Information on Linear Technology

10

» Reliable and precise linear motion. «

mk linear technology is the name for our portfolio of gliding assemblies, track roller assemblies and recirculating ball bearing guides that provide highly precise and reliable linear motion, and that are designed to meet your specific requirements.

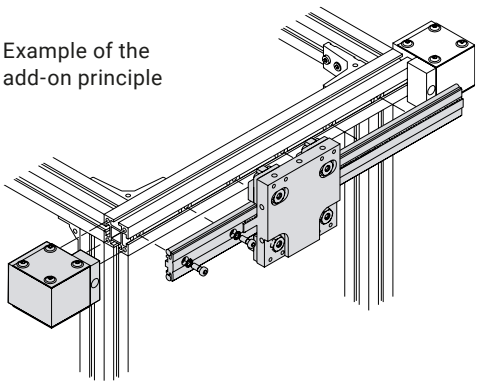
Whether you need manual adjusting units or driven linear modules with a timing belt for handling applications, we're happy to advise you on how the optimal linear guides can achieve both exact directional movement and low-friction transport.

mk's linear technology components are fully compatible with mk profile technology. Installing linear guides allows you to quickly and easily implement linear movements into your machine frames. This method reduces the materials required for the solution, since a separate support structure for the linear motion is not required.

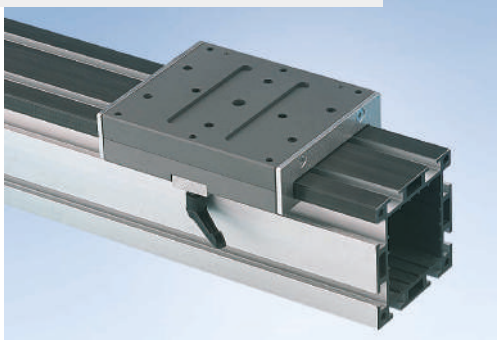
Benefits of mk Linear Technology

- The wide range of guides are designed to meet the customer's requirements and provide optimum function
- Compatible with mk profile series to save materials, costs and space: guides can be mounted directly on the existing support structure
- Uncomplicated and rapid setup of linear guides based on the add-on principle
- mk clamping profile ensures precise travel for maximum parallelism of the guide rods
- Highly reliable operation thanks to high-quality materials and tested third-party parts
- mk engineers provide expert advice and assistance in designing your system

Example of the add-on principle



Gliding Assemblies

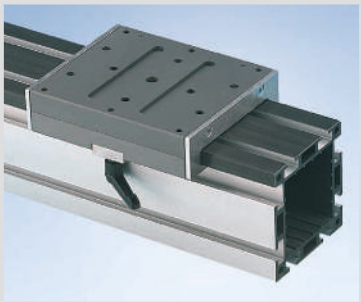


Track Roller Assemblies

Recirculating Ball Bearing Guides

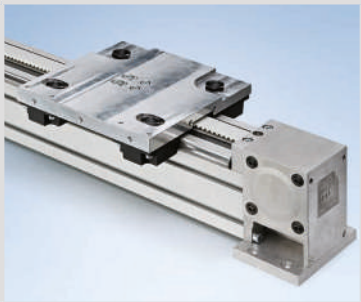
Properties and Benefits of the Different Types of Guide

The following criteria influence the selection of the type of guide to be used for your task and environmental conditions.



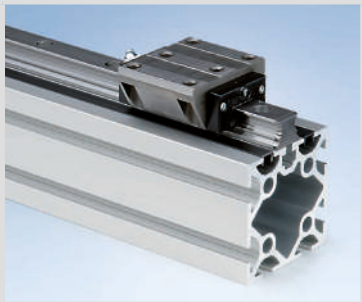
Gliding Assemblies

- For applications that require manual adjustment
- High static load capacity
- Low-maintenance
- Good dry-running characteristics
- Good damping
- Compact design
- Low-noise running



Track Roller Assemblies

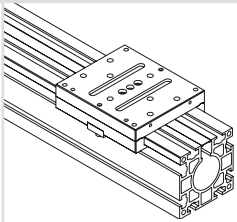
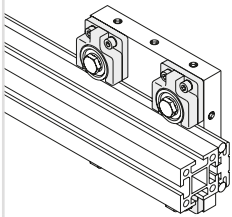
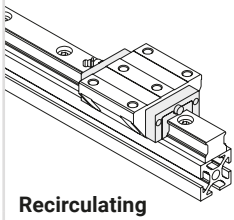
- Compensates for relatively large alignment errors
- Well suited for harsh environmental conditions such as dust, chips, etc.
- High acceleration up to $a = 50\ m/s^2$
- High travel speeds up to $v = 10\ m/s$
- Low rolling resistance
- mk clamping profile ensures precise travel for maximum parallelism of the guide rods
- Simple and economical guide design also makes it an attractive solution for longer lengths
- Multi-axial, i.e. can be loaded in all directions (forces and torques)
- Eccentrics allow you to adjust the pre-tension



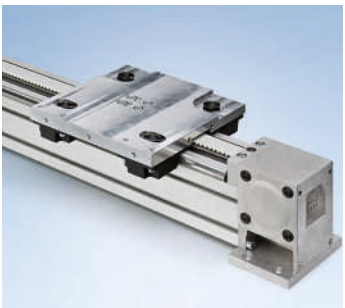
Recirculating Ball Bearing Guides

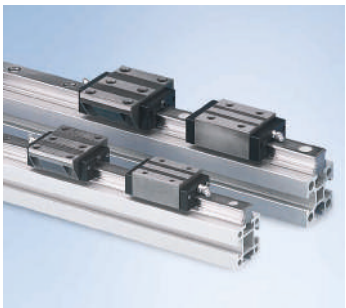
- High load capacity and high stiffness
- Compact design
- Just one track for different types of roller carriage
- Lightly pre-tensioned (standard), available with play or high pre-tension
- Medium to high acceleration up to $a = 30 m/s^2$
- Medium to high speed up to $v = 5\ m/s$
- Four-row multi-axial recirculating ball bearing guide bears loads in all directions (forces and torques)
- High precision with appropriate contact surfaces

Selection Matrix for Linear Guides

	 Gliding Assemblies	 Track Roller Assemblies	 Recirculating Ball Bearing Guides
Running performance			
High		•	•
Low	•		
Precision			
Very high			•
High		•	
Medium	•		
Low			
Speed			
Very high		•	
High			•
Medium			
Low	•		
Load capacity			
Very high			•
High		•	
Medium	•		
Low			
Stiffness			
Very high			
High			•
Medium	•	•	
Low			
Maintenance			
With restrictions	•		
Regularly		•	•
Frequently			

Linear Units and Modules





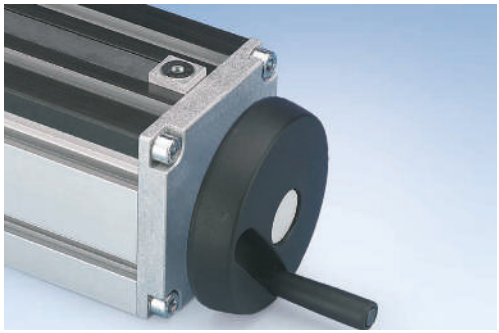
Gliding Assemblies

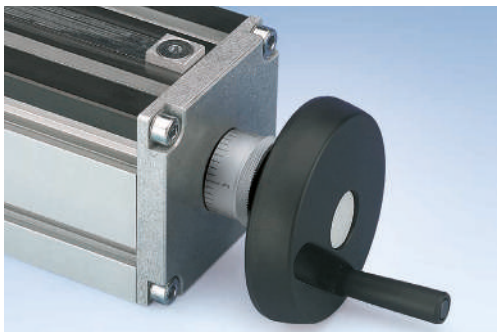
11

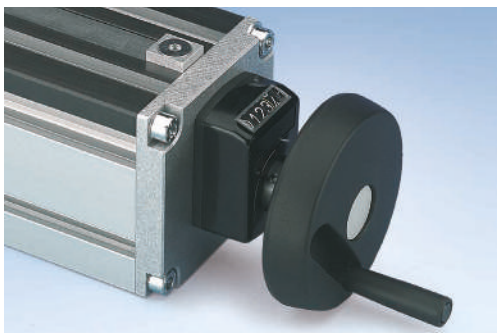
» A simple solution for manual positioning tasks. «

Our adjusting units (VST) are gliding assemblies in which the different guide components, the profile and the carriages operate on gliding elements rather than being separated by roller bearings. The large contact surfaces and special coating make the gliding assemblies virtually maintenance free. The adjusting units can be supplied in different shapes and combinations as required.

