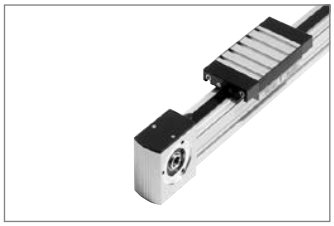
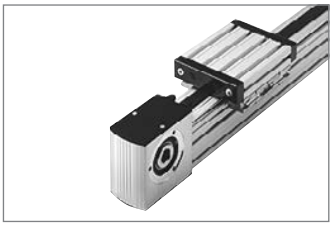
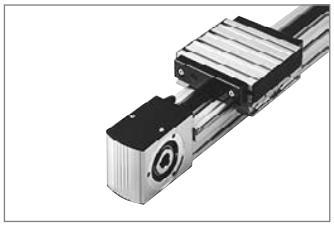
Linear guides



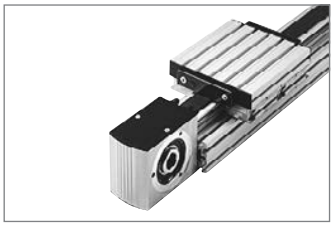
Cam roller guide LF6C
(p. 13-6)



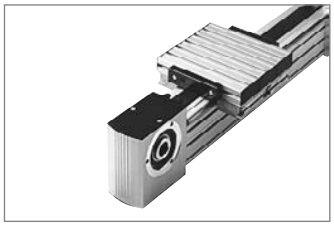
Cam roller guide LF12S
(p. 13-11)



Cam roller guide LF12C
(p. 13-18)



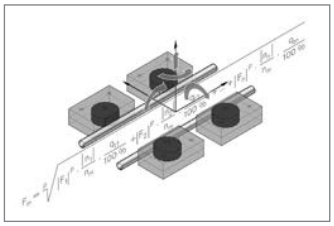
Cam roller guide LF20S
(p. 13-25)



Cam roller guide LF20C
(p. 13-32)



Plug-in shafts, synchronous shafts (p. 13-42)

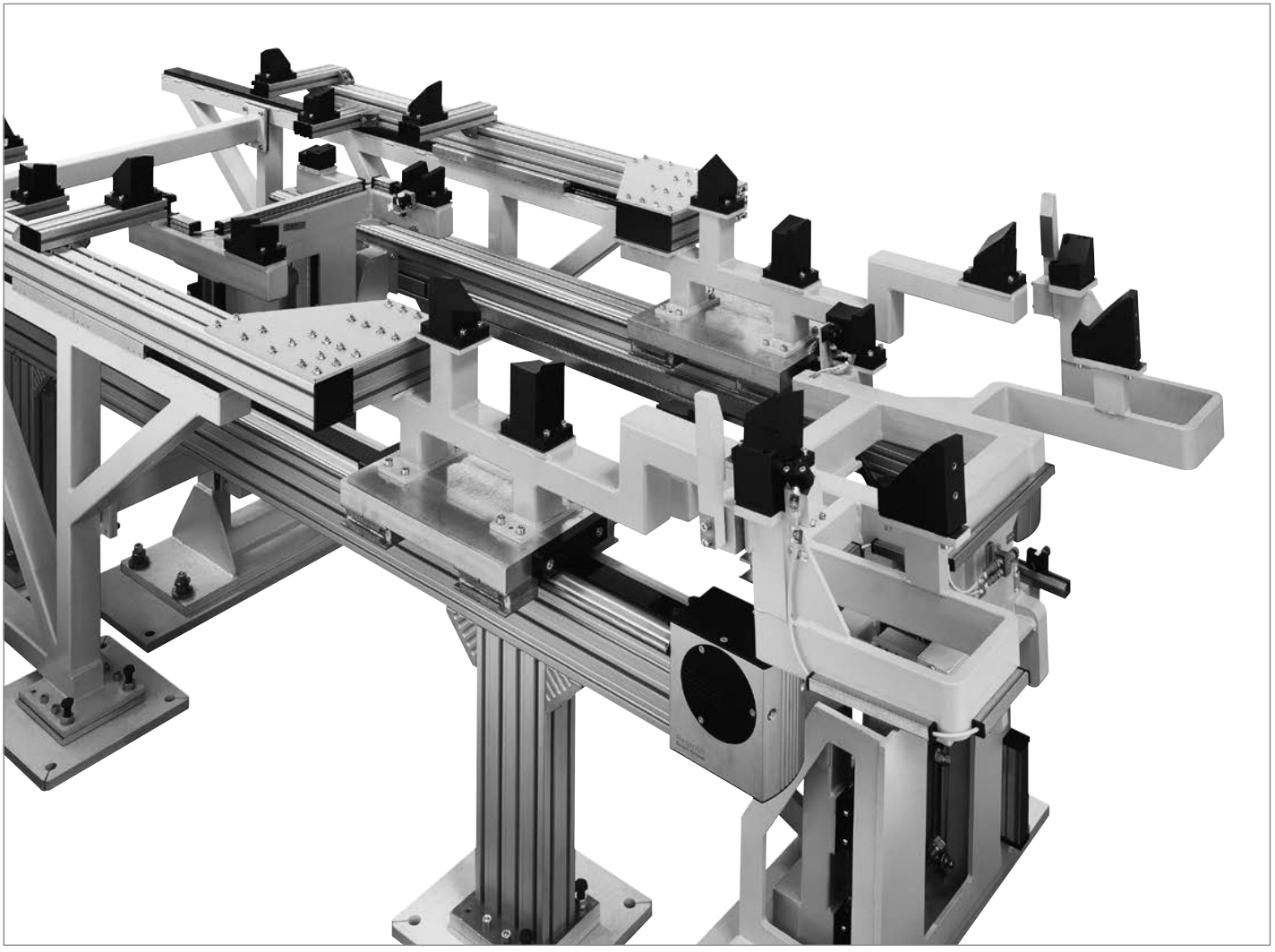


Design (p. 13-44)

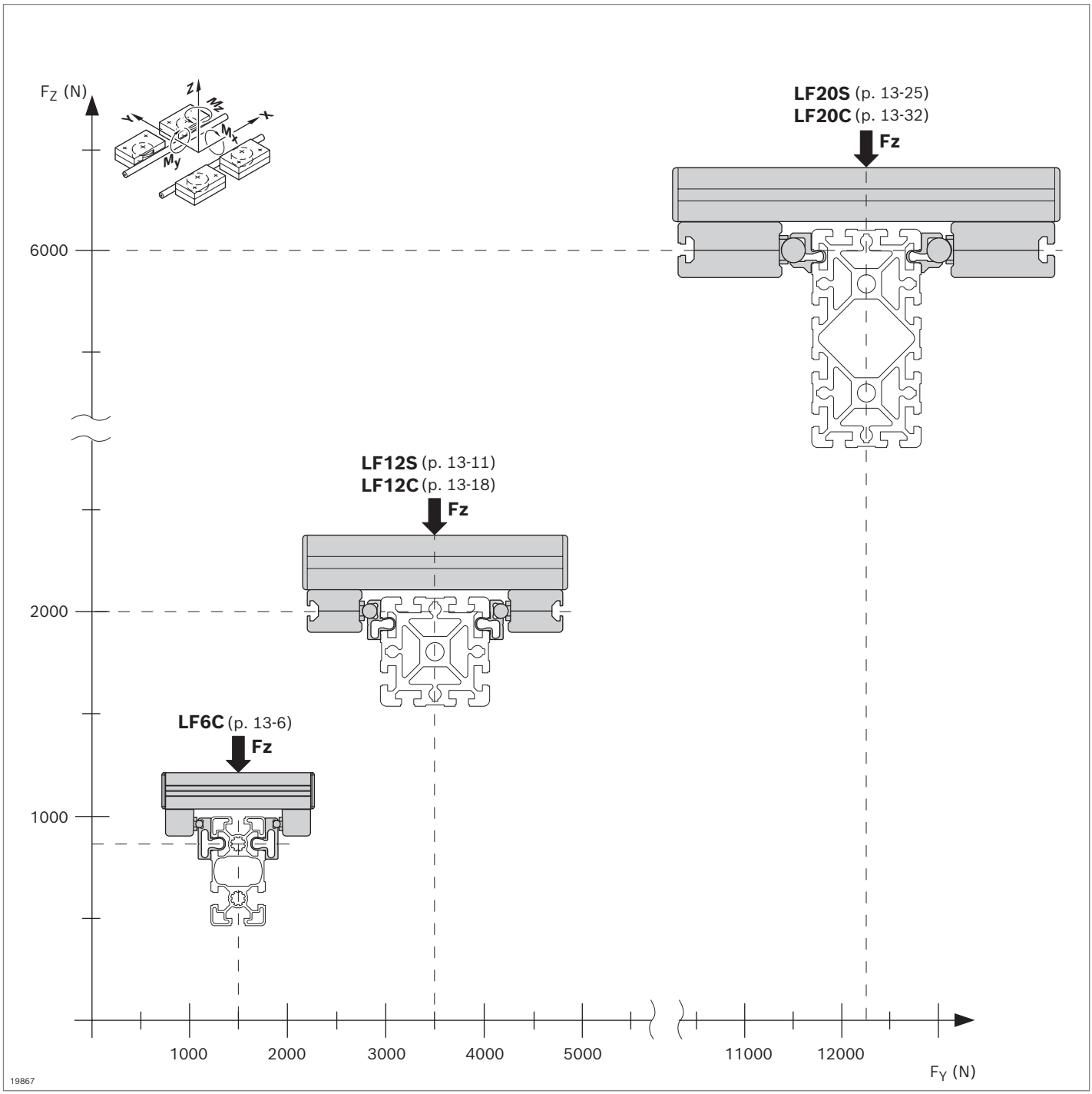


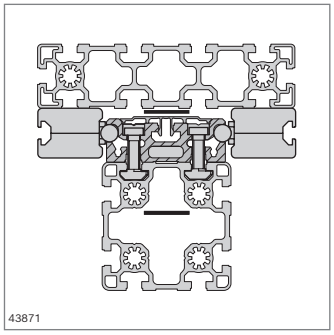
Linear guides

- For constructing linear guides based on cam roller guides
- Cam roller guides are suitable for applications with high speeds and medium loads, in particular for the construction of handling equipment, feed systems, guides in work machines, and many other applications.
- Fully pre-assembled in any required length or as individual components for assembly on site
- Without drive or with toothed belt drive for attaching gears and motors



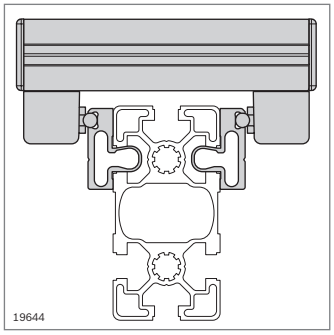
Linear guides – sizes, designs, and loads





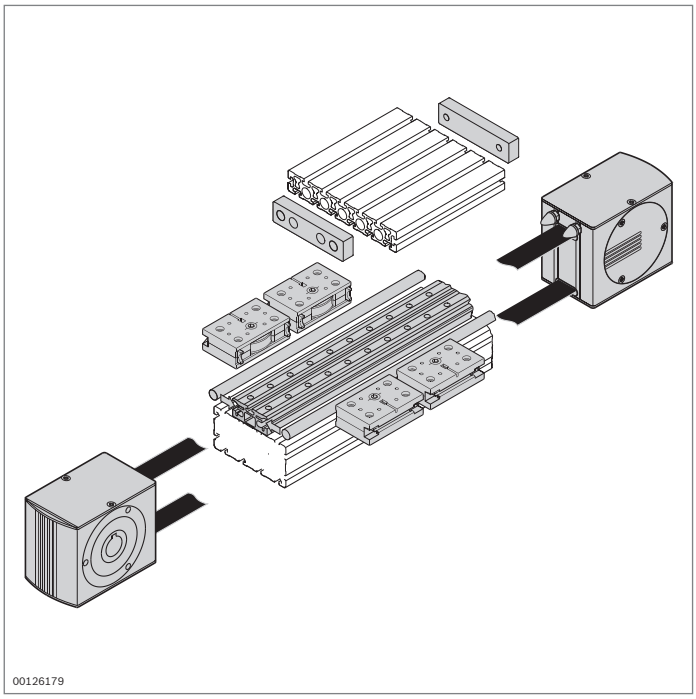
LF...S

- Compact construction
- Fixed track width
- v_{max} = 5 m/s



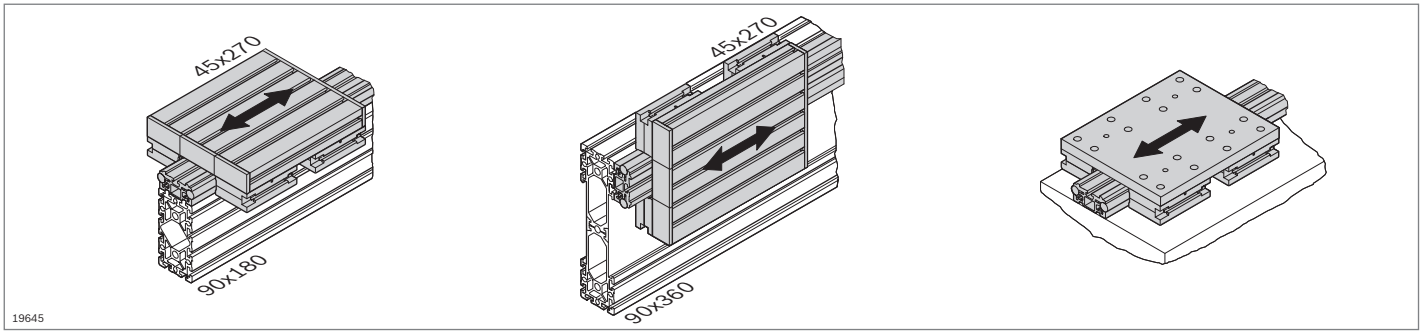
LF...C

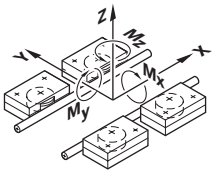
- Freely selectable track width for greater torque absorption
- v_{max} = 5 m/s



Cam roller guides LF...S

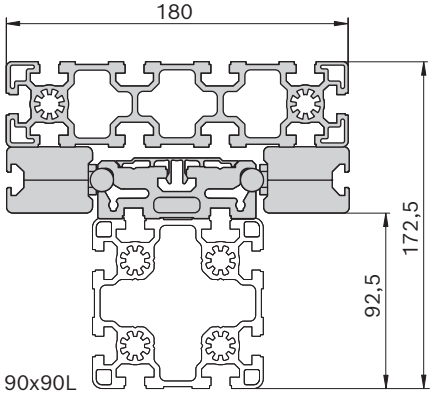
- Cam roller guide LF...S with fixed track widths
- Guide rail made of aluminum with hardened and polished VA guide rods
- Simple mounting on strut profile or directly on flat surface, e.g. on a machine
- High precision, dimensional stability and torsional rigidity
- Lighter and cheaper than steel guides
- Light trolley with good torsional rigidity
- Freely selectable trolley lengths
- Freely selectable stroke lengths possible
- High permissible speed





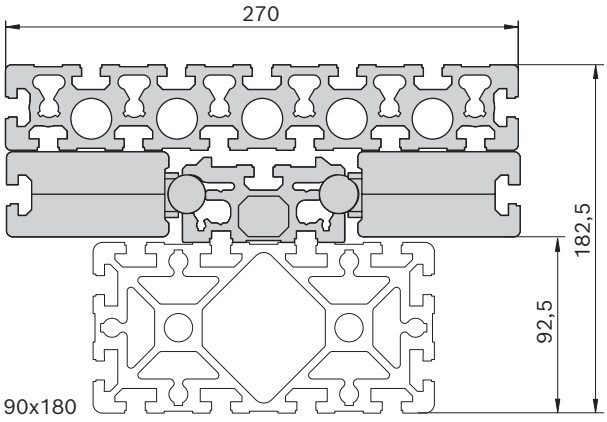
The support profiles shown here are examples

LF12S



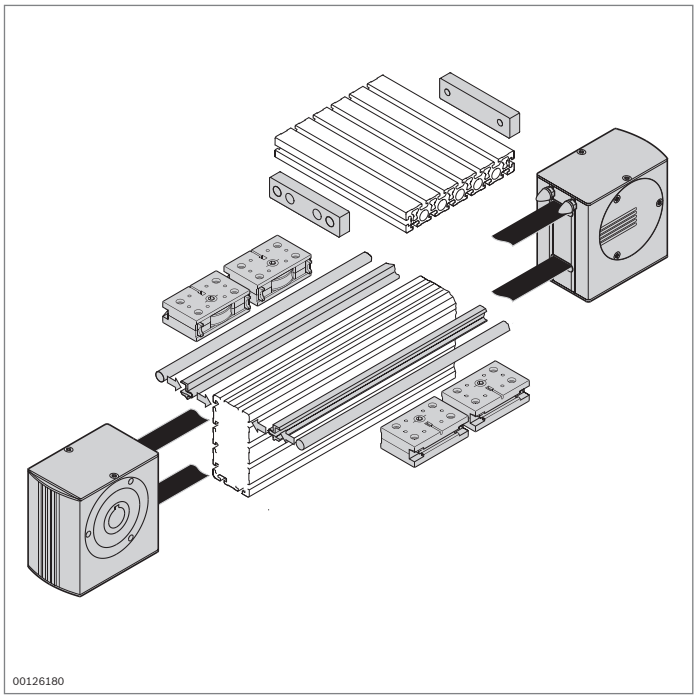
$F_{y\,max}$ = 3500 N
$F_{z\,max}$ = 2000 N
$M_{x\,max}$ = 78 Nm
v_{max} = 5 m/s

LF20S



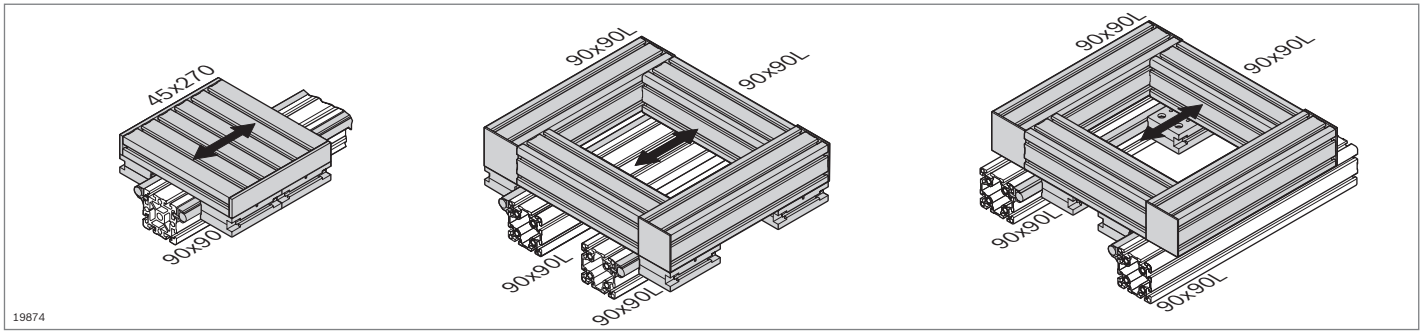
$F_{y\,max}$ = 12500 N
$F_{z\,max}$ = 6000 N
$M_{x\,max}$ = 240 Nm
v_{max} = 5 m/s

19646

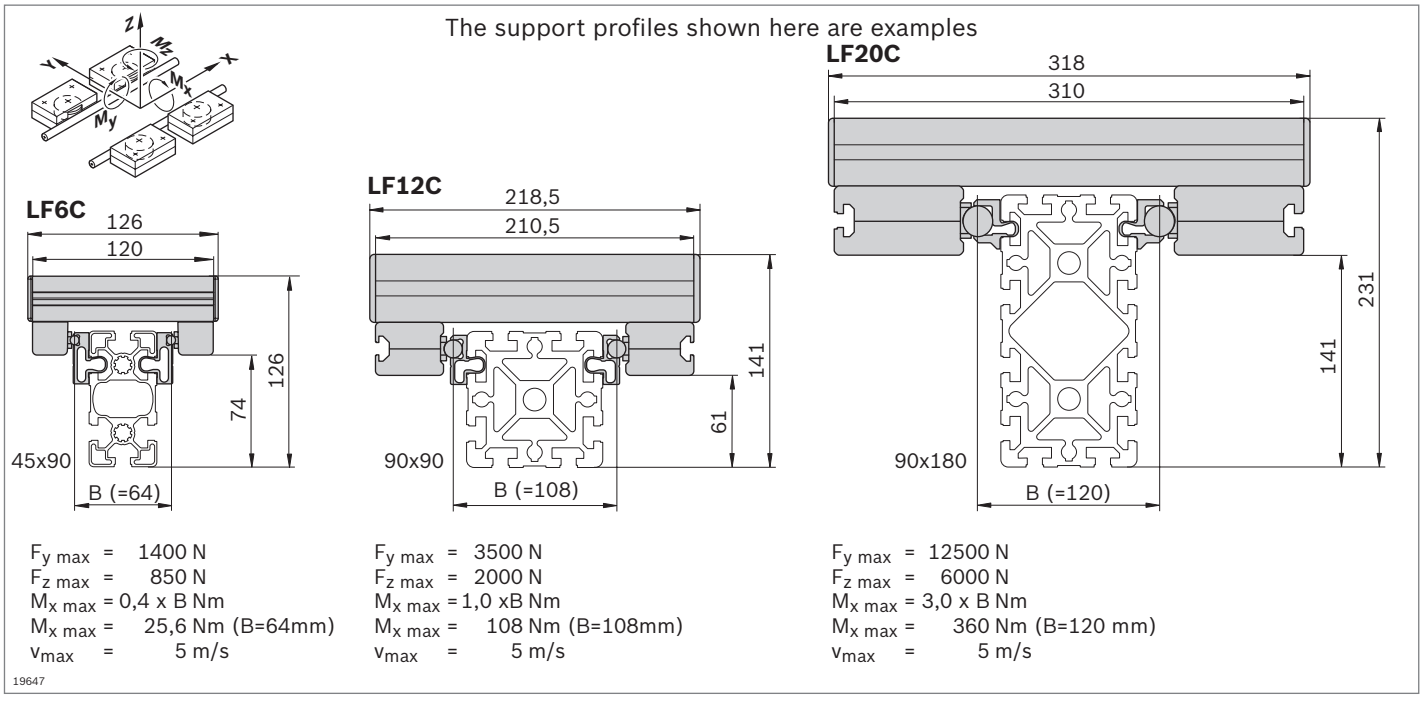


Cam roller guides LF...C

- Cam roller guide LF...C for free choice of track widths and large track widths
- Clamping profile made of aluminum with hardened and polished VA guide rods
- Easy assembly through clipping the clamping profile into the slots of any Rexroth profile with 10 mm slot
- Optimally adjustable to different loads
- Greater torque absorption due to a C construction and free choice of track width
- Light trolley with good torsional rigidity
- Freely selectable trolley lengths and widths
- Freely selectable stroke lengths possible
- High permissible speed



