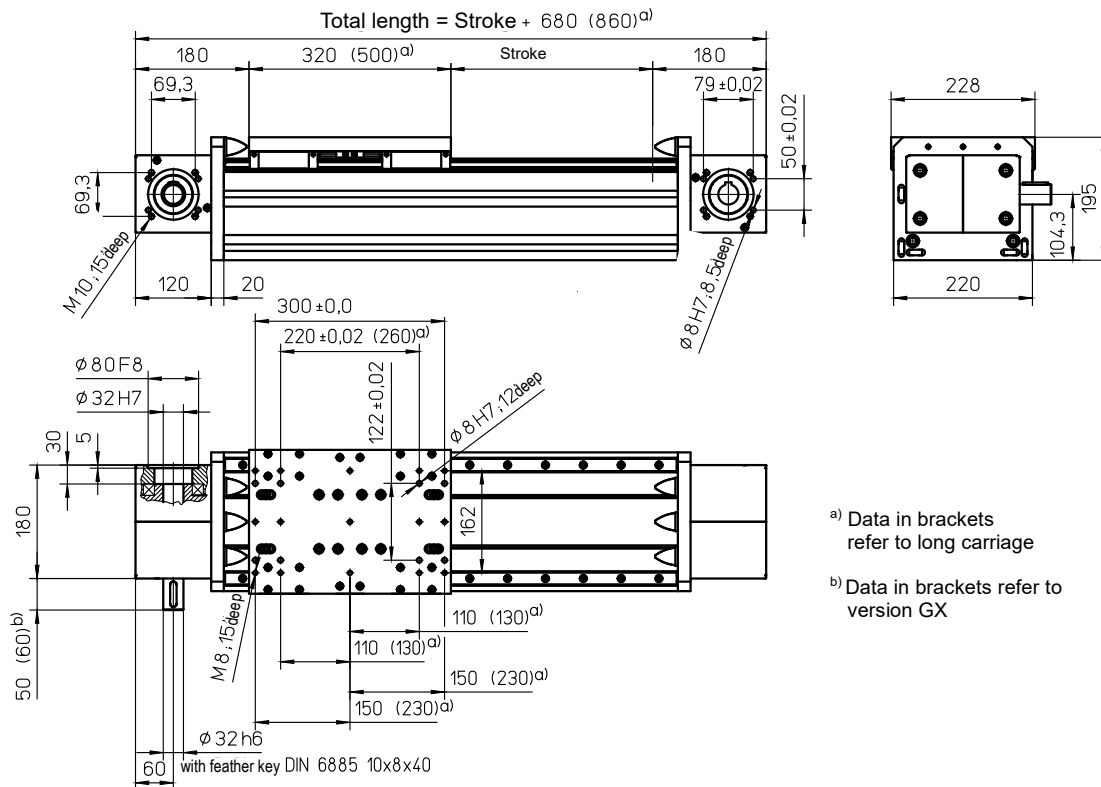
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive standard gear

** depending on gear ratio (see table to right)

with toothed belt drive and double linear guide (ZSS)



^{a)} Data in brackets refer to long carriage

^{b)} Data in brackets refer to version GX

Weights

ZSS

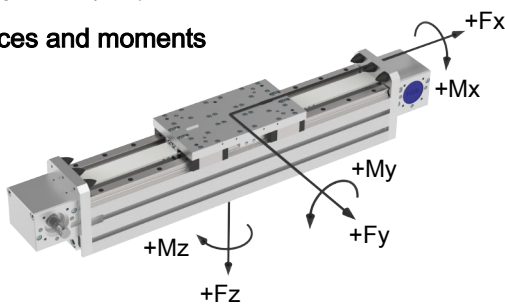
Basic length without stroke:	45.00 kg
100 mm stroke:	3.62 kg
Entire carriage 320 mm:	10.50 kg
Entire carriage 500 mm:	13.20 kg
Max. total length: (longer on request)	12200 mm

Technical Data

ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	7.00 Nm
Moment of inertia:	3.30 • 10 ⁻² kgm ²
Drive element:	Toothed belt 75 ATL10
Stroke per revolution:	320 mm

Forces and moments

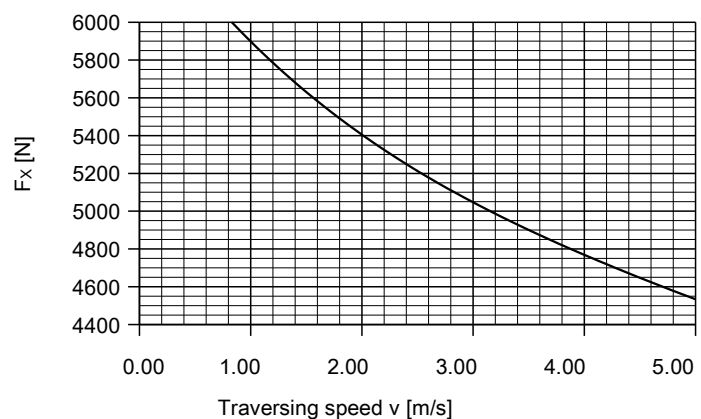


	ZSS
Forces	Dynamic [N]
F_x ^{c)}	6000
F_y	12000
F_z	20000
Moments	Dynamic [Nm]
M_x	2500
M_y	8000 (12000)
M_z	6500 (10000)

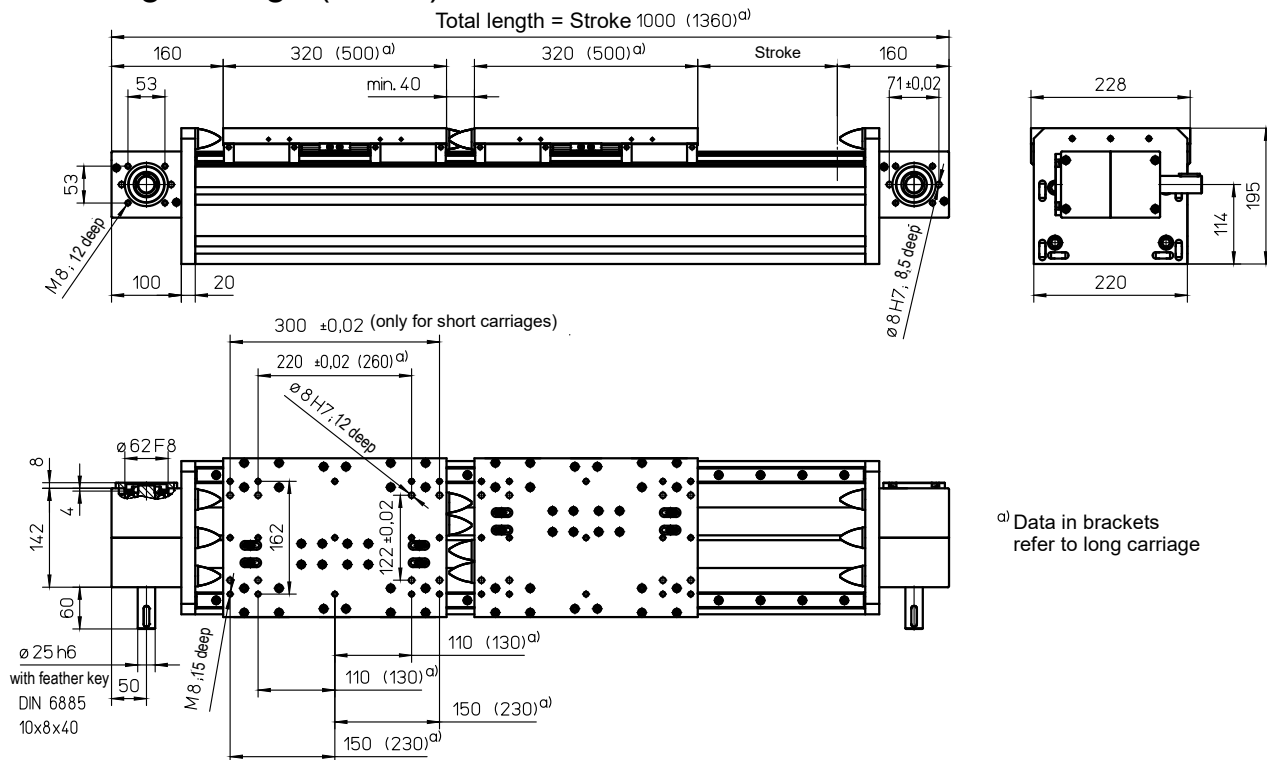
^{c)} Maximum value (see diagram "F_x-v-Diagram")

Data in brackets refer to long carriage (500)

F_x - v - Diagram



with toothed belt drive and double linear guide and a second independently travelling carriage (ZSSD)

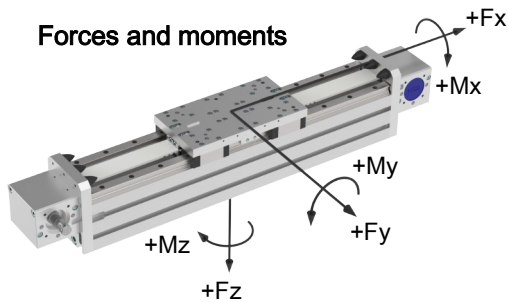


a) Data in brackets refer to long carriage

Weights	ZSSD
Basic length without stroke	57.50 kg
100 mm stroke:	3.60 kg
Entire carriage 320 mm:	9.30 kg
Entire carriage 500 mm:	11.90 kg
Max. total length: (longer on request)	12200 mm

Technical Data	ZSSD
Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0,08 mm
Idle torque:	5.25 Nm
Moment of inertia:	1,55 • 10 ⁻² kgm ²
Drive element:	2 x Zahnriemen 40 AT10
Stroke per revolution:	240 mm

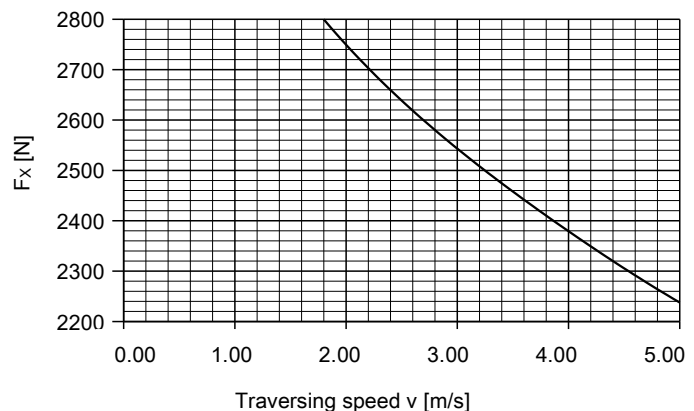
Forces and moments



	ZSSD
Forces	Dynamic [N]
F_x^{c)}	2800
F_y	12000
F_z	20000
Moments	Dynamic [Nm]
M_x	2500
M_y	8000 (12000)
M_z	6500 (10000)

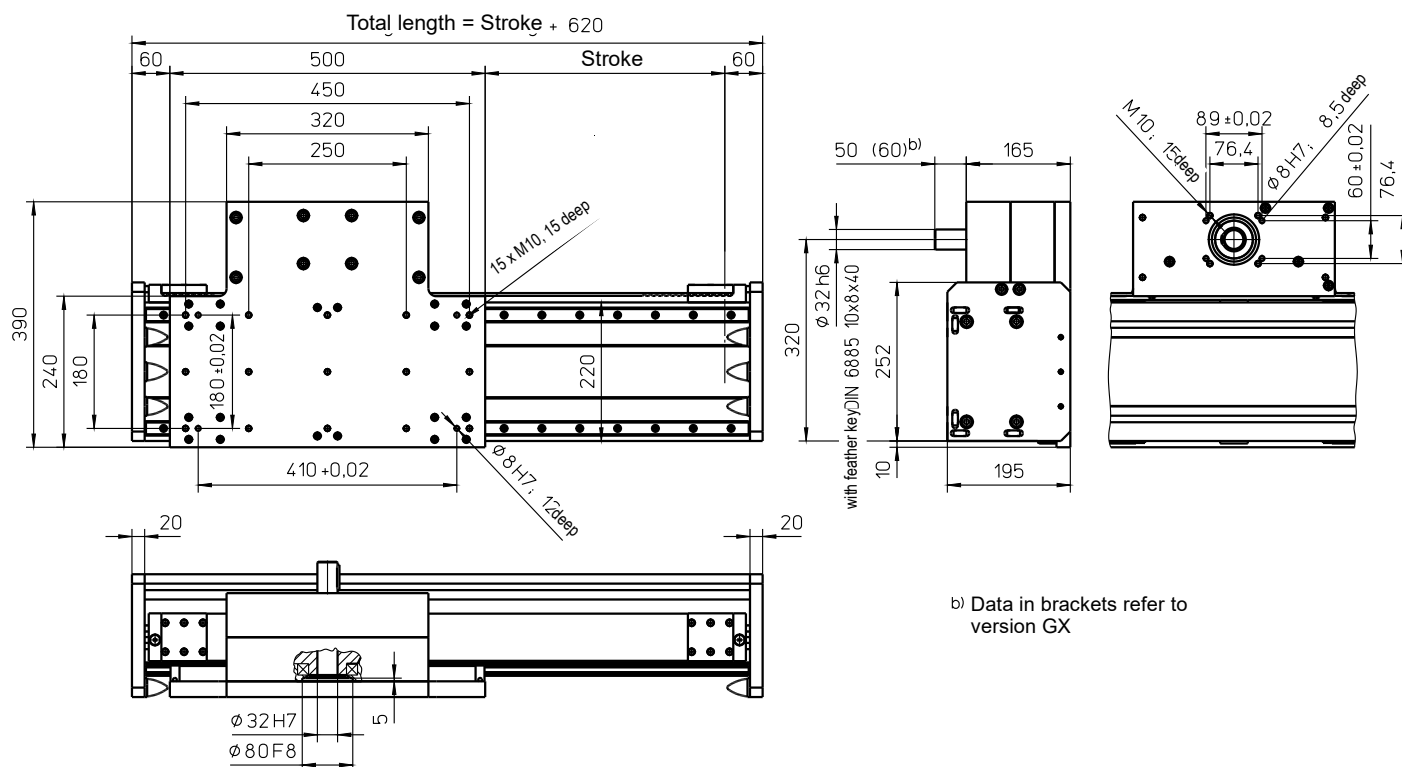
c) Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage (500)

$F_x - v$ - Diagram



These data apply to each carriage.

with toothed belt drive and double linear guide (ASS)



b) Data in brackets refer to version GX

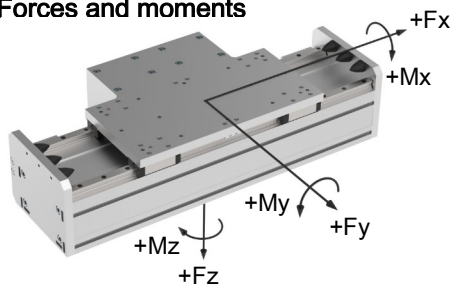
Weights

ASS

Basic length without stroke:	61.00 kg
100 mm stroke:	3.60 kg
Entire carriage 500 mm:	31.70 kg

Max. total length: (longer on request)	12000 mm
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Forces and moments



	ASS
Forces	Dynamic [N]
$F_x^{c)}$	6000
F_y	12000
F_z	20000
Moments	Dynamic [Nm]
M_x	2500
M_y	12000
M_z	10000

c) Maximum value (see diagram "F_x-v-Diagram")

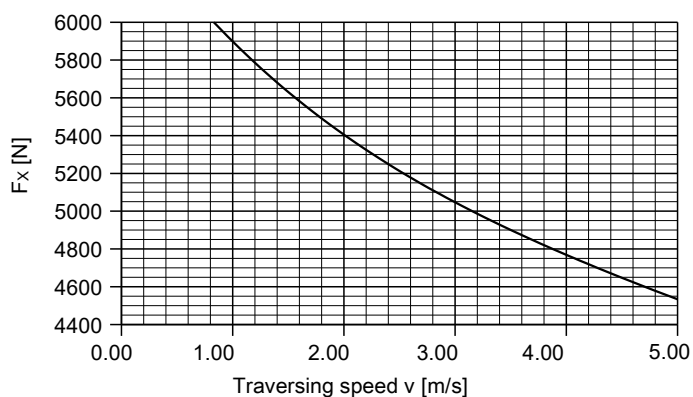
Technical Data

ASS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	8.83 Nm
Moment of inertia: *	$3.75 \cdot 10^{-2} \text{ kgm}^2$
Drive element:	Toothed belt 75 AT10-E
Stroke per revolution:	320 mm

* (entire carriage traverses)

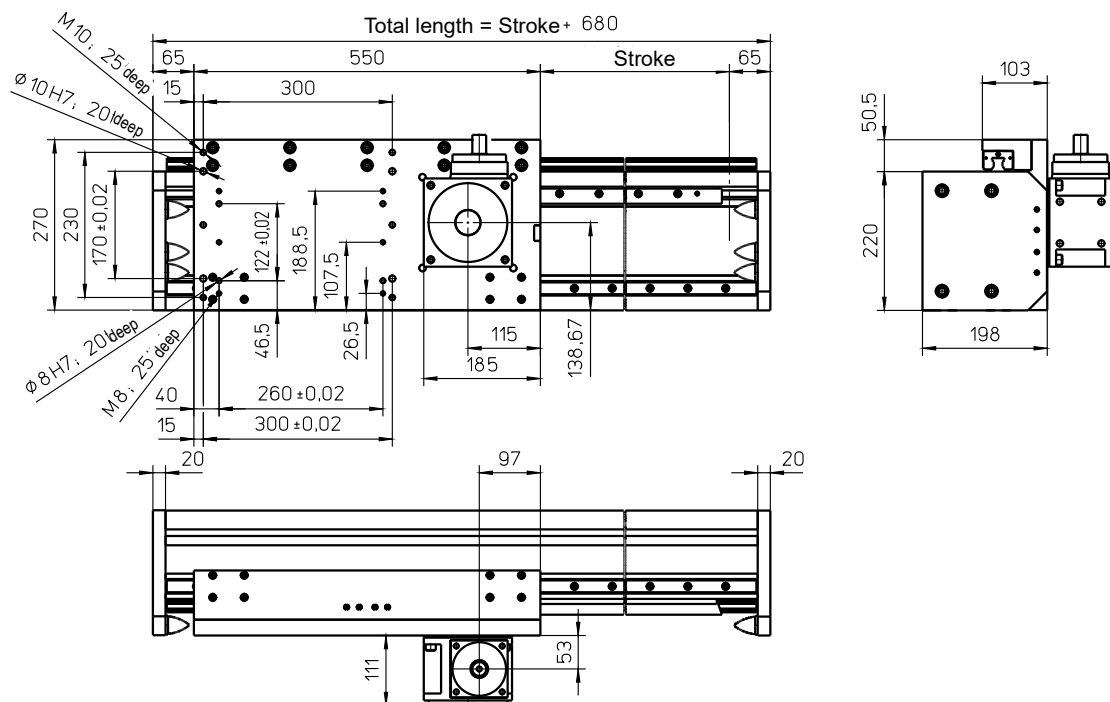
F_x - v - Diagram



Note:

Only insert linear drive with drive housing facing upwards if you have a horizontal installation position.

with rack-and-pinion drive module 2 (helical)
and double linear guide (AZSS)



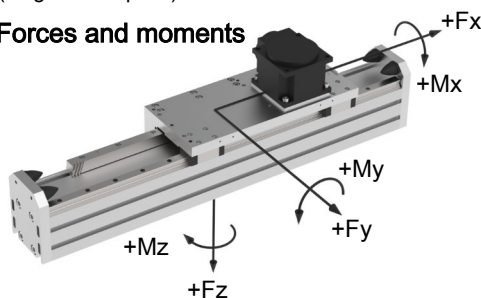
Weights

AZSS

Basic length without stroke:	46.60 kg*
100 mm stroke:	4.10 kg
Carriage 550 mm:	18.10 kg
Gears D90 / D115:	10.35 / 16.70 kg

Max. total length: 12000 mm
(longer on request)

Forces and moments



	AZSS-D90	AZSS-D115
Forces	Dynamic [N]	
F_x	3000-4000 **	5000-6000 **
F_y	20000	
F_z	20000	
Moments	Dynamic [Nm]	
M_x	4000	
M_y	8000	
M_z	8000	

Technical Data

AZSS

Max. speed:	4.50 m/s (D90) / 4.00 m/s (D115)
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	7.2 Nm
Rack and pinion:	Module 2 helical
Drive pinion:	Module 2, 30 teeth
Stroke per revolution:	200 mm
Servo-high-performance-gear:	DynaGear D90 / D115
Ratios:	5 / 10 / 15

	D90	D115
Load F_x	Dynamic [N]	
$i = 5:1$	4000	6000
$i = 10:1$		
$i = 15:1$	3000	5000

Preferred gear: D90

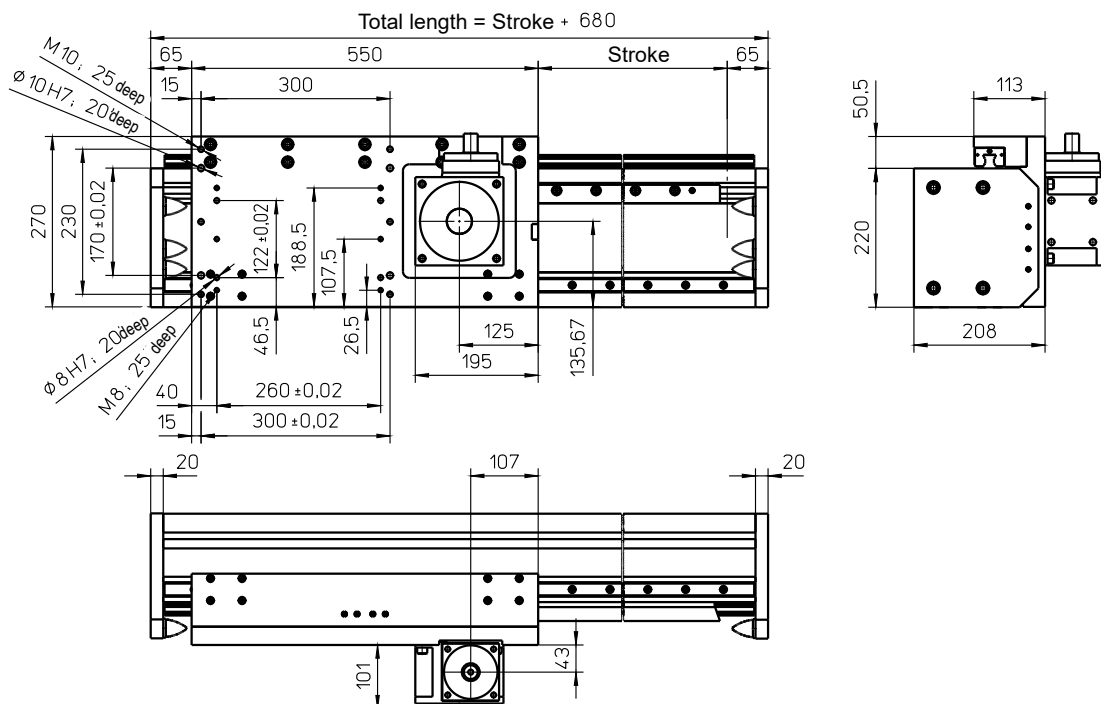
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive standard gear

** depending on gear ratio (see table to right)

with rack-and-pinion drive module 3 (helical)
and double linear guide (AZSS)



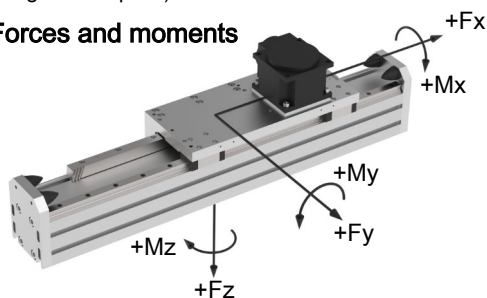
Weights

AZSS

Basic length without stroke:	49.50 kg*
100 mm stroke:	4.30 kg
Carriage 550 mm:	20.40 kg
Gears D90 / D115:	10.35 / 16.65 kg

Max. total length: 12000 mm
(longer on request)

Forces and moments



	AZSS-D90	AZSS-D115
Forces	Dynamic [N]	
F_x	3000-4000 **	5000-7500 **
F_y	20000	
F_z	20000	
Moments	Dynamic [Nm]	
M_x	4000	
M_y	8000	
M_z	8000	

Technical Data

AZSS

Max. speed:	4.50 m/s (D90) / 4.00 m/s (D115)
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	7.20 Nm
Rack and pinion:	Module 3 helical
Drive pinion:	Module 3, 20 teeth
Stroke per revolution:	200 mm
Servo-high-performance-gear:	DynaGear D90 / D115
Ratios:	5 / 10 / 15

	D90	D115
Load F_x	Dynamic [N]	
i = 5:1	4000	7500
i = 10:1		
i = 15:1	3000	5000

Preferred gear: D90

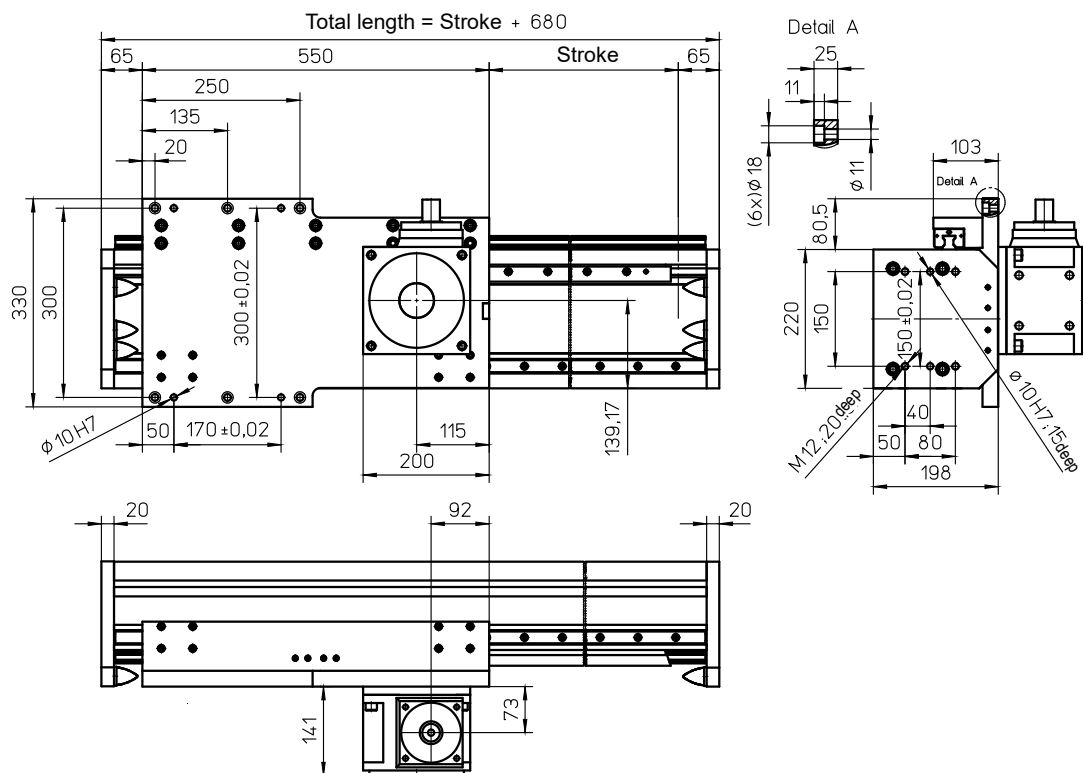
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive standard gear

** depending on gear ratio (see table to right)

with rack-and-pinion drive module 2 (helical)
and double linear guide (AZSH)



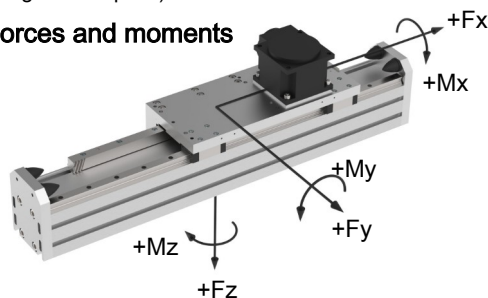
Weights

AZSH

Basic length without stroke:	47.60 kg*
100 mm stroke:	4.10 kg
Carriage 550 mm:	19.10 kg
Gears D90 / D115:	10.35 / 16.70 kg

Max. total length: 12000 mm
(longer on request)

Forces and moments



Technical Data

AZSH

Max. speed:	4.50 m/s (D90) / 4.00 m/s (D115)
Max. acceleration:	20 m/s²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	7.20 Nm
Rack and pinion:	Module 2 helical
Drive pinion:	Module 2, 30 teeth
Stroke per revolution:	200 mm
Servo-high-performance-gear:	DynaGear D90 / D115
Ratios:	5 / 10 / 15

	AZSH-D90	AZSH-D115
Forces	Dynamic [N]	
F_x	3000-4000 **	5000-6000 **
F_y	20000	
F_z	20000	
Moments	Dynamic [Nm]	
M_x	4000	
M_y	8000	
M_z	8000	

	D90	D115
Load F_x	Dynamic [N]	
i = 5:1	4000	6000
i = 10:1		
i = 15:1	3000	5000

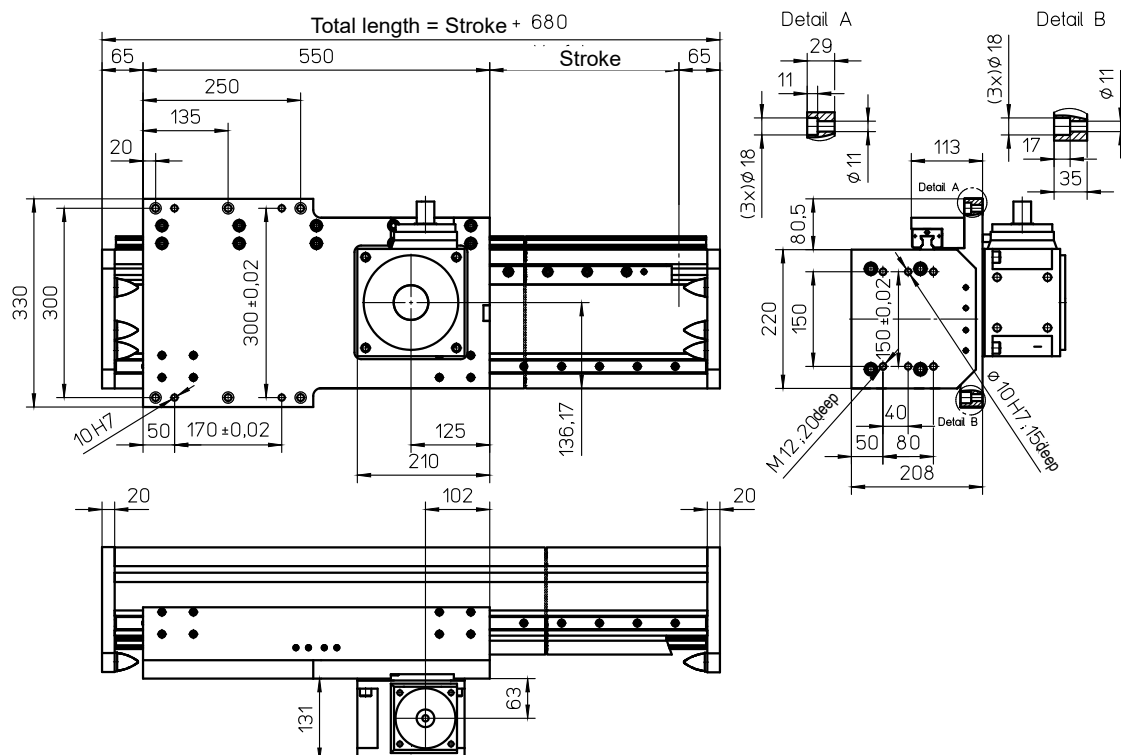
Preferred gear: D115
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive standard gear

** depending on gear ratio (see table to right)

with rack-and-pinion drive module 3 (helical)
and double linear guide (AZSH)



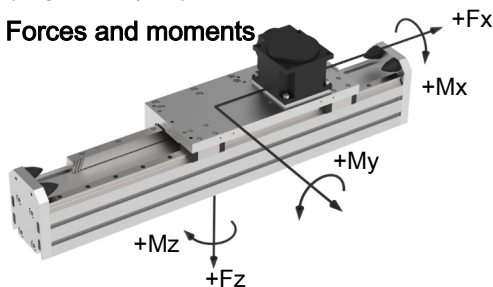
Weights

AZSH

Basic length without stroke:	50.70 kg*
100 mm stroke:	4.30 kg
Carriage 550 mm:	21.60 kg
Gears D90 / D115:	10.35 / 16.65 kg

Max. total length: 12000 mm
(longer on request)

Forces and moments



Technical Data

AZSH

Max. speed:	4.50 m/s (D90) / 4.00 m/s (D115)
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	7.20 Nm
Rack and pinion:	Module 3 helical
Drive pinion:	Module 3, 20 teeth
Stroke per revolution:	200 mm
Servo-high-performance-gear:	DynaGear D90 / D115
Ratios:	5 / 10 / 15

	AZSH-D90	AZSH-D115
Forces	Dynamic [N]	
F_x	3000-4000 **	5000-7500 **
F_y	20000	
F_z	20000	
Moments	Dynamic [Nm]	
M_x	4000	
M_y	8000	
M_z	8000	