The two basic sizes of adjusting unit use mk 2015 (50x50) and mk 2011 (100x100) aluminium profiles as the profiles. A high-quality coating is mechanically applied to the contact surfaces to ensure good gliding properties and a wear-resistant surface. The standard version of the adjusting units is equipped with ball-bearing-mounted trapezoidal threaded spindles with POM nuts, which are protected from dirt by a stainless steel cover. The nuts, the bearing and the gliding assembly are low maintenance. Custom modifications are available on request, e.g. rust-proof spindles, bronze trapezoidal nuts, ball screws or motorised drives.







The position of the slide carriages can be adjusted with different operating options. When using the adjusting unit with a handwheel, you turn the wheel manually and cannot view the adjustment. When using the adjusting unit with a handwheel and scaling, the adjustment can be viewed on the scaling. In the variant of the adjusting unit with a handwheel and mechanical digital display, the adjustment can be viewed on the digital display.

If requested, the adjusting units can also be operated with a motor. The maximum speed is v = 1 m/min.

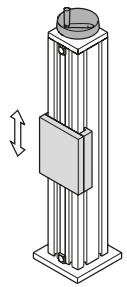
Features of mk Gliding Assemblies

- For applications that require manual adjustment
- High static load capacity
- Low-maintenance
- Good dry-running characteristics
- Good damping
- Compact design
- Low-noise running

Gliding Assemblies

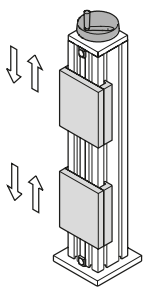
Designs

Adjusting unit with one slide carriage

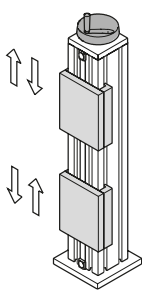


Adjusting unit with two slide carriages (even adjustment)

Independently adjustable lower carriages available as an option

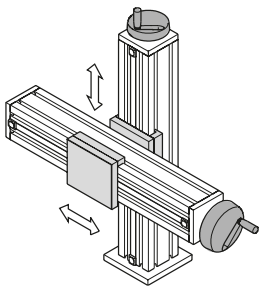


Adjusting unit with two slide carriages (even adjustment)



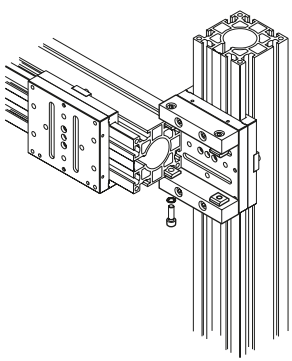
Combinations

A connecting kit lets you combine two adjusting units into one two-axis system.



Connecting kit
for cross-VST 2015
B46.07.020

Connecting kit
for cross-VST 2011
B46.07.021



Clamping Levers and Wipers

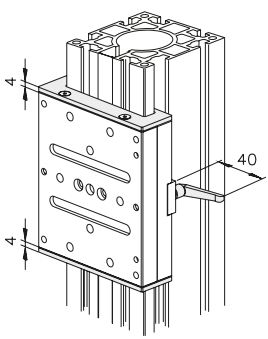
The felt remover prevents solid objects from entering between the slide carriages and guide. It can easily be bolted onto the standard slide carriages as an accessory.

In the standard system, the slide carriage is clamped using a clamping plate that is fastened by tightening a screw. This can also be done using an optional clamping lever.

Felt remover system 2015
B03.00.011

Felt remover system 2011
B03.00.012

Clamping lever
K110030061



11

Sample order

Adjusting unit		VST 2011-H	
Item no.		**B85.00.020**	
Length		L = ... mm	
Stroke		H = ... mm	
Operating option	Handwheel	Scaling	Digital*
Base plate	Version A	Version B	
Felt remover	Yes	No	
Clamping lever	Yes	No	

For the adjusting unit with two slide carriages with even adjustment, please specify whether it uses one or two trapezoidal nuts.

With two trapezoidal nuts, Lx = ... mm (+_ 2 mm)

*For the digital display, please specify “Front” or “Top” for the reading direction and display of numbers.

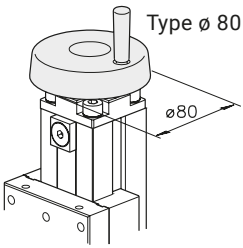
Gliding Assemblies

Adjusting Units VST 2015

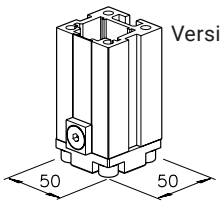
Mounting profile:	mk 2015 (50 x 50 mm)
Trapezoid-thread spindle:	Tr 16 x 4
Axial spindle load:	500 N
Standard lengths L:	250 mm, 500 mm, 750 mm and 1000 mm

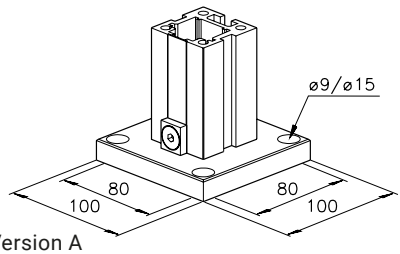
The stroke per revolution is 4 mm,
the minimum stroke length is 10 mm,
and the maximum length L = 1400 mm.

Handwheel



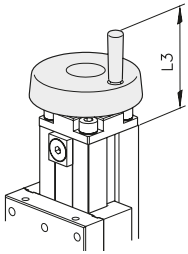
Base Plates





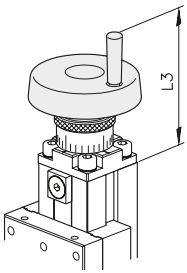
Scaling

System 2015 without Scaling



Type ø 80:
L3 = 90 mm

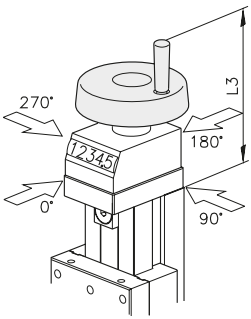
System 2015 with Scaling

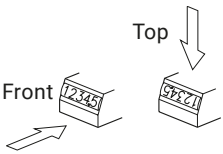


The scaling has a spacing of 0.1 mm.

