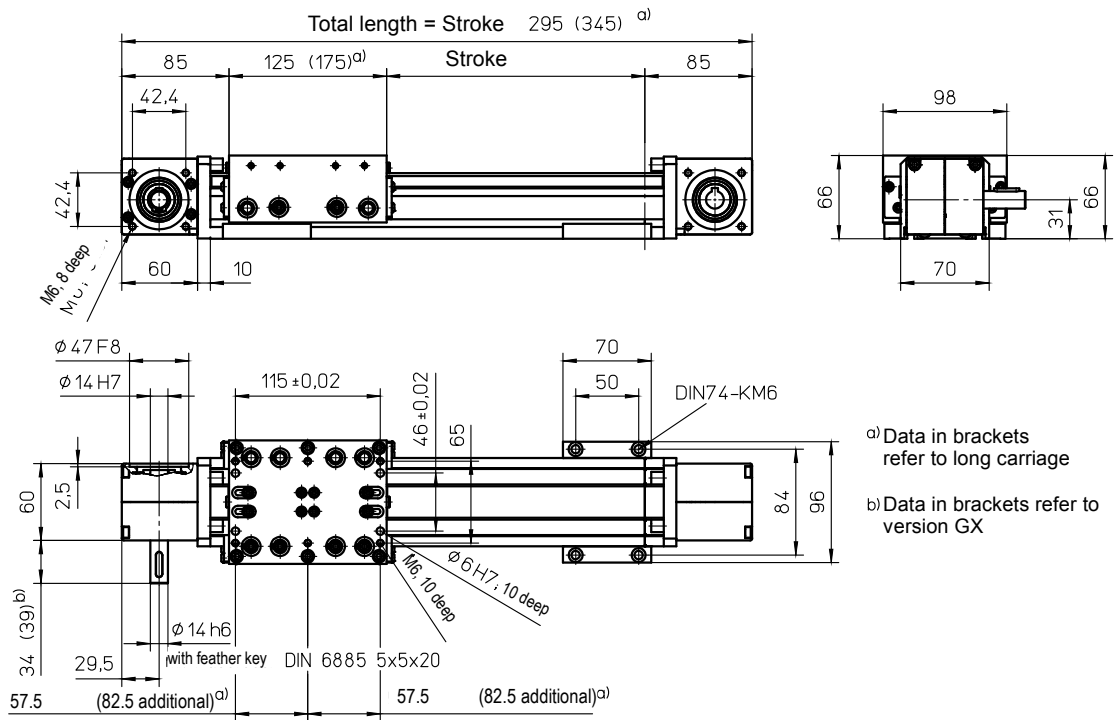


# Chapter S

Portal Linear Drive

**HSB**-sigma®

with toothed belt drive and roller guide (ZRS)



a) Data in brackets refer to long carriage

b) Data in brackets refer to version GX

## Weights

## ZRS

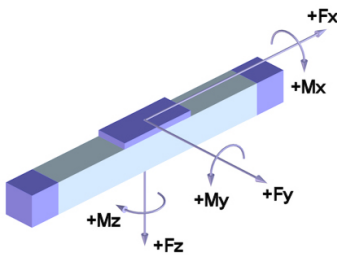
Basic length without stroke:	3.05 kg
100 mm stroke:	0.40 kg
Entire carriage 125 mm:	1.20 kg
Entire carriage 175 mm:	1.35 kg
Max. total length: (longer on request)	8100 mm

## Technical Data

## ZRS

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

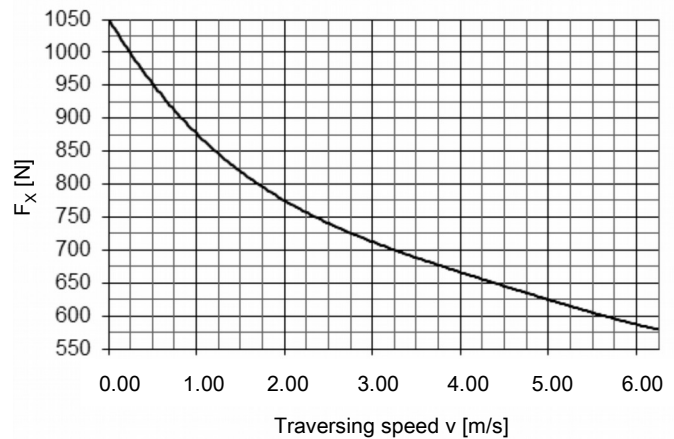
## Forces and moments



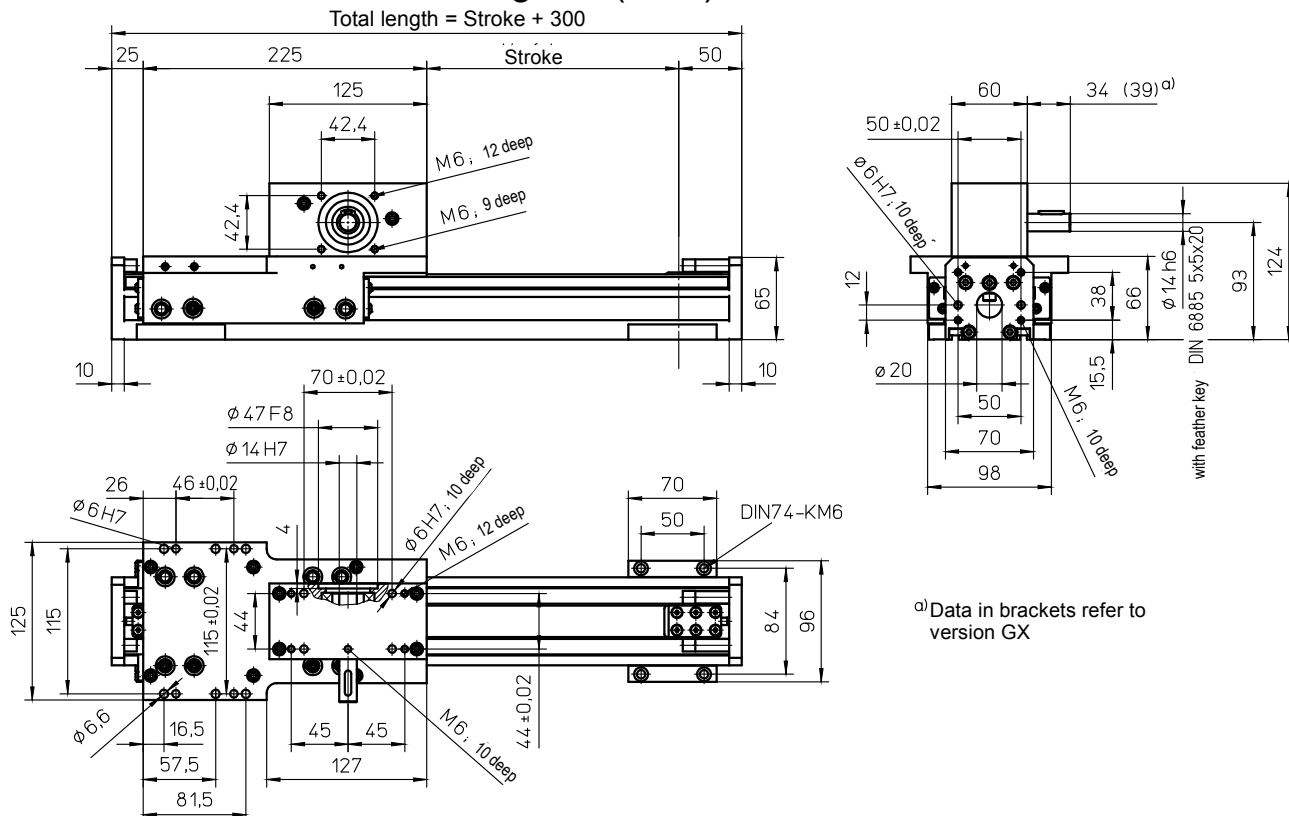
ZRS	
Forces	Dynamic [N]
$F_y^c)$	1050
$F_y$	1350
$F_z$	1850
$-F_z$	1200
Moments	Dynamic [Nm]
$M_x$	50
$M_y$	70 (120)
$M_z$	80 (110)

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

## $F_x$ - v - Diagram



with toothed belt drive and roller guide (ARH)



### Weights

### ARH

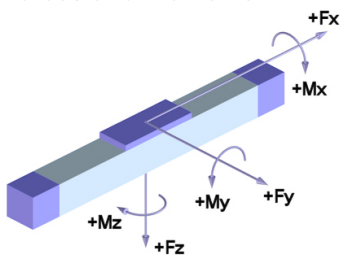
Basic length without stroke:	4.25 kg
100 mm stroke:	0.40 kg
Entire carriage 225 mm:	2.75 kg
Max. total length: (longer on request)	8000 mm

