Section 14: Dynamic Linear Elements

Overview

Bosch Rexroth Dynamic Linear Elements (DGE) have been redesigned to make them more durable and easier to install.

Bosch Rexroth Dynamic Linear Elements provide precise linear motion using standard modular components.
Standardized modular components allow you to build custom length linear units in minimum time using simple hand tools.

Three standard sizes are available, capable of handling dynamic loads up to 12,500 N (2810 lbs) for even heavy-duty applications. The use of stepper motors allows an incredible degree of precision and repeatability in automated assembly applications, with positioning repeatability up to 0.05 mm (0.002")†.

Technical assistance designing a linear motion system is available through your Bosch Rexroth distributor. Your distributor can provide helpful guidelines and tips for designing and maintaining a linear motion system suited to your needs.

†Repeatability must be calculated to include all components contributing to linear movement (i.e., motors); 0.05mm pertains to Bosch Rexroth components only.

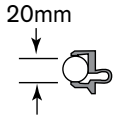
When selecting the correct size and style of dynamic linear elements, there are two key factors to keep in mind.

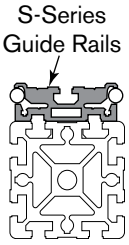
Each model number contains a number that indicates the diameter of the hardened steel guide rail.
For example, an LF20 linear guide uses a guide rail that is 20mm in diameter.

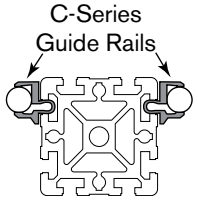
Within each size range, there are also two styles of linear elements: S and C.

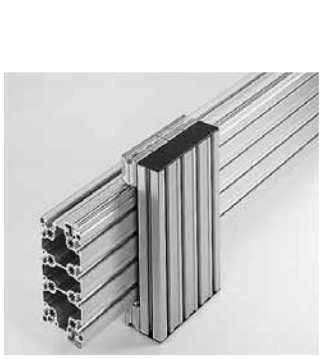
The S series (LF6S, LF12S, LF20S) uses a guide profile that can be mounted to a section of structural profile or a flat plate. This style features a particularly high guide accuracy.

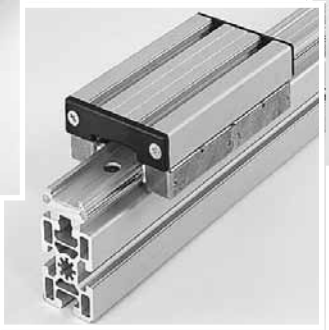
The C series (LF6C, LF12C, and LF20C) uses guide rails that are clamped or pressed into the 10mm T-slots of various structural profiles. With this style, track width can be selected to accommodate a wide range of sizes and loads.

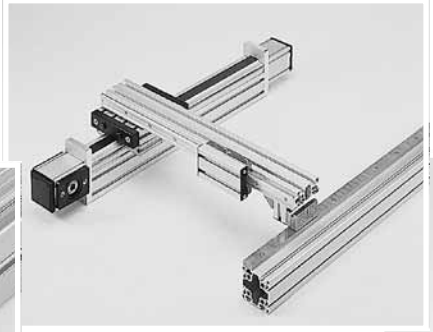


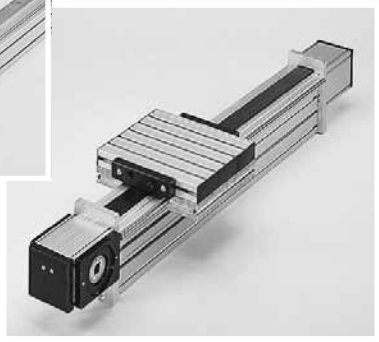








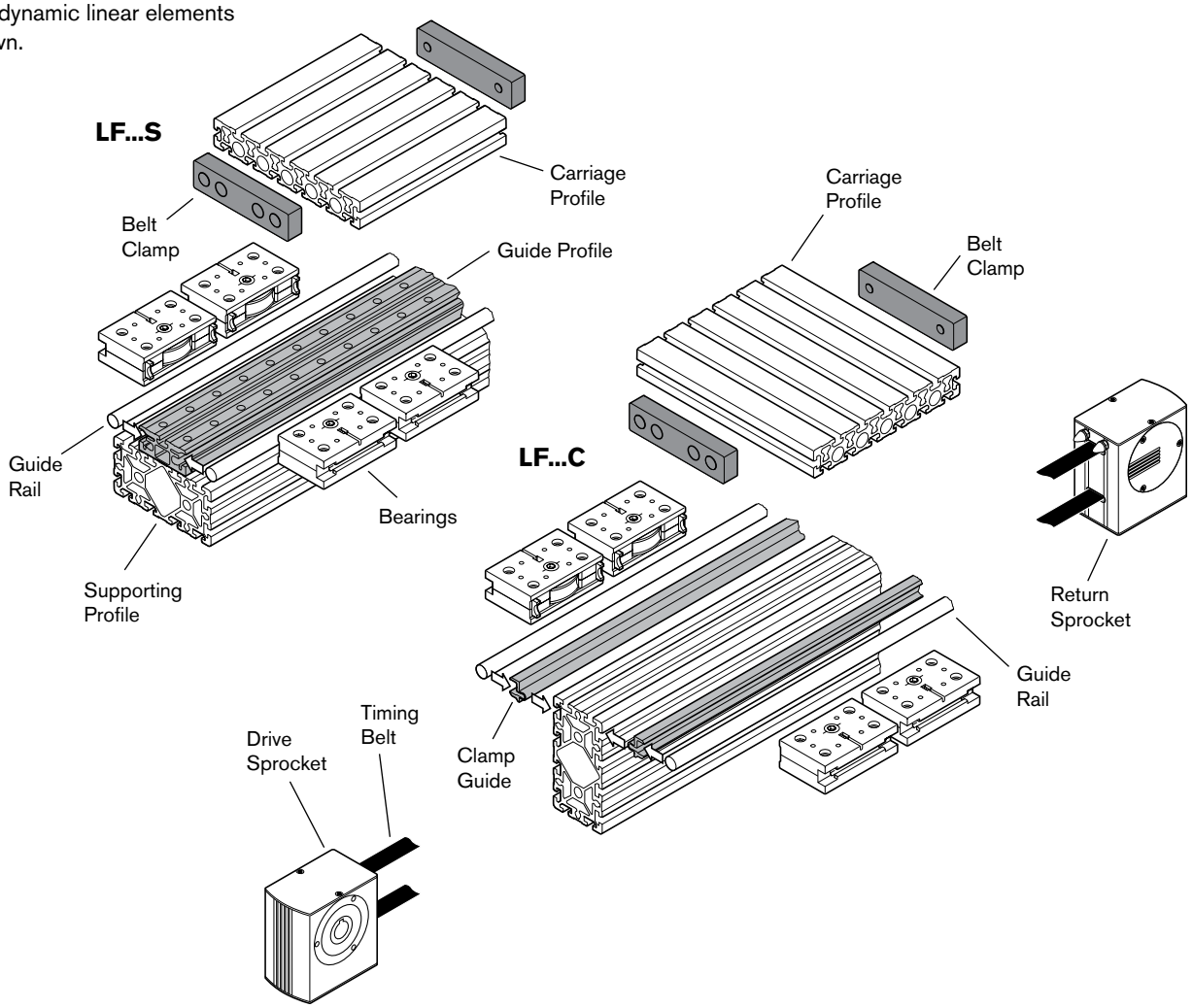


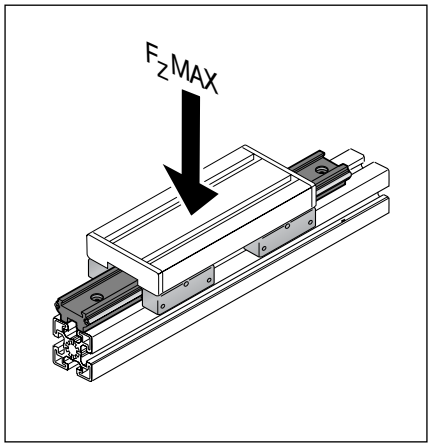


Section 14: Dynamic Linear Elements

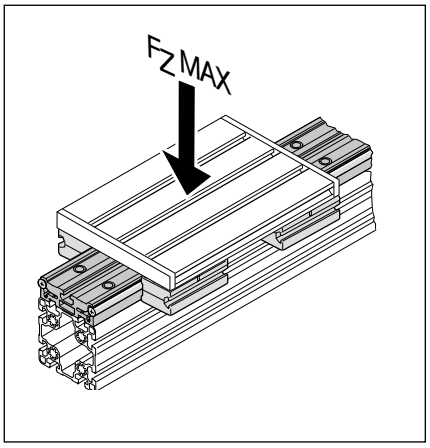
Dynamic Linear Elements—Main Components

The main components of the Bosch Rexroth dynamic linear elements are shown.

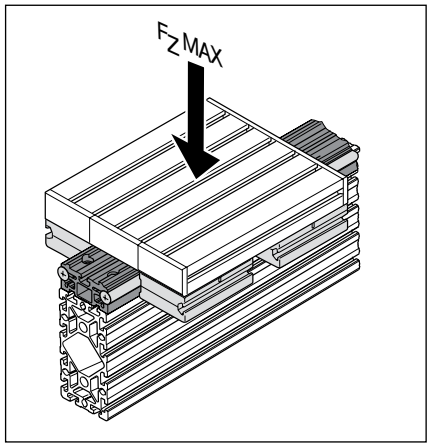




LF6S and LF6C
6mm Guide Rail
F_{ZMAX} 850 N (191 lbs)
F_{YMAX} 1400 N (314 lbs)
14-4 to 14-11



LF12S and LF12C
12mm Guide Rail
F_{ZMAX} 2,000 N (449 lbs)
F_{YMAX} 3,500 N (786 lbs)
14-12 to 14-19



LF20S and LF20C
20mm Guide Rail
F_{ZMAX} 6,000 N (1,348 lbs)
F_{YMAX} 12,500 N (2,810 lbs)
14-20 to 14-27

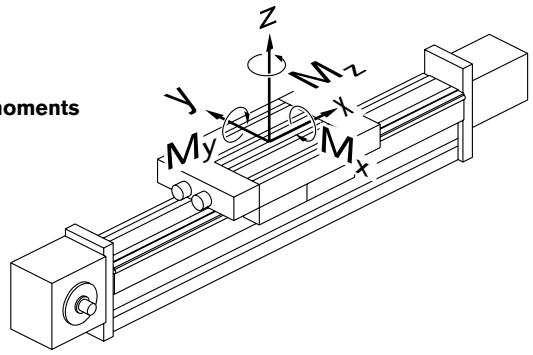
Section 14: Dynamic Linear Elements

Linear Guides
Size Selection

1. Determine the applied forces and moments

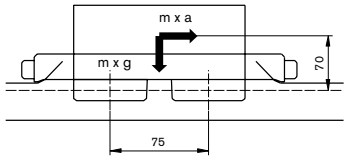
$F_{x\,dyn}$. $F_{y\,dyn}$. $F_{z\,dyn}$ *

$M_{x\,dyn}$. $M_{y\,dyn}$. $M_{z\,dyn}$



* $F_{z\,dyn}$ includes the weight of the trolley

Example:



m = 30 kg; a = 2.5 m/s^2; g = 9.81m/s^2

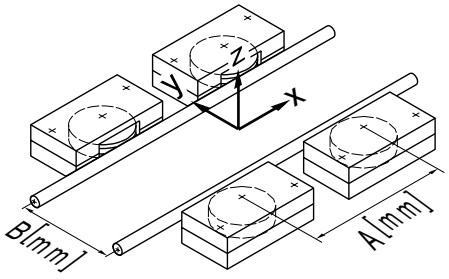
L_1 = 150mm; L_2 = 5000mm

$F_{z\,dyn}$ = m x g = 294 N

$M_{y\,dyn}$ = m x a x 70mm = 5.25 Nm

2. Determine the allowable forces and moments

	LF 6 S LF 6 C	LF 12 S LF 12 C	LF 20 S LF 20 C
$F_{x\,dyn\,zul}$ [N]			
$F_{y\,dyn\,zul}$ [N]	1400	3500	12500
$F_{z\,dyn\,zul}$ [N]	850	2000	6000
$M_{x\,dyn\,zul}$ [Nm]	0.4 x B	1 x B	3 x B
$M_{y\,dyn\,zul}$ [Nm]	0.4 x A	1.7 x A	6.2 x A
$M_{z\,dyn\,zul}$ [Nm]	0.7 x A	1 x A	3 x A



LF 6 S, LF 6 C:

$F_{z\,dyn\,zul}$ = 850 N

$M_{y\,dyn\,zul}$ = 0.4 x A = 0.4 x 75mm

= 30 Nm

3. Select the appropriate size

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

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

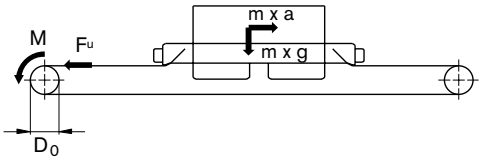
In case of superimposed forces and moments, verify calculations with MGEsoft!

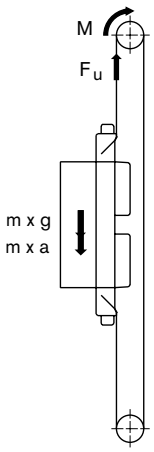
$F_{z\,dyn}$ = 294 N < $F_{z\,dyn\,zul}$ = 850 N !

$M_{y\,dyn}$ = 5.25 Nm < $M_{y\,dyn\,zul}$ = 30 Nm !

Linear Guides
Drive Dimensioning

1. Peripheral force F_u





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

$F_u = m \times a + m \times g + F_o + \mu \times m \times g$

$F_u \leq F_{u\,zul}$!

LF 6 C:

m = 30 kg; a = 2.5 m/s^2

F_u = 75 N + 10 N + 0.025 x 294 N

F_u = 92.35 N < $F_{u\,zul}$ = 600 N !

14

2. Required drive moment M

$M = {}^1/_2 \times D_0 \times F_u \leq M_{zul}$!

	v [m/s]	$F_{u\,zul}$ [N]	M_{zul} [Nm]	F_0 [N]	μ	D_0 [mm]	$D_0 \pi$ [mm]
LF 6 S	2.0	500	9.5	10	0.025	38.21	120.00
LF 6 S	5.0	400	7.6	10	0.025	38.21	120.00
LF 6 C	5.0	600	15	10	0.025	50.94	140.00
LF 12 S	5.0	820*	30*	30	0.020	73.20	230.00
LF 12 C	5.0	820*	30*	30	0.020	73.20	230.00
LF 20 S	5.0	2000*	100*	35	0.015	101.86	320.00
LF 20 C	5.0	2000*	100*	35	0.015	101.86	320.00

F_0 = Frictional force on return units μ = Coefficient of friction

Example:

$M = {}^1/_2 \times 50.94$ mm x 92.35 N = 2.35 Nm

$M = 2.35\ Nm \leq M_{zul} = 15Nm$!