Type ø 80:
L3 = 117 mm

System 2015 with Mechanical Digital Display





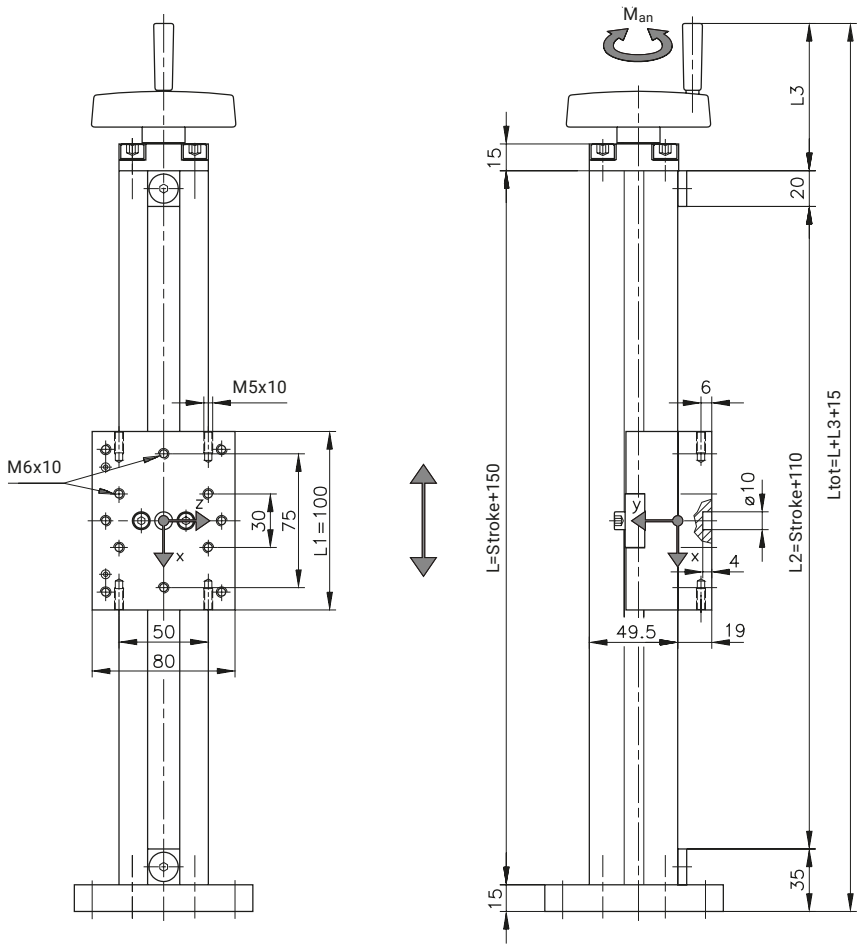
When ordering, please specify "Front" or "Top" for the reading direction and display of numbers.

Spacing: 0.05 mm

Type ø 80: L3 = 129 mm

11

VST 2015 with one Slide Carriage



Designs

Design	Without scaling	Scaling	Digital display
Designation	VST 2015-H	VST 2015-S	VST 2015-D
Type	ø 80	ø 80	ø 80
Item no.	**B85.00.015**	**B85.00.016**	**B85.00.017**

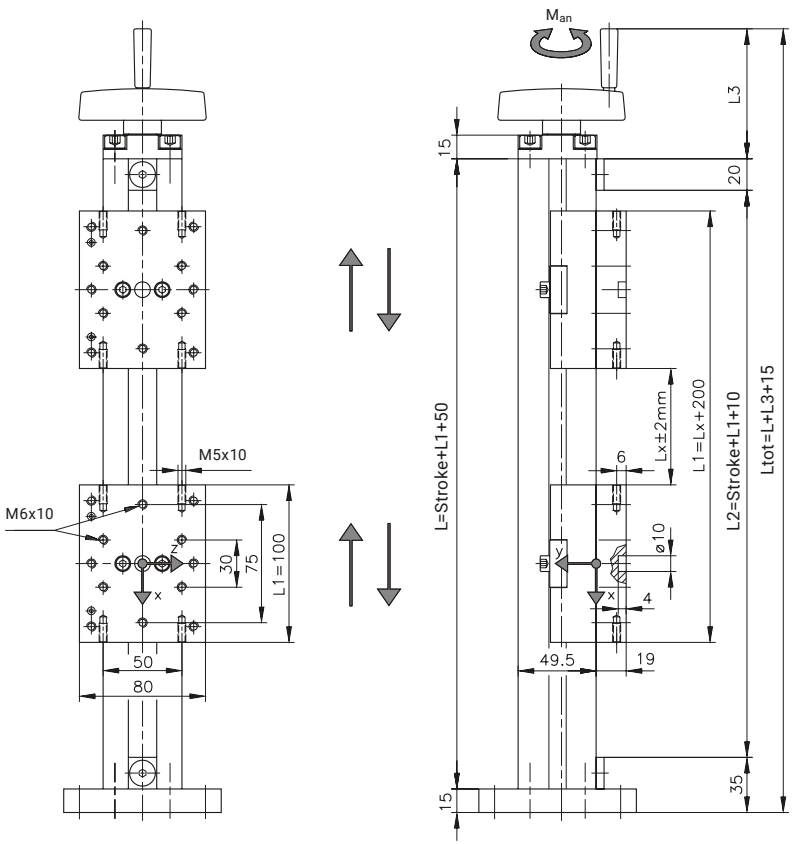
Maximum load specifications for VST 2015

F_y [N]	F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]	M_{Drive} [Nm]	n [min^{-1}]	v [m/min]
750	750	25	25	25	2.5	250	1

Check max. load specifications for slide carriages, and suitability for use if necessary

VST 2015 with two Synchronised or Independent Slide Carriages

Options:
VST with two trapezoidal nuts: the two slide carriages are synchronised (see the arrow directions)
VST with one trapezoidal nut: the lower slide carriages can be separately adjusted manually



Designs

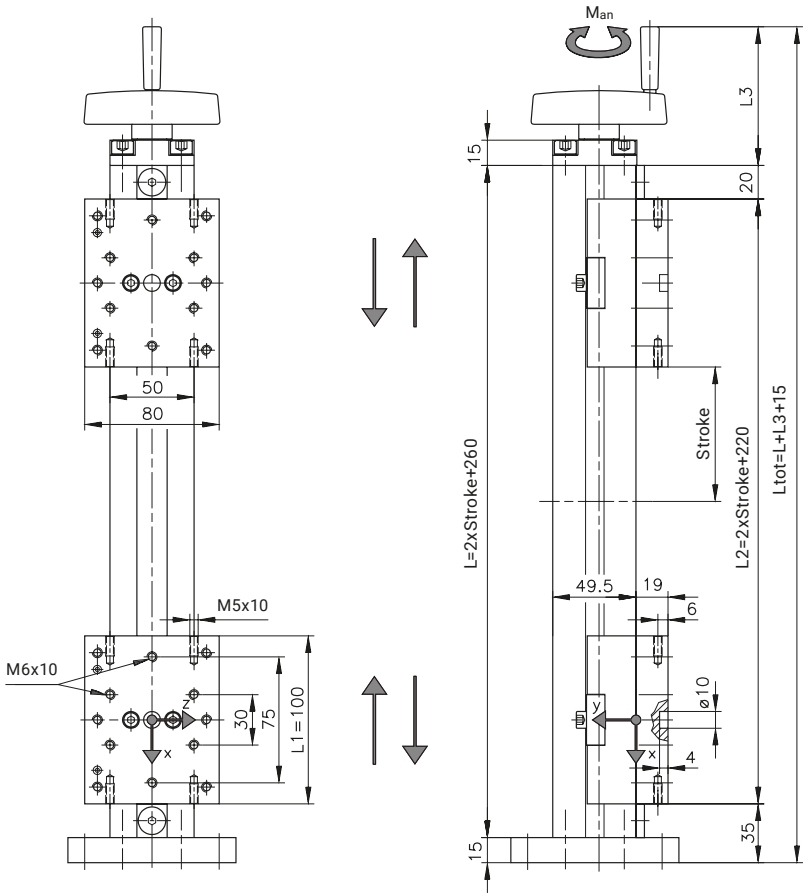
Design	Without scaling	Scaling	Digital display
Designation	VST 2015-H-2	VST 2015-S-2	VST 2015-D-2
Type	ø 80	ø 80	ø 80
Item no.	**B85.00.115**	**B85.00.116**	**B85.00.117**

Maximum load specifications for VST 2015

F_y* [N]	F_z* [N]	M_x* [Nm]	M_y* [Nm]	M_z* [Nm]	M_{Drive} [Nm]	n [min^{-1}]	v [m/min]
750	750	25	25	25	2.5	250	1

Check max. load specifications for slide carriages, and suitability for use if necessary. *Max. load specifications per slide carriage.