### Technical Data

### ARH

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

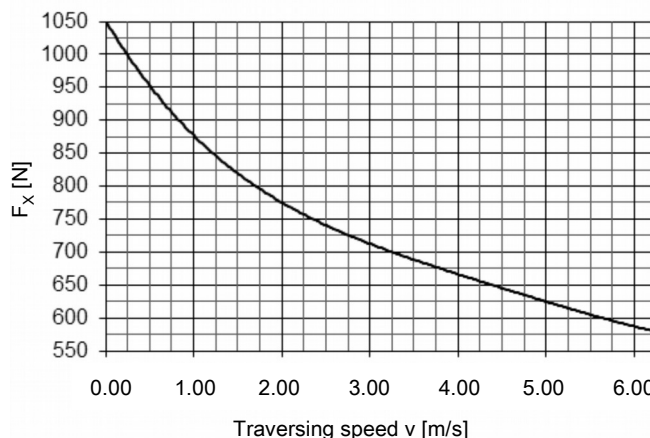
### Forces and moments



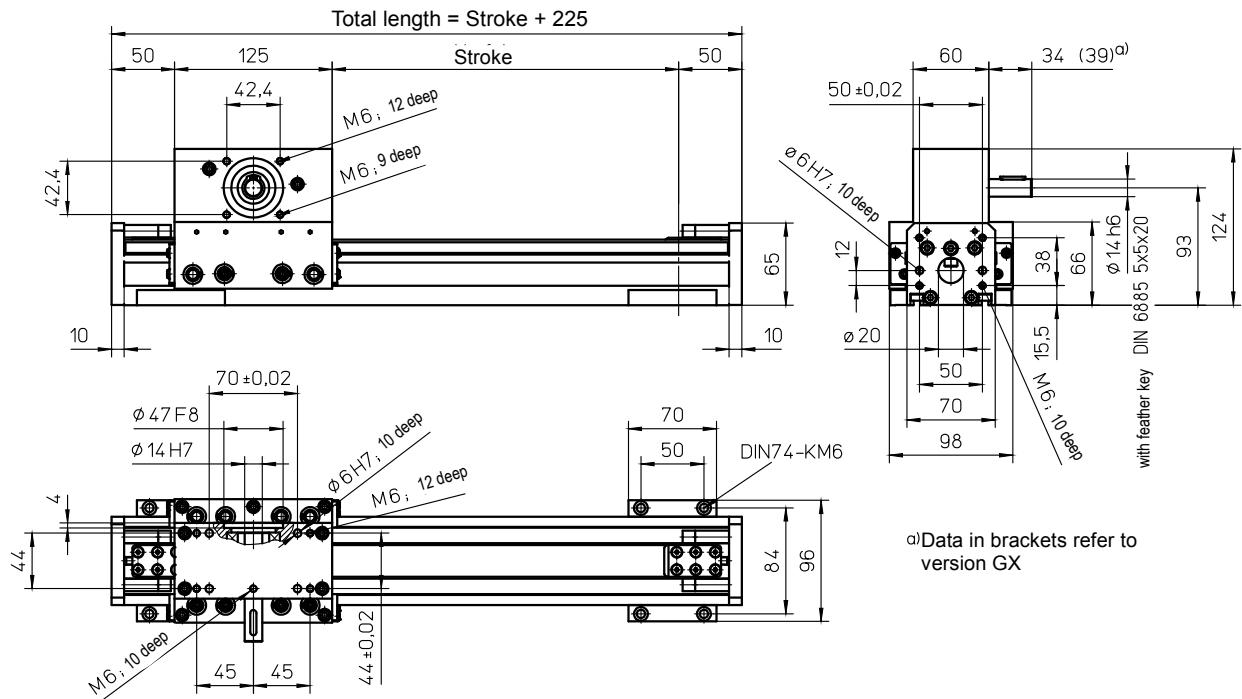
ARH	
Forces	Dynamic [N]
$F_v$ <sup>b)</sup>	1050
$F_y$	1350
$F_z$	1850
$-F_z$	1200
Moments	Dynamic [Nm]
$M_x$	50
$M_y$	120
$M_z$	110

<sup>b)</sup> Maximum value (see diagram „FX-v-Diagram“)

### $F_x$ - v - Diagram



with toothed belt drive and roller guide (ARS)



## Weights

## ARS

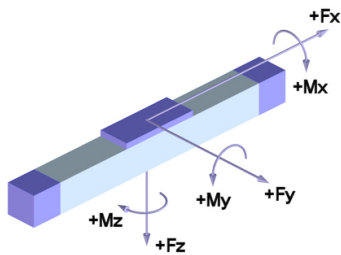
Basic length without stroke:	3.50 kg
100 mm stroke:	0.40 kg
Entire carriage 125 mm:	2.30 kg
Max. total length:	8000 mm
(longer on request)	

## Technical Data

## ARS

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

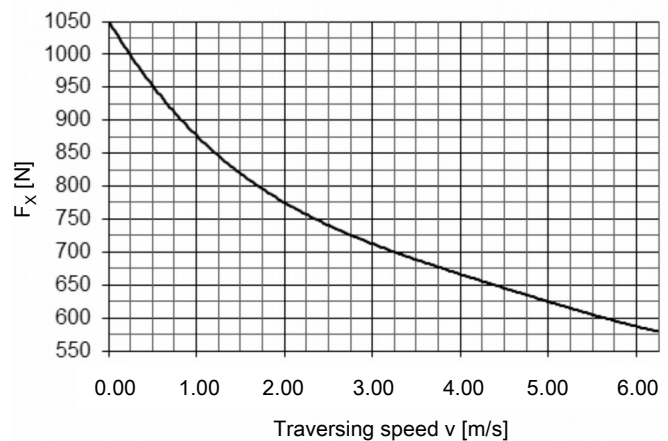
## Forces and moments



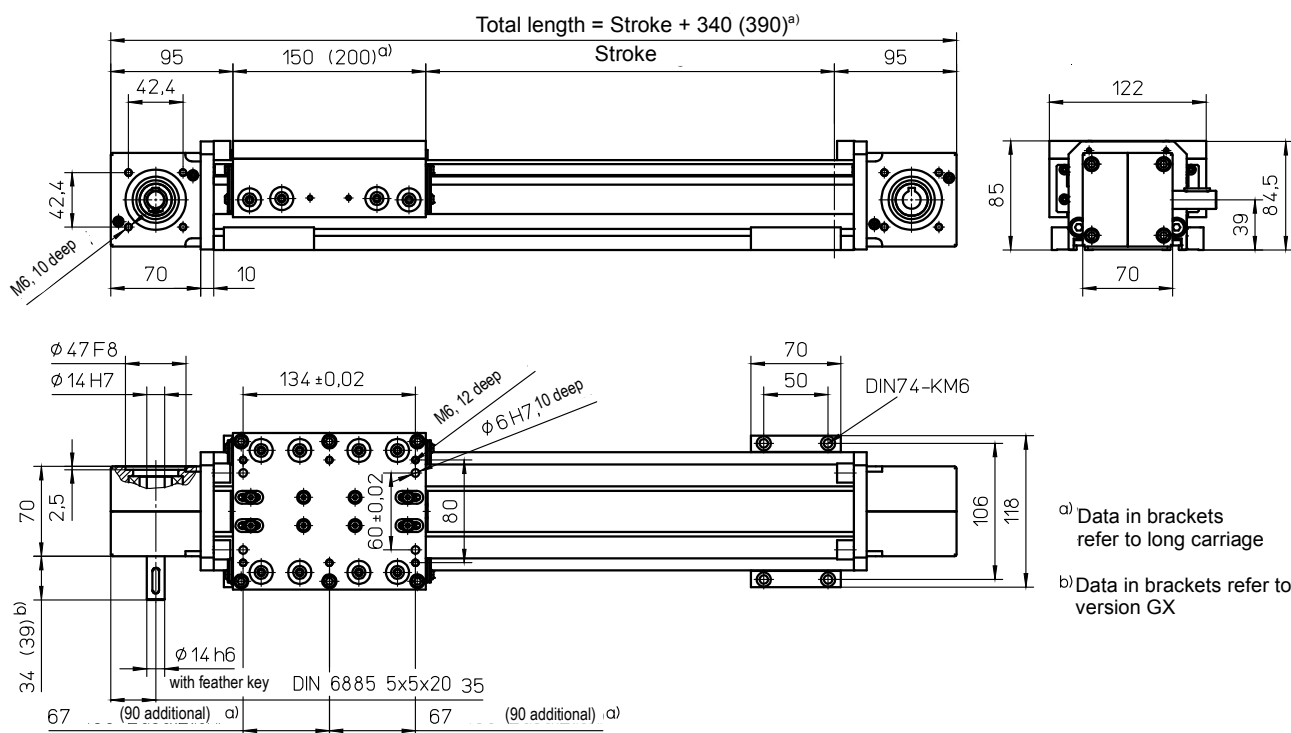
ARS	
Forces	Dynamic [N]
$F_x^{c)}$	1050
$F_y$	1350
$F_z$	1850
$-F_z$	1200
Moments	Dynamic [Nm]
$M_x$	50
$M_y$	70
$M_z$	80

<sup>c)</sup> Maximum value (see diagram „FX-v-Diagram“)

## $F_x$ - v - Diagram



with toothed belt drive and roller guide (ZRS)



## Weights

## ZRS

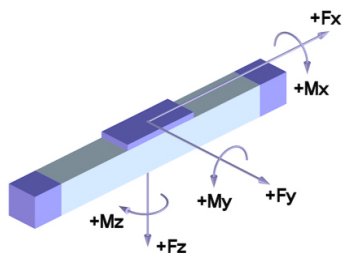
Basic length without stroke:	5.10 kg
100 mm stroke:	0.65 kg
Entire carriage 150 mm:	2.00 kg
Entire carriage 200 mm:	2.40 kg
Max. total length: (longer on request)	8100 mm

## Technical Data

## ZRS

Max. speed:	8.00 m/s
Max. acceleration:	60 m/s <sup>2</sup>
Repeat accuracy:	±0.08 mm
Idle torque:	3.20 Nm
Moment of inertia:	2.10 · 10 <sup>-3</sup> kgm <sup>2</sup>
Drive element:	Toothed belt <b>32 AT5-E</b>
Stroke per revolution:	175 mm