	D90	D115
Load F_x	Dynamic [N]	
i = 5:1	4000	7500
i = 10:1		
i = 15:1	3000	5000

Preferred gear: D115

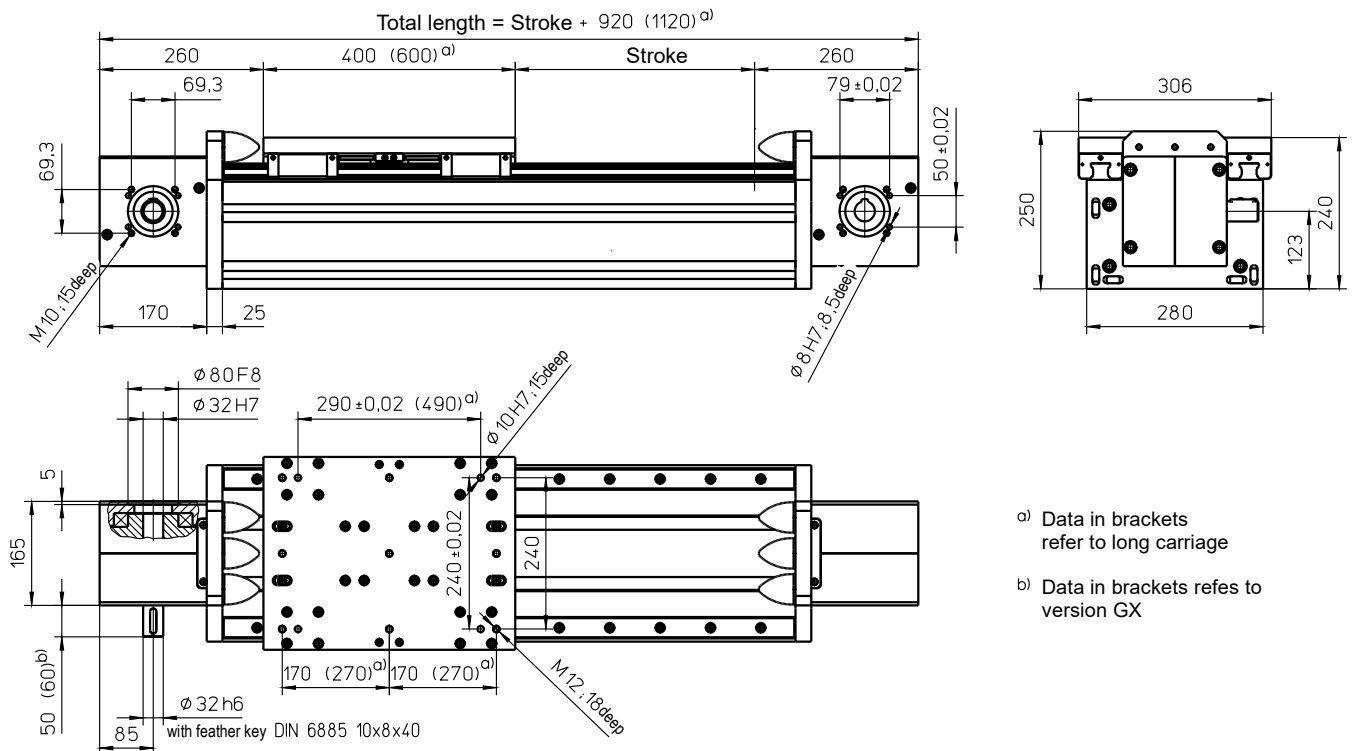
Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

* inclusive standard gear

** depending on gear ratio (see table to right)

with toothed belt drive and double linear guide (ZSS)



Weights

ZSS

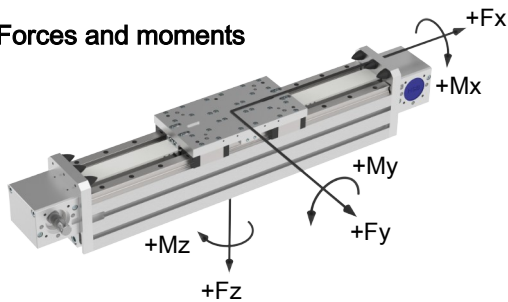
Basic length without stroke:	86.80 kg
100 mm stroke:	5.35 kg
Entire carriage 400 mm:	19.20 kg
Entire carriage 600 mm:	23.80 kg
Max. total length: (longer on request)	10200 mm

Technical Data

ZSS

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	11.00 Nm
Moment of inertia:	0.12 kgm ²
Drive element:	Toothed belt 75 ATS15
Stroke per revolution:	450 mm

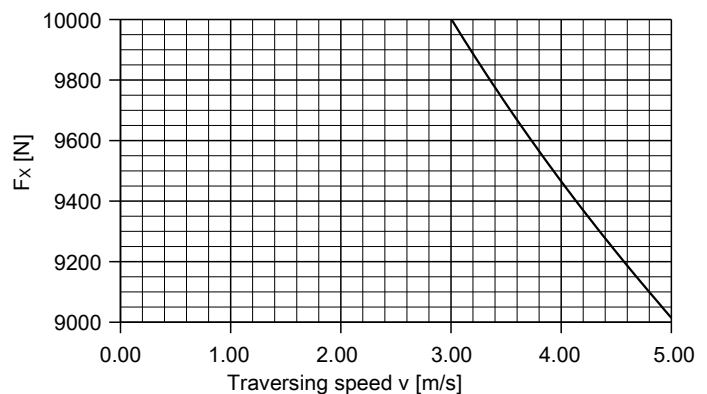
Forces and moments



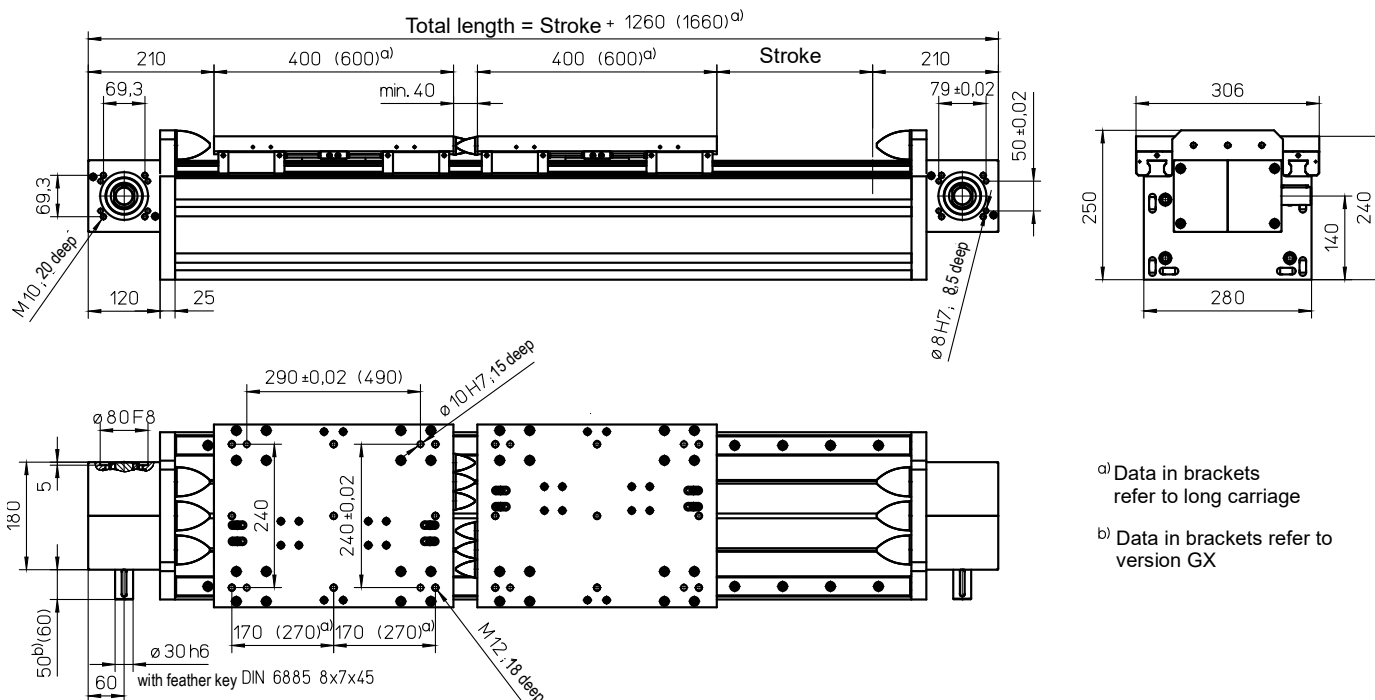
	ZSS
Forces	Dynamic [N]
F_x ^{c)}	10000
F_y	20000
F_z	30000
Moments	Dynamic [Nm]
M_x	4000
M_y	15000 (25000)
M_z	12000 (20000)

c) Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage (600)

F_x - v - Diagram



with toothed belt drive and double linear guide and a second independently travelling carriage (ZSSD)



Weights

ZSSD

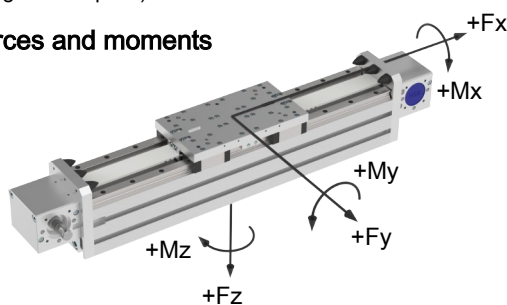
Basic length without stroke:	135.00 kg
100 mm stroke:	5.50 kg
Entire carriage 400 mm:	18.00 kg
Entire carriage 600 mm:	22.55 kg
Max. total length: (longer on request)	10200 mm

Technical Data

ZSSD

Max. speed:	5.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0,08 mm
Idle torque:	11.00 Nm
Moment of inertia:	4.50 • 10 ⁻² kgm ²
Drive element:	2 x Zahnriemen 50 ATL 10
Stroke per revolution:	300 mm

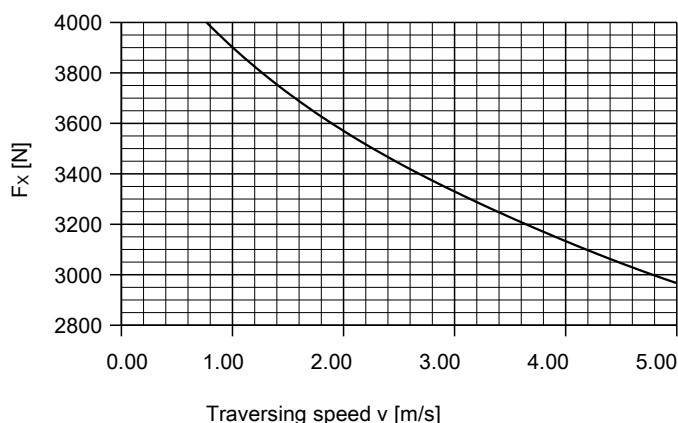
Forces and moments



	ZSSD
Forces	Dynamic [N]
F_x^{c)}	4000
F_y	20000
F_z	30000
Moments	Dynamic [Nm]
M_x	4000
M_y	15000 (25000)
M_z	12000 (20000)

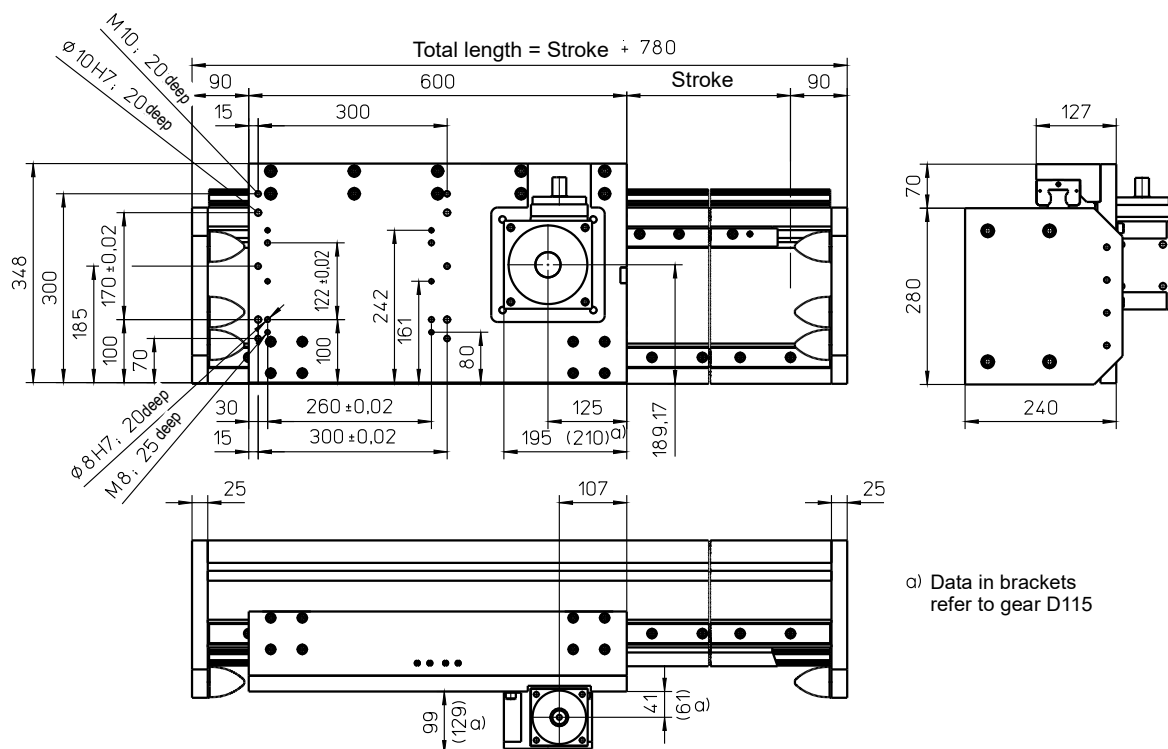
c) Maximum value (see diagram "F_x-v-Diagram")
Data in brackets refer to long carriage (600)

F_x - v - Diagram



These data apply to each carriage.

with rack-and-pinion drive (helical) and double linear guide (AZSS)



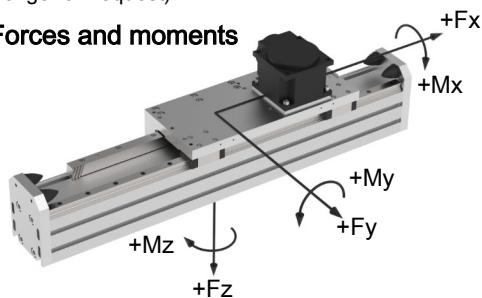
Weights

AZSS

Basic length without stroke:	78.85 kg*
100 mm stroke:	6.15 kg
Carriage drive 600 mm:	27.80 kg
Gears D90 / D115:	10.35 / 16.65 kg

Max. total length: 10000 mm
(longer on request)

Forces and moments



	AZSS-D90	AZSS-D115
Forces	Dynamic [N]	
F_x	3000-4000 **	5000-7500 **
F_y	25000	
F_z	25000	
Moments	Dynamic [Nm]	
M_x	8000	
M_y	16000	
M_z	16000	

Technical Data

AZSS

Max. speed:	4.50 m/s (D90) / 4.00 m/s (D115)
Max. acceleration:	20 m/s ²
Repeat accuracy:	± 0.05 mm
Idle torque at drive pinion:	8.60 Nm
Rack and pinion:	Module 3 helical
Drive pinion:	Module 3, 20 teeth
Stroke per revolution:	200 mm
Servo-high-performance-gear:	DynaGear D90 / D115
Ratios:	5 / 10 / 15

	D90	D115
Load F_x	Dynamic [N]	
$i = 5:1$	4000	7500
$i = 10:1$		
$i = 15:1$	3000	5000

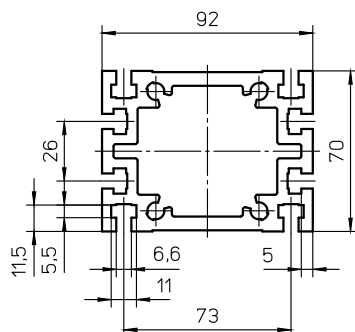
Preferred gear: D90

Efficiency of gears: > 96 %

Variants for gear mounting see page G29.

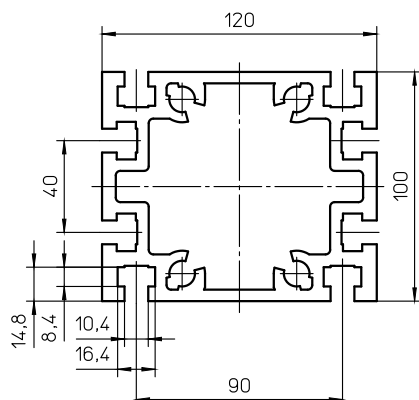
* inclusive standard gear

** depending on gear ratio (see table to right)



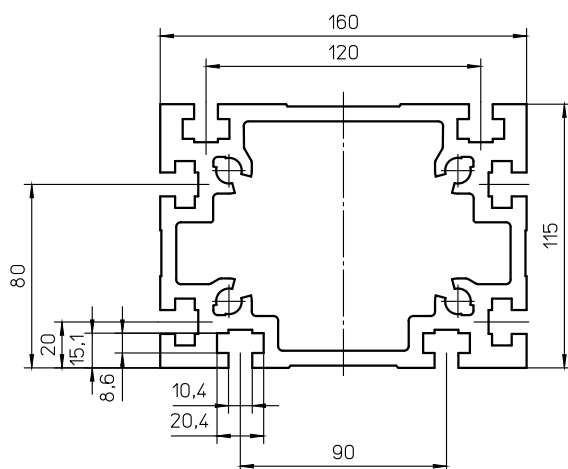
Profile Gamma 90

Specific mass [kg/m]	6.1
Surface measure [mm ²]	2260
Geometrical moment of inertia I _y [mm ⁴]	1373211
Geometrical moment of inertia I _z [mm ⁴]	2297416
Section modulus W _y [mm ³]	39234
Section modulus W _z [mm ³]	49943



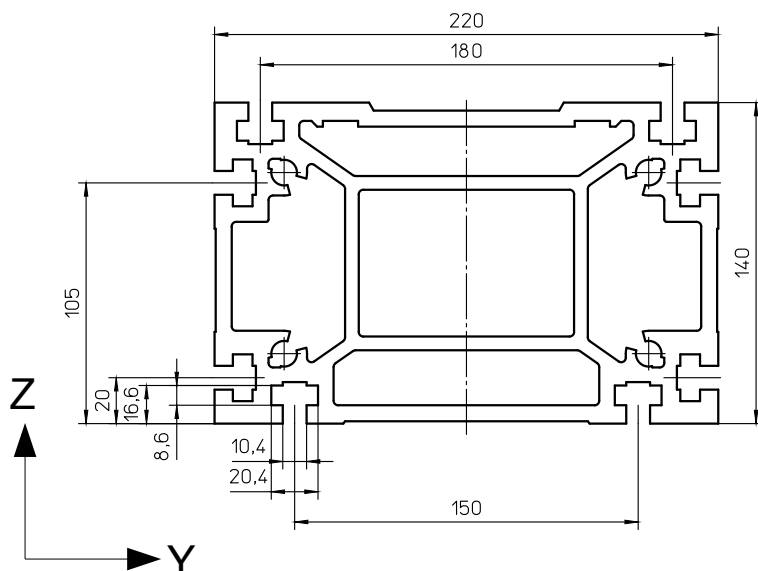
Profile Gamma 120

Specific mass [kg/m]	10.1
Surface measure [mm ²]	3707
Geometrical moment of inertia I _y [mm ⁴]	4636416
Geometrical moment of inertia I _z [mm ⁴]	6696292
Section modulus W _y [mm ³]	92728
Section modulus W _z [mm ³]	111605



Profil Gamma 160

Specific mass [kg/m]	15.31
Surface measure [mm ²]	5672
Geometrical moment of inertia I _y [mm ⁴]	9556948
Geometrical moment of inertia I _z [mm ⁴]	18711836
Section modulus W _y [mm ³]	163867
Section modulus W _z [mm ³]	233898

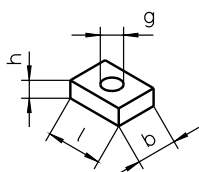


Profile Gamma 220

Specific mass [kg/m]	26.48
Surface measure [mm ²]	9807
Geometrical moment of inertia I _y [mm ⁴]	22915643
Geometrical moment of inertia I _z [mm ⁴]	53513785
Section modulus W _y [mm ³]	327243
Section modulus W _z [mm ³]	486489



Specific mass [kg/m]	37
Surface measure [mm ²]	13701
Geometrical moment of inertia ly [mm ⁴]	52207330
Geometrical moment of inertia lz [mm ⁴]	131653724
Section modulus Wy [mm ³]	609007
Section modulus Wz [mm ³]	940384



Portal-Linear Drive	NS	ID No.	l [mm]	b [mm]	h [mm]	g
Gamma 90	21	22955	20	10	5	M6
Gamma 120	18	23951	20	16	8	M5
	19	23950	20	16	8	M6
	20	23949	20	16	8	M8
Gamma 160	19	23950	20	16	8	M6
	15	19211	25	18	8	M8
	6	10561	25	18	8	M10
Gamma 220	18	23951	20	16	8	M5
	19	23950	20	16	8	M6
	15	19211	25	18	8	M8
	6	10561	25	18	8	M10
Gamma 280	19	23950	20	16	8	M6
	15	19211	25	18	8	M8
	6	10561	25	18	8	M10
	17	19722	30	20	10	M12

Example:

Gamma 160-ZSS-50 ATL10-240-1000-1620-AZ1-8NS6-1

Product

Unit size

Drive

Z = Toothed belt drive

0 = Without drive

A = Powered carriage

Guide system

S = Rail guide

0 = Without guide

Model

S = Standard (Horizontal)

SD = Standard double (Horizontal)

H = Lifting axis (Vertical)

Drive specifications

Width and type of toothed belt

Stroke per revolution

Stroke

Total length

Accessories

AZ1 = Drive shaft short, mounting side **C**

AZ2 = Drive shaft short, mounting side **D**

AZ6 = Drive shaft long, mounting side **C** and **D**

Further arrangements for drive shaft, see **page Z1**

EO2 / EO10 = Inductive limit switch NC with 2 m / 10 m cable fitted

ES2 / ES10 = Inductive limit switch NO with 2 m / 10 m cable fitted

EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted

NS = Sliding block 5 .. 17 (see Table on **page G27**)

Special design

0 = Standard

1 = Special (add specification description)

Further accessories (separate position)

MGK = Motor mounting and coupling (according to dimension sheet)

Example: **Gamma 160-AZSS-M2-200-1000-1630-2EO2-8NS6-1**

Product

Unit size

Drive

AZ = Rack-and-pinion drive

Guide system

S = Rail guide

Model

S = Standard (Horizontal)

H = Lifting axis (Vertical)

Drive specifications

Drive pinion module (M2 / M3)

Stroke per revolution

Stroke

Total length

Accessories

EO2 / EO10 = Inductive limit switch NC with 2m / 10m cable fitted

ES2 / ES10 = Inductive limit switch NO with 2m / 10m cable fitted

EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted

NS = Sliding block 5 .. 17 (see Table on page G27)

Special design

0 = Standard

1 = Special (add specification description)

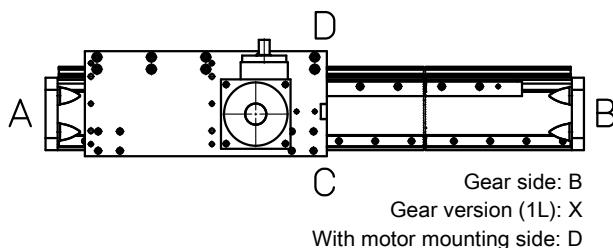
Additional information

Gear size and ratio (D55 to D115 / i = 5 to i = 15)

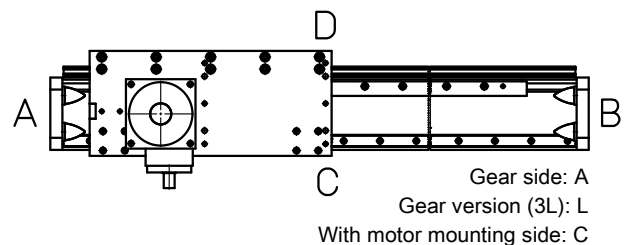
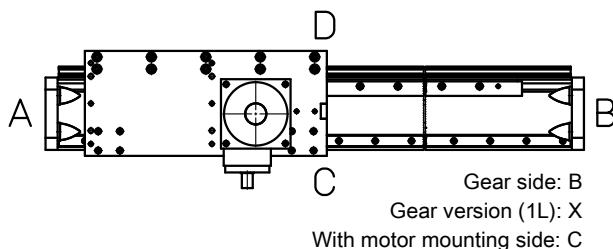
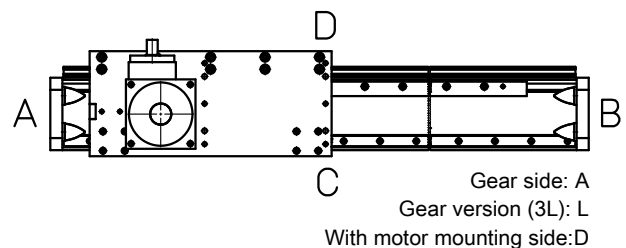
Gear mounting (for example XD)

Gear mounting

Carriage „standard“



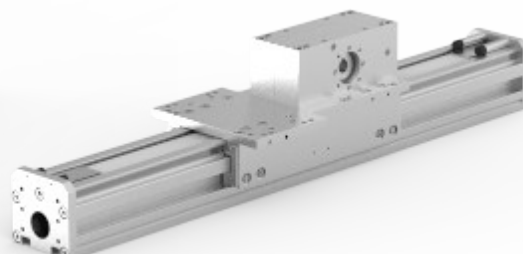
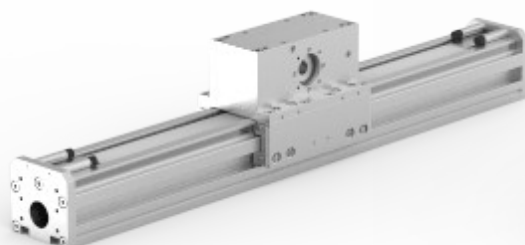
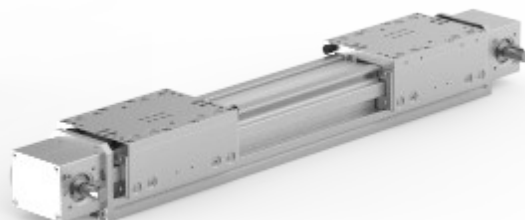
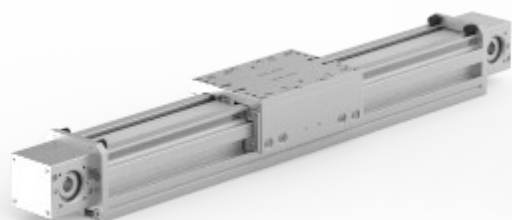
Carriage „mirrored“



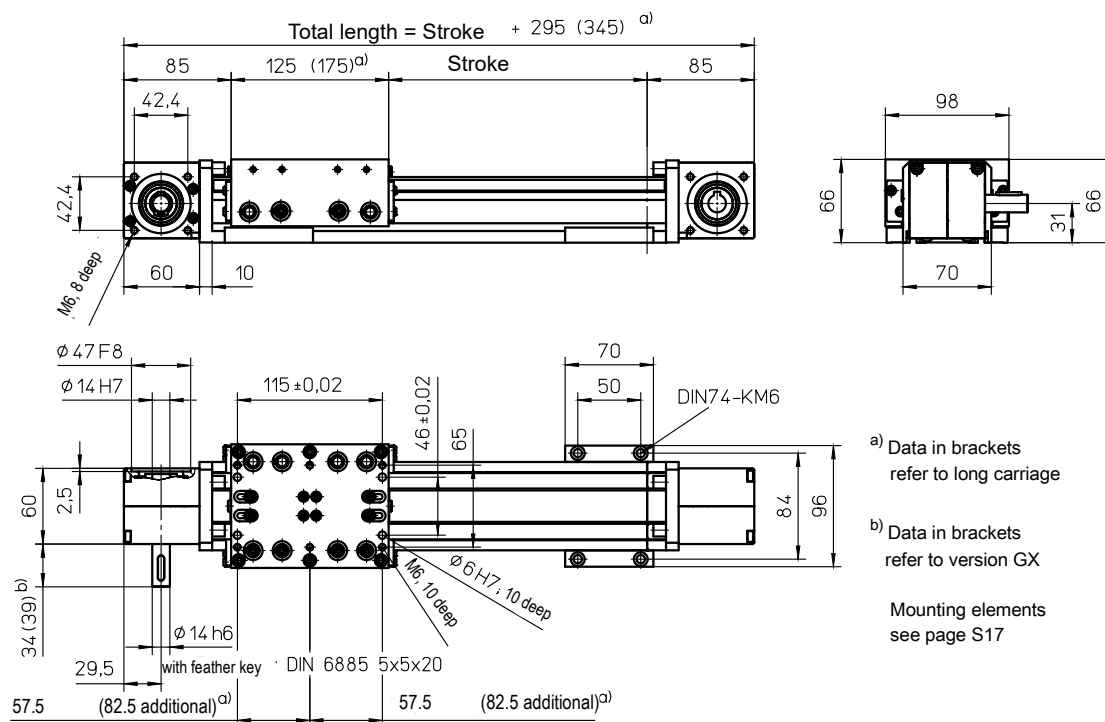
Chapter S

Portal Linear Drive

HSB-sigma[®]



with toothed belt drive and roller guide (ZRS)

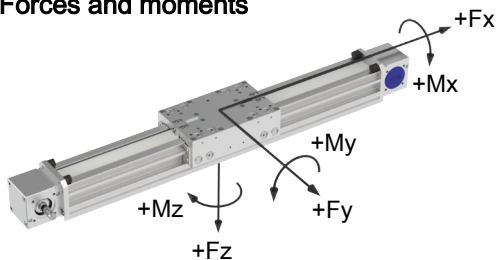


Weights

ZRS

Basic length without stroke:	3.05 kg
100 mm stroke:	0.40 kg
Entire carriage 125 mm:	1.20 kg
Entire carriage 175 mm:	1.35 kg
Max. total length:	8100 mm
(longer on request)	

Forces and moments



	ZRS
Forces	Dynamic [N]
F_x^{c)}	1050
F_y	1350
F_z	1850
-F_z	1200
Moments	Dynamic [Nm]
M_x	50
M_y	70 (120)
M_z	80 (110)

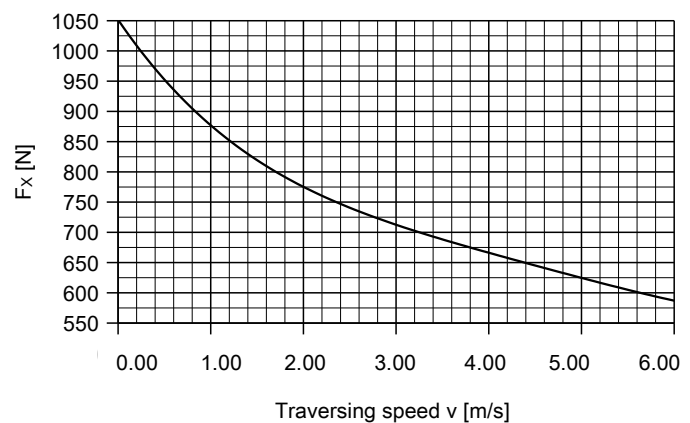
c) Maximum value (see diagram „Fx-v-Diagram“)
Data in brackets refer to long carriage (175)

Technical Data

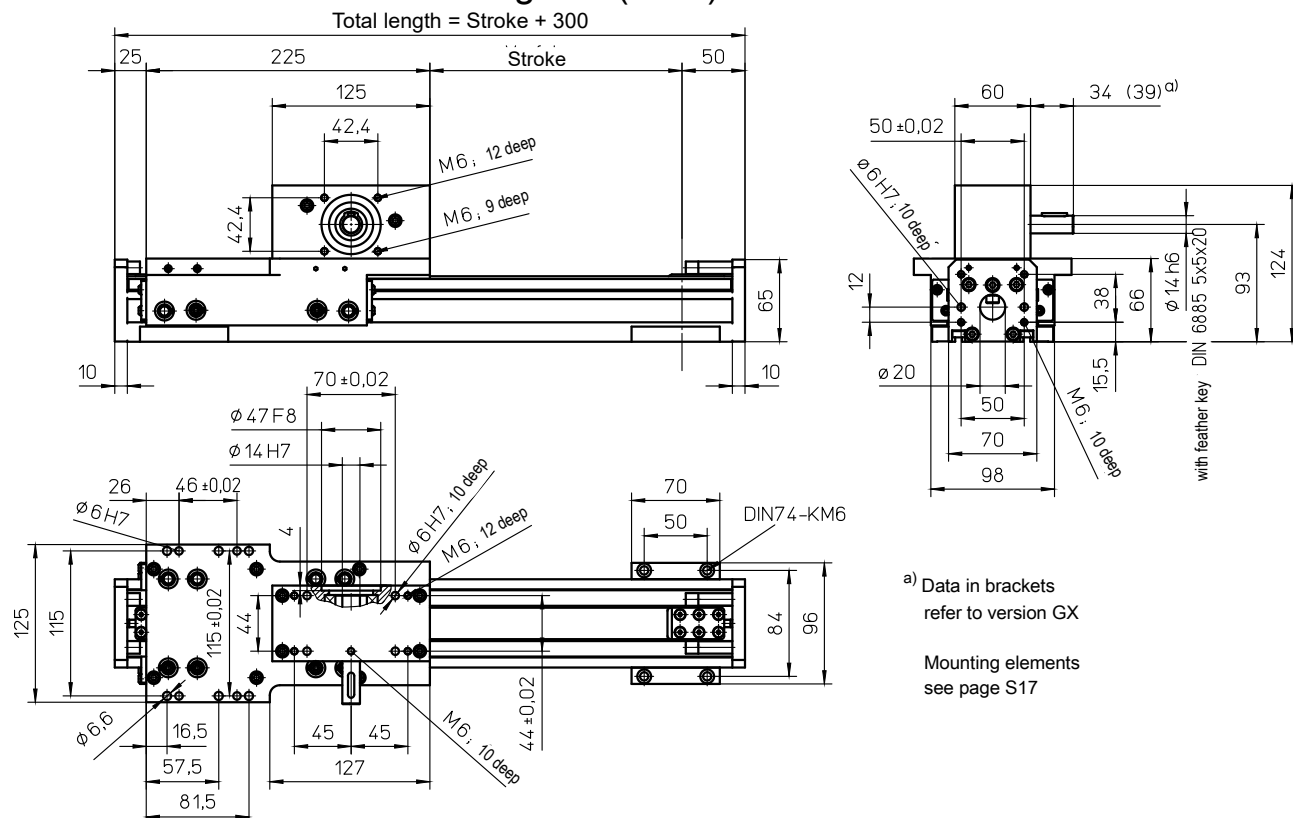
ZRS

Max. speed:	6.25 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	0.85 Nm
Moment of inertia:	6.70 • 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 25 AT5-E
Stroke per revolution:	125 mm