VST 2015 with Two Synchronised Slide Carriages



Designs

Design	Without scaling	Scaling	Digital display
Designation	VST 2015-H-G	VST 2015-S-G	VST 2015-D-G
Type	ø 80	ø 80	ø 80
Item no.	**B85.00.215**	**B85.00.216**	**B85.00.217**

Maximum load specifications for VST 2015

F_y* [N]	F_z* [N]	M_x* [Nm]	M_y* [Nm]	M_z* [Nm]	M_{Drive} [Nm]	n [min^{-1}]	v [m/min]
750	750	25	25	25	2.5	250	1

Check max. load specifications for slide carriages, and suitability for use if necessary. *Max. load specifications per slide carriage.

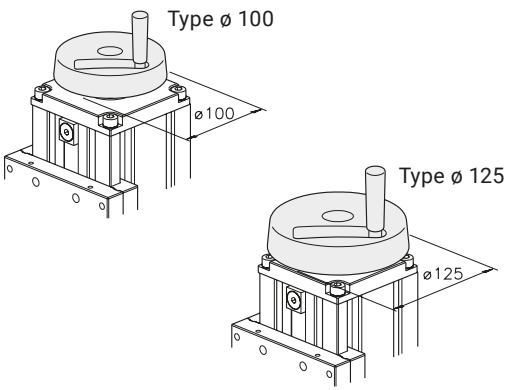
Gliding Assemblies

Adjusting Units VST 2011

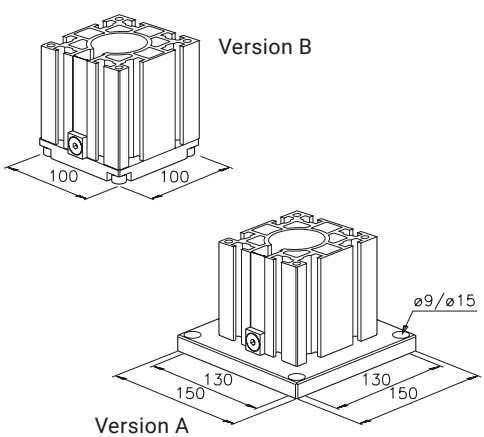
Mounting profile: mk 2011 (100 x 100 mm)
Trapezoid-thread spindle: Tr 20 x 4
Axial spindle load: 1000 N
Standard lengths L: 250 mm, 500 mm, 750 mm and 1000 mm

The stroke per revolution is 4 mm,
the minimum stroke length is 10 mm,
and the maximum length L = 1400 mm.

Handwheel

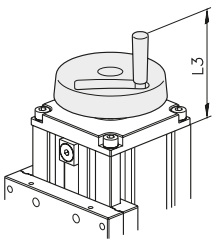


Base Plates



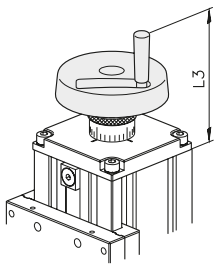
Scaling

System 2011 without Scaling



Type ø 100: L3 = 97 mm
Type ø 125: L3 = 110 mm

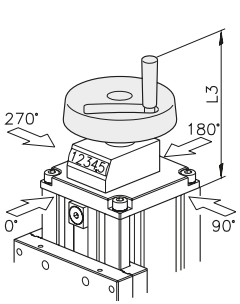
System 2011 with Scaling

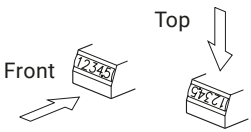


The scaling has a spacing of 0.1 mm

Type ø 100: L3 = 123 mm
Type ø 125: L3 = 136 mm

System 2011 with Mechanical Digital Display



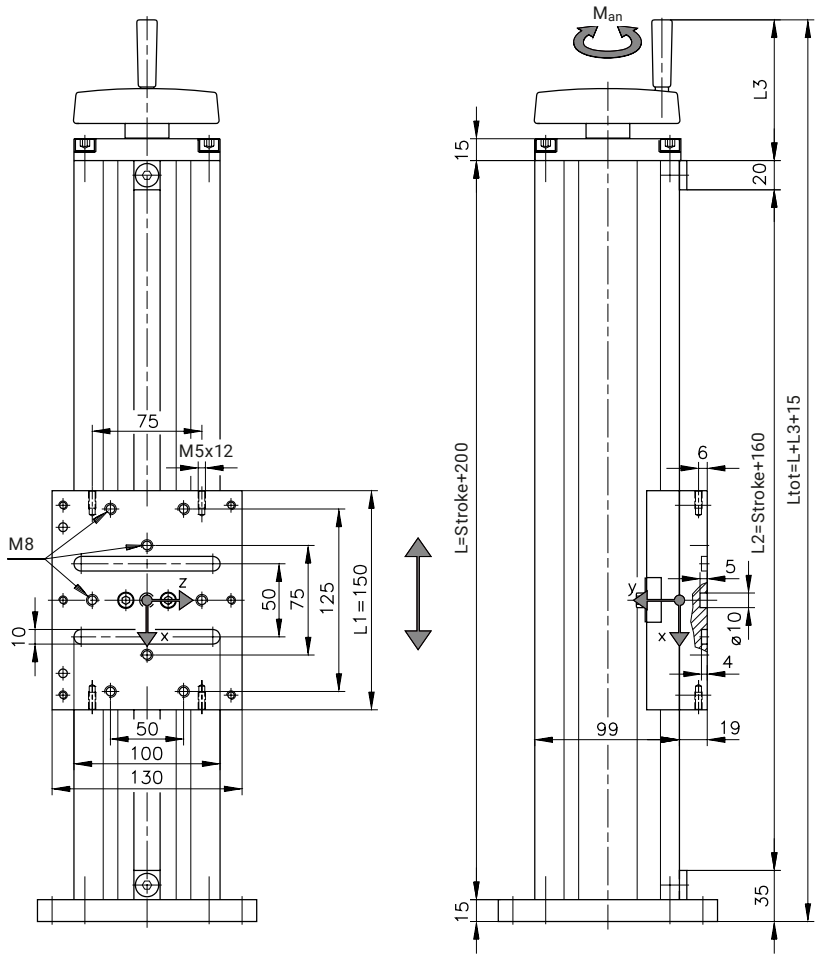


When ordering, please specify "Front" or "Top" for the reading direction and display of numbers.