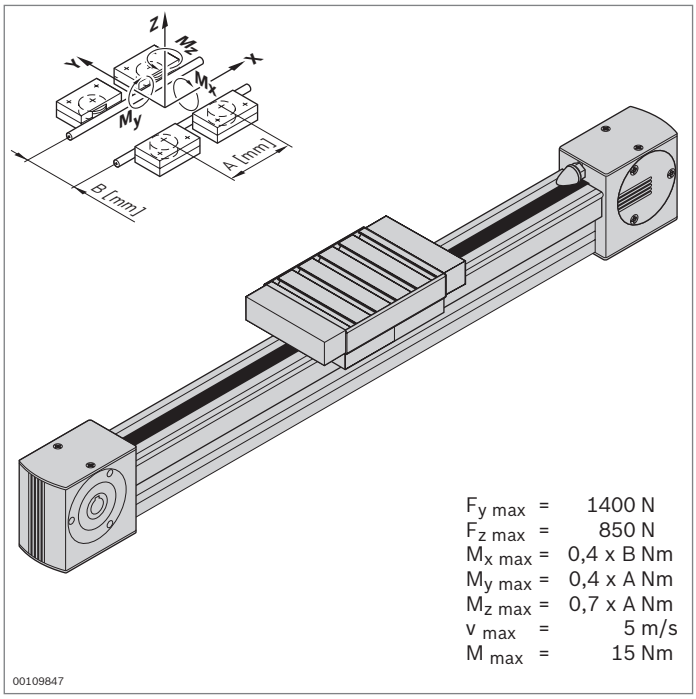
The support profiles shown here are examples



$F_{y\,max}$ = 1400 N
$F_{z\,max}$ = 850 N
$M_{x\,max}$ = 0,4 x B Nm
$M_{x\,max}$ = 25,6 Nm (B=64mm)
v_{max} = 5 m/s

$F_{y\,max}$ = 3500 N
$F_{z\,max}$ = 2000 N
$M_{x\,max}$ = 1,0 xB Nm
$M_{x\,max}$ = 108 Nm (B=108mm)
v_{max} = 5 m/s

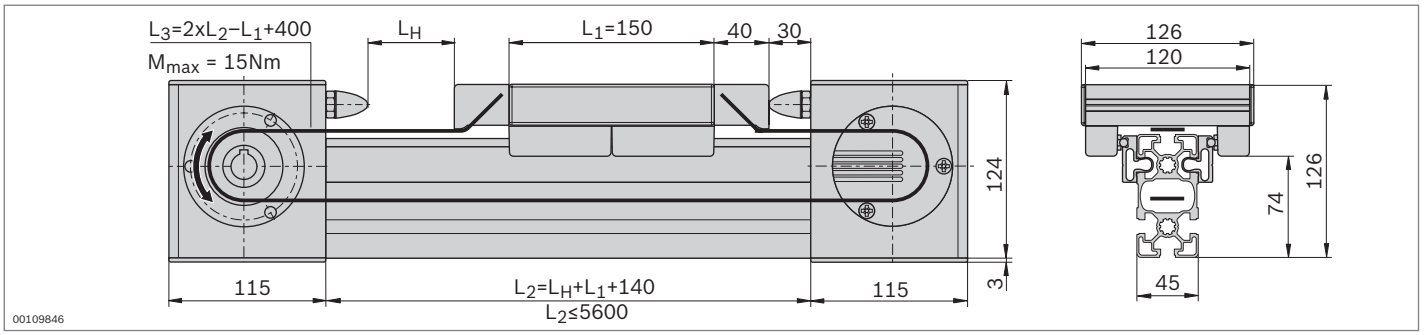
$F_{y\,max}$ = 12500 N
$F_{z\,max}$ = 6000 N
$M_{x\,max}$ = 3,0 x B Nm
$M_{x\,max}$ = 360 Nm (B=120 mm)
v_{max} = 5 m/s



Cam roller guide LF6C – complete axis



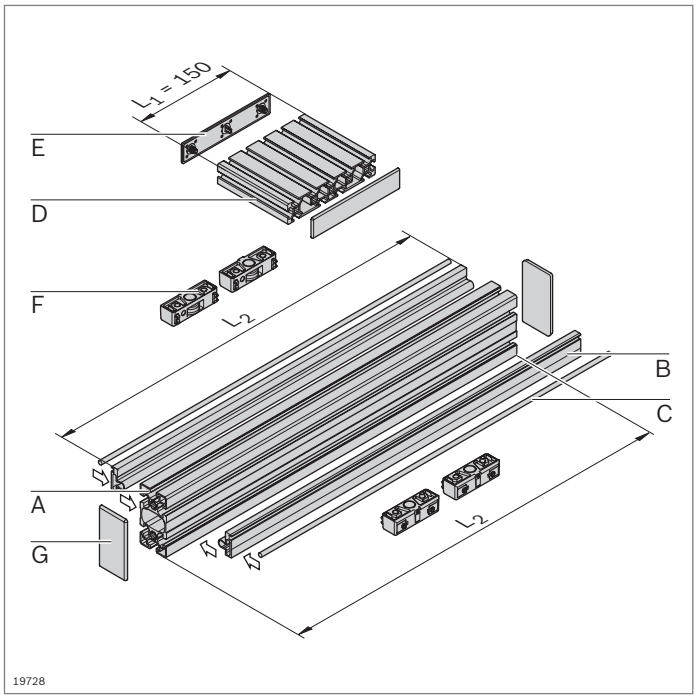
- Fully assembled cam roller guide
- Stroke can be individually selected
- Clamping profile clipped into strut profile 45x90L
- Incl. toothed belt drive; additional notes on the drive concept (p. 13-39)



Technical data

For notes on layout and drive, see page 13-45

Complete axis	L_H (mm)	No.
LF6C	50 ... 5310	**3 842 998 496 / L_H**

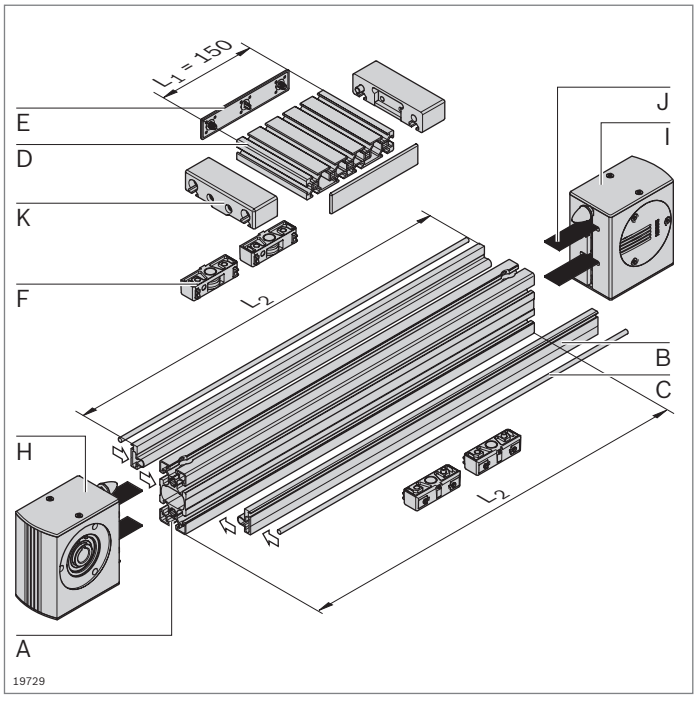


Cam roller guide LF6C – components

- Components for the individual assembly of cam roller guides, with or without drive

Parts list for cam roller guide LF6C without drive

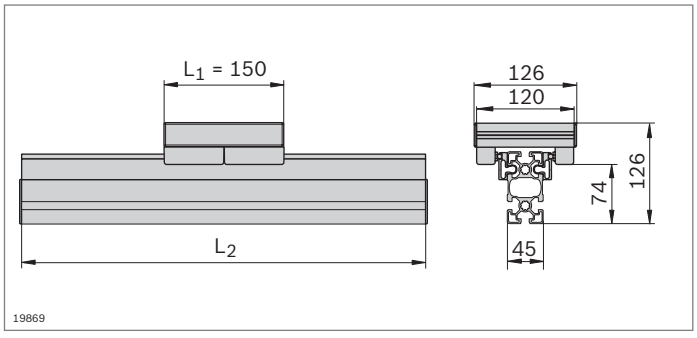
Component		No.	Pcs	Page
A	Profile 45x90L	**3 842 992 432 / L_2**	1	2-43
B	Clamping profile LF6C	**3 842 992 925 / L_2**	2	13-8
C	Guide rod LF6	**3 842 993 967 / L_2**	2	13-8
D	Trolley profile LF6C	**3 842 993 952 / 120 mm**	1	13-8
E	Cover cap LF6C	**3 842 539 120**	2	13-9
F	Guide bearing LF6	**3 842 535 662**	4	13-8
G	Cover cap 45x90	**3 842 548 757**	2	2-43



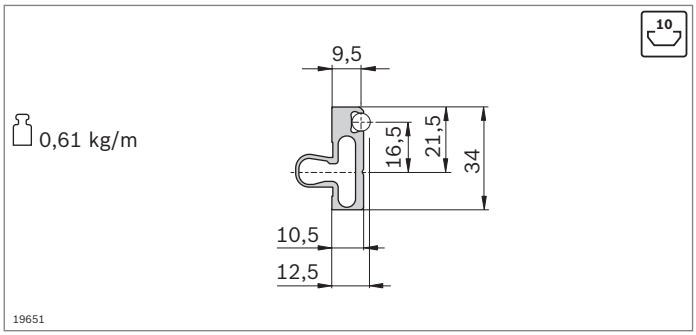
Parts list for cam roller guide LF6C with drive

Component		No.	Pcs	Page
A	Profile 45x90L LF LF	**3 842 993 084 / L_2**	1	2-43
B	Clamping profile LF6C	**3 842 992 925 / L_2**	2	13-8
C	Guide rod LF	**3 842 993 967 / L_2**	2	13-8
D	Trolley profile LF6C	**3 842 993 952 / 120 mm**	1	13-8
E	Cover cap LF6C	**3 842 539 120**	2	13-9
F	Guide bearing LF6	**3 842 535 662**	4	13-8
H	Drive head LF6C	**3 842 526 416**	1	13-9
I	Return head LF6C	**3 842 526 417**	1	13-10
J	Toothed belt LF6C	**3 842 994 711 / L_3**[1)]	1	13-10
K	Belt connector LF6C	**3 842 535 681**	2	13-10

[1)] $L_3 = 2xL_2 - L_1 + 400$

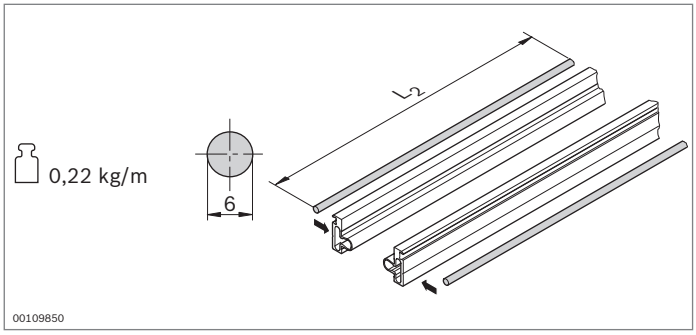


13



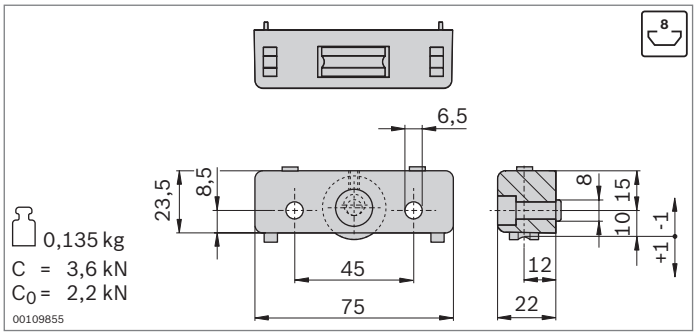
- The clamping profile is clipped into any 10 mm slot of the strut profile and it holds the guide rods

Clamping profile		L_2 (mm)	No.
LF6C	1 pc	150 ... 3000	**3 842 992 925 / L_2**
	20 pcs	3000	**3 842 518 896**
Material:	Aluminum; anodized		



- The guide rod is pressed into the clamping profile
- The guide rod guides the guide bearing

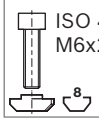
Guide rod	L_2 (mm)		No.
LF6	150 ... 3000	1	**3 842 993 967 / L_2**
	3000	20	**3 842 539 414**
Material:	Solid shaft VA, induction hardened, polished		
Condition on delivery:	Ungreased; greasing according to assembly instructions **3 842 527 226**		

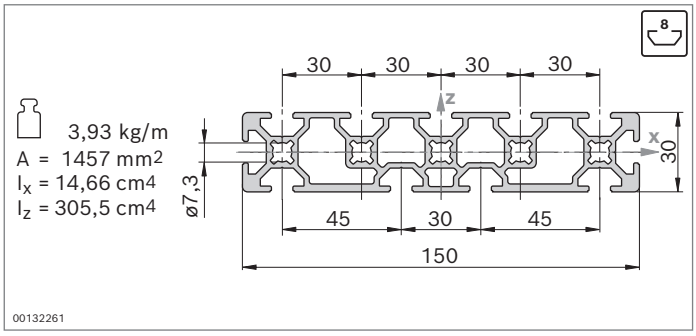


- Guide bearing for trolley construction
- Guiding via guide rod
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts

Guide bearing		No.	FS
LF6	2	**3 842 535 662**	2xFS1
Material:	Housing: Diecast aluminum Cam roller: Steel, hardened, polished		
Scope of delivery:	Incl. fastening material (FS)		
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**		

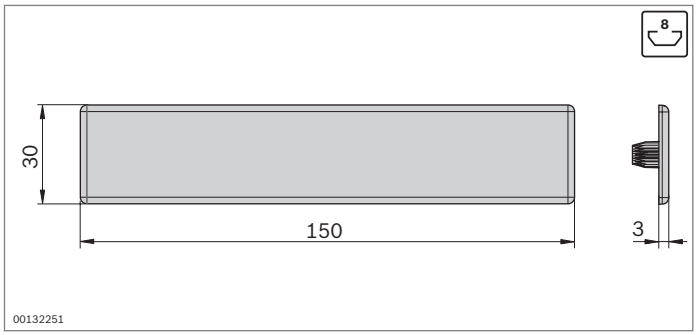
FS1





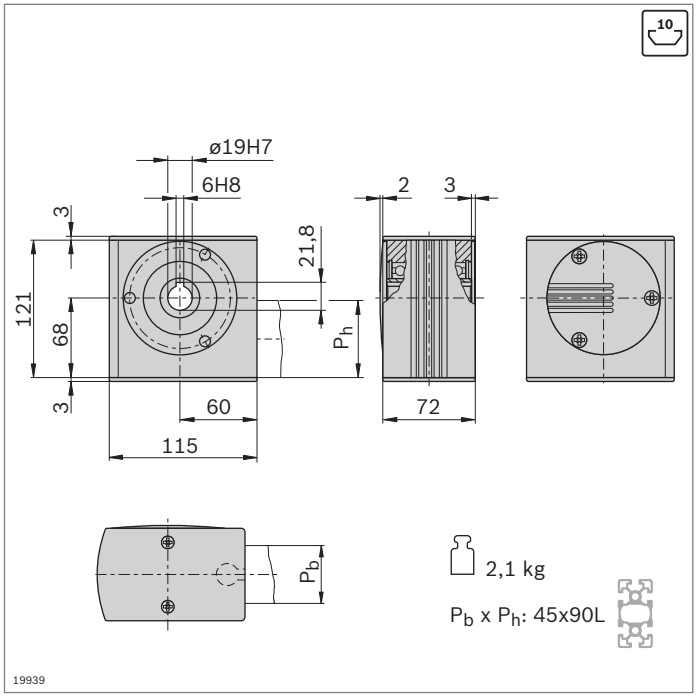
- Trolley profile for the construction of trolley LF6C

Trolley profile	L (mm)	No.
LF6C	150 ... 3000	**3 842 993 952 / L**
Material:	Aluminum; anodized	



- Cover cap for trolley profile LF6C
- For use on trolleys which are not driven by a toothed belt

Cover cap		No.
LF6C	2	**3 842 539 120**
Material:	PA; black	



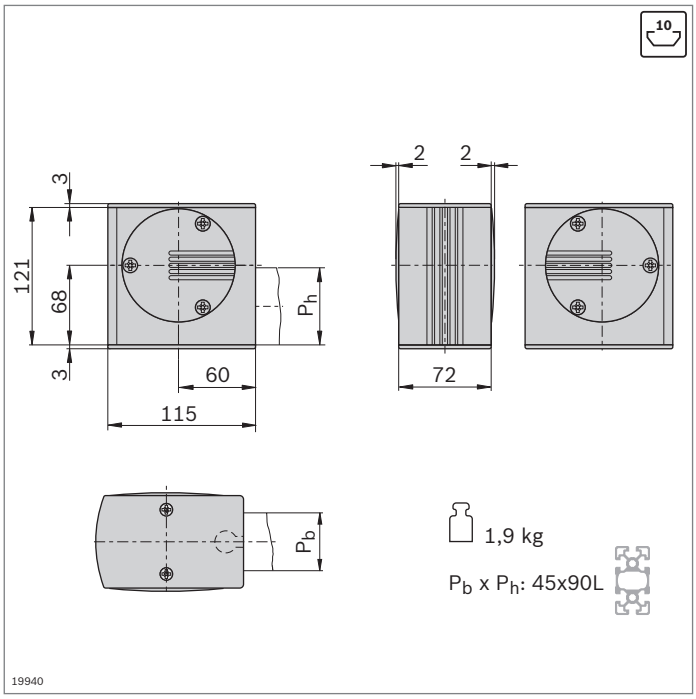
- Drive head for transferring drive torque to a toothed belt
- For direct mounting of a motor or (in conjunction with a plug-in shaft) for mounting a hollow shaft gear or a coupling (p. 13-41)
- Mounted directly on profile 45x90L using longitudinal end connector
- Profile finishing: LF blind hole drilling for longitudinal end connector

Drive head	No.	FS
LF6C	**3 842 526 416**	2xFS2, FS3
Material:	Aluminum; anodized Hollow shaft: Steel; zinc-plated Cover caps: PA; black	
Scope of delivery:	Incl. fastening material (FS), cover caps	

FS2
ISO 7380
M8x40

FS3
ISO 4035
M8-04

13



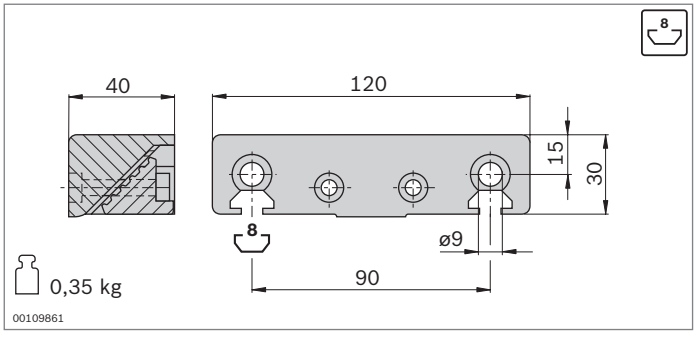
- Return head for tensioning the toothed belt and changing its direction
- Mounted directly on profile 45x90L using longitudinal end connector
- Profile finishing: LF blind hole drilling for longitudinal end connector

Return head	No.	FS
LF6C	**3 842 526 417**	2xFS2, FS3

Material:	Aluminum; anodized Hollow shaft: Steel; zinc-plated Cover caps: PA; black
Scope of delivery:	Incl. fastening material (FS), cover caps

FS2
ISO 7380
M8x40

FS3
ISO 4035
M8-04



- Belt connector for fastening the toothed belt to the trolley slot
- All connecting parts for mounting on the trolley profile LF6C are included

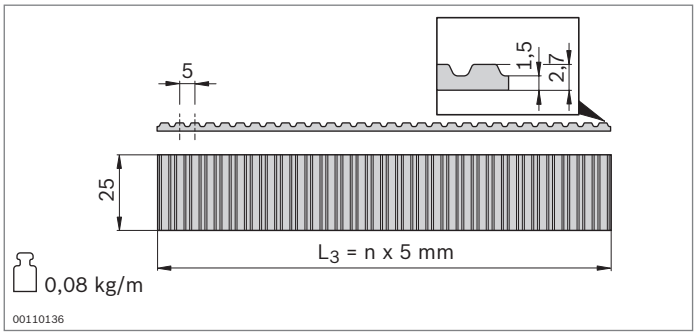
Belt connector		No.	FS
LF6C	2	**3 842 535 681**	2xFS4, 2xFS5, 2xFS6

Material:	Aluminum, painted black
Scope of delivery:	Incl. fastening material (FS)

FS4
DIN 7984
M6x35
6-FSt
ISO 4032–M6

FS5
DIN 7984
M8x50
8-FSt
8

FS6
DIN 7984
M8x40

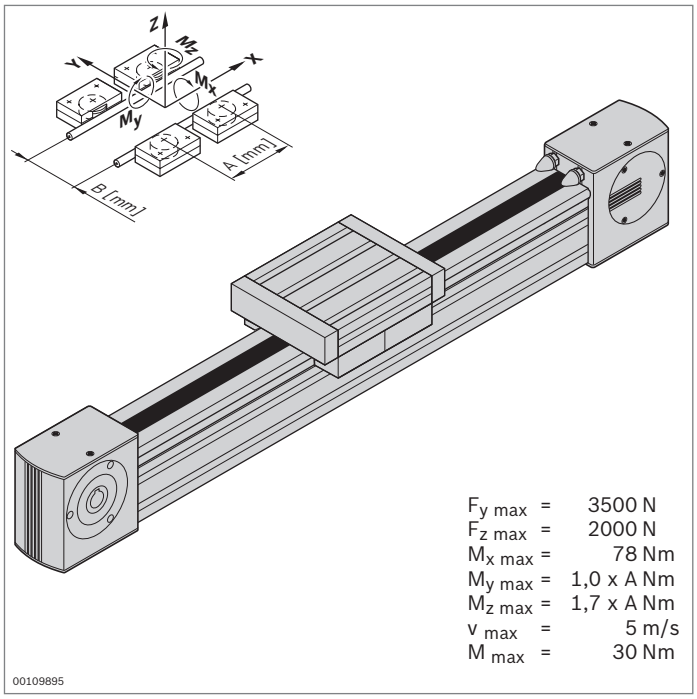


- Toothed belt as a trolley drive
- Pitch: AT5

Toothed belt	L_3 (mm)	No.
LF6C	300 ... 50000	**3 842 994 711 / L_3 [1)]**
	50000	**3 842 518 856**

[1)] $L_3 = 2xL_2 - L_1 + 400$

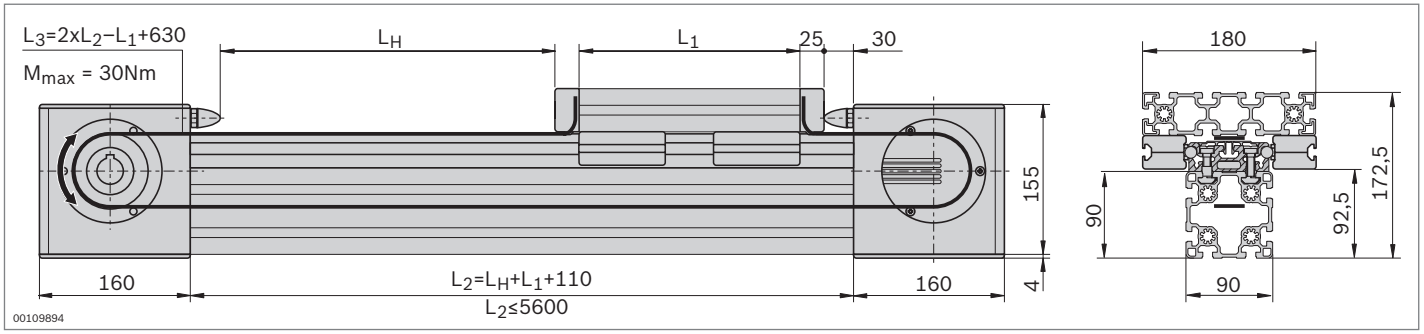
Material: PU with embedded steel wires



Cam roller guide LF12S – complete axis

10

- Fully assembled cam roller guide
- Stroke and trolley length can be individually selected
- Rail profile screwed onto strut profile 90x90L
- Incl. toothed belt drive; additional notes on the drive concept (p. 13-39)