Linear Guides

Verification of Selected Size

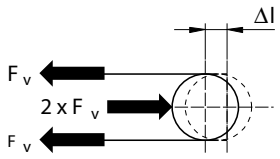
$F_u = 92.35$ N

$F_v \approx 50$ N

1. Initial tension F_v of toothed belt

$0.5 \times F_u \leq F_v \leq F_u$

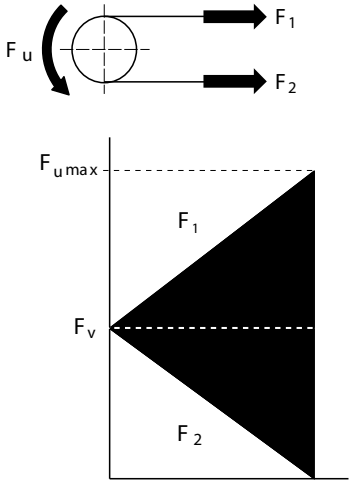
Recommendation: $F_v = 0.5 \times F_u$



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

$F_{1\,max} = F_v + 0.5 \times F_u \leq F_{1\,zul}$!

$F_{2\,min} = F_v - 0.5 \times F_u > 0$!



$F_{1\,max} = 50\ N + 0.5 \times 92.35\ N$

$F_{1\,max} = 96.17\ N < F_{1\,zul} = 900\ N$!

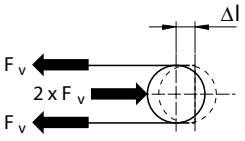
$F_{2\,min} = 50\ N - 0.5 \times 92.35\ N$

$F_{2\,min} = 3.82\ N > 0$!

3. Required initial-tension length ΔI

$\Delta l = 0.5 \times F_v \times L / C_{spez} \leq \Delta l_{max}$!

L = Toothed belt length



	$F_{1\,zul}$ [N]	C_{spez} [N]	Δl_{max} [mm]	L [mm]
LF 6 S	750	315,000	11	$2 \times L_2 - L_1 + 360$
LF 6 C	900	420,000	13	$2 \times L_2 - L_1 + 400$
LF 12 S	1230	1,250,000	16	$2 \times L_2 - L_1 + 570$
LF 12 C	1230	1,250,000	16	$2 \times L_2 - L_1 + 570$
LF 20 S	3000	1,870,000	23	$2 \times L_2 - L_1 + 720$
LF 20 C	3000	1,870,000	23	$2 \times L_2 - L_1 + 720$

LF6C

$L = 2 \times L_2 - L_1 + 400$mm

L = 10,250mm

Δl = 0.5 x 50 N x 10,250mm / 420,000 N

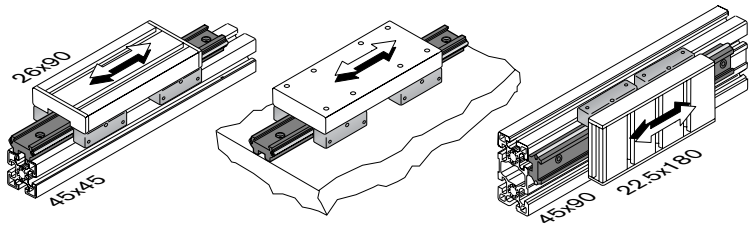
Δl = 0.61mm < Δl_{max} = 13mm !

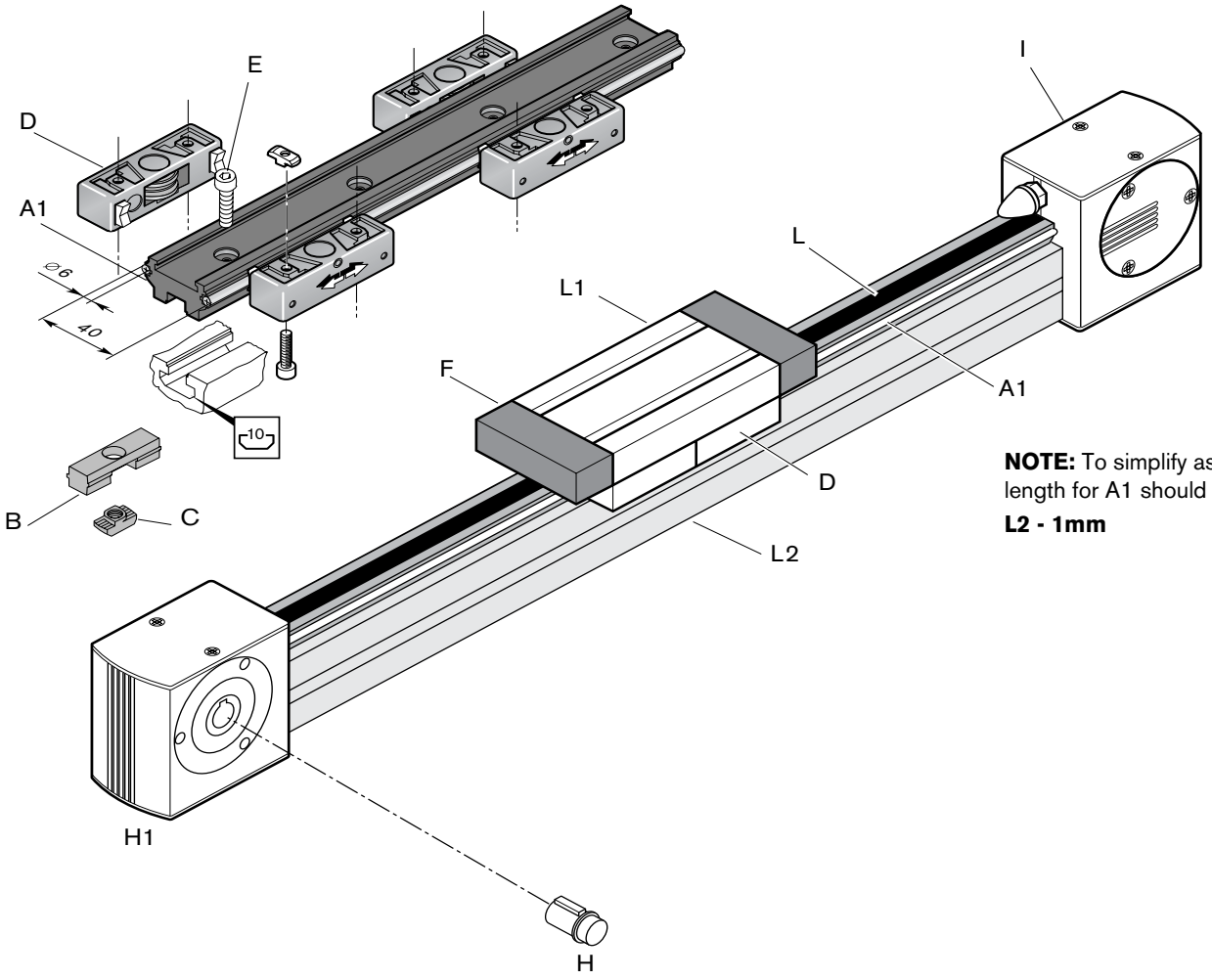
Section 14: Dynamic Linear Elements

LF6 Linear Guides

LF6S Linear Guide (FYMAX = 1,400 N)

The LF6S linear guide provides a high degree of accuracy and a selectable trolley length. The guide profile can be mounted to a section of strut profile or to any flat metal surface. The track width of the trolley is fixed by the guide profile.

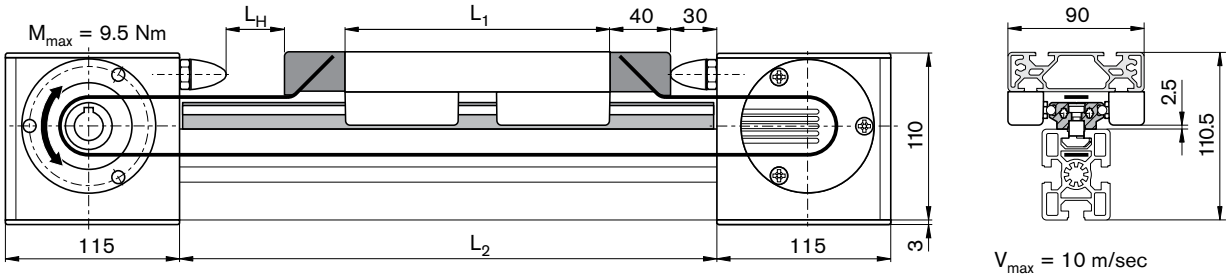




NOTE: To simplify assembly, the length for A1 should be equal to:
L2 - 1mm

LF6S Linear Guide

Description	Formulas to calculate lengths	Ref.
Support profile	L2 = L1 + (80) + (60) + LH	L2
Carriage profile	L1 = Minimum length, 150mm	L1
Timing belt	L = 2 x L2 – L1 + 360	L



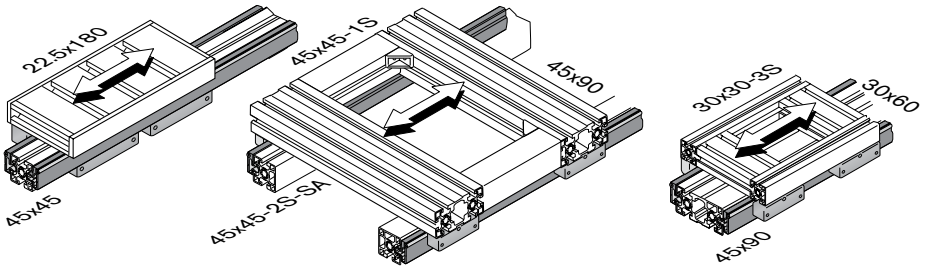
Ref.	Description	Order Quantity	Technical Specifications	Part Number
A1	Corrosion-resistant Guide profile, length = 3000mm	as required	14-8	**3 842 539 413**
	Corrosion-resistant Guide profile, specify length ≥ 150mm ≤ 3000mm	1	14-8	**3 842 993 966/__mm**
B	Alignment block (use one per every 100mm)	as required	14-8	**3 842 146 877**
C	T-nut (use one per every 100mm)	as required	Section 4	**3 842 530 285**
D	Bearings, lot size = 2 (see helpful hint on page 14-9)	4	14-9	**3 842 535 662**
E	DIN 7984 M6x20 SHCS (use one per every 100mm)	as required	14-8	**2 910 131 201**
F	Belt clamps, lot size = 2 (includes fastening kit)	2	14-10	**3 842 535 682**
H1	Drive sprocket, flush mount	1	14-11	**3 842 526 410**
H	Drive shaft w/key, length = 50.5mm	1	14-11	**3 842 526 893**
I	Return sprocket	1	14-10	**3 842 526 411**
J	Caps with fastening set, lot size = 2 (if a toothed belt is not used to drive the trolley, substitute this end cap for belt clamp F)	2	14-10	**3 842 535 645**
L	Timing belt, length = 50,000mm	1	14-11	**3 842 513 646**
	Timing belt, specify length ≥ 300mm ≤ 50,000mm, in 5mm increments	1	14-11	**3 842 994 659/__mm**
L1	Carriage profile 26x90mm, specify length __mm	1	14-10	**3 842 993 061/__mm**
	Carriage profile 26x90mm, length = 3000mm	as required	14-10	**3 842 526 495**
L2	Support profile 45x60H, D17VS/D17VS, specify length __mm	1	Section 2	**3 842 990 670/__mm**

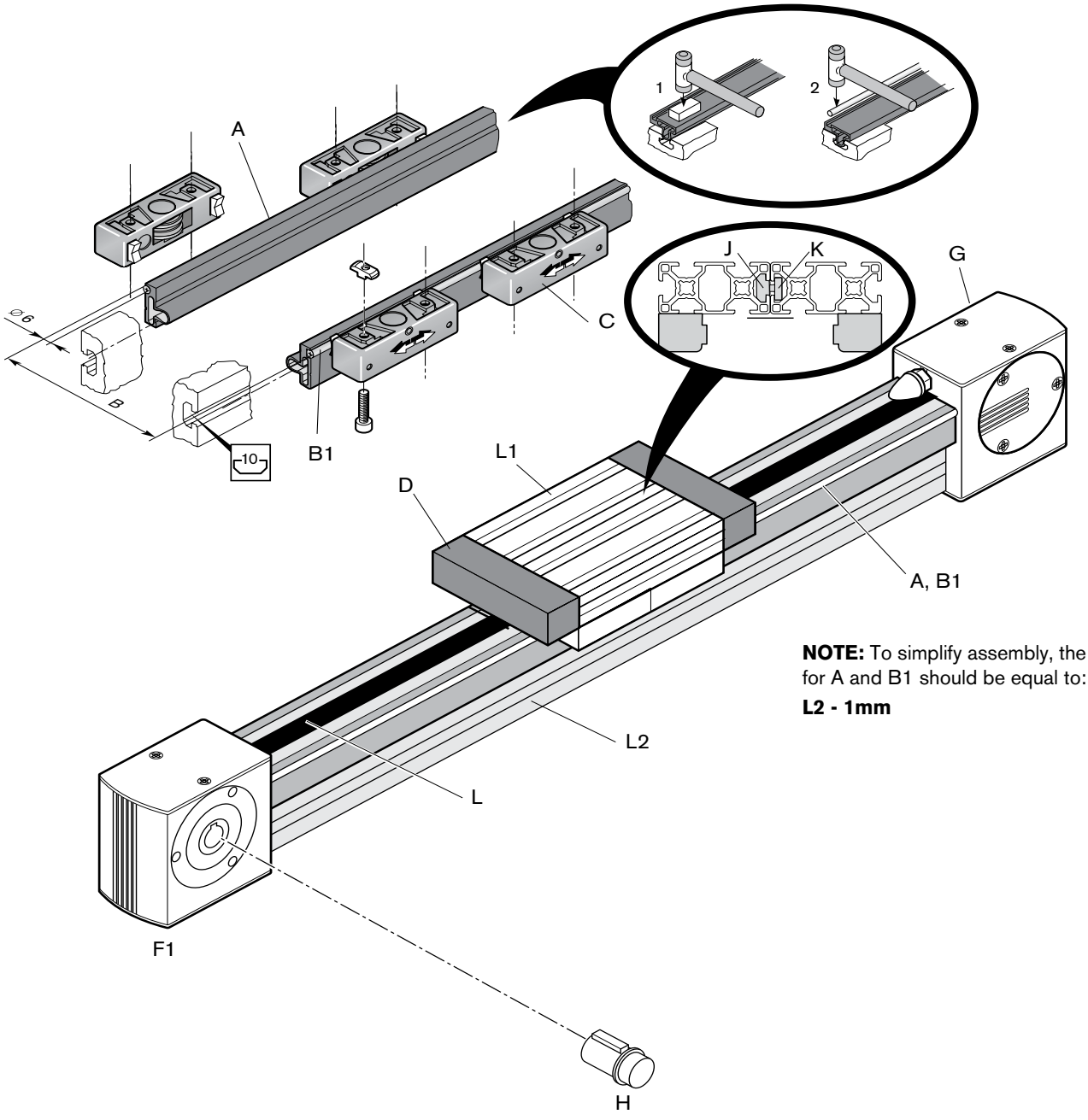
Section 14: Dynamic Linear Elements

LF6 Linear Guides

LF6C Linear Guide (FYMAX = 1,400 N)

The LF6C linear guide provides a high degree of accuracy and a selectable trolley length.