Spacing: 0.05 mm
Type ø 100: L3 = 136 mm
Type ø 125: L3 = 149 mm

11

VST 2011 with one Slide Carriage



Designs

Design	Without scaling		Scaling		Digital display	
Designation	VST 2011-H	VST 2011-H	VST 2011-S	VST 2011-S	VST 2011-D	VST 2011-D
Type	ø 100	ø 125	ø 100	ø 125	ø 100	ø 125
Item no.	**B85.00.020**	**B85.00.025**	**B85.00.021**	**B85.00.026**	**B85.00.022**	**B85.00.027**

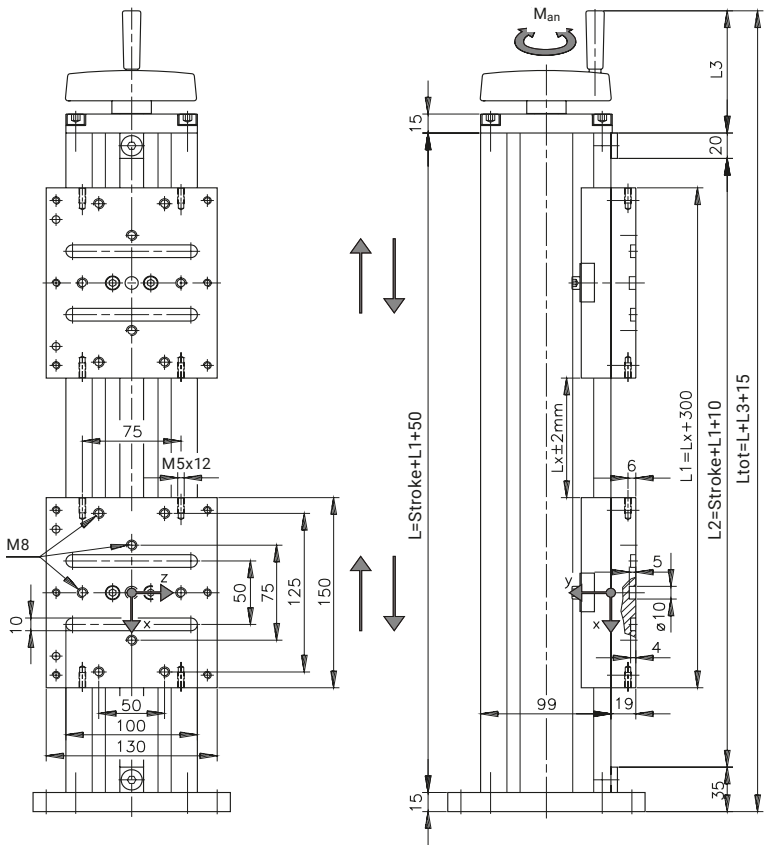
Maximum load specifications for VST 2011

F_y [N]	F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]	M_{Drive} [Nm]	n [min^{-1}]	v [m/min]
2000	2000	75	100	100	6	250	1

Check max. load specifications for slide carriages, and suitability for use if necessary.

VST 2011 with Two Synchronised or Independent Slide Carriages

Options:
VST with two trapezoidal nuts: the two slide carriages are synchronised (see the arrow directions)
VST with one trapezoidal nut: the lower slide carriages can be separately adjusted manually



Designs

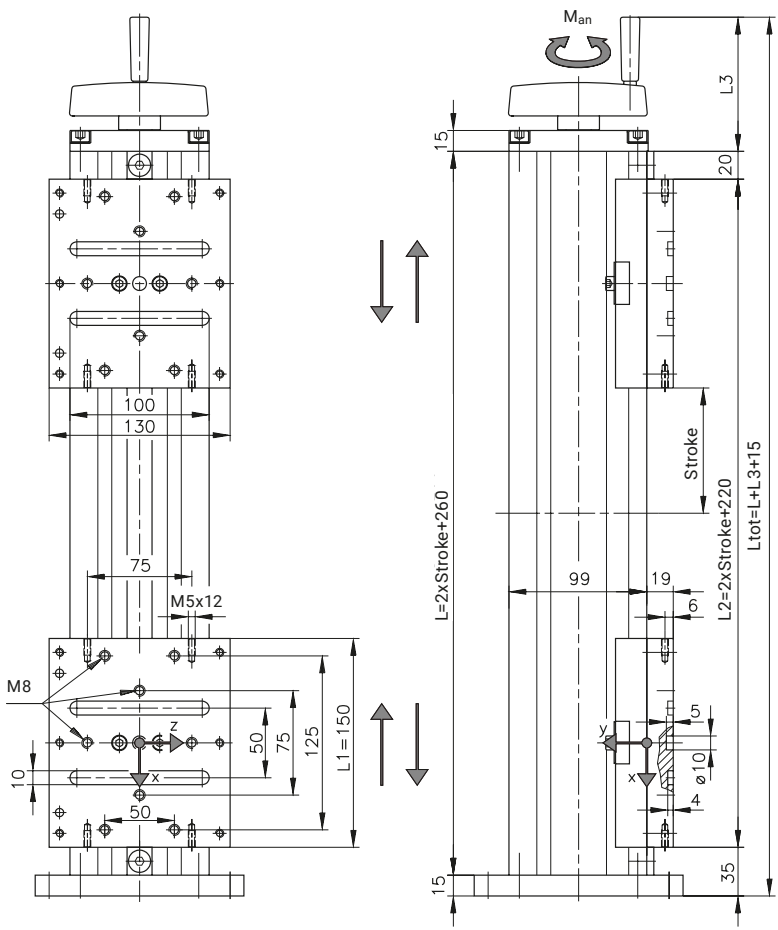
Design	Without scaling		Scaling		Digital display	
Designation	VST 2011-H-2	VST 2011-H-2	VST 2011-S-2	VST 2011-S-2	VST 2011-D-2	VST 2011-D-2
Type	ø 100	ø 125	ø 100	ø 125	ø 100	ø 125
Item no.	**B85.00.120**	**B85.00.125**	**B85.00.121**	**B85.00.126**	**B85.00.122**	**B85.00.127**

Maximum load specifications for VST 2011

F_y* [N]	F_z* [N]	M_x* [Nm]	M_y* [Nm]	M_z* [Nm]	M_{Drive} [Nm]	n [min^{-1}]	v [m/min]
2000	2000	75	100	100	6	250	1

Check max. load specifications for slide carriages, and suitability for use if necessary. *Max. load specifications per slide carriage.

VST 2011 with Two Synchronised Slide Carriages



Designs

Design	Without scaling		Scaling		Digital display	
Designation	VST 2011-H-G	VST 2011-H-G	VST 2011-S-G	VST 2011-S-G	VST 2011-D-G	VST 2011-D-G
Type	ø 100	ø 125	ø 100	ø 125	ø 100	ø 125
Item no.	**B85.00.220**	**B85.00.225**	**B85.00.221**	**B85.00.226**	**B85.00.222**	**B85.00.227**

Maximum load specifications for VST 2011

F_y* [N]	F_z* [N]	M_x* [Nm]	M_y* [Nm]	M_z* [Nm]	M_{Drive} [Nm]	n [min^{-1}]	v [m/min]
2000	2000	75	100	100	6	250	1

Check max. load specifications for slide carriages, and suitability for use if necessary. *Max. load specifications per slide carriage.

Track Roller Assemblies

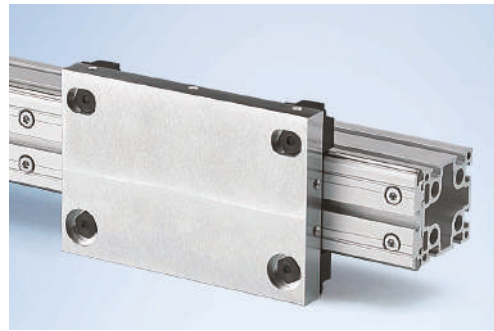
» Linear modules based on track roller assemblies. «

Because of their rigid structure, track roller assemblies offer high accelerations and speeds over a long service life and allow for fast positioning with high repeatability.