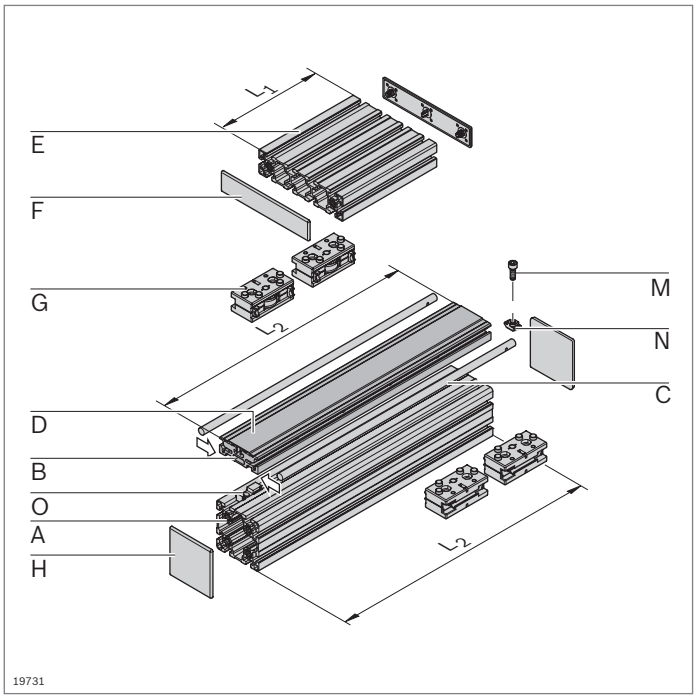


13

Technical data

For notes on layout and drive, see page 13-45

Complete axis	L_H / L_1 (mm)	No.
LF12S	$L_1+50 \leq L_H \leq 5310$ $180 \leq L_1 \leq 1000$	**3 842 998 497 / L_H / L_1**



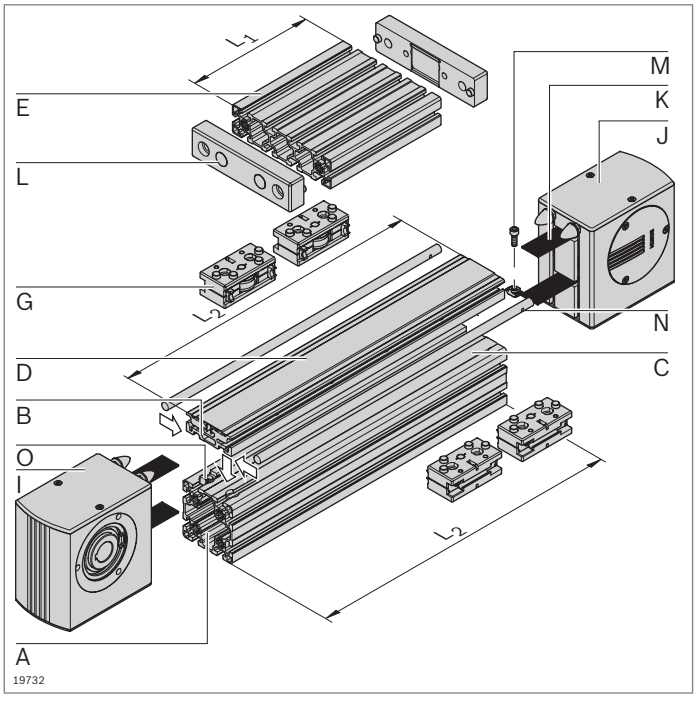
Cam roller guide LF12S – components

- Components for the individual assembly of cam roller guides, with or without drive

Parts list for cam roller guide LF12S without drive

Component		No.	Pcs	Page
A	Profile 90x90L	**3 842 992 415 / L_2**	1	2-48
B	Guide profile LF12S	**3 842 992 438 / L_2**	1	13-13
C	Guide rod LF12	**3 842 993 968 / L_2**	2	13-13
D	Cover profile LF12S	**3 842 993 062 / L_2**	1	13-13
E	Profile 45x180	**3 842 990 335 / L_1**	1	2-46
F	Cover cap 45x180	**3 842 548 795**	2	2-46
G	Guide bearing LF12	**3 842 535 664**	4	13-14
H	Cover cap 90x90L	**3 842 548 759**	2	2-48
M	Cylinder head screw DIN 7984 – M8x30		n[1)]	
N	T-nut M8, 10 mm slot	**3 842 530 287**	n[1)]	3-4
O	Sliding block	**3 842 146 877**	n[1)]	13-13

[1)] For identification see page 13-13

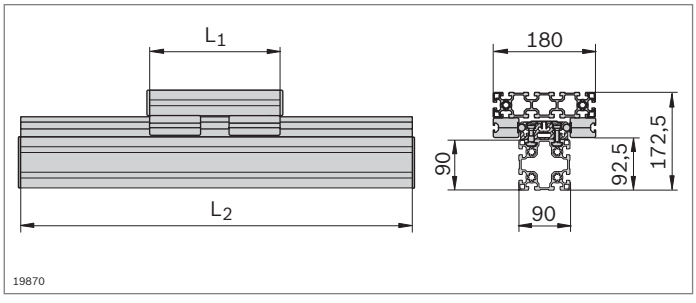


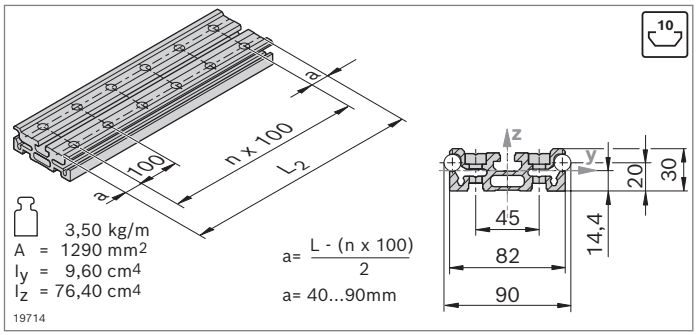
Parts list for cam roller guide LF12S with drive

Component		No.	Pcs	Page
A	Profile 90x90L LF LF	**3 842 992 418 / L_2**	1	2-48
B	Guide profile LF12S	**3 842 992 438 / L_2**	1	13-13
C	Guide rod LF12	**3 842 993 968 / L_2**	2	13-13
D	Cover profile LF12S	**3 842 993 062 / L_2**	1	13-13
E	Profile 45x180 M12 M12	**3 842 990 339 / L_1**	1	2-46
G	Guide bearing LF12	**3 842 535 664**	4	13-14
I	Drive head LF12S	**3 842 526 412**	1	13-16
J	Return head LF12S	**3 842 526 413**	1	13-16
K	Toothed belt	**3 842 994 821 / L_3[1)]**	1	13-17
L	Belt connector	**3 842 535 680**	2	13-17
M	Cylinder head screw DIN 7984 – M8x30		n[2)]	
N	T-nut M8, 10 mm slot	**3 842 530 287**	n[2)]	3-4
O	Sliding block	**3 842 146 877**	n[2)]	13-13

[1)] $L_3 = 2xL_2 - L_1 + 630$

[2)] For identification see page 13-13

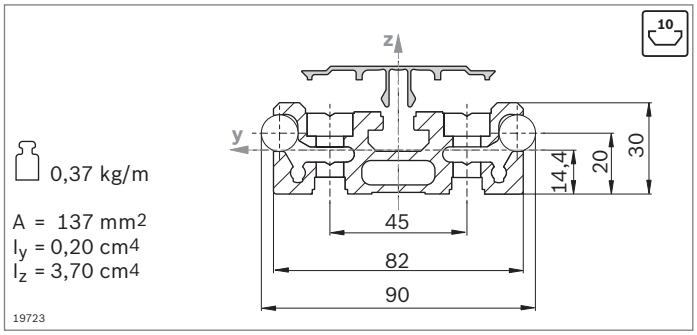




- Guide profile LF12S to hold the guide rods
- Installation on MGE strut profiles with 10 mm slot or directly on a flat surface

Guide profile		L_2 (mm)	No.
LF12S	1 pc	180 ... 6070	**3 842 992 438 / L_2**
	6 pcs	6070	**3 842 557 945**

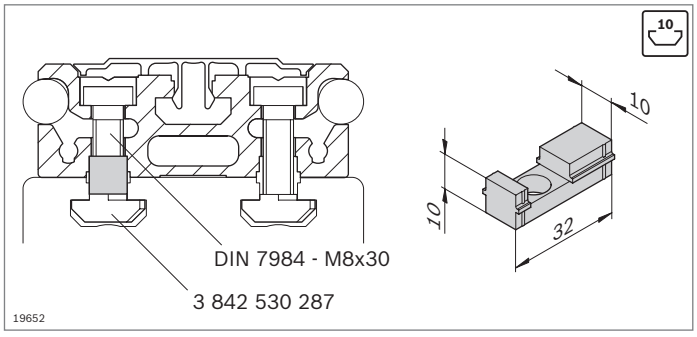
Material: Aluminum; anodized
Accessories: Cylinder bolt DIN 7984 – M8x30
T-nut M8, 10 mm slot, **3 842 530 287**
Sliding block, cover profile, guide rod



- Cover profile to prevent contamination on threaded connections

Cover profile	L_2 (mm)	No.
LF12S	150 ... 5600	**3 842 993 062 / L_2**

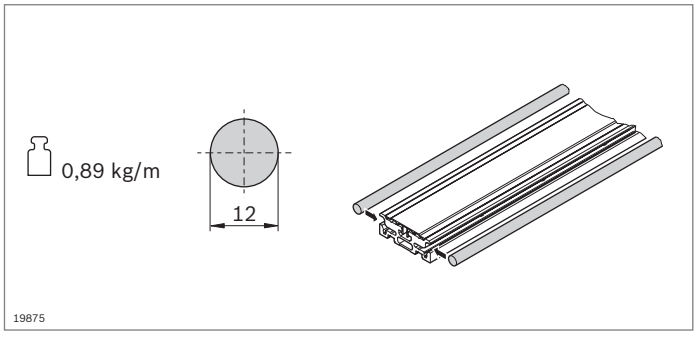
Material: Aluminum; anodized



- Sliding block as a centering aid for mounting the guide profile in a 10 mm profile slot

Sliding block		No.
	50	**3 842 146 877**

Material: PA; black

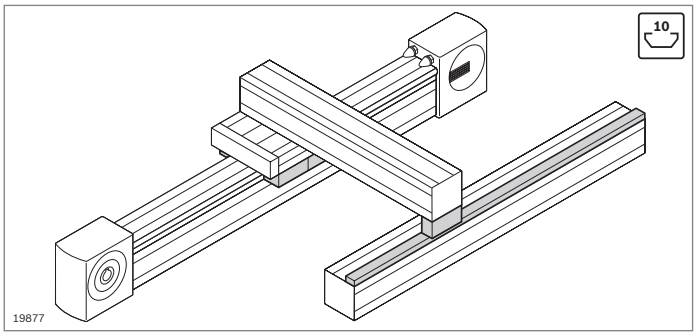


- The guide rod is pressed into the guide profile
- The guide rod guides the guide bearing

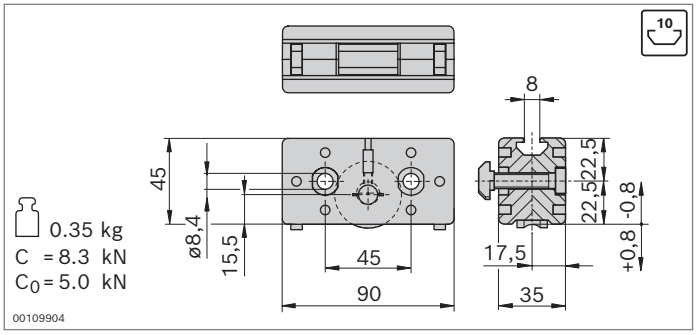
Guide rod	L_2 (mm)		No.
LF12	150 ... 2900	1	**3 842 993 968 / L_2**
	2900	20	**3 842 539 415**

Material: Solid shaft VA, induction hardened and polished
Condition on delivery: Ungreased; greasing according to assembly instructions **3 842 527 226**

13



- Guide bearing for trolley construction
- Supporting bearing for brackets for bearing off-center forces
- Guide rail to support supporting bearings (p. 13-15)



- Guide bearing for trolley construction
- Guiding via guide rod
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts
- Replacement of the lubricating felts possible from rear in installed state

Guide bearing		No.	FS
LF12	2	**3 842 535 664**	2xFS1, 4xFS2

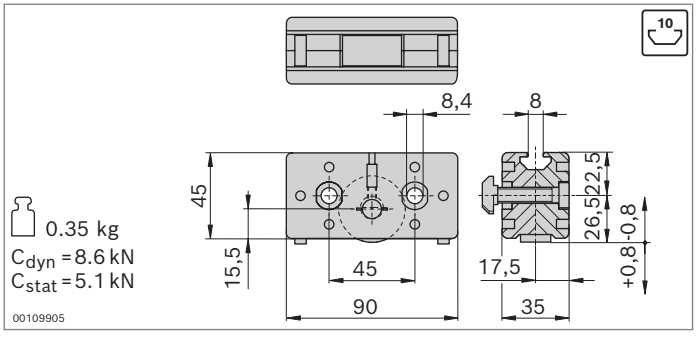
Material:	Housing: Diecast aluminum Cam roller: Steel, hardened, polished
Scope of delivery:	Incl. fastening material (FS)
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**

FS1

DIN 7984
M8x40

FS2

ø10xø5x11



- Supporting bearing for brackets for bearing off-center forces
- For support on the guide rail
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts
- Replacement of the lubricating felts possible from rear in installed state

Supporting bearing		No.	FS
LF12	2	**3 842 535 666**	2xFS3 4xFS2

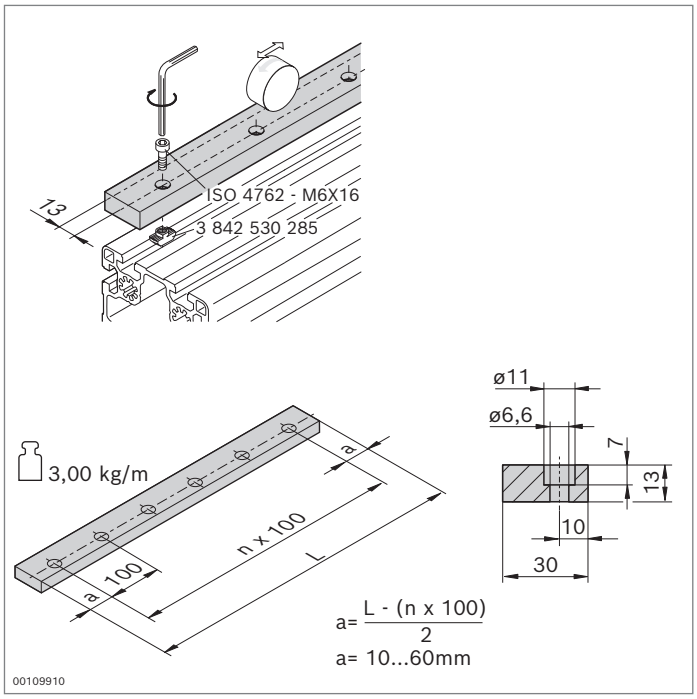
Material:	Housing: Diecast aluminum Cam roller: Steel, hardened, polished
Scope of delivery:	Incl. fastening material (FS)
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**

FS3

DIN 7984
M8x40

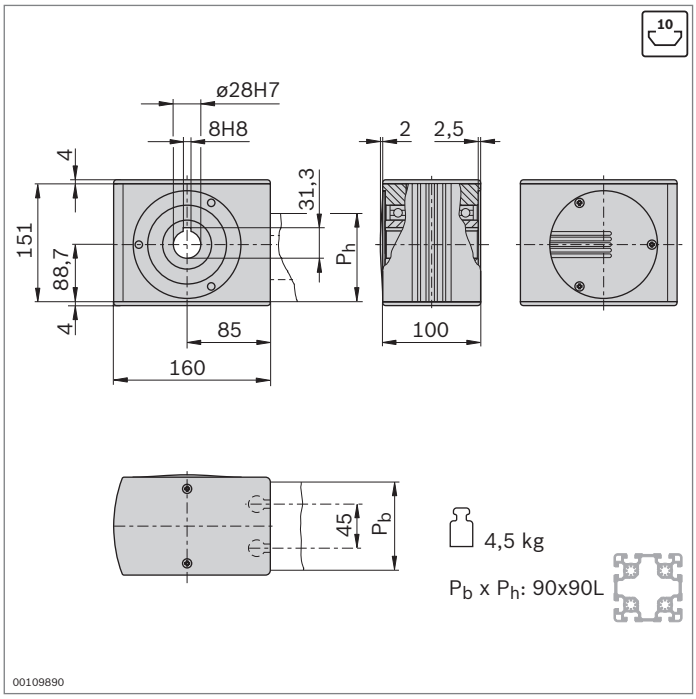
FS2

ø10xø5x11



▶ Guide rail to hold supporting bearings

Guide rail	**L** (mm)	**No.**
LF12	120 ... 2000	**3 842 994 702 / L**
Material:	Steel, hardened, polished	
Condition on delivery:	Ungreased; greasing according to assembly instructions **3 842 527 226**	
Accessories:	Cylinder head screw ISO 4762 – M6x16 T-nut M6, 10 mm slot (**3 842 530 285)**	



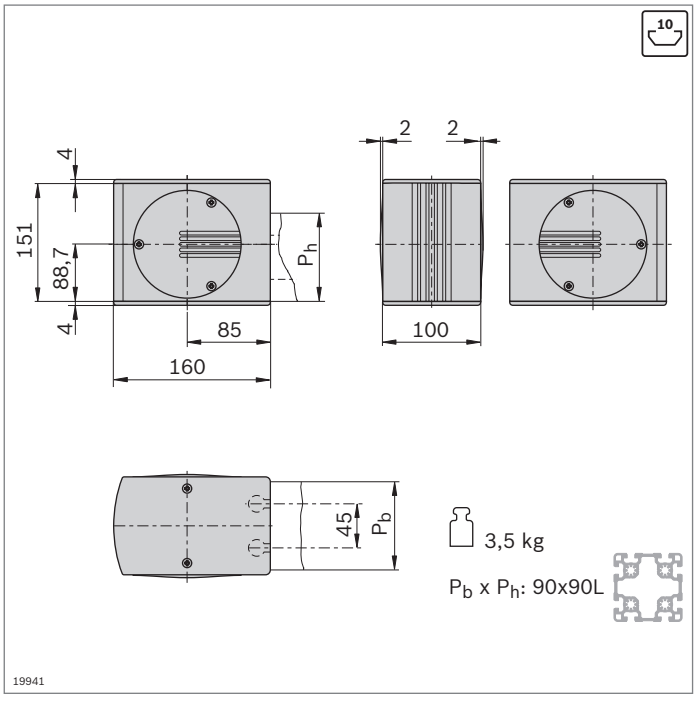
- Drive head for transferring drive torque to a toothed belt
- For direct mounting of a motor or (in conjunction with a plug-in shaft) for mounting a hollow shaft gear or a coupling (p. 13-41)
- Mounted directly on profile by using longitudinal end connector (connector included in scope of delivery)
- Profile finishing: LF blind hole drilling for longitudinal end connector

Drive head	No.	FS
LF12S	**3 842 526 412**	2xFS4, 2xFS5

Material:	Drive head: Aluminum; anodized Cover caps: PA; black Hollow shaft: Steel; zinc-plated
Scope of delivery:	Incl. Fastening material (FS), cover caps

FS4
ISO 7380
M8x40

FS5
ISO 4035
M8-04



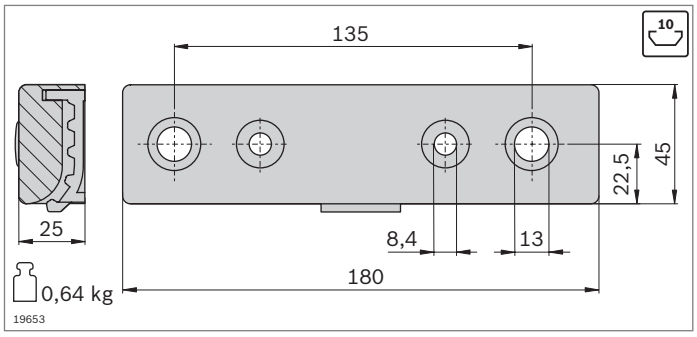
- Return head for tensioning the toothed belt and changing its direction
- Mounted directly on profile by using longitudinal end connector (connector included in scope of delivery)
- Profile finishing: LF blind hole drilling for longitudinal end connector

Return head	No.	FS
LF12S	**3 842 526 413**	2xFS4, 2xFS5

Material:	Aluminum; anodized Hollow shaft: Steel; zinc-plated Cover caps: PA; black
Scope of delivery:	Incl. Fastening material (FS), cover caps

FS4
ISO 7380
M8x40

FS5
ISO 4035
M8-04



- Belt connector suitable for trolley built out of strut profiles 45x180
- All connecting parts included for mounting on the profile end (LF12S) or in the slot (LF12C)
- Profile finishing for strut profile 45x180 for trolley LF12S: M12

Belt connector		No.	FS
LF12	2	**3 842 535 680**	4xFS2, 2xFS6, 2xFS7, 2xFS8, 2xFS9

Material: Aluminum, painted black
Scope of delivery: Incl. fastening material (FS)

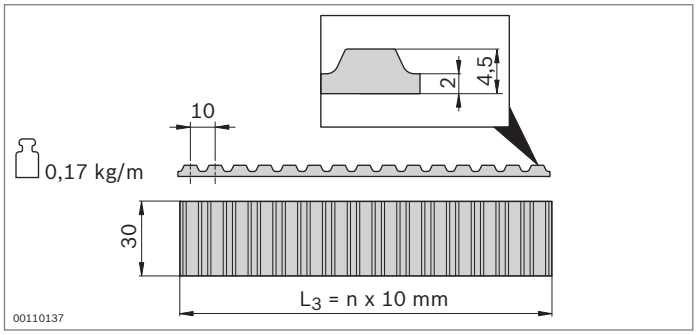
FS2
ø10xø5x11

FS6
DIN7984
M12x40

FS7
DIN 7984
M8x30
DIN 125
A8,4
10

FS8
DIN 7991
M8x30
10

FS9
ø18x7

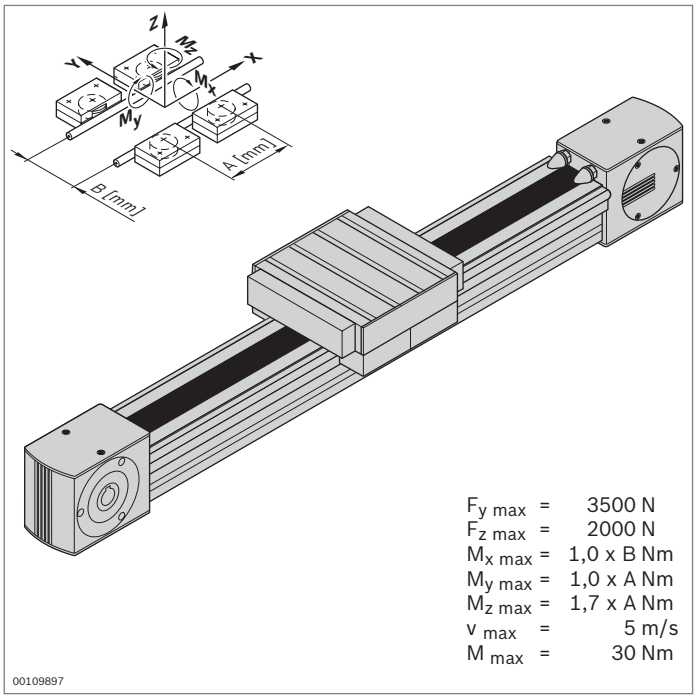


- Toothed belt as a trolley drive
- Pitch: AT10

Toothed belt	L_3 (mm)	No.
LF12	300 ... 50000	**3 842 994 821 / L_3** [1]
	50000	**3 842 526 422**