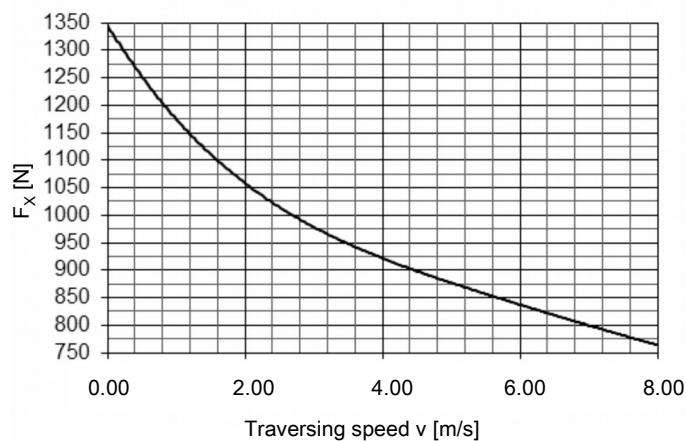
## Forces and moments



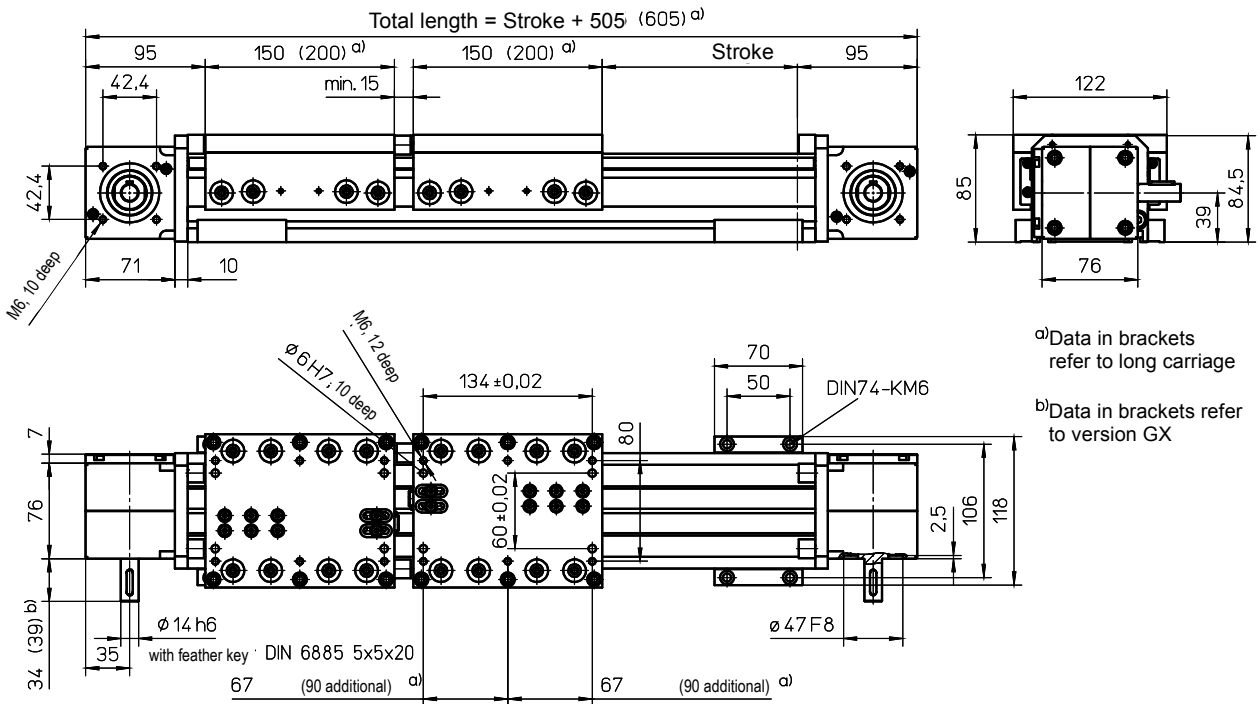
ZRS	
Forces	Dynamic [N]
$F_x$ <sup>c)</sup>	1300
$F_y$	2000
$F_z$	2500
$-F_z$	1500
Moments	Dynamic [Nm]
$M_x$	120
$M_y$	160 (230)
$M_z$	150 (200)

<sup>c)</sup> Maximum value (see diagram „ $F_x$ -v-Diagram“)  
Data in brackets refer to long carriage (200)

## $F_x$ - v - Diagram



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



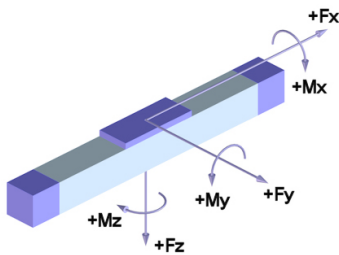
### Weights

	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

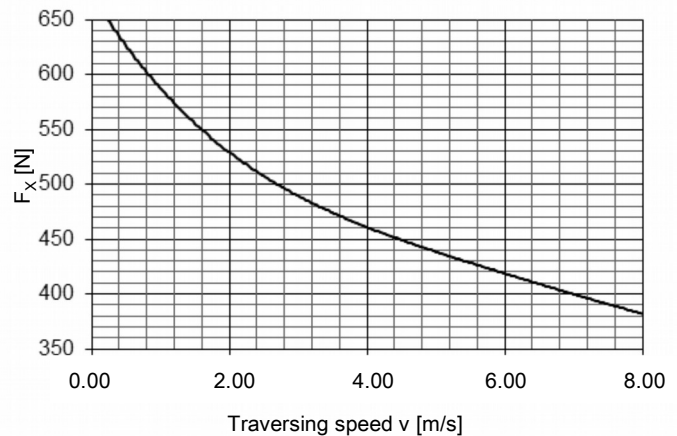
	ZRSD
Max. speed:	8.00 m/s
Max. acceleration:	60 m/s <sup>2</sup>
Repeat accuracy:	±0.08 mm
Idle torque:	3.20 Nm
Moment of inertia:	1.70 · 10 <sup>-3</sup> kgm <sup>2</sup>
Drive element:	2 x Toothed belt <b>16 AT5-E</b>
Stroke per revolution:	175 mm

### Forces and moments



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

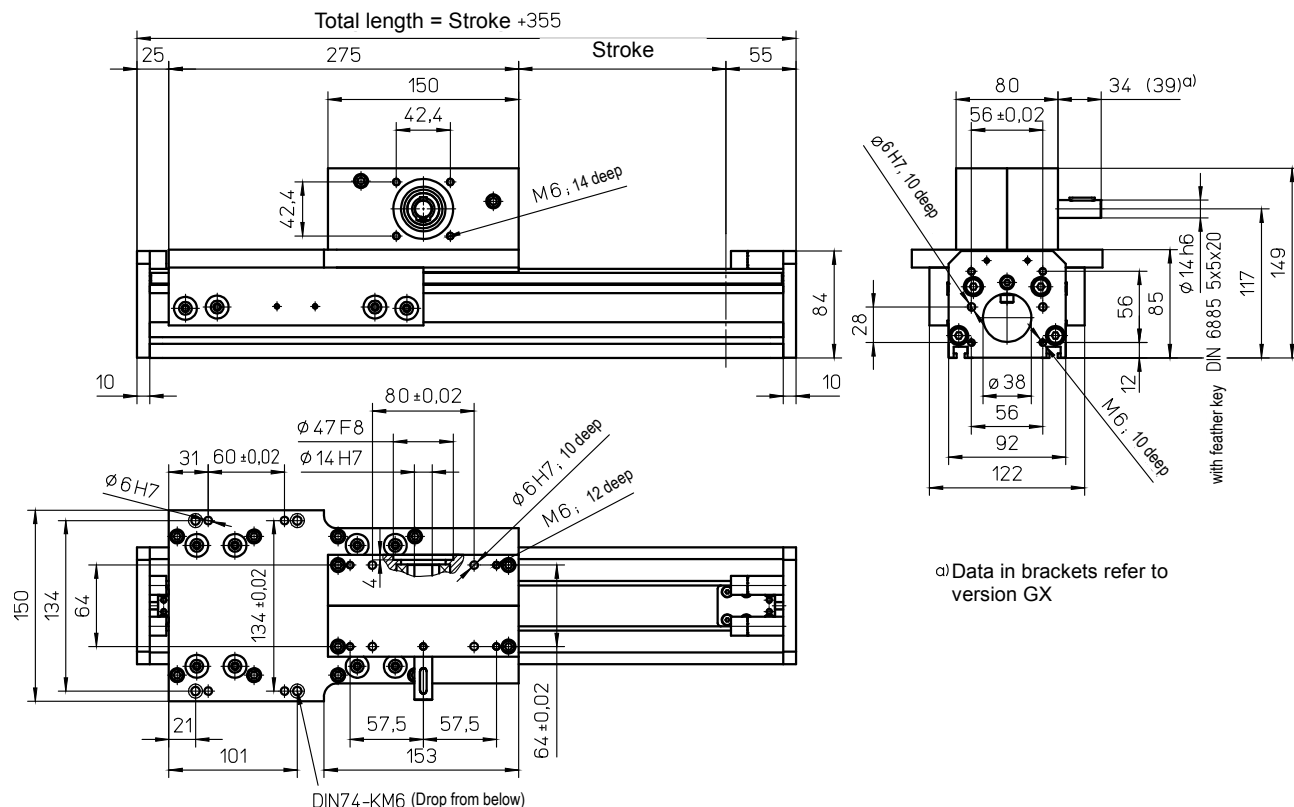
### $F_x$ - v - Diagram



<sup>c)</sup> Maximum value (see diagram „ $F_x$ -v-Diagram“)  
Data in brackets refer to long carriage (200)

These data apply to each carriage.

with toothed belt drive and roller guide (ARH)



## Weights

## ARH

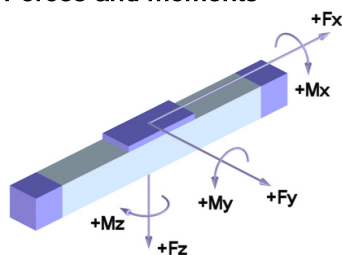
Basic length without stroke:	7.20 kg
100 mm stroke:	0.64 kg
Entire carriage 275 mm:	4.45 kg
Max. total length: (longer on request)	8000 mm

