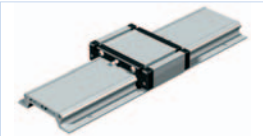
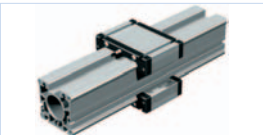
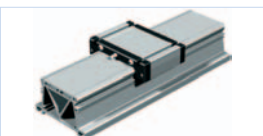
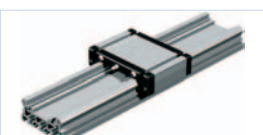
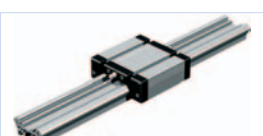


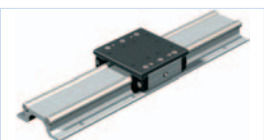
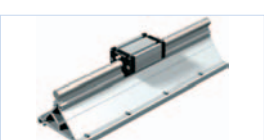
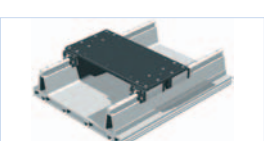
Linear Guides

Overview

LFS-8-1 (MLF 1)		Linear Guide Rail	With Roller Carriage LW 6 With Alu Bearing Carriage WS 1/70	B 22
LFS-8-2 (MLF 2)		Linear Guide Rail	With Roller Carriage LW 6 With Alu Bearing Carriage WS 1/70	B 23
LFS-8-3 (MLF 3)		Linear Guide Rail	With Roller Carriage LW 7 With Alu Bearing Carriage WS 3/70	B 24
LFS-8-4 (MLF 4)		Linear Guide Rail	With 2 x Roller Carriage LW 7 With 2 x Alu Bearing Carriage WS 3/70	B 25
LFS-8-5 (MLF 5)		Linear Guide Rail	With Roller Carriage LW 7 With Alu Bearing Carriage WS 3/70	B 26
LFS-8-6 (MLF 6)		Linear Guide Rail	With Roller Carriage LW 7 With Alu Bearing Carriage WS 3/70	B 27
LFS-8-7 (MLF 7)		Linear Guide Rail	With Roller Carriage LW 10 With Alu Bearing Carriage WS 11	B 28
LFS-8-8 (MLF 8)		Linear Guide Rail	With Roller Carriage LW 7 With Alu Bearing Carriage WS 3/70	B 29
LFS-8-9 (MLF 9)		Linear Guide Rail	With Roller Carriage LW 10 With Alu Bearing Carriage WS 11/70	B 30
LFS-12-10 (DSF 1)		Linear Guide Rail	With Roller Carriage LW 4 With Alu Bearing Carriage WS 8	B 31

Linear Guides

Overview

LFS-12-11 (ELF 1)		Linear Guide Rail	With Roller Carriage LW 5 With Alu Bearing Carriage WS 6/70	B 32
LFS-12-1 (LF 1)		Linear Guide Rail	With Roller Carriage LW 3 With Alu Bearing Carriage WS 4/70 With Steel Sledge LS 1	B 34
LFS-12-2 (LF 2)		Linear Guide Rail	With Roller Carriage LW 3 With Alu Bearing Carriage WS 4/70 With Steel Sledge LS 1	B 36
LFS-12-3 (LF 3)		Linear Guide Rail	With Roller Carriage LW 8 With Alu Bearing Carriage WS 7/70	B 38
LFS-12-7 (LF 7)		Linear Guide Rail	With 2 x Alu Bearing Carriage WS 6/70 With 4 x Alu Bearing Carriage WS 6/70	B 39
LFS-16-1 (ILF 1)		Linear Guide Rail	With Roller Carriage ILW 1 With Alu Bearing Carriage IWS 1 With Steel Sledge ILS 1	B 40
LFS-16-2 (ILF 2)		Linear Guide Rail	With Roller Carriage ILW 1 With Alu Bearing Carriage IWS 1 With Steel Sledge ILS 1	B 42
LFS-16-3 (ILF 3)		Linear Guide Rail	With Roller Carriage ILW 1 With Alu Bearing Carriage IWS 1 With Steel Sledge ILS 1	B 44
LFS-16-10 (ILF 10)		Linear Guide Rail	With Roller Carriage ILW 1 With Alu Bearing Carriage IWS 1 With Steel Carriage ILS 1	B 45a
Accessory, General References				B 46
Functions Overview, Adjustments				B 48
Calculation of Working Loads				B 50

LFS-8-1



- W 30 x H 20 mm
- 2 precision steel shafts Ø 8
- Twist-resistant
- Aluminium shaft profile, anodized
- Bottom-up mounting by means of thread rails M6 in the T-groove indentation
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 1.61 kg/m
- Option: with through boring for M6
- Option: stainless design

Roller Carriage LW 6	
C ₀	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M ₁ stat.	121.1 Nm
M ₁ stat.	194.4 Nm
M ₂ stat.	97.2 Nm
M ₂ dyn.	106.3 Nm
M ₃ dyn.	170.6 Nm
M ₄ dyn.	180.0 Nm

Roller Carriage LW 6	
C ₀	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M _x stat.	121.1 Nm
M _y stat.	194.4 Nm
M _z stat.	97.2 Nm
M _x dyn.	106.3 Nm
M _y dyn.	170.6 Nm
M _z dyn.	180.0 Nm

Bearing Carriage WS 1	
C _o	3,114 N
C	1,846 N
F ₁ stat.	2,659 N
F ₁ dyn.	1,576 N
F ₂ stat.	3,114 N
F ₂ dyn.	1,846 N
M _x stat.	37.3 Nm
M _y stat.	100.5 Nm
M _z stat.	117.6 Nm
M _x dyn.	22.1 Nm
M _y dyn.	59.5 Nm
M _z dyn.	69.7 Nm

Order Key
235 00X XXXX

Standard = 0 Length in mm (in steps of 100 mm)
Stainless = 1 e.g. 0029 = Length 298
 0299 = Length 2998

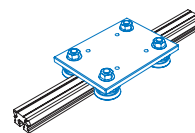
Steel shaft length:
Total length L -3 mm

Profile length till 6000 mm without end to end available, steel shaft shared.

The graph shows the relationship between deflection and length for a cantilever beam under two different loads. The blue curves represent a 50 N load, and the black curves represent a 25 N load. For each load, there are two curves, likely representing different beam geometries or material properties. The deflection increases rapidly with length, following a cubic relationship.

Length L [mm]	Deflection [mm] (50 N, Blue)	Deflection [mm] (25 N, Black)
500	0.15	0.08
1,000	0.60	0.32
1,500	1.35	0.72
2,000	2.40	1.28
2,500	3.75	2.00

Roller Carriage LW 6



- L 125 x W 90 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31,
life-time lubrication
- Adjustable free of clearance
- Weight: 1.03 kg

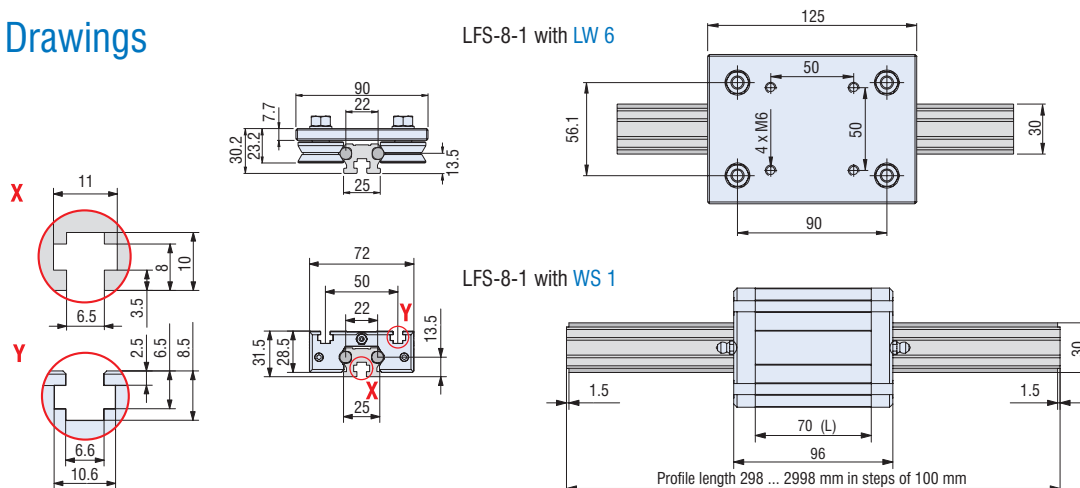
Item no.: 223 011

- L 96 x W 72 x H 28,5 mm
- Milled clamping surface
- M6 T-grooves
- Central lubrication
- Adjustable free of clearance
- Weight: 0.35 kg
- **Option:** stainless version

Item no.: 223 100 0070

Stainless: **223 101 0070**

LFS-8-1 with LW 6



LFS-8-1 with WS 1

Linear Guide Rail

LFS-8-2 (MLF 2)



Features

- W 30 x H 32,5 mm
- 2 precision steel shafts Ø 8 mm
- Twist-resistant
- Aluminium shaft profile, anodized
- Bottom-up mounting by means of thread rails M6 in the T-groove indentation
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 2.01 kg/m
- Option: stainless design

Load Data

Roller Carriage LW 6	
C ₀	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M _x stat.	121.1 Nm
M _y stat.	194.4 Nm
M _z stat.	97.2 Nm
M _x dyn.	106.3 Nm
M _y dyn.	170.6 Nm
M _z dyn.	180.0 Nm

Bearing Carriage WS 1	
C ₀	3,114 N
C	1,846 N
F ₁ stat.	2,659 N
F ₁ dyn.	1,576 N
F ₂ stat.	3,114 N
F ₂ dyn.	1,846 N
M _x stat.	37.3 Nm
M _y stat.	100.5 Nm
M _z stat.	117.6 Nm
M _x dyn.	22.1 Nm
M _y dyn.	59.5 Nm
M _z dyn.	69.7 Nm

Force sketch of the load table see page 37

Order Key

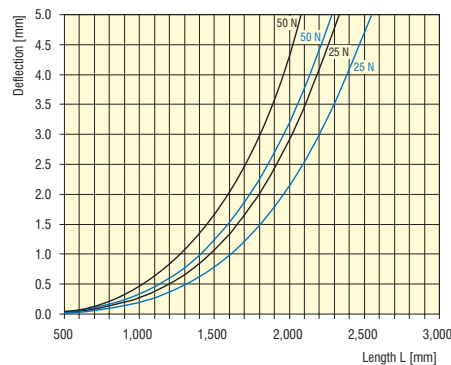
235 00X XXXX

Standard = 2 Length in mm (in steps of 100 mm)
 Stainless = 3 e.g. 0298 = Length 298
 2998 = Length 2998

Steel shaft length:
 Total length L -3 mm

Profile length till 6000 mm without end to end available, steel shaft shared.

Deflection



Force sketch of the deflection diagrams see page 37

Roller Carriage LW 6

- L 125 x W 90 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31, life-time lubrication
- Adjustable free of clearance
- Weight: 1.03 kg

Item no.: **223 011**

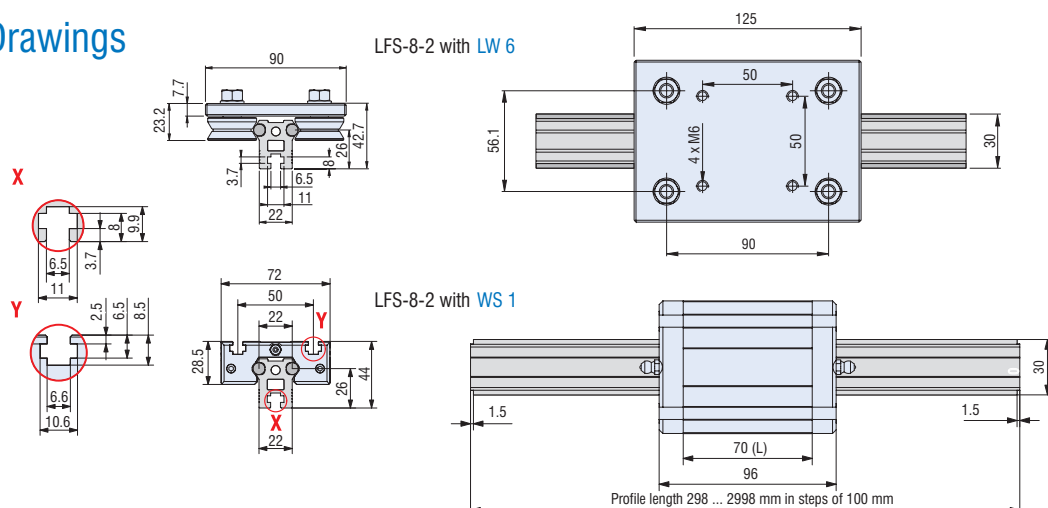
Aluminium Bearing Carriage WS 1/70

- L 96 x W 72 x H 28,5 mm
- Milled clamping surface
- M6 T-grooves
- Central lubrication
- Adjustable free of clearance
- Weight: 0.35 kg
- Option: stainless version

Item no: **223 100 0070**

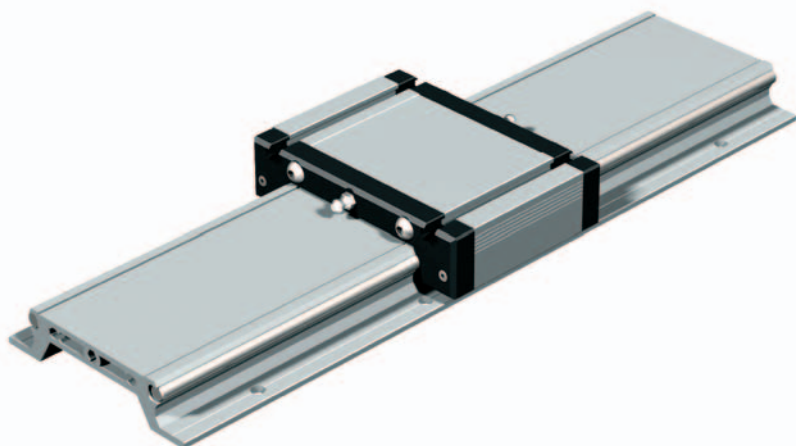
Stainless: **223 101 0070**

Scale Drawings



Linear Guide Rail

LFS-8-3 (MLF 3)



Features

- W 115 x H 25,5 mm
- 2 precision steel shafts Ø 8 mm
- Twist-resistant
- Aluminium shaft profile, anodized
- Top-down mounting by means of through holes for M6 in a 100 mm raster
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 3.22 kg/m
- Option: stainless design

Load Data

Roller Carriage LW 7	
C ₀	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M _x stat.	246.8 Nm
M _y stat.	302.4 Nm
M _z stat.	151.2 Nm
M _x dyn.	216.7 Nm
M _y dyn.	265.4 Nm
M _z dyn.	280.0 Nm

Bearing Carriage WS 3	
C ₀	3,141 N
C	1,879 N
F ₁ stat.	2,682 N
F ₁ dyn.	1,604 N
F ₂ stat.	3,141 N
F ₂ dyn.	1,879 N
M _x stat.	115.7 Nm
M _y stat.	105.3 Nm
M _z stat.	123.3 Nm
M _x dyn.	69.2 Nm
M _y dyn.	62.9 Nm
M _z dyn.	73.7 Nm

Force sketch of the load table see page 37

Order Key

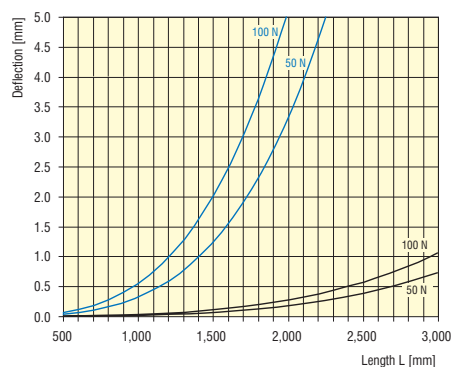
235 00X XXXX

Standard = 4 Length in mm (in steps of 100 mm)
 Stainless = 5 e.g. 0029 = Length 296
 0299 = Length 2996

Steel shaft length:
 Total length L - 1 mm

Profile length till 6000 mm without end to end available, steel shaft shared.