[1] $L_3 = 2xL_2 - L_1 + 630$
Material: PU with embedded steel wires

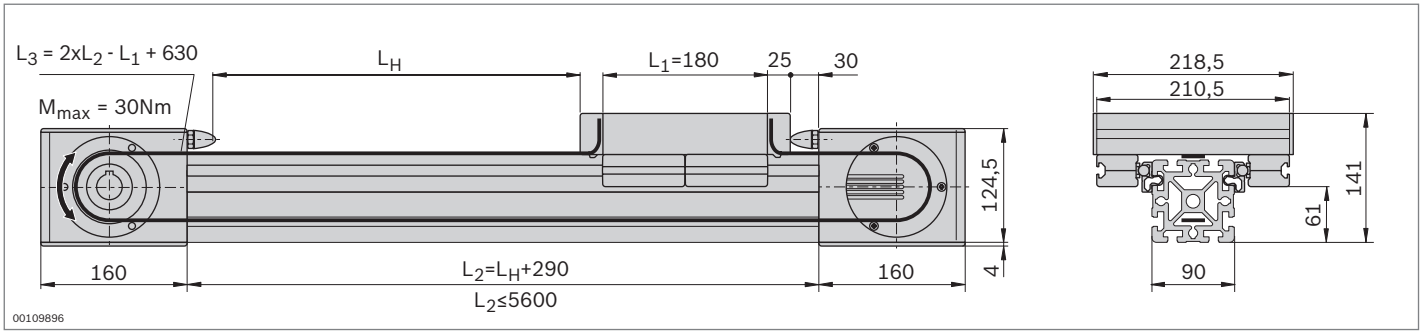
13



Cam roller guide LF12C – complete axis

10

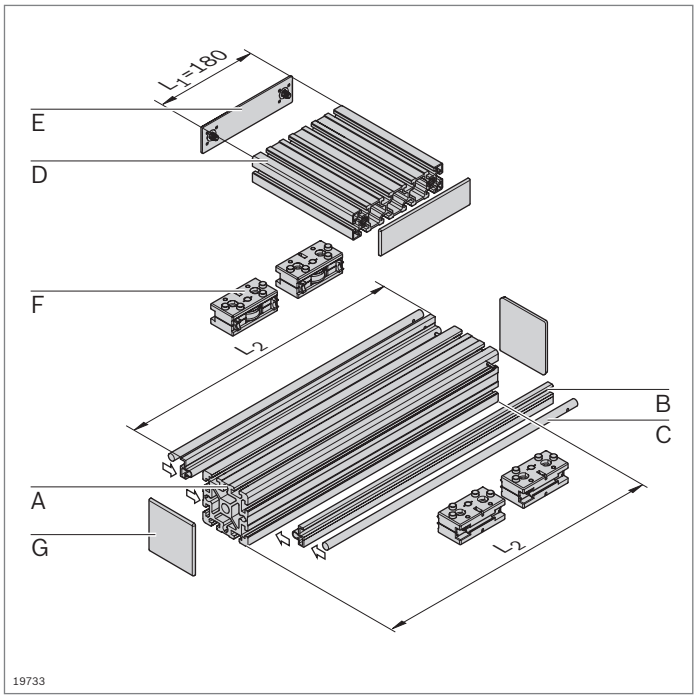
- Fully assembled cam roller guide
- Stroke can be individually selected
- Clamping profile clipped into strut profile 90x90
- Incl. toothed belt drive; additional notes on the drive concept (p. 13-39)



Technical data

For notes on layout and drive, see page 13-45

Complete axis	L_H (mm)	No.
LF12C	50 ... 5310	**3 842 998 498 / L_H**

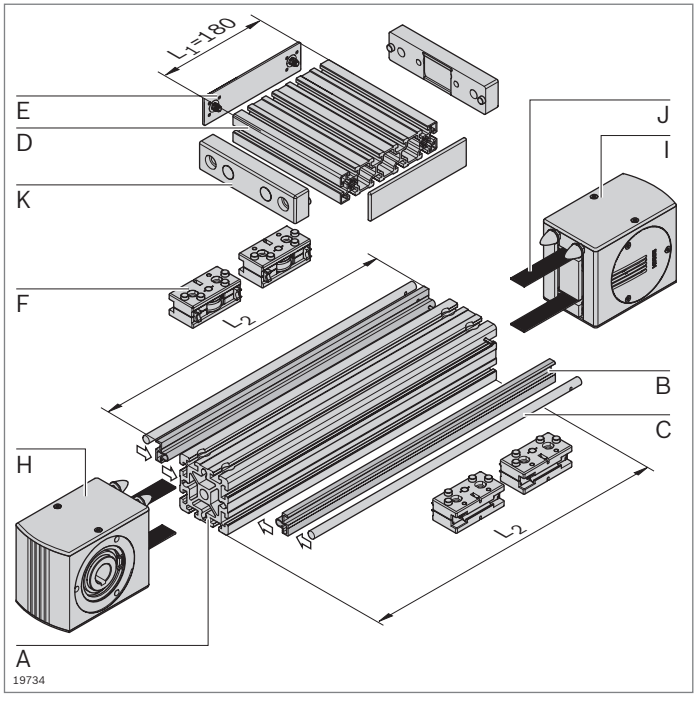


Cam roller guide LF12C – components

- Components for the individual assembly of cam roller guides, with or without drive

Parts list for cam roller guide LF12C without drive

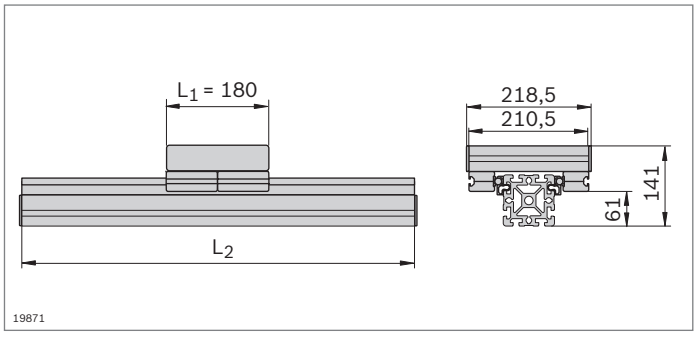
Component		No.	Pcs	Page
A	Profile 90x90	**3 842 990 500 / L_2**	1	2-49
B	Clamping profile LF12C	**3 842 992 440 / L_2**	2	13-20
C	Guide rod LF12	**3 842 993 968 / L_2**	2	13-20
D	Profile 45x180	**3 842 990 335 / 210.5 mm**	1	2-46
E	Cover cap 45x180	**3 842 548 795**	2	2-46
F	Guide bearing LF12	**3 842 535 664**	4	13-21
G	Cover cap 90x90	**3 842 548 761**	2	2-49

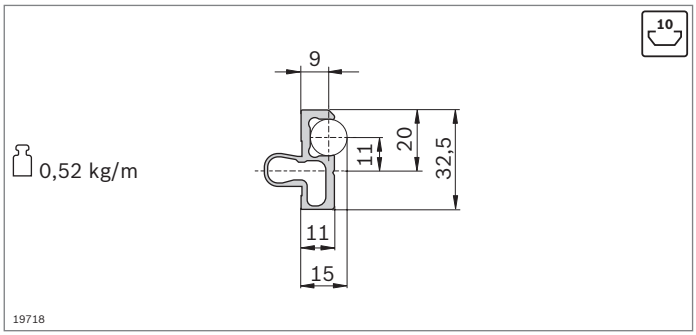


Parts list for cam roller guide LF12C with drive

Component		No.	Pcs	Page
A	Profile 90x90 LF LF	**3 842 993 082 / L_2**	1	2-49
B	Clamping profile LF12C	**3 842 992 440 / L_2**	2	13-20
C	Guide rod LF12	**3 842 993 968 / L_2**	2	13-20
D	Profile 45x180	**3 842 990 335 / 210.5 mm**	1	2-46
E	Cover cap 45x180	**3 842 548 795**	2	2-46
F	Guide bearing LF12	**3 842 535 664**	4	13-21
H	Drive head LF12C	**3 842 526 863**	1	13-23
I	Return head LF12C	**3 842 526 865**	1	13-23
J	Toothed belt LF12	**3 842 994 821 / L_3 [1)]**	1	13-24
K	Belt connector LF12	**3 842 535 680**	2	13-24

[1)] $L_3 = 2xL_2 - L_1 + 630$

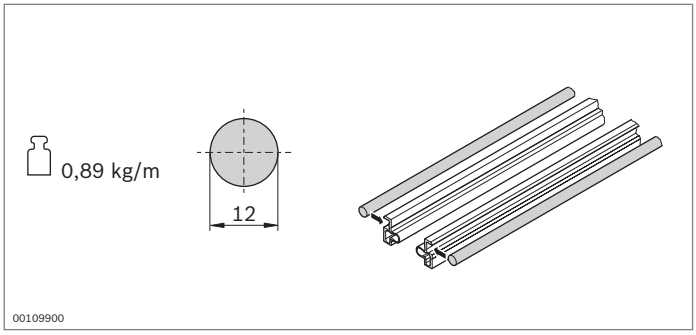




- The clamping profile is clipped into any chosen strut profile with a 10 mm slot and holds the guide rods

Clamping profile		L_2 (mm)	No.
LF12C	1 pc	150 ... 3000	**3 842 992 440 / L_2**
	20 pcs	3000	**3 842 518 897**

Material: Aluminum; anodized

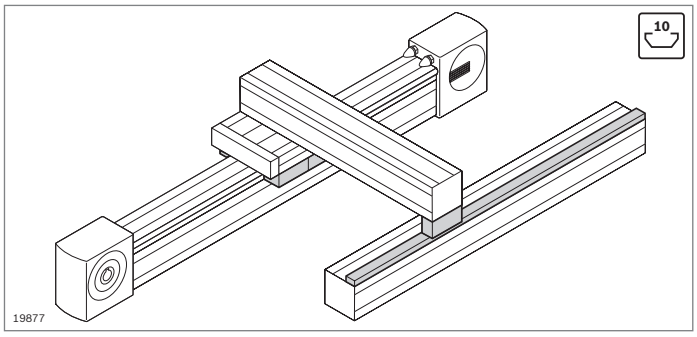


- The guide rod is pressed into the clamping profile
- The guide rod guides the guide bearing

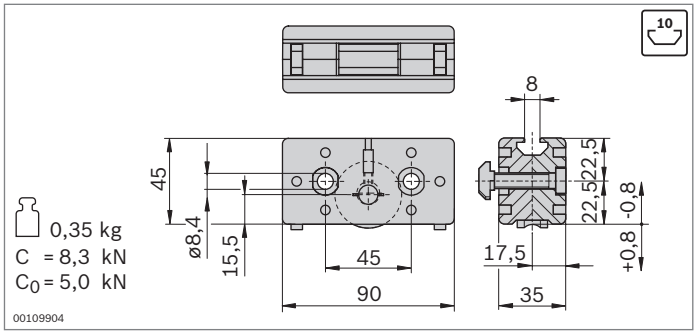
Guide rod	L_2 (mm)		No.
LF12	150 ... 2900	1	**3 842 993 968 / L_2**
	2900	20	**3 842 539 415**

Material: Solid shaft VA, induction hardened and polished

Condition on delivery: Ungreased; greasing according to assembly instructions **3 842 527 226**



- Guide bearing for trolley construction
- Supporting bearing for brackets for bearing off-center forces
- Guide rail to support supporting bearings (p. 13-22)

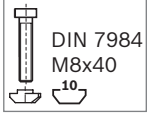


- Guide bearing for trolley construction
- Guiding via guide rod
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts
- Replacement of the lubricating felts possible from rear in installed state

Guide bearing		No.	FS
LF12	2	**3 842 535 664**	2xFS1 4xFS2

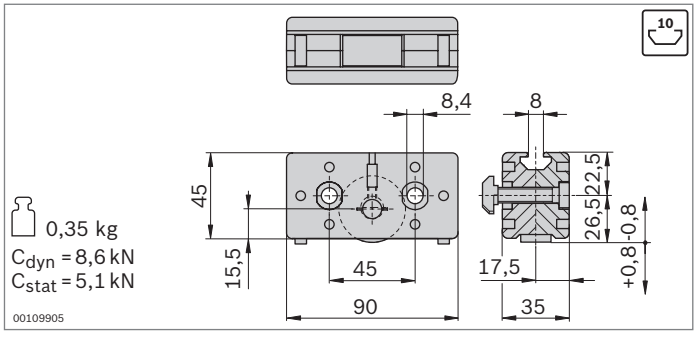
Material:	Guide bearing: Diecast aluminum Cam roller: Steel, hardened, polished
Scope of delivery:	Incl. fastening material (FS)
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**

FS1



FS2

ø10xø5x11

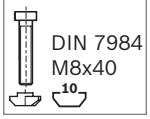


- Supporting bearing for brackets for bearing off-center forces
- For support on the guide rail
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts
- Replacement of the lubricating felts possible from rear in installed state

Supporting bearing		No.	FS
LF12	2	**3 842 535 666**	2xFS1 4xFS2

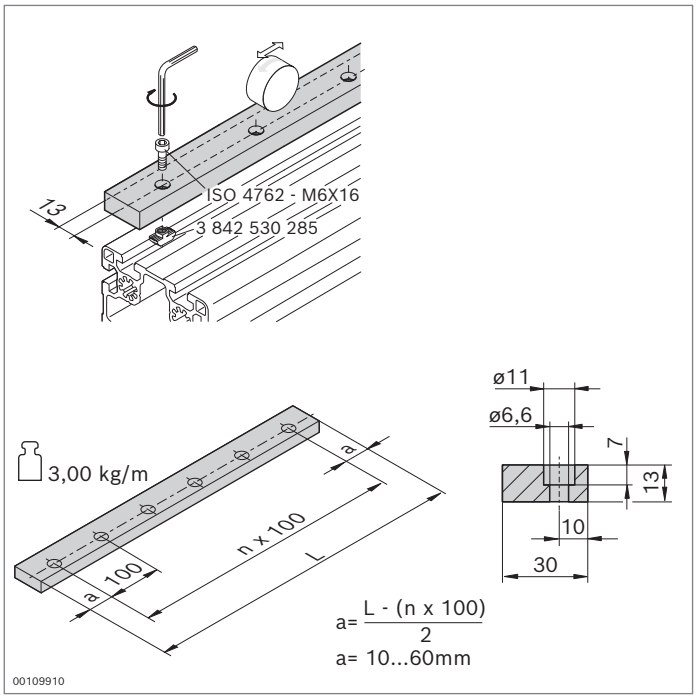
Material:	Guide bearing: Diecast aluminum Cam roller: Steel, hardened, polished
Scope of delivery:	Incl. fastening material (FS)
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**

FS1



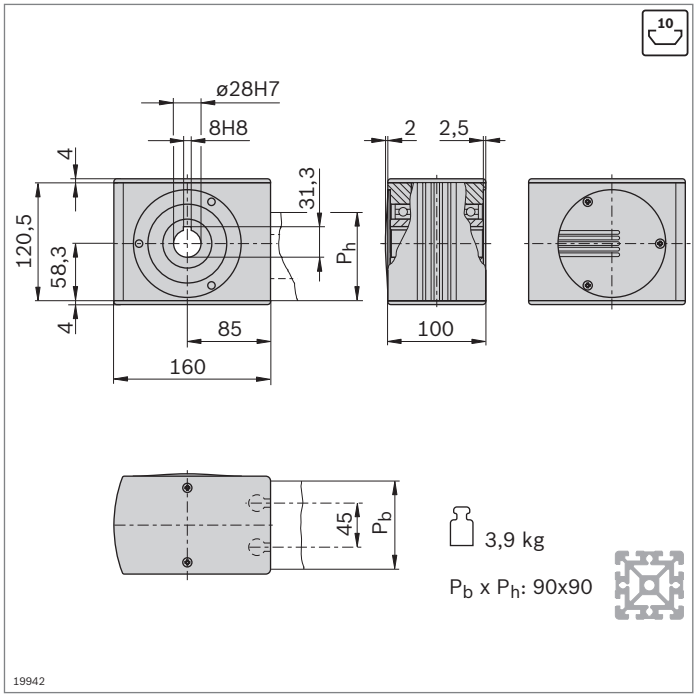
FS2

ø10xø5x11



▶ Guide rail to hold supporting bearings

Guide rail	L (mm)	No.
LF12	120 ... 2000	**3 842 994 702 / L**
Material:	Steel, hardened, polished	
Condition on delivery:	Ungreased; greasing according to assembly instructions **3 842 527 226**	
Accessories:	Cylinder head screw ISO 4762 – M6x16 T-nut M6, 10 mm slot (**3 842 530 285**)	



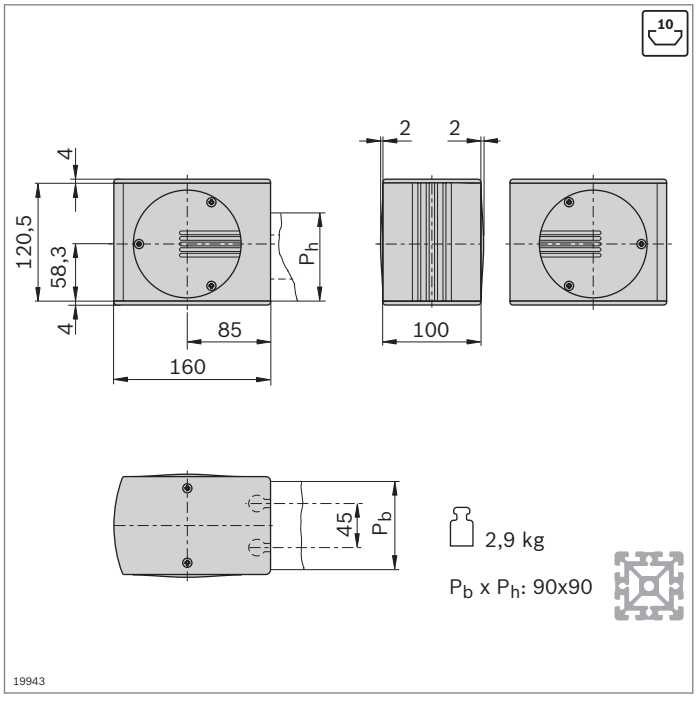
- Drive head for transferring drive torque to a toothed belt
- For direct mounting of a motor or (in conjunction with a plug-in shaft) for mounting a hollow shaft gear or a coupling (p. 13-41)
- Mounted directly on profile by using longitudinal end connector (connector included in scope of delivery)
- Profile finishing: LF blind hole drilling for longitudinal end connector

Drive head	No.	FS
LF12C	**3 842 526 863**	4xFS3, 2xFS4

Material:	Drive head: Aluminum; anodized Hollow shaft: Steel; zinc-plated Cover caps: PA; black
Scope of delivery:	Incl. fastening material (FS), cover caps

FS3
ISO 7380
M8x40

FS4
ISO 4035
M8-04



- Return head for tensioning the toothed belt and changing its direction
- Mounted directly on profile by using longitudinal end connector (connector included in scope of delivery)
- Profile finishing: LF blind hole drilling for longitudinal end connector

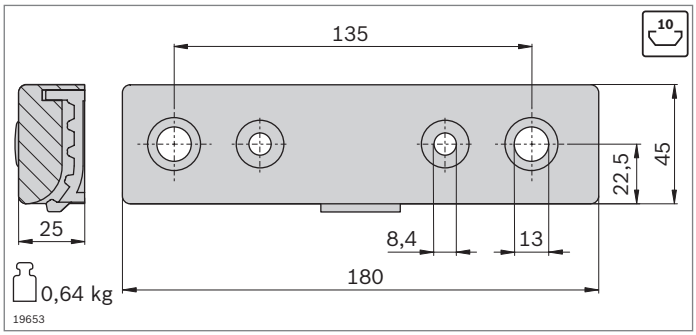
Return head	No.	FS
LF12C	**3 842 526 865**	4xFS3, 2xFS4

Material:	Return head: Aluminum; anodized Hollow shaft: Steel; zinc-plated Cover caps: PA; black
Scope of delivery:	Incl. fastening material (FS), cover caps

FS3
ISO 7380
M8x40

FS4
ISO 4035
M8-04

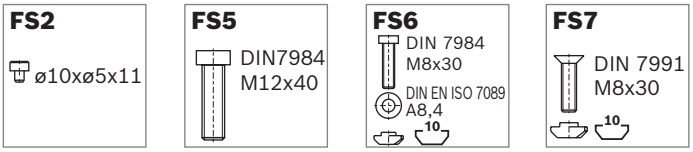
13

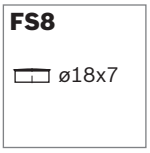


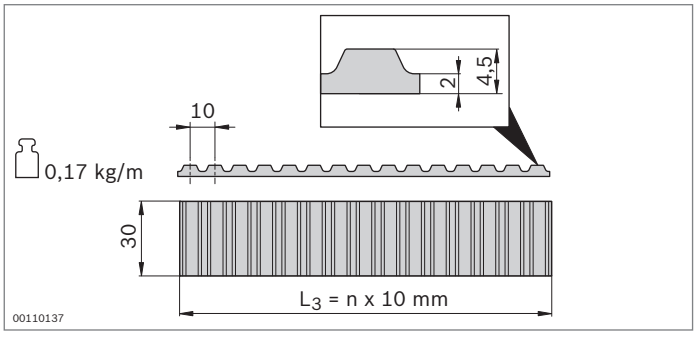
- Belt connector suitable for trolley built out of strut profiles 45x180
- All connecting parts included for mounting at the profile end (LF12S) or the slot (LF12C)
- Profile finishing for strut profile 45x180 for trolley LF12S: M12

Belt connector		No.	FS
LF12	2	**3 842 535 680**	4xFS2, 2xFS5, 2xFS6, 2xFS7, 2xFS8

Material: Aluminum, painted black
Scope of delivery: Incl. fastening material (FS)