$F_x - v$ - Diagram



with toothed belt drive and roller guide (ARH)



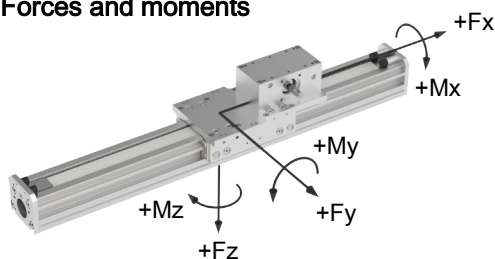
Weights ARH

Basic length without stroke:	4.25 kg
100 mm stroke:	0.40 kg
Entire carriage 225 mm:	2.75 kg
Max. total length:	8000 mm
(longer on request)	

Technical Data ARH

Max. speed:	6.25 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	0.85 Nm
Moment of inertia:	5.37 · 10 ⁻⁵ kgm ²
(rotatory)	
Drive element:	Toothed belt 25 AT5-E
Stroke per revolution:	125 mm

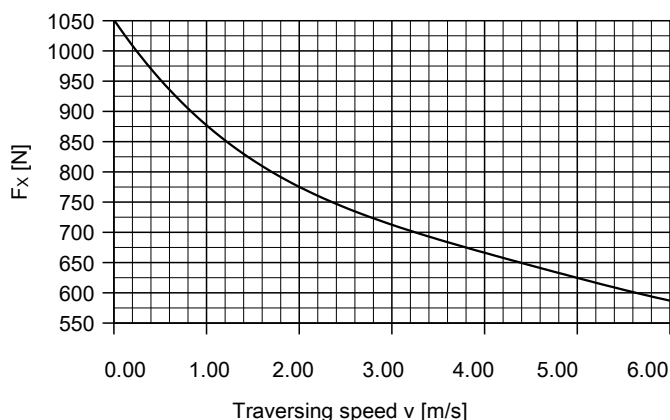
Forces and moments



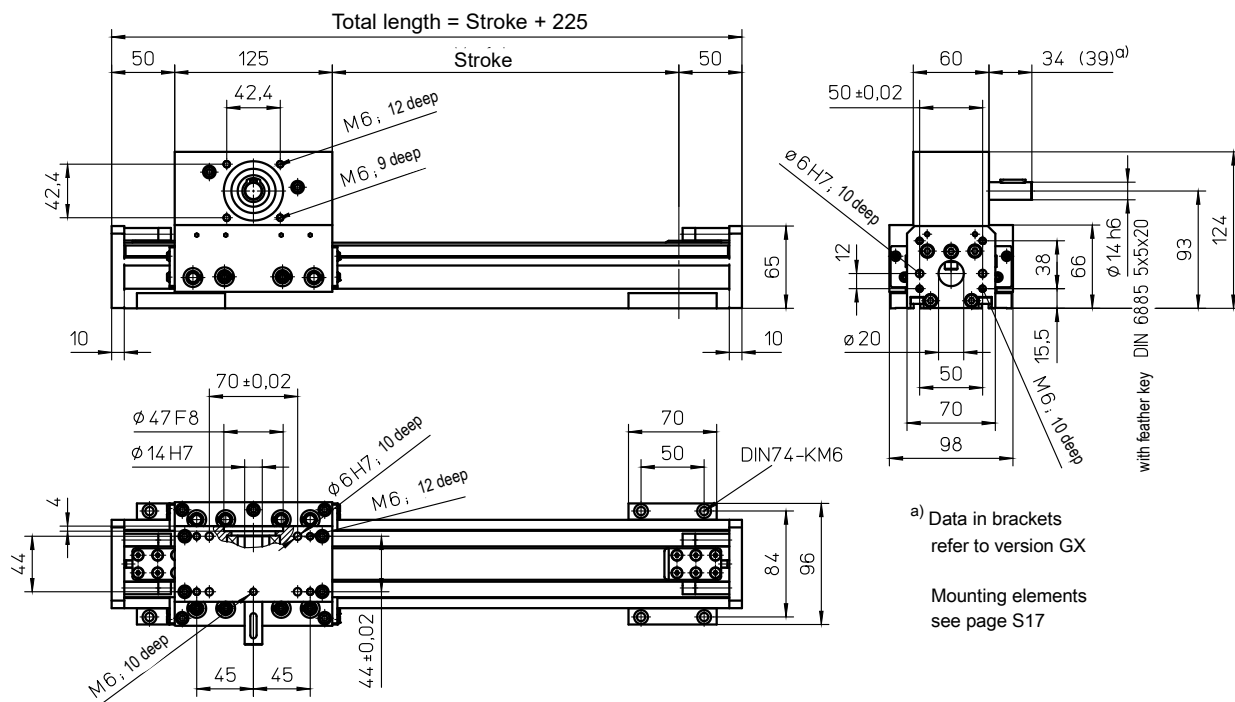
	ARH
Forces	Dynamic [N]
$F_x^{b)}$	1050
F_y	1350
F_z	1850
$-F_z$	1200
Moments	Dynamic [Nm]
M_x	50
M_y	120
M_z	110

^{b)} Maximum value (see diagram „FX-v-Diagram“)

FX - v - Diagram



with toothed belt drive and roller guide (ARS)

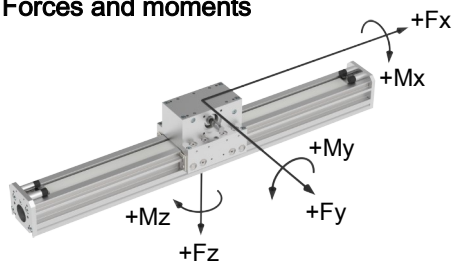


Weights

ARS

Basic length without stroke:	3.50 kg
100 mm stroke:	0.40 kg
Entire carriage 125 mm:	2.30 kg
Max. total length:	8000 mm
(longer on request)	

Forces and moments



	ARS
Forces	Dynamic [N]
$F_x^{c)}$	1050
F_y	1350
F_z	1850
$-F_z$	1200
Moments	Dynamic [Nm]
M_x	50
M_y	70
M_z	80

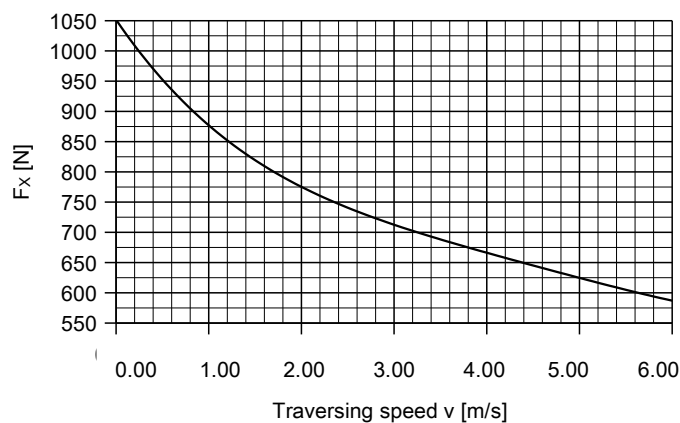
c) Maximum value (see diagram „FX-v-Diagram“)

Technical Data

ARS

Max. speed:	6.25 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	± 0.08 mm
Idle torque:	0.85 Nm
Moment of inertia:	$5.37 \cdot 10^{-5} \text{ kgm}^2$
(rotatory)	
Drive element:	Toothed belt 25 AT5-E
Stroke per revolution:	125 mm

FX - v - Diagram



Technical drawing of the S17 linear actuator, showing dimensions and specifications.

Top View (Front):

- Total length = Stroke + 340 (390)^{a)}
- Stroke dimension is indicated.
- Dimensions: 95, 150 (200)^{a)}, 95.
- Mounting hole diameter: $\phi 47 F8$, $\phi 14 H7$.
- Mounting hole depth: M6, 10 deep.
- Mounting hole spacing: 70, 10.

Side View:

- Dimensions: 122, 85, 39, 84.5, 70.

Detail View (Bottom):

- Dimensions: 70, 50, 106, 118.
- Mounting hole diameter: $\phi 6 H7, 10$ deep.
- Mounting hole depth: M6, 12 deep.
- Mounting hole spacing: 134 ± 0.02 , 60 ± 0.02 , 80.
- Mounting hole diameter: $\phi 14 h6$.
- Mounting hole depth: with feather key.
- Mounting hole spacing: DIN 6885 5x5x20 35.
- Mounting hole diameter: $\phi 14 h6$.
- Mounting hole depth: with feather key.
- Mounting hole spacing: 67, (90 additional) ^{a)}, 67, (90 additional) ^{a)}.
- Mounting hole diameter: $\phi 14 h6$.
- Mounting hole depth: with feather key.
- Mounting hole spacing: 67, (90 additional) ^{a)}, 67, (90 additional) ^{a)}.

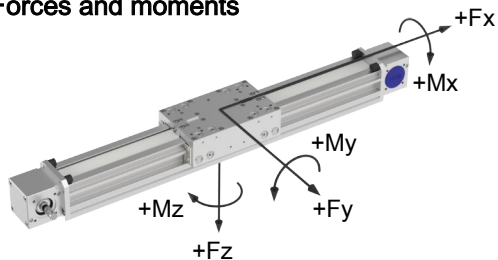
Notes:

- a) Data in brackets refer to long carriage
- b) Data in brackets refer to version GX
- Mounting elements see page S17

ZRS

ZRS

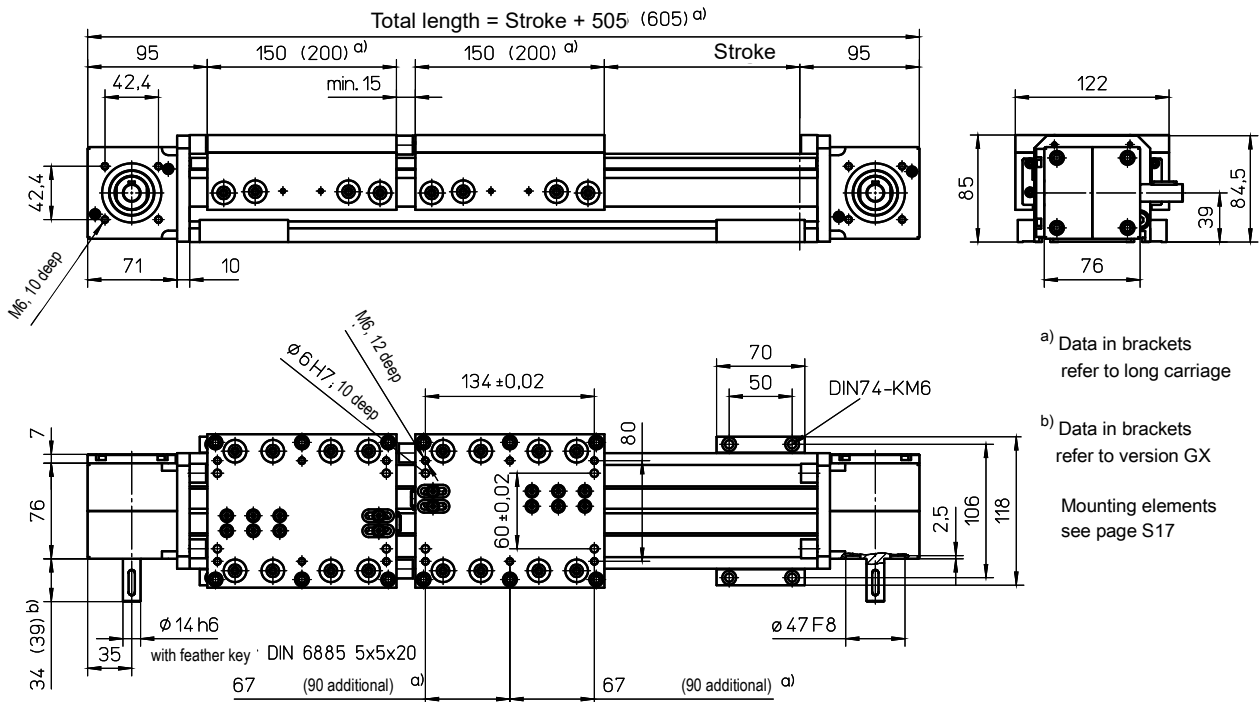
Forces and moments



	ZRS
Forces	Dynamic [N]
F_x^(c)	1300
F_y	2000
F_z	2500
-F_z	1500
Moments	Dynamic [Nm]
M_x	120
M_y	160 (230)
M_z	150 (200)

The graph shows the relationship between the x-component of the force F_x and the traversing speed v . The force decreases as the speed increases, following a smooth, concave-up curve. The y-axis ranges from 750 to 1300 N with major grid lines every 50 N. The x-axis ranges from 0.00 to 8.00 m/s with major grid lines every 1.00 m/s.

with toothed belt drive and roller guide and a second independently travelling carriage (ZRSD)



Weights

ZRSD

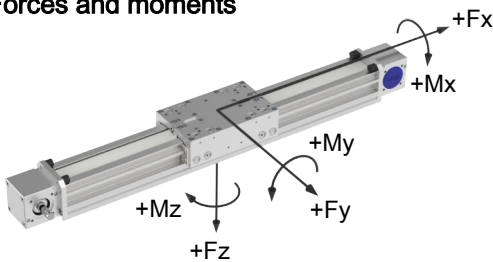
Basic length without stroke:	8.40 kg
100 mm stroke:	0.65 kg
Entire carriage 150 mm:	1.80 kg
Entire carriage 200 mm:	2.15 kg
Max. total length: (longer on request)	8100 mm

Technical Data

ZRSD

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	3.20 Nm
Moment of inertia:	1.70 · 10 ⁻³ kgm ²
Drive element:	2 x Toothed belt 16 AT5-E
Stroke per revolution:	175 mm

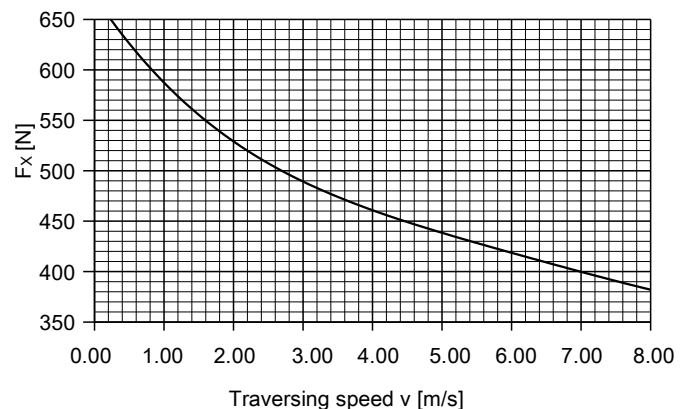
Forces and moments



	ZRSD
Forces	Dynamic [N]
$F_x^c)$	650
F_y	2000
F_z	2500
$-F_z$	1500
Moments	Dynamic [Nm]
M_x	120
M_y	160 (230)
M_z	150 (200)

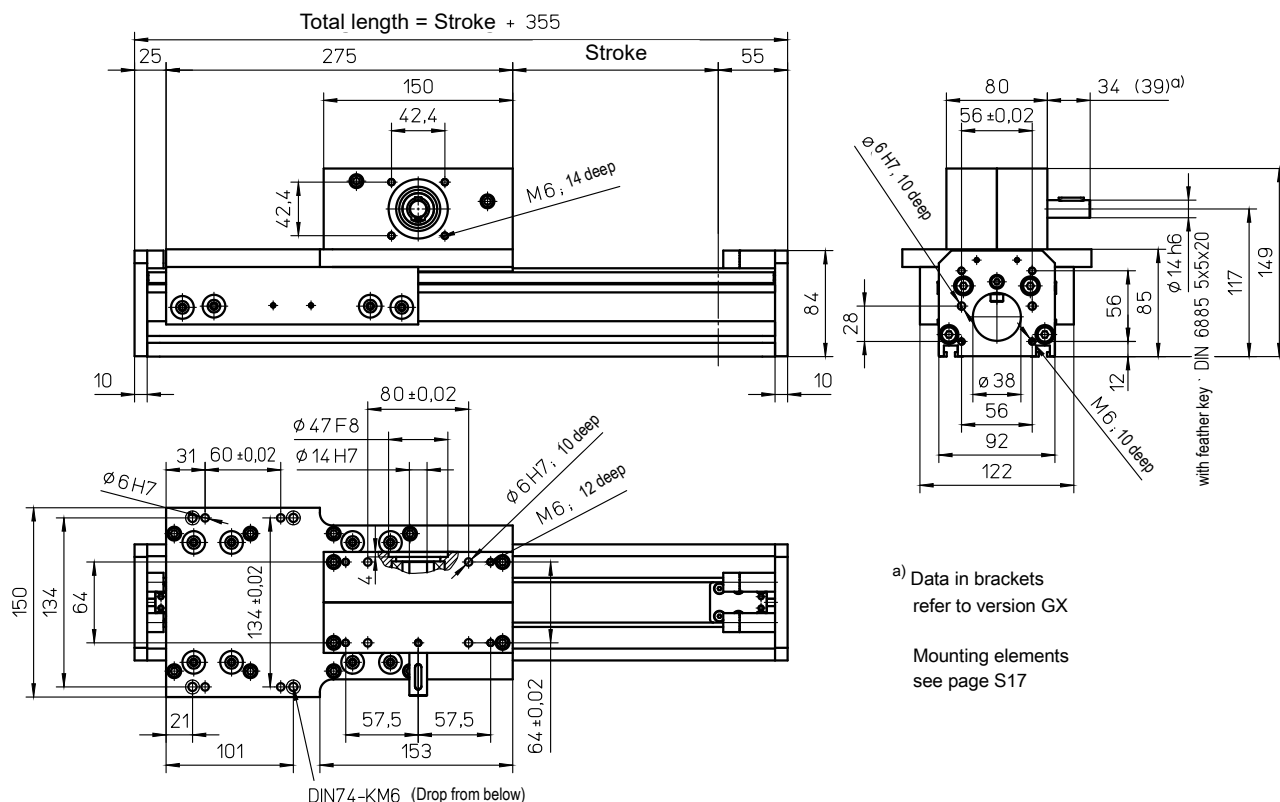
c) Maximum value (see diagram „Fx-v-Diagram“)
Data in brackets refer to long carriage (200)

Fx - v - Diagram



These data apply to each carriage.

with toothed belt drive and roller guide (ARH)



Weights

ARH

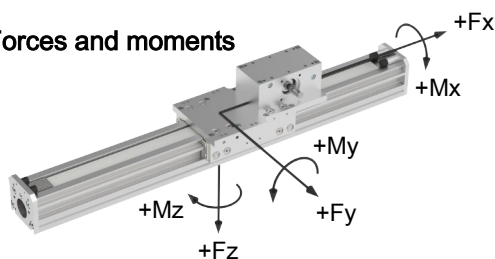
Basic length without stroke:	7.20 kg
100 mm stroke:	0.64 kg
Entire carriage 275 mm:	4.45 kg
Max. total length: (longer on request)	8000 mm

Technical Data

ARH

Max. speed:	7.0 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	2.30 Nm
Moment of inertia: (rotatory)	1.27 · 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 32 AT5-E
Stroke per revolution:	150 mm

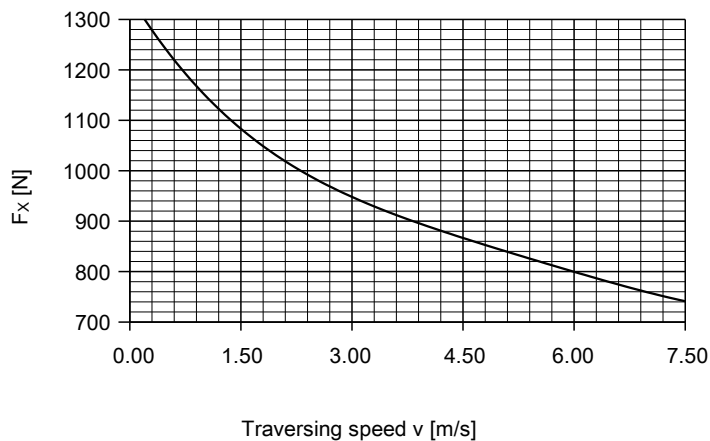
Forces and moments



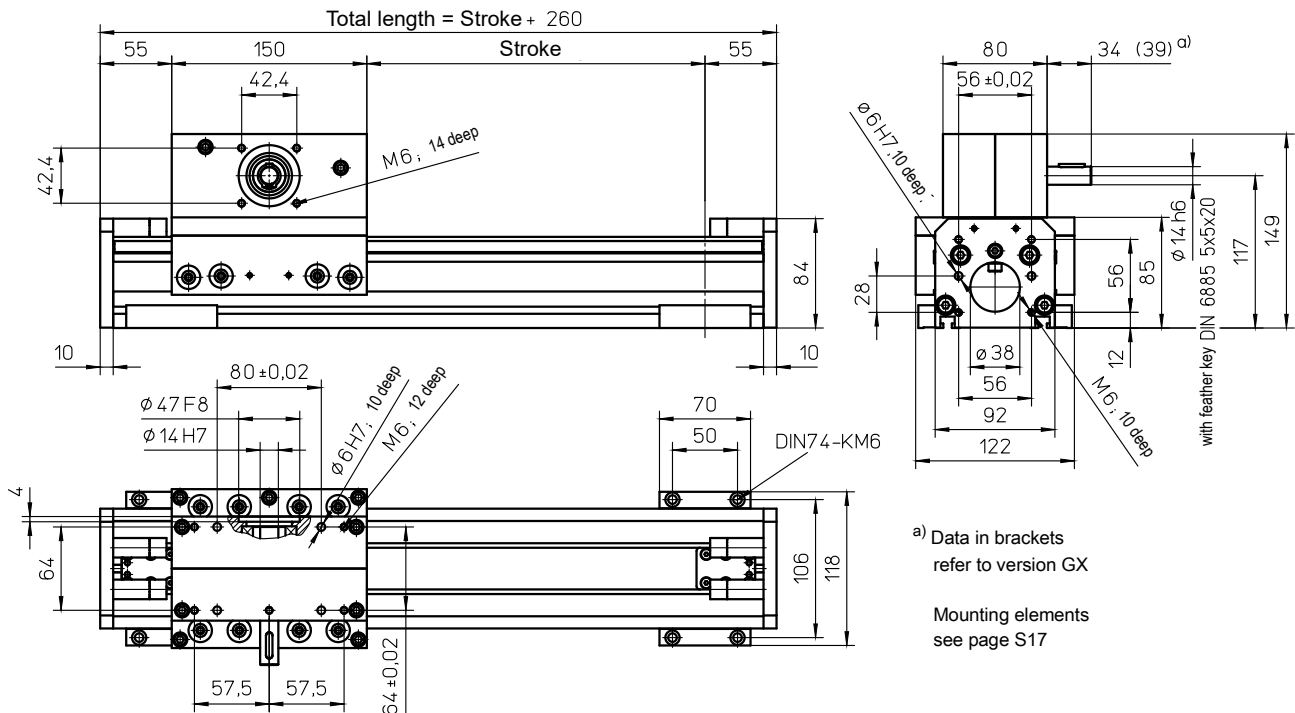
	ARH
Forces	Dynamic [N]
$F_x^{b)}$	1300
F_y	2000
F_z	2500
$-F_z$	1500
Moments	Dynamic [Nm]
M_x	120
M_y	230
M_z	200

^{b)} Maximum value (see diagram „Fx-v-Diagram“)

Fx - v - Diagram



with toothed belt drive and roller guide (ARS)



Weights

ARS

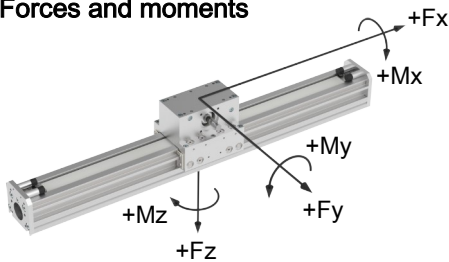
Basic length without stroke:	5.75 kg
100 mm stroke:	0.64 kg
Entire carriage 150 mm:	3.60 kg
Max. total length: (longer on request)	8000 mm

Technical Data

ARS

Max. speed:	7.50 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	2.30 Nm
Moment of inertia: (rotatory)	1.27 · 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 32 AT5-E
Stroke per revolution:	150 mm

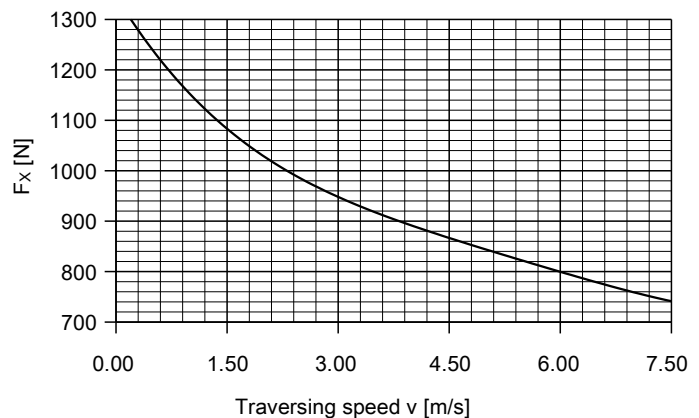
Forces and moments



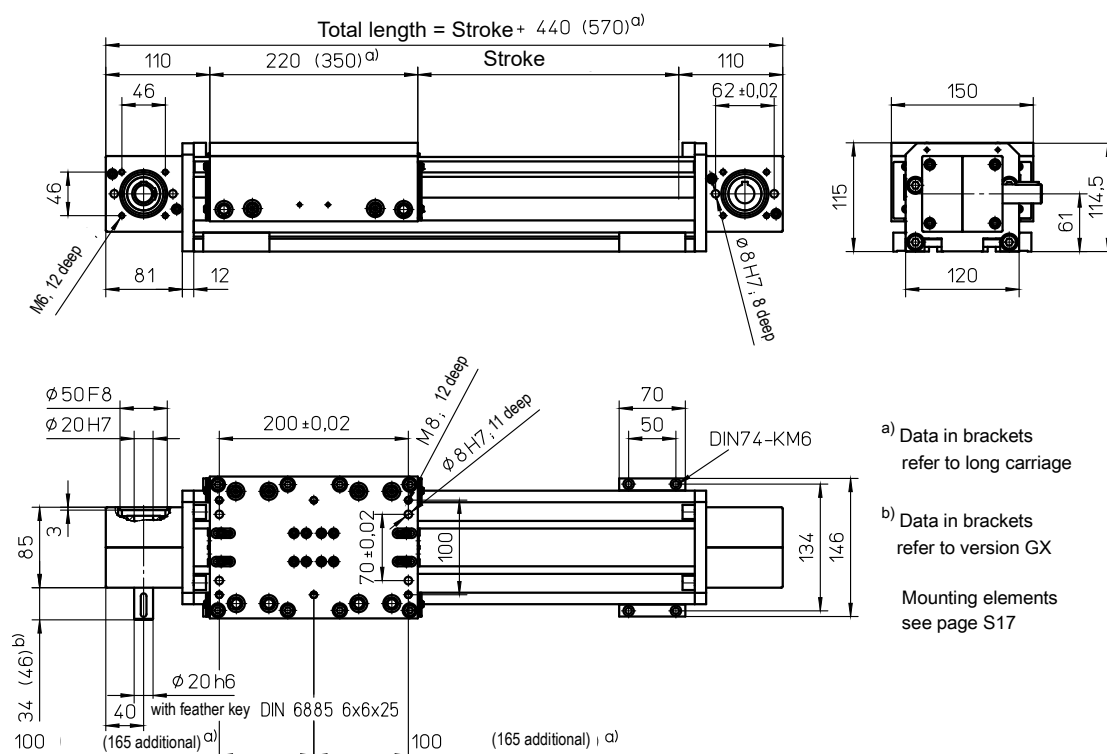
	ARS
Forces	Dynamic [N]
$F_x^{c)}$	1300
F_y	2000
F_z	2500
$-F_z$	1500
Moments	Dynamic [Nm]
M_x	120
M_y	160
M_z	150

c) Maximum value (see diagram „Fx-v-Diagram“)

Fx - v - Diagram



with toothed belt drive and roller guide (ZRS)



Weights

ZRS

Basic length without stroke:	10.90 kg
100 mm stroke:	1.20 kg
Entire carriage 220 mm:	3.85 kg
Entire carriage 350 mm:	5.40 kg

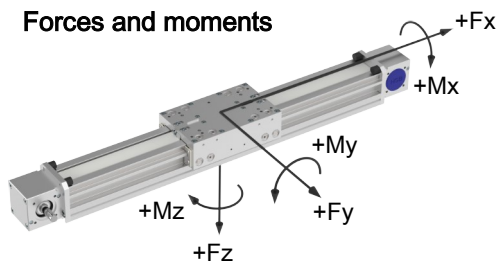
Max. total length: 8100 mm
(longer on request)

Technical Data

ZRS

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	3.00 Nm
Moment of inertia:	7.50 • 10 ⁻³ kgm ²
Drive element:	Toothed belt 40 AT10-E
Stroke per revolution:	200 mm

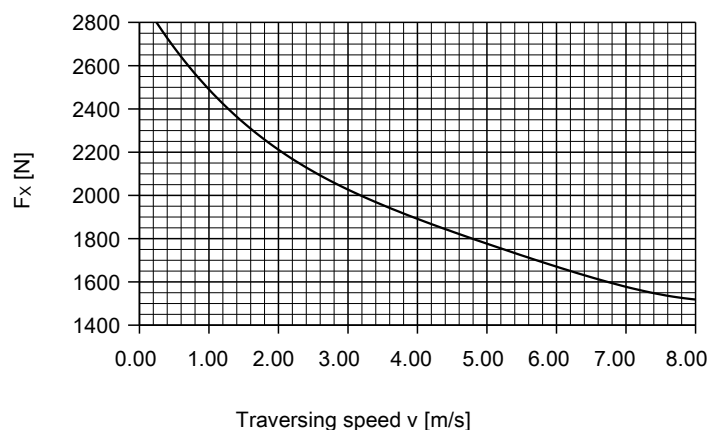
Forces and moments



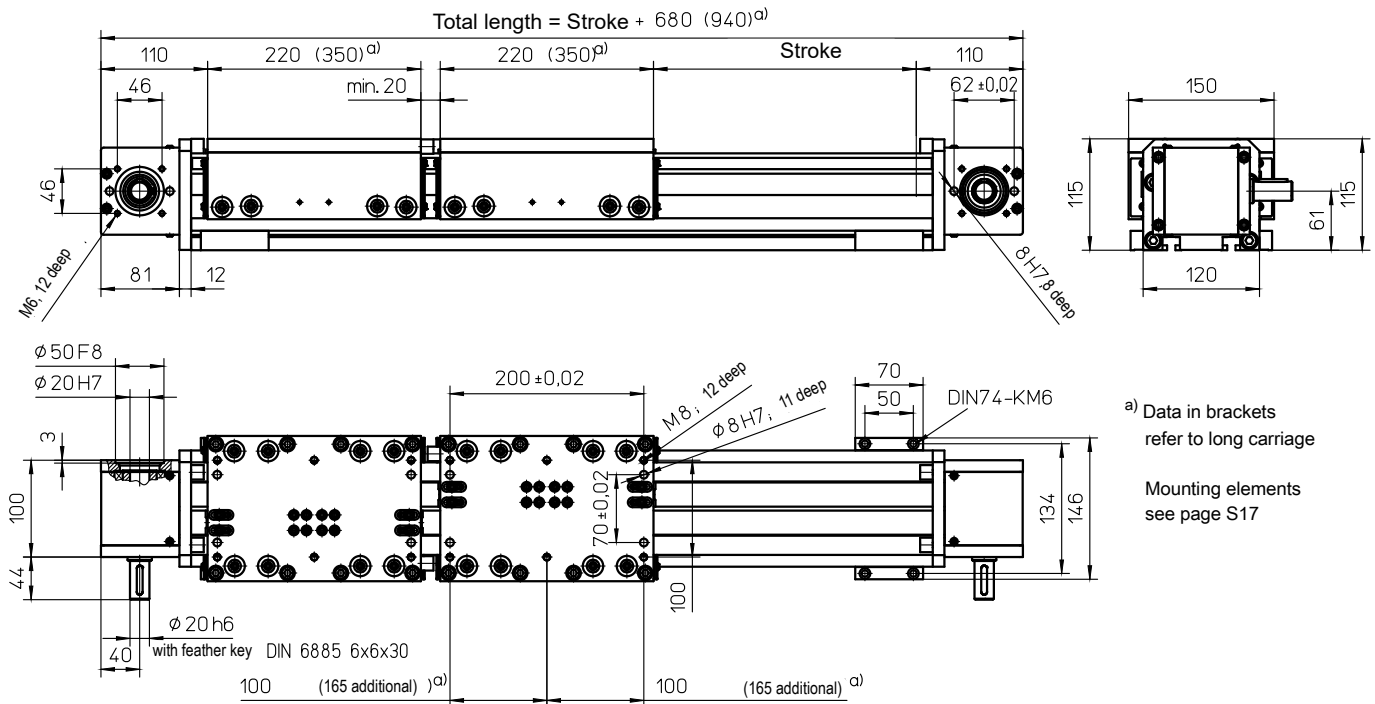
	ZRS
Forces	Dynamic [N]
$F_x^c)$	2800
F_y	2300
F_z	3000
$-F_z$	1800
Moments	Dynamic [Nm]
M_x	170
M_y	270 (400)
M_z	270 (400)

c) Maximum value (see diagram „Fx-v-Diagram“)
Data in brackets refer to long carriage (350)