Deflection



Force sketch of the deflection diagrams see page 37

Roller Carriage LW 7

- L 175 x W 150 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31, life-time lubrication
- Adjustable free of clearance
- Weight: 2.03 kg

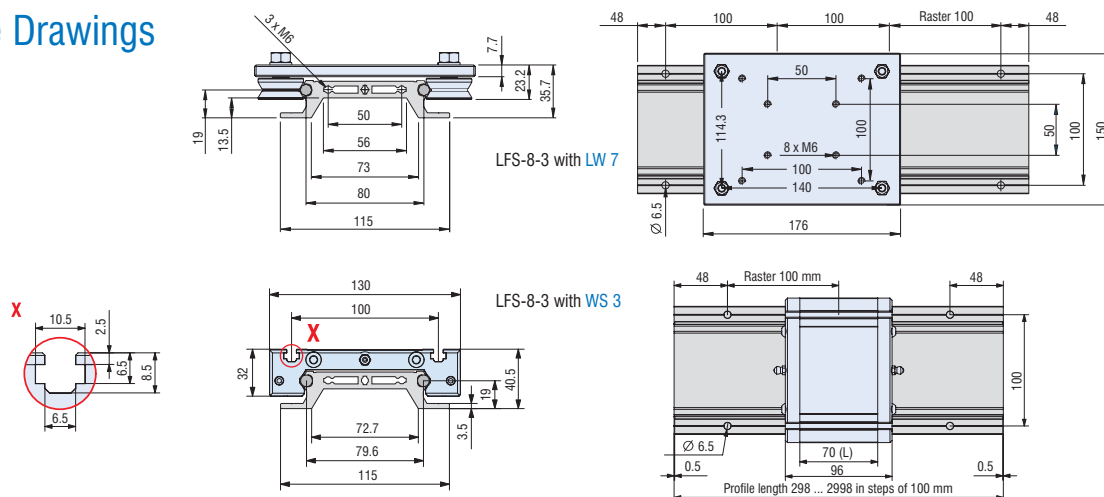
Item no.: **223 012**

Aluminium Bearing Carriage WS 3/70

- L 96 x W 130 x H 32 mm
- Milled clamping surface
- M6 T-grooves
- Central lubrication
- Adjustable free of clearance
- Weight: 0.50 kg
- Option: stainless version

Item no.: **223 103 0070**
 Stainless: **223 103 1070**

Scale Drawings



LFS-8-4

(MLF 4)



- W 80 x H 80 mm
- 4 precision steel shafts Ø 8 mm
- Twist-resistant
- Aluminium shaft seat profile, anodized
- Bottom-up mounting by means of thread rails M6 in the T-grooves or top-down mounting by means of holes for M8
- Lateral T-grooves for limit switch attachment
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 7.15 kg/m
- Option: stainless design

Roller Carriage LW 7	
C _o	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M _x stat.	246.8 Nm
M _y stat.	302.4 Nm
M _z stat.	151.2 Nm
M _x dyn.	216.7 Nm
M _y dyn.	265.4 Nm
M _z dyn.	280.0 Nm

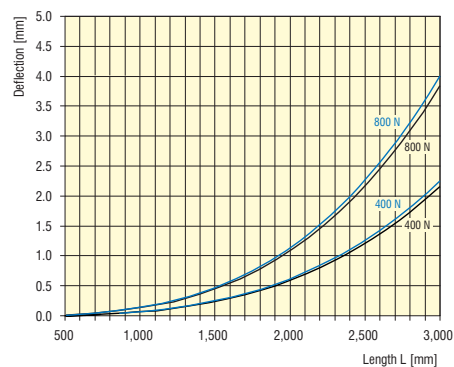
Bearing Carriage WS 3	
C _o	3,141 N
C	1,879 N
F ₁ stat.	2,682 N
F ₁ dyn.	1,604 N
F ₂ stat.	3,141 N
F ₂ dyn.	1,879 N
M _x stat.	115.7 Nm
M _y stat.	105.3 Nm
M _z stat.	123.3 Nm
M _x dyn.	69.2 Nm
M _y dyn.	62.9 Nm
M _z dyn.	73.7 Nm

Order Key
235 00X XXXX

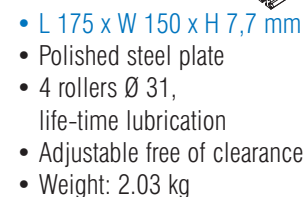
Standard = 6 Length in mm (in steps of 100 mm)
 Stainless = 7 e.g. 0029 = Length 298
 0299 = Length 2998

Steel shaft length:
Total length L -3 mm

Deflection



**With 2 x Roller
Carriage LW 7**

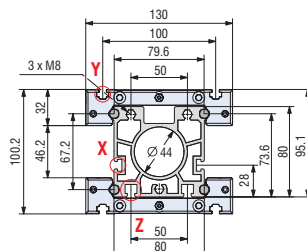
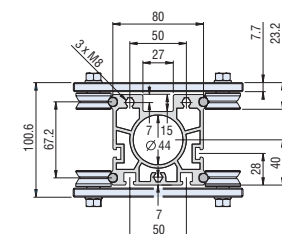
Item no.: **223 012** (1x LW 7)

- L 96 x W 130 x H 32 mm
- Milled clamping surface
- M6 T-grooves
- Central lubrication
- Adjustable free of clearance
- Weight: 0.50 kg
- **Option:** stainless design

Item no.: **223 103 0070** (1xWS 3/70)
Stainless: **223 103 1070** (1xWS 3/70)

The diagrams show three cross-sections of a wall assembly with the following dimensions (in mm):

- Diagram X:** Total width 10.5 mm. Top layer 6.5 mm. Middle layer 10.5 mm. Bottom layer 6.5 mm. A 3 mm gap is shown between the middle and bottom layers.
- Diagram Y:** Total width 10.5 mm. Top layer 6.5 mm. Middle layer 10.5 mm. Bottom layer 6.5 mm. A 2.5 mm gap is shown between the middle and bottom layers.
- Diagram Z:** Total width 10.5 mm. Top layer 6.5 mm. Middle layer 10.5 mm. Bottom layer 6.5 mm. A 3 mm gap is shown between the middle and bottom layers.



96

70 (L)

1.5

Profile length 298 ... 2998 mm in steps of 100 mm

LFS-8-5

(MLF 5)



- ## Load Data

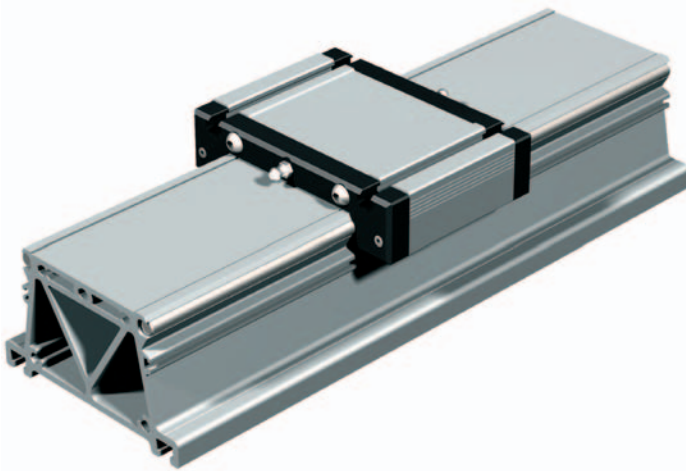
Order Key
235 00X XXXX

Deflection



Linear Guide Rail

LFS-8-6 (MLF 6)



Features

- W 118 x H 68,8 mm
- 2 precision steel shafts Ø 8 mm
- Twist-resistant
- Aluminium shaft profile, anodized
- Attachment from below by means of thread rails in the T-groove indentation profile
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 5.39 kg/m
- Option: stainless design

Load Data

Roller Carriage LW 7	
C ₀	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M _x stat.	246.8 Nm
M _y stat.	302.4 Nm
M _z stat.	151.2 Nm
M _x dyn.	216.7 Nm
M _y dyn.	265.4 Nm
M _z dyn.	280.0 Nm

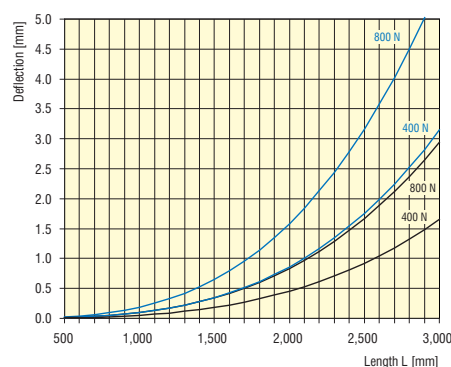
Bearing Carriage WS 3	
C ₀	3,141 N
C	1,879 N
F ₁ stat.	2,682 N
F ₁ dyn.	1,604 N
F ₂ stat.	3,141 N
F ₂ dyn.	1,879 N
M _x stat.	115.7 Nm
M _y stat.	105.3 Nm
M _z stat.	123.3 Nm
M _x dyn.	69.2 Nm
M _y dyn.	62.9 Nm
M _z dyn.	73.7 Nm

Force sketch of the load table see page 37

Order Key 235 01X XXXX

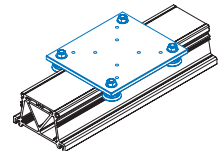
Standard = 0 Length in mm (in steps of 100 mm)
Stainless = 1 e.g. 0029 = Length 298
0299 = Length 2998

Deflection



Force sketch of the deflection diagrams see page 37

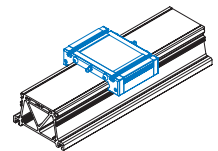
Roller Carriage LW 7



- L 175 x W 150 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31, life-time lubrication
- Adjustable free of clearance
- Weight: 2.03 kg

Item no.: **223 012**

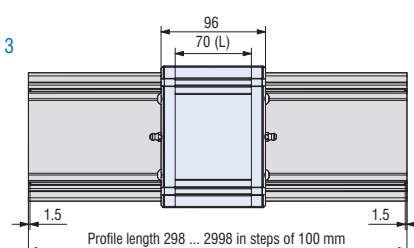
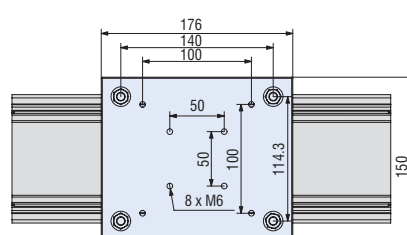
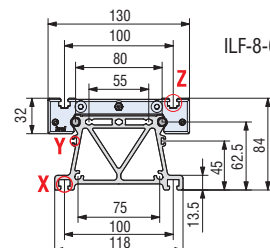
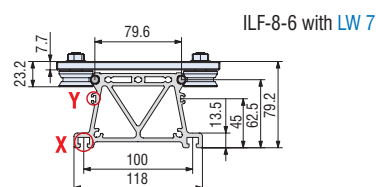
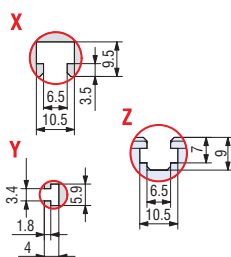
Aluminium Bearing Carriage WS 3/70



- L 96 x W 130 x H 32 mm
- Milled clamping surface
- M6 T-grooves
- Central lubrication
- Adjustable free of clearance
- Weight: 0.50 kg
- Option: stainless construction

Item no.: **--223 103 0070**
Stainless: **223 103 1070**

Scale Drawings



Linear Guide Rail

LFS-8-7 (MLF 7)



Features

- W 78 x H 36 mm
- 2 precision steel shafts Ø 8 mm
- Twist-resistant
- Aluminium shaft profile, anodized
- Top-down mounting by means of through holes for M6 in a 100 mm raster
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 2.9 kg/m
- Option: stainless design

Load Data

Roller Carriage LW 10	
C ₀	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M _x stat.	170.4 Nm
M _x dyn.	248.4 Nm
M _z stat.	124.2 Nm
M _z dyn.	149.5 Nm
M _y dyn.	218.0 Nm
M _z dyn.	230.0 Nm

Bearing Carriage WS 11	
C ₀	3,114 N
C	1,846 N
F ₁ stat.	2,659 N
F ₁ dyn.	1,576 N
F ₂ stat.	3,114 N
F ₂ dyn.	1,846 N
M _x stat.	67.3 Nm
M _x dyn.	100.5 Nm
M _z stat.	117.6 Nm
M _z dyn.	39.9 Nm
M _y dyn.	59.5 Nm
M _z dyn.	69.7 Nm

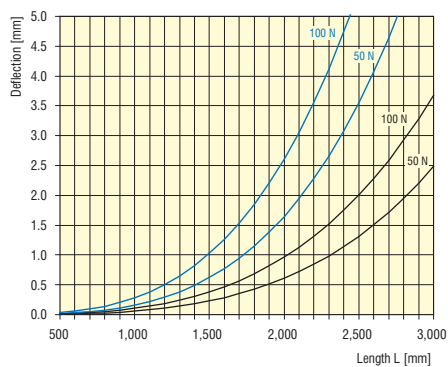
Force sketch of the load table see page 37

Order Key

235 01X XXXX

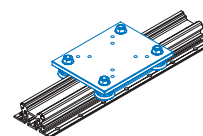
Standard = 2 Length in mm (in steps of 100 mm)
 Stainless = 3 e.g. 0029 = Length 296
 0299 = Length 2996

Deflection



Force sketch of the deflection diagrams see page 37

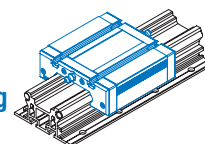
Roller Carriage LW 10



- L 150 x W 115 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31,
- life-time lubrication
- Adjustable free of clearance
- Weight: 2.03 kg