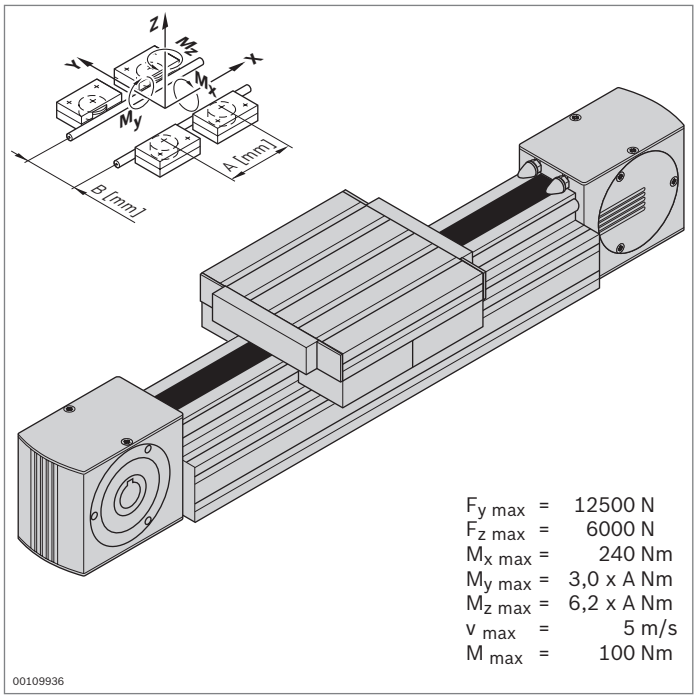




- Toothed belt as a trolley drive
- Pitch: AT10

Toothed belt	L_3 (mm)	No.
LF12	300 ... 50000	**3 842 994 821 / L_3** [1]
	50000	**3 842 526 422**

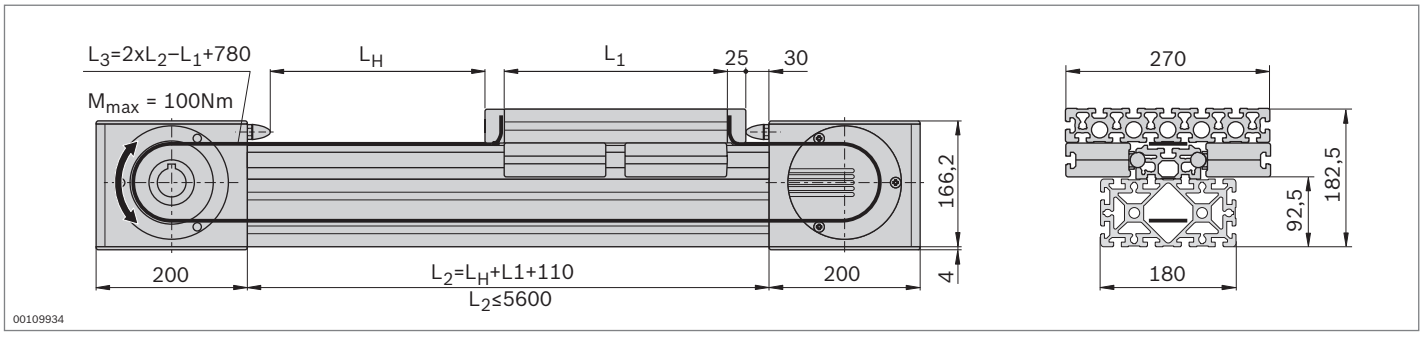
[1] $L_3 = 2xL_2 - L_1 + 630$
Material: PU with embedded steel wires



Cam roller guide LF20S – complete axis

10

- Fully assembled cam roller guide
- Stroke and trolley length can be individually selected
- Rail profile mounted on strut profile 90x180
- Incl. toothed belt drive; additional notes on the drive concept (p. 13-39)

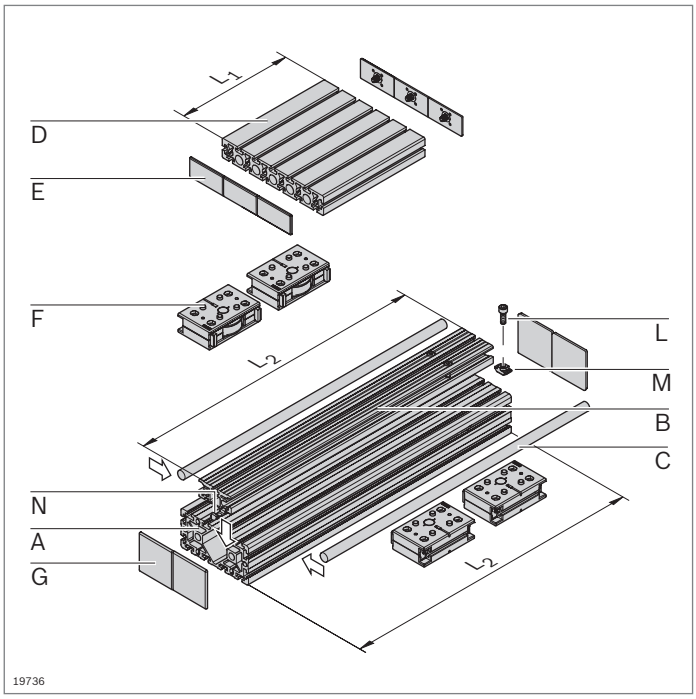


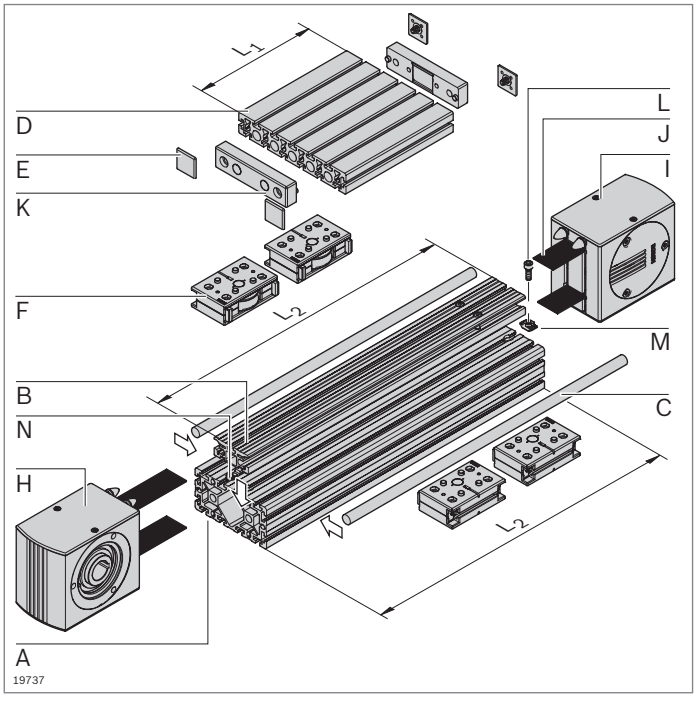
Technical data

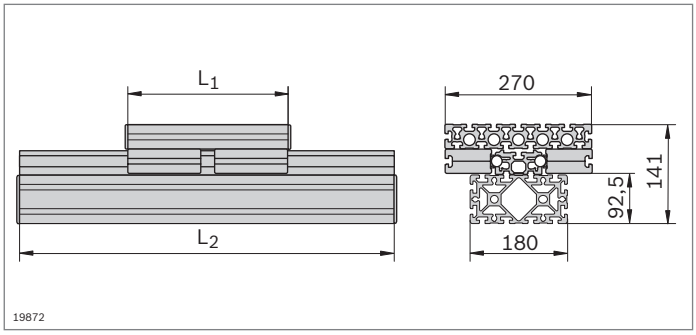
For notes on layout and drive, see page 13-45

Complete axis	L_H / L_1 (mm)	No.
LF20S	$L_1+50 \le L_H \le 5220$ $270 \le L_1 \le 1000$	**3 842 998 499 / L_H / L_1**

13







Cam roller guide LF20S – components

- Components for the individual assembly of cam roller guides, with or without drive

Parts list for cam roller guide LF20S without drive

Component		No.	Pcs	Page
A	Profile 90x180	**3 842 990 416 / L_2**	1	2-51
B	Guide profile LF20S	**3 842 993 080 / L_2**	1	13-27
C	Guide rod LF20	**3 842 993 969 / L_2**	2	13-27
D	Profile 45x270	**3 842 992 927 / L_1**	1	2-47
E	Cover cap 45x90	**3 842 548 757**	6	2-47
F	Guide bearing LF20	**3 842 535 663**	4	13-28
G	Cover cap 90x90	**3 842 548 761**	4	2-49
L	Cylinder head screw DIN 7984 – M8x45		n[1)]	
M	T-nut M8, 10 mm slot	**3 842 530 287**	n[1)]	3-4
N	Sliding block	**3 842 146 877**	n[1)]	13-27

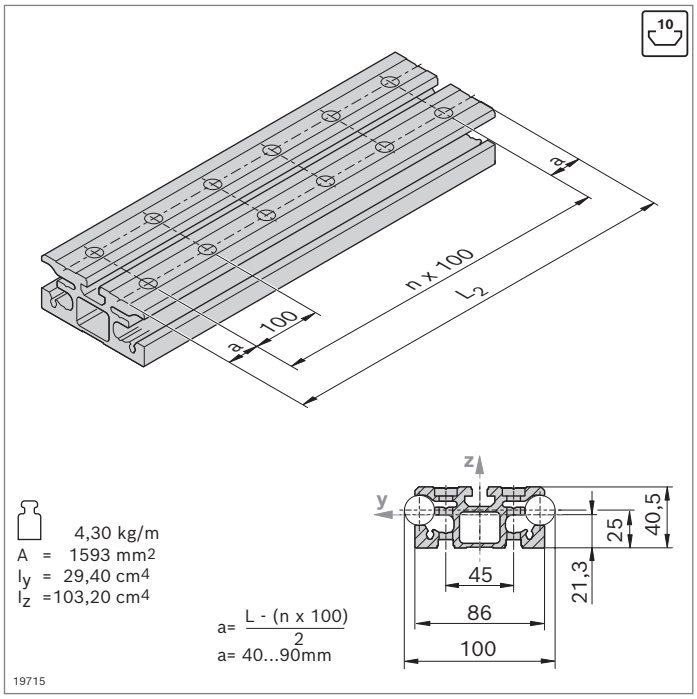
[1)] For identification see page 13-27

Parts list for cam roller guide LF20S with drive

Component		No.	Pcs	Page
A	Profile 90x180 LF-S LF-S	**3 842 993 081 / L_2**	1	2-51
B	Guide profile LF20S	**3 842 993 080 / L_2**	1	13-27
C	Guide rod LF20	**3 842 993 969 / L_2**	2	13-27
D	Profile 45x270 M12 M12	**3 842 992 928 / L_1**	1	2-47
E	Cover cap 45x45	**3 842 548 753**	4	2-41
F	Guide bearing LF20	**3 842 535 663**	4	13-28
H	Drive head LF20S	**3 842 526 414**	1	13-30
I	Return head LF20S	**3 842 526 415**	1	13-30
J	Toothed belt LF20	**3 842 994 662 / L_3[1)]**	1	13-31
K	Belt connector LF20	**3 842 535 680**	2	13-31
L	Cylinder head screw DIN 7984 – M8x45		n[2)]	
M	T-nut M8, 10 mm slot	**3 842 530 287**	n[2)]	3-4
N	Sliding block	**3 842 146 877**	n[2)]	13-27

[1)] $L_3 = 2xL_2 - L_1 + 780$

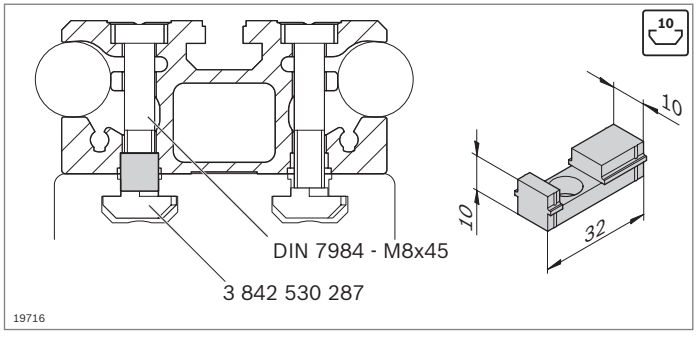
[2)] For identification see page 13-27



- Guide profile LF20S to hold the guide rods
- Installation on MGE strut profiles with 10 mm slot or directly on a flat surface

Guide profile		L_2 (mm)	No.
LF20S	1 pc	180 ... 6070	**3 842 993 080 / L_2**
	6 pcs	6070	**3 842 557 958**

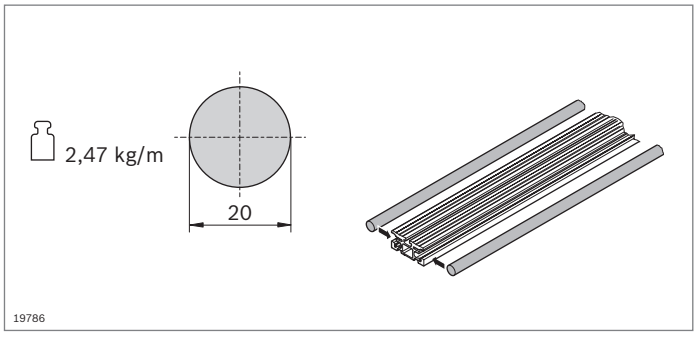
Accessories: Cylinder head screw DIN 7984 M8x45
T-nut M8, 10 mm slot (p. 3-4)
Sliding block



- Sliding block as a centering aid for mounting the guide profile in a 10 mm profile slot

Sliding block		No.
	50	**3 842 146 877**

Material: PA; black

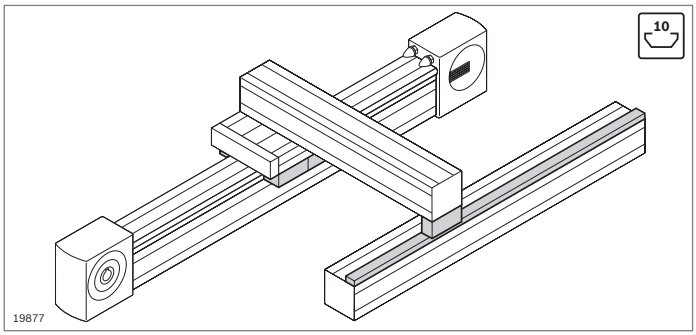


- The guide rod is pressed into the guide profile
- The guide rod guides the guide bearing

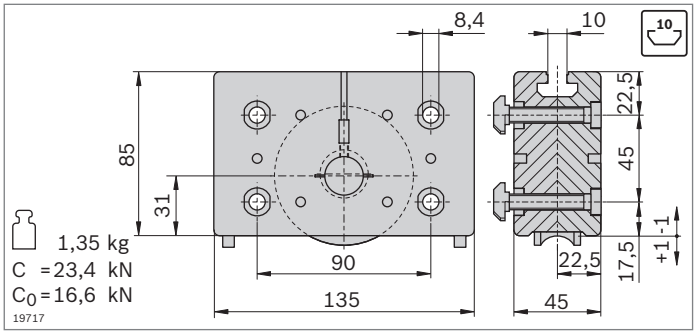
Guide rod	L_2 (mm)		No.
LF20	150 ... 2900	1	**3 842 993 969 / L_2**
	2900	20	**3 842 539 416**

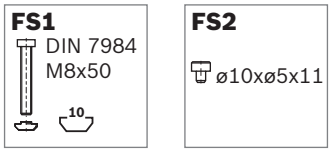
Material: Solid shaft VA, induction hardened, polished
Condition on delivery: Ungreased; greasing according to assembly instructions **3 842 527 226**

13



- Guide bearing for trolley construction
- Supporting bearing for brackets for bearing off-center forces
- Guide rail to support supporting bearings (p. 13-29)

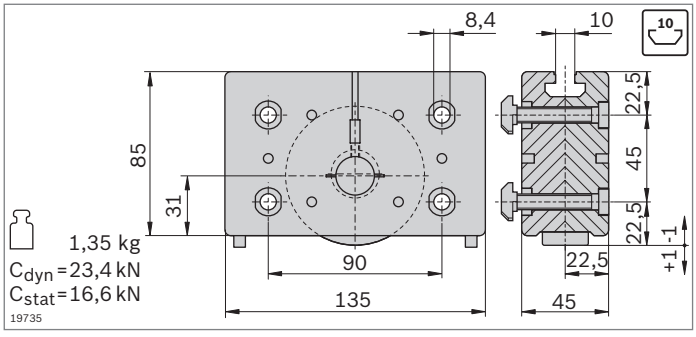


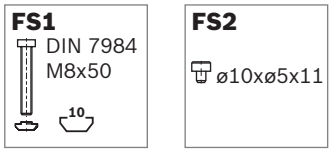


- Guide bearing for trolley construction
- Guiding via guide rod
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts
- Replacement of the lubricating felts possible from rear in installed state

Guide bearing		No.	FS
LF20	2	**3 842 535 663**	4xFS1 4xFS2

Material:	Housing: Diecast aluminum Cam roller: Steel, hardened, polished
Scope of delivery:	Incl. fastening material (FS)
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**

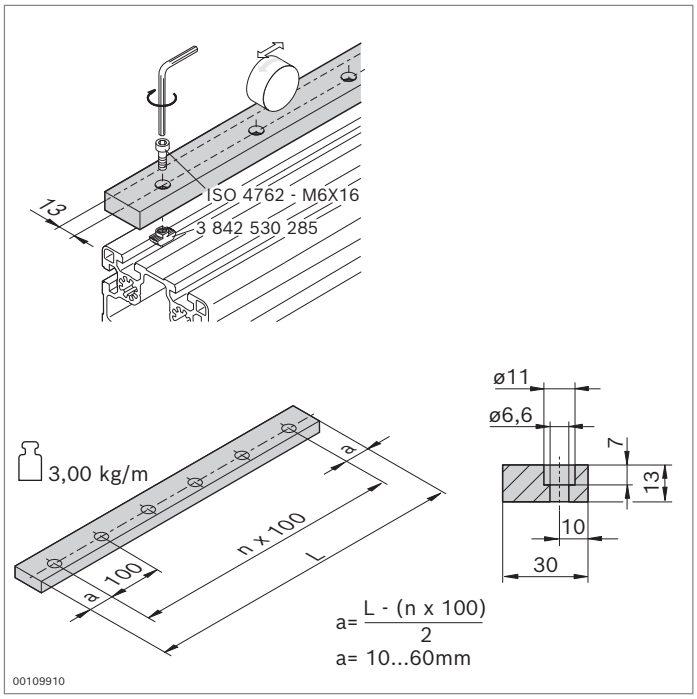




- Supporting bearing for brackets for bearing off-center forces
- For support on the guide rail
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts
- Replacement of the lubricating felts possible from rear in installed state

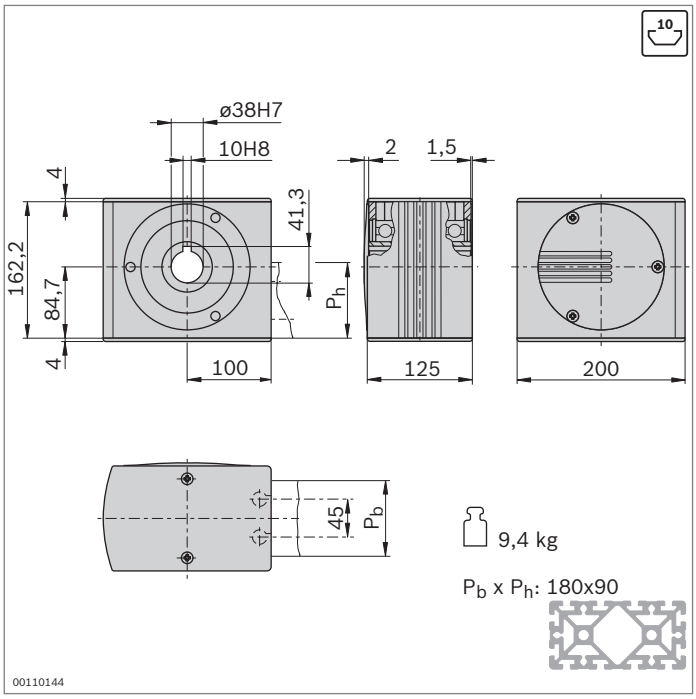
Supporting bearing		No.	FS
LF20	2	**3 842 535 665**	4xFS1 4xFS2

Material:	Housing: Diecast aluminum Cam roller: Steel, hardened, polished
Scope of delivery:	Incl. fastening material (FS)
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**



▶ Guide rail to hold supporting bearings

Guide rail	**L** (mm)	**No.**
LF20	120 ... 2000	**3 842 994 702 / L**
Material:	Steel, hardened, polished	
Condition on delivery:	Ungreased; greasing according to assembly instructions **3 842 527 226**	
Accessories:	Cylinder head screw ISO 4762 – M6x16 T-nut M6, 10 mm slot (**3 842 530 285**)	



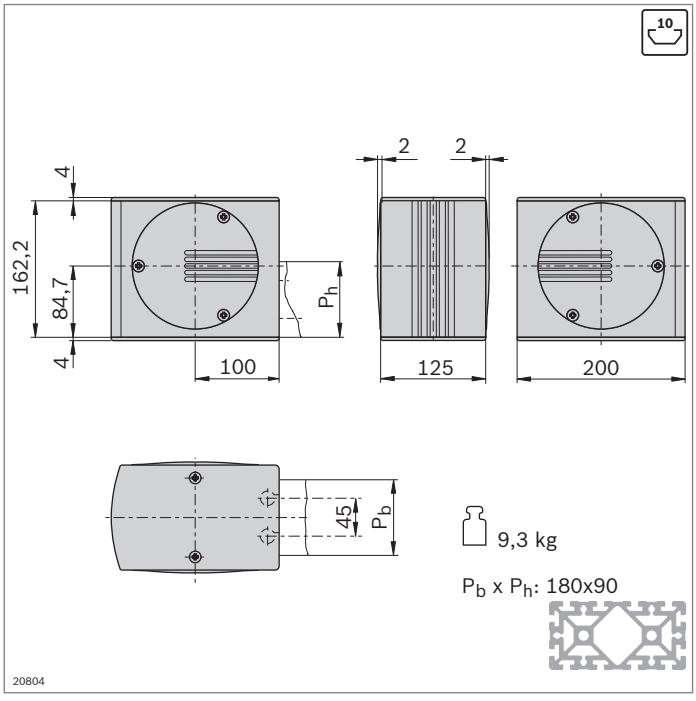
- Drive head for transferring drive torque to a toothed belt
- For direct mounting of a motor or (in conjunction with a plug-in shaft) for mounting a hollow shaft gear or a coupling (p. 13-41)
- Mounted directly on profile by using longitudinal end connector (connector included in scope of delivery)
- Profile finishing: LF-S blind hole drilling for longitudinal end connector

Drive head	No.	FS
LF20S	**3 842 526 414**	4xFS3, 2xFS4

Material:	Drive head: Aluminum; anodized Hollow shaft: Steel; zinc-plated
Scope of delivery:	Incl. fastening material (FS), cover caps

FS3


FS4

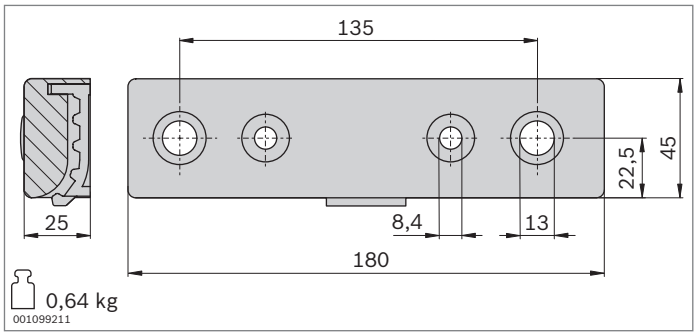
- Return head for tensioning the toothed belt and changing its direction
- Mounted directly on profile by using longitudinal end connector (connector included in scope of delivery)
- Profile finishing: LF-S blind hole drilling for longitudinal end connector