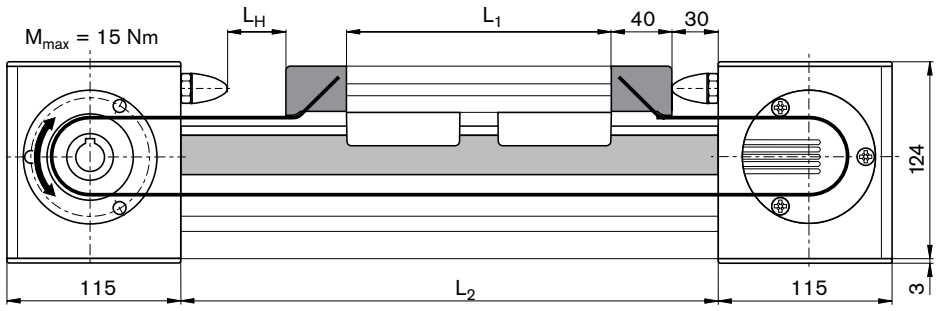


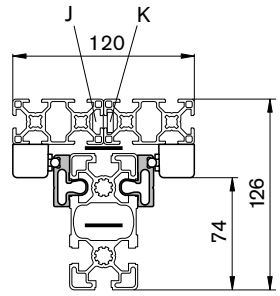
NOTE: To simplify assembly, the length for A and B1 should be equal to:

L2 - 1mm

LF6C Linear Guide

Description	Formulas to calculate lengths	Ref.
Support profile	L2 = L1 + (80) + (60) + LH	L2
Carriage profile	L1 = Minimum length, 150mm	L1
Timing belt	L = 2 x L2 – L1 + 400	L





V_{max} = 10 m/sec

Ref.	Description	Order Quantity	Technical Specifications	Part Number
	Clamp guide profile, length = 3000mm, pkg. of 20		14-9	**3 842 518 896**
A	Clamp guide profile, length = 3000mm	as required	14-9	**3 842 518 893**
	Clamp guide profile, specify length ≥ 150mm ≤ 3000mm		14-9	**3 842 992 925/__mm**
B1	Corrosion-resistant Guide rail, length = 3000mm	as required	14-9	**3 842 539 414**
	Corrosion-resistant Guide rail, specify length ≥ 150mm ≤ 3000mm	1	14-9	**3 842 993 967/__mm**
C	Bearings, lot size = 2 (see helpful hint on page 14-9)	4	14-9	**3 842 535 662**
D	Belt clamps, lot size = 2 (includes fastening kit)	2	14-10	**3 842 535 681**
F1	Drive sprocket, flush mount	1	14-11	**3 842 526 416**
H	Drive shaft w/key, length = 50.5mm	as required	14-11	**3 842 526 893**
G	Return sprocket	1	14-10	**3 842 526 417**
J	T-block, M8, 8mm	as required	Section 4	**3 842 514 931**
K	ISO 7380 M8x12	as required		**2 910 141 234**
L	Timing belt, length = 50,000mm	1	14-11	**3 842 518 856**
	Timing belt, specify length ≥ 300mm ≤ 50,000mm in 5mm increments	1	14-11	**3 842 994 711/__mm**
L1	Carriage profile 30x150mm, specify length ≥ 150mm ≤ 3000mm	1	14-10	**3 842 993 952/__mm**
	Caps, lot size = 2 (if a toothed belt is not used to drive the trolley, substitute this end cap for the belt clamp D)	2		**3 842 539 120**
L2	Support profile 45x90, D17VS/D17VS, specify length __mm	1	Section 2	**3 842 992 435/__mm**
	Support profile 45x90H, D17VS/D17VS, specify length __mm	1	Section 2	**3 842 990 309/__mm**

Section 14: Dynamic Linear Elements

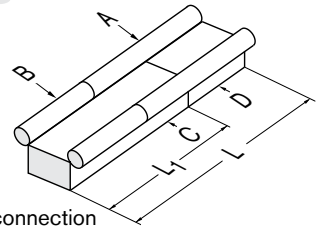
LF6 Linear Guides

Assembly Note

To create a linear guide element larger than purchased lengths, offset the splits in the guide profile and guiderails. This will create a much stronger and better aligned connection. Make sure butting edges are cut square and deburred.

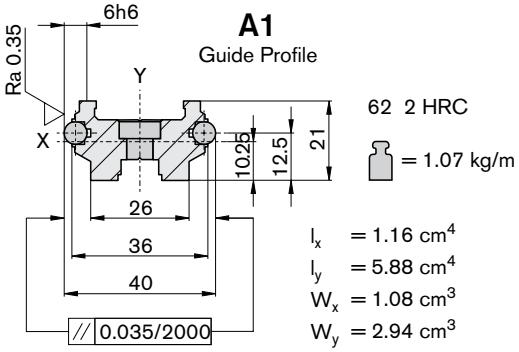
A = L_1 - (L x .10) (Guide rail)
B = L - A (Overlap guide rail)
C = L_1 (Guide profile)
D = L - L_1 (Guide profile)

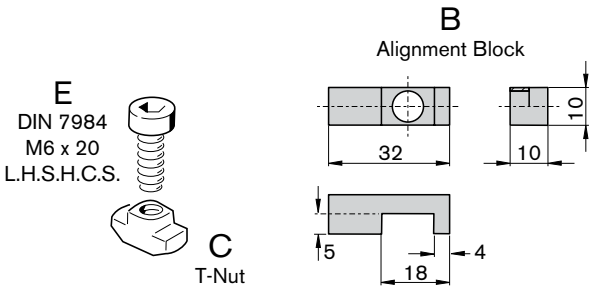
L = Total length
L_1 = Location of profile connection as chosen by customer



LF6S Guide Profile [10]

For mounting the guide profile, we recommend DIN 7984 M6 x 20-8.8 socket head cap screws. Mounting holes are spaced every 100mm in the guide profile.
Material A: AlMgSi 0.5 F25/hardened, polished steel
Material B: Black PA 6



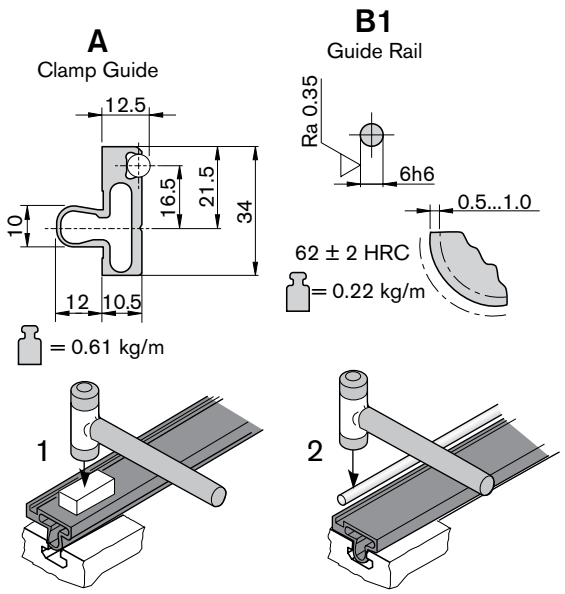


	Description	Lot Size	Part Number
	Standard Guide Profiles:		
A 1	L = 3000mm	1	**3 842 518 886**
	L = ... mm, Specify length 150mm 3000mm	1	**3 842 990 085/...mm**
B	Alignment block		**3 842 146 877**
C	T-Nut, M6 x 10mm	1	**3 842 530 285**
E	DIN 7984, M6 x 20 S.H.C.S.	1	**2 910 131 201**

Section 14: Dynamic Linear Elements

LF6C Clamp Guide [10]

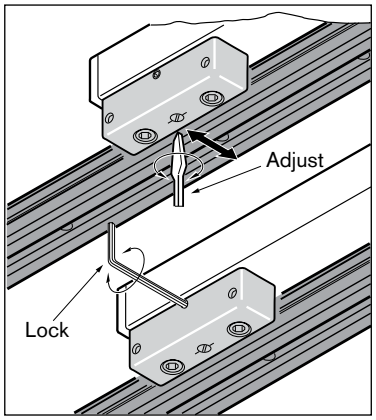
Material A: AlMgSi 0.5 F25, natural color anodized
Material B: Hardened, polished steel

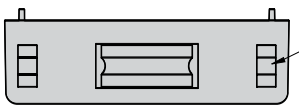


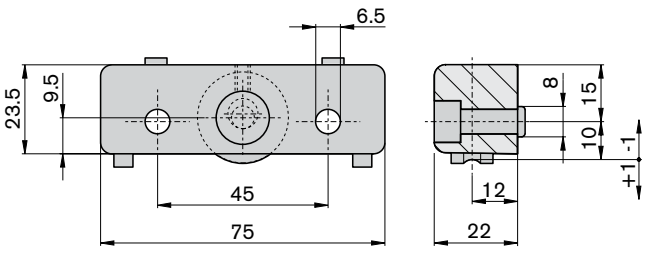
	Description	Lot Size	Part Number
A	Clamp guide L = 3000mm	1	**3 842 518 893**
	Clamp guide L = ... mm Specify length 150mm 3000mm	1	**3 842 992 925/...mm**
	Standard Guide Rail:		
B 1	L = 3000mm	1	**3 842 518 878**
	L = ... mm Specify length 150mm 3000mm	1	**3 842 994 822/...mm**

Bearing for LF6S and LF6C

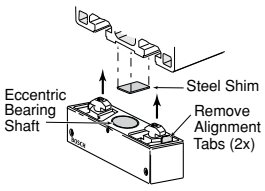
Eccentric bearings are used to eliminate play.
Includes fastening kit.
Housing material: Die-cast zinc
Roller material: Hardened, polished steel
Load capacity of roller: C_{dyn} = 4100 N, C_{stat} = 2280 N



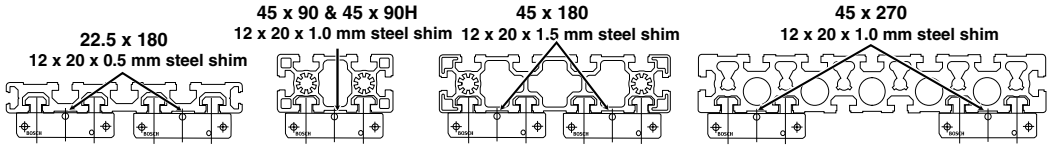




Description	Lot Size	Part Number
Bearing	2	**3 842 535 662**
Felt repair kit	1	**3 842 528 519**



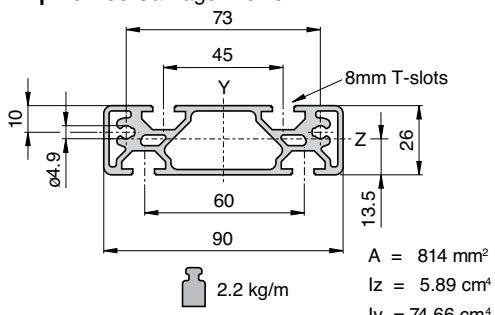
NOTE: When mounting LF6 bearings crosswise on the profiles shown below, break off the alignment tabs and place the appropriate size shim in the profile groove as illustrated.



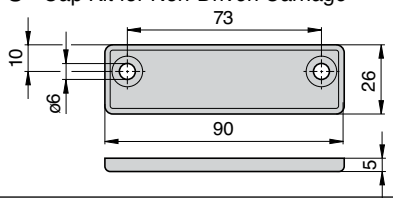
LF6 Linear Guides

LF6S Carriage Profile 26x90 and Cap [8]

L_1 26 x 90 Carriage Profile



J Cap Kit for Non-Driven Carriage



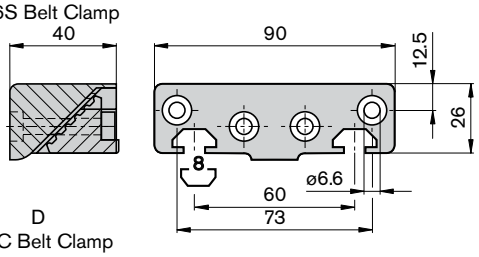
Cap Kit includes fastening set

The carriage profile is especially suited for use with linear guide LF6. The cap is used when the carriage is not driven with a toothed belt.
Carriage profile (L_1) material: AlMgSi 0.5 F25, natural-color, anodized
Cap (J) material: PA 6, black

	Description	Lot Size	Part Number
L_1	26 x 90 carriage profile, 3000mm	1	**3 842 526 495**
	26 x 90 carriage profile, 3000mm Specify length 150mm 3000mm	1	**3 842 993 061/...mm**
J	Cap kit for non-driven carriage	2	**3 842 535 645**

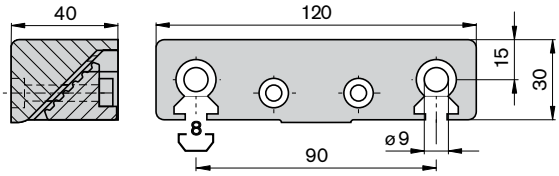
Belt Clamps for LF6S and LF6C

F
LF6S Belt Clamp



= 0.2 kg

D
LF6C Belt Clamp



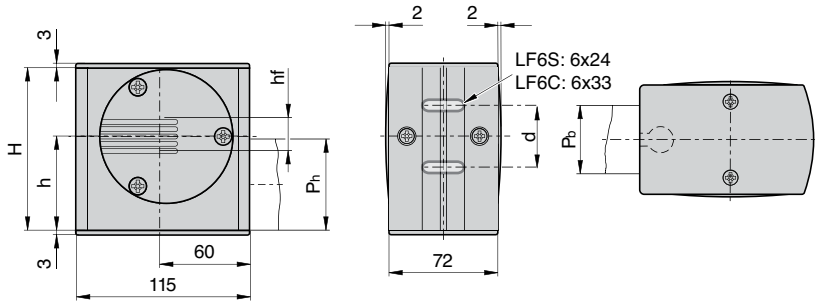
= 0.35 kg

Material: AlMgSi 0.5 F22, painted black

Includes mounting hardware.
The LF6C requires 2 M8 tapped holes in mounting profile.

Description	Lot Size	Ref.	Part Number
LF6S belt clamp	2	F	**3 842 535 682**
LF6C belt clamp	2	D	**3 842 535 681**

Return Sprockets for LF6S and LF6C



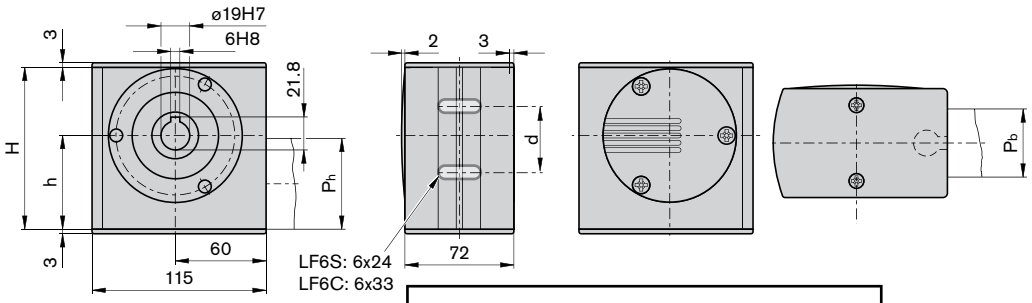
Material: AlMgSi 0.5 F22

Includes mounting hardware.