Fx - v - Diagram



with toothed belt drive and roller guide and a second independently travelling carriage (ZRSD)



Weights

ZRSD

Basic length without stroke:	24.85 kg
100 mm stroke:	1.20 kg
Entire carriage 220 mm:	3.70 kg
Entire carriage 350 mm:	5.55 kg

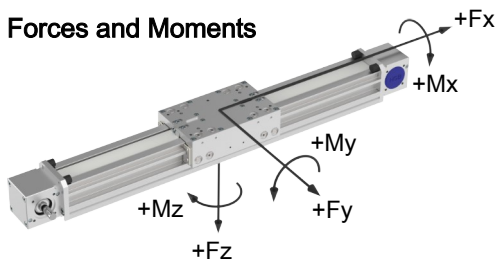
Max. total length: 8100 mm
(longer on request)

Technical Data

ZRSD

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	3.00 Nm
Moment of inertia:	4.92 · 10 ⁻³ kgm ²
Drive element:	2 x Toothed belt 25 ATL10
Stroke per revolution:	200 mm

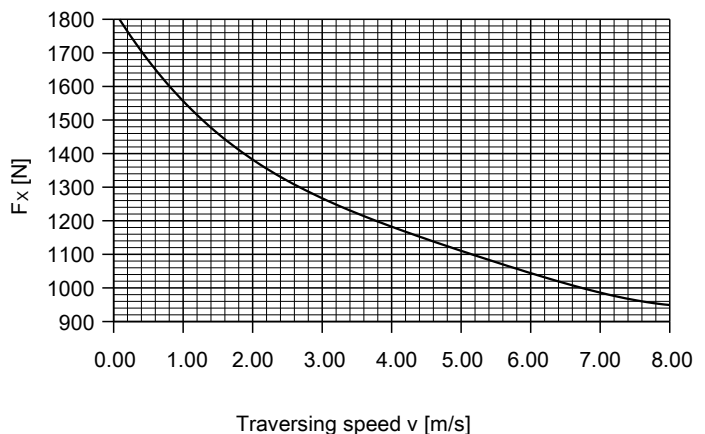
Forces and Moments



Forces	Dynamic [N]
F_x^b	1800
F_y	2300
F_z	3000
$-F_z$	1800
Moments	Dynamic [Nm]
M_x	170
M_y	270 (400)
M_z	270 (400)

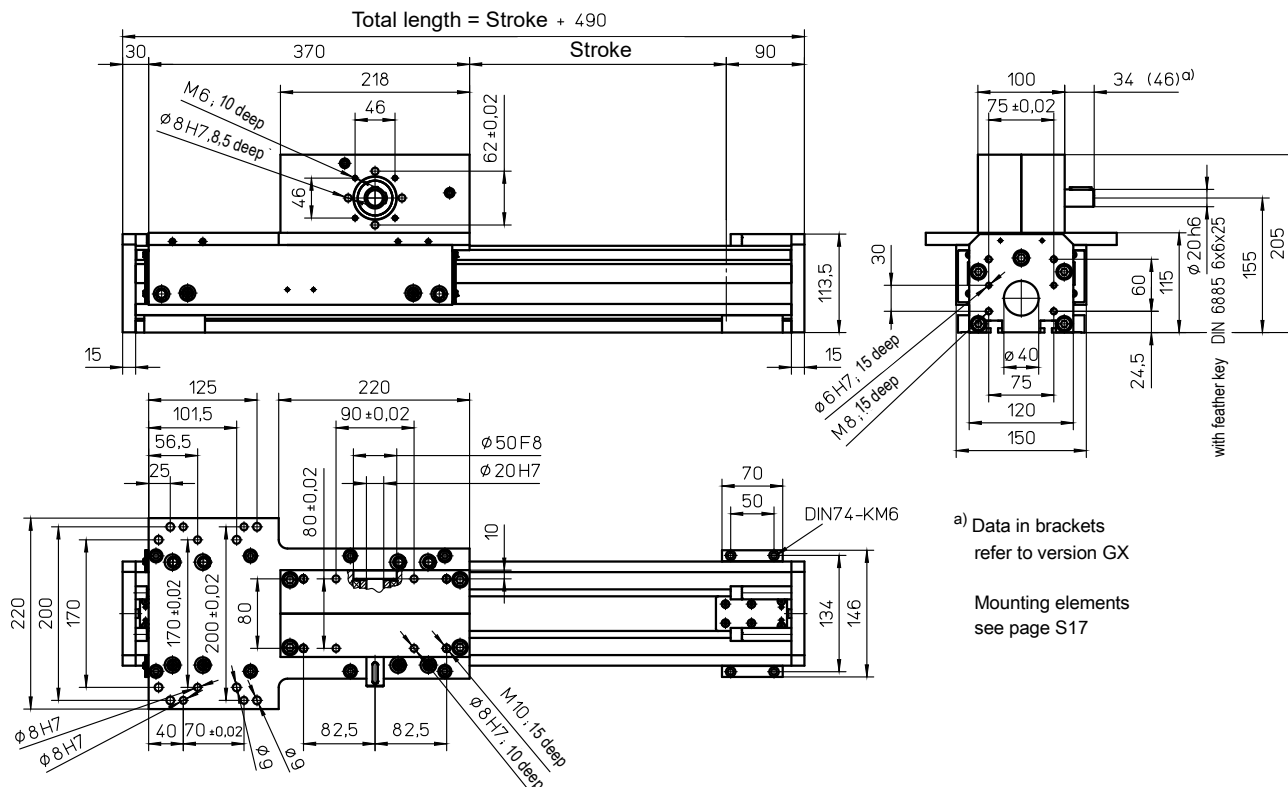
^{b)} Maximum value (see diagram „Fx-v-Diagram“)
Data in brackets refer to long carriage (350)

Fx - v - Diagram



These data apply to each carriage.

with toothed belt drive and roller guide (ARH)

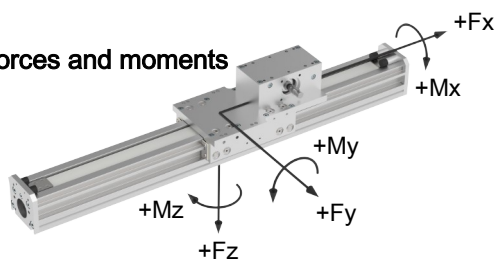


Weights

ARH

Basic length without stroke:	17.00 kg
100 mm stroke:	1.20 kg
Entire carriage 370 mm:	9.90 kg
Max. total length:	8000 mm
(longer on request)	

Forces and moments



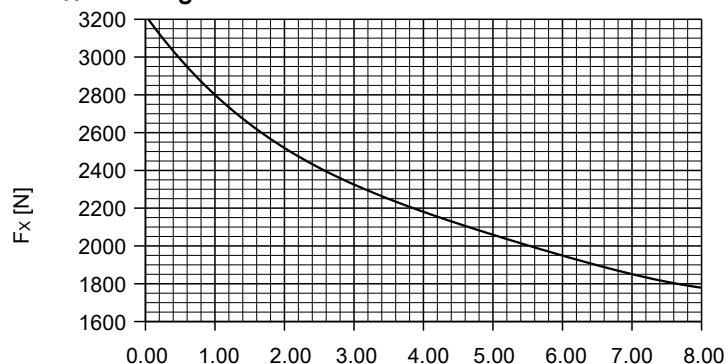
	ARH
Forces	Dynamic [N]
$F_x^b)$	3200
F_y	2300
F_z	3000
$-F_z$	1800
Moments	Dynamic [Nm]
M_x	170
M_y	400
M_z	400

Technical Data

ARH

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	3.80 Nm
Moment of inertia:	7.90 · 10 ⁻⁴ kgm ²
(rotatory)	
Drive element:	Toothed belt 40 AT10-E
Stroke per revolution:	240 mm

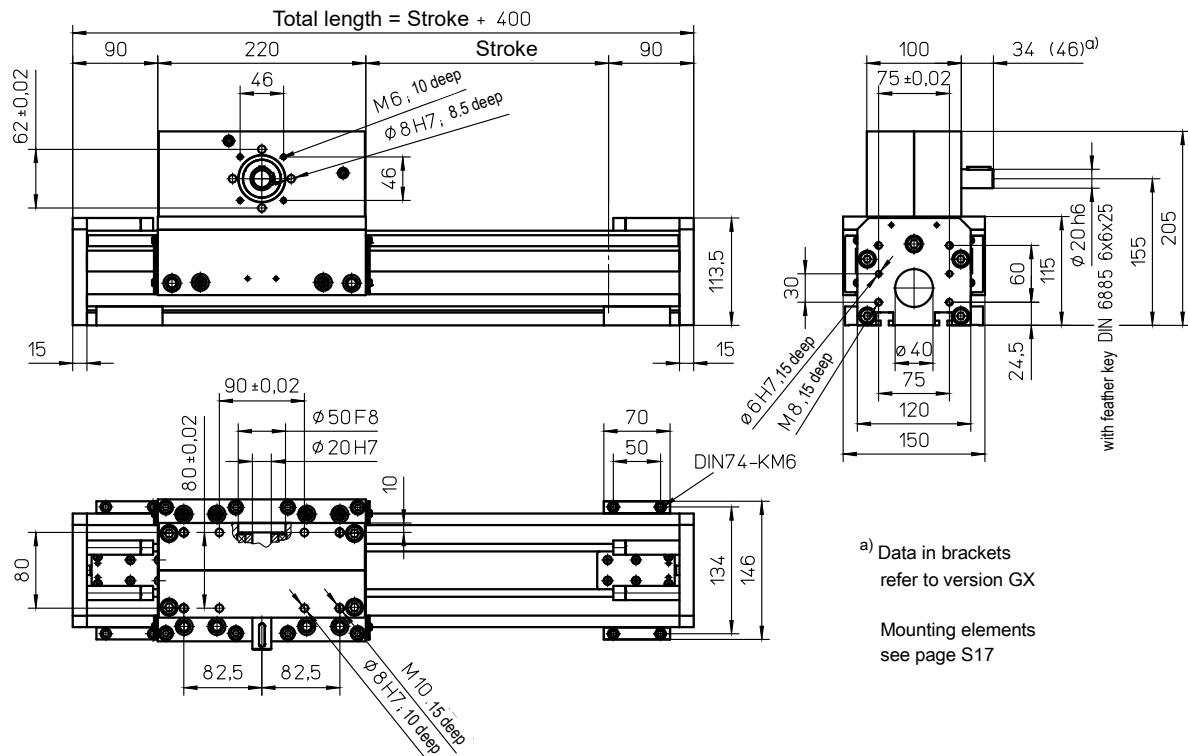
F_x - v - Diagram



^{b)} Maximum value (see diagram „ F_x -v-Diagram“)

Traversing speed v [m/s]

with toothed belt drive and roller guide (ARS)



Weights

ARS

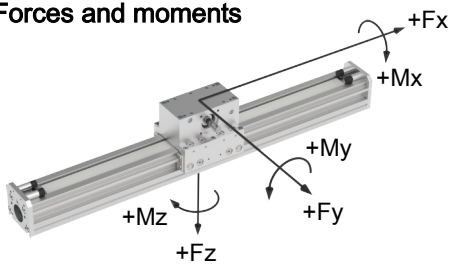
Basic length without stroke:	14.00 kg
100 mm stroke:	1.20 kg
Entire carriage 220 mm:	7.90 kg
Max. total length: (longer on request)	8000 mm

Technical Data

ARS

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	3.80 Nm
Moment of inertia: (rotatory)	7.90 · 10 ⁻⁴ kgm ²
Drive element:	Toothed belt 40 AT10-E
Stroke per revolution:	240 mm

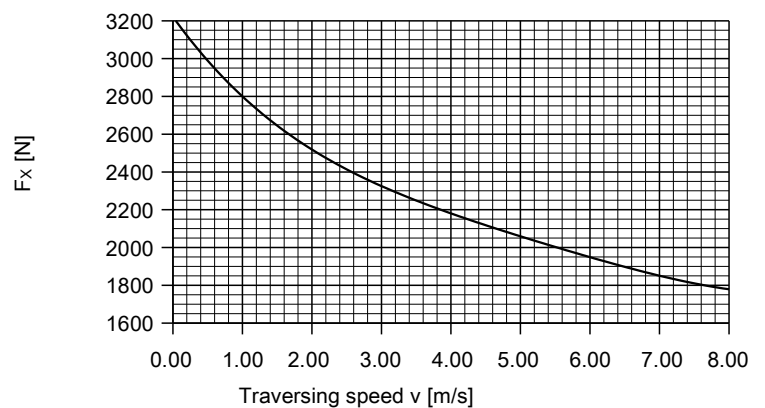
Forces and moments



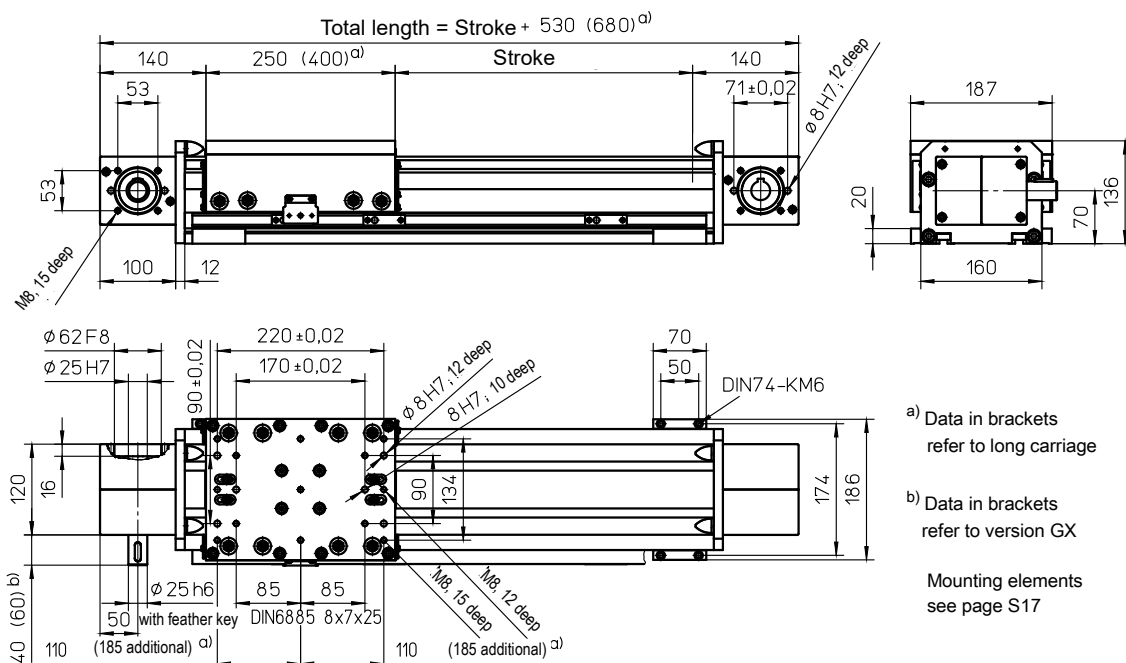
	ARS
Forces	Dynamic [N]
$F_x^{b)}$	3200
F_y	2300
F_z	3000
$-F_z$	1800
Moments	Dynamic [Nm]
M_x	170
M_y	270
M_z	270

b) Maximum value (see diagram „F_x-v-Diagram“)

F_x - v - Diagram



with toothed belt drive and roller guide (ZRS)



Weights

ZRS

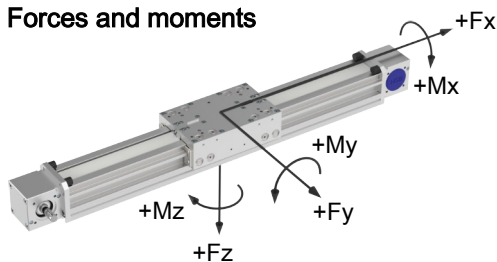
Basic length without stroke:	17.65 kg
100 mm stroke:	1.67 kg
Entire carriage 250:	5.95 kg
Entire carriage 400 mm:	8.75 kg
Max. total length: (longer on request)	6100 mm

Technical Data

ZRS

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	4.00 Nm
Moment of inertia:	1.23 · 10 ⁻² kgm ²
Drive element:	Toothed belt 50 ATL10
Stroke per revolution:	240 mm

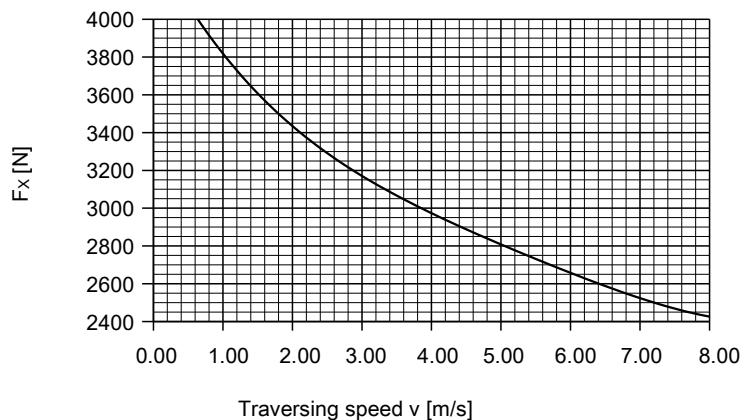
Forces and moments



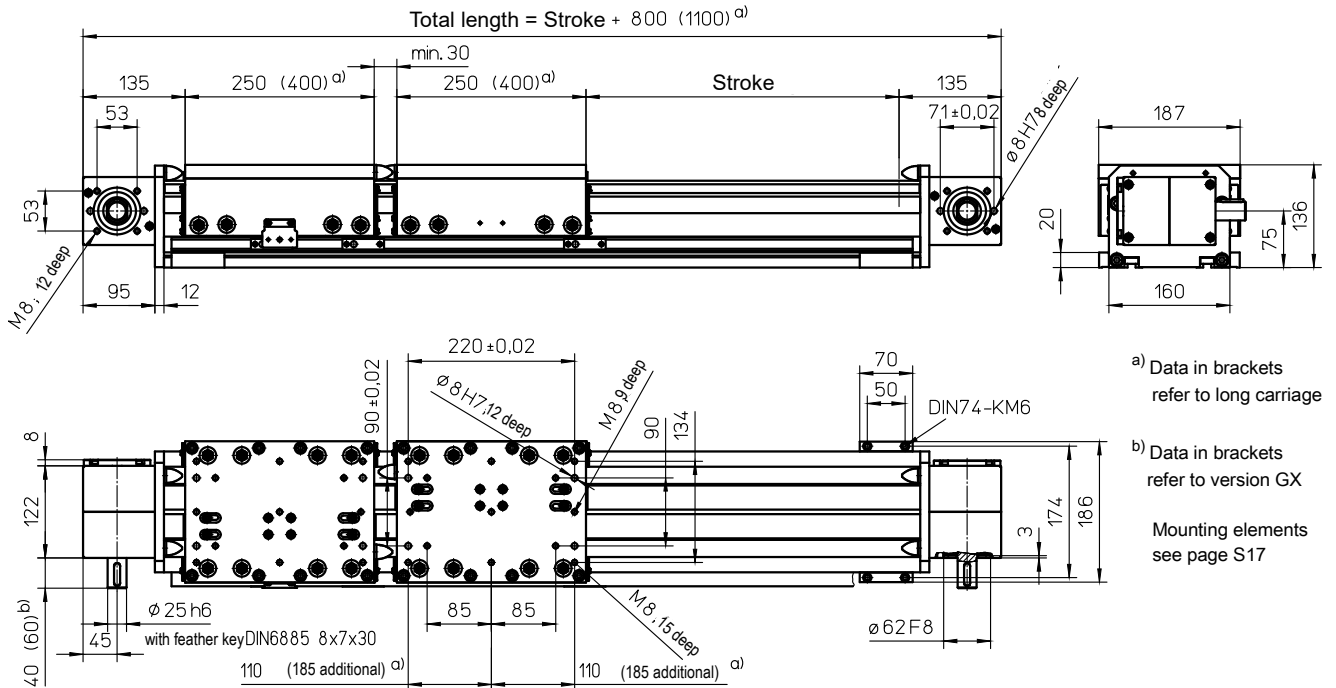
	ZRS
Forces	Dynamic [N]
$F_x^{c)}$	4000
F_y	4500
F_z	6000
$-F_z$	4000
Moments	Dynamic [Nm]
M_x	500
M_y	700 (1000)
M_z	700 (1000)

^{c)} Maximum value (see diagram „Fx-v-Diagram“)
Data in brackets refer to long carriage (400)

Fx - v - Diagram



with toothed belt drive and roller guide and a second independently travelling carriage (ZRSD)



Weights

ZRSD

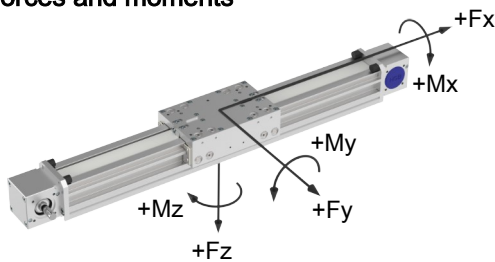
Basic length without stroke:	28.10 kg
100 mm stroke:	1.68 kg
Entire carriage 250 mm:	5.75 kg
Entire carriage 400 mm:	8.30 kg
Max. total length: (longer on request)	6100 mm

Technical data

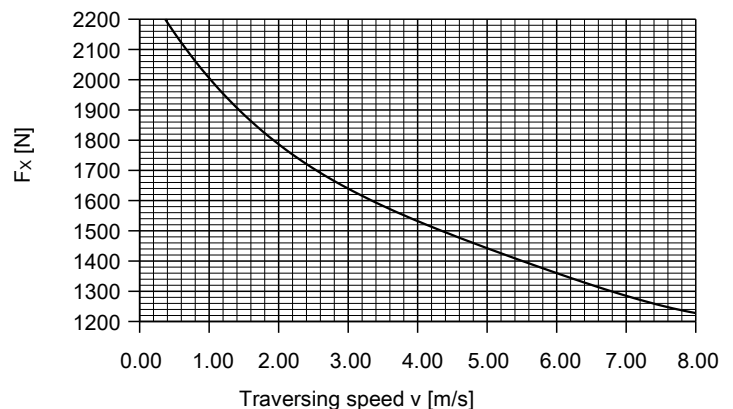
ZRSD

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	3.50 Nm
Moment of inertia:	7.16 • 10 ⁻³ kgm ²
Drive element:	2 x Toothed belt 32 AT10
Stroke per revolution:	210 mm

Forces and moments



F_x - v - Diagram

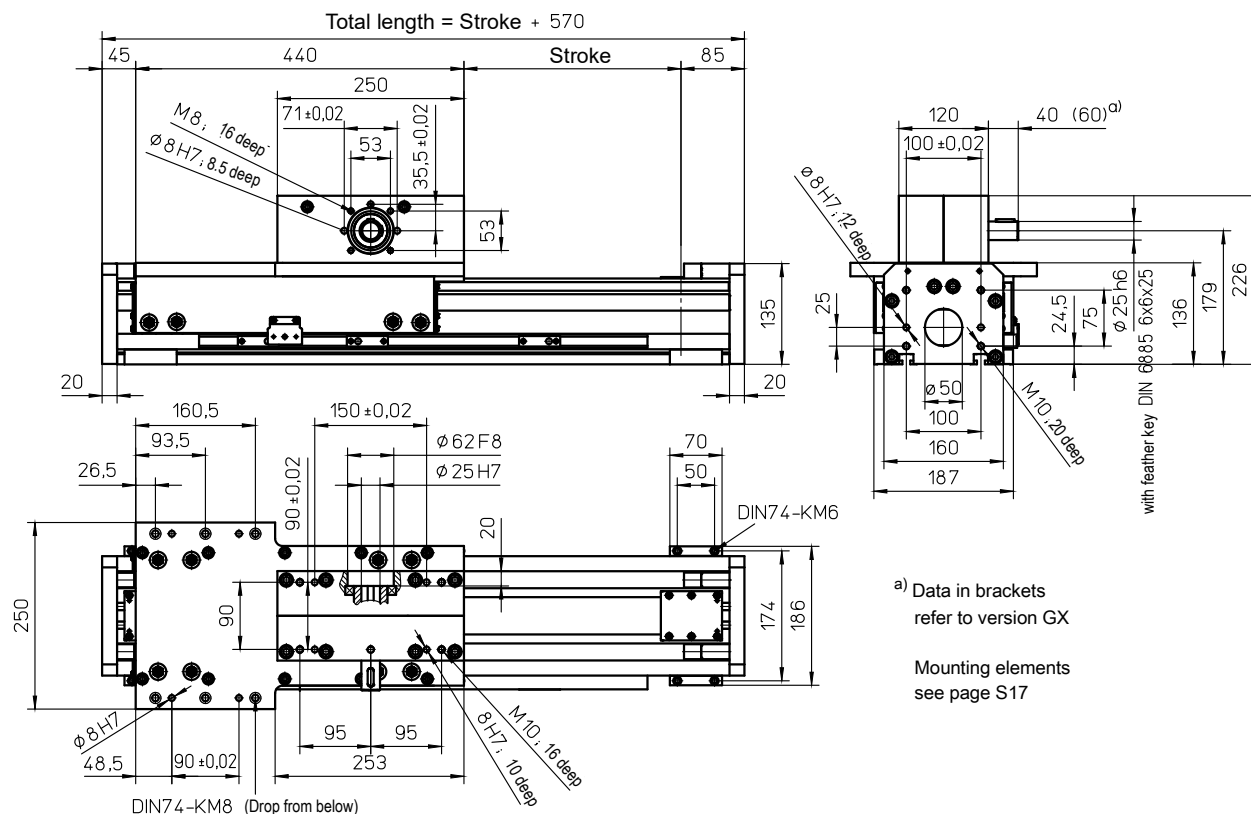


	ZRSD
Forces	Dynamic [N]
F _x ^{c)}	2300
F _y	4500
F _z	6000
-F _z	4000
Moments	Dynamic [Nm]
M _x	500
M _y	700 (1000)
M _z	700 (1000)

c) Maximum value (see diagram „F_x-v-Diagram“)
Data in brackets refer to long carriage (400)

These data apply to each carriage.

with toothed belt drive an roller guide (ARH)

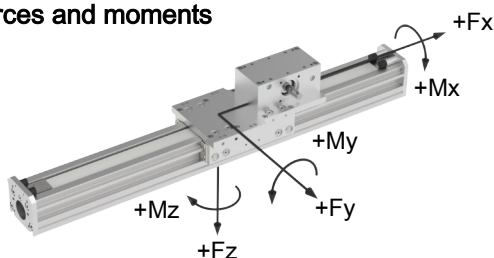


Weights

ARH

Basic length without stroke:	27.30 kg
100 mm stroke:	1.63 kg
Entire carriage 440 mm:	14.65 kg
Max. total length: (longer on request)	6000 mm

Forces and moments



	ARH
Forces	Dynamic [N]
$F_x^b)$	4000
F_y	4500
F_z	6000
$-F_z$	4000
Moments	Dynamic [Nm]
M_x	500
M_y	1000
M_z	1000

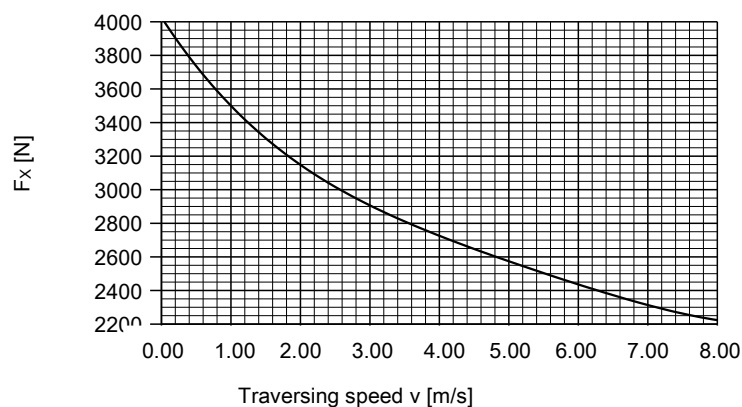
b) Maximum value (see diagram „Fx-v-Diagram“)

Technical Data

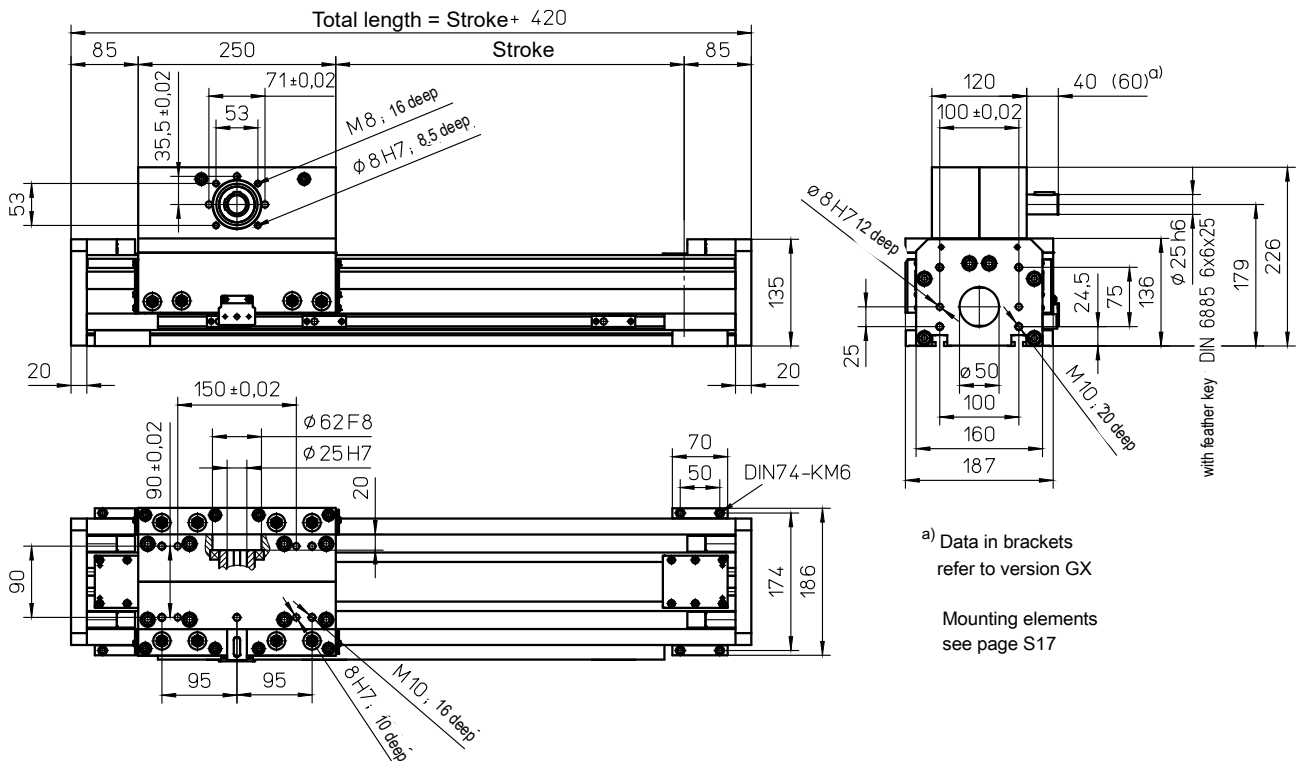
ARH

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	4.20 Nm
Moment of inertia: (rotatory)	1.50 • 10 ⁻³ kgm ²
Drive element:	Toothed belt 50 AT10-E
Stroke per revolution:	240 mm

Fx - v - Diagram



with toothed belt drive and roller guide (ARS)



Weights

ARS

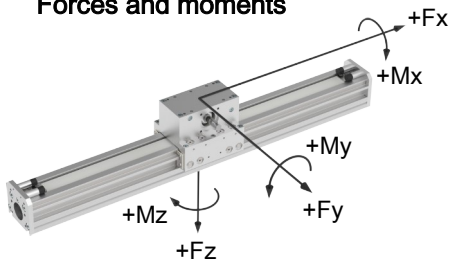
Basic length without stroke:	21.25 kg
100 mm stroke:	1.63 kg
Entire carriage 250 mm:	11.20 kg
Max. total length: (longer on request)	6000 mm

Technical Data

ARS

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s ²
Repeat accuracy:	±0.08 mm
Idle torque:	4.20 Nm
Moment of inertia: (rotatory)	1.50 · 10 ⁻³ kgm ²
Drive element:	Toothed belt 50 AT10-E
Stroke per revolution:	240 mm

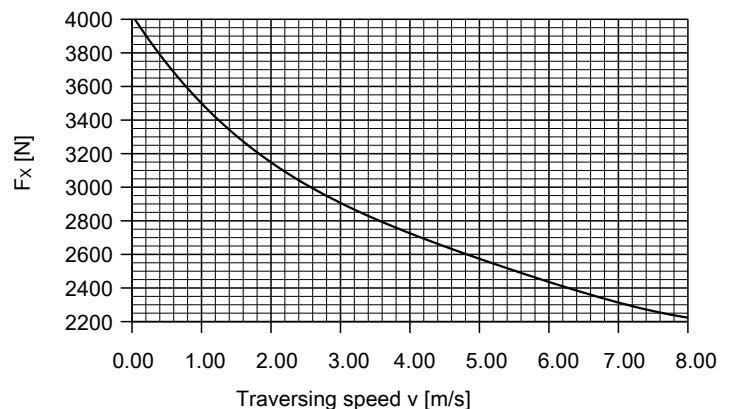
Forces and moments

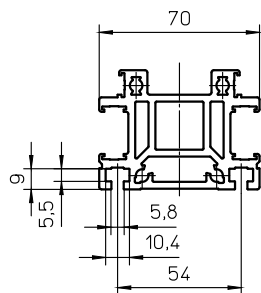


Forces	ARS Dynamic [N]
$F_x^{c)}$	4000
F_y	4500
F_z	6000
$-F_z$	4000
Moments	ARS Dynamic [Nm]
M_x	500
M_y	700
M_z	700

c) Maximum value (see diagram „Fx-v-Diagram“)