## Technical Data

## ARH

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

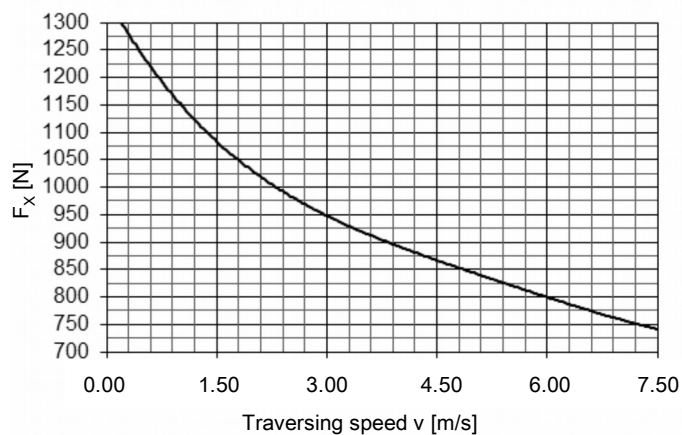
## Forces and moments



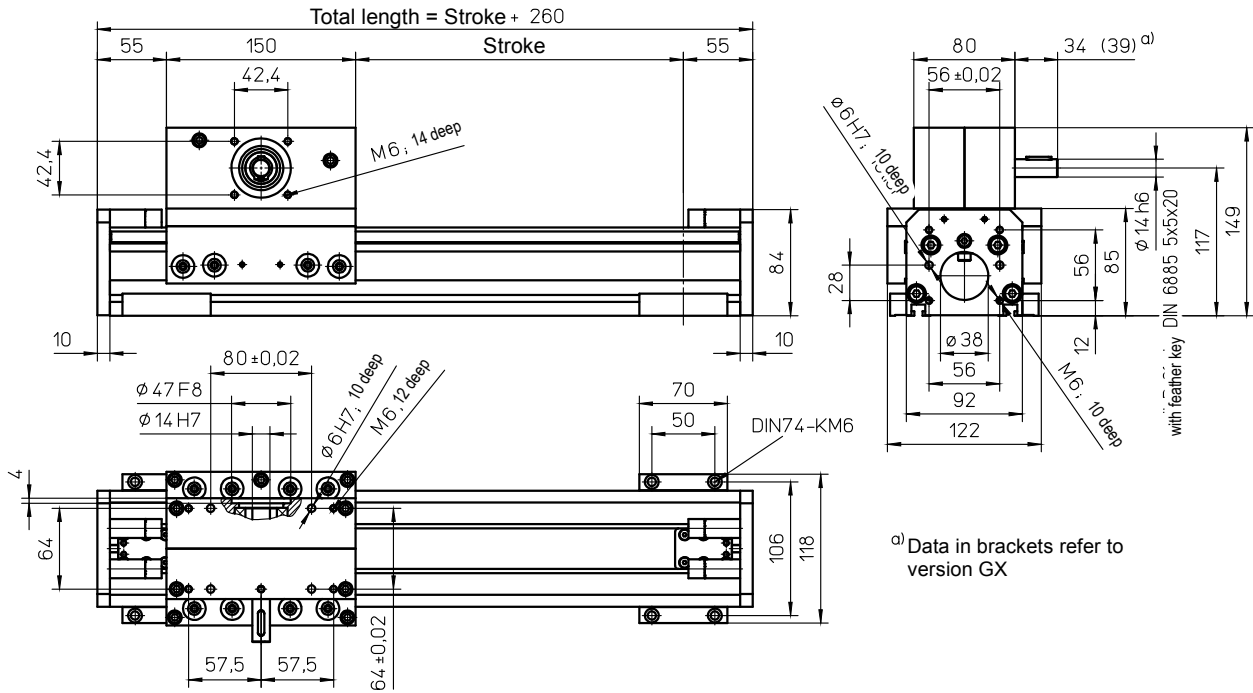
ARH	
<b>Forces</b>	Dynamic [N]
$F_x^{b)}$	1300
$F_y$	2000
$F_z$	2500
$-F_z$	1500
<b>Moments</b>	Dynamic [Nm]
$M_x$	120
$M_y$	230
$M_z$	200

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

## $F_x$ - v - Diagram



with toothed belt drive and roller guide (ARS)



## Weights

## ARS

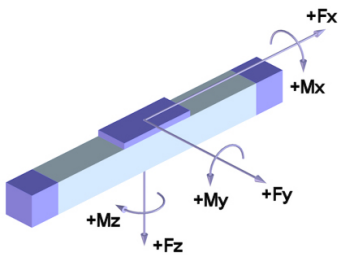
Basic length without stroke:	5.75 kg
100 mm stroke:	0.64 kg
Entire carriage 150 mm:	3.60 kg
Max. total length: (longer on request)	8000 mm

## Technical Data

## ARS

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

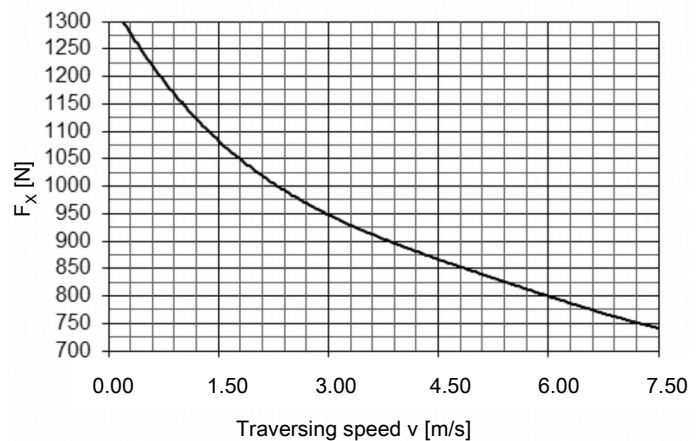
## Forces and moments



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

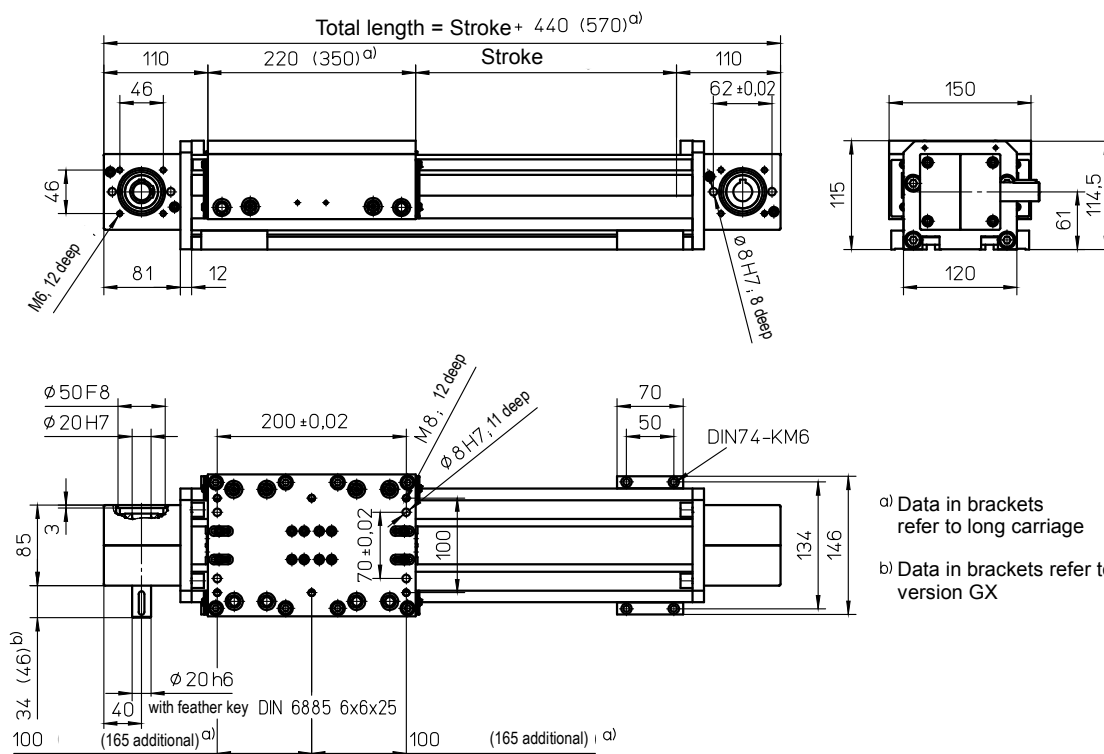
c) Maximum value (see diagram „ $F_x$ -v-Diagram“)

## $F_x$ - v - Diagram





with toothed belt drive and roller guide (ZRS)



a) Data in brackets refer to long carriage  
b) Data in brackets refer to version GX

## Weights

## ZRS

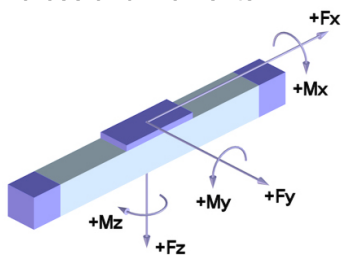
Basic length without stroke:	10.90 kg
100 mm stroke:	1.20 kg
Entire carriage 220 mm:	3.85 kg
Entire carriage 350 mm:	5.40 kg
Max. total length: (longer on request)	8100 mm

## Technical Data

## ZRS

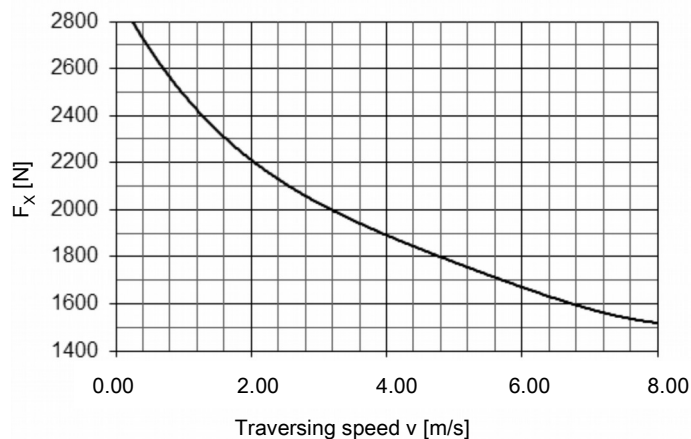
Max. speed:	8.00 m/s
Max. acceleration:	60 m/s <sup>2</sup>
Repeat accuracy:	±0.08 mm
Idle torque:	3.00 Nm
Moment of inertia:	7.50 • 10 <sup>-3</sup> kgm <sup>2</sup>
Drive element:	Toothed belt <b>40 AT10-E</b>
Stroke per revolution:	200 mm

## Forces and moments



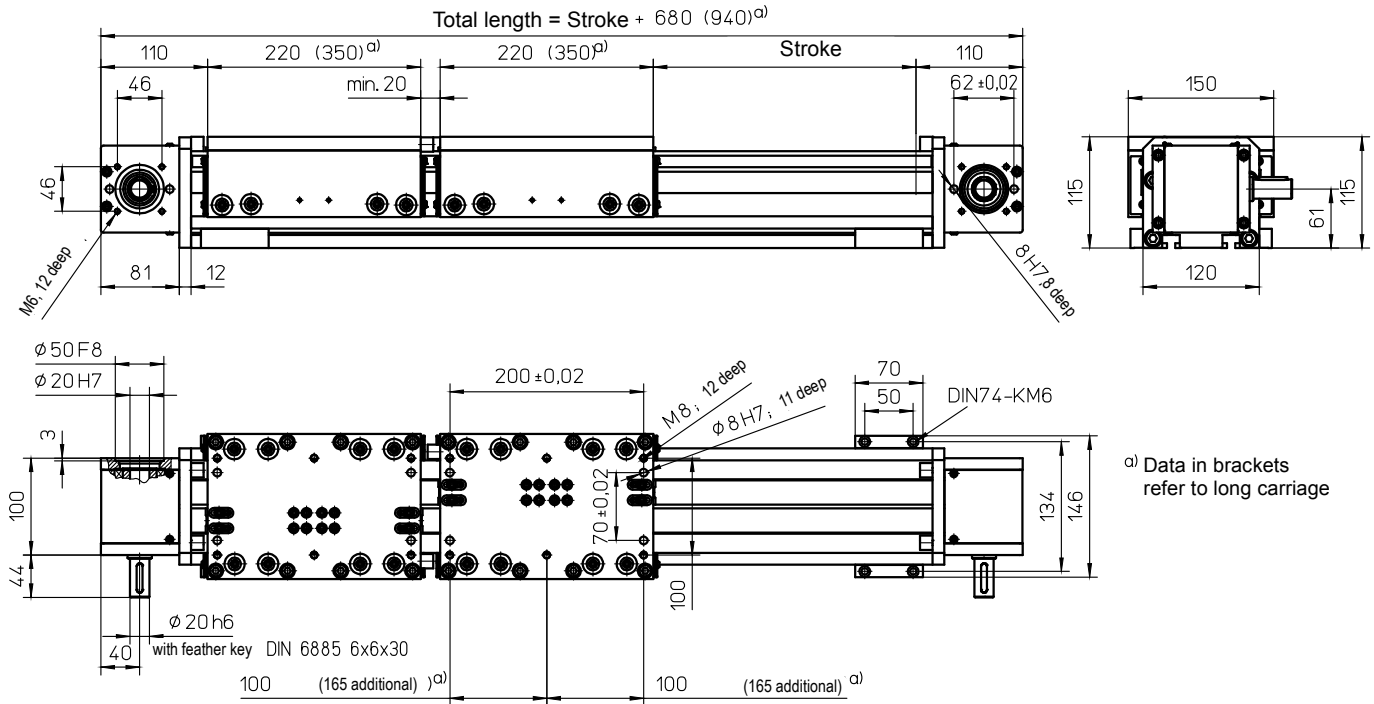
ZRS	
Forces	Dynamic [N]
$F_x$ c)	2800
$F_y$	2300
$F_z$	3000
$-F_z$	1800
Moments	Dynamic [Nm]
$M_x$	170
$M_y$	270 (400)
$M_z$	270 (400)