Item no.: **223 014**

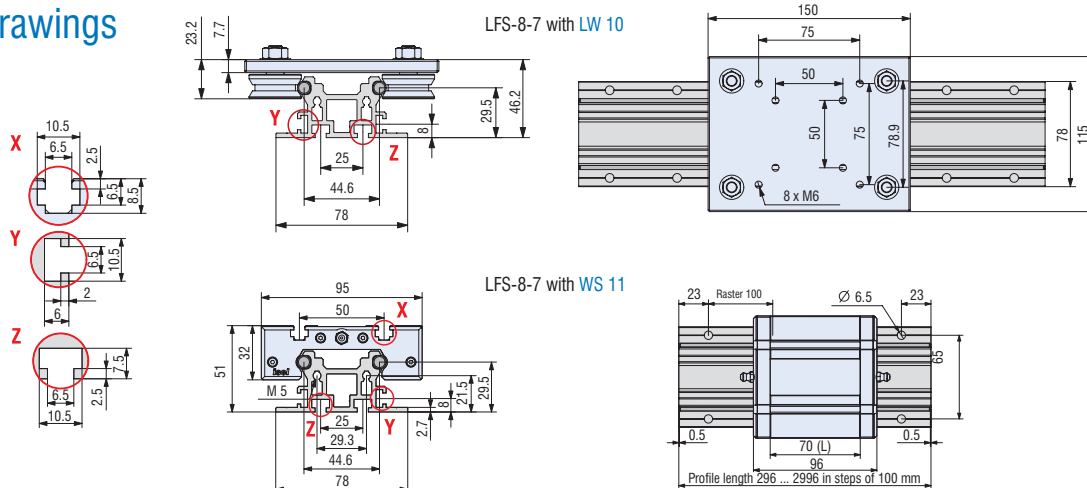
Aluminium Bearing Carriage WS 11



- L 95 x W 96 x H 32 mm
- Milled clamping surface
- M6 T-grooves
- Central lubrication
- Adjustable free of clearance
- Weight: 0.4 kg

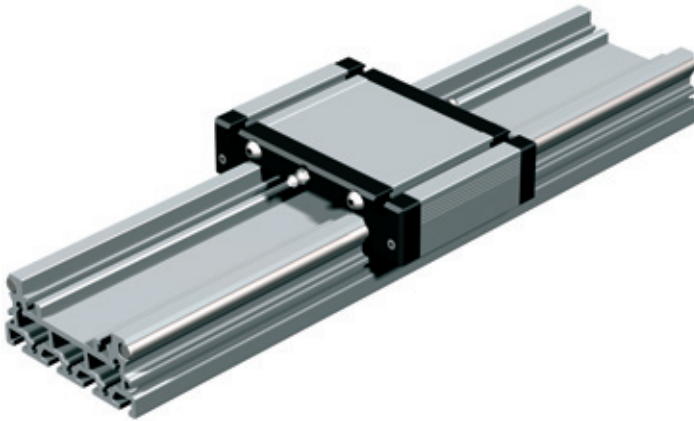
Item no.: **223 111 0070**
 Stainless: **223 111 1070**

Scale Drawings



Linear Guide Rail

LFS-8-8 (MLF 8)



Features

- W 91 x H 40 mm
- 2 precision steel shafts Ø 8 mm
- especial Twist-resistant
- Aluminium shaft profile, anodized
- Attachment from below by means of thread rails in the T-groove indentation profile
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 3.9 kg/m

Load Data

Roller Carriage LW 7	
C ₀	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M _x stat.	246.8 Nm
M _y stat.	302.4 Nm
M _z stat.	151.2 Nm
M _x dyn.	216.7 Nm
M _y dyn.	265.4 Nm
M _z dyn.	280.0 Nm

Bearing Carriage WS 3	
C ₀	3,141 N
C	1,879 N
F ₁ stat.	2,682 N
F ₁ dyn.	1,604 N
F ₂ stat.	3,141 N
F ₂ dyn.	1,879 N
M _x stat.	115.7 Nm
M _y stat.	105.3 Nm
M _z stat.	123.3 Nm
M _x dyn.	69.2 Nm
M _y dyn.	62.9 Nm
M _z dyn.	73.7 Nm

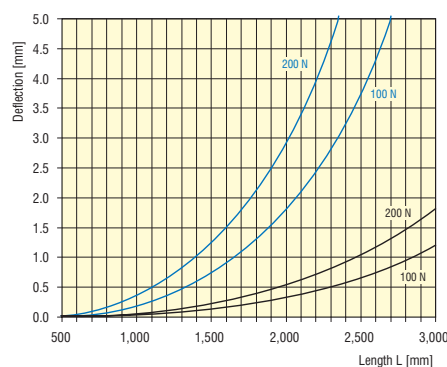
Force sketch of the load table see page 37

Order Key

235 0XX XXXX

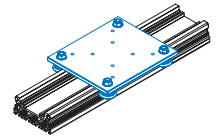
Standard = 14 Length in mm (in steps of 100 mm)
 Stainless = 15 e.g. 0029 = Length 296
 0299 = Length 2996

Deflection



Force sketch of the deflection diagrams see page 37

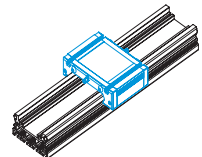
Roller Carriage LW 7



- L 176 x W 150 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31,
- life-time lubrication
- Adjustable free of clearance
- Weight: 2.03 kg

Item no.: **223 012**

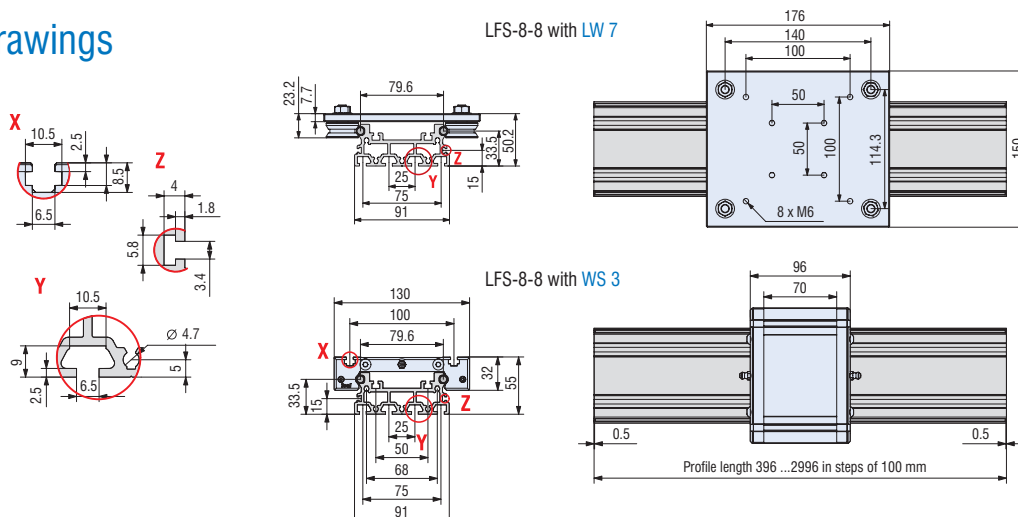
Aluminium Bearing Carriage WS 3/70



- L 96 x W 130 x H 32 mm
- Milled clamping surface
- M6 T-grooves
- Central lubrication
- Adjustable free of clearance
- Weight: 0.50 kg
- Option: stainless design

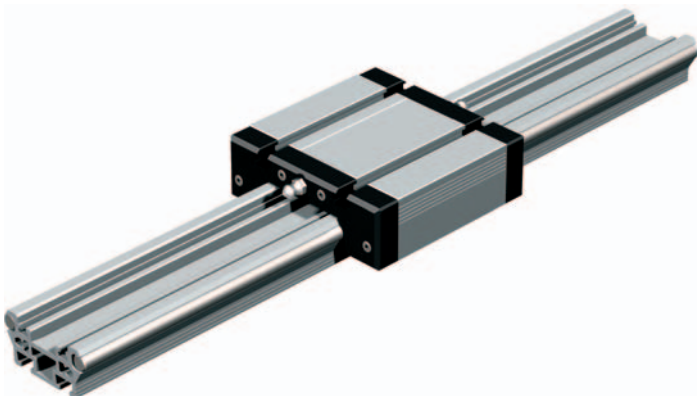
Item no.: **223 103 0070**
 Stainless: **223 103 1070**

Scale Drawings



Linear Guide Rail

LFS-8-9 (MLF 9)



Features

- W 53 x H 25 mm
- 2 precision steel shafts Ø 8 mm
- especial Twist-resistant
- Aluminium shaft profile, anodized
- Bottom-up mounting by means of thread rails in the T-groove profile
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 1.96 kg/m

Load Data

Roller Carriage LW 10	
C ₀	2,160 N
C	4,000 N
F ₁ stat.	4,320 N
F ₁ dyn.	3,792 N
F ₂ stat.	2,160 N
F ₂ dyn.	4,000 N
M _x stat.	170.4 Nm
M _y stat.	248.4 Nm
M _z stat.	124.2 Nm
M _x dyn.	149.5 Nm
M _y dyn.	218.0 Nm
M _z dyn.	230.0 Nm

Bearing Carriage WS 11	
C ₀	3,114 N
C	1,846 N
F ₁ stat.	2,659 N
F ₁ dyn.	1,576 N
F ₂ stat.	3,114 N
F ₂ dyn.	1,846 N
M _x stat.	67.3 Nm
M _y stat.	100.5 Nm
M _z stat.	117.6 Nm
M _x dyn.	39.9 Nm
M _y dyn.	59.5 Nm
M _z dyn.	69.7 Nm

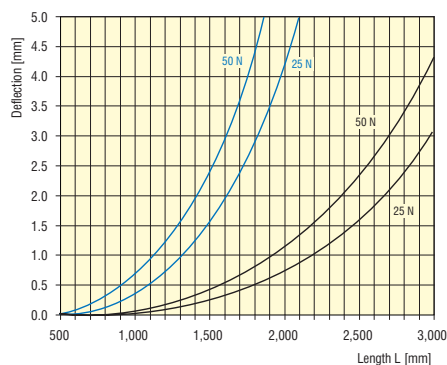
Force sketch of the load table see page 37

Order Key

235 0XX XXXX

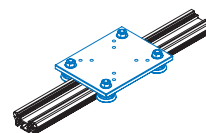
Standard = 16 Length in mm (in steps of 100 mm)
 Stainless = 17 e.g. 0029 = Length 296
 0299 = Length 2996

Deflection



Force sketch of the deflection diagrams see page 37

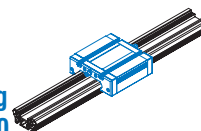
Roller Carriage LW 10



- L 150 x W 115 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31, life-time lubrication
- Adjustable free of clearance
- Weight: 1.47 kg

Item no.: **223 014**

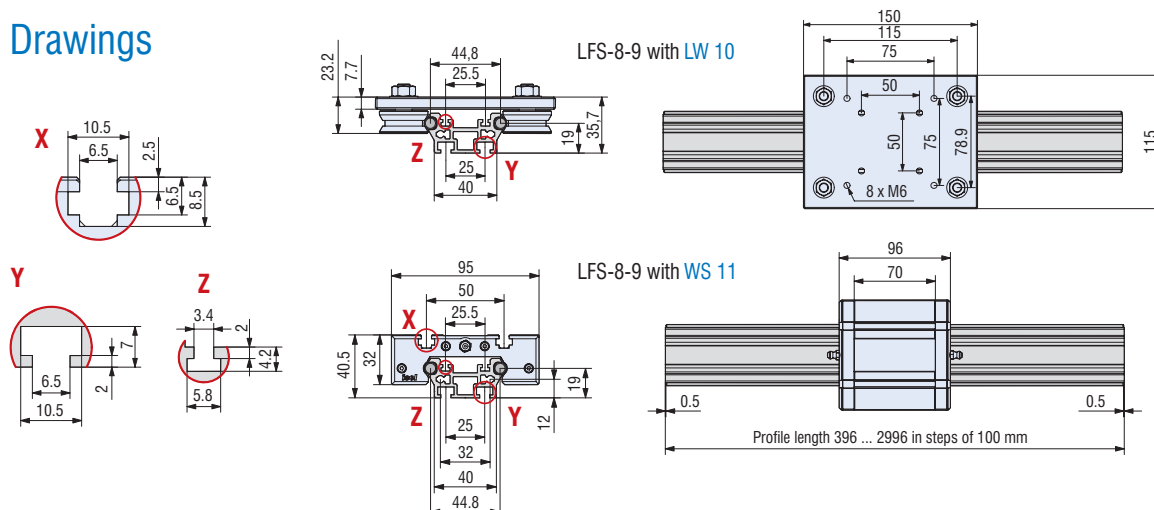
Aluminium Bearing Carriage WS 11/70



- L 95 x W 96 x H 32 mm
- Milled clamping surface
- M6 T-grooves
- Central lubrication
- Adjustable free of clearance
- Weight: 0.40 kg
- Option: Stainless design

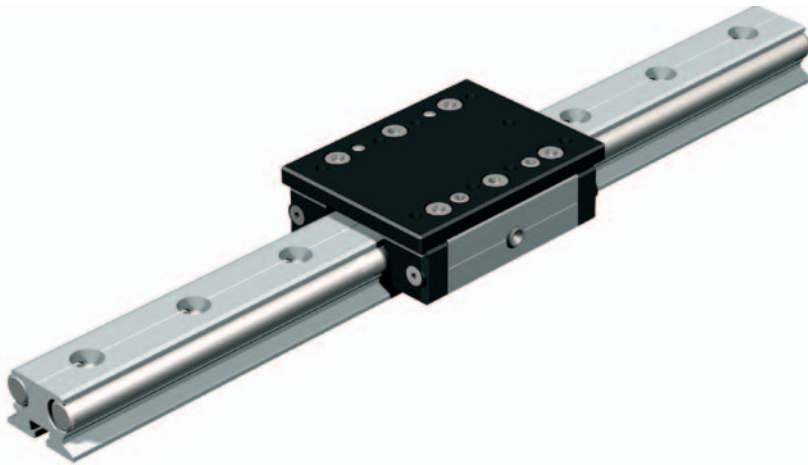
Item no.: **223 111 0070**
 Stainless: **223 111 1070**

Scale Drawings



Linear Guide Rail

LFS-12-10 (DSF 1)



Features

- W 36 x H 24,5 mm
- 2 precision steel shafts Ø 12
- Stress-resistant
- Aluminium shaft profile, anodized
- Bottom-up mounting by means of thread rails M6 in the T-grooves and top-down mounting by means of Durchgangsbohrungen für M6 holes for M6 in a 50 mm raster
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 2.90 kg/m

Load Data

Roller Carriage LW 4	
C_0	2160 N
C	4000 N
F_1 stat.	4320 N
F_1 dyn.	3846 N
F_2 stat.	2160 N
F_2 dyn.	4000 N
M_x stat.	135.4 Nm
M_x stat.	194.4 Nm
M_x stat.	97.2 Nm
M_x dyn.	120.5 Nm
M_x dyn.	173.0 Nm
M_x dyn.	180.0 Nm

Sledge WS 8	
C_0	3303 N
C	1873 N
F_1 stat.	2821 N
F_1 dyn.	1599 N
F_2 stat.	3303 N
F_2 dyn.	1873 N
M_x stat.	46.7 Nm
M_x stat.	105.3 Nm
M_x stat.	123.3 Nm
M_x dyn.	26.4 Nm
M_x dyn.	59.7 Nm
M_x dyn.	69.9 Nm

Force sketch of the load table see page 37

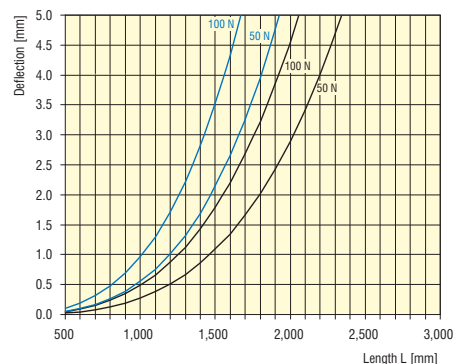
Order Key 220 001 XXXX

Length in mm (in steps of 100 mm)
e.g. 0300 = Length 296
3000 = Length 2996

Steel Shaft Length = Total Length L - 1 mm

Special length at 3000 mm
with bar connection on request

Deflection

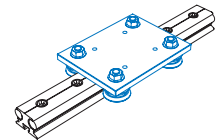


Force sketch of the deflection diagrams see page 37

Roller Carriage LW 4

- L 125 x W 97 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31, life-time lubrication
- Adjustable free of clearance
- Weight: 1.02 kg