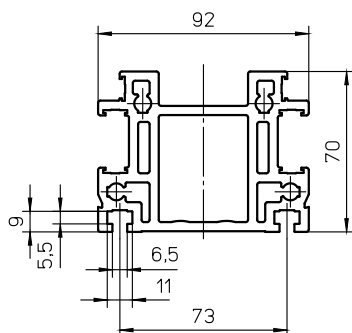
Fx - v - Diagram





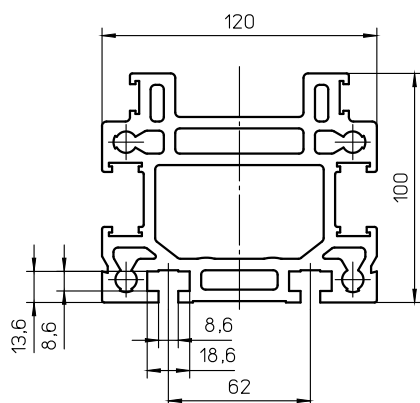
Profile Sigma 70

Specific mass [kg/m]	3.31
Surface measure [mm ²]	1228
Geometrical moment of inertia I _y [mm ⁴]	311462
Geometrical moment of inertia I _z [mm ⁴]	506500
Section modulus W _y [mm ³]	11005
Section modulus W _z [mm ³]	14471



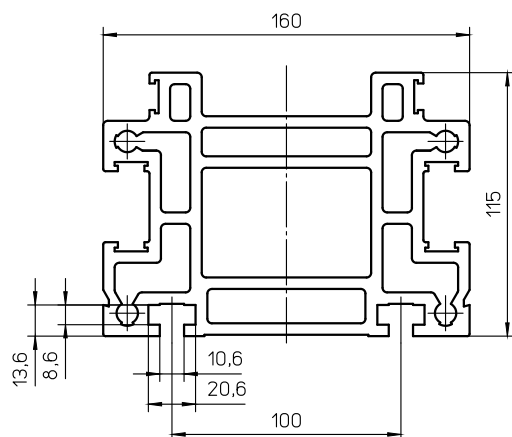
Profile Sigma 90

Specific mass [kg/m]	5.69
Surface measure [mm ²]	2108
Geometrical moment of inertia I _y [mm ⁴]	1012035
Geometrical moment of inertia I _z [mm ⁴]	1806590
Section modulus W _y [mm ³]	26586
Section modulus W _z [mm ³]	39274



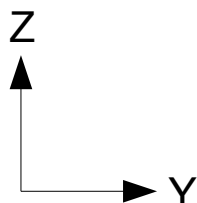
Profile Sigma 120

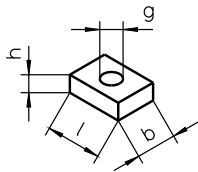
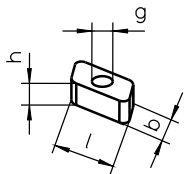
Specific mass [kg/m]	10.92
Surface measure [mm ²]	4044
Geometrical moment of inertia I _y [mm ⁴]	4001551
Geometrical moment of inertia I _z [mm ⁴]	5857612
Section modulus W _y [mm ³]	74232
Section modulus W _z [mm ³]	97627



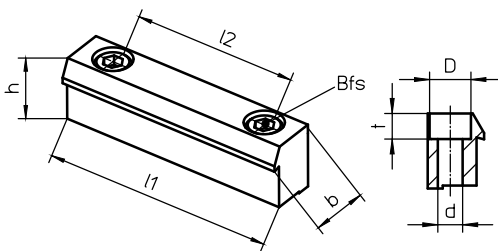
Profile Sigma 160

Specific mass [kg/m]	15.08
Surface measure [mm ²]	5583
Geometrical moment of inertia I _y [mm ⁴]	7080449
Geometrical moment of inertia I _z [mm ⁴]	14157096
Section modulus W _y [mm ³]	114660
Section modulus W _z [mm ³]	176964



NS 2..21

RM 2 / 6


Linear drive	Page *	NS	ID No.	l [mm]	b [mm]	h [mm]	g
Sigma 70	E	2	10557	16	10	4	M5
Sigma 90	E	2	10557	16	10	4	M5
		21	22955	20	10	5	M6
		RM2	15370	10	6	4	M4
Sigma 120	E	19	10559	18	14	6	M8
		20	10560	20	14	8	M8
		10	16499	20	13	6	M6
Sigma 160	E	6	10561	25	18	8	M10
		RM6	15372	18	10	8	M6

BL 1 / 2


Linear drive	BL	ID No.	l1 [mm]	l2 [mm]	b [mm]	h [mm]	Bfs	D [mm]	d [mm]	t [mm]
Sigma 70	11	25267	70	50	13	12	M6	11	6,6	6,8
Sigma 90	1	10552	70	50	15	17,5	M6	11	6,6	6,8
Sigma 120	2	10553	70	50	15	20	M6	11	6,6	6,8
Sigma 160	2	10553	70	50	15	20	M6	11	6,6	6,8

* For further information on pages C – E, see page Z1
Bfs = Mounting screw DIN 912 / ISO 4762

Example: Sigma 120-ZRS-40 AT10-200-1000-1440-AZ1-6NS5-1

Product _____

Size _____

Drive _____

Z = Toothed belt drive

0 = Without drive

A = Powered carriage

Guide system _____

R = Roller guide

Model _____

ZRS = Standard (Horizontal)

ZRSD = Standard double (Horizontal)

ARH = Lifting axis (Vertical)

ARS = Standard (Horizontal)

Drive specifications _____

Width of toothed belt and tooth pitch

Stroke per revolution _____

Stroke _____

Total length _____

Accessories _____

AZ1 = Drive shaft short, mounting side **C**

AZ2 = Drive shaft short, mounting side **D**

AZ6 = Drive shaft long, mounting side **C** and **D**

Further arrangements for drive shaft, see **page Z1**

EO2 / EO10 = Inductive limit switch with 2 m/10 m cable fitted

ES2 / ES10 = Inductive limit switch with 2 m/10 m cable fitted

EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted

BL = Mounting bracket

NS / RM = Sliding block 2 .. 10 / Rhomb nut 2 .. 6 (See Table on **page S17**)

Special design _____

0 = Standard

1 = Special (add specification description)

Further accessories (separate position)

MGK = Motor mounting and coupling (according to dimension sheet)

Notes and drawing

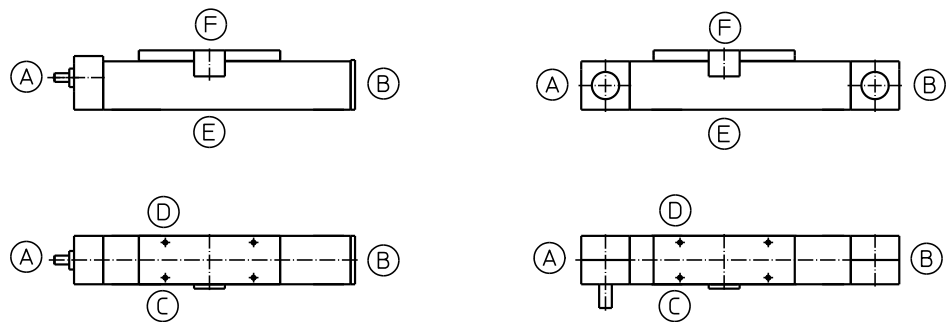


Chapter Z

Accessories

Ordering code for limit switch positions, limit switch type **(EN)**,
lubrication ports and drive shafts **(AZ)** and wiper versions

Limit switch position



Limit switch types **(EN)**

EO2	= Inductive proximity switch "Normally Closed"	with 2 m cable (L 408.2115.25)
EO10	= Inductive proximity switch "Normally Closed"	with 10 m cable (L 408.2116.25)
ES2	= Inductive proximity switch "Normally Open"	with 10 m cable (L 408.2118.25)
ES10	= Inductive proximity switch "Normally Open"	with 2 m cable (L 408.2117.25)
EMS / EMB	= Mechanical limit switch "normally closed" (S = Siemens, B = Balluff; without cable)	

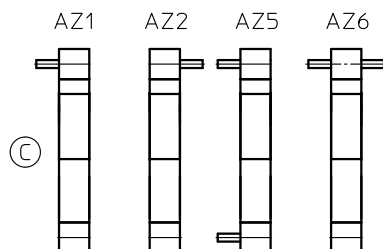
Insofar as there are no other specifications provided, the limit switches are fitted as follows (standard):

1. Switch: **EO2** NC with 2 m cable on page C, pos. A, cable exit at A
Switching point = Mechanical end position
2. Switch: **EO2** NC with 2 m cable on page C, pos. B, cable exit at B
Switching point = Mechanical end position
3. Switch: **ES2** NO with 2 m cable on page C, pos. A, cable exit at A
Switching point = Directly beside first switch (as reference)

Lubrication ports

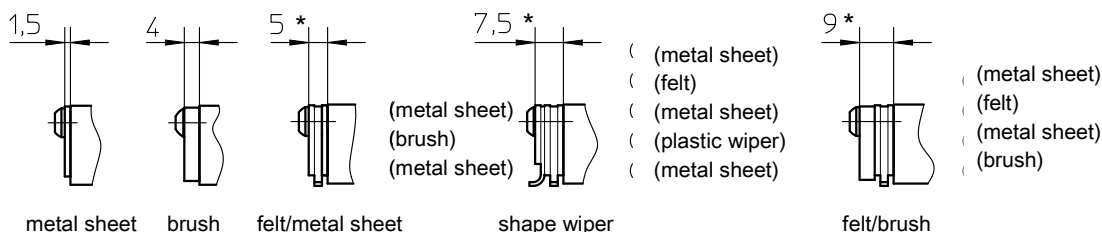
Standard Beta, Delta-C and Alpha: Lubricating nipple M8x1, page **C + D**
(exception: Delta = M6; Beta 40, Beta 70-C-ARS-ASS = drive in lubrication nipple)

Drive shafts **(AZ)**



Wiper versions

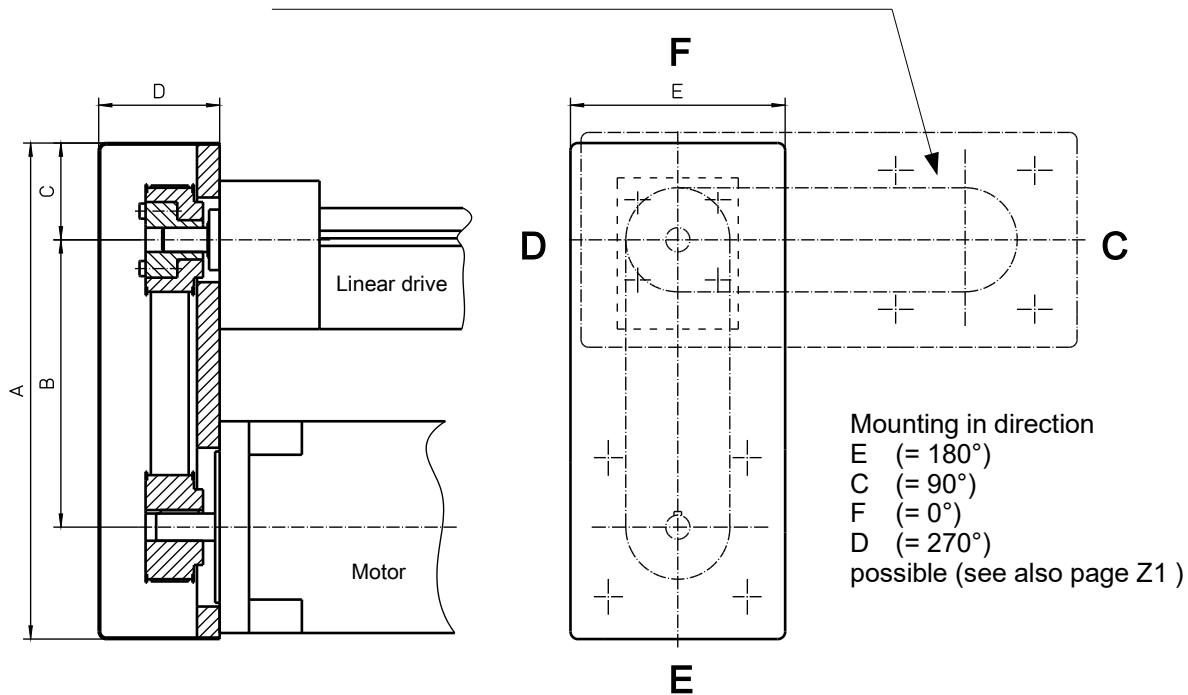
(Design is based on carriage plate)



* Bei Beta 165(-C)
und Beta 180(-C)
+ 2 mm

Deflection belt drive mounting (URT)

URT can be turned 90° when mounted



Linear drive version			URT version	A	B*	C	D	E
Beta 40 Beta 50-C	Delta 90 Delta 110		URT 1	195	105 ±10	41	45	90
Beta 60 Beta 70-C	Delta 145-C	Alpha 15-B	URT 2	238	120 ±10	46	52	102
Beta 80(-C) Beta 100-D Beta 110 Beta 120-C Beta 140(-C) Beta 165(-C) Beta 180(-C)	Delta 200 Delta 240	Alpha 20-B Alpha 30-B Alpha 35-B	URT 3	328	190 ±10	64	80	142

* Centre distance B: depending on ratio and toothed belt

Possible gear ratios:

i = 1:1

i = 2:1

i = 3:1**

Note: Depending on the motor shaft diameter and necessary drive moment, all ratios may not be possible

** maximum possible motor shaft diameter with shaft without feather key:

URT 1: not possible

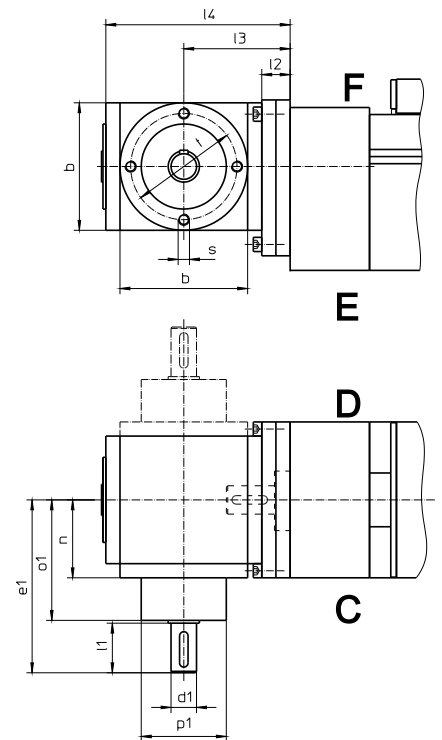
URT 2: 11

URT 3: 15

Motor mounting shown in direction E (= 180°) (dashed C (= 90°))

Bevel gear mounting (KRG)

Unit size	Gear types	Version	Ratio	b	l2	l3	l4	n	s	t
Beta 40	V065	E0N0, K0N0	1:1 ... 3:1	65	11	53	95	42	M6	54
Beta 50-C	V065	E0N0, K0N0	1:1 ... 3:1	65	11	53	95	42	M6	54
Beta 60	V065	E0N0, K0N0	1:1 ... 3:1	65	16	58	100	42	M6	54
Beta 60-SGV	V065	E0N0, K0N0	1:1 ... 3:1	65	16	58	100	42	M6	54
Beta 70-C	V065	E0N0, K0N0	1:1 ... 3:1	65	16	58	100	42	M6	54
Beta 80	V090	E0N0, K0N0	1:1 ... 6:1	90	20	75	130	55	M8	75
Beta 100-D	V090	E0N0, K0N0	1:1 ... 6:1	90	20	75	130	55	M8	75
Beta 110	V090	E0N0, K0N0	1:1 ... 6:1	90	20	75	130	55	M8	75
Beta 110-C-SGV	V120	E0N0, K0N0	1:1 ... 6:1	120	30	102	174	75	M10	100
Beta 120-C	V120	E0N0, K0N0	1:1 ... 6:1	120	30	102	174	75	M10	100
Beta 140(-C)	V090	E0N0, K0N0	1:1 ... 6:1	90	20	75	130	55	M8	75
Beta 165(-C)	V120	E0N0, K0N0	1:1 ... 6:1	120	30	102	174	75	M10	100
Beta 180(-C)	V120	E0N0, K0N0	1:1 ... 6:1	120	30	102	174	75	M10	100
Delta 90	V065	E0N0, K0N0	1:1 ... 3:1	65	16	58	100	42	M6	54
Delta 110-C	V065	E0N0, K0N0	1:1 ... 3:1	65	18	58	100	42	M6	54
Delta 145-C	V090	B0,C0,G0,H0	1:1 ... 6:1	90	94	149	204	55	M8	75
Delta 200	V120	B0,C0,G0,H0	1:1 ... 6:1	120	112	184	256	75	M10	100
Delta 240(-C)	V120	B0,C0,G0,H0	1:1 ... 6:1	120	112	184	256	75	M10	100
Alpha 15-B-155	V065	E0N0, K0N0	1:1 ... 3:1	65	16	58	100	42	M6	54
Alpha 20-B-225	V090	E0N0, K0N0	1:1 ... 6:1	90	20	75	130	55	M8	75
Alpha 30-B-325	V090	E0N0, K0N0	1:1 ... 6:1	90	20	75	130	55	M8	75
Alpha 35-B-455	V120	E0N0, K0N0	1:1 ... 6:1	120	30	102	174	75	M10	100



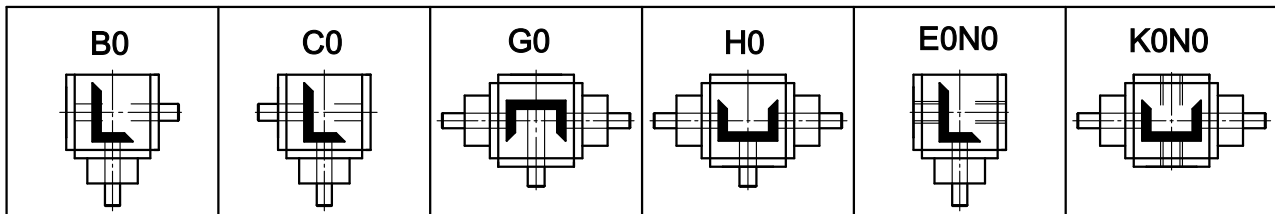
Motor mounting side "C", "D", "E" or "F" (see also page Z1)

Ratio	1:1 – 2:1					3:1					4:1					5:1 – 6:1				
Unit size	d1	l1	e1	o1	p1	d1	l1	e1	o1	p1	d1	l1	e1	o1	p1	d1	l1	e1	o1	p1
Beta 40	12	26	100	72	44	12	26	100	72	44										
Beta 50-C	12	26	100	72	44	12	26	100	72	44										
Beta 60	12	26	100	72	44	12	26	100	72	44										
Beta 60-SGV	12	26	100	72	44	12	26	100	72	44										
Beta 70-C	12	26	100	72	44	12	26	100	72	44										
Beta 80	18	35	122	85	60	12	35	122	85	60	12	35	132	95	60	12	35	132	95	60
Beta 100-D	18	35	122	85	60	12	35	122	85	60	12	35	132	95	60	12	35	132	95	60
Beta 110	18	35	122	85	60	12	35	122	85	60	12	35	132	95	60	12	35	132	95	60
Beta 110-C-SGV	25	45	162	115	80	20	45	162	115	80	20	45	172	125	80	15	35	162	125	70
Beta 120-C	25	45	162	115	80	20	45	162	115	80	20	45	172	125	80	15	35	162	125	70
Beta 140(-C)	18	35	122	85	60	12	35	122	85	60	12	35	132	95	60	12	35	132	95	60
Beta 165(-C)	25	45	162	115	80	20	45	162	115	80	20	45	172	125	80	15	35	162	125	70
Beta 180(-C)	25	45	162	115	80	20	45	162	115	80	20	45	172	125	80	15	35	162	125	70
Delta 90	12	26	100	72	44	12	26	100	72	44										
Delta 110-C	12	26	100	72	44	12	26	100	72	44										
Delta 145-C	18	35	122	85	60	12	35	122	85	60	12	35	132	95	60	12	35	132	95	60
Delta 200	25	45	162	115	80	20	45	162	115	80	20	45	172	125	80	15	35	162	125	70
Delta 240(-C)	25	45	162	115	80	20	45	162	115	80	20	45	172	125	80	15	35	162	125	70
Alpha 15-B-155	12	26	100	72	44	12	26	100	72	44										
Alpha 20-B-225	18	35	122	85	60	12	35	122	85	60	12	35	132	95	60	12	35	132	95	60
Alpha 30-B-325	18	35	122	85	60	12	35	122	85	60	12	35	132	95	60	12	35	132	95	60
Alpha 35-B-455	25	45	162	115	80	20	45	162	115	80	20	45	172	125	80	15	35	162	125	70

All bevel gears are lubricated for life with synthetic oil (lubrication B0). Maximum duty cycle 40 %.

For a longer duty cycle, please order "lubrication B1" and specify mounting position. Angular play <20 minutes.

Versions:



(Pay attention to diameter of sleeve shaft of version E0/K0.)

Allowed output nominal torque (Nm) at input rotation speed 3000 min⁻¹

Atek-Gears

Gear V	Ratio i							Ø Sleeve shafts of Version E0N0 / K0N0
	1:1	1,5:1	2:1	3:1	4:1	5:1	6:1	
065	10	10	10	10	-	-	-	12
090	27	25	23	23	23	23	23	18
120	66	61	56	58	60	60	54	25

Nidec Graessner-Gears

Power Gear	Ratio i					
	1:1	1,5:1	2:1	3:1	4:1	5:1
P54	15	15	12	12	-	-
P75	45	45	42	33	28	25
P90	78	78	68	54	52	40
P110	150	150	150	120	100	85

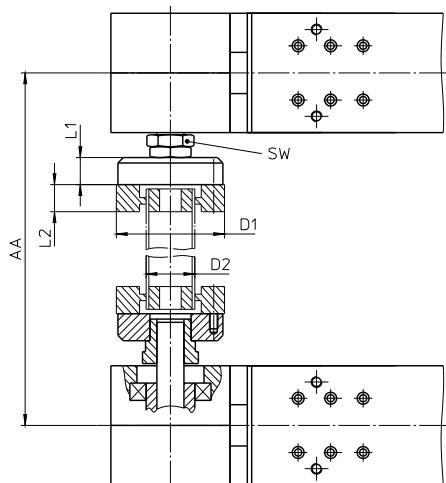
At allowed values there are only limited** thermal limiting performances considered.
This applies to both producers.
Details see documentation of producers (Atek and Nidec Graessner).

** switch-on time ED = 40 %, rotation speed 3000 U/min, ambient temperature 20 °C

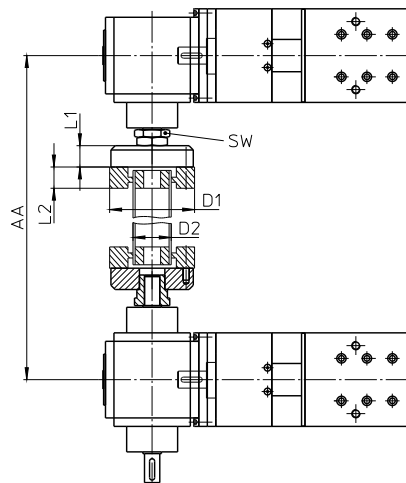
Joint shaft mounting (GX)

Toothed belt drive

Dimension AA = Centre distance between mechanical linear drives



Threaded spindle drive



Linear Drive	Size	max. Moment [Nm]	AA min.	SW
Beta 40-ZSS	GX1	8	170	22
Beta 50-C-ZRS	GX1	12	190	22
Beta 60-ZSS	GX2	22	205	27
Beta 60-SSS	GX2		320	22
Beta 60-SGV	GX2		320	22
Beta 70-C-ZRS-ZSS	GX2	31	215	27
Beta 70-C-SRS-SSS	GX2		330	27
Beta 80-ZRS-ZSS	GX2	47	225	27
Beta 80-SRS-SSS	GX2		330	27
Beta 80-C-ZRS-ZSS	GX4	74	270	36
Beta 100-ZRS-ZSS	GX4	89	270	36
Beta 100-D-ZSS	GX4	38	270	36
Beta 100-D-SSS	GX4		290	36
Beta 110-ZRS-ZSS	GX4 / GX8*	191	320	46
Beta 110-SRS-SSS	GX4		350	46
Beta 120-ZRS-ZSS	GX4 / GX8*	153	300	46
Beta 120-C-ZSS	GX4 / GX8*	229	300	46
Beta 120-C-SSS	GX4		350	46
Beta 140-ZRS-ZSS	GX4 / GX8*	140	310	46
Beta 140-SRS-SSS	GX4		350	36
Beta 140-C-ZSS	GX4 / GX8*	140	310	46
Beta 140-C-SSS	GX4		350	36
Beta 165-ZSS	GX16	700	350	55
Beta 165(-C)-SGV / -SSF	GX8		430	46
Beta 165-SSS	GX8		430	46
Beta 180-ZSS	GX8 / GX16*	306	370	55
Beta 180-SSS	GX8		430	46
Beta 180-C-ZSS	GX8 / GX16*	370	370	55
Beta 180-C-SSS	GX8		430	46

Linear Drive	Size	Moment max. [Nm]	AA min.	SW
Gamma 90-ZSS	GX4	77	250	36
Gamma 90-ZSSD	GX2	37	240	36
Gamma 120-ZSS	GX4	90	280	36
Gamma 120-ZSSD	GX4	57	280	36
Gamma 160-ZSS	GX4 / GX8*	153	300	46
Gamma 160-ZSSD	GX4	74	300	46
Gamma 220-ZSS	GX8 / GX16*	306	370	55
Gamma 220-ZSSD	GX4 / GX8*	107	350	46

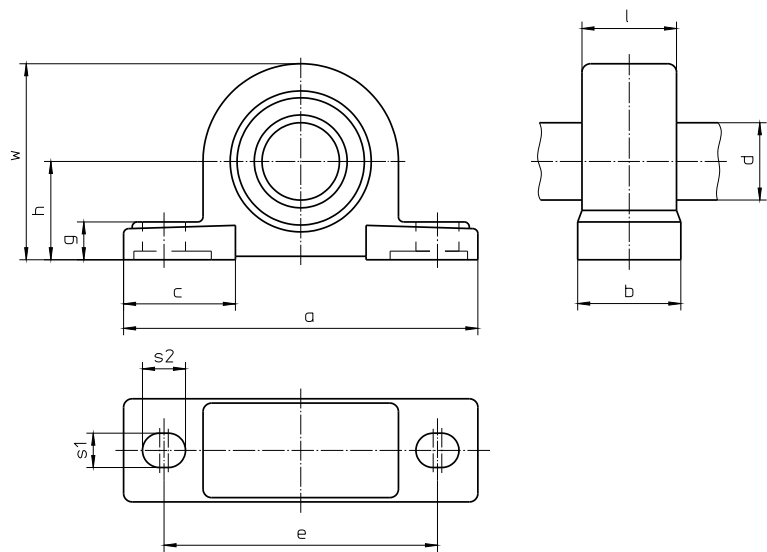
Sigma 70-ZRS	GX2	22	205	27
Sigma 90-ZRS	GX2	36	240	27
Sigma 90-ZRSD	GX2	18	240	27
Sigma 120-ZRS	GX4	89	280	36
Sigma 120-ZRSD	GX4	57	280	36
Sigma 160-ZRS	GX4 / GX8*	153	300	46
Sigma 160-ZRSD	GX4	77	300	46

Size	D1	D2		L1	L2
		St	VA		
GX1	57	30x2	30x2,0	20	24
GX2	88	40x2,5	40x2,5	20	24
GX4	100	45x2,5	44,5x1,5	25	28
GX8	125	60x2,5	60,3x1,6	30	32
GX16	155	70x1,5	70,0x2,0	50	35

* The larger version is to be selected where necessary.

This table is a selection. More sizes and combinations on request.

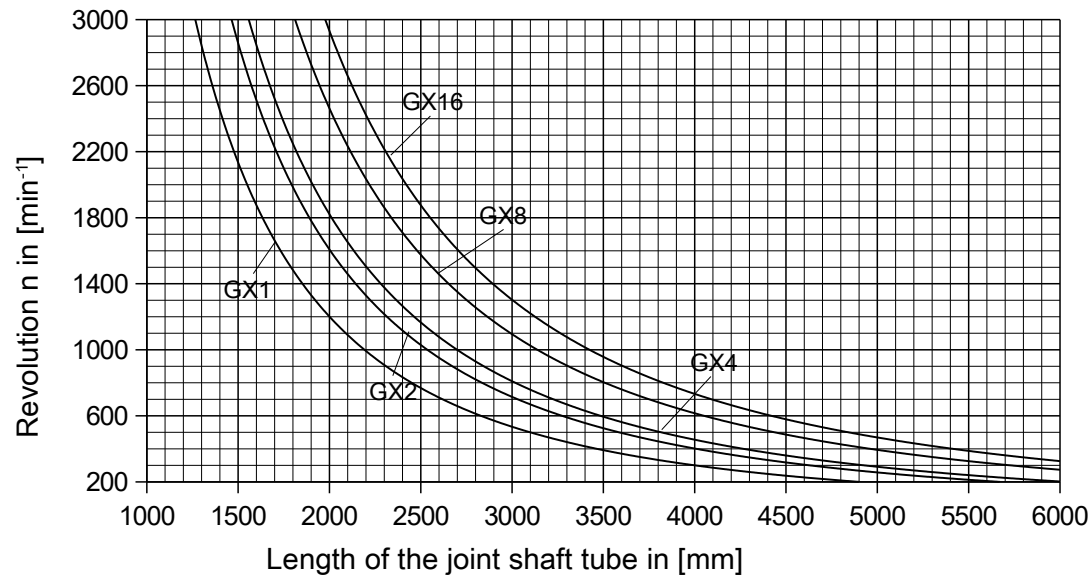
Pillow bearing drawing



For Joint shaft	a	b	c	d	e	g	h	l	s1	s2	w	Weight GX-shaft in kg			
												Length 500 mm complete		100 mm tube	
												St	VA	St	VA
GX1	167	48	54	30	127	19	47,6	43	17	21	92	1.20	1.21	0.14	0.14
GX2	190	54	60	40	146	20	54	50	17	22	106	2.37	2.42	0.23	0.23
GX4	206	60	65	45	159	22	57,2	55	20	25	114	3.56	3.11	0.26	0.16
GX8	265	70	77	60	203	27	76,2	65	25	29	150	6.08	5.55	0.35	0.23
GX16	292	78	85	70	232	30	88,9	64	25	31	175	11.03	11.37	0.26	0.34

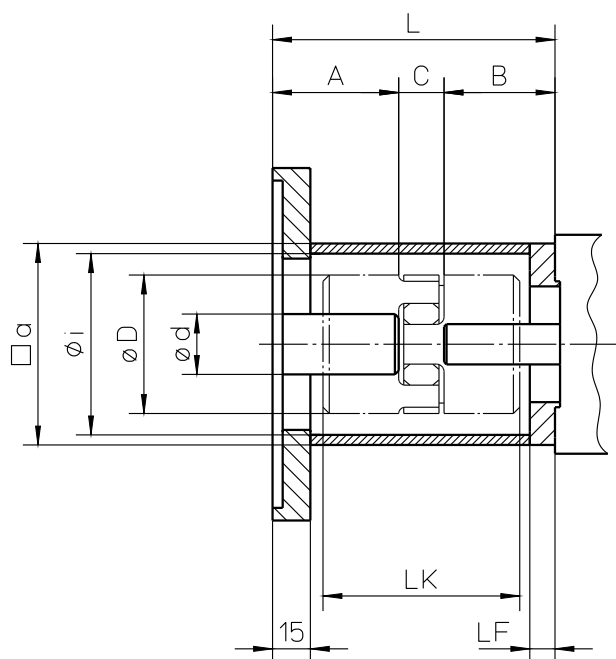
Joint shaft diagram

Depends on length and revolution



Motor mounting, coupling (MGK)

Standard motor mounting (3-part)



Gr.	□ a	øi	LF
55	55	46	8
80	80	69	10

$$L = A + B + C$$

A = Length of drive shaft of motor/gear

B = Length of drive journal of mechanical linear drive

C = See Table for Coupling Sizes

Size of coupling

	9	12	14	19	24	28
C	10	12	13	16	18	20
ø d _{max}	11	12	16 (14)	20	28	38
ø D	20	25	30	40	55	65
LK	30	34	35 (50)	66	78	90

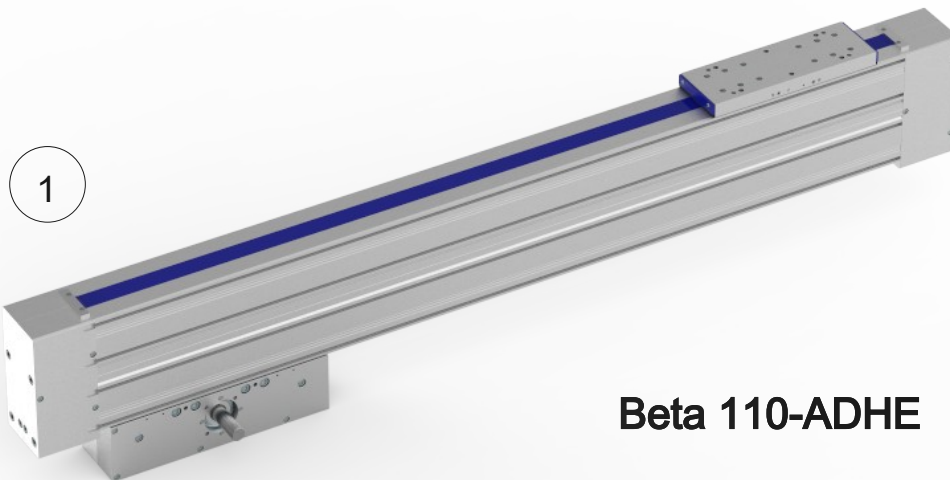
Clamping hub and clamping ring (from size 14) possible.
Dimensions in brackets apply for clamping ring.