Description	Ref.	Lot Size	H (mm)	h (mm)	Pb x Ph (mm)	d (mm)		Part Number
LF6S return sprocket	I	1	107	62	45x60	38	1.6 kg	**3 842 526 411**
LF6C return sprocket	G	1	121	68	45x90	51	1.9 kg	**3 842 526 417**

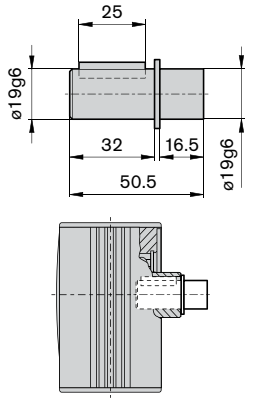
Drive Sprockets for LF6S and LF6C

H1, F1
Drive Sprocket



H1	Pulley Diameter = 36.98mm Carriage Travel (1 revolution) = 116.17mm

H
Drive Shaft w/Key

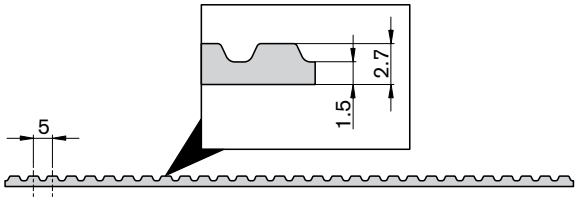


F1	Pulley Diameter = 49.71mm Carriage Travel (1 revolution) = 156.17mm

Material:
Housing: AlMgSi 0.5 F22
Includes mounting hardware.
Toothed Belt Pulley: (H1, H2) AT5 = 24
Toothed Belt Pulley: (F1, F2) AT5 = 32

Description	Ref.	Lot Size	H (mm)	h (mm)	Pb x Ph (mm)	d (mm)		Part Number
LF6S drive sprocket	H1	1	107	62	45x60	38	1.8 kg	**3 842 526 410**
LF6C drive sprocket	F1	1	121	68	45x90	51	2.1 kg	**3 842 526 416**
Drive shaft w/key	H	1	-	-	-	-	0.11 kg	**3 842 526 893**

Timing Belts for LF6S and LF6C

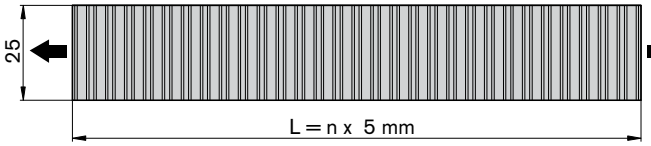


Description	Length	Lot Size	Part Number
LF6S	50,000mm	1	**3 842 513 646**
	L = ...mm	1	**3 842 994 659/...mm***
LF6C	50,000mm	1	**3 842 518 856**
	L = ...mm	1	**3 842 994 711/...mm***

LF6S
Timing Belt

F_{MAX} = 1260 N
= 51 g/m

LF6C
Timing Belt



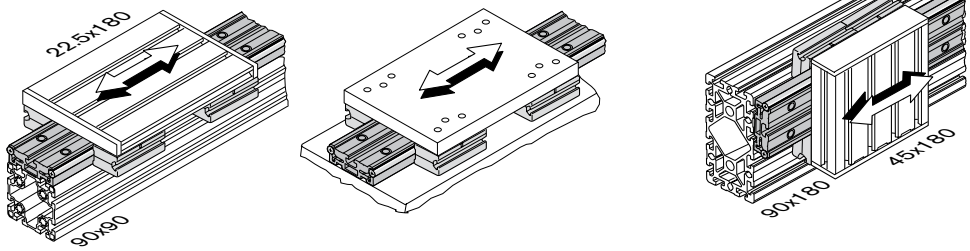
F_{MAX} = 1680 N
= 80 g/m

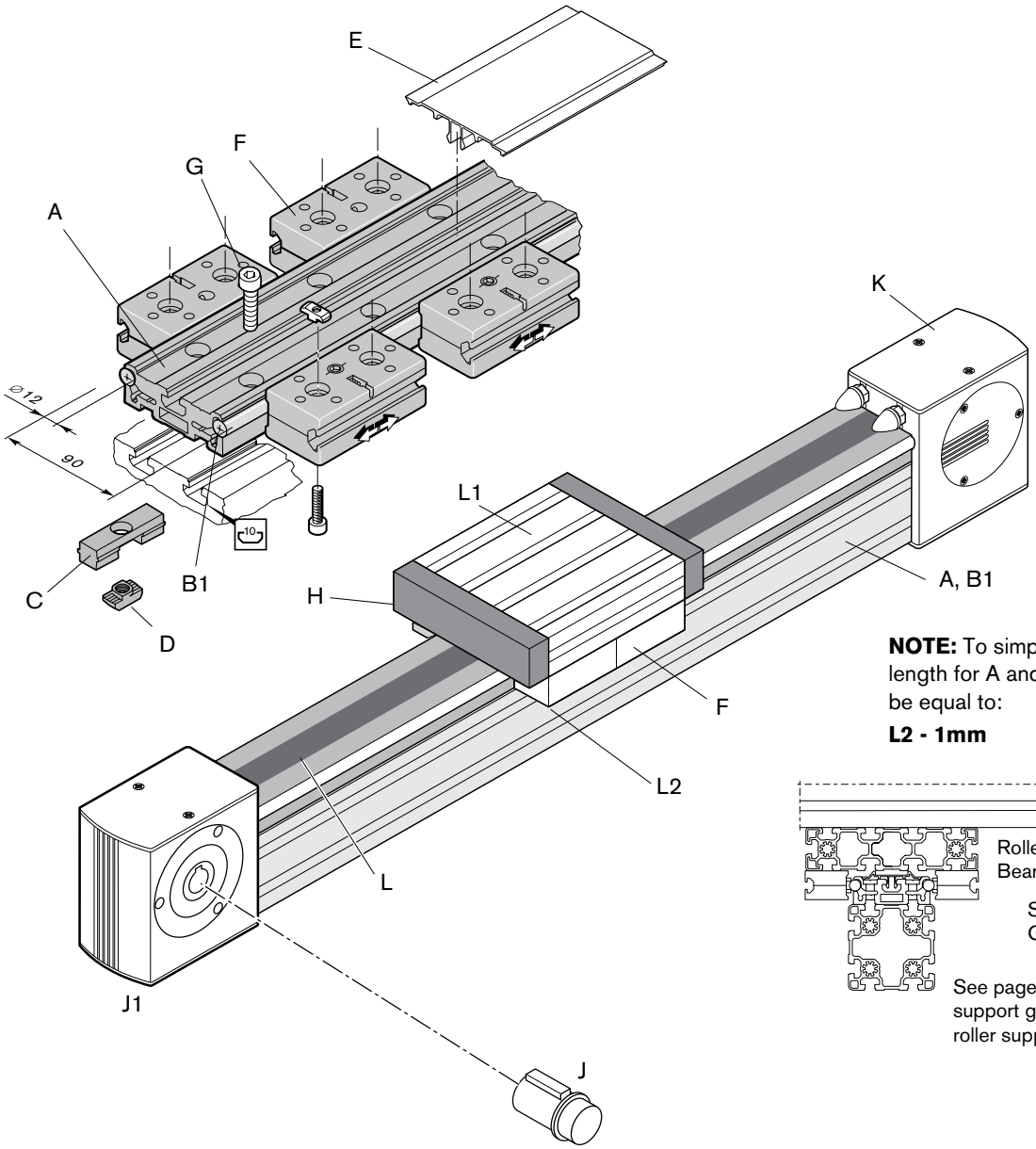
Toothed belt LF6S: AT5
Toothed belt LF6C: AT5
Material: PU with embedded wire mesh.
* **Note:**
Specify length
≥ 300mm ≤ 50,000mm
in 5mm increments.

LF12 Linear Guides

LF12S Linear Guide (FYMAX = 3,500 N)

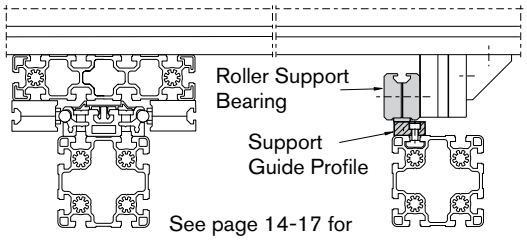
The LF12S linear guide provides a high degree of accuracy and a selectable trolley length. The guide profile can be mounted to a section of strut profile or to any flat metal surface. The track width of the trolley is fixed by the guide profile.





NOTE: To simplify assembly, the length for A and B1 should be equal to:

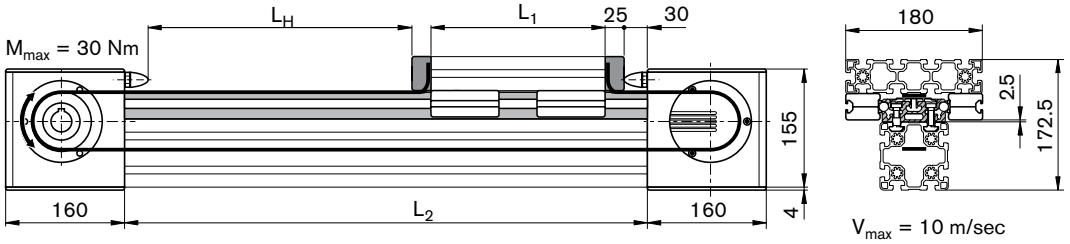
L2 - 1mm



See page 14-17 for support guide profile and roller support bearing.

LF12S Linear Guide

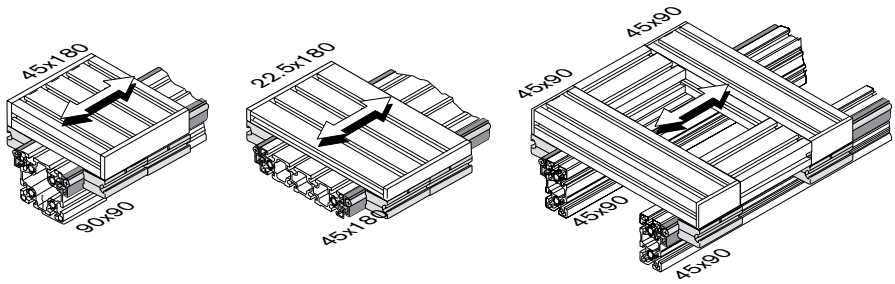
Description	Formulas to calculate lengths	Ref.
Support profile	L2 = L1 + (50) + (60) + LH	L2
Carriage profile	L1 = Minimum length, 180mm	L1
Timing belt	L = 2 x L2 - L1 + 630	L



Ref.	Description	Order Quantity	Technical Specifications	Part Number
	Guide profile, length = 5600mm, pkg. of 5	as required	14-16	**3 842 511 841**
A	Guide profile, length = 5600mm	as required	14-16	**3 842 511 903**
	Guide profile, specify length ≥ 150mm ≤ 5600mm	1	14-16	**3 842 992 438/__mm**
B1	Corrosion-resistant Guide rail, length = 2900mm	as required	14-16	**3 842 539 415**
	Corrosion-resistant Guide rail, specify length ≥ 150mm ≤ 2900mm	1	14-16	**3 842 993 968/__mm**
C	Alignment block (use two per every 100mm)	as required	14-16	**3 842 146 877**
D	T-nut (use two per every 100mm)	as required	Section 4	**3 842 530 287**
E	Belt guide, length = 5600mm	as required	14-16	**3 842 526 500**
	Belt guide, specify length 150mm 5600mm	1	14-16	**3 842 993 062/__mm**
F	Bearing, lot size = 2 (includes fastening set)	4	14-17	**3 842 535 664**
G	DIN 7984 M8x30 SHCS (use two per every 100mm)	as required	14-16	**2 910 131 246**
H	Belt clamps, lot size = 2 (includes fastening kit)	2	14-18	**3 842 535 680**
J1	Drive sprocket, flush mount	1	14-19	**3 842 526 412**
J	Drive shaft w/ key, length = 68.5mm	1	14-19	**3 842 526 894**
K	Return sprocket (includes fastening kit)	1	14-18	**3 842 526 413**
L	Timing belt, length = 50,000mm	1	14-19	**3 842 526 422**
	Timing belt, specify length ≥ 300mm ≤ 50,000mm, in 10mm increments	1	14-19	**3 842 994 821/__mm**
L1	Carriage profile 45x180H, specify length ...mm (min = 180)	1	Section 2	**3 842 990 339/__mm**
L2	Support profile 90x90, specify length ...mm	1	Section 2	**3 842 992 418/__mm**

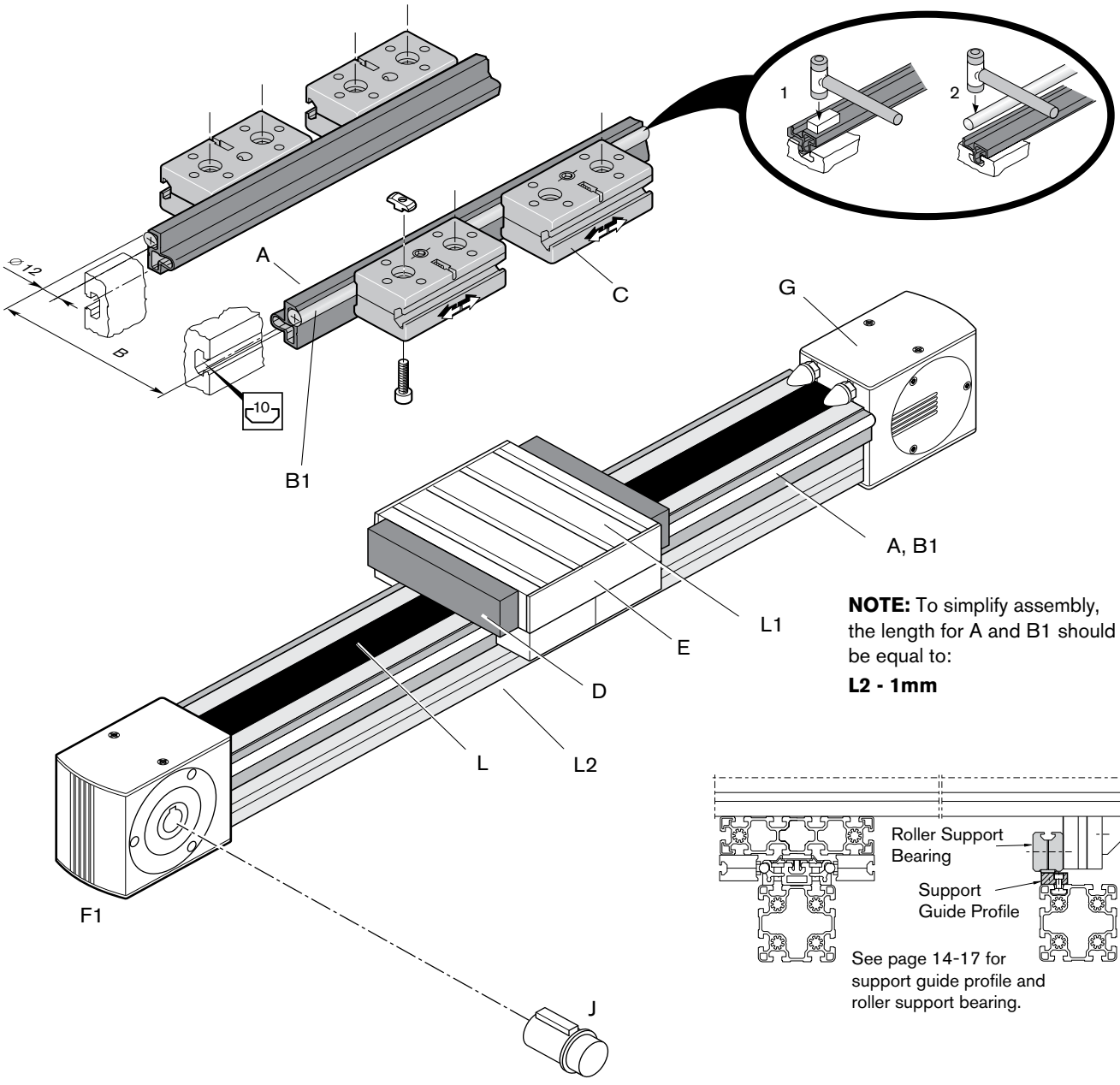
Section 14: Dynamic Linear Elements

LF12 Linear Guides



LF12C Linear Guide (FYMAX = 3,500 N)

The LF12C linear guide provides a high degree of accuracy and a selectable trolley length.