Return head	No.	FS
LF20S	**3 842 526 415**	4xFS3, 2xFS4

Material:	Return head: Aluminum; anodized Hollow shaft: Steel; zinc-plated Cover caps: PA; black
Scope of delivery:	Incl. fastening material (FS), cover caps

FS3

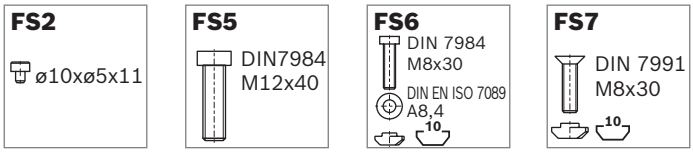

FS4

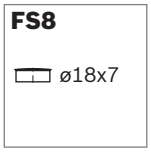



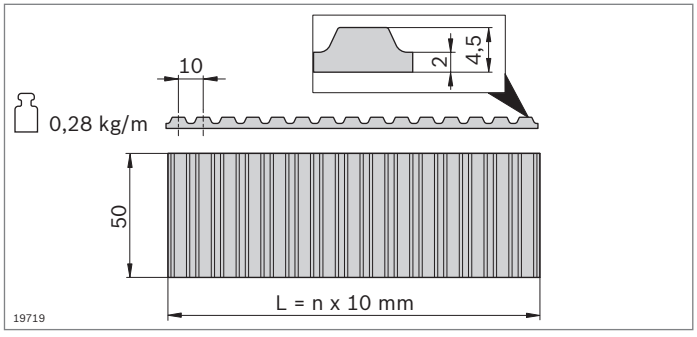
- Belt connector for fixing the toothed belt on the front of the trolley
- Profile finishing for strut profile 45x270 for trolley LF20S: M12
- All connecting parts included for mounting at the profile end (LF20S) or the slot (LF20C)

Belt connector		No.	FS
LF20	2	**3 842 535 680**	4xFS2, 2xFS5, 2xFS6, 2xFS7, 2xFS8

Material: Aluminum, painted black
Scope of delivery: Incl. fastening material (FS)





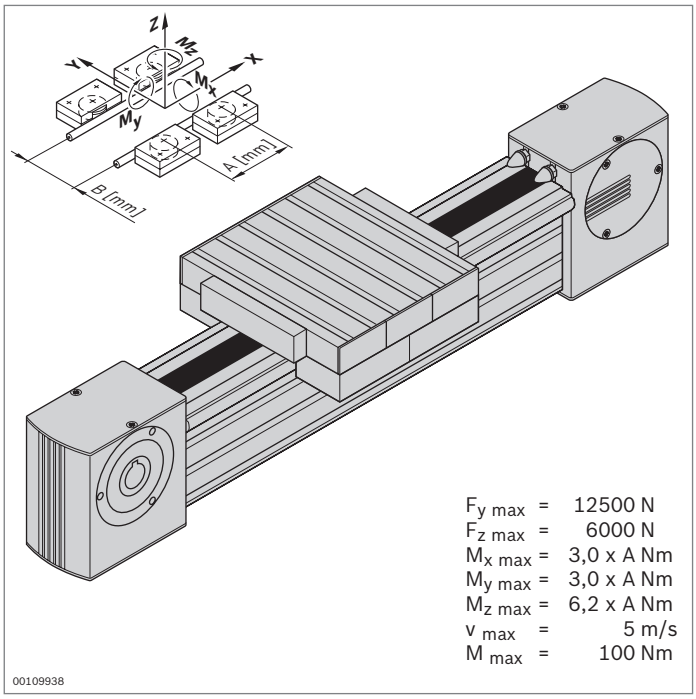


- Toothed belt as a trolley drive
- Pitch: AT10

Toothed belt	L_3 (mm)	No.
LF20	300 ... 50000	**3 842 994 662 / L_3**[1)]
	50000	**3 842 513 648**

[1)] $L_3 = 2xL_2 - L_1 + 780$
Material: PU with embedded steel wires

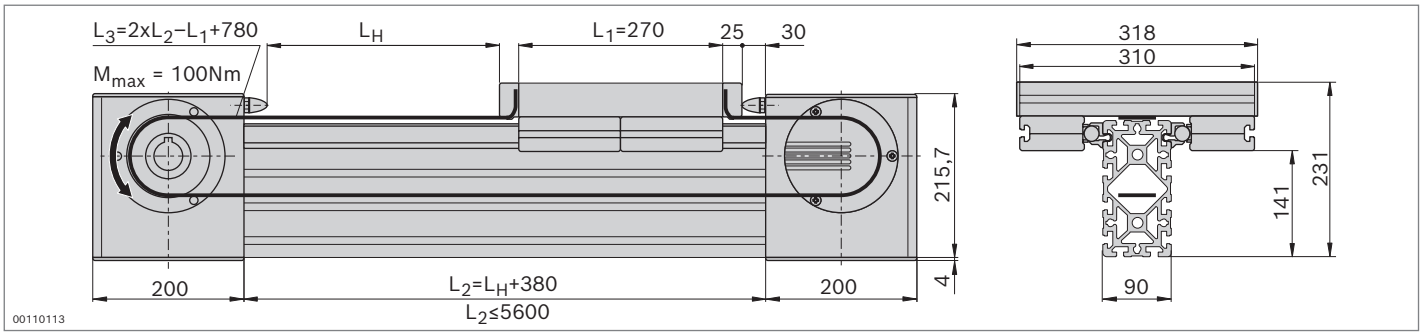
13



Cam roller guide LF20C – complete axis

10

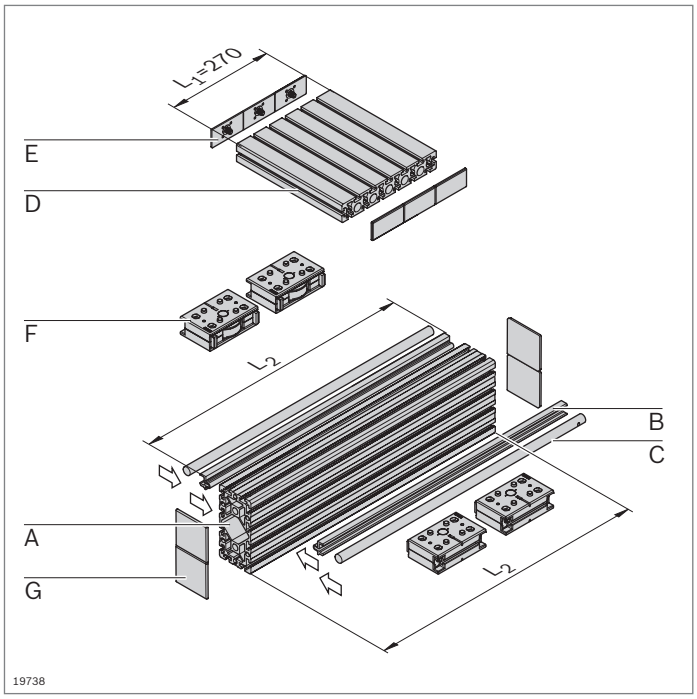
- Fully assembled cam roller guide
- Stroke can be individually selected
- Clamping profile clipped into strut profile 90x180
- Incl. toothed belt drive; additional notes on the drive concept (p. 13-39)



Technical data

For notes on layout and drive, see page 13-45

Complete axis	L_H (mm)	No.
LF20C	50 ... 5220	**3 842 998 500 / L_H**

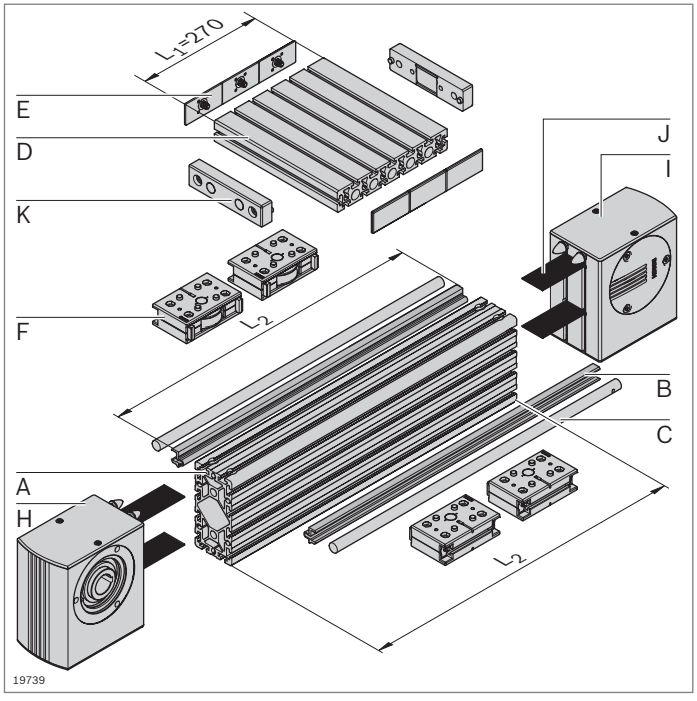


Cam roller guide LF20C – components

- Components for the individual assembly of cam roller guides, with or without drive

Parts list for cam roller guide LF20C without drive

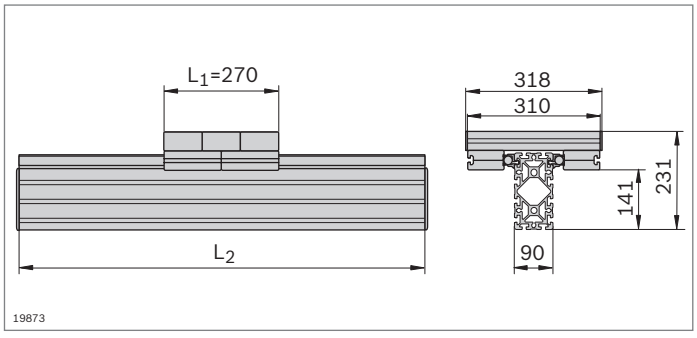
Component		No.	Pcs	Page
A	Profile 90x180	**3 842 990 416 / L_2**	1	2-51
B	Clamping profile LF20C	**3 842 992 441 / L_2**	2	13-34
C	Guide rod LF20	**3 842 993 969 / L_2**	2	13-34
D	Profile 45x270	**3 842 992 927 / 310 mm**	1	2-47
E	Cover cap 45x90	**3 842 548 757**	6	2-47
F	Guide bearing LF20	**3 842 535 663**	4	13-35
G	Cover cap 90x90	**3 842 548 761**	4	2-51



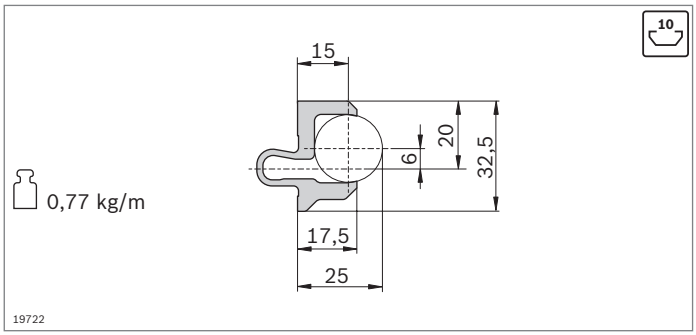
Parts list for cam roller guide LF20C with drive

Component		No.	Pcs	Page
A	Profile 90x180 LF LF	**3 842 992 898 / L_2**	1	2-51
B	Clamping profile LF20C	**3 842 992 441 / L_2**	2	13-34
C	Guide rod LF20	**3 842 993 969 / L_2**	2	13-34
D	Profile 45x270	**3 842 992 927 / 310 mm**	1	2-47
E	Cover cap 45x90	**3 842 548 757**	6	2-47
F	Guide bearing LF20	**3 842 535 663**	4	13-35
H	Drive head	**3 842 526 867**	1	13-37
I	Return head	**3 842 526 869**	1	13-37
J	Toothed belt	**3 842 994 662 / L_3**[1)]	1	13-38
K	Belt connector	**3 842 535 680**	2	13-38

[1)] $L_3 = 2xL_2 - L_1 + 780$

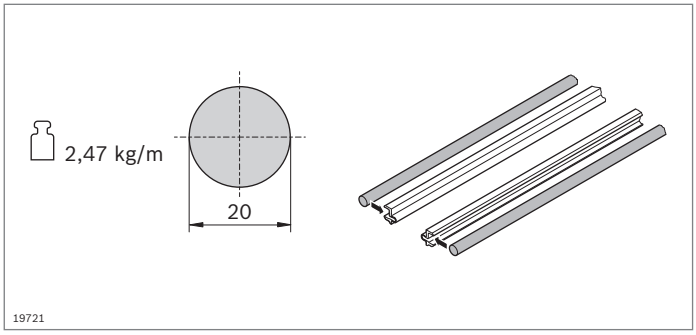


13



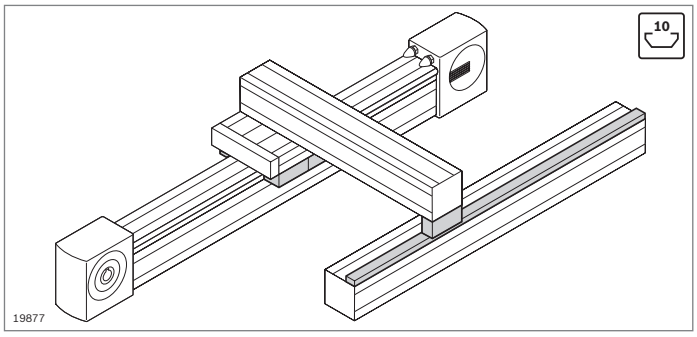
- The clamping profile is clipped into any chosen 10 mm strut profile slot and holds the guide rods

Clamping profile		L (mm)	No.
LF20C	1 pc	150 ... 3000	**3 842 992 441 / L**
	20 pcs	3000	**3 842 518 898**
Material:	Aluminum; anodized		

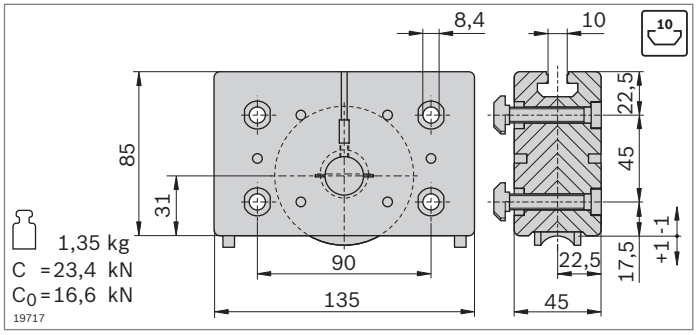


- The guide rod is pressed into the clamping profile
- The guide rod guides the guide bearing

Guide rod	L (mm)		No.
LF20	150 ... 2900	1	**3 842 993 969 / L**
	2900	20	**3 842 539 416**
Material:	Solid shaft VA, induction hardened, polished		
Condition on delivery:	Ungreased; greasing according to assembly instructions **3 842 527 226**		



- Guide bearing for trolley construction
- Supporting bearing for brackets for bearing off-center forces
- Guide rail to support supporting bearings (p. 13-36)



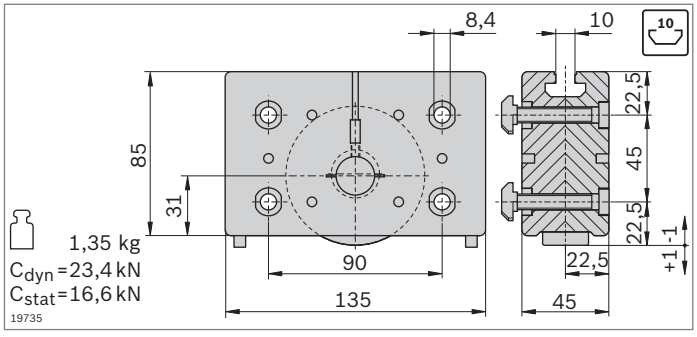
FS1
DIN 7984
M8x50
10

FS2
ø10xø5x11

- Guide bearing for trolley construction
- Guiding via guide rod
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts
- Replacement of the lubricating felts possible from rear in installed state

Guide bearing		No.	FS
LF20	2	**3 842 535 663**	4xFS1 4xFS2

Material:	Housing: Diecast aluminum Cam roller: Steel, hardened, polished
Scope of delivery:	Incl. fastening material (FS)
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**



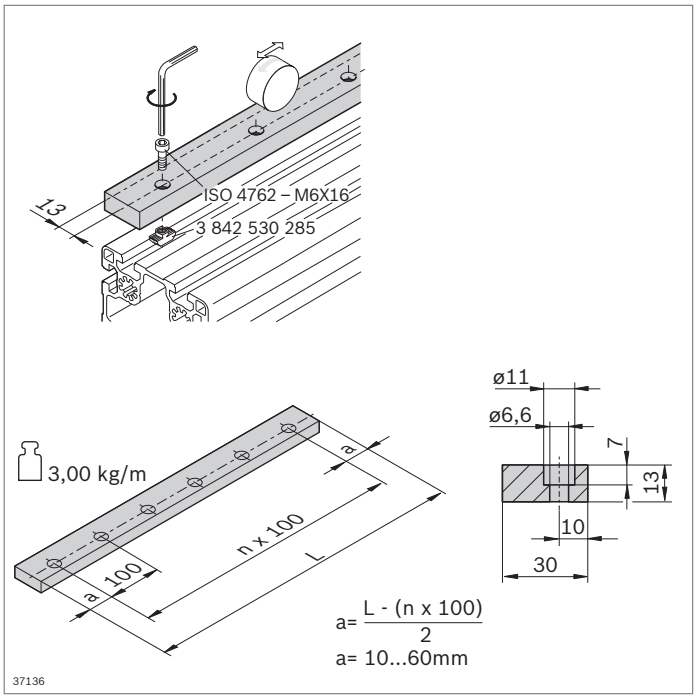
FS1
DIN 7984
M8x50
10

FS2
ø10xø5x11

- Supporting bearing for brackets for bearing off-center forces
- For support on the guide rail
- Cam rollers with ball bearings, permanently lubricated
- Lubricating felts with guide rod lubrication reservoir
- Play-free cam roller adjustment via eccentric bolts
- Replacement of the lubricating felts possible from rear in installed state

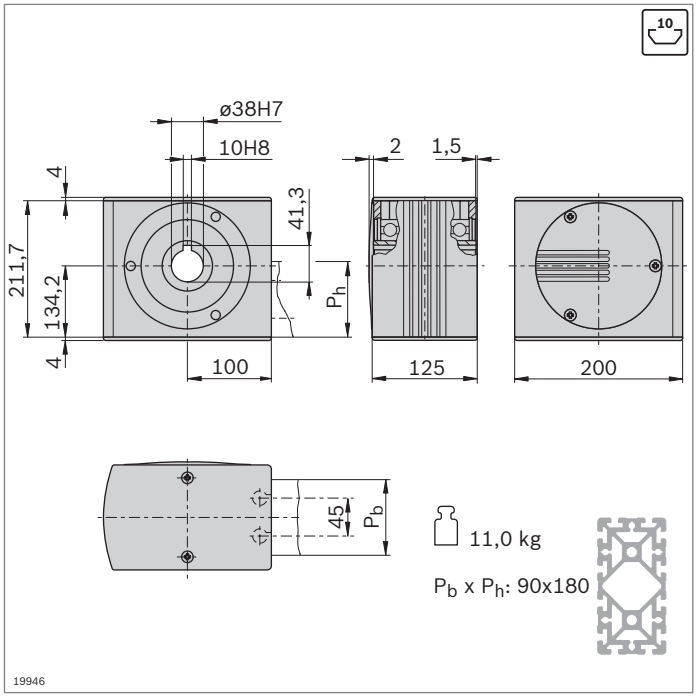
Supporting bearing		No.	FS
LF20	2	**3 842 535 665**	4xFS1 4xFS2

Material:	Housing: Diecast aluminum Cam roller: Steel, hardened, polished
Scope of delivery:	Incl. fastening material (FS)
Condition on delivery:	Lubricating felts ungreased; greasing according to assembly instructions **3 842 527 226**



▶ Guide rail to hold supporting bearings

Guide rail	L (mm)	No.
LF20	120 ... 2000	**3 842 994 702 / L**
Material:	Steel, hardened, polished	
Accessories:	Cylinder head screw ISO 4762 – M6x16 T-nut M6, 10 mm slot (**3 842 530 285**)	
Condition on delivery:	Ungreased; greasing according to assembly instructions **3 842 527 226**	



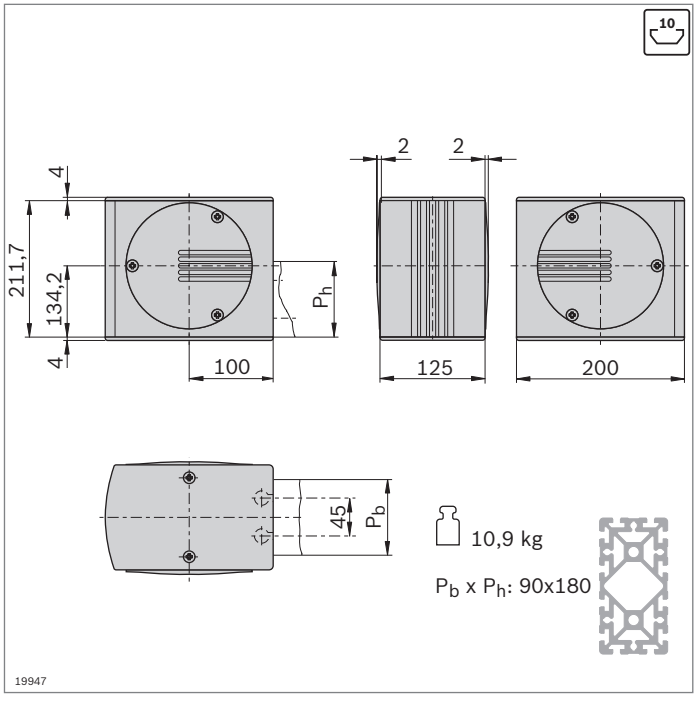
- Drive head for transferring drive torque to a toothed belt
- For direct mounting of a motor or (in conjunction with a plug-in shaft) for mounting a hollow shaft gear or a coupling (p. 13-41)
- Mounted directly on profile by using longitudinal end connector (connector included in scope of delivery)
- Profile finishing: LF blind hole drilling for longitudinal end connector

Drive head	No.	FS
LF20C	**3 842 526 867**	4xFS3, 2xFS4

Material:	Drive head: Aluminum; anodized Hollow shaft: Steel; zinc-plated
Scope of delivery:	Incl. fastening material (FS), cover caps

FS3
ISO 7380
M8x40

FS4
ISO 4035
M8-04



- Return head for tensioning the toothed belt and changing its direction
- Mounted directly on profile by using longitudinal end connector (connector included in scope of delivery)
- Profile finishing: LF blind hole drilling for longitudinal end connector