Chapter X

Custom

Designs

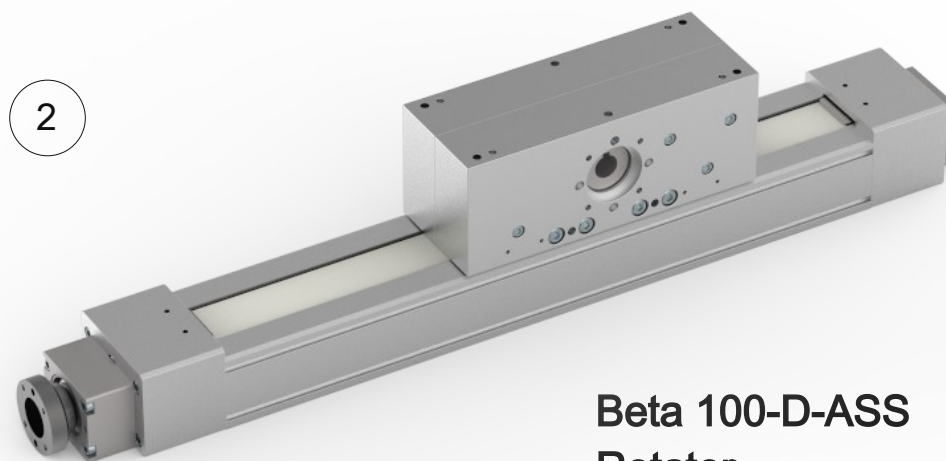


Beta 110-ADHE

The ADHE design (driven carriage, duplex unit) is currently available in sizes 50 and 110 but can in principle be supplied in the HSB-beta® series sizes.

The lower carriage with the gearbox/motor detects that the profile tube and the top carriage are travelling. There is therefore a relative/ double stroke action. An outrigger can be attached to the upper carriage and thereby e.g. a spray lance with a single profile length of the linear unit can be immersed into a tool by the doubled stroke.

The upper linear unit with the single carriage is enclosed by the covering strip.



**Beta 100-D-ASS
Rotator**

The HSB-beta®-ARS-ASS versions are often used with a vertical axis.

The carriage and drive are upright and the profile tube runs vertically.

The gripper/attachments often also need to rotate.

This can be implemented very simply with the HSB rotator.

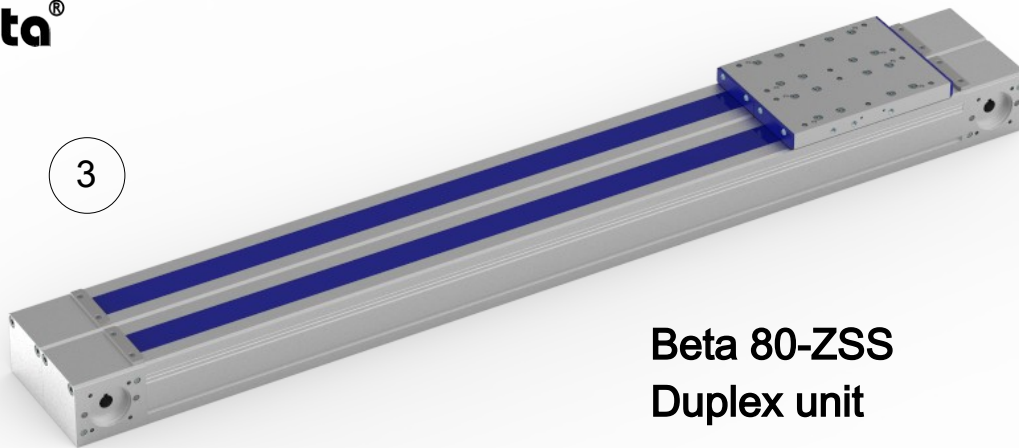
A top and bottom-mounted tube is fed through the rear cavity of the profile.

A servo motor is attached at the top by a timing belt drive (or motor mounting)

while the gripper or attachment can be attached to the adapter plate on the bottom.

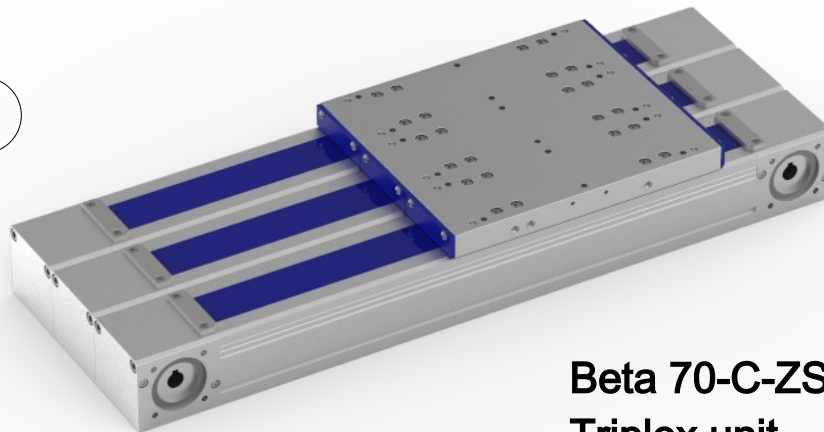


3



**Beta 80-ZSS
Duplex unit**

4



**Beta 70-C-ZSS
Triplex unit**

With a spindle or toothed belt drive, all HSB-beta® series sizes can be converted into duplex/triplex or multiple units.

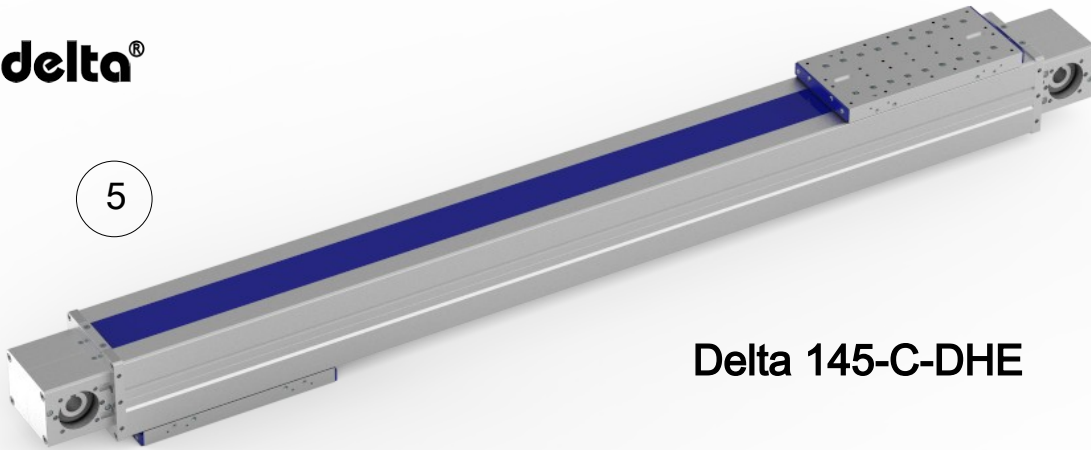
Profiles are screwed/glued together. The result is a broad, flat linear unit. A shared carriage plate allows large torques to be accommodated in the M_x direction. With a shared drive (toothed belt units) it is possible to generate greater thrust forces.

Counter-acting movements can be implemented with single carriage plates.

If different spindle pitches are used it is possible to realise different speeds from the same engine speed.

HSB-delta®

5



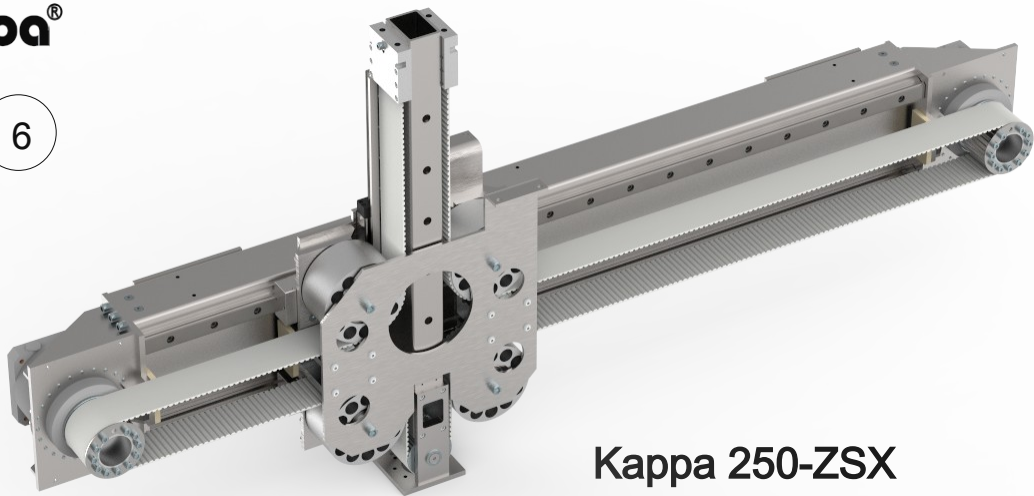
Delta 145-C-DHE

The DHE (double stroke unit) is currently available for the 145 size but other HSB-delta® series sizes are possible in principle.

In this case, along with the flat design and large transferable torques, an optimum ratio of stroke to overall length was required due to the duplex design of the HSB-delta® series.

HSB-kappa®

6



Kappa 250-ZSX

The linear units of the HSB-kappa® series are a particular highlight of HSB Automation GmbH.

The function principle is well known and some of our competitors supply and build this concept as a small system. The challenge for HSB Automation GmbH lay not in the system itself but in the parameters to be achieved:

it needed to move a mass of up to 100 kg horizontally by 2000 mm and vertically by 600 mm with 30 strokes/ minute. All components had to be non-rusting since it was for the food industry.

To save mass and weight in the vertical axis conventional linear units were out of the question. The drive which had to be co-transported (gearbox and servomotor with brake) overstressed every system. We therefore opted for the system with two vertical motors and a toothed belt.



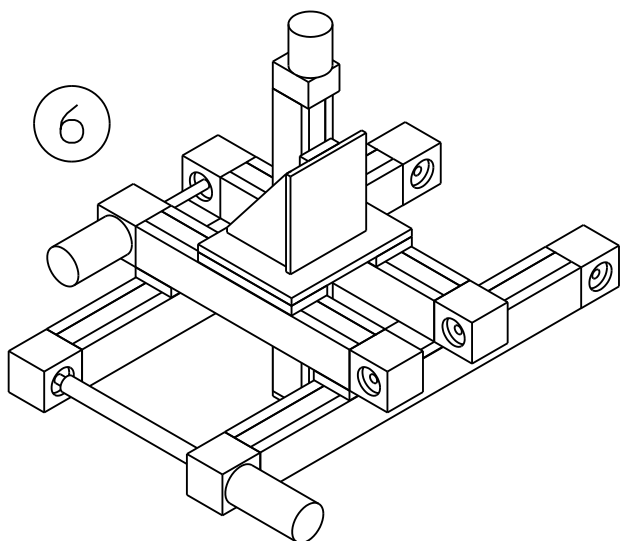
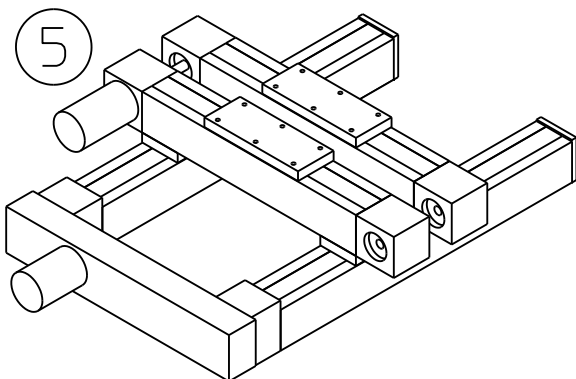
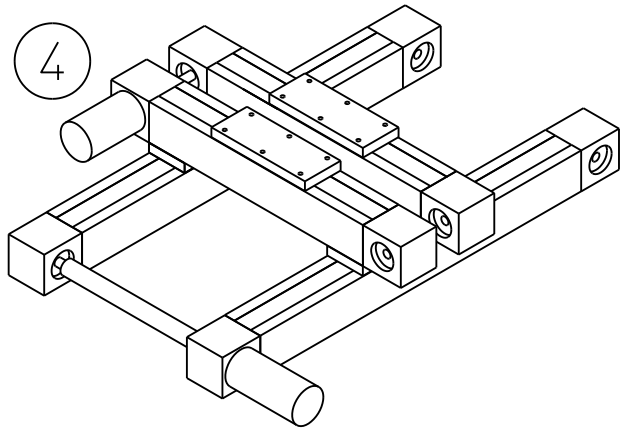
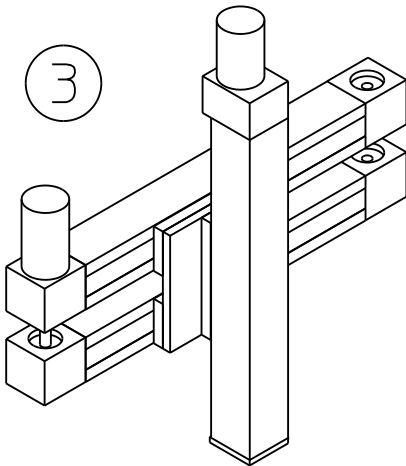
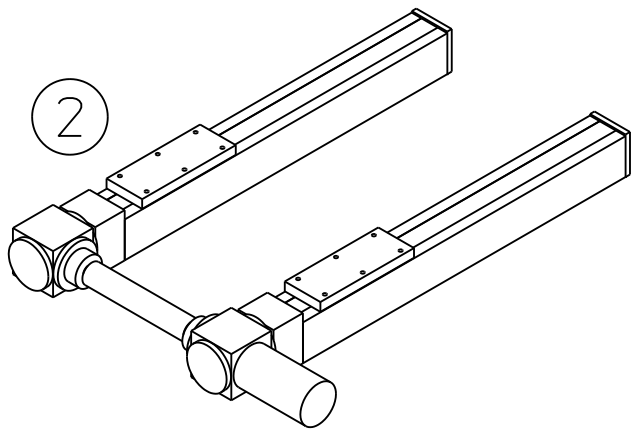
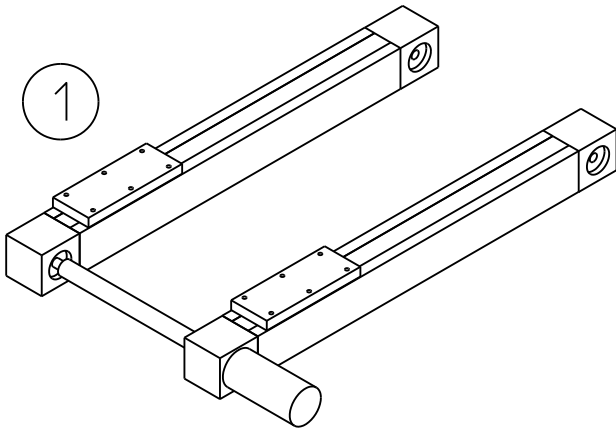
Chapter TL

Technology

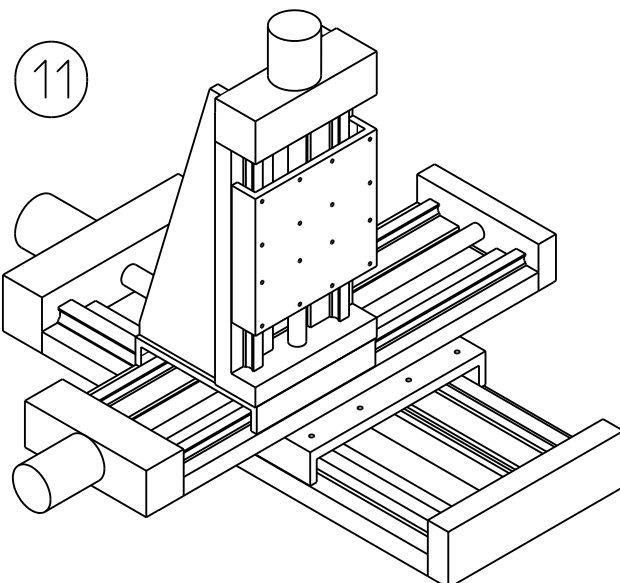
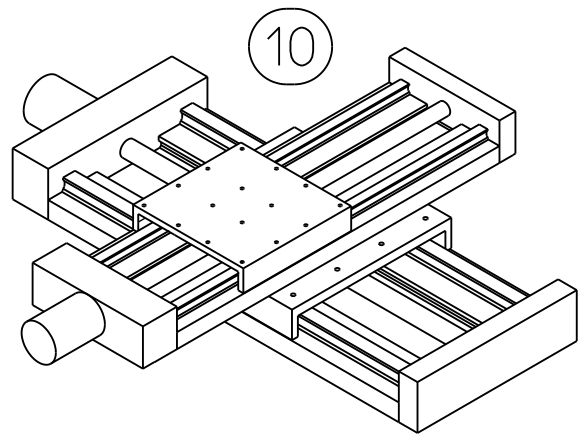
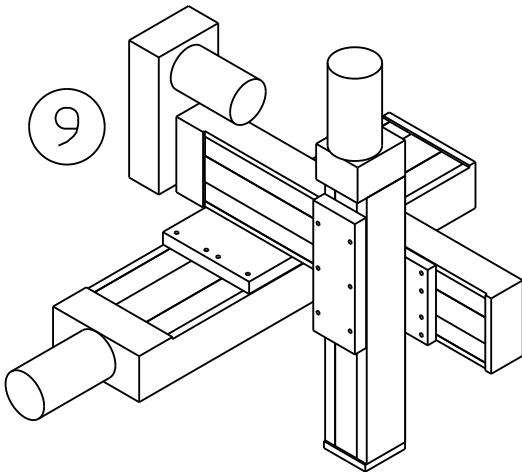
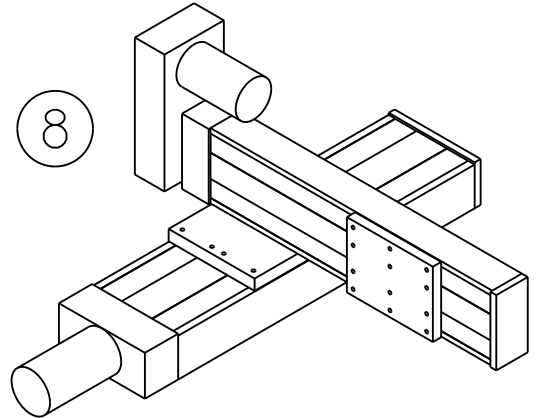
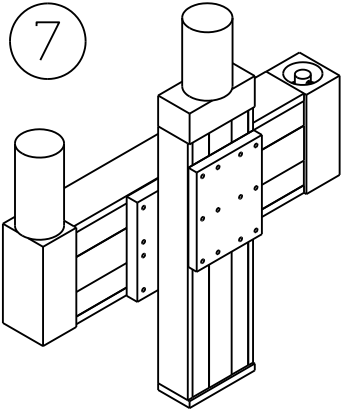
Linear

Examples of multi-axis systems

Type **HB-beta**[®]



Type **HB-alpha®** and **HB-delta®**



Mechanical Linear Drives



with spindle drive or toothed belt drive
with rail guide or roller guide

Compact Modules



with spindle drive or toothed belt drive
with rail guide

Linear Tables



with spindle drive
with rail guide

Portal Linear Drive



with rack-and-pinion drive or toothed belt drive
with rail guide

Portal Linear Drive



with toothed belt drive
with roller guide

Customised solutions

In accordance with customer requirements (e.g.: ex-protection according to Atex, corrosion-resistant, clean room compatible, toothed belt linear drive right/left, etc.) .

Handling systems

For the most varied of industries

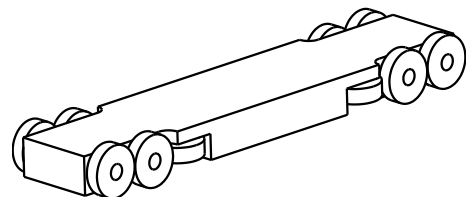
Accessories

Fixing parts, proximity switches, gears, motor mountings, couplings, belt drives with various gear ratios

Selection criteria for the guide system

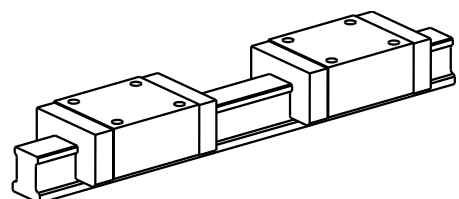
Roller guide

Smooth travel thanks to optimum rolling characteristics
Low noise thanks to quiet rolling
High moment acceptance thanks to optimum load transmission into profile
Large stroke lengths possible without a problem
Low maintenance due to long-life lubrication of rollers
Low-cost alternative to rail guide



Rail guide

High load capacity of guide
Longer service life
High level of guiding accuracy



Further information regarding the performance overview

All specifications refer to the standard configuration. The values given for special designs may deviate considerably. The loads specified are the maximum single loads possible for the entire system. If there are different loads (several different forces or moments), the single permissible loads are lower. There may be elastic deformations which will influence the level of accuracy. For mechanical linear drives with roller guides, the static load rating (C_{stat}) applies for static loads.

Repeat accuracy is defined as the ability of the mechanical linear drive to once again return to the same actual position under the same conditions. Conditions such as temperature, load, speed, deceleration and direction of travel may influence the repeat accuracy.

Mechanical Linear Drives with Screw Drive

For calculating service life, the guide and screw drive load ratings are used. Please contact us for further information. The idle torques refer to the respective standard configurations (not double nut or low-backlash single nut) and are measured at a very low speed ($\approx 0 \text{ min}^{-1}$). Production and assembly tolerances vary by $\pm 20 \%$.

The permissible deflection of the linear axis is 0.2 mm/m (1 mm maximum).

For special applications trapezoidal screw drives optional stand for disposal. When used, please ask our technical sales specialists and clarify the exact use.

Mechanical Linear Drives with Toothed Belt Drive

For calculating service life, the guide load ratings are used. Please contact us for further information.

The idle torques refer to the respective standard configurations and are measured at a very low speed ($\approx 0 \text{ min}^{-1}$). Production and assembly tolerances vary by $\pm 20\%$.

The specification for load F_x is the maximum value permitted for low speeds. Please contact us for the maximum value at higher speeds.

The permissible deflection of the linear axis is 0.5 mm/m (2.5 mm maximum).

It is generally recommended to change the toothed belt after 5 to 7 years, as the base material (PU) ages. A theoretical service life calculation is not possible.

Running performance and noise

Contingent on the production tolerances in the used components (e.g. screw or toothed belt drive, guide, mounting, etc.), the running behaviour and noise development for linear drives and linear tables can vary enormously even with the same units. Using customised solutions, such as for example longer spindle supports or damping, the running behaviour can be changed for the better.

Straightness and torsion

All aluminium profiles used for the linear devices and the linear tables are extruded profiles.

The straightness and torsion of these profiles may deviate as a result of the manufacturing process.

The permissible deviations in accordance with DIN 17615 are, however, generally far from exceeded.

However, it may be necessary to align the linear drives using suitable levelling elements or

fix them to a mounting surface machined with sufficient accuracy in order to achieve the desired guiding accuracy.

Better tolerances of 0.1 mm / 1000 mm can thus be achieved.

Stroke length

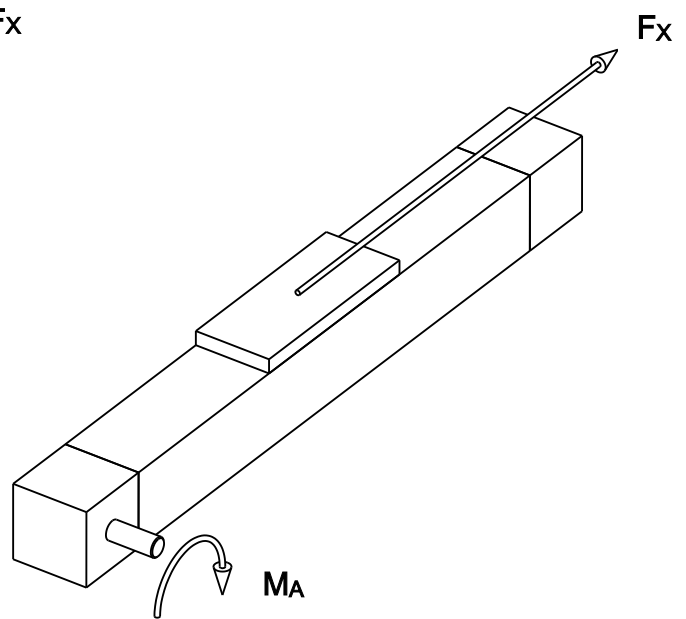
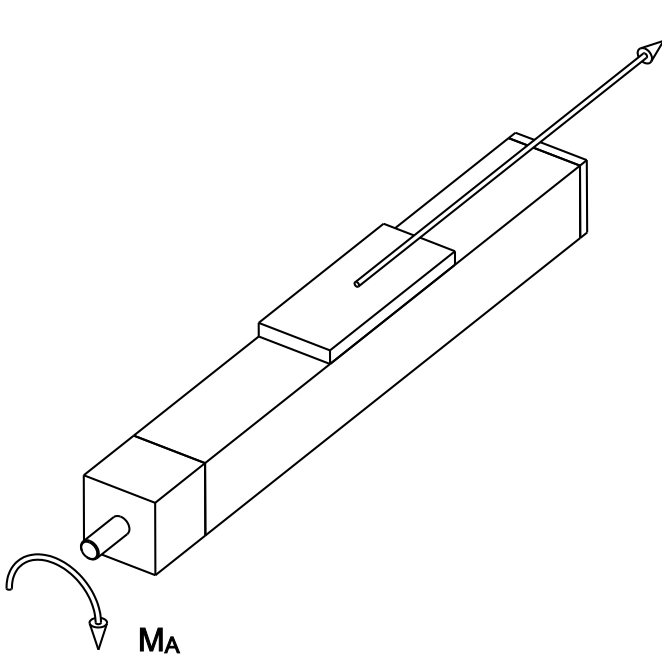
The stroke length specified in the ordering code refers to the maximum permissible stroke.

Acceleration-, braking distances or possible overrun must be taken into consideration here.

We reserve the right to make technical changes to all products!

Drive Dimensions for Mechanical Linear Drives

with screw drive or toothed belt drive



Required drive torque* M_A [Nm]:

$$M_A = M_{\text{load}} + M_{\text{idle}}$$

Definitions:

- M_A : Required drive torque [Nm]
 M_{load} : Load torque [Nm]
 M_{idle} : See data sheets [Nm]
 F_x : Feed force in horizontal application [N]
 Feed force in vertical application [N]

$$M_{\text{load}} = \frac{F_x \cdot p}{2 \cdot \pi \cdot 1000}$$

$$F_x = m \cdot g \cdot \mu + m \cdot a$$

$$F_x = m \cdot (g + a)$$

- | | | |
|---------|---|--------------------------|
| μ : | Friction coefficient for linear guide | $\mu = 0.05$ |
| | Friction coefficient for roller guide | $\mu = 0.02$ |
| | Friction coefficient for sliding guide | $\mu = 0.1$ |
| g : | Gravitational acceleration [m/s ²] | $g = 9.81 \text{ m/s}^2$ |
| a : | Acceleration [m/s ²] | |
| m : | Transport weight [kg] | |
| p : | Spindle pitch [mm] (screw drive) or stroke per revolution [mm] (toothed belt drive) | |

* (rough estimate)

Basics for Calculating the Forces and Moments

Forces (**F**) result if

a mass (**m**) being accelerated (**a**).

a mass (**m**) being accelerated due to gravity (**a**).

This means:

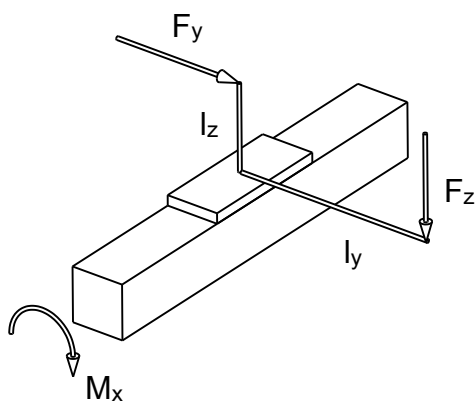
$$F_x, F_y = m \cdot a$$

$$F_z = m \cdot (g + a)$$

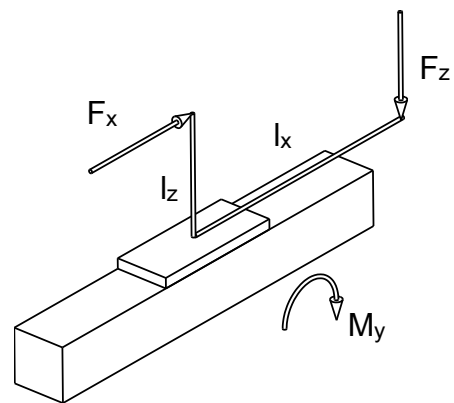
(vertical applications)

A moment is caused by a force (**F**) acting upon a lever arm (**l**).

This means a force is acting off-centre.

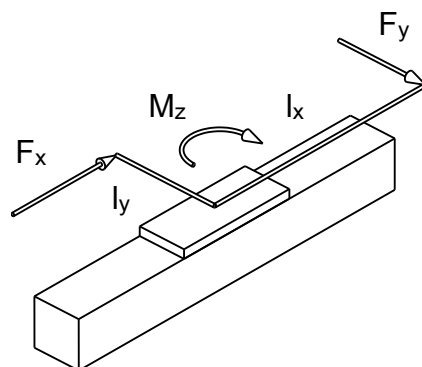


$$M_x = F_y \cdot l_z \text{ or } F_z \cdot l_y$$



$$M_y = F_x \cdot l_z$$

$$M_y = F_z \cdot l_x$$



$$M_z = F_x \cdot l_y$$

$$M_z = F_y \cdot l_x$$

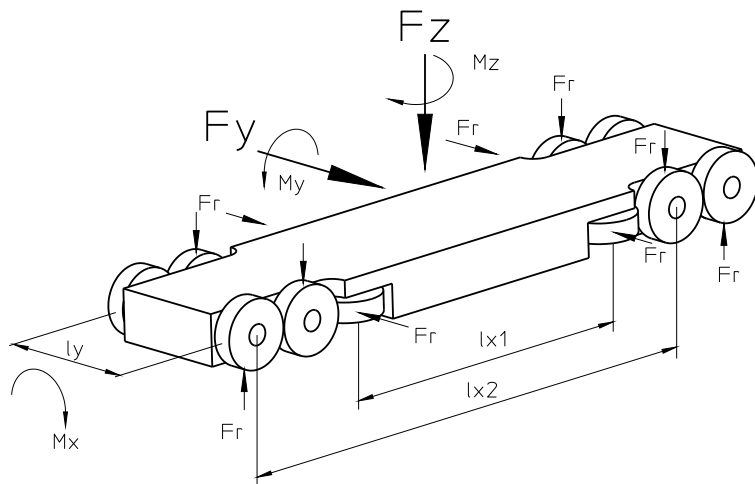
In most of the applications, there are combinations of these forces.

The resulting end forces must always be smaller than the permitted values.

For calculating service life, the actual forces are used.