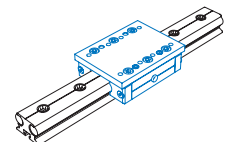
Item no.: 223 009



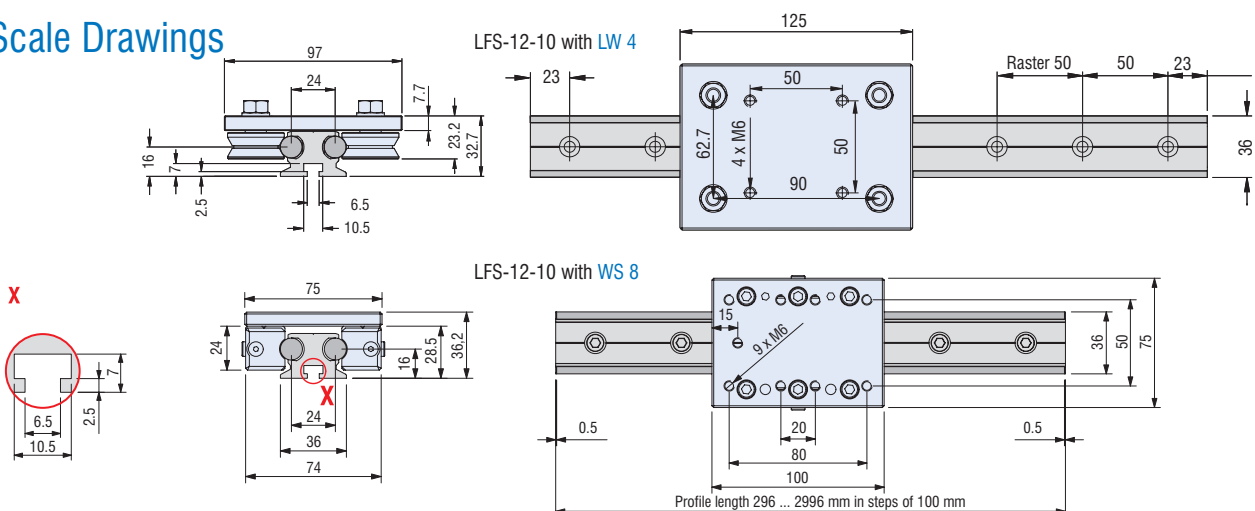
Sledge WS 8

- L 100 x W 75 x H 32 mm
- Milled clamping surface
- Lubrication possibility
- Adjustable free of clearance
- Weight: 0.70 kg

Item no.: 223 108 0070



Scale Drawings



Linear Guide Rail

LFS-12-11 (ELF 1)



Features

- W 20 x H 31 mm
- Precision steel shaft Ø 12
- Aluminium shaft profile, anodized
- Bottom-up mounting on a plane surface by means of thread rails M6 in the T-grooves
- Arbitrary guide rail length
- Weight: 1.26 kg/m

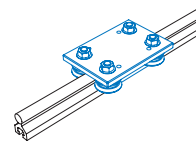
Order Data



LFS-12-11

L [mm]	Item no.
298	220 002 0298
398	220 002 0398
498	220 002 0498
598	220 002 0598
698	220 002 0698
798	220 002 0798
898	220 002 0898
998	220 002 0998
1098	220 002 1098
1198	220 002 1198
1298	220 002 1298
1398	220 002 1398
1498	220 002 1498
1598	220 002 1598
1798	220 002 1798
1998	220 002 1998
2098	220 002 2098
2498	220 002 2498
2598	220 002 2598
2998	220 002 2998
Profile length = L - 2 mm	

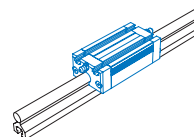
Roller Carriage LW 5



- L 110 x W 75 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31, life-time lubrication
- Adjustable free of clearance
- Weight: 0.81 kg

Item no.: **223 010**

Bearing Carriage WS 6/70



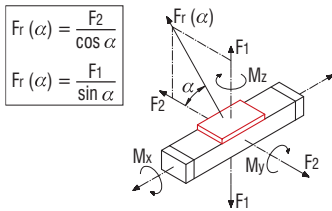
- L 100 x W 50 x H 31,5 mm
- T-grooves M6
- Central lubrication
- Adjustable free of clearance
- Weight: 0.30 kg
- Option: stainless version

Item no.: **223 106 0070**
stainless: **223 106 1070**

Linear Guide Rail

LFS-12-11 (ELF 1)

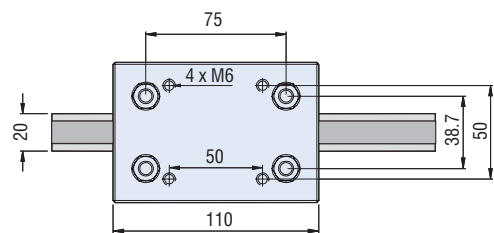
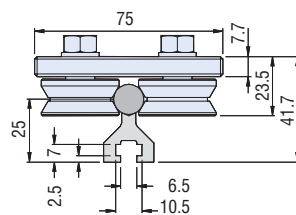
Load Data



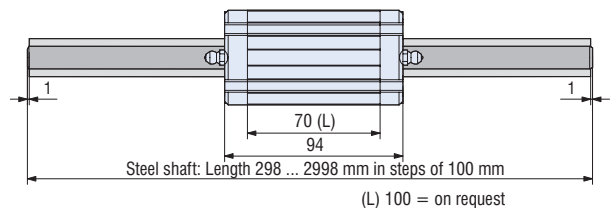
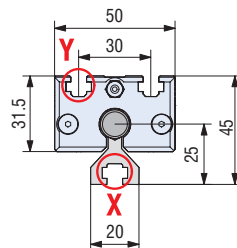
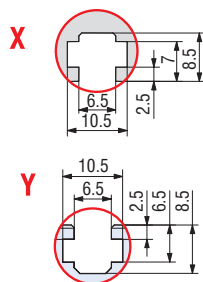
Roller Carriage LW 5		Bearing Carriage WS 6	
C ₀	2160 N	C ₀	3303 N
C	4000 N	C	1873 N
F ₁ stat.	4320 N	F ₁ stat.	2821 N
F ₁ dyn.	3846 N	F ₁ dyn.	1599 N
F ₂ stat.	2160 N	F ₂ stat.	3303 N
F ₂ dyn.	4000 N	F ₂ dyn.	1873 N
M ₁ stat.	-	M ₁ stat.	-
M ₁ stat.	162.0 Nm	M ₁ stat.	105.3 Nm
M ₂ stat.	81.0 Nm	M ₂ stat.	123.3 Nm
M ₁ dyn.	-	M ₁ dyn.	-
M ₁ dyn.	144.2 Nm	M ₁ dyn.	59.7 Nm
M ₂ dyn.	150.0 Nm	M ₂ dyn.	69.9 Nm

Scale Drawings

LFS-12-11 with LW 5

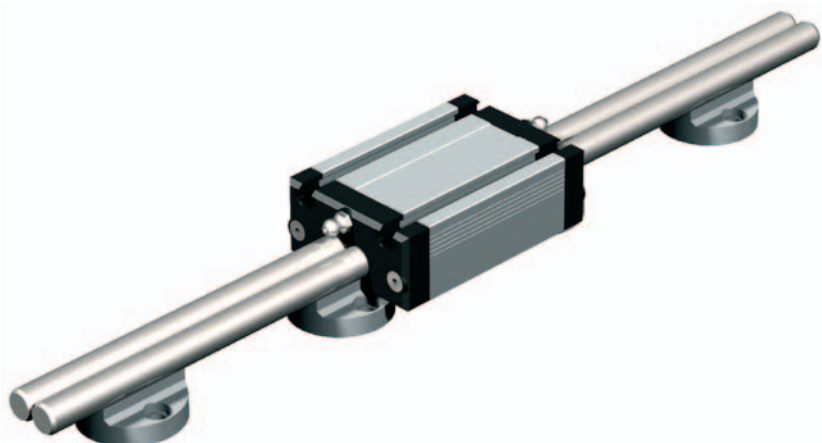


LFS-12-11 with WS 6



Linear Guide Rail

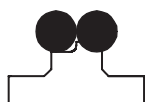
LFS-12-1 (LF 1)



Features

- W 40 x H 27 mm
- 2 precision steel shafts Ø 12
- Twist-resistant
- Aluminium shaft blocks
- Bottom-up or top-down mounting by means of through holes for M6 in the seat blocks
- Arbitrary guide rail length
- Weight: 1.93 kg/m

Order Data

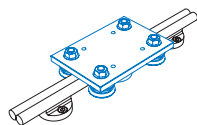


LFS-12-1 (Single Steel Shaft!)

L [mm]	Item no.
298	227 312 0298
398	227 312 0398
498	227 312 0498
598	227 312 0598
698	227 312 0698
798	227 312 0798
898	227 312 0898
998	227 312 0998
1098	227 312 1098
1198	227 312 1198
1298	227 312 1298
1398	227 312 1398
1498	227 312 1498
1598	227 312 1598
1798	227 312 1798
1998	227 312 1998
2098	227 312 2098
2498	227 312 2498
2998	227 312 2998
Aluminum shaft seat blocks 10 pieces, item no. 221 501	

Special length on request

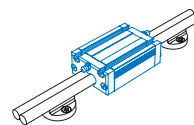
Roller Carriage LW 3



- L 125 x W 85 x H 7,7 mm
- Polished steel plate
- Weight: 0.93 kg

Item No.: **223 008**

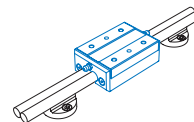
Aluminium Bearing Carriage WS 4/70



- L 94 x W 62 x H 31,5 mm
- Milled clamping surface
- Weight: 0.33 kg
- Option: stainless version

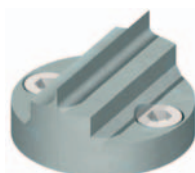
Item no.: **223 104 0070**
stainless: **223 104 1070**

Steel Sledge LS 1



- L 91 x W 60 x H 32 mm
- Polished clamping surface
- Weight: 0.80 kg

Item no.: **223 006**



Shaft Supporting Blocks

- Ø40 mm, hole center distance 28 mm
- Zinc cast
- Packing unit: 10 pieces

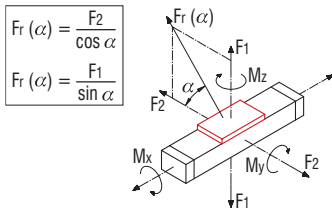
Item no.: **221 501**

Linear Guide Rail

LFS-12-1

(LF 1)

Load Data



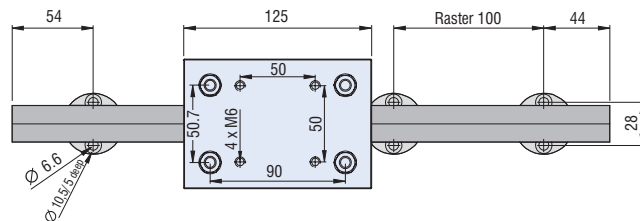
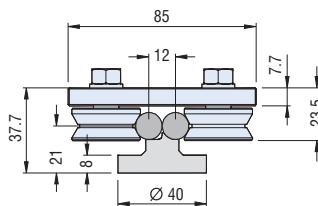
Roller Carriage LW 3	
C ₀	2160 N
C	4000 N
F ₁ stat.	4320 N
F ₁ dyn.	3846 N
F ₂ stat.	2160 N
F ₂ dyn.	4000 N
M ₁ stat.	109.5 Nm
M ₁ stat.	194.4 Nm
M ₂ stat.	97.2 Nm
M ₂ dyn.	97.4 Nm
M ₃ dyn.	173.0 Nm
M ₄ dyn.	180.0 Nm

Bearing Carriage WS 4	
C ₀	3303 N
C	1873 N
F ₁ stat.	2821 N
F ₁ dyn.	1599 N
F ₂ stat.	3303 N
F ₂ dyn.	1873 N
M ₁ stat.	29.8 Nm
M ₁ stat.	105.3 Nm
M ₂ stat.	123.3 Nm
M ₂ dyn.	16.8 Nm
M ₃ dyn.	59.7 Nm
M ₄ dyn.	69.9 Nm

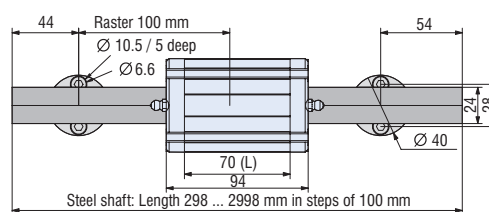
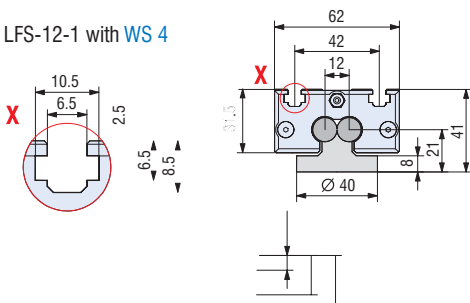
Bearing Carriage LS 1	
C ₀	3508 N
C	2105 N
F ₁ stat.	3549 N
F ₁ dyn.	2130 N
F ₂ stat.	3508 N
F ₂ dyn.	2105 N
M ₁ stat.	36.2 Nm
M ₁ stat.	129.0 Nm
M ₂ stat.	127.5 Nm
M ₂ dyn.	21.7 Nm
M ₃ dyn.	77.4 Nm
M ₄ dyn.	76.5 Nm

Scale Drawings

LFS-12-1 with LW 3

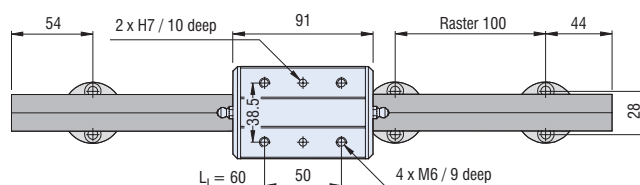
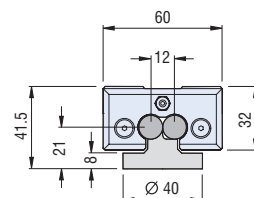


LFS-12-1 with WS 4



(L) 100 = on request

LFS-12-1 with LS 1



Linear Guide Rail

LFS-12-2 (LF 2)



Features

- W 62 x H 31 mm
- 2 precision steel shafts Ø 12
- Twist-resistant
- Aluminium shaft profile, anodized
- High parallelism due to patented shaft seat contour
- High guiding precision
- Bottom-up or top-down mounting on a plane surface by means of through holes
Ø 6,5 in a 100 mm raster
- Arbitrary guide rail length
- Weight: 3.29 kg/m

Order Data

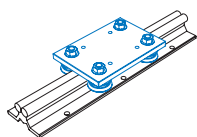


LFS-12-2

L [mm]	Item no.
298	235 200 0298
398	235 200 0398
498	235 200 0498
598	235 200 0598
698	235 200 0698
798	235 200 0798
898	235 200 0898
998	235 200 0998
1098	235 200 1098
1198	235 200 1198
1298	235 200 1298
1398	235 200 1398
1498	235 200 1498
1598	235 200 1598
1798	235 200 1798
1998	235 200 1998
2098	235 200 2098
2498	235 200 2498
2598	235 200 2598
2998	235 200 2998
Profile length = L - 2 mm	