They are excellently suited for both single-axis applications and use as multi-axis systems. Linear systems constructed from these modules can meet even the most demanding technical and financial requirements.

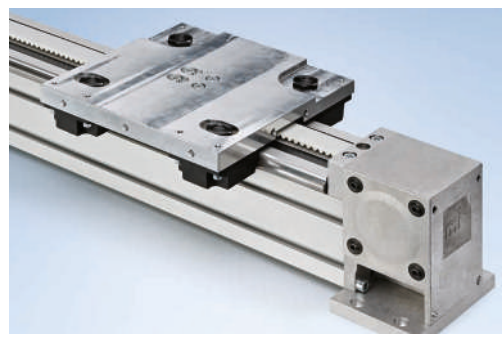
Track roller assemblies consist of a linear guide with a matching roller carriage. The guide is built from a standard mk profile that acts as the mounting profile and guide rods that are mounted to the mounting profile with a clamping profile. The roller carriage consists of a support plate and guide rollers, which can be custom-configured to meet your specific requirements. The guide rollers have eccentric bearings to prevent play in the guide. The series and the dimensions chosen for the mounting profile are key factors that determine the linear module design.

Linear Module with Timing Belt (LZR)
Linear modules based on track roller assemblies are usually equipped with a high-powered drive connected via a timing belt. The components of the timing belt drive responsible for transferring the power, such as the deflection bearings and the connectors, are mounted on the mounting profile at the head end. The motor can be connected directly via the shaft end or indirectly on request. LZRs are the preferred solutions for implementing handling systems with an X-Y-Z axis.



Benefits of mk Track Roller Assemblies

- Compensates for relatively large alignment errors
- Well suited for harsh environmental conditions such as dust, chips, etc.
- High acceleration up to a = 50 m/s²
- High travel speeds up to v = 10 m/s
- Low rolling resistance
- mk clamping profile ensures precise travel for maximum parallelism of the guide rods
- Simple and economical guide design also makes it an attractive solution for longer lengths
- Multi-axial, i.e. can be loaded in all directions (forces and torques)
- Eccentrics allow you to adjust the pre-tension



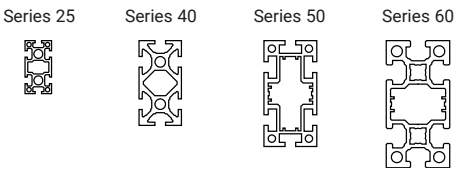
Mounting Profiles

The linear units and modules shown in the catalogue are based on mk's own profile system. Note the series and dimensions of the mounting profiles.

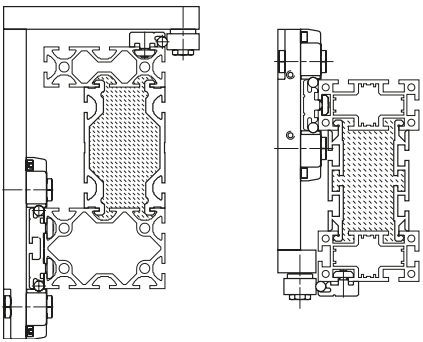
Mounting profiles can also be used in combination with foamed combined profiles to construct gantries with span widths of up to 10 metres.

The suitability for use (deformation) and strength calculation are decisive factors for the mounting profile. A deformation of 1 mm/m is permitted for the function of the linear guide. The deformation and strength are calculated based on the basic rules of technical mechanics.

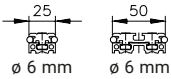
Examples of mk Mounting Profiles



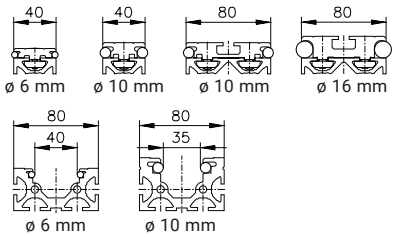
Examples of Foamed Combined Profiles



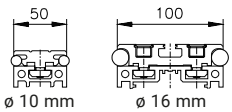
Series 25 Profile Guides



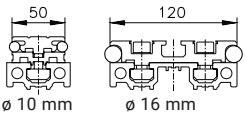
Series 40 Profile Guides



Series 50 Profile Guides

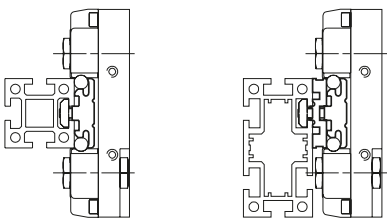


Series 60 Profile Guides



Adapter Profiles

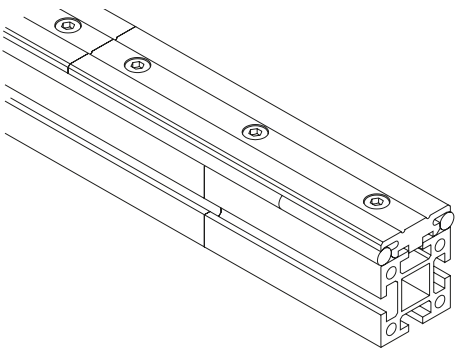
Adapter profiles enable a wide variety of possible combinations. They are used to create the necessary distance for the roller carriage in cases where the dimensions of the mounting profile exceed the clamping profile. Some profiles can also be adapted between different profile series.



Without adapter profile | With adapter profile

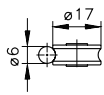
Stock lengths

The maximum length of linear units is 6000 mm. It can be exceeded by mounting multiple mounting profiles with clamping profiles and guide rods set on joins that are mounted staggered with each other.

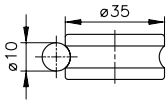


Guides

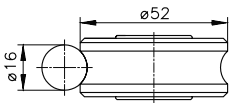
The load capacity of the guide is based primarily on the diameter of the guide rod and on the corresponding guide roller. mk offers four guide rod diameters. The guide rods (ground h6) are made from the material Cf 53 as standard, but are also available as options made from X46 Cr13 with corrosion resistance or galvanised Cf 53 with corrosion protection.



Guide rod 6
0.22 kg/m



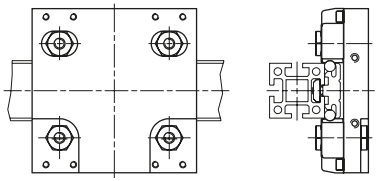
Guide rod 10
0.62 kg/m



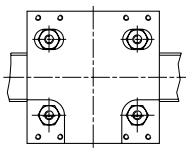
Guide rod 16
1.58 kg/m

Roller Carriage

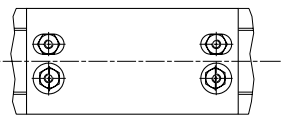
The mk roller carriage comes with four rollers as standard, but is also available as an option with three or two rollers on request.



Example of external track rollers



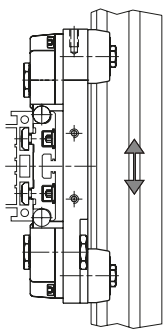
Example of internal track rollers



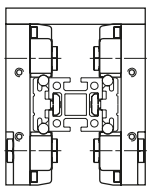
Designs

The mk roller carriage is available with the standard design (see above) and two additional designs.

Cross-carriage



Double-roller carriage



11

Design of the Track Rollers

The indicated static load carrying capacities can be used as a guideline for the preliminary selection of track rollers. These values are the maximum allowable unit loads and include a static safety factor s0 = 4 in relation to the plastic deformation of the roller bearings within the steel track roller. For stainless steel components, these values must be reduced by 30%.

The load values shown for the axial load (F_y) and radial load (F_z) are for moment-free loads. The allowable moments are the result of opposing offset loads.