## $F_x$ - v - Diagram



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

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



## Weights

## ZRSD

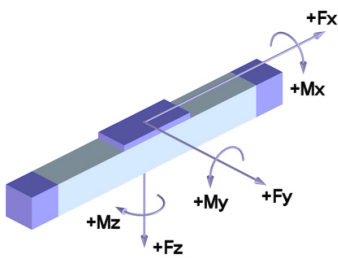
Basic length without stroke:	24.85 kg
100 mm stroke:	1.20 kg
Entire carriage 220 mm:	3.70 kg
Entire carriage 350 mm:	5.55 kg
Max. total length: (longer on request)	8100 mm

## Technical Data

## ZRSD

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

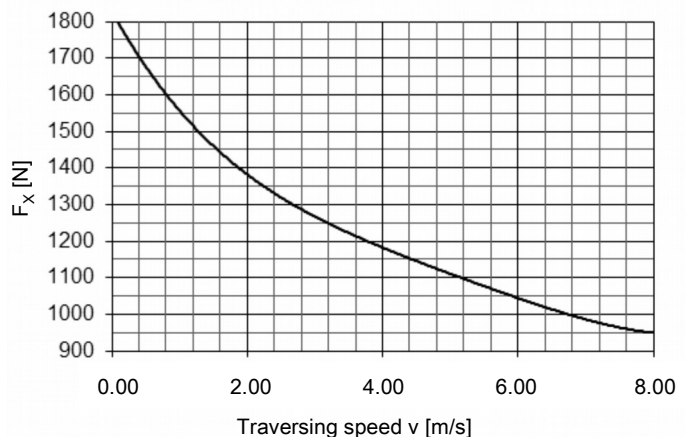
## Forces and Moments



ZRSD	
Forces	Dynamic [N]
$F_x$ <sup>b)</sup>	1800
$F_y$	2300
$F_z$	3000
$-F_z$	1800
Moments	Dynamic [Nm]
$M_x$	170
$M_y$	270 (400)

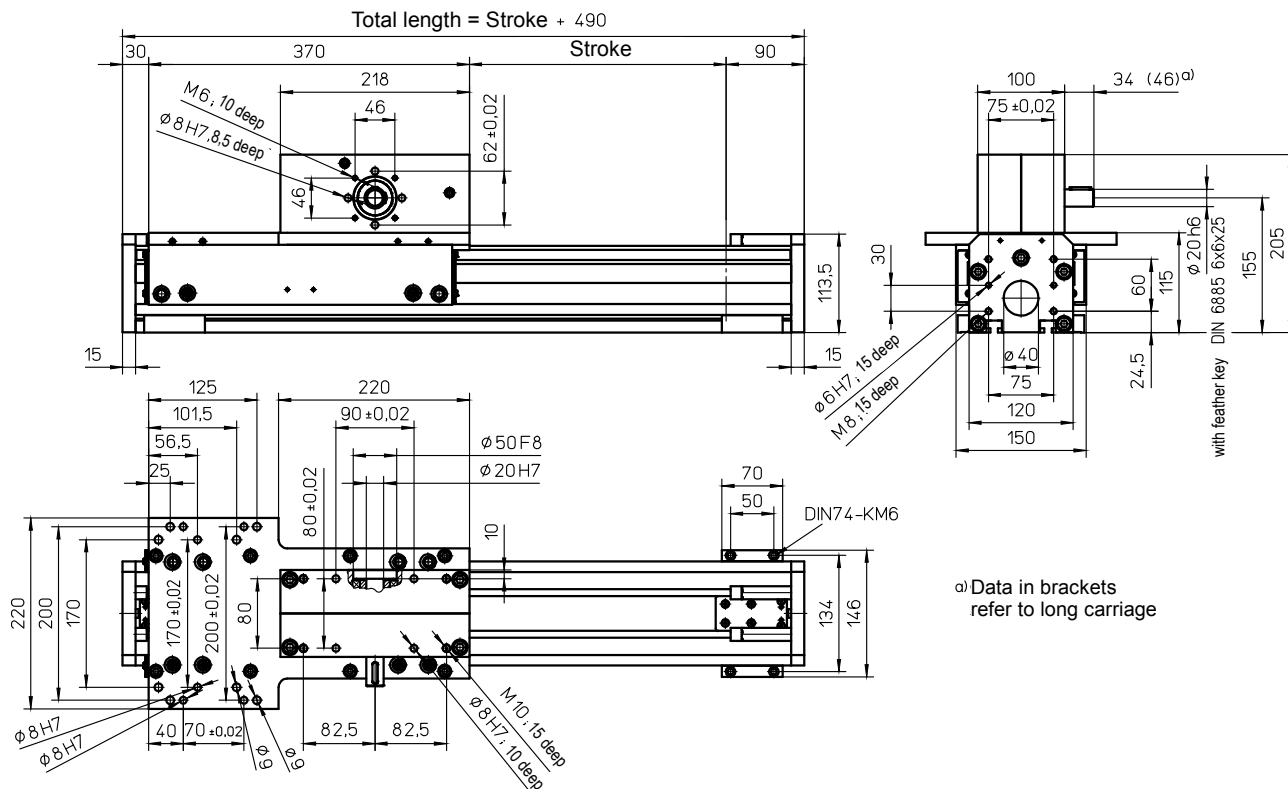
b) Maximum value (see diagram „ $F_x$ -v-Diagram“)  
Data in brackets refer to long carriage (350)

## $F_x$ - v - Diagram



These data apply to each carriage.

with toothed belt drive and roller guide (ARH)



## Weights

## ARH

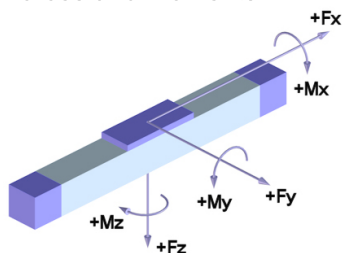
Basic length without stroke:	17.00 kg
100 mm stroke:	1.20 kg
Entire carriage 370 mm:	9.90 kg
Max. total length: (longer on request)	8000 mm

## Technical Data

## ARH

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

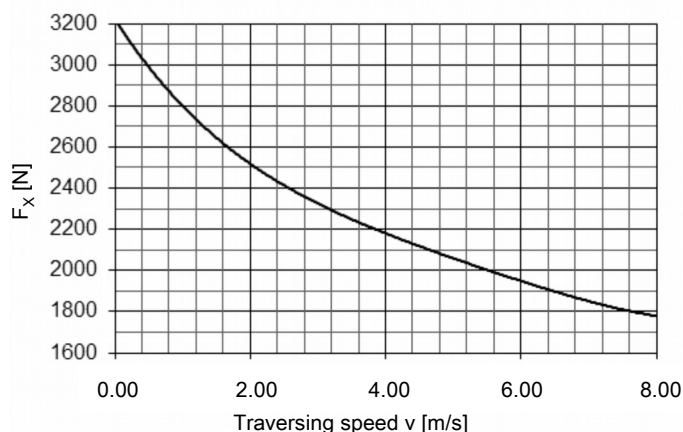
## Forces and moments



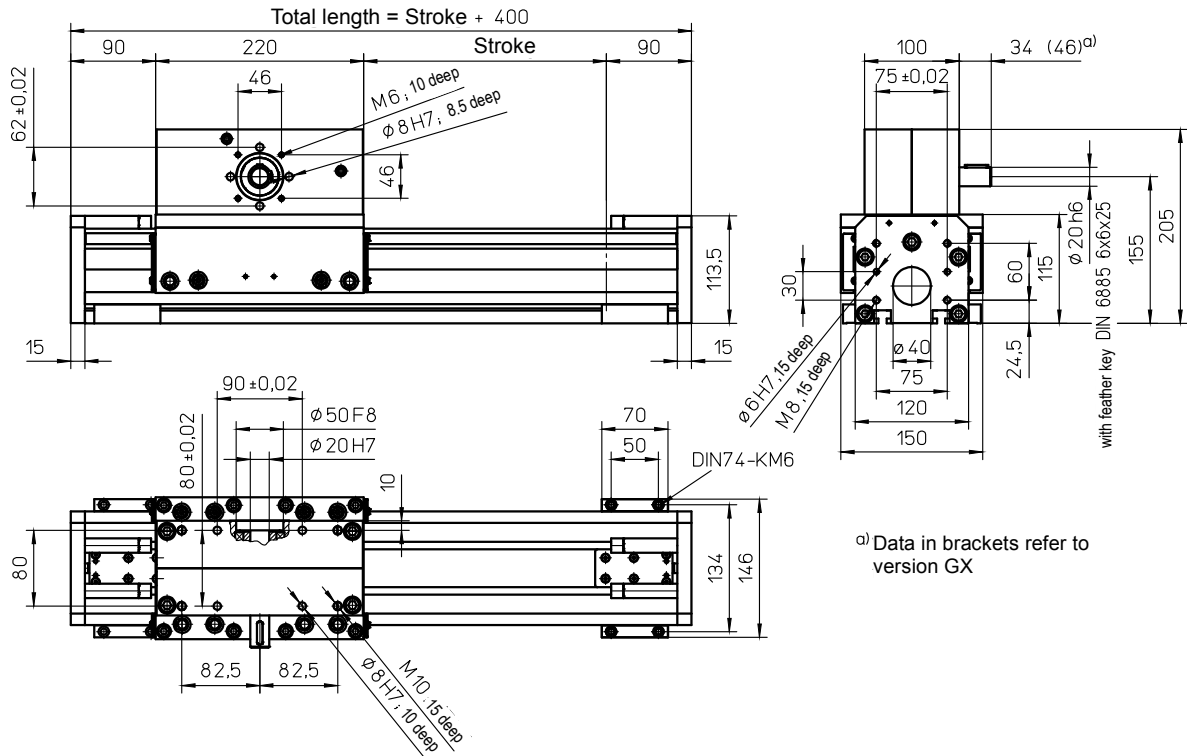
ARH	
Forces	Dynamic [N]
$F_x$ <sup>b)</sup>	3200
$F_y$	2300
$F_z$	3000
$-F_z$	1800
Moments	Dynamic [Nm]
$M_x$	170
$M_y$	400
$M_z$	400