Special length at 3000 mm
with bar connection on request

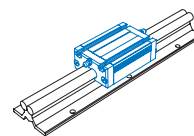
Roller Carriage LW 3



- L 125 x W 85 x H 7,7 mm
- Polished steel plate
- Weight: 0.93 kg

Item no.: **223 008**

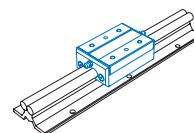
Aluminium Bearing Carriage WS 4/70



- L 94 x W 62 x H 31,5 mm
- Milled clamping surface
- Weight: 0.33 kg
- Option: stainless version

Item no.: **223 104 0070**
stainless: **223 104 1070**

Steel Carriage LS 1



- L 91 x W 60 x H 32 mm
- Polished clamping surface
- Weight: 0.80 kg

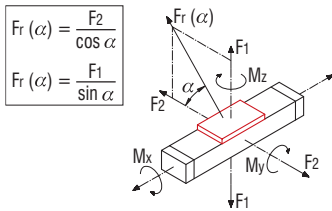
Item no.: **223 006**

Linear Guide Rail

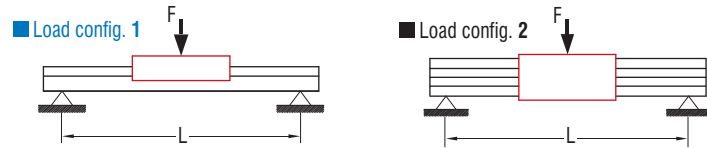
LFS-12-2

(LF 2)

Load Data



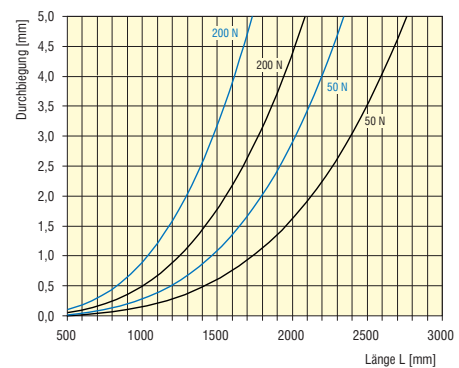
Deflection



Roller Carriage LW 3	
C ₀	2160 N
C	4000 N
F ₁ stat.	4320 N
F ₁ dyn.	3846 N
F ₂ stat.	2160 N
F ₂ dyn.	4000 N
M ₁ stat.	109.5 Nm
M ₁ stat.	194.4 Nm
M ₂ stat.	97.2 Nm
M ₂ dyn.	97.4 Nm
M ₃ dyn.	173.0 Nm
M ₃ dyn.	180.0 Nm

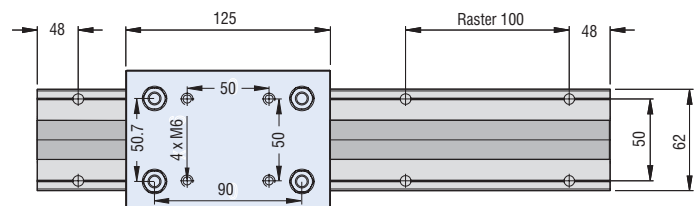
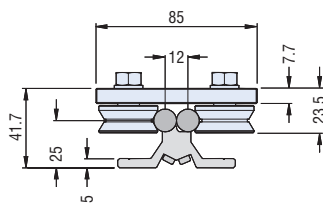
Bearing Carriage WS 4	
C ₀	3303 N
C	1873 N
F ₁ stat.	2821 N
F ₁ dyn.	1599 N
F ₂ stat.	3303 N
F ₂ dyn.	1873 N
M ₁ stat.	29.8 Nm
M ₁ stat.	105.3 Nm
M ₂ stat.	123.3 Nm
M ₂ dyn.	16.8 Nm
M ₃ dyn.	59.7 Nm
M ₃ dyn.	69.9 Nm

Bearing Carriage LS 1	
C ₀	3508 N
C	2105 N
F ₁ stat.	3549 N
F ₁ dyn.	2130 N
F ₂ stat.	3508 N
F ₂ dyn.	2105 N
M ₁ stat.	36.2 Nm
M ₁ stat.	129.0 Nm
M ₂ stat.	127.5 Nm
M ₂ dyn.	21.7 Nm
M ₃ dyn.	77.4 Nm
M ₃ dyn.	76.5 Nm

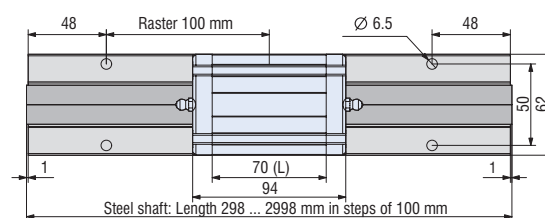
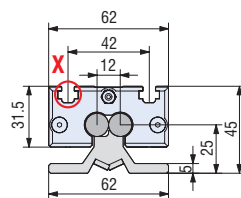
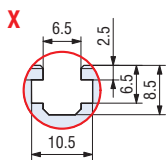


Scale Drawings

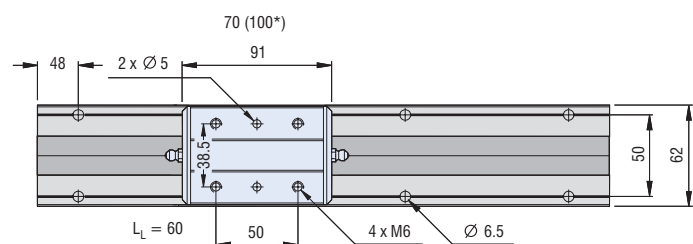
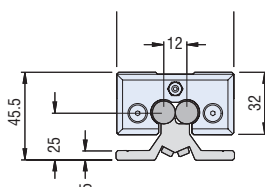
LFS-12-2 with LW 3



LFS-12-2 with WS 4



LFS-12-2 with LS 1

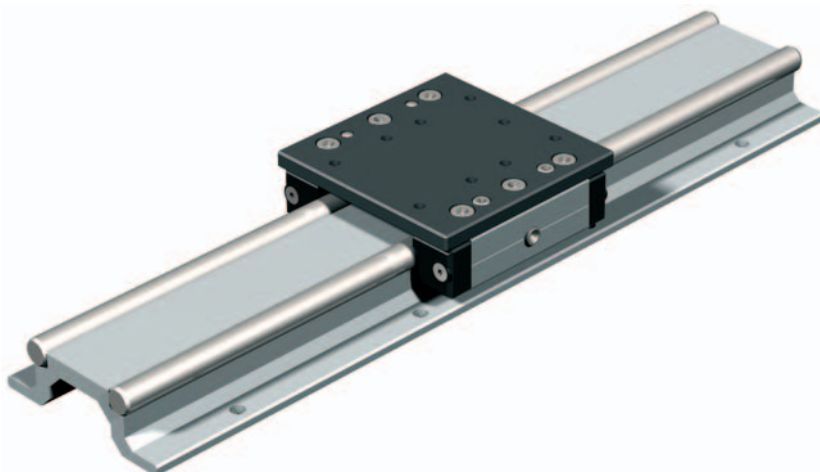


* = on request

Linear Guide Rail

LFS-12-3

(LF 3)



Features

- W 90 x H 31 mm
- 2 precision steel shafts Ø 12
- Twist-resistant
- Aluminium shaft profile, anodized
- Increased shaft distance allows for taking up higher forces
- Bottom-up or top-down mounting by means of through holes for M6 in a 100 mm raster
- Arbitrary guide rail length
- Weight: 3.90 kg/m

Load Data

Roller Carriage LW 8	
C_0	2160 N
C	4000 N
F_1 stat.	4320 N
F_1 dyn.	3846 N
F_2 stat.	2160 N
F_2 dyn.	4000 N
M_x stat.	189.2 Nm
M_x dyn.	248.4 Nm
M_y stat.	124.2 Nm
M_y dyn.	168.4 Nm
M_z stat.	221.1 Nm
M_z dyn.	230.0 Nm

Bearing Carriage WS 7	
C_0	3303 N
C	1873 N
F_1 stat.	2821 N
F_1 dyn.	1599 N
F_2 stat.	3303 N
F_2 dyn.	1873 N
M_x stat.	82.0 Nm
M_x dyn.	105.3 Nm
M_y stat.	123.3 Nm
M_y dyn.	46.4 Nm
M_z stat.	59.7 Nm
M_z dyn.	69.9 Nm

Force sketch of the load table see page 37

Order Key

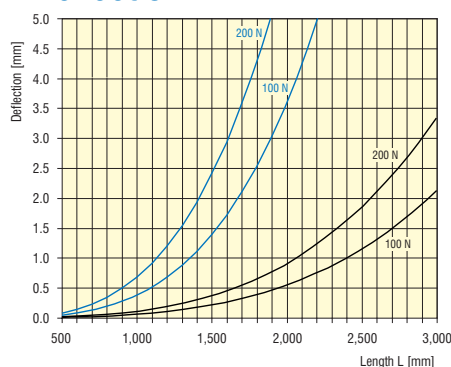
235 300 XXXX

Length in mm (in steps of 100 mm)
e.g. 0029 = Length 298
0299 = Length 2998

Profile Length = Total Length L - 2 mm

Special length at 3000 mm
with bar connection on request

Deflection



Force sketch of the deflection diagrams see page 37

Roller Carriage LW 8

- L 150 x W 125 x H 7,7 mm
- Polished steel plate
- 4 rollers Ø 31, life-time lubrication
- Adjustable free of clearance
- Weight: 1.51 kg

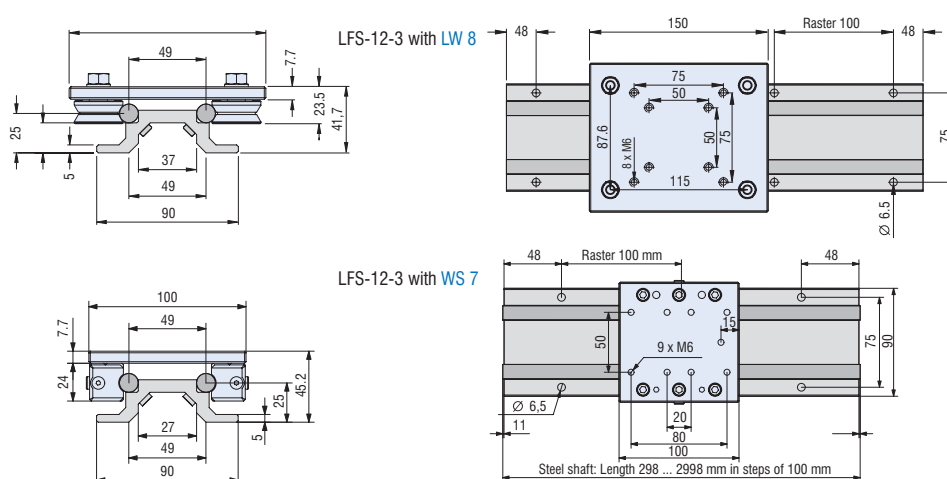
Item no.: 223 013

Bearing Carriage WS 7/70

- L 100 x W 100 x H 32 mm
- Polished steel plate
- Central lubrication
- Adjustable free of clearance
- Weight: 1.67 kg

Item no.: 223 107 0070

Scale Drawings



Linear Guide Rail

LFS-12-7

(LF 7)



Features

- W 128 x H 40 mm
- 2 precision steel shafts Ø 12
- Twist-resistant
- Aluminium shaft profile, anodized
- Attachment from below by means of thread rails in the T-groove indentation profile
- Conditionally cantilever
- Arbitrary Guide Rail length
- Weight: 5.63 kg/m

Load Data

Unit with 2x WS 6	
C_0	4955 N
C	2810 N
F_1 stat.	4232 N
F_1 dyn.	2399 N
F_2 stat.	4955 N
F_2 dyn.	2810 N
M_1 stat.	159 Nm
M_1 stat.	148 Nm
M_1 stat.	173 Nm
M_1 dyn.	90 Nm
M_1 dyn.	84 Nm
M_1 dyn.	98 Nm

Unit with 4x WS 6	
C_0	6606 N
C	3746 N
F_1 stat.	5642 N
F_1 dyn.	3198 N
F_2 stat.	6606 N
F_2 dyn.	3746 N
M_1 stat.	212 Nm
M_1 stat.	310 Nm
M_1 stat.	363 Nm
M_1 dyn.	120 Nm
M_1 dyn.	176 Nm
M_1 dyn.	206 Nm

Force sketch of the load table see page 37

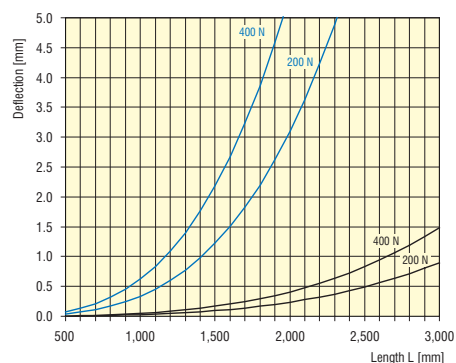
Order Key

220 006 XXXX

Length in mm (in steps of 100 mm)
e.g. 0029 = Length 298
0299 = Length 2998

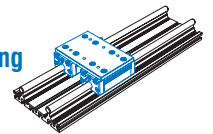
Profile length = Total Length L - 2 mm

Deflection



Force sketch of the deflection diagrams see page 37

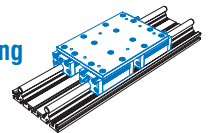
2 x Aluminium Bearing Carriage WS 6/70 (Kit)



- L 84 x W 126 x H 8 mm
- Polished steel plate
- 2 x WS 6/70, central lubrication
- Adjustable free of clearance
- Total Weight: 1.19 kg

Item no.: 223 240 0001

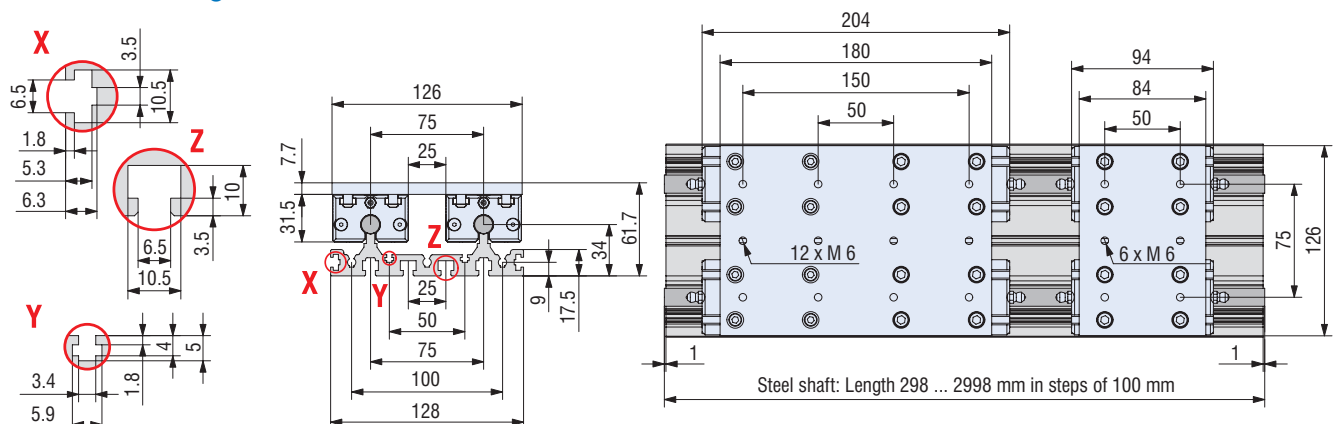
4 x Aluminium Bearing Carriage WS 6/70 (Kit)