Combined loads must be verified separately. A combined load is a single point load which, with a 50 mm offset for example, also introduces a moment. Careful consideration must be given to combined loads which cause torsion.

When arranging track rollers, it is important that the track rollers only transfer compressive loads in the radial direction. The centric track rollers are especially suitable for handling radial loads, especially in the F_z direction. The centric track rollers are prevented from twisting by using a steel bushing.

Application Notes

Care must be taken to ensure that the track rollers are installed in an unloaded condition. In most cases, readjustment of the eccentric track rollers under load

causes premature wear. For “normal” applications (up to a = 3 m/s^2), the track rollers should be set so that they rotate as they travel along the track but you can still prevent this rotation by placing your thumb and index finger on the circumference of the roller.

For applications requiring a speed of over a = 3 m/s^2, the track rollers require further pre-tensioning, and you can then no longer manually prevent the rollers from rotating. As an additional safety measure, we recommend securing the eccentric bushings with adhesive to prevent them from slipping. To prevent corrosion and increased abrasion, sufficient lubrication must also be used.

Calculations

When confirming the suitability of particular track rollers, a distinction must be made between static and the dynamic loading. Static loads are loads that are transferred at the contact point between the rod and the track roller while the roller is not rotating. That is to say that dynamic loads, or loads along other axes, must also be considered.

It is helpful to first confirm the static and then the dynamic load calculations. The allowable static axial and radial track roller loads and the static and dynamic safety factors of the most highly loaded rollers must be confirmed. The maximum track roller loads are technically considered mechanical contact loads (supported loads).

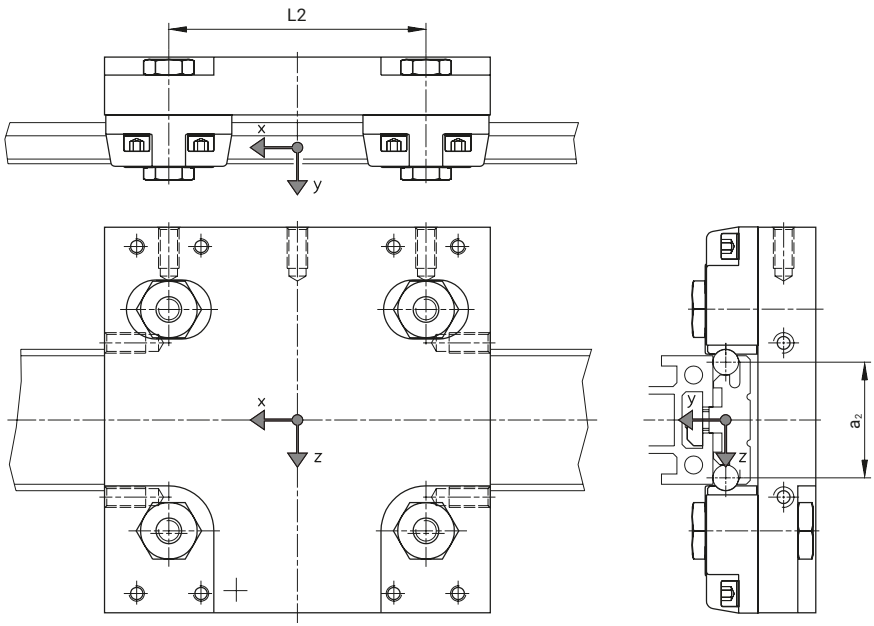
The static safety factor and dynamic safety factor are derived from the relationship between the allowable load capacity C_w and the available equivalent load P.

Recommended Guidelines

Up to v = 3m/s and a = 3 m/s^2, full load capacity of the track rollers with $s_0 \geq 4$ and $2 < s_D \leq 5$.

For high dynamic loads with a > 10 m/s^2 and speeds of up to v = 10m/s, the load values must be reduced.

Technical Specifications for Track Roller Assemblies



Static safety factor:

$s_o = \frac{C_{ow}}{P_o} \geq 4 = s_o$ recomm.

Dynamic safety factor:

$s_D = \frac{C_w}{P} \geq 5 = s_D$ recomm.

Nominal service life:

$L_h = \left(\frac{C_w}{P}\right)^3 [10^5 \text{ m}]$

Equivalent loads

– Static:

$P_o = x_o \cdot F_{ro} + y_o \cdot F_{ao}$ [N]

– Dynamic:

$P = x \cdot F_r + y \cdot F_a$ [N]

Factors from the table

– Static: roller stationary

– Dynamic: roller rotating

Track roller loads

– Radial:

$F_{r(o)} = \pm \frac{F_{z(o)}}{2} \pm \frac{M_{y(o)}}{L_2}$ [N]

– Axial:

$F_{a(o)} = \pm \frac{F_{y(o)}}{4} \pm \frac{M_{x(o)}}{2 \cdot a_2} \pm \frac{M_{z(o)}}{2 \cdot L_2}$ [N]

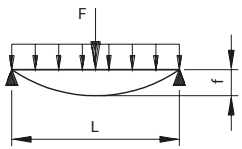
Most highly loaded roll (that is, with the largest value respectively)

Load specifications

Item no.	Designation Guide with	Rod ø	$F_{ro\text{-}max}$ [N]	$F_{ao\text{-}max}$ [N]	$F_{r(0) \geq a(0)}$ x_o	y_o	x	y	$F_{r(0) < a(0)}$ x_o	y_o	x	y	C_{ow} [N]	C_w [N] based on 10^5 m
K101100003	LR 6	6	175	60	1.2	3.6	1.0	3.1	0.9	3.6	0.5	3.9	890	1270
K101100001	LR 10	10	1000	300	1.2	4.0	1.0	3.4	0.9	4.0	0.5	4.3	5100	8500
K101100002	LR 16	16	2000	500	1.2	4.8	1.0	3.9	1.0	5.0	0.5	4.8	9500	16800
K101100006	LR 20	20	3250	825	1.2	4.9	1.0	4.0	1.1	5.0	0.5	4.9	16600	29500

Selection Based on Load and Length

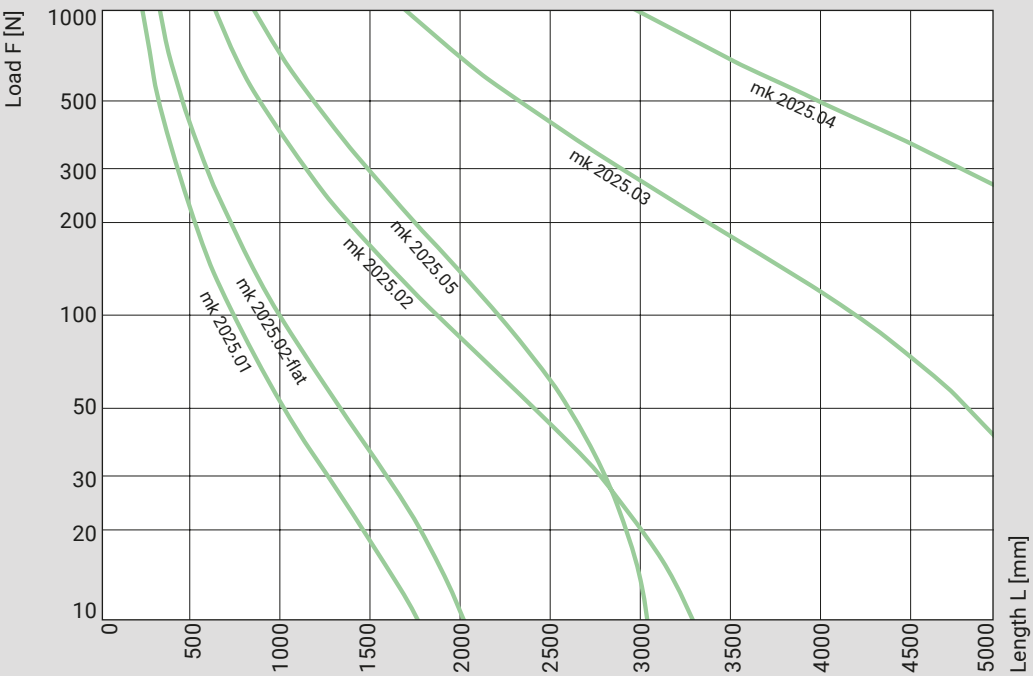
Example



F = 100 N
L = 1000 mm
=> suitable profile mk 2025.02-flat

with $\frac{f}{L} \leq \frac{1}{1000}$

With point load at centre and profile weight for the case: $\frac{f}{L} = \frac{1}{1000}$