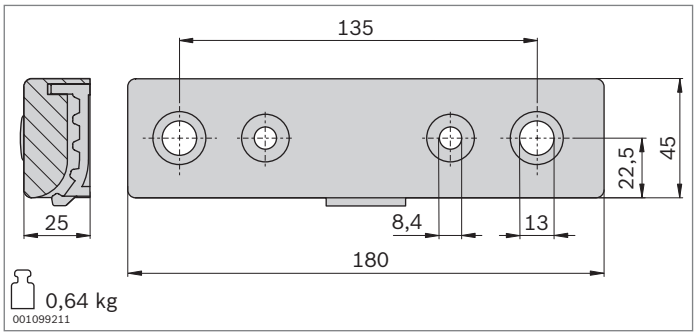
Return head	No.	FS
LF20C	**3 842 526 869**	4xFS3, 2xFS4

Material:	Return head: Aluminum; anodized Hollow shaft: Steel; zinc-plated Cover caps: PA; black
Scope of delivery:	Incl. fastening material (FS), cover caps

FS3
ISO 7380
M8x40

FS4
ISO 4035
M8-04

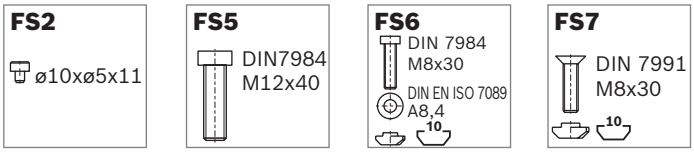
13

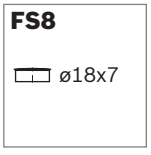


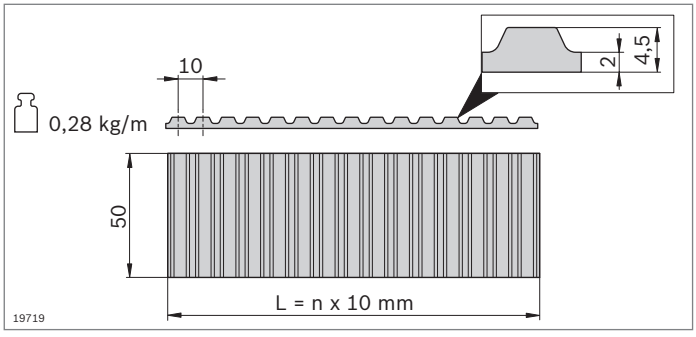
- Belt connector for fastening the toothed belt to the trolley slot
- Profile finishing for strut profile 45x270 for trolley LF20S: M12
- All connecting parts included for mounting at the profile end (LF20S) or the slot (LF20C)

Belt connector		No.	FS
LF20	2	**3 842 535 680**	4xFS2, 2xFS5, 2xFS6, 2xFS7, 2xFS8

Material: Aluminum, painted black
Scope of delivery: Incl. fastening material (FS)



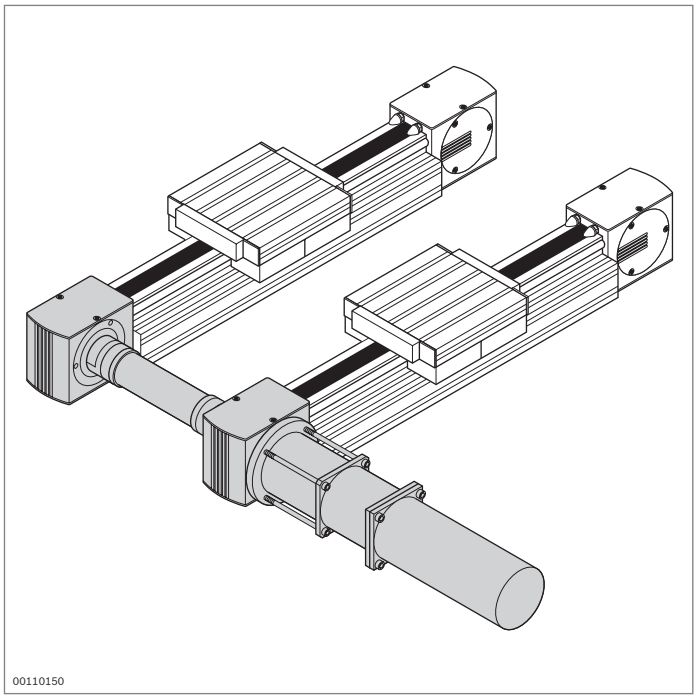




- Toothed belt as a trolley drive
- Pitch: AT10

Toothed belt	L (mm)	No.
LF20	300 ... 50000	**3 842 994 662 / L_3**[1)]
	50000	**3 842 513 648**

[1)] $L_3 = 2xL_2 - L_1 + 780$
Material: PU with embedded steel wires

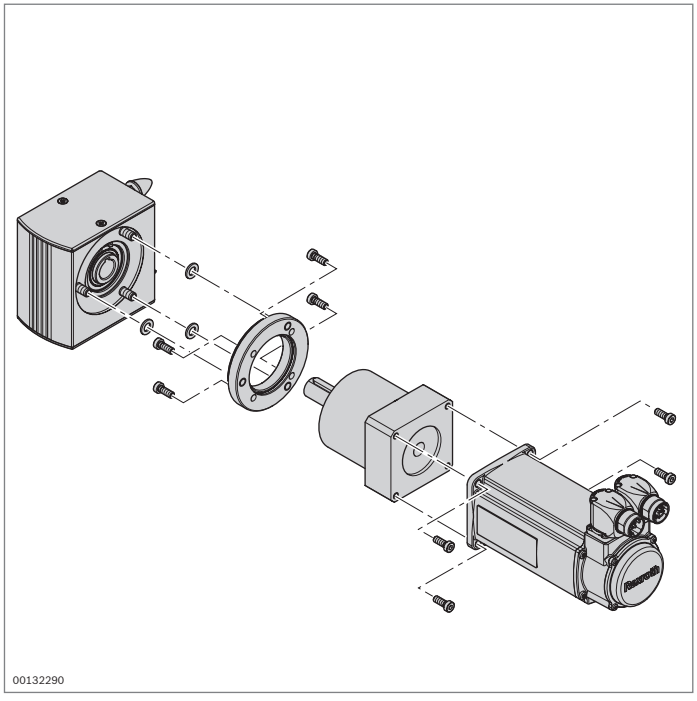


Linear guide drives

Drive concept

The linear guides are driven via the hollow shaft in the drive head. The drive head is used to directly install a motor or alternatively (in connection with a plug-in shaft) a hollow shaft gear or a coupling. Depending on the desired speeds of movement for the application, it is necessary to use various motor types in conjunction with intermediate gears. Due to the multitude of drive components available in the market, there are a large number of possible combinations.

The aluminum modular profile system makes it easy to assemble Bosch Rexroth linear guides through the use of a standard shaft and simple connection dimensions.



Fastening

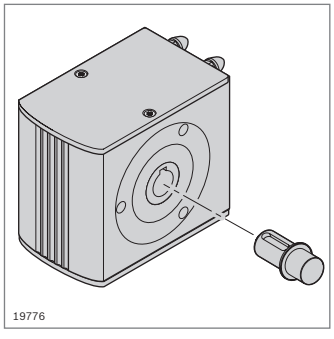
The drive head is directly secured on the profile by means of longitudinal end connectors.
The motor, or the intermediate gear flange, can be screwed to the drive head as a complete unit from the left- or right-hand side.

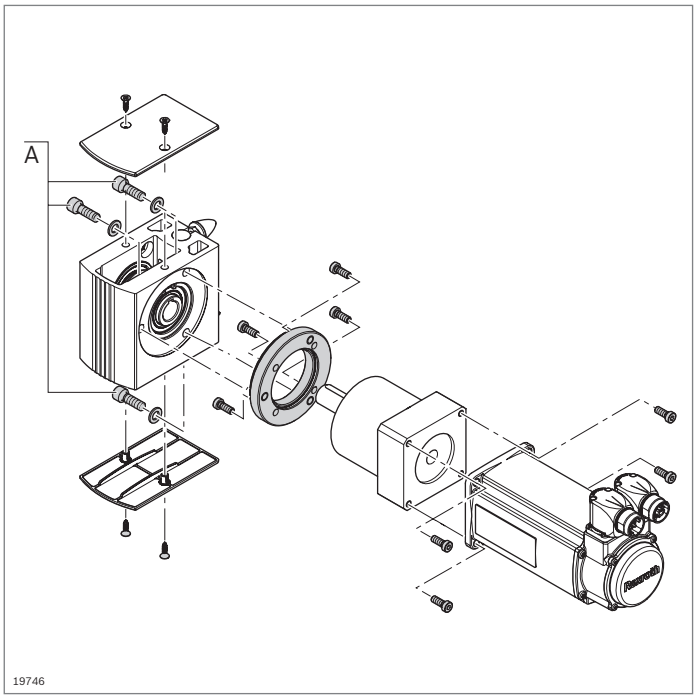
Synchronous shafts

The use of synchronous shafts (p. 13-42) enables several linear axes to be operated with one drive.

Connection dimensions (flanges)

The connection dimensions for the size LF6, LF12 and LF20 linear guides are shown on pages 13-40.





Flange

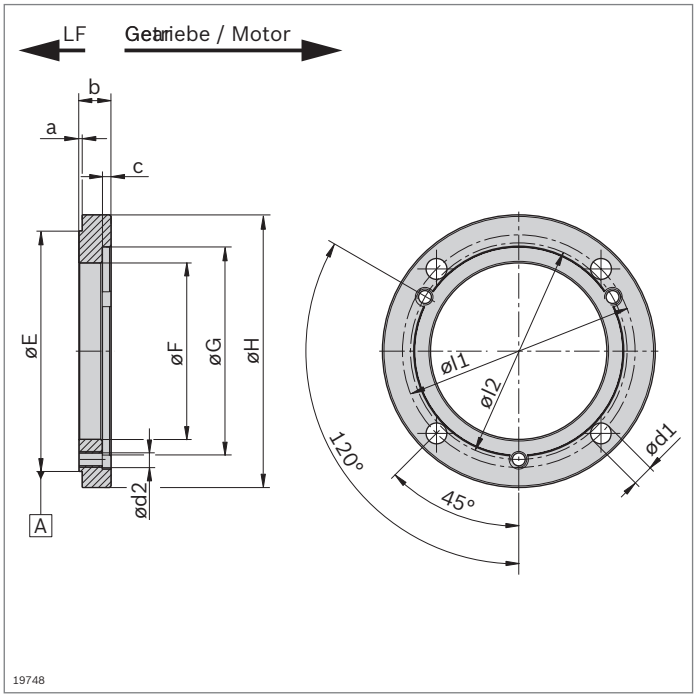
A flange is generally required for fixing the motor/gear unit in place. The connection dimensions for connection to the drive head are shown below. The connection to the motor/ gear unit depends on the model chosen in each case.

Also see connection dimensions of drive heads
LF6C (p. 13-9),
LF12C (p. 13-23), LF12S (p. 13-16),
LF20C (p. 13-37), LF20S (p. 13-30)

Fastening material flange (A)

Note regarding flange in self-build version. Adapt fastening material to suit differing flange thicknesses.

	LF6 (b = 14.5 mm)	LF12 (b = 20 mm)	LF20 (b = 20 mm)
Drive head – flange	ISO 4762 – M8x22 (3x)	ISO 4762 – M8x25 (3x)	ISO 4762 – M10x30 (3x)
	ISO 7092 – 8 (3x)	ISO 7092 – 8 (3x)	ISO 7092 – 10 (3x)

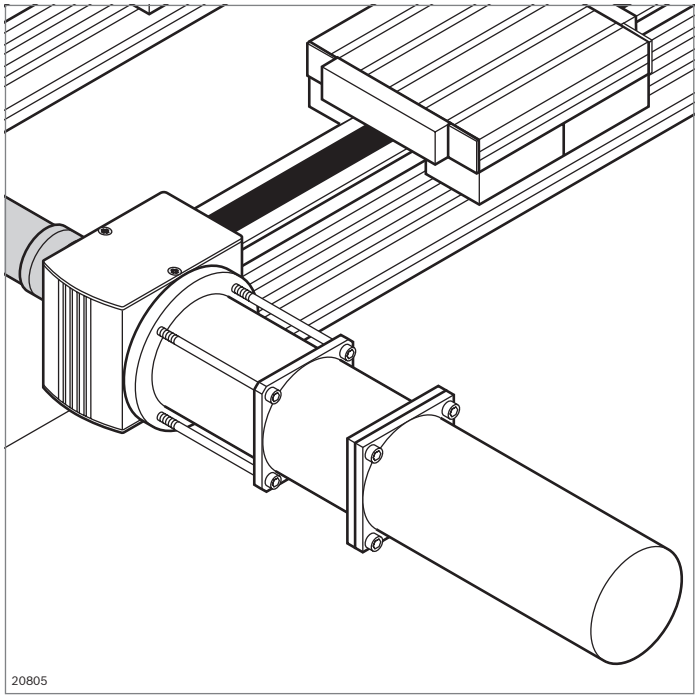


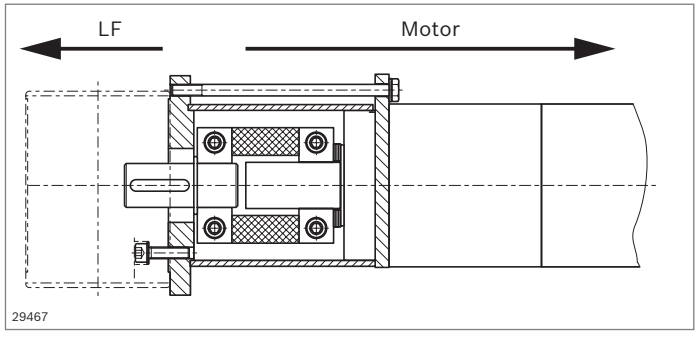
Drawing and dimensions for flange in self-build version. Customer-specific adjustment is necessary, depending on the motor and gear unit. The fastening material must be self-sourced.

Flange

Dimension parameter		LF6 (mm)	LF12 (mm)	LF20 (mm)
a		3.5 ± 0.15	3.5 ± 0.15	2 ± 0.15
b_{min} *)	// 0.05	*)	*)	*)
c*)		*)	*)	*)
E	A	Ø 88 -0.1/-0.3	Ø 111 -0.1/-0.3	Ø 150 -0.1/-0.3
F_{min} *)		Ø *)	Ø *)	Ø *)
G*)	◎ 0.05 A	Ø *)	Ø *)	Ø *)
H*)		Ø *)	Ø *)	Ø *)
l1*)		Ø *)	Ø *)	Ø *)
l2		Ø 78	Ø 100	Ø 135
d1*)		Ø *)	Ø *)	Ø *)
d2	⌖ Ø 0.25	M8	M8	M10

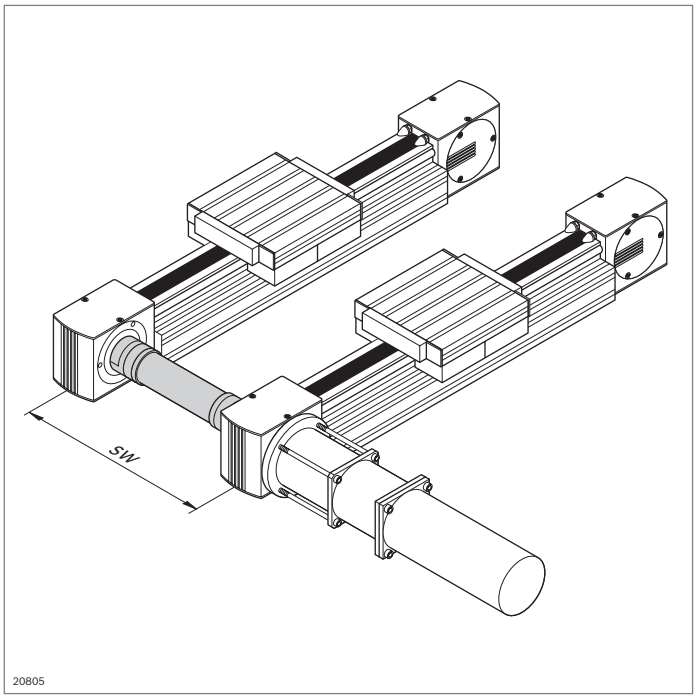
*) Dimension according to customer drive.
Notice: The values must be checked by the user.





Alternative mounting with coupling

Instead of direct mounting over the section link, a coupling can be inserted. This allows any user truing errors to be rectified. The coupling must be designed and sourced by the customer.



Plug-in shafts, synchronous shafts

Plug-in shafts

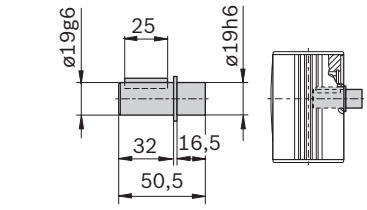
- Enable the installation of customized drive solutions

Plug-in shaft	No.
LF6	**3 842 526 893**
LF12	**3 842 526 894**
LF20	**3 842 526 895**

Material: Steel; nickel-plated

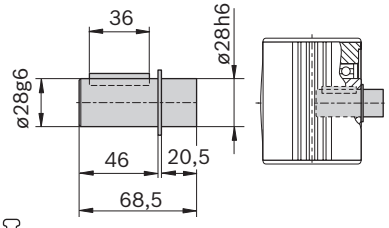
SW = support separation

LF6



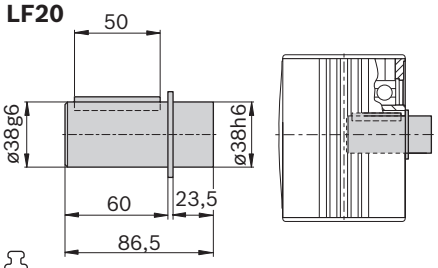
0,11 kg

LF12



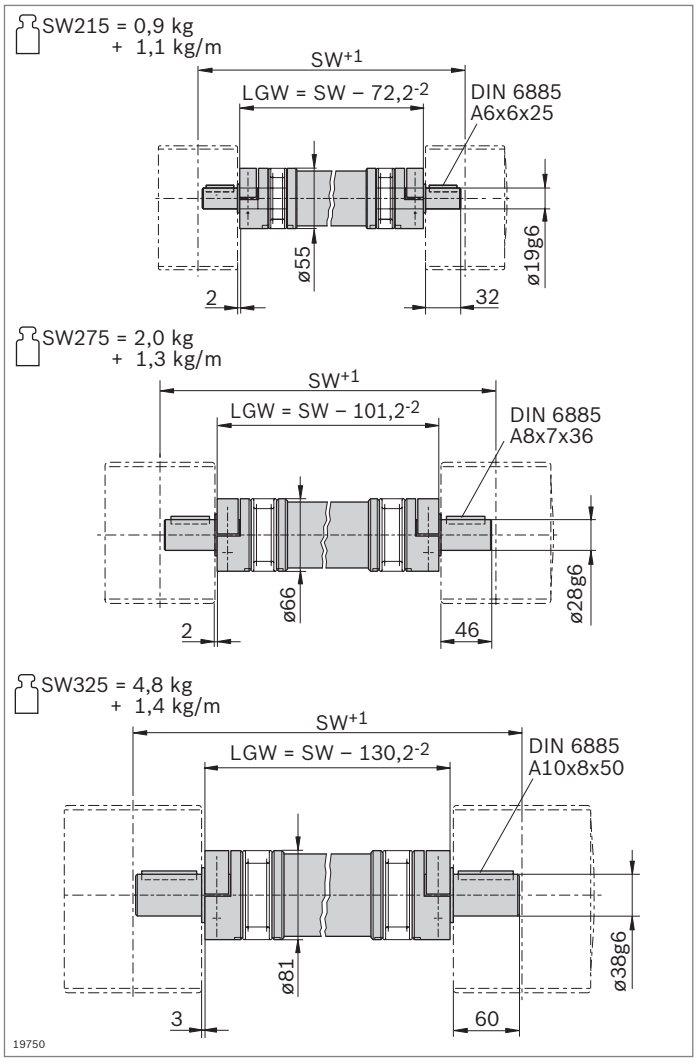
0,33 kg

LF20



0,77 kg

19749



SW = support separation
LGW = length of synchronous shaft

Synchronous shafts

- Allow several linear guides to be operated synchronously while being driven by a common motor
- The synchronous shaft can be replaced without the drive heads having to be disassembled

The selection diagrams on page 13-50, 13-51 specify maximum values without safety margins.

Synchronous shaft	SW (mm)	No.
LF6	215 ... 3000	**3 842 994 811 / SW**
LF12	275 ... 3500	**3 842 994 812 / SW**
LF20	325 ... 3500	**3 842 994 813 / SW**
Material:	Steel/aluminum	

Technical data for roller, design, mounting

General technical data and calculations

Speed

$v_{max} = 5$ m/s

Acceleration

$a_{max} = 15$ m/s²

Temperature resistance

$-10\ °C < \vartheta < 40\ °C$

Lubrication

All cam roller guide bearings are delivered with built-in lubricating felts.

Condition on delivery

Ungreased (greasing with Klüber Isoflex Topas NCA 52; see assembly instructions **3 842 527 226**)
Lubricating felts with reservoir are not greased.
Guide rods are ungreased.

Definition of dynamic load rating C

The radial loading of constant magnitude and direction which a linear rolling bearing can theoretically withstand for a nominal service life of 100 km distance traveled (acc. to ISO 14728 Part 1).

Note regarding maximum load F_{max}

The maximum loads apply to individual loads. Combining loads decreases the expected service life.

Definition and calculation of the nominal service life

The calculated service life which an individual linear rolling bearing – or a group of apparently identical rolling element bearings operating under the same conditions – can attain with a 90 % probability, based on the materials of normal manufacturing quality that are generally used today and under usual operating conditions (acc. to ISO 14728 Part 1) and optimal installation conditions.

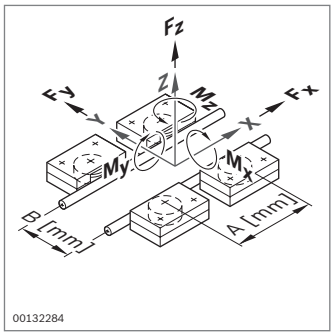
Nominal service life at constant speed

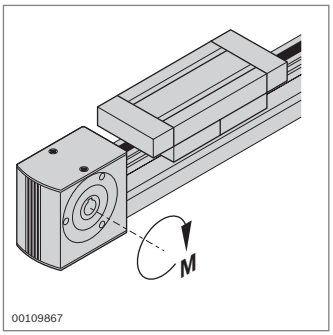
$$L = \left(\frac{C}{F}\right)^3 10^5$$

$$L_h = \left(\frac{L}{2 \cdot s \cdot n_s \cdot 60}\right)$$

L = nominal service life (m)
L_h = nominal service life (h)
C = dynamic load capacity (N)
F = equivalent load (N)
s = length of stroke* (m)
n_S = stroke frequency (double stroke) (rpm)

*) For $s < 2 \cdot L_1$ (trolley length) load capacities are reduced.
Please consult us.