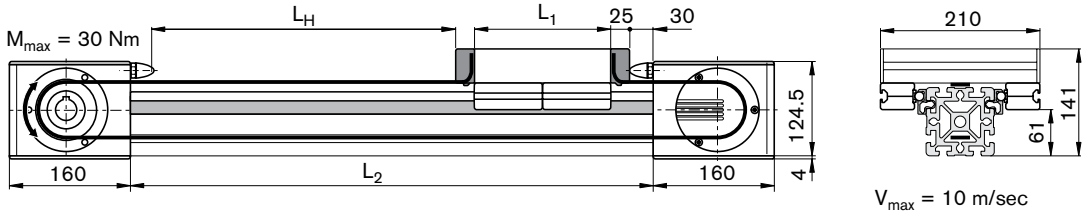
NOTE: To simplify assembly, the length for A and B1 should be equal to:

L2 - 1mm

See page 14-17 for support guide profile and roller support bearing.

LF12C Linear Guide

Description	Formulas to calculate lengths	Ref.
Support profile	L2 = L1 + (50) + (60) + LH	L2
Carriage profile	L1 = Minimum length, 180mm	L1
Timing belt	L = 2 x L2 - L1 + 630	L



Ref.	Description	Order Quantity	Technical Specifications	Part Number
	Clamp guide profile, length = 3000mm, pkg. of 20		14-16	**3 842 518 897**
A	Clamp guide profile, length = 3000mm	as required	14-16	**3 842 518 894**
	Clamp guide profile, specify length ≥ 150mm ≤ 3000mm		14-16	**3 842 992 440/__mm**
B1	Corrosion-resistant Guide rail, length = 2900mm	as required	14-16	**3 842 539 415**
	Corrosion-resistant Guide rail, specify length ≥ 150mm ≤ 2900mm	1	14-16	**3 842 993 968/__mm**
C	Bearings, lot size = 2 (includes fastening kit)	4	14-17	**3 842 535 664**
D	Belt clamps, lot size = 2 (includes fastening kit)	1	14-18	**3 842 535 680**
F1	Drive sprocket, flush mount	1	14-19	**3 842 526 863**
J	Drive shaft w/key, length = 68.5mm	as required	14-19	**3 842 526 894**
G	Return sprocket (includes fastening kit)	1	14-18	**3 842 526 865**
E	45x180 end cap, black (two required)	2	Section 9	**3 842 503 845**
L	Timing belt, length = 50,000mm	as required	14-19	**3 842 526 422**
	Timing belt, specify length ≥ 300mm ≤ 50,000mm, in 10mm increments	1	14-19	**3 842 994 821/__mm**
L1	Carriage profile 45x180H, specify length ...mm (min. = 180)	1	Section 2	**3 842 990 335/__mm**
L2	Support profile 90x90H, D17/D17, specify length ...mm	1	Section 2	**3 842 990 093/__mm**

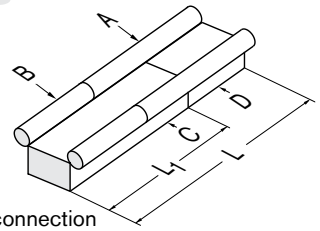
LF12 Linear Guides

Assembly Note

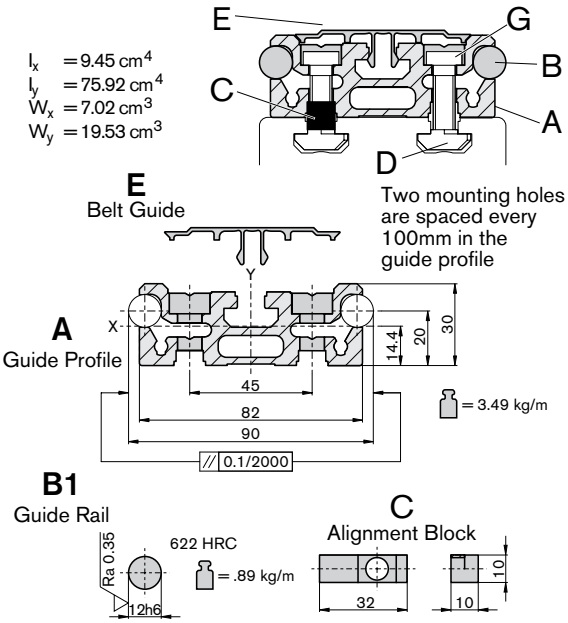
To create a linear guide element larger than purchased lengths, offset the splits in the guide profile and guiderails. This will create a much stronger and better aligned connection. Make sure butting edges are cut square and deburred.

A = L_1 - (L x .10) (Guide rail)
B = L - A (Overlap guide rail)
C = L_1 (Guide profile)
D = L - L_1 (Guide profile)

L = Total length
L_1 = Location of profile connection as chosen by customer



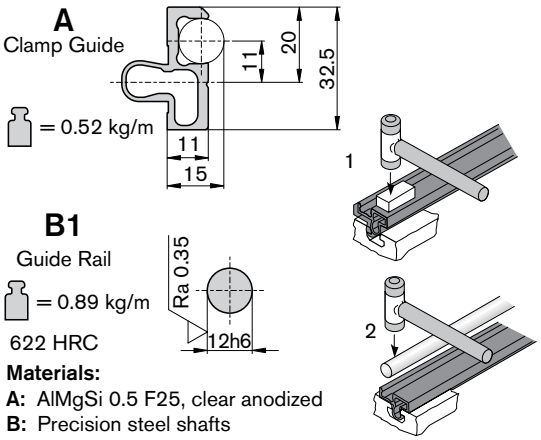
LF12S Guide Profile



Material:
A, E: AlMgSi 0.5 F25, natural-color, anodized
B: Precision steel shafts

Ref	Description	Lot Size	Part Number
A	Guide profile L = 5600mm	1	**3 842 511 903**
	Guide profile L = ... mm Specify length 150mm 5600mm	1	**3 842 992 438/...mm**
B	***Standard Guide Rails:***		
1	L = 3000mm	1	**3 842 518 879**
	L = ... mm Specify length 150mm 3000mm	1	**3 842 994 648/...mm**
C	Alignment block	1	**3 842 146 877**
D	T-Nut	1	**3 842 530 287**
E	Belt guide L = 5600mm	1	**3 842 526 500**
	Belt guide L = ... mm	1	**3 842 993 062/...mm**
G	M8 x 30 DIN 7984	1	**2 910 131 246**

LF12C Clamp Profile



Materials:
A: AlMgSi 0.5 F25, clear anodized
B: Precision steel shafts

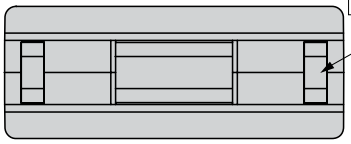
Ref	Description	Qty	Part Number
A	Clamp guide L = 3000mm	1	**3 842 518 894**
	Clamp guide L = ... mm Specify length 150mm 3000mm	1	**3 842 992 440/...mm**
B	***Standard Guide Rails:***		
1	L = 3000mm	1	**3 842 518 879**
	L = ... mm Specify length 150mm 3000mm	1	**3 842 994 648/...mm**

14

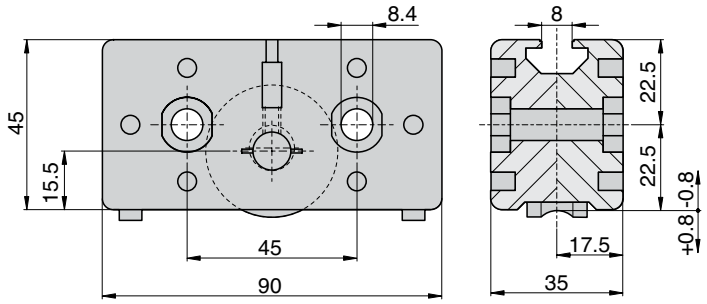
Bearing for LF12S and LF12C

Housing: Die-cast aluminum
Load capacity of roller:
C_{stat} = 5000 N, C_{dyn} = 8300 N

Felt repair kit includes 2 felts, 2 springs, 2 lubricating nipples, and 2 locks.

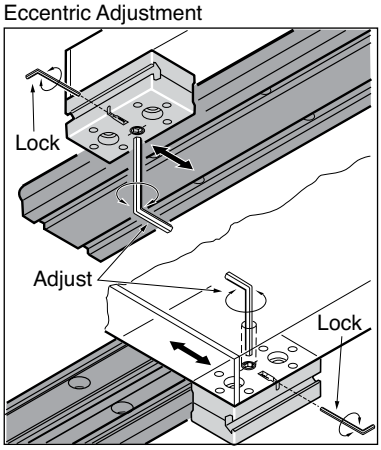


= 0.35 kg



Includes fastening set

Eccentric Adjustment



Description	Lot Size	Part Number
Bearing	2	**3 842 535 664**
Felt repair kit	1	**3 842 528 520**

Support Guide Profile for LF12S and LF12C

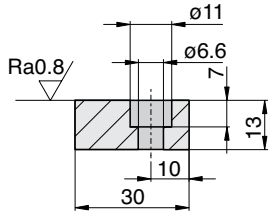
Support guide profile is mounted using DIN 912 M6 x 16-8.8 screws.
Drilled mounting holes provided every 100mm.

The supporting bearing for extensions absorb non-central forces to 1750 N.

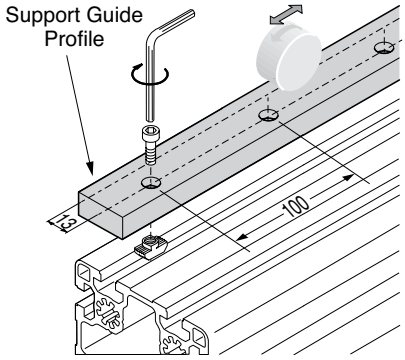
Materials:
Guide profile: Hardened, polished steel
Support bearing housing: Die-cast aluminum
Roller: Hardened, polished steel

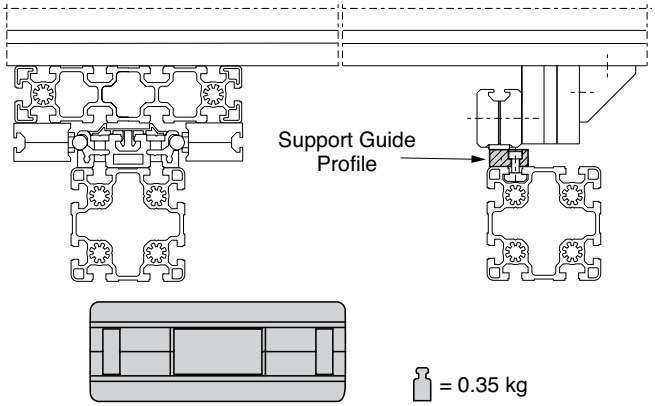
Load capacity of rollers:
C_{dyn} = 8600 N, C_{stat} = 5100 N

Support Guide Profile

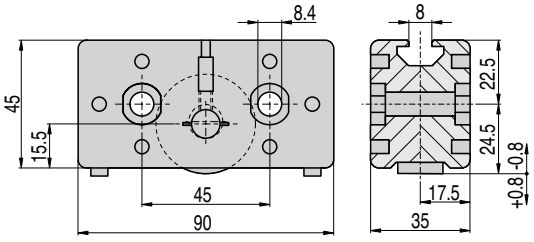


= 3.0 kg/m
633 HRC





= 0.35 kg

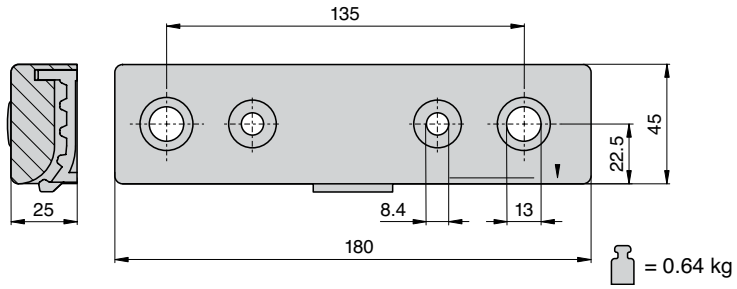


Roller Support Bearing

Description	Lot Size	Part Number
Support guide profile, 2000mm	1	**3 842 517 160**
Support guide profile, square cut to length	1	**3 842 994 702/... mm**
Roller support bearing, pkg. of 2	1	**3 842 535 666**
ISO 912, M6 x 16 screw (1 reqd. per 100mm)	1	**2 910 141 197**
T-Nut, M6, 10mm (1 reqd. per 100mm)	1	**3 842 530 285**

LF12 Linear Guides

Belt Clamps for LF12S and LF12C

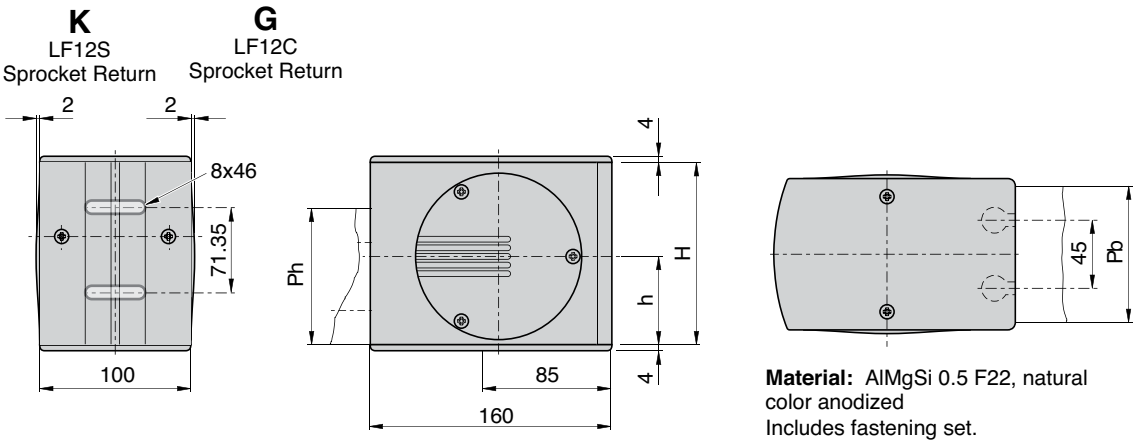


Material: AlMgSi 0.5 F22, painted black

Includes fastening set.

Description	Lot Size	Part Number
LF12S Belt clamp LF12C Belt clamp	2	**3 842 535 680**

Return Sprockets for LF12S and LF12C

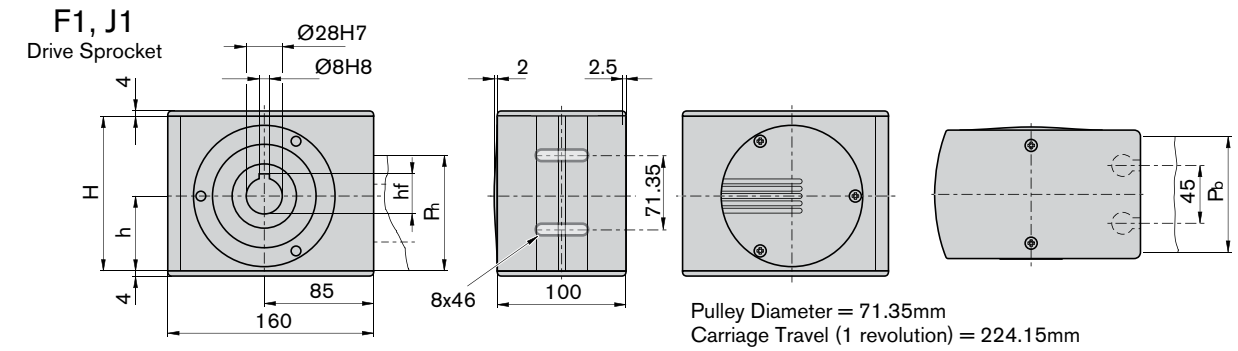


Material: AlMgSi 0.5 F22, natural color anodized

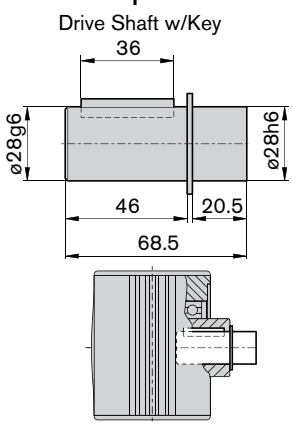
Includes fastening set.