- L 180 x W 126 x H 8 mm
- Polished steel plate
- 4 x WS 6/70, central lubrication
- Adjustable free of clearance
- Total Weight: 2.48 kg

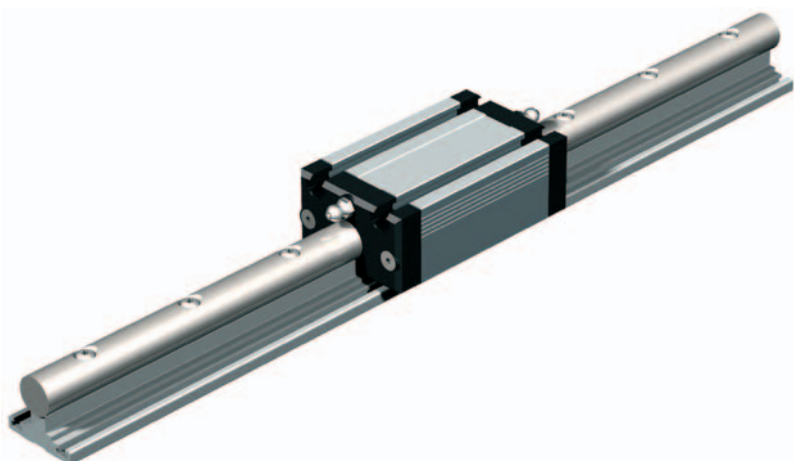
Item no.: 223 240 0002

Scale Drawings



Linear Guide Rail

LFS-16-1 (ILF 1)



Features

- W 34,5 x H 30 mm
- Precision steel shaft Ø 16
- Aluminium shaft profile, anodized
- Top-down mounting in a 100 mm raster on a plane surface by means of provided special screws M5
- Arbitrary guide rail length
- Weight: 2.2 kg/m

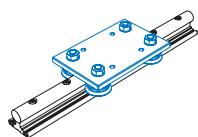
Order Data



LFS-16-1

L [mm]	Item no.
298	220 003 0029
398	220 003 0039
498	220 003 0049
598	220 003 0059
698	220 003 0069
798	220 003 0079
898	220 003 0089
998	220 003 0099
1098	220 003 0109
1198	220 003 0119
1298	220 003 0129
1398	220 003 0139
1498	220 003 0149
1598	220 003 0159
1798	220 003 0179
1998	220 003 0199
2098	220 003 0209
2498	220 003 0249
2598	220 003 0259
2998	220 003 0299
Profile length = L - 2 mm	

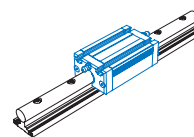
Roller Carriage ILW 1



- L 125 x W 80 x H 7,7 mm
- Polished steel plate
- Weight: 0.87 kg

Item no.: **223 230**

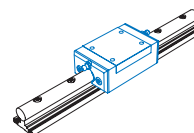
Aluminium Bearing Carriage IWS 1



- L 94 x W 55 x H 33,5 mm
- Milled clamping surface
- Weight: 0.32 kg
- Option: stainless version

Item no.: **223 220**
Stainless: **223 220 0001**

Steel Bearing Carriage ILS 1



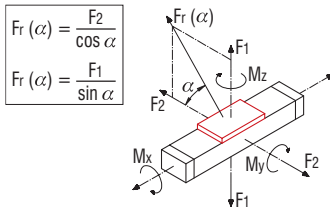
- L 94 x W 58 x H 33,7 mm
- Milled clamping surface
- Weight: 0.72 kg

Item no.: **223 210**

Linear Guide Rail

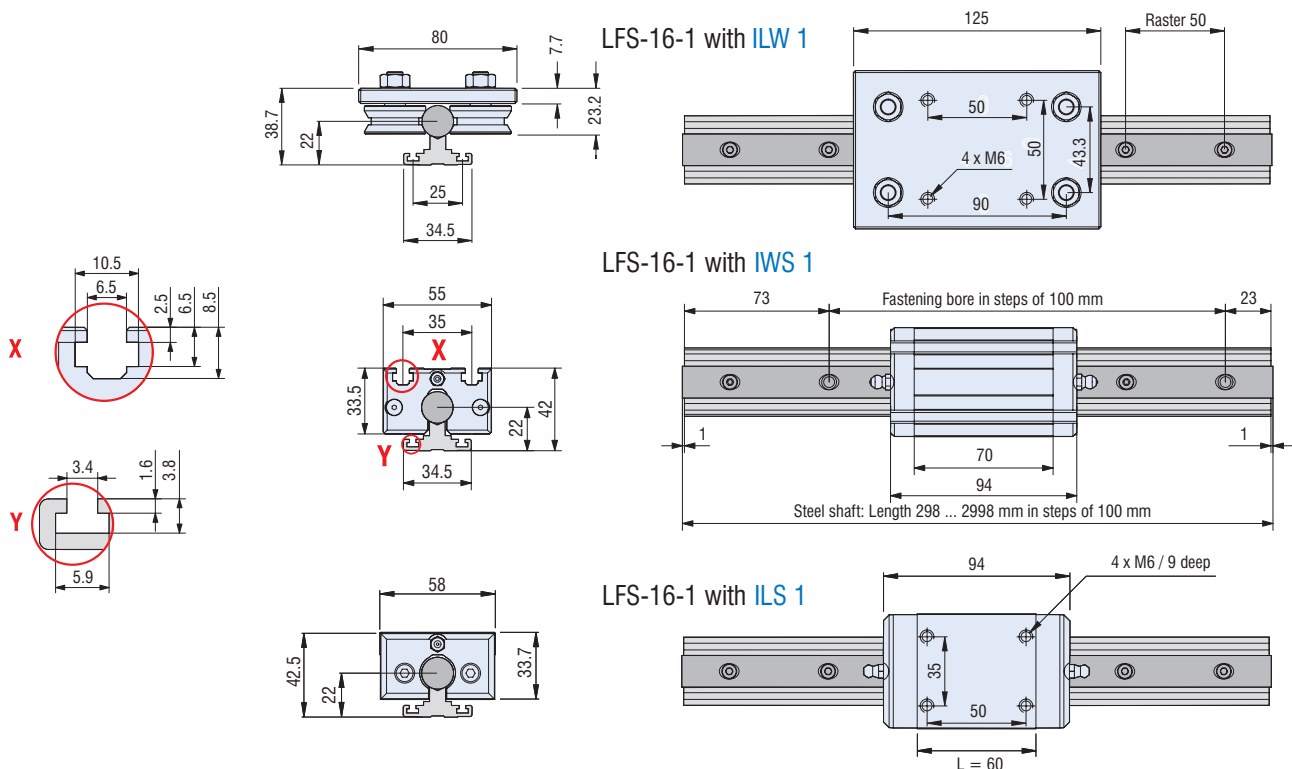
LFS-16-1 (ILF 1)

Load Data



Roller Carriage ILW 1		Bearing Carriage IWS 1		Bearing Carriage ILS 1	
C ₀	2160 N	C ₀	3286 N	C ₀	5065 N
C	4000 N	C	1773 N	C	3238 N
F ₁ stat.	4320 N	F ₁ stat.	2806 N	F ₁ stat.	4325 N
F ₁ dyn.	3897 N	F ₁ dyn.	1514 N	F ₁ dyn.	2765 N
F ₂ stat.	2160 N	F ₂ stat.	3286 N	F ₂ stat.	5065 N
F ₂ dyn.	4000 N	F ₂ dyn.	1773 N	F ₂ dyn.	3238 N
M ₁ stat.	-	M ₁ stat.	--	M ₁ stat.	-
M ₁ stat.	194.4 Nm	M ₁ stat.	104.7 Nm	M ₁ stat.	113.4 Nm
M ₂ stat.	97.2 Nm	M ₂ stat.	122.6 Nm	M ₂ stat.	132.8 Nm
M ₁ dyn.	-	M ₁ dyn.	--	M ₁ dyn.	-
M ₁ dyn.	175.3 Nm	M ₁ dyn.	56.4 Nm	M ₁ dyn.	72.4 Nm
M ₂ dyn.	180.0 Nm	M ₂ dyn.	66.1 Nm	M ₂ dyn.	84.8 Nm

Scale Drawings



Linear Guide Rail

LFS-16-2 (ILF 2)



Features

- W 25 x H 47,5 mm
- Precision steel shaft Ø 16
- Aluminium shaft profile, anodized
- Bottom-up mounting on a plane surface by means of thread bars M6 in the T-groove indentation
- Not cantilever
- Length in steps of 100 mm
- max. Length 2998 mm
- Special length on request
- Weight: 2.70 kg/m

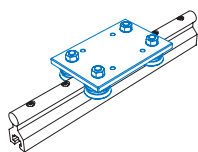
Order Data



LFS-16-2

L [mm]	Item no.
298	220 004 0029
398	220 004 0039
498	220 004 0049
598	220 004 0059
698	220 004 0069
798	220 004 0079
898	220 004 0089
998	220 004 0099
1098	220 004 0109
1198	220 004 0119
1298	220 004 0129
1398	220 004 0139
1498	220 004 0149
1598	220 004 0159
1798	220 004 0179
1998	220 004 0199
2098	220 004 0209
2498	220 004 0249
2598	220 004 0259
2998	220 004 0299
Profile length = L - 2 mm	

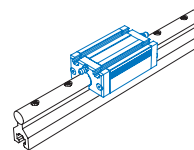
Roller Carriage ILW 1



- L 125 x W 80 x H 7,7 mm
- Polished steel plate
- Weight: 0.87 kg

Item no.: **223 230**

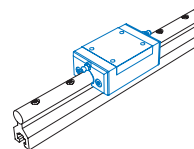
Aluminium Bearing Carriage IWS 1



- L 94 x W 55 x H 33,5 mm
- Milled clamping surface
- Weight: 0.32 kg
- Option: stainless version

Item no.: **223 220**Stainless: **223 220 0001**

Steel Bearing Carriage ILS 1



- L 94 x W 58 x H 33,7 mm
- Milled clamping surface
- Weight: 0.72 kg

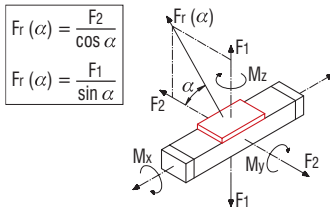
Item no.: **223 210**

Linear Guide Rail

LFS-16-2

(ILF 2)

Load Data

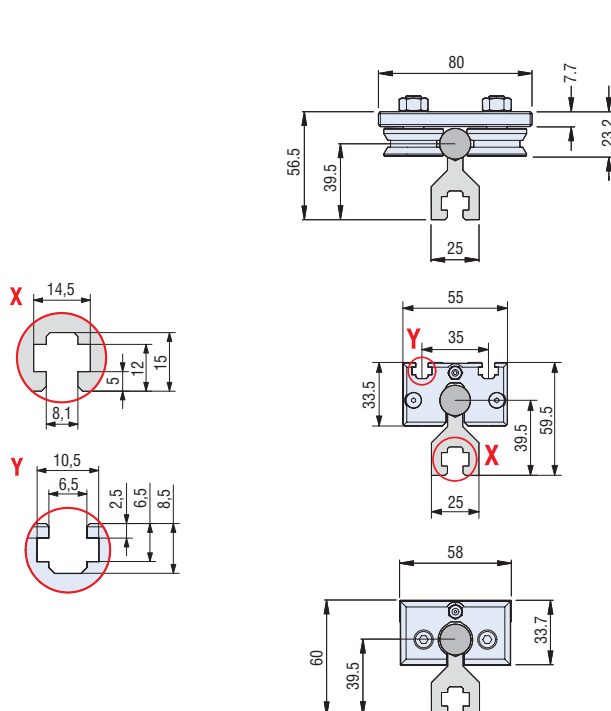


Roller Carriage ILW 1	
C ₀	2160 N
C	4000 N
F ₁ stat.	4320 N
F ₁ dyn.	3897 N
F ₂ stat.	2160 N
F ₂ dyn.	4000 N
M ₁ stat.	-
M ₁ stat.	194.4 Nm
M ₂ stat.	97.2 Nm
M ₁ dyn.	-
M ₁ dyn.	175.3 Nm
M ₂ dyn.	180.0 Nm

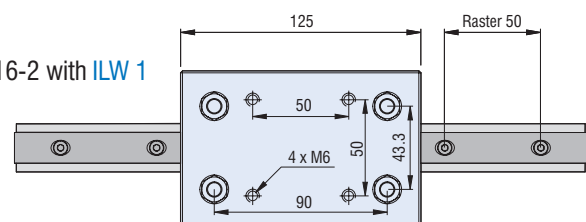
Bearing Carriage IWS 1	
C ₀	3286 N
C	1773 N
F ₁ stat.	2806 N
F ₁ dyn.	1514 N
F ₂ stat.	3286 N
F ₂ dyn.	1773 N
M ₁ stat.	--
M ₁ stat.	104.7 Nm
M ₂ stat.	122.6 Nm
M ₁ dyn.	--
M ₁ dyn.	56.4 Nm
M ₂ dyn.	66.1 Nm

Bearing Carriage ILS 1	
C ₀	5065 N
C	3238 N
F ₁ stat.	4325 N
F ₁ dyn.	2765 N
F ₂ stat.	5065 N
F ₂ dyn.	3238 N
M ₁ stat.	-
M ₁ stat.	113.4 Nm
M ₂ stat.	132.8 Nm
M ₁ dyn.	-
M ₁ dyn.	72.4 Nm
M ₂ dyn.	84.8 Nm

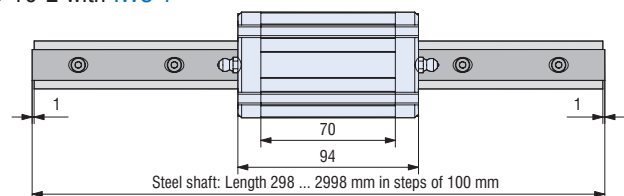
Scale Drawings



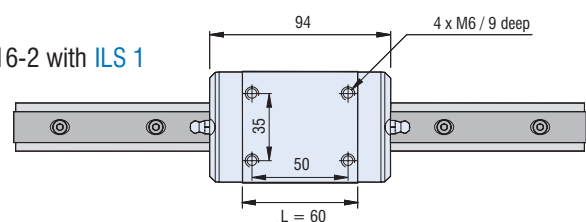
LFS-16-2 with ILW 1



LFS-16-2 with IWS 1



LFS-16-2 with ILS 1



Linear Guide Rail

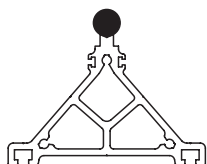
LFS-16-3 (ILF 3)



Features

- W 118 x H 93,7 mm
- Precision steel shaft Ø 16
- Aluminium shaft profile, anodized
- Milled shaft seat contour
- Bottom-up mounting by means of thread rails in the T-groove indentation or top-down mounting by means of hole raster bar and screws M6
- Conditionally cantilever
- Length in steps of 100 mm
- max. Length 2998 mm
- Special length on request
- Weight: 6.5 kg/m