Load-dependent design

- The specified values are maximum single loads, which are reduced when loads are combined

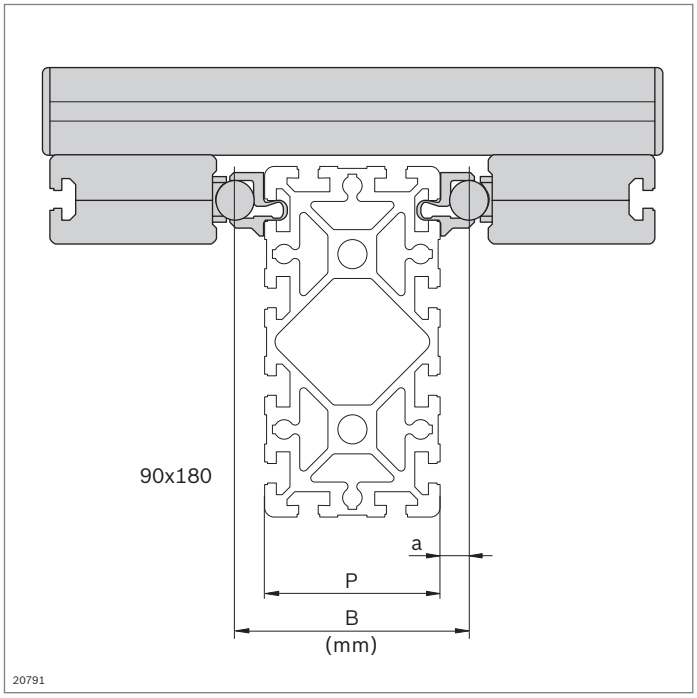
Notice: If cumulative forces and moments arise in your application and load limits may be reached, please contact your Rexroth representative for consultation in design.

	A_{min} [1] (mm)	F_z (N)	F_y (N)	M_x (Nm)	M_z (Nm)	M_y (Nm)	v_{max} (m/s)	M_{max} (Nm)
LF6C	75	850	1400	0.4 · B[2]	0.7 · A[2]	0.4 · A[2]	5	15
LF12S	90	2000	3500	78.0	1.7 · A[2]	1.0 · A[2]	5	30
LF12C	90	2000	3500	1.0 · B[2]	1.7 · A[2]	1.0 · A[2]	5	30
LF20S	135	6000	12500	240.0	6.2 · A[2]	3.0 · A[2]	5	100
LF20C[3]	135	6000	12500	3.0 · B[2]	6.2 · A[2]	3.0 · A[2]	5	100

[1] A_{min} = Length of guide bearing
[2] Notice: A (spacing of support wheels, see image above) in mm; see below for calculation of B (track width)
[3] Maximum values (profile slot load capacity) are only reached with the following profiles: 45x270; 60x90; 90x90; 90x180; 90x360 (see p. 18-15)

Do not exceed the maximum loading of the screwed connections for rails, carriages and fastenings.
Ensure sufficiently stable basic profile and respective substructure.

Take account of the general service life of lubricants!



Calculating the track width B

B = P + 2 · a

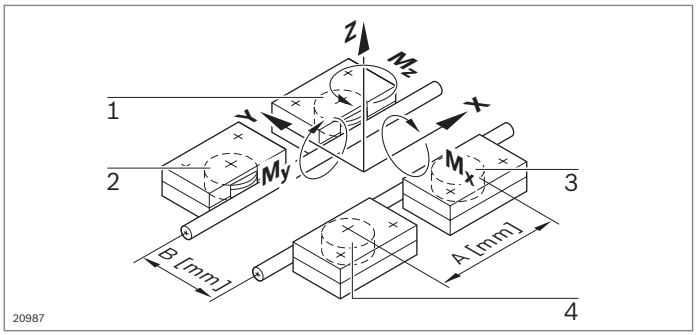
B = track width (in mm)
P = profile width (in mm)
a = rod spacing (in mm)

LF ... C

Values for a: for LF6C = 9.5 mm (p. 13-8)
for LF12C = 9 mm (p. 13-20)
for LF20C = 15 mm (p. 13-34)

LF ... S

Values for B: for LF12S = 90 – 12 = 78 mm (p. 13-13)
for LF20S = 100 – 20 = 80 mm (p. 13-27)



Cam roller 1:

$$F_r = -(\frac{F_y}{2}) - (\frac{M_z}{A})$$

$$F_a = (\frac{F_z}{4}) + (\frac{M_x}{2 \cdot B}) - (\frac{M_y}{2 \cdot A})$$

Cam roller 3:

$$F_r = +(\frac{F_y}{2}) + (\frac{M_z}{A})$$

$$F_a = (\frac{F_z}{4}) - (\frac{M_x}{2 \cdot B}) - (\frac{M_y}{2 \cdot A})$$

Cam roller 2:

$$F_r = -(\frac{F_y}{2}) + (\frac{M_z}{A})$$

$$F_a = (\frac{F_z}{4}) + (\frac{M_x}{2 \cdot B}) + (\frac{M_y}{2 \cdot A})$$

Cam roller 4:

$$F_r = +(\frac{F_y}{2}) - (\frac{M_z}{2})$$

$$F_a = (\frac{F_z}{4}) - (\frac{M_x}{2 \cdot B}) + (\frac{M_y}{2 \cdot A})$$

Table 1: Load factors for cam rollers

	Load case: $F_r \geq \lvert F_a \rvert$				Load case: $F_r < \lvert F_a \rvert$			
	x	y	x_0	y_0	x	y	x_0	y_0
LF6	1	3.1	1.2	3.5	0.5	3.6	1	3.7
LF12	1	4.2	1.2	5.2	0.5	4.7	1	5.4
LF20	1	4	1.2	4.9	0.5	4.5	1.1	5

Table 2: Cam rollers - load capacities

	C for 10^5 m (N)	C_o (N)
LF6	3670	2280
LF12	8300	5000
LF20	23400	16600

Calculation of load on bearing for a trolley

Loading of the individual rollers

- A mm: Spacing of the rollers' rotational axes
- B mm: Center-to-center distance between the guide rods
- Only compressive forces can be transferred between cam rollers and guide rods in the radial direction.
  The following therefore applies in respect of radial forces:
  $F_r \leq 0$: $F_r = 0$
- Cam rollers can be loaded equally in both directions.
  Therefore force F_a is sufficient for calculating P and P_0

Equivalent dynamic and static loads

To calculate the service life of a cam roller guide, the roller with the greatest load has to be considered.
The following must be determined:
$P = \max (P_1,...,P_4)$
$P_0 = \max (P_{01},...,P_{04})$

Equivalent dynamic load P

$$P = x \cdot |F_r| + y \cdot |F_a|$$

Equivalent static load P_0

$$P_0 = x_0 \cdot |F_r| + y_0 \cdot |F_a|$$

F_r (N): radial load of the roller
The following applies: $F_r \leq 0$: $F_r = 0$

F_a(N): axial load of the roller

x, x_0: Radial factor (table 1)
y, y_0: Axial factor (table 1)

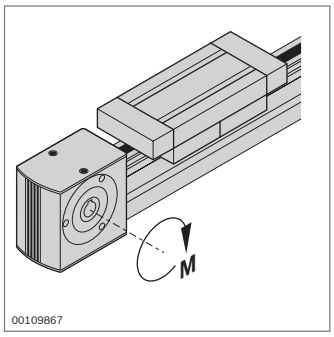
C: dynamic load capacity (table 2)
C_0: static load capacity (table 2)

Static safety values:

$$S_0 = (\frac{C_0}{P_0})$$

$S_0 \geq 4$ recommended!

Size selection



Determining the forces and moments which arise

$F_{x\,dyn}$, $F_{y\,dyn}$, $F_{z\,dyn}$ [1)]
$M_{x\,dyn}$, $M_{y\,dyn}$, $M_{z\,dyn}$

[1)] $F_{z\,dyn}$ includes the weight of the trolley

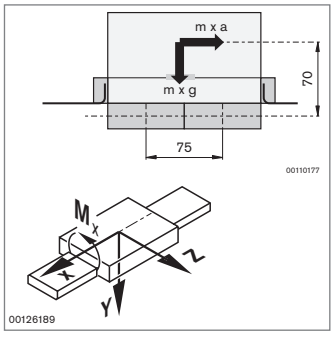
All the influences must be considered, e.g.:

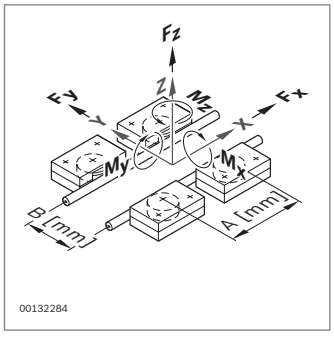
- Net mass and load
- Acceleration forces and moments
- Process forces and moments
- Loads caused by dampers and/or stops

Example

m = 30 kg a = 2.5 m/s²;
L_1 = 150 mm L_2 = 5000 mm
g = 9.81 m/s²

$F_{z\,dyn}$ = m · g = 294 N
$M_{y\,dyn}$ = m · a · 70 mm = 5.25 Nm





Determining the permissible forces and moments

For values see p. 13-50

Example LF 6 C

$F_{z\,dyn\,zul}$ = 850 N > $F_{z\,dyn}$ = 294 N
$M_{y\,dyn\,zul}$ = 0.4 · A = 0.4 · 75 mm
= 30 Nm > $M_{y\,dyn}$ = 5.25 Nm

Selection of the suitable size

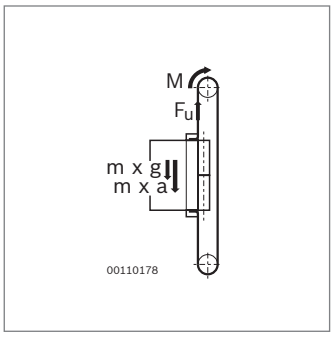
$F_{x,\,y,\,z\,dyn}$ < $F_{x,\,y,\,z\,dyn\,zul}$!
$M_{x,\,y,\,z\,dyn}$ < $M_{x,\,y,\,z\,dyn\,zul}$!

If F and M are cumulative:
In case of higher load, the next size is to be used.
In case of doubt, please contact your
Rexroth representative for consultation in design.

Example

$F_{z\,dyn}$ = 294 N < $F_{z\,dyn\,zul}$ = 850 N !
$M_{y\,dyn}$ = 5.25 Nm < $M_{y\,dyn\,zul}$
= 30 Nm !

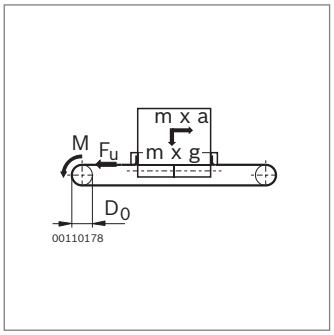
Calculating the drive



Peripheral force F_u

$$F_u = m \cdot a + m \cdot g + F_0 + \mu \cdot m \cdot g$$
$$F_u \leq F_{u\,zul}\ !$$

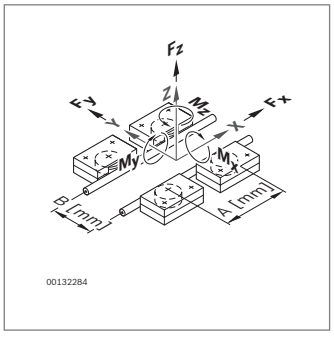
F_0: frictional force on return units
μ : coefficient of friction of the guide
see table below.



Alternative calculation formula

$$F_u = m \cdot a + F_0 + \mu \cdot m \cdot g \leq F_{u\,zul}\ !$$

Example of LF6C
m = 30 kg; a = 2.5 m/s²
$F_u = (30 \cdot 2.5)N + 10\ N$
$\quad + (0.025 \cdot 30 \cdot 9.81)N$
$F_u = 75\ N + 10\ N + 0.025 \cdot 294\ N$
$F_u = 92.35\ N < F_{u\,zul} = 600\ N\ !$



Required drive torque M

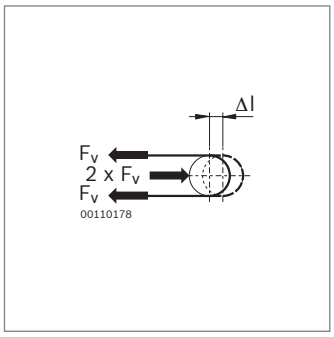
$$M = ½ \cdot D_0 \cdot F_u \leq M_{zul}\ !$$

Example
$M = ½ \cdot 50.94\ mm \cdot 92.35\ N$
$\quad = 2.4\ Nm$
$M = 2.35\ Nm \leq M_{zul}$
$\quad = 15\ Nm\ !$

	v (m/s)	$\mathbf{F_{u\,zul}}$ (N)	$\mathbf{M_{zul}}$ (Nm)	$\mathbf{F_0}$ (N)	**μ**	$\mathbf{D_0}$ (mm)	$\mathbf{D_0 \times \pi}$ (mm)
LF6C	≤ 5.0	600	15.0	10	0.025	50.94	160
LF12S	≤ 5.0	820	30.0	30	0.020	73.20	230
LF12C	≤ 5.0	820	30.0	30	0.020	73.20	230
LF20S	≤ 5.0	2000	100.0	35	0.015	101.86	320
LF20C	≤ 5.0	2000	100.0	35	0.015	101.86	320

F_0: frictional force on return units; μ : coefficient of friction

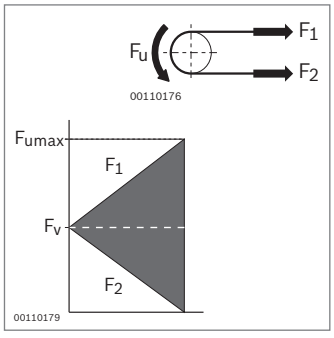
Checking the selected size



Preload force F_v of toothed belt

$0.5 \cdot F_u \leq F_v \leq F_u$
Recommendation: $F_v = 0.5 \cdot F_u$

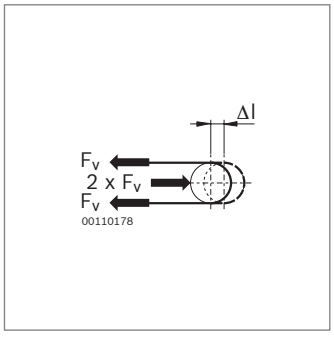
Example
F_u = 92.35 N
F_v = 50 N



Maximum toothed belt force $F_{1\,max}$

$F_{1\,max} = F_v + 0.5 \cdot F_u \leq F_{1\,zul}$!
$F_{2\,min} = F_v - 0.5 \cdot F_u > 0$!

Example of LF6C
$F_{1\,max}$ = 50 N + 0.5 · 92.35 N
$F_{1\,max}$ = 96.18 N < $F_{1\,zul}$ = 900 N !
$F_{2\,min}$ = 50 N – 0.5 · 92.35 N
$F_{2\,min}$ = 3.825 N > 0 !



Required preload length ΔI

$\Delta I = 0.5 \cdot F_v \cdot L / C_{spez} \leq \Delta I_{max}$!

Example
L = 2 · L_2 – L_1 + 400 mm
L = 10250 mm
ΔI = 0.5 · 50 N · 10250 mm
/ 420000 N
ΔI = 0.8 mm < ΔI_{max} = 13 mm !

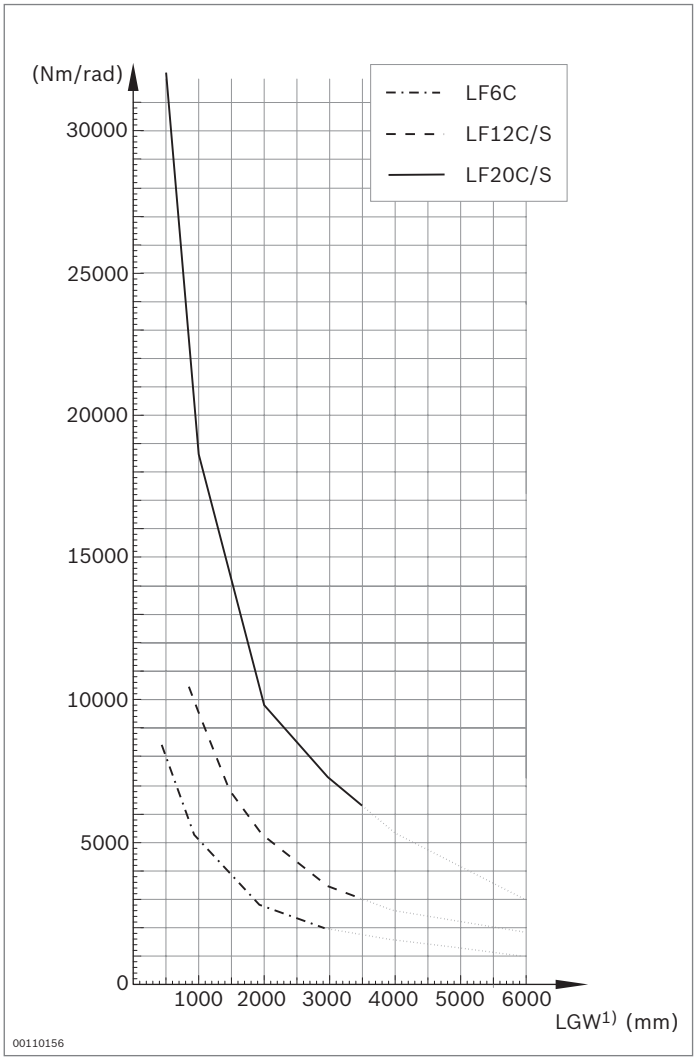
	$F_{1\,zul}$ (N)	C_{spez} (N)	ΔI_{max} (mm)	L (mm)	Page
LF6C	900	420000	13	2 · L_2 – L_1 + 400	13-6
LF12S	1230	1250000	16	2 · L_2 – L_1 + 630	13-11
LF12C	1230	1250000	16	2 · L_2 – L_1 + 630	13-18
LF20S	3000	1870000	23	2 · L_2 – L_1 + 780	13-25
LF20C	3000	1870000	23	2 · L_2 – L_1 + 780	13-32

C_{spez}: Belt stiffness;
L: Toothed belt length,
see also LF6C (p. 13-6),
LF12S (p. 13-11), LF12C (p. 13-18),
LF20S (p. 13-25), LF20C (p. 13-32)

Dimensioning of synchronous shafts
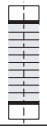
			LF6	LF12	LF20
Support separation SW	horizontal		215 ... 3000 mm	275 ... 3500 mm	325 ... 3500 mm
	vertical		215 ... 2000 mm	275 ... 2000 mm	325 ... 1100 mm
Rated torque			max. 30 Nm	max. 60 Nm	max. 150 Nm
Permitted rpm			Diagram 3 (p. 13-51) **max. 0.7 · n_k**	Diagram 3 (p. 13-51) **max. 0.7 · n_k**	Diagram 3 (p. 13-51) **max. 0.7 · n_k**
Elasticity	axial		max. 2 mm	max. 3 mm	max. 4 mm
	lateral		Diagram 4 (p. 13-51)	Diagram 4 (p. 13-51)	Diagram 4 (p. 13-51)
	rotation angle		Diagram 5 (p. 13-51)	Diagram 5 (p. 13-51)	Diagram 5 (p. 13-51)

Diagram 1: Torsion stiffness



1) Length synchronous shaft LGW

LF6	LGW = SW - 72
LF12	LGW = SW - 101
LF20	LGW = SW - 130

Diagram 2: Mass inertia

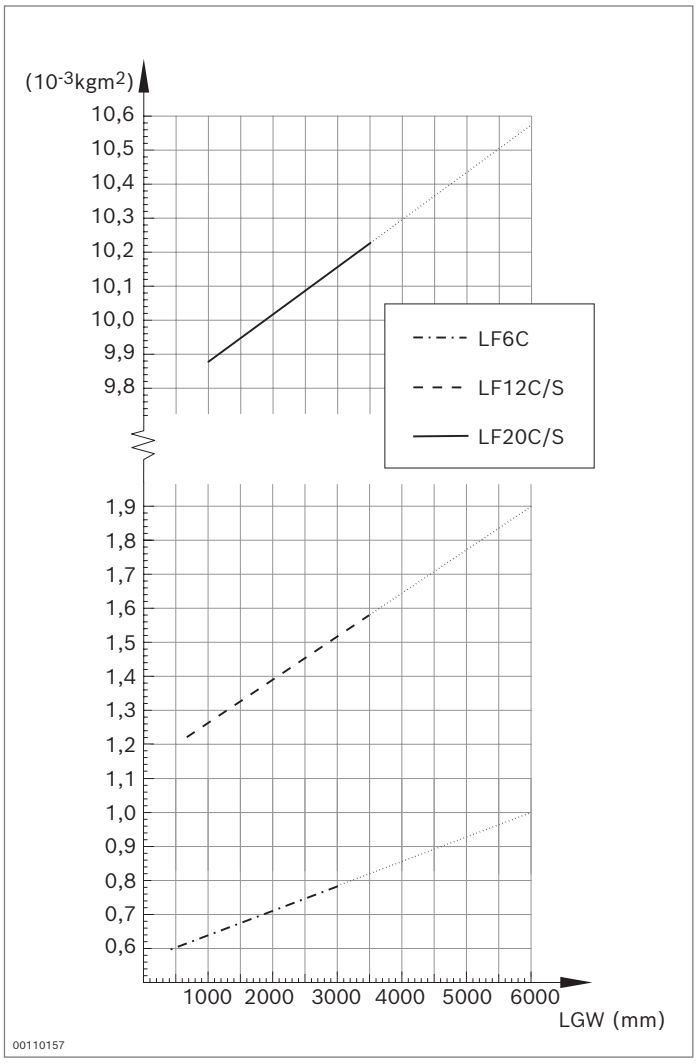


Diagram 3: Critical rpm due to bending n_k

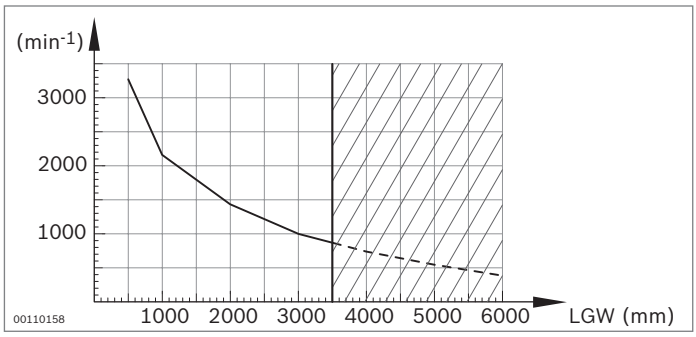
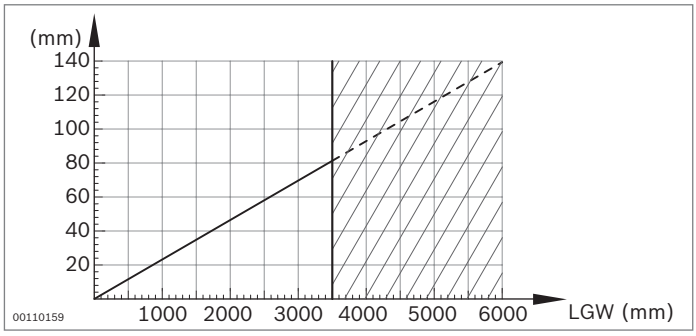


Diagram 4: Lateral offset

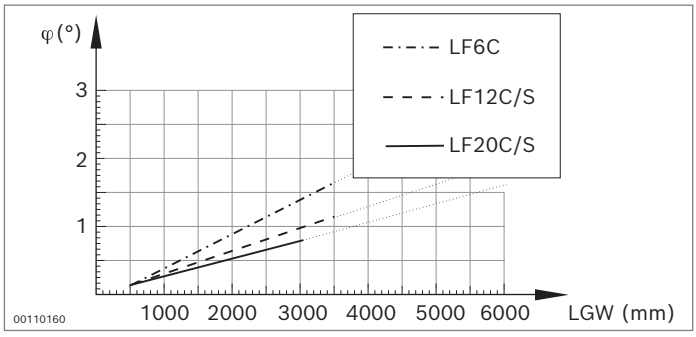




Aligned shafts are recommended.

Diagram 5: rotation angle





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