<sup>b)</sup> Maximum value (see diagram „F<sub>x</sub>-v-Diagram“)

## F<sub>x</sub> - v - Diagram



with toothed belt drive and roller guide (ARS)



## Weights

## ARS

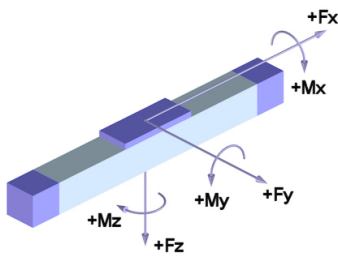
Basic length without stroke:	14.00 kg
100 mm stroke:	1.20 kg
Entire carriage 220 mm:	7.90 kg
Max. total length: (longer on request)	8000 mm

## Technical Data

## ARS

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

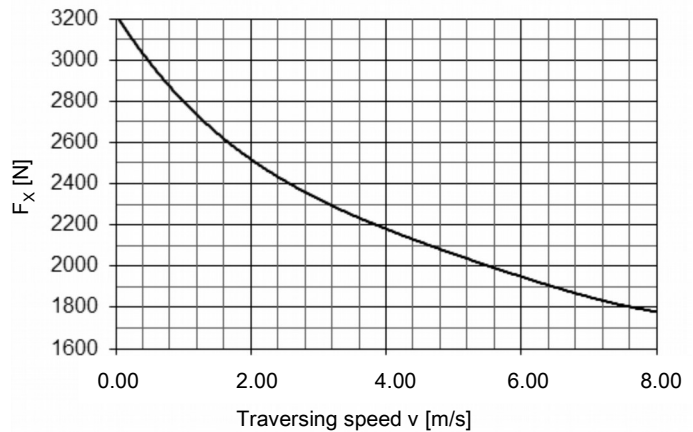
## Forces and moments



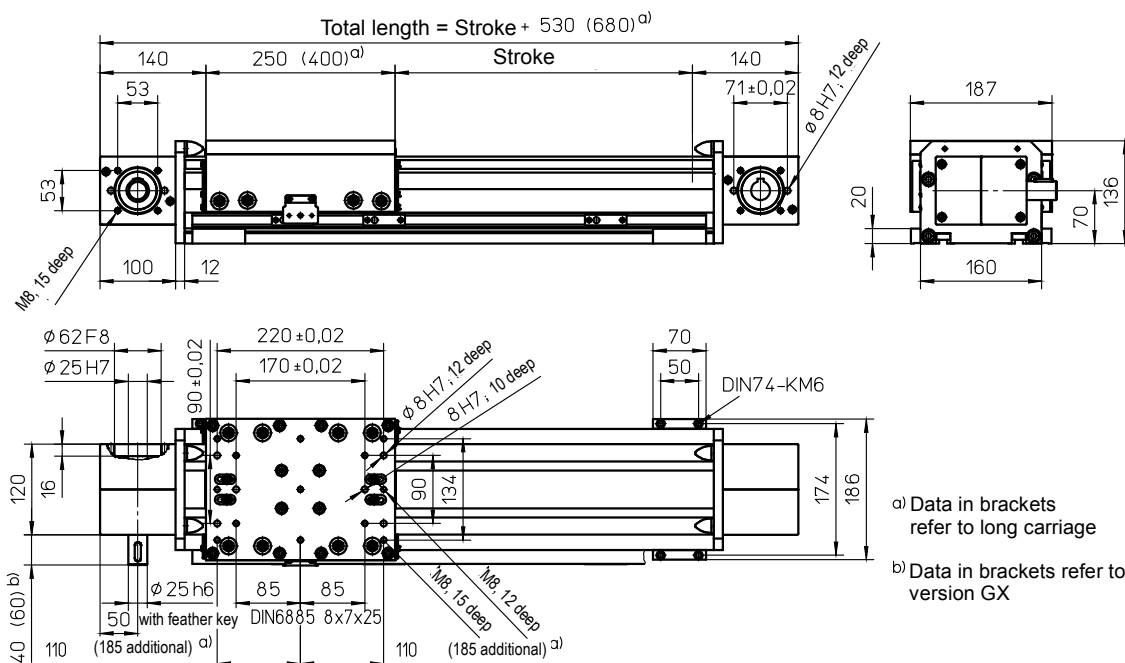
ARS	
Forces	Dynamic [N]
$F_x$ b)	3200
$F_y$	2300
$F_z$	3000
$-F_z$	1800
Moments	Dynamic [Nm]
$M_x$	170
$M_y$	270
$M_z$	270

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

## $F_x$ - v - Diagram



with toothed belt drive and roller guide (ZRS)



## Weights

## ZRS

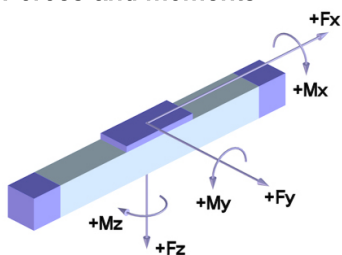
Basic length without stroke:	17.65 kg
100 mm stroke:	1.67 kg
Entire carriage 250:	5.95 kg
Entire carriage 400 mm:	8.75 kg
Max. total length: (longer on request)	6200 mm

## Technical Data

## ZRS

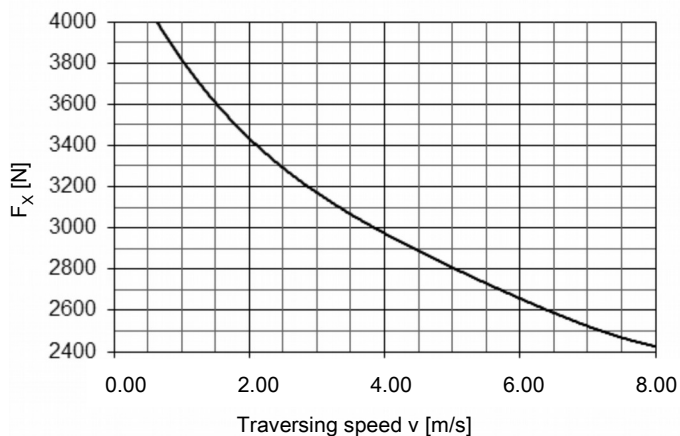
Max. speed:	8.00 m/s
Max. acceleration:	60 m/s <sup>2</sup>
Repeat accuracy:	±0.08 mm
Idle torque:	4.00 Nm
Moment of inertia:	1.23 · 10 <sup>-2</sup> kgm <sup>2</sup>
Drive element:	Toothed belt <b>50 ATL10</b>
Stroke per revolution:	240 mm

## Forces and moments



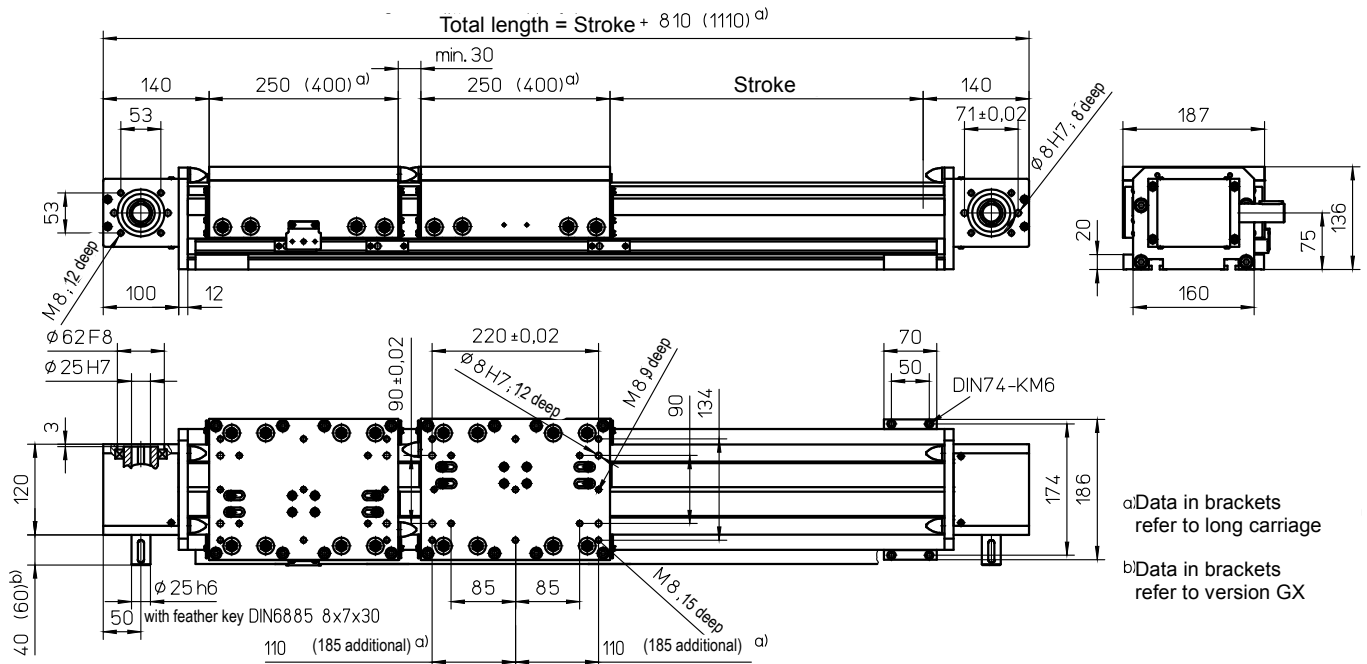
ZRS	
<b>Forces</b>	Dynamic [N]
$F_x$ <sup>c)</sup>	4000
$F_y$	4500
$F_z$	6000
$-F_z$	4000
<b>Moments</b>	Dynamic [Nm]
$M_x$	500
$M_y$	700 (1000)
$M_z$	700 (1000)