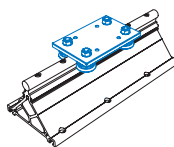
Order Data



LFS-16-3

L [mm]	Item no.
298	220 005 0029
398	220 005 0039
498	220 005 0049
598	220 005 0059
698	220 005 0069
798	220 005 0079
898	220 005 0089
998	220 005 0099
1098	220 005 0109
1198	220 005 0119
1298	220 005 0129
1398	220 005 0139
1498	220 005 0149
1598	220 005 0159
1798	220 005 0179
1998	220 005 0199
2098	220 005 0209
2498	220 005 0249
2598	220 005 0259
2998	220 005 0299
Profile length = L - 2 mm	

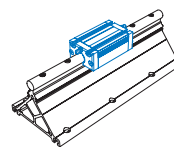
Roller Carriage ILW 1



- L 125 x W 80 x H 7,7 mm
- Polished steel plate
- Weight: 0.87 kg

Item no.: **223 230**

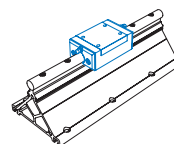
Aluminium Bearing Carriage IWS 1



- L 94 x W 55 x H 33,5 mm
- Milled clamping surface
- Weight: 0.32 kg
- Option: Stainless version

Item no.: **223 220**
stainless: **223 220 0001**

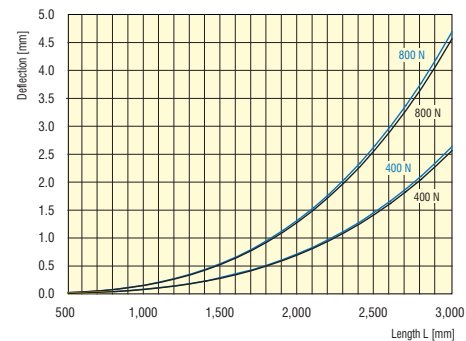
Steel Bearing Carriage ILS 1



- L 94 x W 58 x H 33,7 mm
- Polished clamping surface
- Weight: 0.72 kg

Item no.: **223 210**

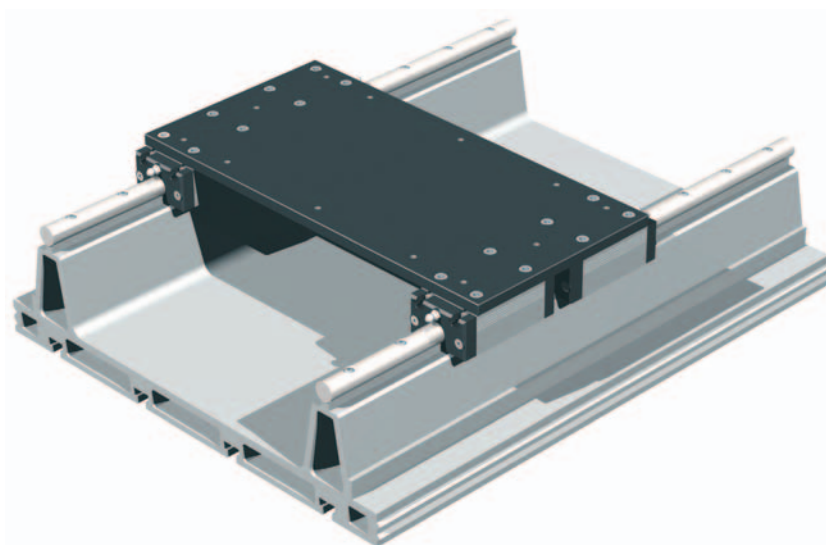
LFS-16-3



Technical drawing of the front view of a 100 mm wide, 60 mm high aluminum extrusion. The extrusion has a central rectangular cutout with a width of 50 mm and a height of 35 mm. The total width is 94 mm. There are four M6 x 9 deep screws, one in each corner of the central cutout. The drawing shows the extrusion is part of a larger assembly with other extrusions visible on either side.

Linear Guide Rail

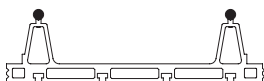
LFS-16-10 (ILF 10)



Features

- W 400 x H 113 mm
- 2 precision steel shafts Ø 16
- Twist-resistant
- Aluminium shaft profile, anodized
- Bottom-up mounting by means of thread rails M6 in the T-groove indentation
- Conditionally cantilever
- Arbitrary guide rail length
- Weight: 25.48 kg/m

Order Data

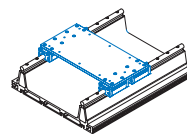


LFS-16-10

L [mm]	Item no.
298	220 010 0029
398	220 010 0039
498	220 010 0049
598	220 010 0059
698	220 010 0069
798	220 010 0079
898	220 010 0089
998	220 010 0099
1098	220 010 0109
1198	220 010 0119
1298	220 010 0129
1398	220 010 0139
1498	220 010 0149
1598	220 010 0159
1798	220 010 0179
1998	220 010 0199
2098	220 010 0209
2498	220 010 0249
2598	220 010 0259
2998	220 010 0299

Profile Length = L - 2 mm

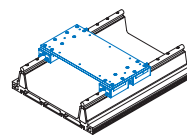
With 4 x Aluminium Bearing Carriage IWS 1 (Kit)



- L 180 x W 358 x H 8 mm
- Polished steel plate
- 4 x IWS 1, central lubrication possibility
- Adjustable free of clearance
- Total weight: 6.06 kg

Item no.: **223 240 0015**

With 4 x Steel Bearing Carriage ILS 1 (Kit)



- L 180 x W 358 x H 8 mm
- Polished steel plate
- 4 x ILS 1, central lubrication possibility
- Adjustable free of clearance
- Total weight: 7.66 kg

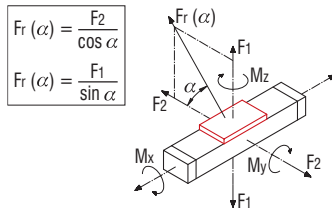
Item no.: **223 240 0016**

Linear Guide Rail

LFS-16-10

(ILF 10)

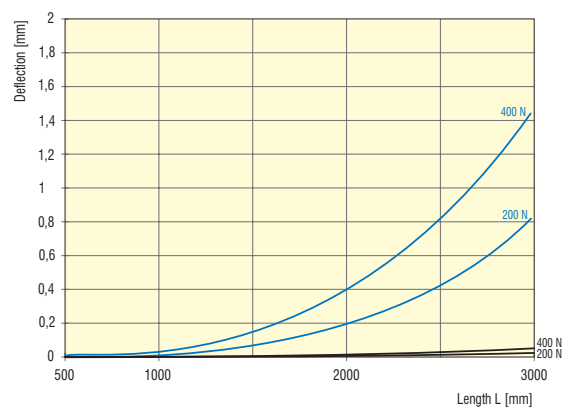
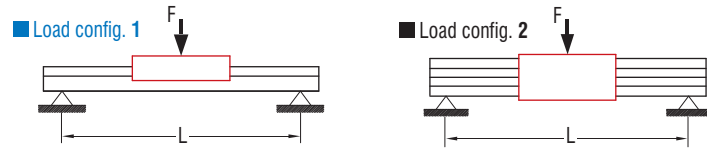
Load Data



Unit with 4 x IWS 1	
C ₀	6572 N
C	3546 N
F ₁ stat.	5612 N
F ₁ dyn.	3028 N
F ₂ stat.	6572 N
F ₂ dyn.	3546 N
M _x stat.	842 Nm
M _x stat.	309 Nm
M _y stat.	361 Nm
M _y dyn.	454 Nm
M _z dyn.	167 Nm
M _z dyn.	195 Nm

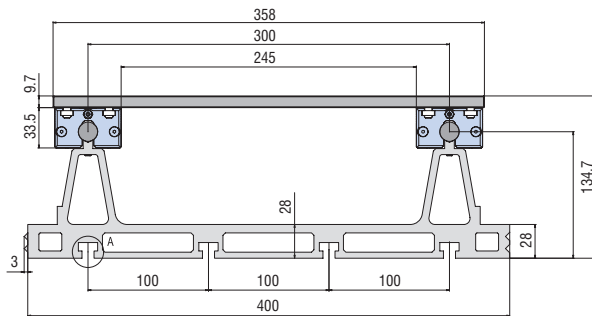
Unit with 4 x ILS 1	
C ₀	10130 N
C	6476 N
F ₁ stat.	8650 N
F ₁ dyn.	5530 N
F ₂ stat.	10130 N
F ₂ dyn.	6476 N
M _x stat.	1298 Nm
M _x stat.	476 Nm
M _y stat.	557 Nm
M _y dyn.	830 Nm
M _z dyn.	304 Nm
M _z dyn.	356 Nm

Deflection

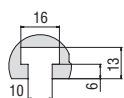


Scale Drawings

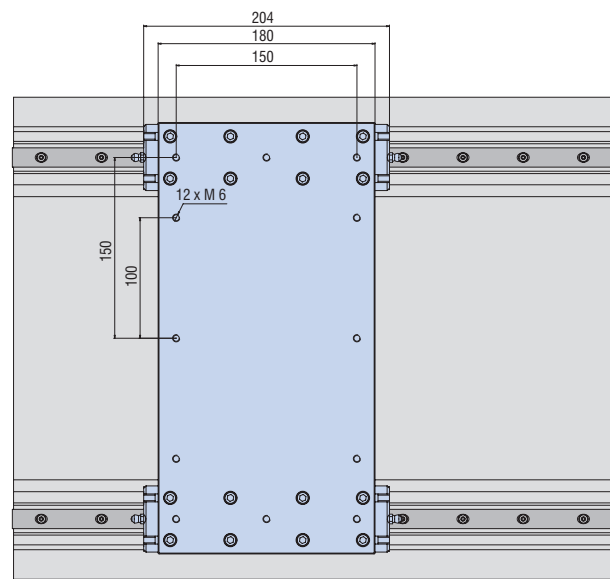
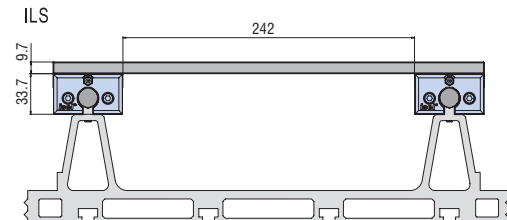
IWS



Detail A

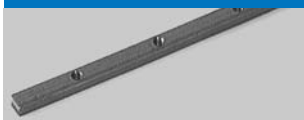


ILS



Accessory

Thread Rails



Thread Rail M6

- 10 x 4 mm
- galvanized
- M6 Ra 50 mm
- VE 3 pc. of 1 m
- for all except of PT / RE 40, 65 / SP / PG

Item no.: **209 011**

Slide Nuts



Slide Nut M6 (fig. 1)

- L 25 x W 10 x H 3,5
- galvanized
- PU 100 pieces
- for all except of PT / RE 40, 65 / PS 50 / SP / PG

Item no.: **209 001 0005**

Slide Nut M6 (fig. 1)

- L 25 x W 13 x H 5
- galvanized
- PU 50 pieces
- for all except of PT / RE 40, 65 / PG

Item no.: **209 004 0001**

Slide Nut 2 x M6 (fig. 2)

- L 45 x W 10 x H 3,5
- galvanized
- PU 50 pieces
- for all except of PT / RE 40, 65 / SP / PG

Item no.: **209 002 0004**

Slide Nut 2 x M6 (fig. 2)

- L 45 x W 13 x H 6
- galvanized
- 2 x M6 Ra 25 mm
- PU 25 pieces
- for PT / RE 40, 65 / PG

Item no.: **209 005 0001**

Angle Slide Nut 2 x M6 (fig. 3)

- galvanized
- PU 25 pieces
- for all except of PT / RE 40, 65 / SP / PG

Item no.: **209 021 0003**

Special Angle Slide Nut

3 x M6 (fig. 4)

- galvanized
- PU 25 pieces
- for all except of PT / RE 40, 65 / SP / PG

Item no.: **209 022 0003**

Linear Bearings



For Steelshafts Ø 12 mm

Linear Bearing LARGE

- L80 x W20 x H19 mm
- PU 2 pieces

Item no.: **222 002 0001**

Linear Bearing MEDIUM

- L60 x W20,5 x H17,8 mm
- PU 2 pieces

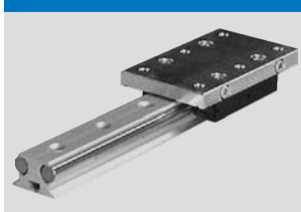
Item no.: **222 000**

Linear Bearing SMALL

- L40 x W20 x H19 mm
- PU 2 pieces

Item no.: **222 001**

Dual Track Set



For Steelshafts Ø 12 mm

Dual Track Set 1 for DSF 1

- L75 x W75 x H30,2 mm
- with 2 linear bearings SMALL

Item no.: **223 001**

Dual Track Set 2 for DSF 1

- L125 x W75 x H30,2 mm
- with 2 linear bearings LARGE

Item no.: **223 002**

Roller Carriage LW 2



Roller Carriage LW 2 for LFS-12-3

- with aluminium T-groove plate
- L150 x W125, 4 rollers Ø 31 mm

Item no.: **223 005**

Rollers



Roller Ø 21 mm

- concentric
- PU 2 pieces

Item no.: **222 003**

- eccentric
- PU 2 pieces

Item no.: **222 004**

Roller Ø 31 mm

- concentric
- PU 2 pieces

Item no.: **222 006**

- eccentric
- PU 2 pieces

Item no.: **222 007**

Lubricating Grease / Grease Gun



Lubricating Grease Item no.: **299 032 0002**

Hand Lever Grease Gun
for grease and oil
Item no.: **299 032 0003**

General References

Bearing capacity and life time

Fitting Position

Basically, the fitting position of the linear guides is arbitrarily selectable. It simply has to be considered that all arising forces and moments are below the maximum values of the respective axes.

Temperatures

All linear guides are designed for ambient temperatures of up to 60 °C in continuous operation. For a short time of operation, temperatures of up to 80 °C are admissible. The linear guides are not suitable for temperatures below the freezing point.

Straightness/Torsion

The used aluminium profiles are extruded shapes that deviate with regard to straightness and torsion due to the manufacturing processes. The tolerance of this deviation is determined in the DIN 17615. In the worst case, the deviations of the linear guides correspond to these limit values, however they usually remain below those values. In order to achieve the desired linear guide precision, it is necessary to align the guide by using levelling plates and/or by clamping it on a precisely machined bearing surface. Thereby, tolerances of at least 0.1 mm/1000 mm are achieved.

Basic Facts - Bearing Capacity and Life Time

The dimensioning of a linear guide is based on the bearing capacity of the individual elements. The bearing capacity is described by:

- the dynamic load rating C
- the static load rating C_0
- the static moments M_{0X} , M_{0Y} and M_{0Z}

According to DIN, the basis of the dynamic load rating is a nominal life time of 100.000 m traverse way. Far Eastern suppliers frequently indicate the load ratings for a nominal life time of 50.000 m; that results in load ratings that are more than 20% higher than the ones according to DIN.

Dynamic Bearing Capacity

The fatigue behaviour of the material determines the dynamic bearing capacity. The life time - the fatigue period - depends on:

- the load of the linear guide
- the traverse speed of the linear guide
- the statistic eventuality of the first case of damage

Working Life

The definition of the working life is the actually reached life time. The working life can be different from the calculated life time.