Description	Ref.	Lot Size	H (mm)	h (mm)	Pb x Ph (mm)		Part Number
LF12S return sprocket	K	1	151.0	88.7	90x90	3.5 kg	**3 842 526 413**
LF12C return sprocket	G	1	120.5	58.3	90x90H	2.9 kg	**3 842 526 865**

Drive Sprockets for LF12S and LF12C



Pulley Diameter = 71.35mm
Carriage Travel (1 revolution) = 224.15mm



Description	Ref.	Lot Size	H (mm)	h (mm)	Pb x Ph (mm)		Part Number
LF12S drive sprocket	J1	1	151.0	88.7	90x90	4.5 kg	**3 842 526 412**
LF12C drive sprocket	F1	1	120.5	58.3	90x90H	3.9 kg	**3 842 526 863**
Drive shaft w/key	F	1	-	-	-	0.33 kg	**3 842 526 894**

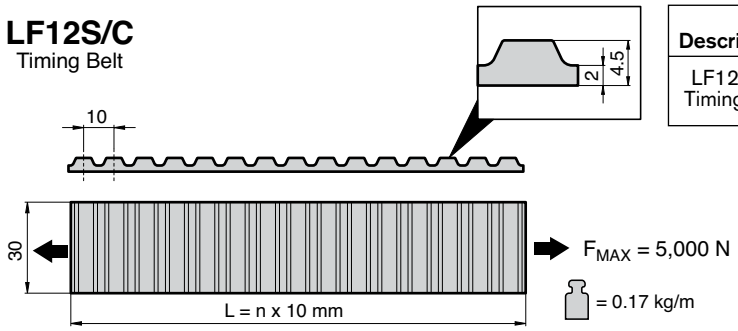
Material:
Toothed belt pulley (J, F): AT 10/oz = 32
Housing material: AlMgSi 0.5 F22, natural color anodized

Includes fastening set.

Timing Belts for LF12S and LF12C

14

LF12S/C
Timing Belt



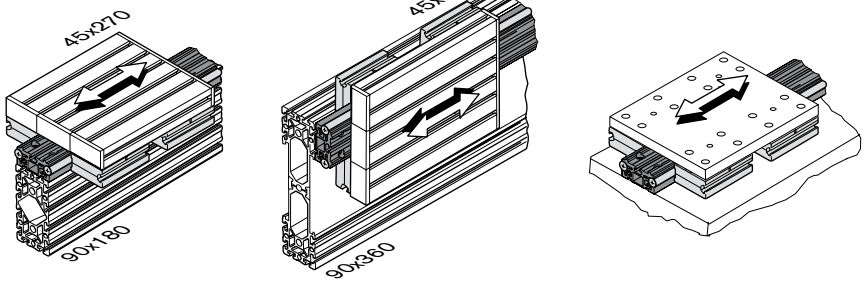
Description	Length	Lot Size	Part Number
LF12S/C Timing belt	L = 50,000mm	1	**3 842 526 422**
	L = ...mm	1	**3 842 994 821/...mm***

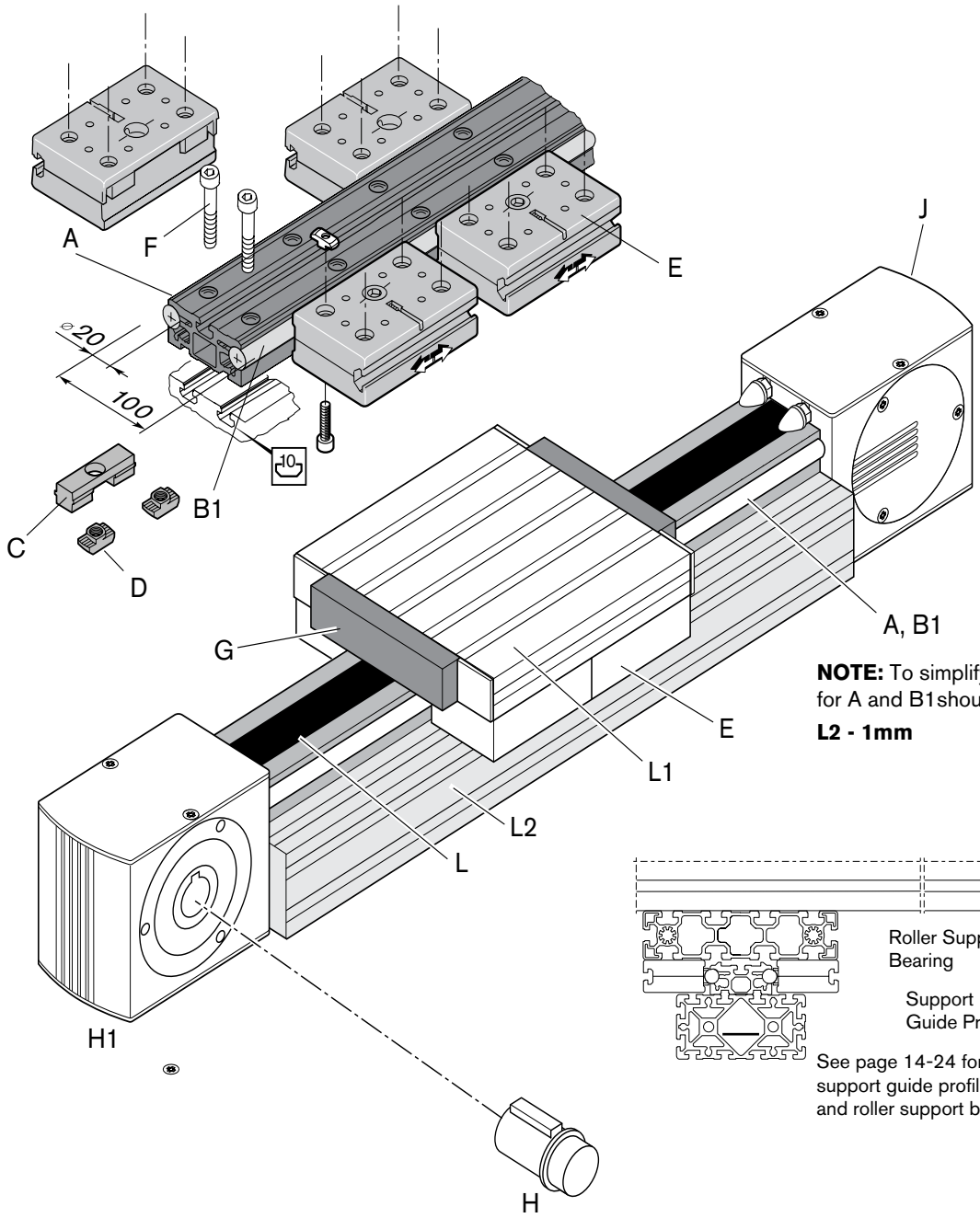
Timing belt: AT10
Material: PU with embedded wire mesh
*** Note:**
Specify length 300mm 50,000mm in 10mm increments

LF20 Linear Guides

LF12S Linear Guide (FYMAX = 12,500 N)

The LF20S linear guide provides a high degree of accuracy and a selectable trolley length. The guide profile can be mounted to a section of strut profile or to any flat metal surface. The track width of the trolley is fixed by the guide profile.





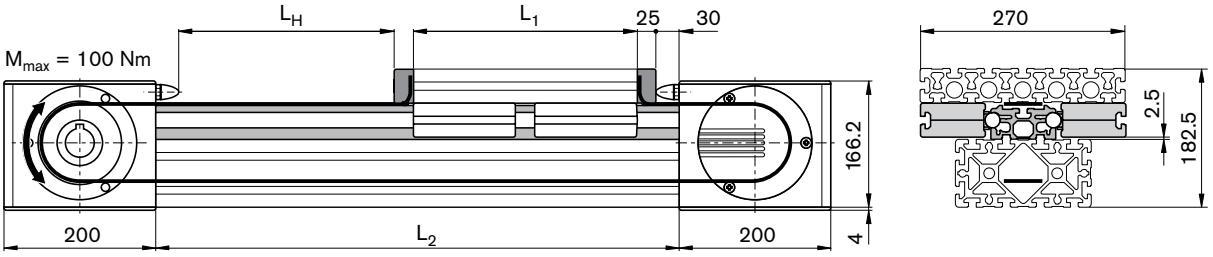
NOTE: To simplify assembly, the length for A and B1should be equal to:

L2 - 1mm

See page 14-24 for support guide profile and roller support bearing.

LF20S Linear Guide

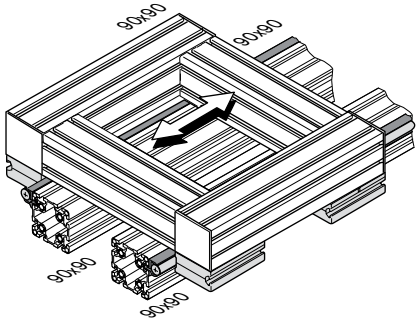
Description	Formulas to calculate lengths	Ref.
Support profile	L2 = L1 + (50) + (60) + LH	L2
Carriage profile	L1 = Minimum length, 270mm	L1
Timing belt	L = 2 x L2 - L1 + 780	L

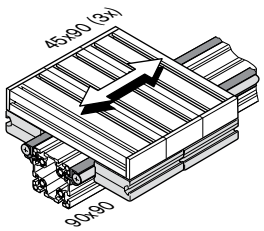


Ref.	Description	Order Quantity	Technical Specifications	Part Number
	Guide profile, length = 5600mm, pkg. of 5	as required	14-25	**3 842 526 878**
A	Guide profile, length = 5600mm	as required	14-25	**3 842 526 931**
	Guide profile, specify length ≥ 150mm ≤ 5600mm	1	14-25	**3 842 993 080/__mm**
B1	Corrosion-resistant Guide rail, length = 2900mm	as required	14-25	**3 842 539 416**
	Corrosion-resistant Guide rail, specify length ≥ 150mm ≤ 2900mm	1	14-25	**3 842 993 969/__mm**
C	Alignment block (use two per every 100mm)	as required	14-25	**3 842 146 877**
D	T-nut (use two per every 100mm)	as required	Section 4	**3 842 530 287**
E	Bearing, lot size = 2 (includes fastening kit)	4	14-26	**3 842 535 663**
F	DIN 7984 M8x45 SHCS (use two per every 100mm)	as required	14-25	**2 910 131 252**
G	Belt clamps, lot size = 2 (includes fastening kit)	2	14-26	**3 842 535 680**
H1	Drive sprocket, flush mount	1	14-27	**3 842 526 414**
H	Drive shaft w/key, length = 68.5mm	1	14-27	**3 842 526 895**
J	Return sprocket	1	14-26	**3 842 526 415**
L	Timing belt, length = 50,000mm	1	14-27	**3 842 513 648**
	Timing belt, specify length ≥ 300mm ≤ 50,000mm, in 10mm increments	1	14-27	**3 842 994 662/__mm**
L1	Carriage profile 45x270H, specify length ...mm (min = 270)	1	Section 2	**3 842 992 928/__mm**
L2	Support profile 90x180H, D17/D17, specify length __mm	1	Section 2	**3 842 993 081/__mm**

Section 14: Dynamic Linear Elements

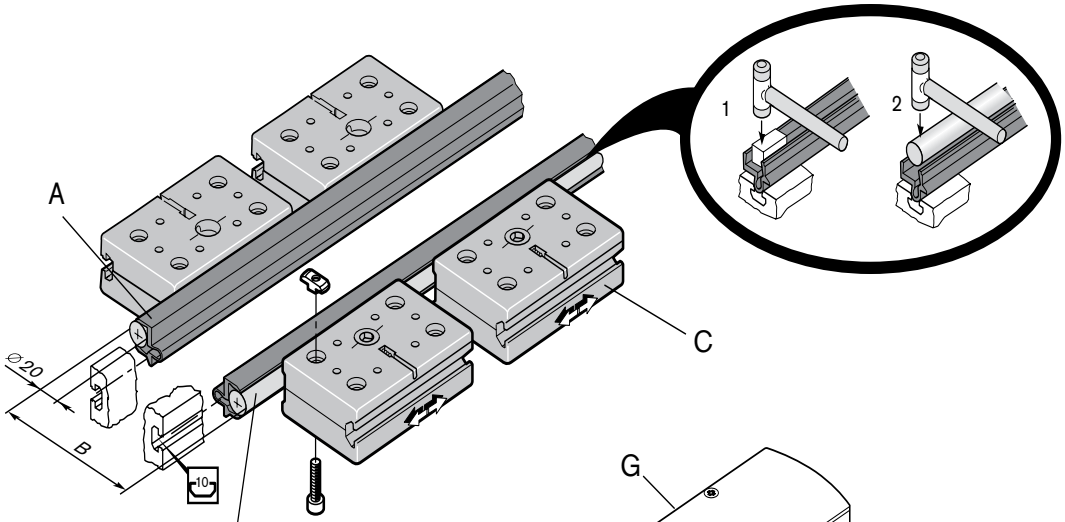
LF20 Linear Guides

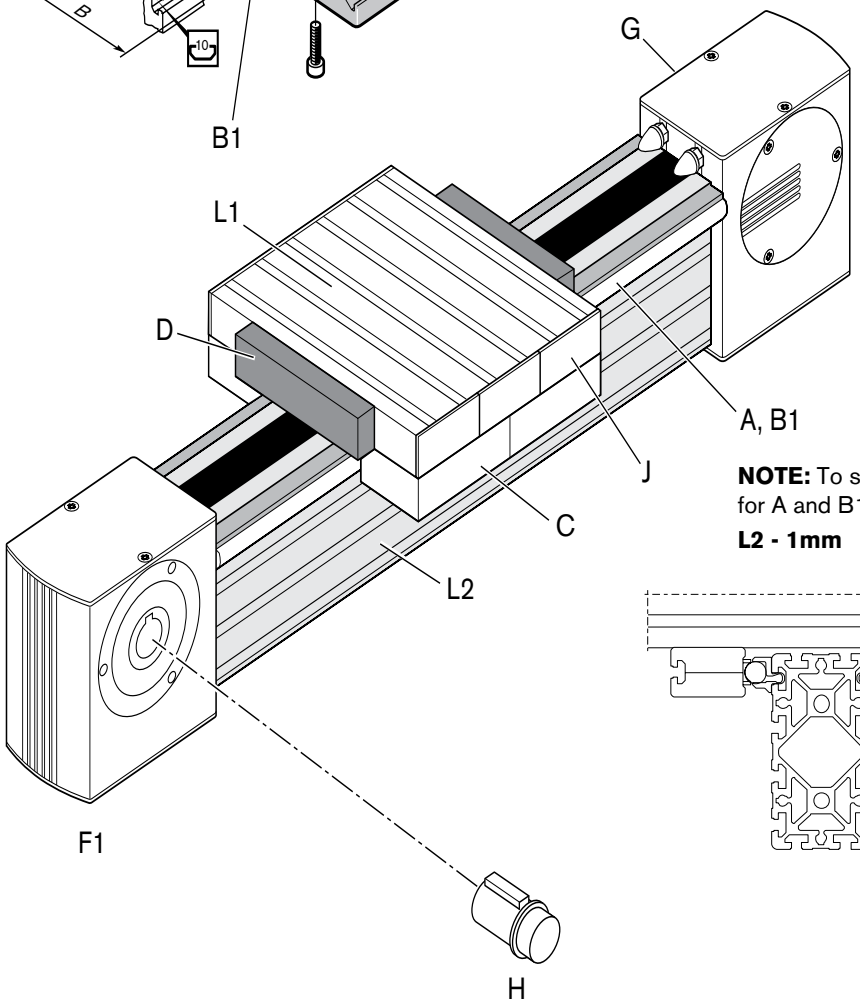




LF12C Linear Guide (FYMAX = 12,500 N)

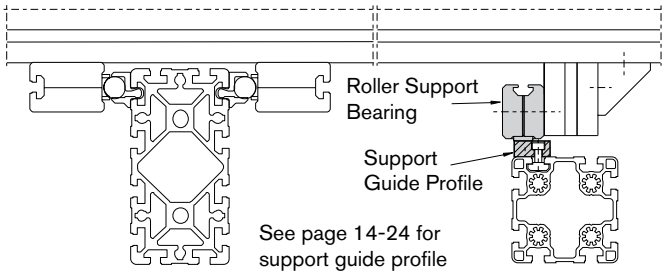
The LF20C linear guide provides a high degree of accuracy and a selectable trolley length.