## $F_x$ - v - Diagram



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

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



## Weights

## ZRSD

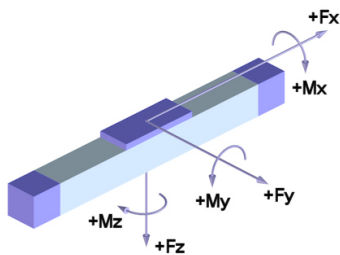
Basic length without stroke:	28.10 kg
100 mm stroke:	1.68 kg
Entire carriage 250 mm:	5.75 kg
Entire carriage 400 mm:	8.30 kg
Max. total length: (longer on request)	6200 mm

## Technical data

## ZRSD

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

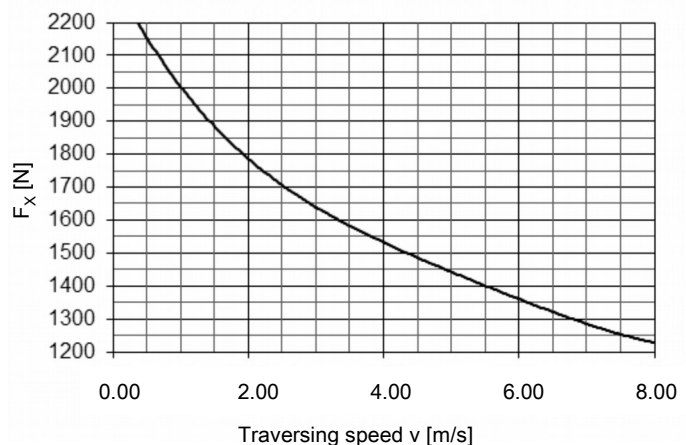
## Forces and moments



ZRSD	
Forces	Dynamic [N]
$F_x$ <sup>c)</sup>	2300
$F_y$	4500
$F_z$	6000
$-F_z$	4000
Moments	Dynamic [Nm]
$M_x$	500
$M_y$	700 (1000)
$M_z$	700 (1000)

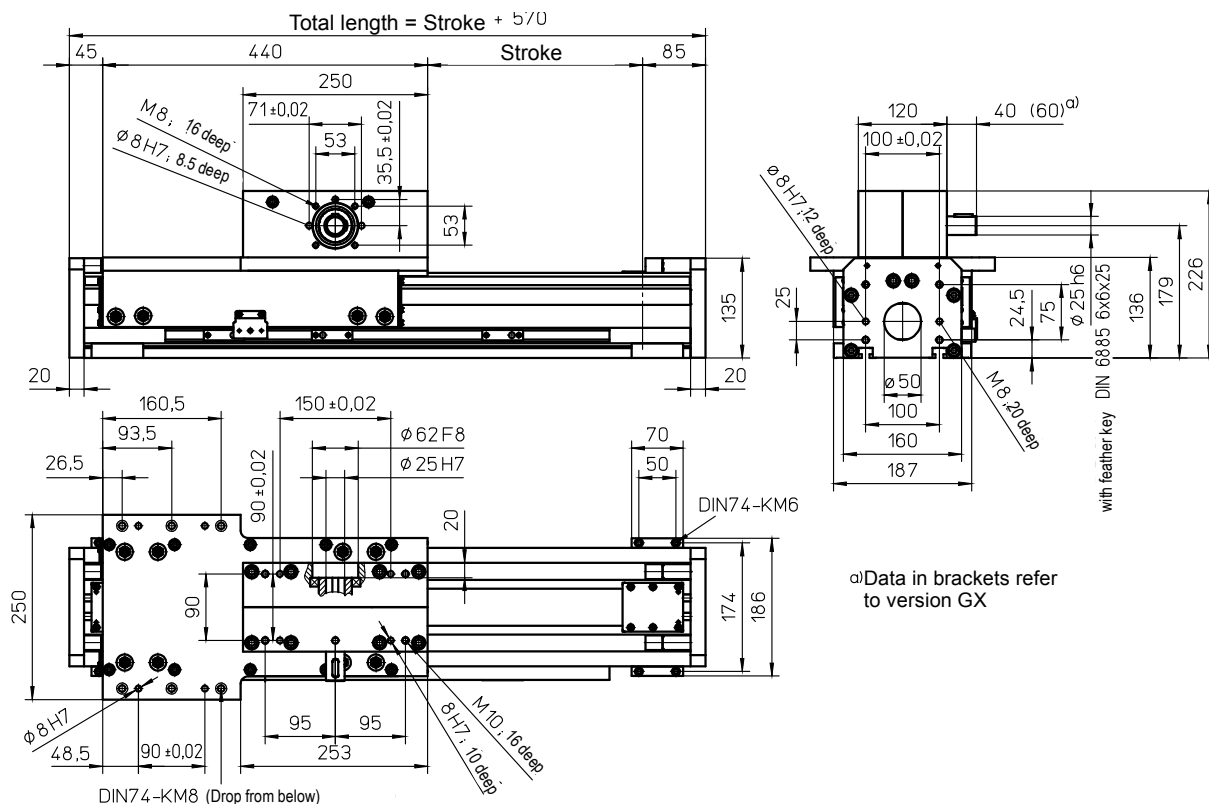
<sup>c)</sup> Maximum value (see diagram „F<sub>x</sub>-v-Diagram“)  
Data in brackets refer to long carriage (400)

### F<sub>x</sub> - v - Diagram



These data apply to each carriage.

with toothed belt drive an roller guide (ARH)



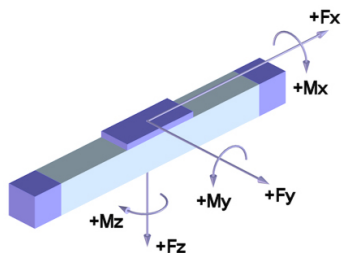
## Weights ARH

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

## Technical Data ARH

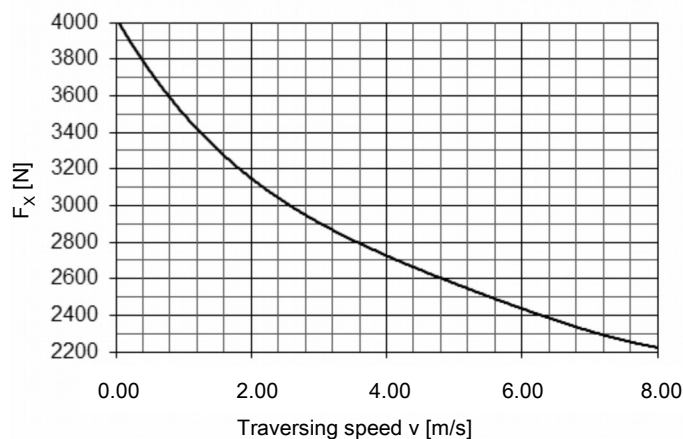
Max. speed:	8.00 m/s
Max. acceleration:	60 m/s <sup>2</sup>
Repeat accuracy:	±0.08 mm
Idle torque:	4.20 Nm
Moment of inertia: (rotatory)	1.50 · 10 <sup>-3</sup> kgm <sup>2</sup>
Drive element:	Toothed belt <b>50 AT10-E</b>
Stroke per revolution:	240 mm

## Forces and moments



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

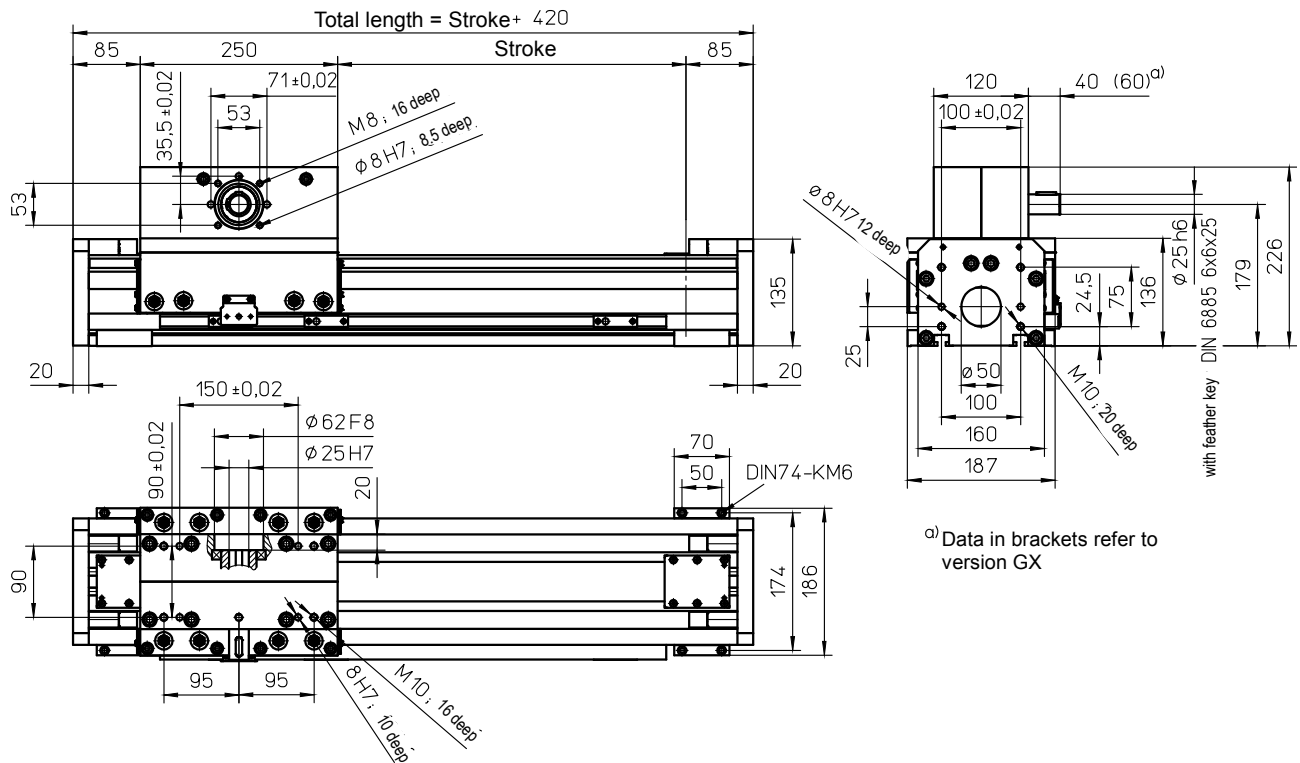
## $F_x$ - v - Diagram



<sup>b)</sup> Maximum value (see diagram „ $F_x$ -v-Diagram“)



with toothed belt drive and roller guide (ARS)