Premature failure by wear or fatigue can be caused by:

- misalignments between guiding rails or guiding elements
- soiling of the guiding rails
- insufficient lubrication
- oscillating movement with very small strokes (rippling)
- vibrations while standing still (rippling)

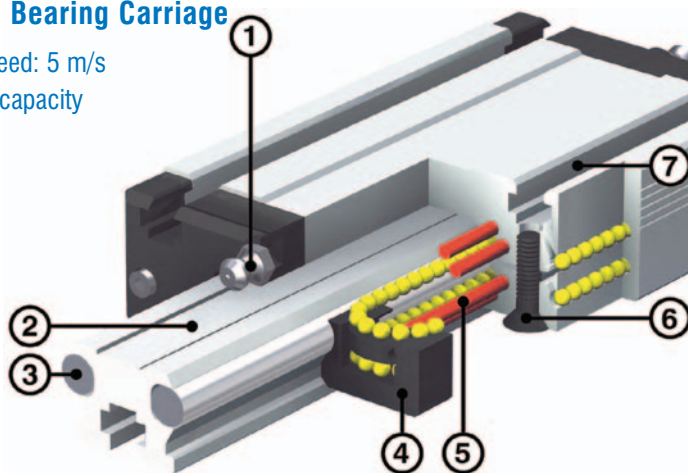
Due to the variety of the installation and operation conditions, it is not possible to exactly determine the working life of a linear guide in advance. The safest way to get an applicable estimation of the working life still is the comparison with similar cases of installation.

Functions Overview / Adjustments

Aluminium Bearing Carriage

Maximum speed: 5 m/s

High loading capacity

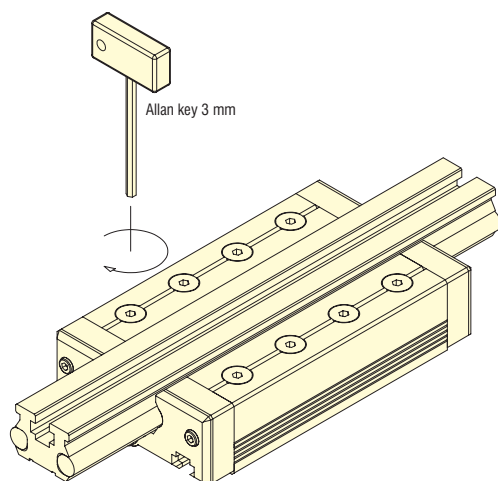


The patented bearing carriages are especially applicable for constructing complex multi-axis systems for handling and machining.

A wide range of models makes it possible to cover many fields of application.

Each model can be manufactured with different profile lengths (70, 100, 150 and 200 mm).

1. Lubrication possibilities for the recirculating balls on both sides.
2. The basic carriers of all linear guides are extruded aluminium profiles according to DIN 17615, which are provided with T-groove slots and/or mounting holes.
3. Precision steel shafts with a hardness of 60 ± 2 HRC are used as guide rails. All MLF types are optionally available with stainless steel shafts.
4. The ball recirculation is fibre reinforced.
5. Inside the linear carriage there are patented ball recirculations. Each supporting ball runs between two polished steel pins and the guiding shaft.
6. The adjustment of the carriage takes place by means of self-locking set screws: the ball rows and shafts and/or pins are screwed down and thus prestressed. The carriages are factory-adjusted to the respective prestress. All bearing carriages are optionally available in stainless design.
7. For the attachment of transportation loads, carriage plates etc., the Bearing Carriages are provided with T-groove slots and/or mounting holes.



The bearing carriages are adjusted by cross-wise tightening the set screws at the bottom side.

The desired prestress depends on the application. Together with the prestress, rigidity, moment loading capacity, guiding precision and traverse resistance increase. The life time decreases.

Maintenance

The bearing carriages must be lubricated once in 300 operating hours, however at least quarterly by using the lubrication nipples located at both faces of the carriages.

The factory presetting is appropriate for the respective data in the concerned product descriptions and describes an average value of the load data.

Note: The sliding onto the guiding rail takes place by slightly pushing forwards and back during the slide-on movement.

Lubricant

isel special grease is characterised by the following properties:

- Enormous reduction of wear and tear
- Clearly less consumption
- Mixable with lithium and calcium greases
- Water-repellent
- Highly resistant against cold, hot and salt water as well as against solvents
- Temperature rating: -25°C up to 200°C
- Dry running $> 300^{\circ}\text{C}$
- Lifetime extendable up to six times
- Extremely good adhesion on metal surfaces

In case of too much prestress, the life time decreases.

Characteristic: The bearing carriage runs sluggishly and can be slid onto the guiding rail only with difficulty.

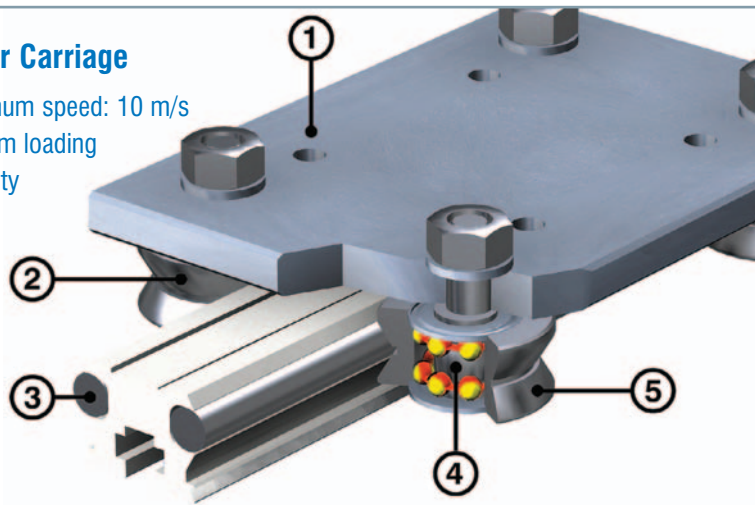
Lubricants available at **iselautomation KG**:
Lubricating grease: item no.: **299 032 0002**
Grease gun: item no.: **299 032 0003**

Functions Overview / Adjustments

Roller Carriage

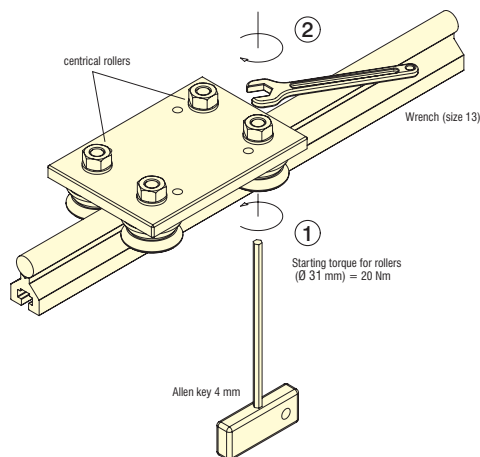
Maximum speed: 10 m/s

Medium loading capacity



The roller carriages are high-quality transportation linear units, preferably used for the fast positioning of light-weight up to medium-weight loads.

1. The polished fastening steel plate with a thickness of 8 mm is used for taking up the rollers as well as the transportation load. To this purpose it is provided with M6 mounting threads.
2. Firmly standing centric rollers.
3. All guide rails can be equipped with bearing carriages as well as with roller carriages (for more information, refer to "Bearing Carriages").
4. The roller principle corresponds to a similar double-row ball bearing with gothic track, life-time lubricated, with an axial play of max. 0.01 mm.
5. Eccentric rollers for adjusting the roller carriage. The delivery takes place with factory-presetting. If necessary, the roller carriages can be adjusted according to the desired application.



Step 1:

Adjustment of the eccentric rollers

Using an Allen key, rotate the roller in such a way that the conical tracks are set to the steel shaft of the linear guide. Select the torque in such a way that zero backlash and smooth running between the opposite rollers are ensured.

Step 2:

Tightening of the hexagon nuts

Tighten the hexagon nut with a torque of 20 Nm. While doing so, keep the rollers in the adjusted position by using an Allen key.

Verification

The roller carriage is adjusted correctly, if all rollers rotate when traversing and the roller carriage runs smoothly.

In case of too much prestress, which results from adjusting the rollers too tightly, the life time decreases.

Characteristic: The roller carriage runs sluggishly and can be slid onto the guiding rail only with difficulty.

Calculation of Working Loads

Calculation of the Effective Load

Different factors have an influence on the load calculation of isel Linear Guides. These are the position of the load center, pull- and push forces, force origins, load- and acceleration forces.

For a linear table on 4 bearings, the bearing forces are determined as a function of the force origins at different load directions.

The calculation is also applicable to a carriage arrangement of 2 carriages.

$L_L/2$ is used then instead of the dimension figure L (see dimensional drawings of the respective Linear Guides).

The load rating for this application is $C_0/2$.

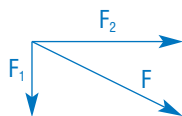
Combined Load

If the load direction of an element does not coincide with one of the main load directions, the equivalent load is calculated as:

$$P = |F_1| + |F_2|$$

If a force F and a moment M load an element at the same time, the following applies for the dynamic equivalent load:

$$P = |F| + |M| \cdot \frac{C_0}{M_{0(XYZ)}}$$



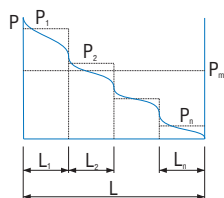
P [N]	dynamic equivalent load
F [N]	applying force = $\sqrt{F_1^2 + F_2^2}$
F_1 [N]	vertical component, see sketch (4)
F_2 [N]	horizontal component, see sketch (4)
C_0 [N]	static load rating
M [Nm]	applying moment
$M_{0(XYZ)}$ [Nm]	static moment towards the applying moment

According to DIN, the dynamic equivalent load should not exceed the value $P = 0,5 \cdot C$.

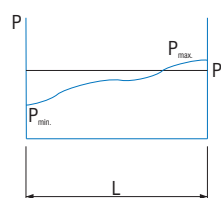
Calculation of the Equivalent Load

Operating Conditions

A Gradual change



B Homogeneous change



Equivalent Load

$$P = \sqrt[3]{\frac{1}{L} \cdot (P_1^3 \cdot L_1 + P_2^3 \cdot L_2 + P_3^3 \cdot L_3 + \dots + P_n^3 \cdot L_n)}$$

$$P = \frac{1}{3} \cdot (P_{\min} + 2 \cdot P_{\max})$$

P	dynamical equivalent load [N]	$P_{\min}$	minimum load [N]
$P_{1...n}$	individual load [N]	$P_{\max}$	maximum load [N]
L	total travel [m]		
$L_{1...n}$	individual travel [m]		

Static Safety

Operating conditions

Normal movement	1,0 - 3,0
High speed	2,0 - 4,0
With jerks and vibrations	3,0 - 5,0

$$S_0 = \frac{C_0}{P_0} = \frac{M_0}{M}$$

S_0	static bearing safety
C_0	static load rating [N]
P_0	static equivalent bearing stress [N]
M_0	static bearing moment [Nm]
M	equivalent static moment [Nm]

Nominal Life Time

90% of a sufficient large quantity of the same bearings reach or exceed the nominal life time, before the first signs of metal fatigue can be seen.

$$L = \left(\frac{C}{P} \right)^3$$

$$L_h = \frac{833}{H \cdot n_{osz}} \cdot \left(\frac{C}{P} \right)^3$$

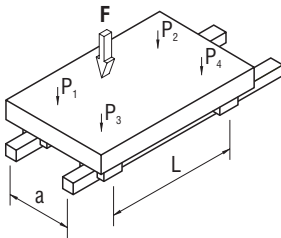
$$L_h = \frac{1666}{v} \cdot \left(\frac{C}{P} \right)^3$$

L [m]	nominal life time in 100.000 m
L_h [h]	nominal life time in operating hours
C [N]	dynamic load rating
P [N]	dynamic equivalent bearing
H [m]	single stroke length of the oscillating movement
n_{osz} [min]	number of double strokes per minute
v [m/min]	average traverse speed

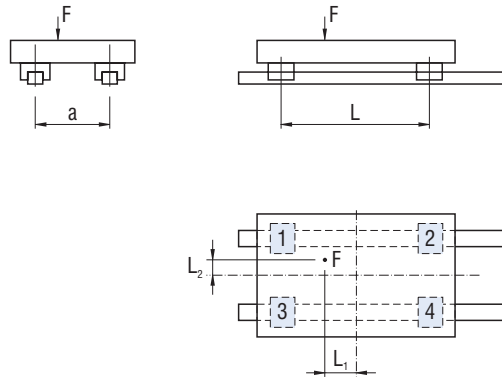
Calculation of Working Loads

Load Normal to the Table Surface

Load Application



Scale Drawing



Load on one carriage

$$P_1 = \frac{F}{4} + \frac{F \cdot L_1}{2L} + \frac{F \cdot L_2}{2a}$$

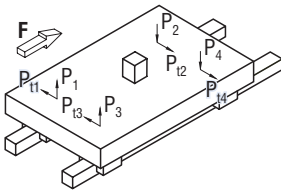
$$P_2 = \frac{F}{4} - \frac{F \cdot L_1}{2L} + \frac{F \cdot L_2}{2a}$$

$$P_3 = \frac{F}{4} + \frac{F \cdot L_1}{2L} - \frac{F \cdot L_2}{2a}$$

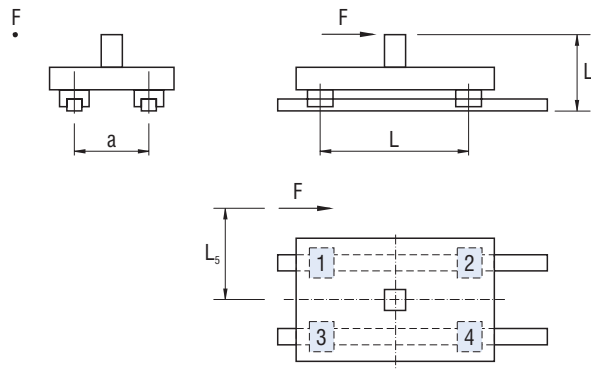
$$P_4 = \frac{F}{4} - \frac{F \cdot L_1}{2L} - \frac{F \cdot L_2}{2a}$$

Load in Traversing Direction

Load Application



Scale Drawing



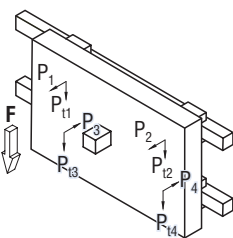
Load on one Carriage

$$P_1 \dots P_4 = \frac{F \cdot L_6}{2L}$$

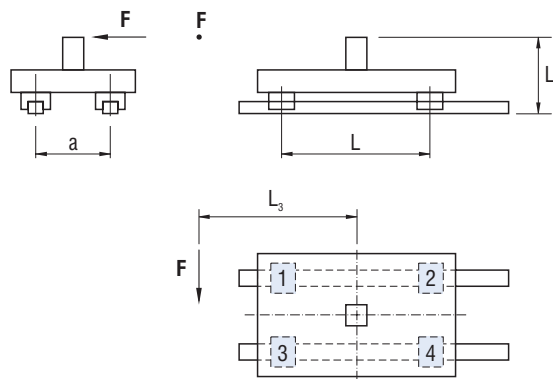
$$P_{11} \dots P_{14} = \frac{F \cdot L_5}{2L}$$

Load Across the Traversing Direction

Load Application



Scale Drawing



Load on one Carriage

$$P_1 \dots P_4 = \frac{F \cdot L_4}{2a}$$

$$P_{11} = P_{13} = \frac{F}{4} + \frac{F \cdot L_3}{2L}$$

$$P_{12} = P_{14} = \frac{F}{4} - \frac{F \cdot L_3}{2L}$$