(See following pages)

Forces at the roller guide



- F_x : Force in feed direction
- F_y : Force in Y direction
- F_z : Force in Z direction
- M_x : Moment for longitudinal axis (X)
- M_y : Moment for lateral axis (Y)
- M_z : Moment for vertical axis (Z)
- F_r : Force on the roller
- l_y : Guiding distance in y direction
(see Table on page T11)
- l_{x1} : Guiding distance in x direction
(see Table on page T11)
- l_{x2} : Guiding distance in x direction
(see Table on page T11)

Direction of force F_y

F_y shared by 2 rollers

$$F_r = F_y \cdot 0.5$$

Direction of force F_z

$+F_z$ and $-F_z$ shared by 4 rollers

$$F_r = F_z \cdot 0.25$$

Moment M_x

M_x shared by 2 rollers

$$F_r = M_x / l_y \cdot 0.5$$

Moment M_y

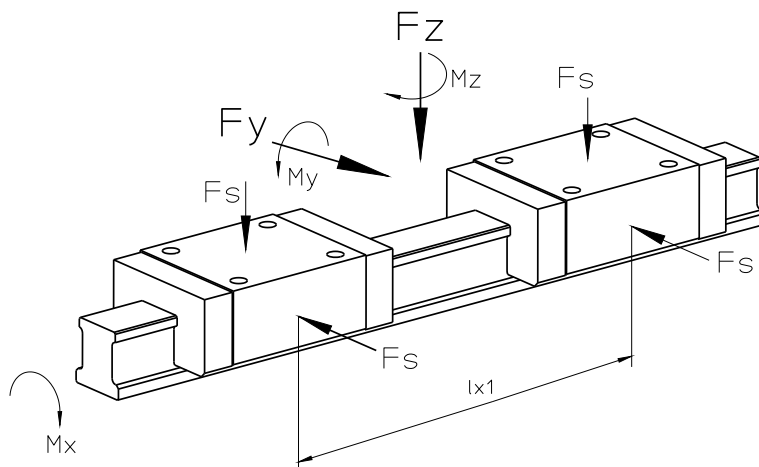
M_y shared by 2 rollers

$$F_r = M_y / l_{x2} \cdot 0.5$$

Moment M_z

M_z shared by 1 roller

$$F_r = M_z / l_{x1} \cdot 1$$



- F_x : Force in feed direction
- F_y : Force in Y direction
- F_z : Force in Z direction
- M_x : Moment for longitudinal axis (X)
- M_y : Moment for lateral axis (Y)
- M_z : Moment for vertical axis (Z)
- M_t : Permissible dynamic moment for the guide carriage
(see Table on page T12)
- C : Dynamic load rating (C_{dyn}) for the guide carriage
(see Table on page T12)
- F_s : Force on a carriage
- l_{x1} : Guiding distance in x direction
(see Table on page T12)

Direction of force F_y

F_y shared by 2 carriages

$$F_s = F_y \cdot 0.5$$

Direction of force F_z

F_z shared by 2 carriages

$$F_s = F_z \cdot 0.5$$

Moment M_x

M_x shared by 2 carriages
With combined external load (F_z and F_y)
in combination with a torsional moment

$$F_s = |F_z| + |F_y| + C \cdot (|M_x| / M_t) \cdot 0.5$$

Moment M_y

M_y shared by 2 carriages
(with opposite direction of force)

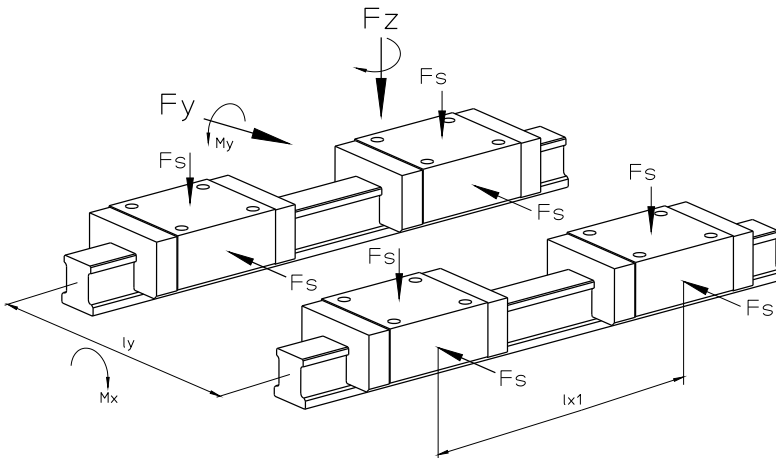
$$F_s = M_y / l_{x1} \cdot 1$$

Moment M_z

M_z shared by 2 carriages
(with opposite direction of force)

$$F_s = M_z / l_{x1} \cdot 1$$

Forces at the double rail guide



- F_x : Force in feed direction
- F_y : Force in Y direction
- F_z : Force in Z direction
- M_x : Moment for longitudinal axis (X)
- M_y : Moment for lateral axis (Y)
- M_z : Moment for vertical axis (Z)
- F_s : Force on a carriage
- l_y : Guiding distance in y direction
(see Table on page T12)
- l_{x1} : Guiding distance in x direction
(see Table on page T12)

Direction of force F_y

F_y shared by 4 carriages

$$F_s = F_y \cdot 0.25$$

Direction of force F_z

F_z shared by 4 carriages

$$F_s = F_z \cdot 0.25$$

Moment M_x

M_x shared by 4 carriages
(2 per opposite direction of force)

$$F_s = M_x / l_y \cdot 0.5$$

Moment M_y

M_y shared by 4 carriages
(2 per opposite direction of force)

$$F_s = M_y / l_{x1} \cdot 0.5$$

Moment M_z

M_z shared by 4 carriages
(2 per opposite direction of force)

$$F_s = M_z / l_{x1} \cdot 0.5$$

Service Life of Roller, Rail Guide and Ball Screw

It is primarily the guide values for the mechanical linear drive that are used when calculating nominal service life. The ball screw must also be taken into consideration for the drive with ball screw spindle. With the multitude of parameters crucial for the service life of the entire mechanical linear drive (forces and moments, taking into consideration directions and possible combinations, lead to a moderate load (F_m); ambient conditions, duty cycle...), the following simplified formulae only serve as an initial estimate.

1. Moderate load of the guide or ball screw

$$F_m = (F_1^3 \cdot q_1 / 100 + F_2^3 \cdot q_2 / 100 + F_n^3 \cdot q_n / 100)^{1/3}$$

2. Nominal service life of the roller guide

$$L = (C / F)^3 \cdot 10^5 \cdot R$$

$$F = F_m + F_v$$

3. Nominal service life of the sliding guide

$$L = (C / F)^3 \cdot 10^5$$

$$F = F_m + F_v$$

4. Nominal service life of the ball screw

$$L_{KGT} = (C_{KGT} / F)^3 \cdot 10^6$$

$$F = F_m + F_v \text{ (} F_v \text{ only with double nut (MM); approx. 10 \%)}$$

Definitions

F_m : Moderate load [N] of guide or ball screw

F_1, F_2, F_n : Stepped single load [N]

q_1, q_2, q_n : Stroke rate for F_1, F_2, F_n [%]

L : Nominal service life of guide [m]

C : Dynamic load rating of guide (C_{dyn}) [N] (see Table on pages T11 and T12)

R : Factor for roller guide size

Beta 50 ... Beta 80 + Sigma 70: $R = 0,625$; Beta 80-C + Sigma 90: $R = 0,75$;

Beta 100 + 110 + Sigma 120: $R = 0,87$;

Beta 120 + 140 + Sigma 160: $R = 1,1$;

Delta 90: $R = 0,595$ (Y) und $R = 0,625$ (Z)

F : Equivalent load [N] for guide or ball screw

F_v : Pretensioning [N] (3 % of C_{dyn} , 5 % for roller guide (see Table on pages T11 and T12)

L_{KGT} : Nominal service life of the ball screw [revolutions]

C_{KGT} : Dynamic load rating of the ball screw (C_{dyn}) [N] (see Table on page T13)

Technical Data for Mounted Guides

Static and dynamic load ratings of the roller guides

Unit size	Size ($\varnothing$) [mm]	Number of supporting rollers for Fz	Number of supporting rollers for Fy	Load rating per roller C _{stat} [N]	Load rating per roller C _{dyn} [N]	Guide distance* in direction x [mm]		Guide distance in direction y [mm]
						lx1	lx2	ly
Beta 50-C	20	4	2	600	1500	86 (136)	86 (136)	30.5
Beta 70-C	20	4	2	600	1500	74 (124)	138.5 (188)	41
Beta 80	20	4	2	600	1500	95 (155)	156.5 (216)	41.5
Beta 80-C	24	4	-	1240	2750	-	148.5 (208.5)	42
		-	2	2300	4200	75 (135)	-	-
Beta 80-C-ARS	24	4	-	1240	2750	-	208,5	42
		-	2	2300	4200	135	-	-
Beta 100	28	4	2	1300	3200	136 (256)	223 (343)	47
Beta 110	28	4	2	1300	3200	175 (355)	262 (424)	66
Beta 120	35	4	2	3000	6800	148 (328)	148 (328)	70
Beta 140	35	4	2	3000	6800	202 (352)	202 (389)	98
Beta 140-ARS	35	4	2	3000	6800	272	272	98
Delta 90	20	4	-	790	1830	-	100 (180)	54.5
	19	-	2	1370	2700	100 (180)	-	-
Sigma 70	20	4	4	790	1830	67 (117)	71 (121)	57
Sigma 90	24	4	4	1240	2750	76 (126)	99 (149)	77
Sigma 120	28	4	4	1300	3200	130 (260)	160 (290)	99
Sigma 160	35	4	4	3000	6800	145 (295)	177 (327)	135

The pretensioning per roller is approx. 5 %.

* () = Data for long entire carriage, Beta ARS and Sigma ARH

Technical Data for Mounted Guides

Dynamic load ratings of the rail guides (THK and Rex = Rexroth)

Unit size	Size	Number of rails	Number of guiding carriages per carriage	Load rating per carriage C _{dyn} [N] THK / Rex	Pretensioning F _v [N] THK / Rex	M _t [Nm] THK / Rex	Guide distance* in direction x [mm]	Guide distance in direction y [mm]
							lx1	ly
Beta 40	12	1	2	3175 / 2310	-	25 / 14	83 (163)	-
Beta 60	15	1	2	11271 / 9860	564 / 620	60 / 74	106 (156)	-
Beta 70-C	15	1	2	11271 / 9860	564 / 620	60 / 74	124 (174)	-
Beta 80	20	1	2	17700 / 23400	885 / 1500	210 / 240	128 (188)	-
Beta 80-C	25	1	2	25160 / 28600	1258 / 1820	340 / 320	122 (182)	-
Beta 80-C-ASS	25	1	2	25160 / 28600	1258 / 1820	340 / 320	172	-
Beta 100	20	1	2	17700 / 23400	885 / 1500	210 / 240	152 (272)	-
Beta 100-D-ZSS	15	2	4	11271 / 9860	564 / 620	-	150 (210)	56
Beta 100-D-ASS	15	2	4	11271 / 9860	564 / 620	-	192	56
Beta 100-D-SSS	15	2	4	11271 / 9860	564 / 620	-	150 (210)	56
Beta 110	25	1	2	25160 / 28600	1258 / 1820	340 / 320	203 (383)	-
Beta 120	25	1	2	25160 / 28600	1258 / 1820	340 / 320	144 (324)	-
Beta 120-C	30	1	2	35558 / 36500	1778 / 2540	580 / 540	184 (364)	-
Beta 140	15	2	4	11271 / 9860	564 / 620	-	180 (330)	72
Beta 140-ASS	15	2	4	11271 / 9860	564 / 620	-	242 (322)	72
Beta 140-C-ZSS	20	2	4	17700 / 23400	885 / 1500	-	220 (400)	76
Beta 140-C-ASS	20	2	4	17700 / 23400	885 / 1500	-	220 (300)	76
Beta 140-C-SSS	20	2	4	17700 / 23400	885 / 1500	-	210 (360)	76
Beta 165-ZSS	35	1	2	49448 / 51800	2472 / 3350	985 / 890	198 (398)	-
Beta 165-SSS	35	1	2	49448 / 51800	2472 / 3350	985 / 890	219 (329)	-
Beta 165-C-SSF	30L	2	4	43018 / 46000	2151 / 3200	-	280	128
Beta 180-ZSS	20	2	4	17700 / 23400	885 / 1500	-	172 (392)	84
Beta 180-ASS	20	2	4	17700 / 23400	885 / 1500	-	306	84
Beta 180-SSS	20	2	4	17700 / 23400	885 / 1500	-	247 (467)	84
Beta 180-C-ZSS	25	2	4	25160 / 28600	1258 / 1820	-	272 (492)	84
Beta 180-C-ASS	25	2	4	25160 / 28600	1258 / 1820	-	307	84
Beta 180-C-SSS	25	2	4	25160 / 28600	1258 / 1820	-	233 (453)	84
Delta 110-C	15	2	4	11271 / 9860	564 / 620	-	75 (195)	66
Delta 145-C	20	2	4	17700 / 23400	885 / 1500	-	87 (207)	87
Delta 200	25	2	4	25160 / 28600	1258 / 1820	-	144 (294)	126
Delta 240(-C)	25	2	4	25160 / 28600	1258 / 1820	-	200 (320)	150
Alpha 15B	15	2	4	11271 / 9860	564 / 620	-	94 (164)	105
Alpha 20B	20	2	4	17700 / 23400	885 / 1500	-	143 (243)	160
Alpha 30B	30	2	4	35558 / 36500	1778 / 2540	-	205 (335)	240
Alpha 35B	35L	2	4	57861 / 66700	2893 / 4450	-	286 (436)	340
Gamma 90-ZSS	15	2	4	11271 / 9860	564 / 620	-	135 (285)	73
Gamma 90-ZSSD	15	2	4	11271 / 9860	564 / 620	-	75	73
Gamma 90-ASH	15	2	4	11271 / 9860	564 / 620	-	265	73
Gamma 90-AZS.	15	2	4	11271 / 9860	564 / 620	-	255	90
Gamma 120-ZSS	20	2	4	17700 / 23400	885 / 1500	-	170 (320)	90
Gamma 120-ZSSD	20	2	4	17700 / 23400	885 / 1500	-	76	90
Gamma 120-ASH	20	2	4	17700 / 23400	885 / 1500	-	320	90
Gamma 120-AZS.	20	2	4	17700 / 23400	885 / 1500	-	320	115
Gamma 160-ZSS	25	2	4	25160 / 28600	1258 / 1820	-	208 (408)	120
Gamma 160-ZSSD	25	2	4	25160 / 28600	1258 / 1820	-	208 (408)	120
Gamma 160-ASH	25	2	4	25160 / 28600	1258 / 1820	-	408	120
Gamma 160-AZS.	25	2	4	25160 / 28600	1258 / 1820	-	408	151
Gamma 220-ZSS	25L	2	4	29208 / 37300	1460 / 2430	-	210 (390)	180
Gamma 220-ZSSD	25L	2	4	29208 / 37300	1460 / 2430	-	210 (390)	180
Gamma 220-ASS	25L	2	4	29208 / 37300	1460 / 2430	-	390	180

Technical Data for Mounted Ball Screws

Dynamic load ratings for ball screw

Unit size		Nominal $\varnothing$ in [mm]	Pitch in [mm]	C_{dyn} [N]
Beta 40 Beta 50-C	Delta 90	12	5 10	3800 4300
Beta 70-C	Delta 110-C	16	5 10 20 40	12800 14300 8100 8500
Beta 60 Beta 80 Beta 100-D	Delta 145-C	20	5 10 20 50	14600 13500 11500 12300
Beta 80-SGV Beta 110 Beta 140(-C)		25	5 10 25 50	16100 15100 15800 14500
Beta 110-C-SGV Beta 120-C Beta 180(-C)	Delta 200 Delta 240(-C)	32	5 10 20 40 60	26200 33100 30200 15200 14100
Beta 110-C-SGV Beta 165		40	5 10 20 40	34900 44900 45500 44400
Beta 165-C-SGV Beta 165-C-SSF		50	10 20	95600 90800
Alpha 15B		20	5 20	14600 13500 11500 12300
Alpha 20B		25	5 10 25	16100 15100 15800 14500
Alpha 30B		32	5 10 20 40	26200 33100 30200 15200
Alpha 35B		40	5 10 20 40	34900 44900 45500 44400

(Dynamic load rating for ball screw nut in accordance with DIN 69051, 1989)

Unit size	F _{Max} [N]	Stroke/revol. [mm]	M _{load} [Nm]	M _{idle} [Nm]	M _{total} [Nm]
Beta 40-Z..	500	100	7.96	0.30	8.26
Beta 40-S..	1000	10	1.59	0.40	1.99
Beta 50-C-ZRS	700	110	12.25	0.40	12.65
Beta 50-C-ARS	700	110	12.25	1.50	13.75
Beta 50-C-SRS	1000	10	1.59	0.30	1.89
Beta 60-ZSS	850	160	21.65	1.10	22.75
Beta 60-SGV-SSS	4000	50	31.83	0.70	32.53
Beta 70-C-Z..	1100	175	30.64	1.20	31.84
Beta 70-C-A..	900	220	31.51	1.00	32.51
Beta 70-C-S..	2000	40	12.73	0.40	13.13
Beta 80-Z..	1350	220	47.27	1.50	48.77
Beta 80-A..	1000	220	35.01	1.50	36.51
Beta 80-S..	4000	50	31.83	0.80	32.63
Beta 80-SGV	6000	50	47.75	1.00	48.75
Beta 80-C-Z..	2200	210	73.53	1.80	75.33
Beta 80-C-A..	1300	220	45.52	1.80	47.32
Beta 100-Z..	2800	200	89.13	2.50	91.63
Beta 100-D-ZSS	1500	160	38.20	5.00	43.20
Beta 100-D-ASS	2200	240	84.03	2.50	86.53
Beta 100-D-SSS	4000	50	31.83	1.30	33.13
Beta 110-Z..	4000	300	190.99	3.50	194.49
Beta 110-A..	2000	300	95.49	3.50	98.99
Beta 110-S..	6000	50	47.75	1.50	49.25
Beta 110-C-SGV (KGT 40xx)	16000	40	101.86	1.50	103.36
Beta 110-C-SGV (KGT 32xx)	12000	60	114.59	1.50	116.09
Beta 120-Z..	4000	240	152.79	3.20	155.99
Beta 120-C-ZSS	4800	300	229.18	4.50	233.68
Beta 120-C-SSS	12000	60	114.59	2.00	116.59
Beta 140-Z..	4000	220	140.06	3.50	143.56
Beta 140-A..	2500	240	95.49	3.50	98.99
Beta 140-S..	6000	50	47.75	1.50	49.25
Beta 140-C-ZSS	4000	220	140.06	3.50	143.56
Beta 140-C-ASS	2500	240	95.49	3.50	98.99
Beta 140-C-SSS	6000	50	47.75	1.50	49.25
Beta 165-ZSS	10000	450	716.20	12.00	728.20
Beta 165-SSS	18000	40	114.59	3.00	117.59
Beta 165-SGV	18000	40	114.59	3.00	117.59
Beta 165-C-SGV	25000	20	79.58	3.20	82.78
Beta 165-C-SSF	25000	20	79.58	3.20	82.78
Beta 180-ZSS	6000	320	305.58	8.00	313.58
Beta 180-ASS	3500	320	178.25	8.00	186.25
Beta 180-SSS	12000	60	114.59	2.50	117.09
Beta 180-AZSS	4500	320.5	229.54	10.00	239.54
Beta 180-C-ZSS	6000	320	305.58	8.00	313.58
Beta 180-C-ASS	3500	320	178.25	8.00	186.25
Beta 180-C-SSS	12000	60	114.59	2.50	117.09

Maximum Drive Torques

Unit size	F _{Max} [N]	Stroke/revol. [mm]	M _{load} [Nm]	M _{idle} [Nm]	M _{total} [Nm]
Delta 90-ZRS	800	100	12.73	2.00	14.73
Delta 90-SRS	1000	10	1.59	0.3	1.59
Delta 110-ZSS	750	90	10.74	1.6	10.74
Delta 110-C-ZSS	950	110	16.63	2.00	18.63
Delta 110-C-SSS	2000	40	12.73	1.00	13.73
Delta 145-C-ZSS	2000	150	47.75	3.00	50.75
Delta 145-C-SSS	6000	50	47.75	1.00	48.75
Delta 200-ZSS	6000	220	210.08	6.8	216.88
Delta 200-SSS	10000	60	95.49	2.8	95.49
Delta 240-ZSS	2500	150	59.68	5.5	59.68
Delta 240-SSS	12000	60	114.59	2.8	114.59
Delta 240-C-ZSS	3800	180	108.86	5.5	108.86
Delta 240-C-SSS	12000	60	114.59	2.8	114.59
Alpha 15-B-155	4000	50	31.83	0.35	31.83
Alpha 20-B-255	6000	50	47.75	1.2	47.75
Alpha 30-B-325	12000	40	76.39	1.6	76.39
Alpha 35-B-455	18000	40	114.59	2.5	114.59
Gamma 90-ZSS	2300	210	76.87	3.2	76.87
Gamma 90-ZSSD	1150	200	36.61	2.9	36.61
Gamma 90-ASH	2300	210	76.87	3.2	76.87
Gamma 90-AZ.. (i=5:1)	1800	24	6.88	2.5	6.88
Gamma 120-ZSS	2800	200	89.13	3.00	92.13
Gamma 120-ZSSD	1800	200	57.30	3.00	60.30
Gamma 120-ASH	3200	240	122.23	3.6	122.23
Gamma 120-AZ.. (i=5:1)	2200	40	14.01	4.8	14.01
Gamma 160-ZSS	4000	240	152.79	4.00	156.79
Gamma 160-ZSSD	2200	210	73.53	4.00	77.53
Gamma 160-ASH	4000	240	152.79	4.00	156.79
Gamma 160-AZ.. (D75 i=5:1)	2200	40	14.01	5.8	14.01
Gamma 160-AZ.. (D90 i=5:1)	4000	40	25.46	5.8	25.46
Gamma 220-ZSS	6000	320	305.58	7.00	312.58
Gamma 220-ZSSD	2800	240	106.95	5.25	106.95
Gamma 220-ASS	6000	320	305.58	7.00	312.58
Gamma 220-AZ.. (M2 D90 i=5:1)	4000	40	25.46	7.2	25.46
Gamma 220-AZ.. (M2 D115 i=5:1)	6000	40	38.20	7.2	38.20
Gamma 220-AZ.. (M3 D90 i=5:1)	4000	40	25.46	7.2	25.46
Gamma 220-AZ.. (M3 D115 i=5:1)	7500	40	47.75	7.2	47.75
Gamma 280-ZSS	10000	450	716.20	11.00	727.20
Gamma 280-ZSSD	4000	300	190.99	11.00	201.99
Gamma 280-AZSS (D90 i=5:1)	4000	40	25.46	8.6	25.46
Gamma 280-AZSS (D115 i=5:1)	7500	40	47.75	8.6	47.75

Unit size	F_{Max} [N]	Stroke/revol. [mm]	M_{load} [Nm]	M_{idle} [Nm]	M_{total} [Nm]
Sigma 70-ZRS	1050	125	20,89	0,85	21,74
Sigma 70-AR.	1050	125	20,89	0,85	21,74
Sigma 90-ZRS	1300	175	36,21	3,20	39,41
Sigma 90-ZRSD	650	175	18,10	3,20	21,30
Sigma 90-AR.	1300	150	31,04	2,30	33,34
Sigma 120-ZRS	2800	200	89,13	3,00	92,13
Sigma 120-ZRSD	1800	200	57,30	3,00	60,30
Sigma 120-AR.	3200	240	122,23	3,80	126,03
Sigma 160-ZRS	4000	240	152,79	4,00	156,79
Sigma 160-ZRS	2300	210	76,87	3,50	80,37
Sigma 160-AR.	4000	240	152,79	4,20	156,99

Maintenance

Maintenance instructions for THK and Rexroth rail guide

For all guide carriage sizes, the relubrication interval is approx. 5000 km for the carriage with ball chain or approx. 2000 km for the carriage without (Rexroth without ball chain / standard). It is dependent on several factors, i.e. operating temperature, load, degree of pollution, etc. Grease quantity depends on the guide carriage (see Table).

Size		12	15	20	25	30	35
Guide		THK					
Quantity	[cm ³]	0.14	0.4	0.6	1.2	1.5	1.7
Guide		Rexroth					
Quantity	[cm ³]	0.15	0.8	1.4	2.8	4.4	4.4

Klüberplex BE 31-102 is used for the initial lubrication. (When using other roller bearing greases, please take note of the manufacturer's instructions!) Roller bearing greases with a solid lubricant percentage (e.g. graphite or MoS₂) is not to be used.

Please refer here to our assembly and maintenance instructions.

Maintenance instructions for roller guide

Under normal operating conditions (dry environment, no dust, etc.), the roller guide is lubricated for life by integrated lubricating felts.

Maintenance instructions for ball screw

For ball screws, relubrication intervals depend on the pitch and the spindle diameter:

KGT 12xx to 32xx after approx. 2.5×10^7 overrolling movements

KGT 40xx and 50xx after approx. 1.5×10^7 overrolling movements

KGT-Type	[Size]	1205	1210	1605	1610	1620	1640	2005	2010	2020	2050	2505	2510	2525	2550
Quantity	[cm ³]	0,55	0,55	1,70	1,80	1,70	1,80	2,00	2,10	2,30	4,50	2,60	3,40	3,10	4,80

KGT-Type	[Size]	3205	3210	3220	3232	3240	3260	4005	4010	4020	4040	5010	5020
Quantity	[cm ³]	4,20	5,60	4,60	5,30	3,00	4,60	5,30	15,40	10,20	14,30	25,90	26,50

Klüberplex BE 31-102 is used for the initial lubrication. (When using other roller bearing greases, please take note of the manufacturer's instructions!) Roller bearing greases with a solid lubricant percentage (e.g. graphite or MoS₂) is not to be used.

In general, ball screw spindles should be protected against contamination. A cover band (standard) or a bellows can be used here.

Please refer here to our assembly and maintenance instructions.

Note: PRESSOL 12226 (125 cm³) one-hand grease gun with spout and corresponding coupler can be ordered from us.

Other maintenance instructions

The relubrication interval and the relubrication amount are generally influenced by many factors (e.g. speed, temperature, ambient conditions, etc.). For this reason, only reference values have been given here. Relubrication should take place at least every two years.

The relubrication should take place "in motion".

Note: The customer is required to carry out a basic lubrication after commissioning!

All mounted ball bearings are sealed and maintenance-free.

The toothed belt is also maintenance-free and must only be replaced if an excess load leads to the breakage or elongation of the elastic area.

Excessive dust and contamination on the toothed belt and at the cover band should be regularly removed.

Chapter K

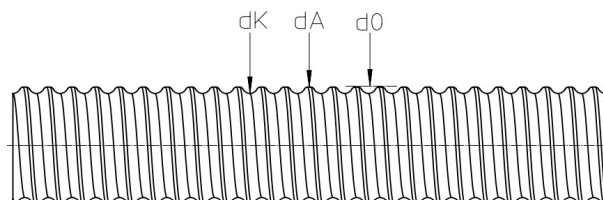
Ball Screws

HSB-kgt[®]



Rolled ball screw spindles

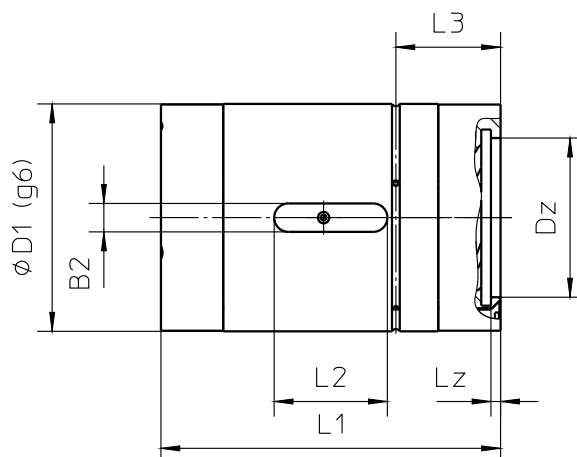
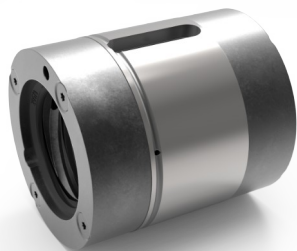
- Ball screw spindles from reputable manufacturers (some made specially for HSB)
- Small rotating parts ensure a high dynamic response and smooth running.
- Accuracy classes: Standard T7 (52 µm/300 mm), optionally T5 (23 µm/300 mm) (the most sizes)
- Standard length 5600 mm; jointed spindles for greater lengths available on request



Nominal Ø d0	Nominal pitch p	Outer Ø [0/-0,2] dA	Core Ø dK	Number of starts	Ball Ø Dw	Max. length	Specific weight	Cross section area	Minimum axial geometrical moment of inertia	Polar geometrical moment of inertia
[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg/m]	[mm²]	[mm⁴]	[mm⁴]
12 05		11.5	10.1	1	2.0	3000	0.76	96.4	689	1480
12 10		11.5	10.1	2	2.0	3000	0.75	96.1	659	1480
16 05		15.4	13.0	1	3.0	5600	1.25	161	2003	4117
16 10		15.4	13.0	2	3.0	5600	1.29	160	1691	4161
16 20		15.4	13.0	4	3.0	5600	1.24	159	2043	4086
16 40		15.0	12.6	4	3.0	5600	1.23	159	2038	4076
20 05		19.5	16.9	1	3.5	5600	2.05	261	5392	10825
20 10		19.5	16.9	2	3.5	5600	2.00	260	4607	10931
20 20		19.5	16.9	4	3.5	5600	2.16	259	5406	10812
20 50		19.1	16.5	5	3.5	5600	2.19	262	5522	11044
25 05		24.5	21.9	1	3.5	5600	3.81	425	14279	28715
25 10		24.5	22.0	2	3.5	5600	3.39	425	12665	28947
25 25		24.5	22.0	5	3.5	5600	3.44	423	14365	28730
25 50		24.1	21.5	5	3.5	5600	3.48	429	14765	29530
32 05		31.5	28.9	1	3.5	5600	5.73	717	40769	81806
32 10		31.5	29.0	2	3.5	5600	5.54	716	37052	81956
32 20		31.5	28.9	4	3.5	5600	5.81	716	40959	81918
32 40		30.9	28.3	4	3.5	5600	5.51	717	41035	82070
32 60		31.0	28.4	6	3.5	5600	5.66	721	41485	82970

Cylindrical ball screw nuts HSB (KGM-M)

- Uniform design; for each nominal diameter all nuts have the same outer diameter, drive key slots and centring
- Lubrication can be performed via the drive key and lubrication groove
- Newly developed ball recirculation cover with optimised recirculation geometry for high operating speeds
- Made of the best materials and to the highest precision for optimum running characteristics and high load ratings
- Double nut units (KGM-MM) with predefined pre-load (3 %, 5 % or 7 % of the dynamic load rating)

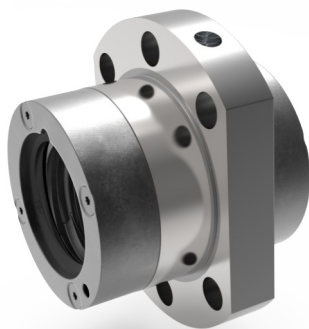


Nominal $\varnothing$	Pitch	Outer $\varnothing$ D1 [mm]	Overall length L1 [mm]	Lubrication groove L3 [mm]	Number of starts	Drive key slots			Centring		Load rating	
						B2 x	L2 x	T	Dz	Lz	stat. C0 [kN]	dyn. C [kN]
12	05	24	26	11	1	3	6	1.5	13.0	3	5.60	3.80
	10	24	26	10	2	3	6	1.5	13.0	1.2	6.80	4.30
16	05	28	34	12.6	1	5	10	2	17.5	1.5	16.90	10.50
	10	28	45	16.3	2	5	10	2	17.5	1.5	24.50	14.30
	20	28	34	14.0	4	5	10	2	17.5	1.5	13.00	8.10
	40	28	45	14.5	4	5	10	2	17.5	0.5	13.00	8.50
20	05	35	34	13.0	1	5	10	3	23.0	2.0	25.40	14.60
	10	35	34	13.0	2	5	10	3	23.0	1.6	23.40	13.50
	20	35	34	13.0	4	5	10	3	23.0	2.0	19.80	11.50
	20 (long)	35	54	15.0	4	5	20	3	23.0	2.0	46.60	23.90
	50	35	56	15.0	5	5	20	3	23.0	2.0	24.60	12.30
25	05	40	35	13.4	1	5	10	3	28.0	2.4	31.80	16.10
	05 (long)	40	45	13.4	1	5	20	3	28.0	2.4	49.00	23.30
	10	40	35	13.4	2	5	10	3	28.0	2.0	29.70	15.10
	10 (long)	40	45	13.4	2	5	20	3	28.0	2.0	46.80	22.30
	25	40	35	13.4	5	5	10	3	28.0	0.8	32.20	15.80
	25 (long)	40	60	19.0	5	5	20	3	28.0	0.8	75.10	32.70
	50	40	58	18.0	5	5	20	3	28.0	1.5	31.60	14.50
32	05	50	45	13.6	1	6	20	3	35.0	2.1	63.60	26.20
	10	50	60	17.2	2	6	20	3	35.0	2.0	83.80	33.10
	20	50	55	15.5	4	6	20	3	35.0	2.1	75.90	30.20
	40	50	50	13.6	4	6	20	3	35.0	2.1	35.20	15.20
	60	50	65	18.0	6	6	20	3	35.0	2.2	46.80	18.40

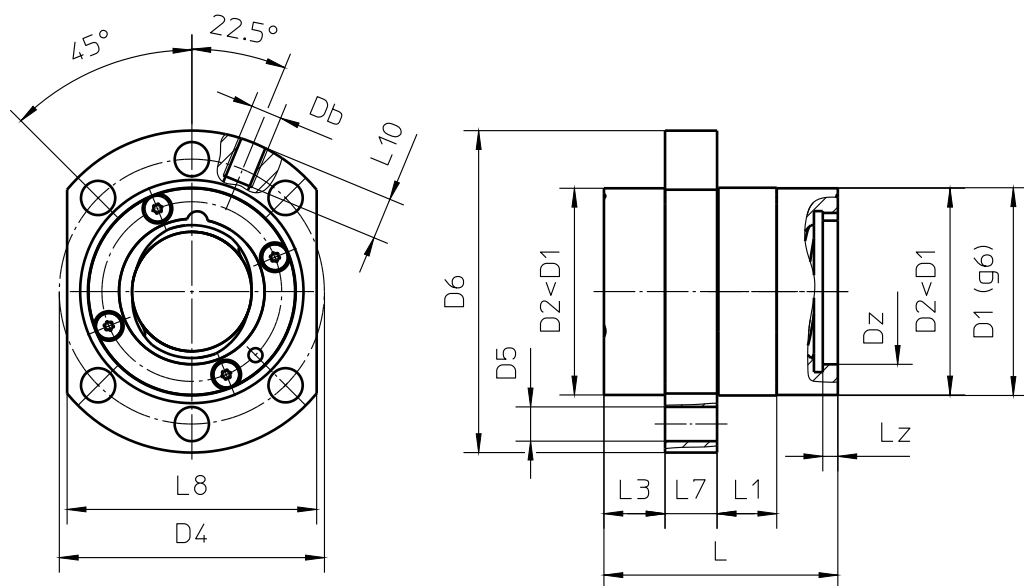
¹ To ISO 3408-5 (formerly DIN 69051-4)

Ball screw flanged nuts HSB (KGM-F) (to DIN 69051-5)

- All connection dimensions to DIN 69051, for easy adaptation
- Newly developed ball recirculation cover with optimised recirculation geometry for high operating speeds
- Made of the best materials and to the highest precision for optimum running characteristics and high load ratings
- Double nut units (KGM-FM) with predefined pre-load (3 %, 5 % or 7 % of the dynamic load rating)



Nominal Ø	Pitch	Outer ø D1 [mm]	Total length L [mm]	Number of Starts	Centring length L1 [mm]	Projection L3 [mm]	Flange thickness L7 [mm]	Width across flats L8 [mm]
12	05	24	26	1	2.75	8.63	6	26
	10	24	26	2	6.50	6.75	6	26
16	05	28	34	1	4.50	9.75	10	40
	10	32	45	2	13.45	10.75	10	40
	20	32	34	4	3.00	11.50	8	40
	40	32	45	4	10.00	10.00	10	40
20	05	36	34	1	4.75	10.63	8	44
	10	36	34	2	3.50	11.25	8	44
	20	36	34	4	3.00	11.50	8	44
	20 (long)	36	54	4	10.00	11.50	10	44
	50	36	56	5	10.00	12.00	10	44
25	05	40	35	1	2.75	11.13	10	48
	05 (long)	40	45	1	12.75	11.13	10	48
	10	40	35	2	3.50	11.75	8	48
	10 (long)	40	45	2	11.50	11.75	10	48
	25	40	35	5	3.00	11.00	10	48
	25 (long)	40	60	5	10.00	11.00	10	48
	50	40	58	5	10.00	13.00	10	48
32	05	50	45	1	10.25	11.38	12	62
	10	50	60	2	19.70	14.15	12	62
	20	50	55	4	17.00	13.50	12	62
	40	50	50	4	14.80	11.60	12	62
	60	50	65	6	15.00	13.50	12	62



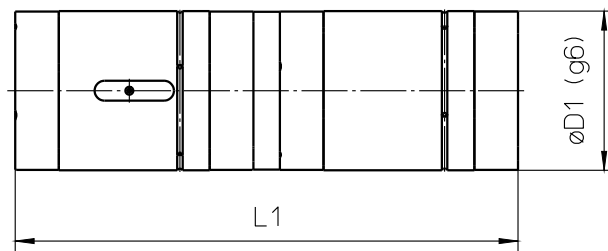
Hole depth L10 [mm]	Pitch circle ø D4 [mm]	Attachment hole D5 [mm]	Flange ø D6 [mm]	Hole ø D5	Centring		Load rating ¹	
					Dz	Lz	stat. C0 [kN]	dyn. C [kN]
-	32	4.5	40	-	13.0	3.0	5.60	3.80
-	32	4.5	40	-	13.0	1.2	6.80	4.30
8	38	5.5	52	M6	17.5	1.5	16.90	10.50
8	42	5.5	52	M6	17.5	1.5	24.50	14.30
8	42	5.5	52	M6	17.5	1.5	13.00	8.10
8	42	5.5	52	M6	17.5	0.5	13.00	8.50
8	47	6.6	58	M6	23.0	2.0	25.40	14.60
8	47	6.6	58	M6	23.0	1.6	23.40	13.50
8	47	6.6	58	M6	23.0	2.0	19.80	11.50
8	47	6.6	58	M6	23.0	2.0	46.60	23.90
8	47	6.6	58	M6	23.0	2.0	24.60	12.30
8	51	6.6	62	M6	28.0	2.4	31.80	16.10
8	51	6.6	62	M6	28.0	2.4	49.00	23.30
8	51	6.6	62	M6	28.0	2.0	29.70	15.10
8	51	6.6	62	M6	28.0	2.0	46.80	22.30
8	51	6.6	62	M6	28.0	0.8	32.20	15.80
8	51	6.6	62	M6	28.0	0.8	75.10	32.70
8	51	6.6	62	M6	28.0	1.5	31.60	14.50
10	65	9.0	80	M6	35.0	2.1	63.60	26.20
10	65	9.0	80	M6	35.0	2.0	83.80	33.10
10	65	9.0	80	M6	35.0	2.1	75.90	30.20
10	65	9.0	80	M6	35.0	2.1	35.20	15.20
10	65	9.0	80	M6	35.0	2.2	46.80	18.40

¹ To ISO 3408-5 (formerly DIN 69051-4)

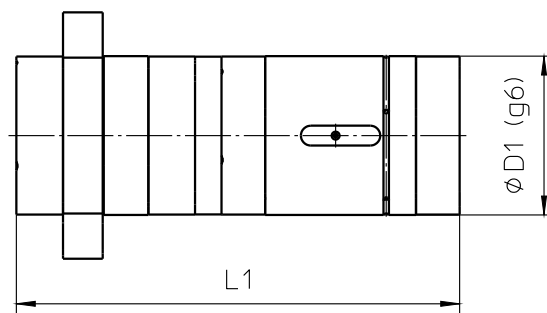
Double nuts HSB (KGM-MM and KGM-FM)

- Double nuts are made by a combination of 2 single nuts; either 2 cylindrical nuts (MM) or one flanged nut and one cylindrical nut (FM)
- The pre-load can be selected by the customer as 3 %, 5 % or 7 % of the dynamic load rating of the ball screw nut

• Cylindrical double nut KGM-MM



• Flanged double nut KGM-FM



Nominal Ø	Pitch	Outer ø D1 [mm]	Total length L1 [mm]	Number of Starts
16 05		28 / 32 *	74	1
10		28 / 32 *	96	2
20		28 / 32 *	74	4
20 05		35	73	1
10		35	73	2
20		35	73	4
20 (long)		35	113	4
25 05		40	77.5	1
05 (long)		40	97.5	1
10		40	77.5	2
10 (long)		40	97.5	2
25		40	77.5	5
25 (long)		40	127.5	5
32 05		50	95	1
10		50	125	2
20		50	115	4

The remaining technical data are the same as for single nuts.