## Weights

## ARS

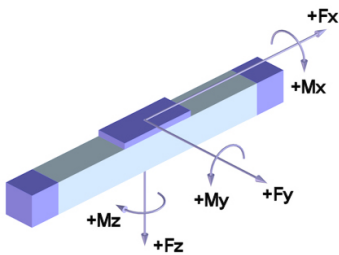
Basic length without stroke:	21.25 kg
100 mm stroke:	1.63 kg
Entire carriage 250 mm:	11.20 kg
Max. total length: (longer on request)	6000 mm

## Technical Data

## ARS

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

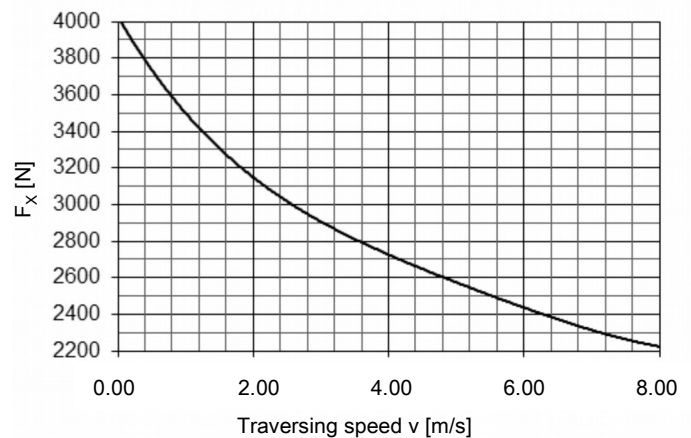
## Forces and moments



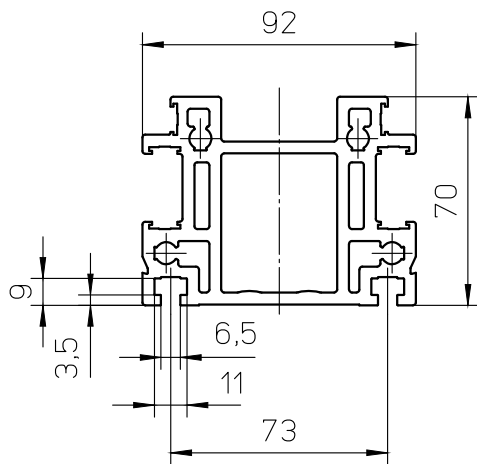
ARS	
Forces	Dynamic [N]
$F_x^{c)}$	4000
$F_y$	4500
$F_z$	6000
$-F_z$	4000
Moments	Dynamic [Nm]
$M_x$	500
$M_y$	700
$M_z$	700

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

## $F_x$ - v - Diagram

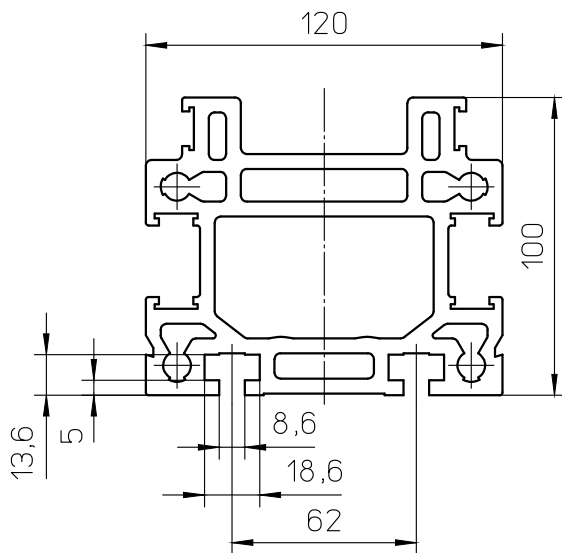






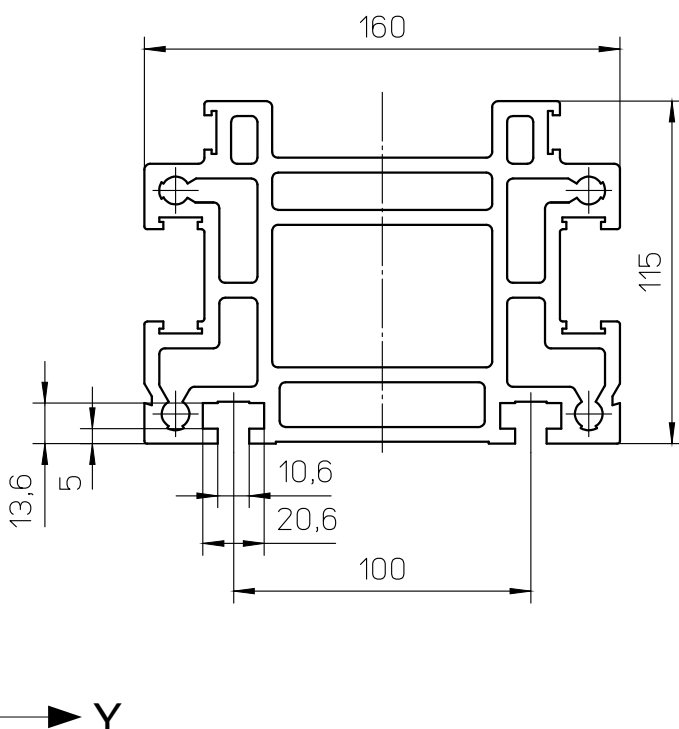
**Profile Sigma 90**

Specific mass [kg/m]	5,69
Surface measure [mm <sup>2</sup> ]	2108
Geometrical moment of inertia I <sub>y</sub> [mm <sup>4</sup> ]	1012035
Geometrical moment of inertia I <sub>z</sub> [mm <sup>4</sup> ]	1806590
Section modulus W <sub>y</sub> [mm <sup>3</sup> ]	26586
Section modulus W <sub>z</sub> [mm <sup>3</sup> ]	39274



**Profile Sigma 120**

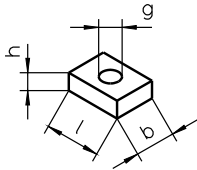
Specific mass [kg/m]	10,92
Surface measure [mm <sup>2</sup> ]	4044
Geometrical moment of inertia I <sub>y</sub> [mm <sup>4</sup> ]	4001551
Geometrical moment of inertia I <sub>z</sub> [mm <sup>4</sup> ]	5857612
Section modulus W <sub>y</sub> [mm <sup>3</sup> ]	74232
Section modulus W <sub>z</sub> [mm <sup>3</sup> ]	97627



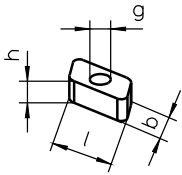
**Profile Sigma 160**

Specific mass [kg/m]	15,08
Surface measure [mm <sup>2</sup> ]	5583
Geometrical moment of inertia I <sub>y</sub> [mm <sup>4</sup> ]	7080449
Geometrical moment of inertia I <sub>z</sub> [mm <sup>4</sup> ]	14157096
Section modulus W <sub>y</sub> [mm <sup>3</sup> ]	114660
Section modulus W <sub>z</sub> [mm <sup>3</sup> ]	176964

**NS 2 ..10**

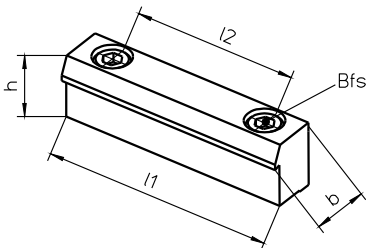


**RM 2 / 6**



Linear drive	Page	NS	ID No.	l [mm]	b [mm]	h [mm]	g
<b>Sigma 70</b>	E	2	10557	16	10	4	M5
<b>Sigma 90</b>	E	2	10557	16	10	4	M5
		RM2	15370	10	6	4	M4
<b>Sigma 120</b>	E	4	10559	18	14	6	M8
		5	10560	20	14	8	M8
		10	16499	20	13	6	M6
<b>Sigma 160</b>	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
<b>Sigma 70</b>	1	25267	70	50	13	12	M6
<b>Sigma 90</b>	1	10552	70	50	15	17,5	M6
<b>Sigma 120</b>	2	10553	70	50	15	20	M6
<b>Sigma 160</b>	2	10553	70	50	15	20	M6

\* 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-AZ1-1

<b>Product</b>	
<b>Size</b>	
<b>Drive</b>	
Z = Toothed belt drive 0 = Without drive A = Powered carriage	
<b>Guide system</b>	
R = Roller guide	
<b>Model</b>	
ZRS = Standard (Horizontal) ZRSD = Standard double (Horizontal) ARH = Lifting axis (Vertikal) ARS = Standard (Horizontal)	
<b>Drive specifications</b>	
Width of toothed belt and tooth pitch	
<b>Stroke per revolution</b>	
<b>Stroke</b>	
<b>Total length</b>	
<b>Accessories</b>	
BL = Mounting bracket EMS / EMB = Mechanical limit switch (S = Siemens, B = Balluff) fitted EO2 / EO10 = Inductive limit switch with 2 m/10 m cabel fitted ES2 / ES10 = Inductive limit switch with 2 m/10 m cabel fitted NS ② .. ⑩ = Sliding block ② .. ⑩ (See Table on <b>page S17</b> ) AZ1 = Drive shaft short, mounting side <b>C</b> AZ2 = Drive shaft short, mounting side <b>D</b> AZ6 = Drive shaft long, mounting side <b>C</b> and <b>D</b> Further arrangements for drive shaft, see <b>page Z1</b>	
<b>Special design</b>	
0 = Standard 1 = Special (add specification description)	

**Further accessories** (separate position)

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