NOTE: To simplify assembly, the length for A and B1 should be equal to:

L2 - 1mm

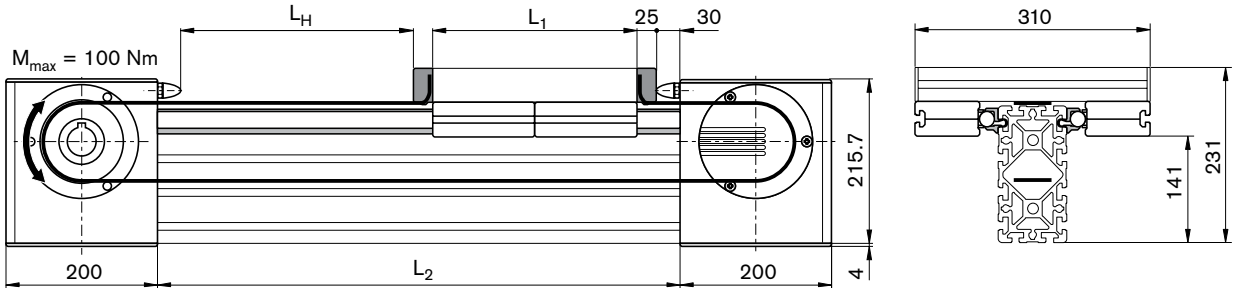


See page 14-24 for support guide profile and roller support bearing.

Section 14: Dynamic Linear Elements

LF20C Linear Guide

Description	Formulas to calculate lengths	Ref.
Support profile	L2 = L1 + (50) + (60) + LH	L2
Carriage profile	L1 = Minimum length, 180mm	L1
Timing belt	L = 2 x L2 - L1 + 630	L



Ref.	Description	Order Quantity	Technical Specifications	Part Number
	Clamp guide profile, length = 3000mm, pkg. of 20	as required	14-25	**3 842 518 898**
A	Clamp guide profile, length = 3000mm	as required	14-25	**3 842 518 895**
	Clamp guide profile, specify length ≥ 150mm ≤ 3000mm	1	14-25	**3 842 992 441/__mm**
B1	Corrosion-resistant Guide rail, length = 2900mm	as required	14-25	**3 842 539 416**
	Corrosion-resistant Guide rail, specify length ≥ 150mm ≤ 2900mm	2	14-25	**3 842 993 969/__mm**
C	Bearings, lot size = 2 (includes fastening kit)	4	14-26	**3 842 535 663**
D	Belt clamps, lot size = 2 (includes fastening kit)	2	14-26	**3 842 535 680**
F1	Drive sprocket, flush mount	1	14-27	**3 842 526 867**
H	Drive shaft w/key, length = 68.5 mm	1	14-27	**3 842 526 895**
G	Return sprocket	1	14-26	**3 842 526 869**
J	45x90 end cap, black	6	Section 9	**3 842 511 783**
L	Timing belt, length = 50,000mm	1	14-27	**3 842 513 648**
	Timing belt, specify length ≥ 300mm ≤ 50,000mm, in 10mm increments	1	14-27	**3 842 994 662/__mm**
L1	Carriage profile 45x270H, specify length ...mm (min = 270)	1	Section 2	**3 842 992 928/__mm**
L2	Support profile 90x180H, D17/D17, specify length __mm	1	Section 2	**3 842 992 898/__mm**

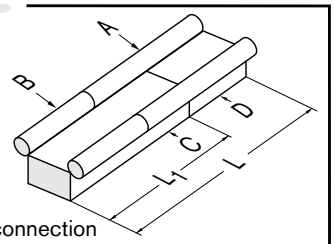
LF20 Linear Guides

Assembly Note

To create a linear guide element larger than purchased lengths, offset the splits in the guide profile and guiderails. This will create a much stronger and better aligned connection. Make sure butting edges are cut square and deburred.

A = L_1 - (L x .10) (Guide rail)
B = L - A (Overlap guide rail)
C = L_1 (Guide profile)
D = L - L_1 (Guide profile)

L = Total length
L_1 = Location of profile connection as chosen by customer

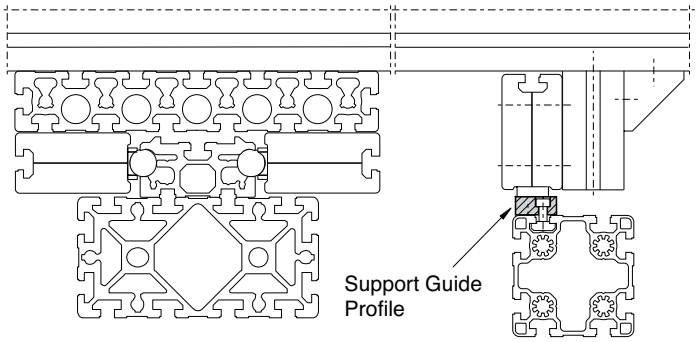


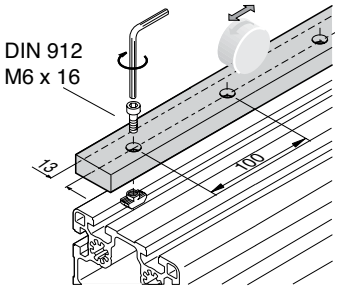
Support Guide Profile for LF20S and LF20C

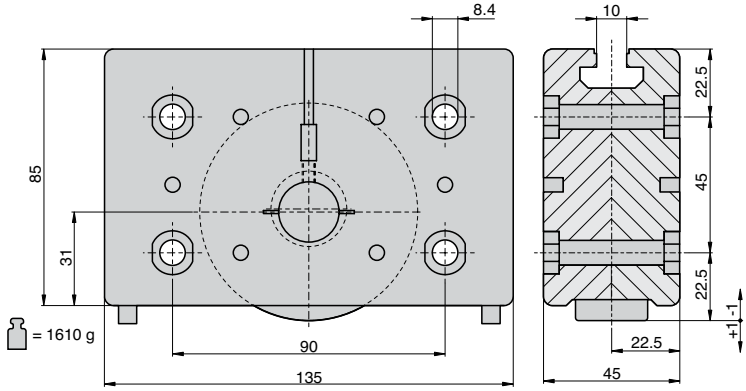
The guide profile for support bearings is mounted using DIN 912 - M6 x 16 - 8.8 SHCS. Drilled holes are provided every 100mm.

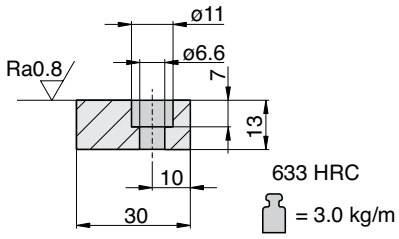
The supporting bearings for extensions absorb non-central forces to 6250 N.

Materials:
Guide profile: Hardened, polished steel
Support bearing: Die-cast aluminum
Roller: Hardened, polished steel
Load capacity of rollers:
C_{dyn} = 24,600 N, C_{stat} = 21,400 N







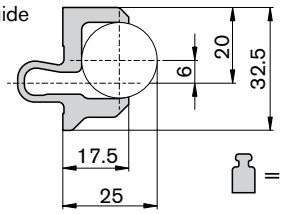


Description	Lot Size	Part Number
Profile, support guide, 2000mm	1	**3 842 517 160**
Profile, support guide, square cut to length	1	**3 842 994 702/...mm**
Bearing, support	2	**3 842 535 665**
DIN 912, M6 x 16, 8.8 (one reqd. every 100mm)	1	**2 910 141 197**
T-Nut, M6 x 10 (one reqd. every 100mm)	1	**3 842 530 285**

LF20C Clamp Guide

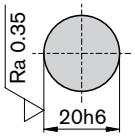
Material:
A: AlMgSi 0.5 F25, clear anodized
B: precision steel shafts

A
Clamp Guide



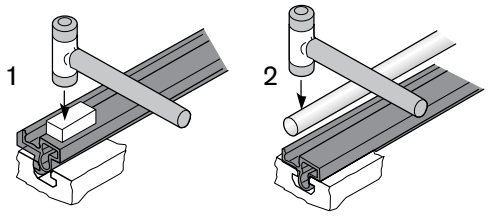
= 0.77 kg/m

B1
Guide Rail



62 2 HRC

= 2.47 kg/m

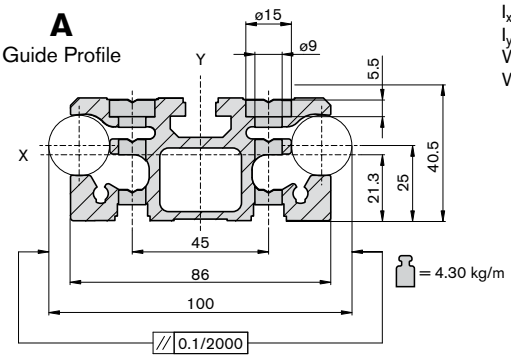


Ref	Description	Lot Size	Part Number
A	Clamp guide profile L = 3000mm	1	**3 842 518 895**
	Clamp guide profile L = ... mm Specify length 150mm 3000mm	1	**3 842 992 441/...mm**
B	***Standard Guide Rails:***		
	L = 3000mm	1	**3 842 518 880**
1	L = ... mm Specify length 150mm 3000mm	1	**3 842 994 649/...mm**

LF20S Guide Profile

Material:
A, E: AlMgSi 0.5 F25, natural color anodized
B: precision steel shafts

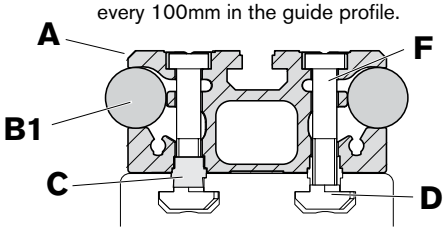
A
Guide Profile



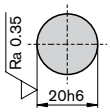
= 4.30 kg/m

I_x = 29.40 cm⁴
I_y = 103.20 cm⁴
W_x = 23.95 cm³
W_y = 35.98 cm³

Two mounting holes are spaced every 100mm in the guide profile.



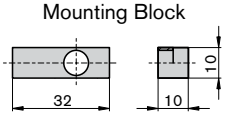
B1
Guide Rail



62 2 HRC

= 2.47 kg/m

C
Mounting Block

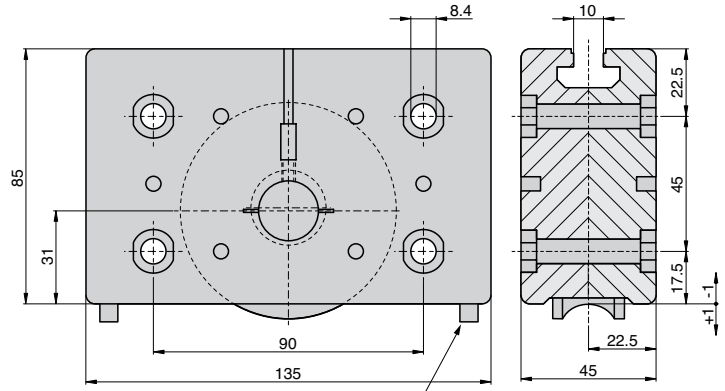


Ref	Description	Lot Size	Part Number
A	Guide profile L = 5600mm	1	**3 842 526 931**
	Guide profile L = ... mm Specify length 150mm 5600mm	1	**3 842 993 080/...mm**
B	***Standard Guide Rails:***		
	L = 3000mm	1	**3 842 518 880**
1	L = ... mm Specify length 150mm 3000mm	1	**3 842 994 649/...mm**
C	Alignment block	1	**3 842 146 877**
D	T-Nut	1	**3 842 530 287**
F	M8 x 45 DIN 7984	1	**2 910 131 252**

LF20 Linear Guides

Bearing for LF20S and LF20C

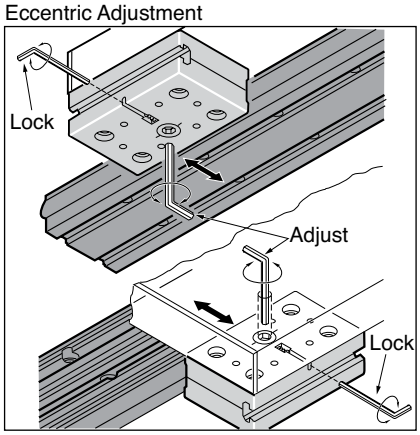
Material:
Housing: die-cast zinc
Load capacity of roller:
C_{stat} = 16,600 N, C_{dyn} = 23,400 N



Felt repair kit includes 2 felts, 2 springs, 2 lubricating nipples, and 2 locks.

= 1.35 kg

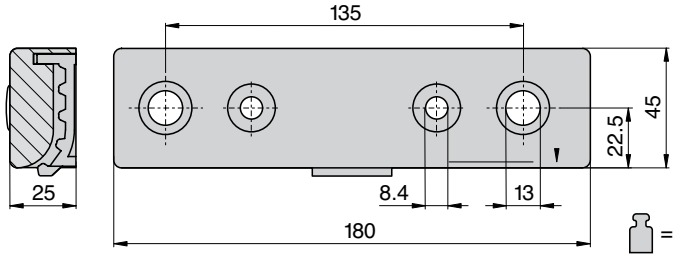
Eccentric Adjustment



Includes fastening set

Description	Lot Size	Part Number
LF20S, LF20C Bearing	2	**3 842 535 663**
LF20S, LF20C Felt repair kit	1	**3 842 528 521**

Belt Clamps for LF20S and LF20C



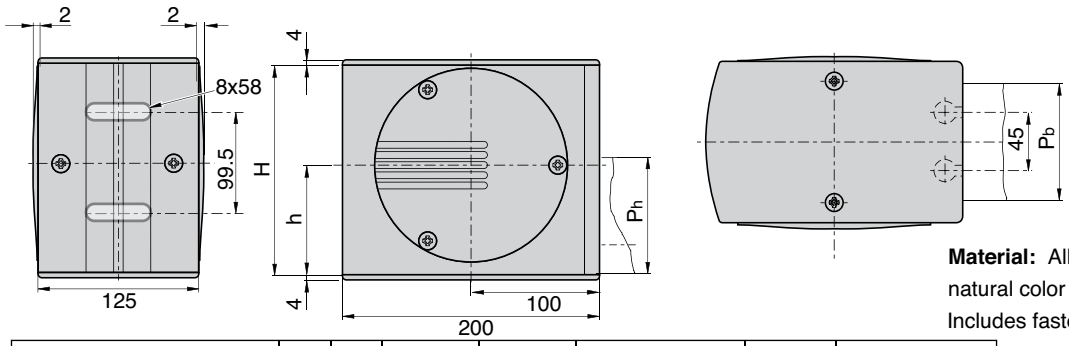
= 0.64 kg

Material: AlMgSi 0.5 F22, painted black

Includes fastening set.