* KGM-MM Ø 28
KGM-FM Ø 32

Standard end machining for floating bearings and fixed bearings

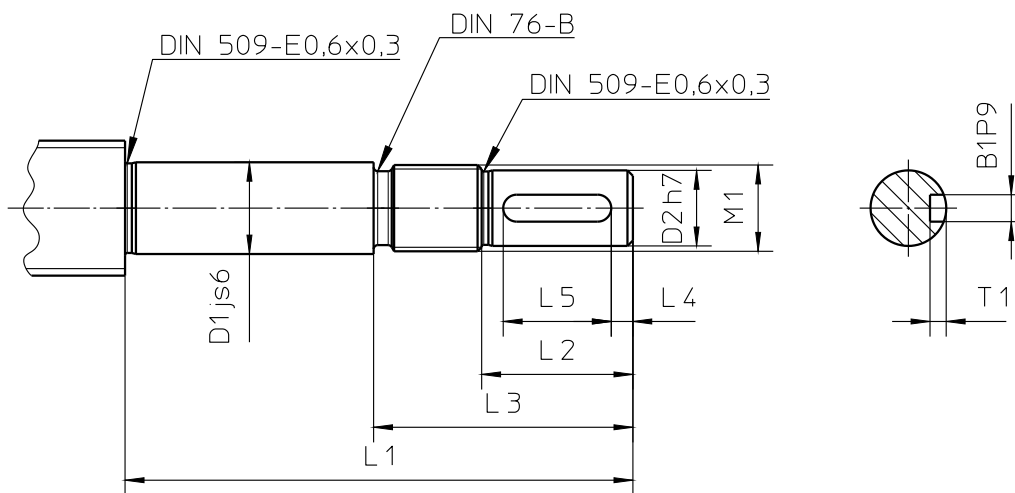
The bearing arrangement and hence also the spindle end is a significant factor for the quality of the ball screw. The applies particularly in respect of torsional vibration and buckling characteristics of the drive.

We list below our standard ends for our ball screws. In some cases these are turned directly on to the end of the ball screw spindle (form A); or if a larger spindle diameter is required are also bonded on using a modern high-strength adhesive process (form B).

Customer-specific shaft ends to the customer's drawing are available on request.

Standard spindle end Form A

Spindle end is annealed, shaft end is turned

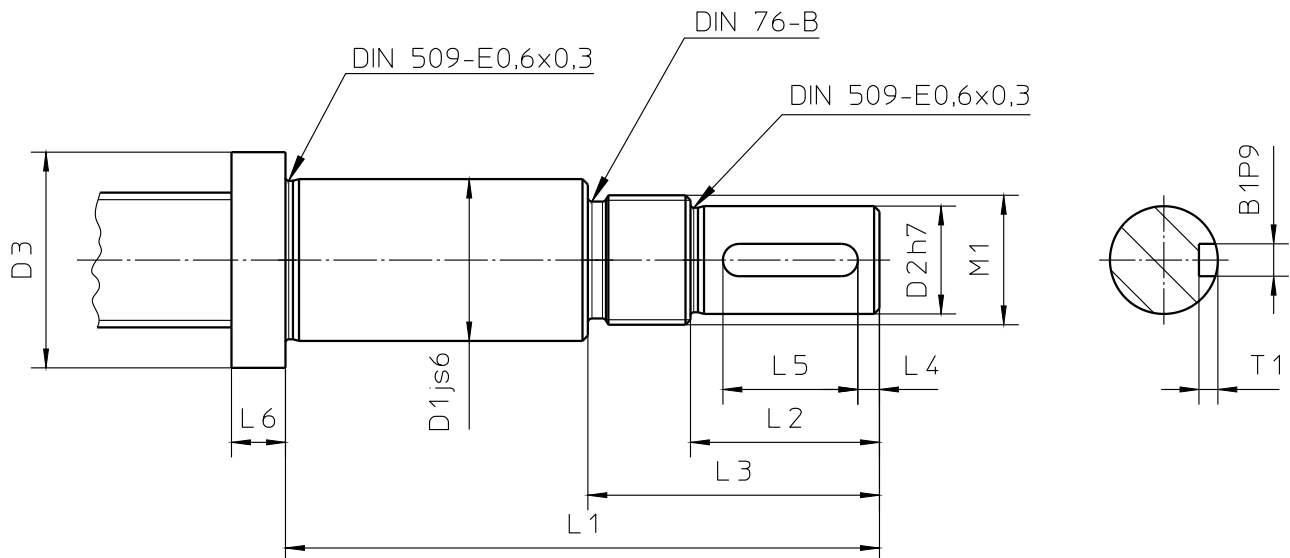


Spindle nominal diameter	D1 [mm]	D2 [mm]	M1	L1 [mm]	L2 [mm]	L3 [mm]	L4 [mm]	L5 [mm]	B1 [mm]	T1 [mm]
20	15	12	14x1.5	76	24	42	3	14	4	2.5
	15	12	14x1.5	78	24	41	3	14	4	2.5
	17	14	16x1.5	94	28	48	4	20	5	3
25	17	14	16x1.5	94	28	48	4	20	5	3
	20	16	18x1.5	104	30	50	4	20	5	3
32	25	20	24x1.5	110	33	52	4	25	6	3.5
	25	20	24x1.5	116	31	53	4	25	6	3.5

(shaft ends with non-standard parameters or to customer's drawing on request.)

Standard spindle end Form B

The spindle end is bonded to the spindle with a high-strength adhesive joint

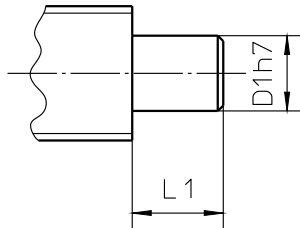


Spindle nominal diameter	D1 [mm]	D2 [mm]	D3 [mm]	M1	L1 [mm]	L2 [mm]	L3 [mm]	L4 [mm]	L5 [mm]	L6 [mm]	B1 [mm]	T1 [mm]
12 ²	10	8	14	10x1	67	20	32	3	14	3	2	1.2
16 ²	15	12	20	14x1.5	69	20	36	3	14	16	4	2.5
	25	14	28	24x1.5	89	30	50	4	20	4	5	3
20	25	16	32	24x1.5	104	30	50	4	20	12	5	3
25	30	20	40	24x1.5	110	35	54	4	25	10	6	3.5
32 ²	30	24	40	28x1.5	126	51	74	5	30	9	8	4
	40	24	50	35x1.5	134	41	67	5	30	12	8	4

² The stub end is machined prior to bonding to the spindle.

(shaft ends with non-standard parameters or to customer's drawing on request.)

Standard spindle end form C

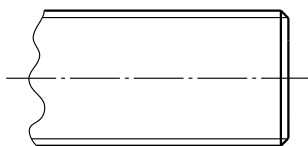


Spindle nominal diameter	D1 [mm]	L1 [mm]
12	5	7
16	8	9
20	12	9.5
	15	13
25	15	14
32	15	14
	25	17

(shaft ends with non-standard parameters or to customer's drawing on request.)

Standard spindle end form X

Separate and chamfered



Standard spindle end Form G

Spindle end separate and annealed

Ordering example:
KGT-FM - 2510 - RH - T7 - B120 - 1334 - G60 - V3 - 0
Product

KGT-M = ball screw with cylindrical single nut
 KGT-F = ball screw with flanged single nut
 KGT-MM = ball screw with cylindrical double nut
 KGT-FM = ball screw with flanged double nut
 KGM-M = cylindrical ball screw single nut
 KGM-F = flanged ball screw single nut
 KGM-M = cylindrical ball screw double nut
 KGM-FM = flanged ball screw double nut
 KGS = ball screw spindle

Nominal diameter [mm]
Nominal pitch [mm]
Pitch sense

RH = right-hand screw (standard)
 LH = left-hand screw (on request)

Pitch accuracy

T7 = 52 µm/300 mm (standard)
 T5 = 23 µm/300 mm (on request)

Spindle end fixed bearing

A, B, C = standard end (page K6 ff.)
 X = separate
 G = annealed
 K = to customer's drawing

Length of spindle end for fixed bearing
Overall length of the spindle
Spindle end floating bearing

A, B, C = standard end (page K6 ff.)
 X = separate
 G = annealed
 K = to customer's drawing

Length of spindle end for floating bearing
Play / pre-load ¹

S2 = standard play	pitch 5 mm and 10 mm	⇒ approx. 0.04 to 0.06 mm
	Pitch 20 mm and 25 mm	⇒ approx. 0.06 to 0.08 mm
	Pitch 40 mm and larger	⇒ approx. 0.08 to 0.15 mm
S1 = low play	pitch 5 mm and 10 mm	⇒ approx. 0.02 mm
	Pitch 20 mm and 25 mm	⇒ approx. 0.02 to 0.04 mm
	Pitch 40 mm and larger	⇒ approx. 0.03 to 0.08 mm
S0 = free of play	no free play, very small pre-load	
V3 = 3 % pre-load	(in relation to the dynamic load rating)	
V5 = 5 % pre-load		
V7 = 7 % pre-load		

Special version

0 = standard version
 1 = customer-specific version, after discussions with our sales staff
 (e.g. Pitch accuracy 23 µm/300 mm [T5] or similar)

¹ For single nuts without spindle (KGM-M, KGM-F) only standard play is available.

Chapter TK

Technology

Ball Screw

HSB-kgt[®]

General technical specification

Manufacturing processes

HSB ball screw spindles are made by the cold rolling process, then heat treated and polished.
HSB ball screw nuts are first machined in the soft condition, then heat treated and finish machined in a modern hard turning process. Both spindles and nuts are finished to a gothic arch profile. The ball contact angle is 45° (±5°).

Speeds

The generally permitted speed limit is 3000 rpm. On request, for certain sizes and installation situations, speeds up to 4500 rpm are permissible. The speed limits are the maximum speeds, achievable only under ideal operating conditions.

The critical speed must always be taken into account. The achievable speed is calculated as follows:

$$\frac{\text{Permissible speed} \cdot \text{Pitch}}{60000} \left[\frac{\text{m}}{\text{s}} \right]$$

Installed length

The installed length of a ball screws is generally freely selectable. Ball screws transmit only axial forces. All radial forces that arise must be accepted by external guides, otherwise they may cause the ball screw to fail prematurely.

Accuracy

HSB ball screw spindles are available in the following accuracy classes:

T5 = Pitch accuracy 23 µm/300 mm

T7 = Pitch accuracy 52 µm/300 mm

Unless specified otherwise, we supply class T7.

Self-locking

Due to their low rolling resistance, ball screws do not self-lock.

Therefore it is necessary, particularly when the ball screw shaft is mounted vertically, to employ a suitable motor with a restraining brake.

Efficiency

For trapezoidal screws, the mechanical efficiency is generally below 50 %;
for ball screws however it is up to 98 %.

Duty cycle

The ball screw is capable of maintaining a duty cycle of up to 100 %. It is best to avoid extremely high loadings in combination with high duty cycles.

Temperatures

All ball screws are designed for ambient temperatures from 0 °C to 80 °C. Temperatures of a minimum of -20 °C and maximum of 110 °C are also permissible for brief periods. Ball screws are subject to certain restrictions when used at temperatures below freezing. In addition, the specifications provided by the lubricant supplier must be complied with.

Positioning accuracy, repetition accuracy, backlash

Positioning accuracy is the maximum deviation between instructed position and actual position.

Repetition accuracy is defined as the capability of the system, under the same conditions, to return to a position it had previously taken up.

Backlash describes the “dead space” between the parts that are moved.

Aggressive operating conditions

Under very large amounts of dirt and/or fine dust/chips, the customer is advised to take measures to shield the ball screw.

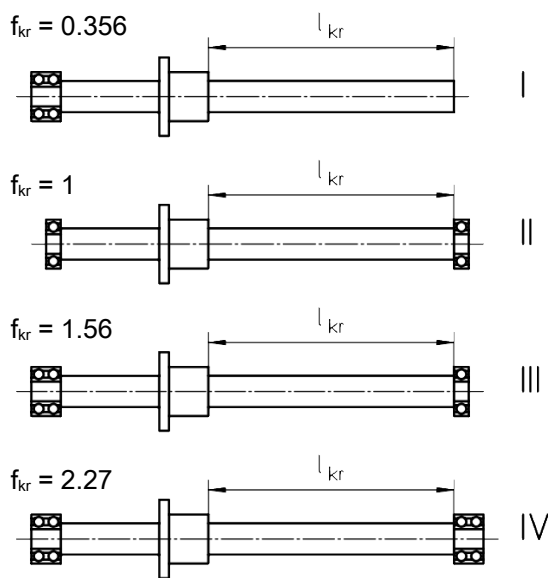
Technical Data

Ball screw spindle KGS

- Thread: Gothic arch profile
- Nominal diameter: 12 – 32 mm
- Pitch: 5 – 60 mm
- Number of starts: 1 – 6
- Direction of rotation: right-hand
- max. length: 5600 mm
- Material: 1.1213 (Cf 53)
- Bearing track induction hardened and polished
- Spindle end and spindle core are soft
- Straightness: L < 500 mm: 0.05 mm/m
L = 500 – 1000 mm: 0.08 mm/m
L > 1000 mm: 0.1 mm/m
- End machining: to customer's specification

Critical bending speed

Critical bending speed is the speed at which the forces of rotational imbalance initiate resonant vibration of the spindle. The cause of this imbalance is the sag of the ball screw spindle under its own weight. The critical bending speed is similar to the buckling load in that its value depends on the bearings of the ball screw spindle. For this purpose both the fixed bearing and also the floating bearing can be assumed to be rigid or non-rigid. These assignments yield 4 possible variants.



Critical speed:

$$n_{kr} = 1,08 \cdot 10^8 \cdot f_{kr} \cdot \frac{d}{l_{kr}^2}$$

wit $d = \frac{d_A + d_K}{2}$

n_{kr} [rpm]
 d, d_A, d_K [mm]
 L_{kr} [mm]

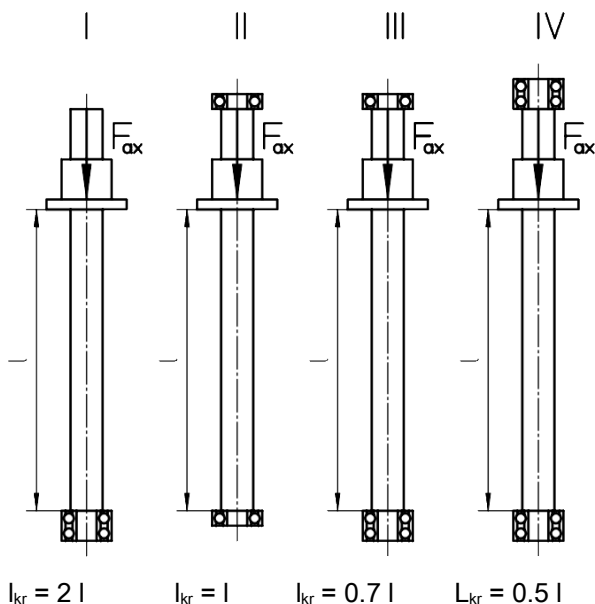
The permissible speed must not be greater than a maximum of 80 % of the critical speed.

Permissible speed:

$$n_{zul} = 0,8 \cdot n_{kr}$$

Critical buckling load

For slender components there is a risk of lateral buckling under axial forces. The procedure described below allows the permissible axial force to be determined for four different support bearing cases, using Euler's method. Allowance should always be made of machine-specific safety factors.



Critical buckling load:

$$F_{kr} = 1,017 \cdot 10^5 \cdot \frac{d_2^4}{l_{kr}^2}$$

F_{kr} [N]
 d_2 [mm]
 l_{kr} [mm]

Working life calculation

The nominal theoretical working life of a ball screw is calculated by a method similar to that for calculating the working life of a ball bearing. It should be noted that vibration and shock loads adversely affect the working life of the ball screw. Radial loadings are not permitted.

Average speed:

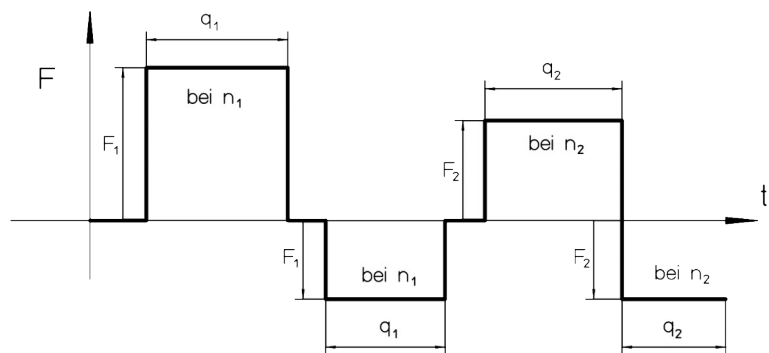
$$n_m = \frac{n_1 \cdot q_1 + n_2 \cdot q_2 + \dots + n_i \cdot q_i}{100}$$

n_m ... Average speed in [rpm]
 $n_1, n_2, \dots$ Speeds in [rpm] during the interval $q_1, q_2, \dots$
 $q_1, q_2, \dots$ Proportions of the duration of loaded operation in one direction of loading in [%]

Dynamic equivalent axial load:

$$F_m = \sqrt[3]{F_1^3 \cdot \frac{n_1 \cdot q_1}{n_m \cdot 100} + F_2^3 \cdot \frac{n_2 \cdot q_2}{n_m \cdot 100} + \dots + F_i^3 \cdot \frac{n_i \cdot q_i}{n_m \cdot 100}}$$

$F_1, F_2, \dots$ Axial loads in [N] in one direction of loading during the interval $q_1, q_2, \dots$
 F_m ... Dynamic equivalent axial load
 Since a ball screw can be loaded in either of two directions, F_m is first determined for each of the two directions of loading. The larger value is then used in the calculation of L .
 In general it is useful to create the following structure:



It should be remembered that a pre-load represents an ever-present additional load.

Theoretical working life:

$$L_{10} = \left(\frac{C}{F_m} \right)^3 \cdot 10^6$$

C ... Dynamic load rating
 Centrally applied load in [N], of unchangeable value and direction, for which a sufficiently large number of identical ball screws each achieves a nominal working life of 10^6 revolutions.

 L_{10} ... Working life of the ball screw. Expressed as the number of overrollings which are reached or exceeded by 90 % of a sufficiently large number of apparently identical ball screws before the first signs of material fatigue appear.

(Working life in metres: L_{10} multiplied by the pitch, divided by 1000)

Efficiency and torque

The efficiency depends on many operating influences, as well as the geometrical values. In practice therefore the actual values may vary by $\pm 5\%$ from the theoretically determined values.

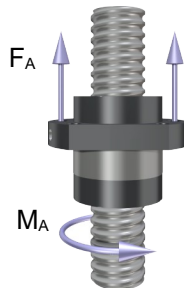
Conversion of a rotary movement into a longitudinal movement:

Efficiency η

$$\eta = \frac{\tan \phi}{\tan(\phi + \rho)} \quad \text{with} \quad \tan \phi = \frac{P_0}{d_0 \cdot \pi}$$

Drive torque M_A

$$M_A = \frac{F_A \cdot P_0}{2000 \cdot \pi \cdot \eta}$$



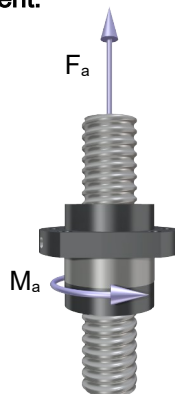
Conversion of a longitudinal movement into a rotary movement:

Efficiency η'

$$\eta' = \frac{\tan(\phi - \rho)}{\tan \phi} \quad \text{with} \quad \tan \phi = \frac{P_0}{d_0 \cdot \pi}$$

Output torque M_a

$$M_a = \frac{F_a \cdot P_0 \cdot \eta'}{2000 \cdot \pi}$$



η, η' ...	Efficiency of the ball screw	
ρ ...	Friction angle (0.34° for tolerance classes T5 + T7)	$[\circ]$
Φ ...	Pitch angle	$[\circ]$
P_0 ...	Nominal pitch of the ball screw	$[\text{mm}]$
d_0 ...	Nominal diameter of the ball screw	$[\text{mm}]$
M_A ...	Drive torque	$[\text{Nm}]$
M_a ...	Output torque	$[\text{Nm}]$
F_A ...	Result axial force	$[\text{N}]$
F_a ...	Effective axial force	$[\text{N}]$

Installation

The installation of ball screws demands technical knowledge and appropriate measuring equipment. Due to the low friction of a ball screw, alignment errors when turning the screw by hand are generally imperceptible. Forces acting radially or eccentrically must be taken up by the external guides. Ball screws can absorb only axial forces. In order to prevent damage to the ball screw, the machine must be provided with limit switches and end of travel dampers.

Cover

Any contamination that occurs during installation should be removed using kerosene, oil or benzine. Cold cleaning solvents and paint solvents are not permissible. Ball screws must be protected from dust, swarf and the like during operation, even if they are equipped with wipers.

Protective measures that can be taken are as follows:

- Bellows (if not equipped with an additional guide these are permissible only for vertical installations)
- Spiral spring cover
- Telescopic tubes or sleeves (large axial space requirement)

Our range also includes fully protected and ready-to-install systems:

- HSB-beta®, HSB-delta® and HSB-alpha® linear guides providing integral guidance within an encapsulated aluminium profile with covering strip or covering bellows. Please request our documents.

Lubrication

Correct lubrication is important in order that the ball screw achieves its calculated service life, to prevent excessive heating and to guarantee smooth, quiet running. KGT uses the same lubricants as are used for roller bearings.

Oil mist lubrication

If central lubrication using oil mist is in operation, make sure that only ball screw nuts without wipers are used.

Oil lubrication

The oil quantities that are supplied must not exceed the application losses at the wipers (otherwise the result is circulating oil lubrication).

Type of oil: Viscosity 25 to 100 mm²/s at 100 °C.

Grease lubrication

For ball screws, lubrication intervals depend on the pitch and the spindle diameter: Lubrication is determined by whether grease is emerging from the wipers (under normal operating conditions every $2.5 \cdot 10^7$ overrollings*). Because the grease does escape, we find by experience that a lifetime fill of lubrication is not sufficient.

Types of grease:

Roller bearing grease without any element of solid lubricant

The first filling must be with KLÜBERPLEX BE31-102 NLGI2 roller bearing grease to DIN 51818.

Detailed data on the amounts of grease and lubrication intervals can be found in the "Installation and Maintenance Manual" as well as on the Internet under www.hsb-automation.de.

* $\triangleq$ Revolutions of the spindle

KGT Type	Lubrication amount [ml]	
	Standard	Long
1205	0.6	-
1210	0.6	-
1605	1.7	-
1610	1.8	-
1620	1.7	-
1640	2.3	-
2005	2.0	-
2010	2.1	-
2020	2.3	4.5
2050	4.5	-
2505	2.6	3.9
2510	3.4	5.1
2525	3.1	5.4
2550	4.8	-
3205	4.2	-
3210	5.6	-
3220	4.6	-
3240	3.0	-
3260	3.9	-

Operating temperature

The permissible operating temperature range for ball screws is between 0 °C and +80 °C. A minimum temperature of -20 °C and a maximum temperature of +110 °C are permissible for brief periods. This always assumes lubrication has been carried out correctly.

At temperatures of -20 °C, the torque can increase by a factor of up to 10.

Technical data for the design of linear modules

Date: _____

Company: _____

Address: _____

Application: _____

Specification:

Transport weight [kg]: _____

Required stroke [mm]: _____

Installed length: ☐ horizontal ☐ vertical

Traversing speed [m/sec]: _____

Acceleration [m/sec²]: _____

Cycle time [sec]: _____

Cycles/min: _____

Repeat accuracy [$\pm$ mm]: _____

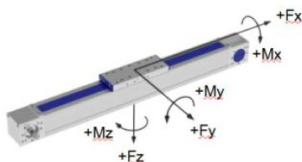
Carriage plate installation position:

☐ top ☐ bottom ☐ side

Lever arm length (catalogue: "Basic principles of determining forces and moments"):

lx [mm]: _____ ly [mm]: _____ lz [mm]: _____

Forces/moments:



Environmental influences: ☐ Dust ☐ Chips

Ambient temperature [°C]: _____

Humidity [%]: _____

Data recorded by: _____

Contact: _____

E-mail: _____

Phone: _____

Fax: _____

Sketch, where applicable:

Accessories:

Fastening:

☐ Sliding blocks (NS____) Number: _____
☐ Mounting bracket (BL____) Number: _____

Limit switch:

☐ mechanical, built-in (type EMB/EMS): Number: _____
☐ inductive, built-in EO2: Number: _____
☐ inductive, built-in EO10: Number: _____
☐ inductive, built-in ES2 Number: _____
☐ inductive, built-in ES10 Number: _____

Limit switch installation position
 (Catalogue: Ordering designations for limit switch items...and drive shafts):

	Page	Item a	Item b	Type	Cable side
Switch 1					
Switch 2					
Switch 3					
Switch 4					

Drive shafts:

☐ AZ1 ☐ AZ2 ☐ AZ6 ☐ Other

Motor mounting (type MGK): ☐ Yes* ☐ No

*Please attach motor dimension sheet

Motor coupling (type GS): ☐ Yes* ☐ No

*Motor diameter: _____

*Feather key: ☐ Yes ☐ No

Deflection belt drive: ☐ Yes* ☐ No

*Mounting position: _____ Gear ratio: _____

*Please attach motor dimension sheet.

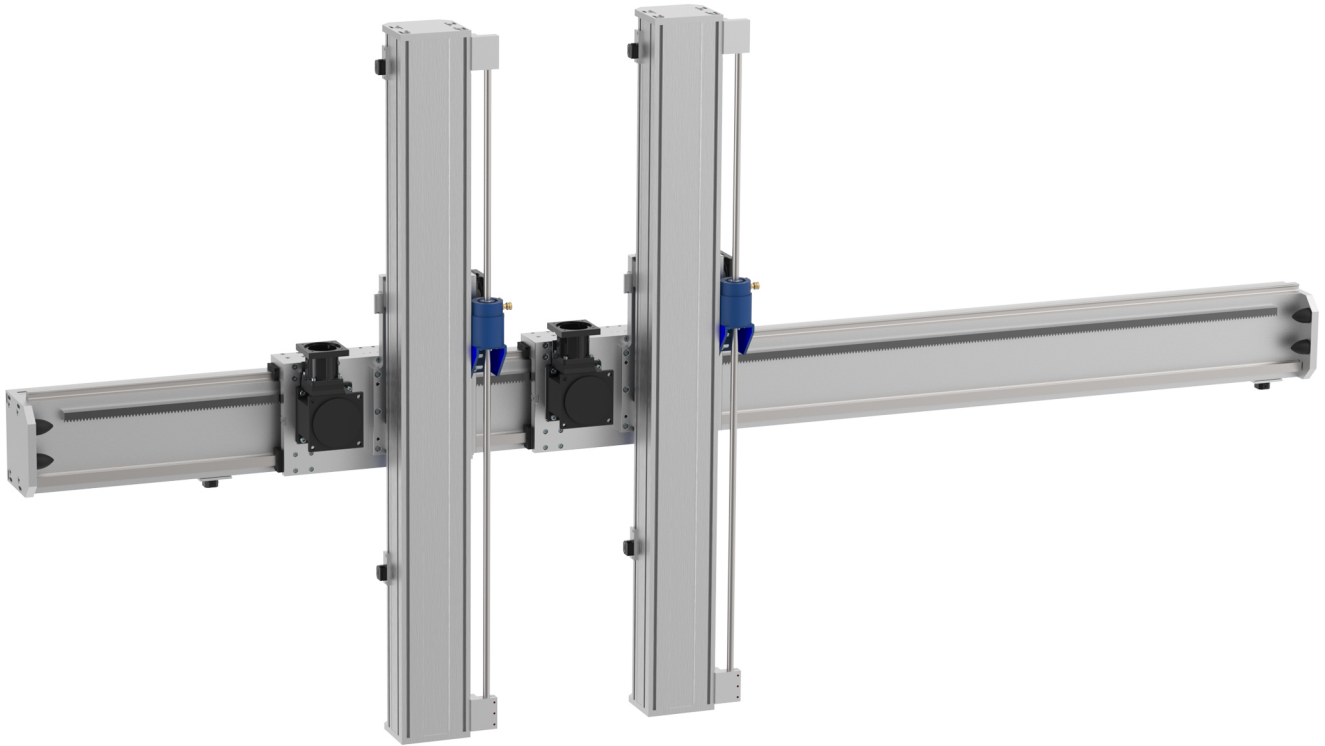
Bevel gear: ☐ Yes* ☐ No

*Gear ratio: _____

Joint shaft GX: ☐ Yes* ☐ No

* Centre distance: _____ mm between unit size: _____

Handling Systems



This 2-axis portal system consists of:

1x HSB-gamma® 280-AZSS and
2x HSB-gamma® 220-AZSH

You can find our worldwide sales on
our website www.hsb-automation.de



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