Description	Lot Size	Part Number
LF20S belt clamp	2	**3 842 535 680**
LF20C belt clamp		

Return Sprockets for LF20S and LF20C

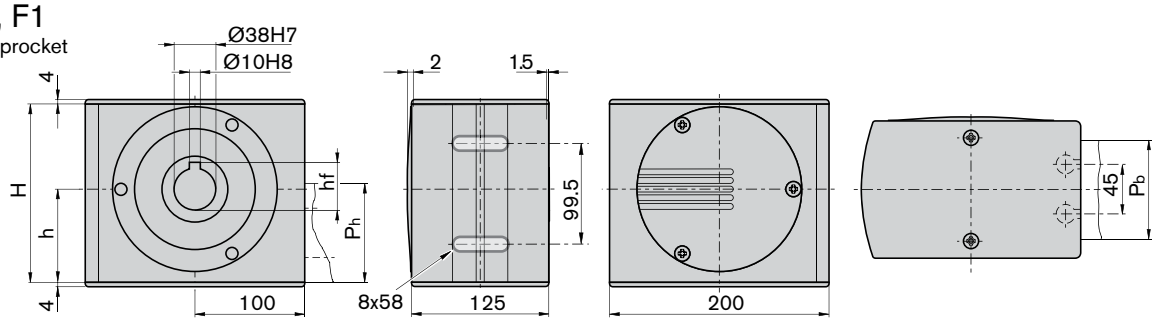


Material: AlMgSi 0.5 F22, natural color anodized
Includes fastening set.

Description	Ref.	Lot Size	H (mm)	h (mm)	Pb x Ph (mm)		Part Number
LF20S return sprocket	J	1	162.2	84.7	90x180	7.6 kg	**3 842 526 415**
LF20C return sprocket	G	1	211.7	134.2	180x90	9.3 kg	**3 842 526 869**

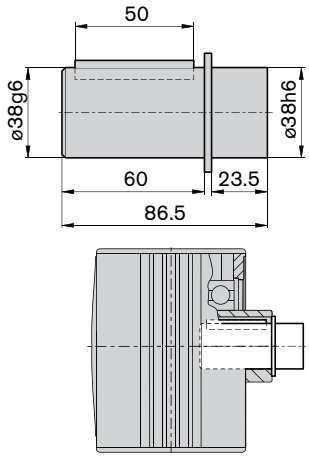
Drive Sprockets for LF20S and LF20C

H1, F1
Drive Sprocket



Pulley Diameter = 100.00mm
Carriage Travel (1 revolution) = 314.16mm

H
Drive Shaft w/Key

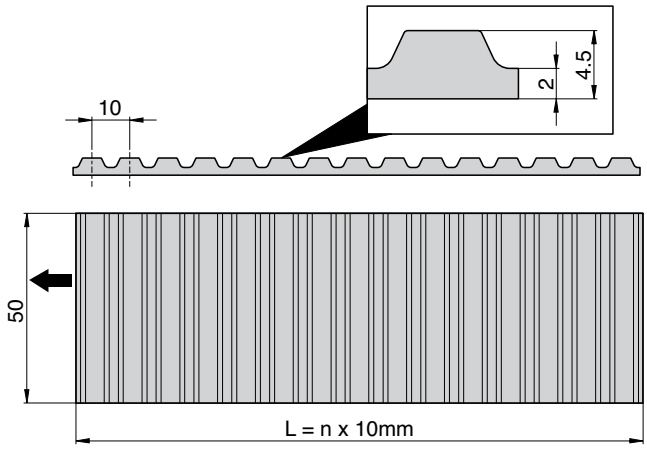


Description	Ref.	Lot Size	H (mm)	h (mm)	Pb x Ph (mm)		Part Number
LF20S drive sprocket	H1	1	162.2	84.7	180x90	9.4 kg	**3 842 526 414**
LF20C drive sprocket	F1	1	211.7	134.2	90x180	11.0 kg	**3 842 526 867**
Drive shaft w/key	H	1	-	-	-	0.77 kg	**3 842 526 895**

Material:
Toothed belt pulley: AT 10/z = 32
Housing: AlMgSi 0.5 F22, natural color anodized

Includes fastening set.

Timing Belts for LF20S and LF20C



Description	Lot Size	Part Number
LF20S, LF20C L = 50,000mm	1	**3 842 513 648**
LF20S, LF20C L = ...mm	1	**3 842 994 662/...mm**

Toothed belt: AT 10
Material: PU with embedded wire mesh
Note:
Specify length 300mm 50,000mm
in 10mm increments

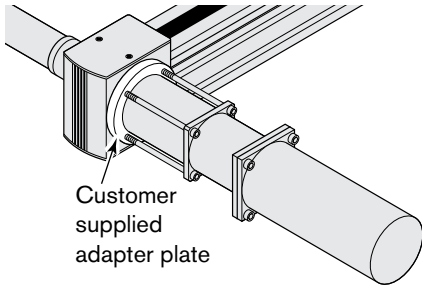
F_{MAX} = 7500 N

= 0.28 kg/m

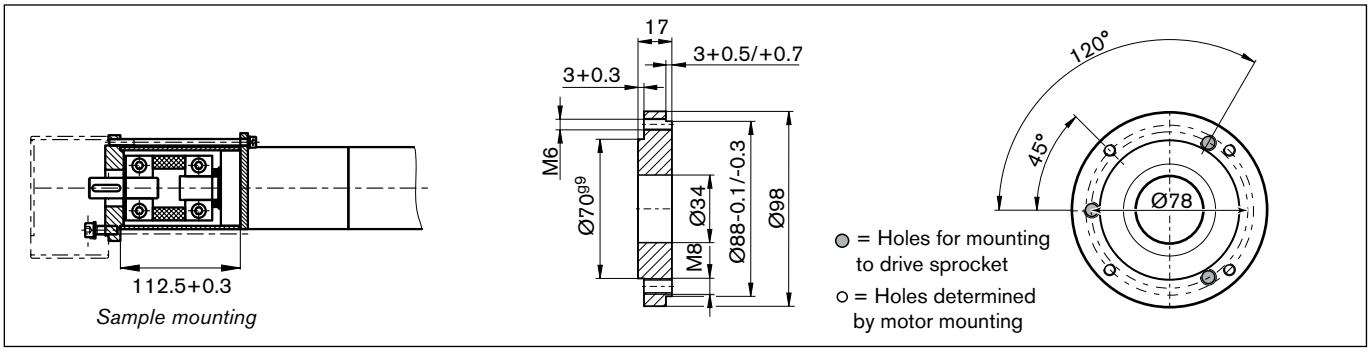
Gearmotor Adapter Plate Machining Templates

Due to the wide range of gearmotor mounting hole patterns, Bosch Rexroth does not offer gearmotor adapter plates for linear guides.

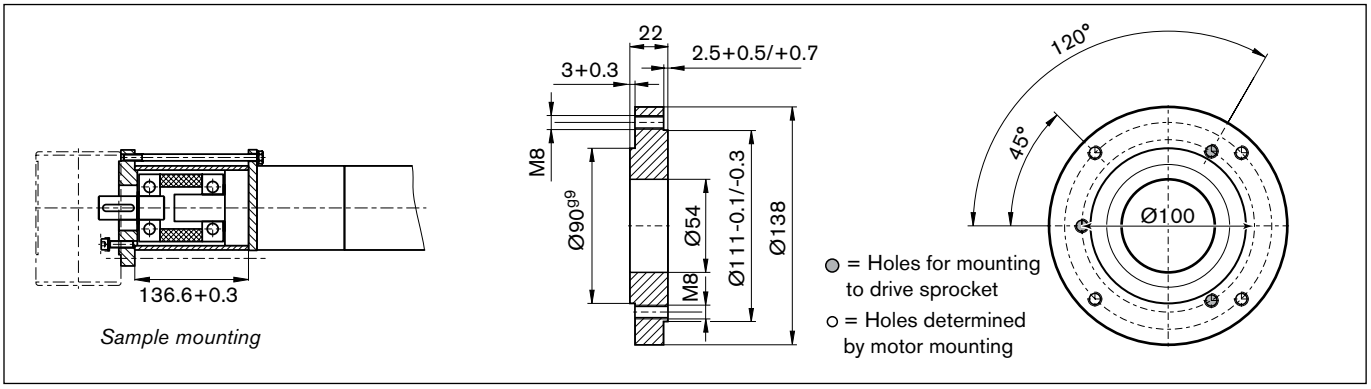
The diagrams below show the recommended dimensions, including the required mounting hole spacing and dimensions for each type of linear guide.



LF6S & LF6C



LF12S & LF12C



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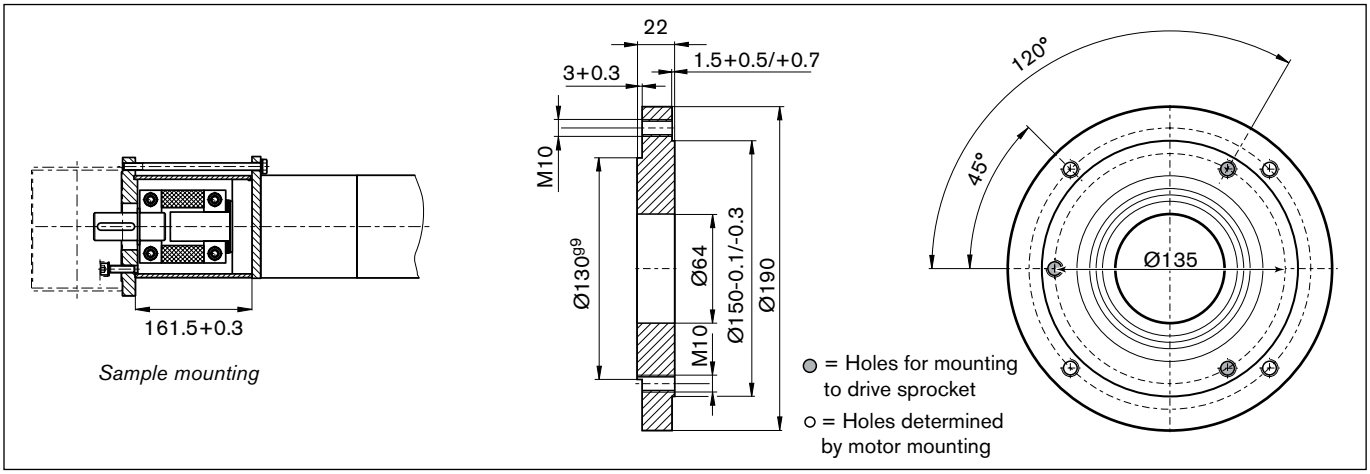
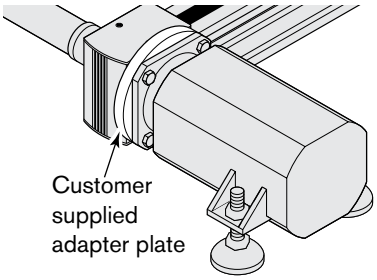


Section 14: Dynamic Linear Elements

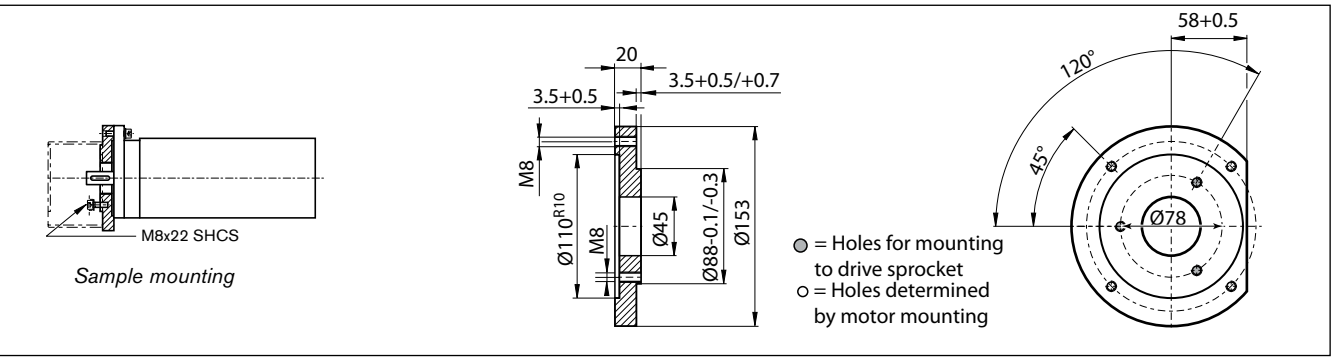
Servomotor Adapter Plate Machining Templates



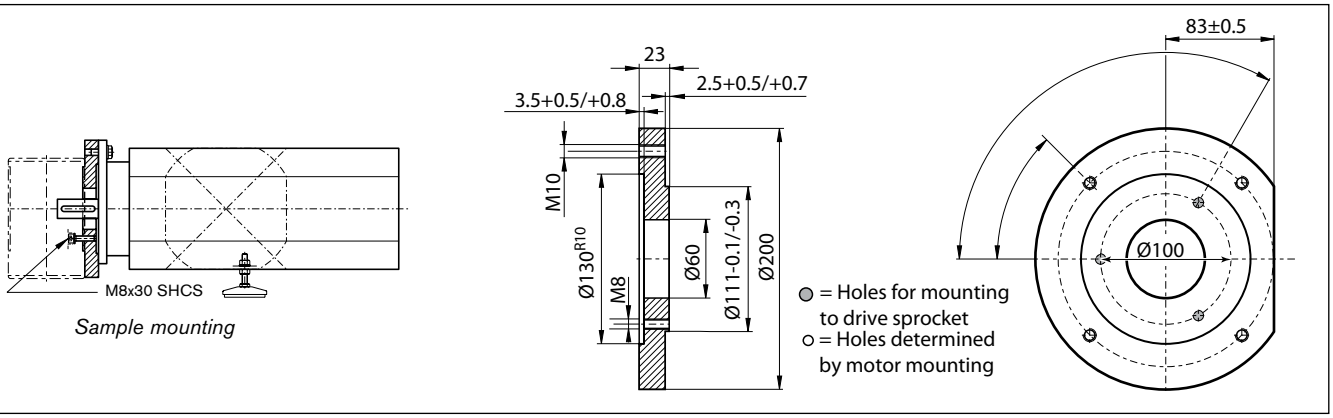
Due to the wide range of servomotor mounting hole patterns, Bosch Rexroth does not offer servomotor adapter plates for linear guides.

The diagrams below show the recommended dimensions, including the required mounting hole spacing and dimensions for each type of linear guide.

LF6S & LF6C



LF12S & LF12C



LF20S & LF20C