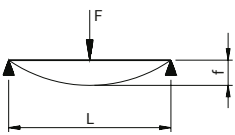
11

Calculating the Deflection

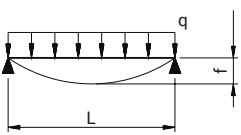
Use our online tool at **www.mk-group.com/en/deflection**

$$\sigma_b = \frac{M_{bmax}}{W_{x,y}} \qquad S = \frac{R_{p0,2}}{\sigma_b}$$

$R_{p0.2}$ = 200 N/mm² (AlMgSi 0.5 F25)
$R_{p0.2}$ = 215 N/mm² (AlMgSi 0.7 F27)

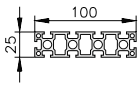
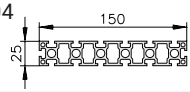


$$M_{bmax} = \frac{F \cdot L}{4} \qquad f = \frac{F \cdot L^3}{48 \cdot E \cdot I_{x,y}}$$



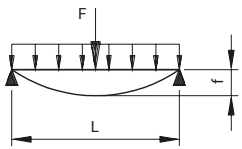
$$M_{bmax} = \frac{q \cdot L^2}{8} \qquad f = \frac{5}{384} \cdot \frac{q \cdot L^4}{E \cdot I_{x,y}}$$

Mounting Profiles with Properties

	Area	Mass	Moments of inertia		Section moduli	
6	A [mm²]	m [kg/m]	Ix [cm⁴]	Iy [cm⁴]	Wx [cm³]	Wy [cm³]
Series 25 Profiles						
mk 2025.01 **25.01. ....** 	279	0.75	1.73	1.73	1.38	1.38
mk 2025.02 **25.02. ....** 	501	1.35	12.20	3.30	4.87	2.64
mk 2025.03 **25.03. ....** 	945	2.55	87.00	6.44	17.40	5.15
mk 2025.04 **25.04. ....** 	1390	3.75	280.00	9.58	37.30	7.66
mk 2025.05 **25.05. ....** 	816	2.21	22.30	22.30	8.90	8.90

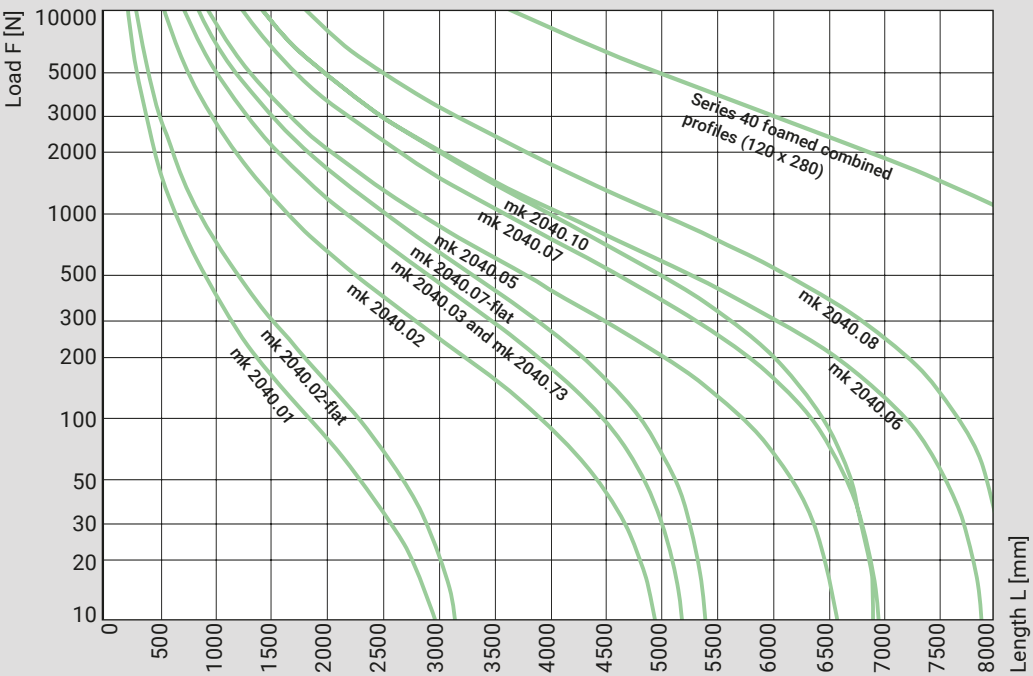
Selection Based on Load and Length

Example



F = 300 N
L = 1500 mm
=> suitable profile mk 2040.02-flat
with $\frac{f}{L} \leq \frac{1}{1000}$

With point load at centre and profile weight for the case: $\frac{f}{L} = \frac{1}{1000}$

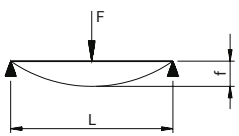


Calculating the Deflection

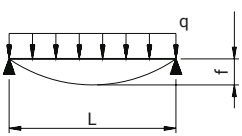
Use our online tool at **www.mk-group.com/en/deflection**

$$\sigma_b = \frac{M_{bmax}}{W_{x,y}} \qquad S = \frac{R_{p0,2}}{\sigma_b}$$

$R_{p0.2}$ = 200 N/mm² (AlMgSi 0.5 F25)
$R_{p0.2}$ = 215 N/mm² (AlMgSi 0.7 F27)

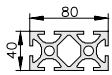
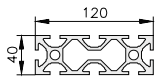
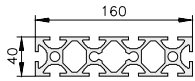
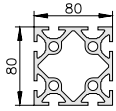
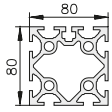
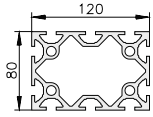
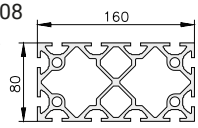
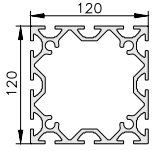


$$M_{bmax} = \frac{F \cdot L}{4} \qquad f = \frac{F \cdot L^3}{48 \cdot E \cdot I_{x,y}}$$



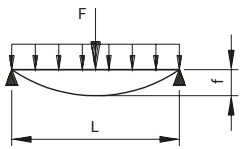
$$M_{bmax} = \frac{q \cdot L^2}{8} \qquad f = \frac{5}{384} \cdot \frac{q \cdot L^4}{E \cdot I_{x,y}}$$

Mounting Profiles with Properties

	Area	Mass	Moments of inertia		Section moduli	
10	A [mm²]	m [kg/m]	Ix [cm⁴]	Iy [cm⁴]	Wx [cm³]	Wy [cm³]
Series 40 Profiles						
mk 2040.01 **54.01. ....** 	742	2.00	12.10	12.10	6.06	6.06
mk 2040.02 **54.02. ....** 	1340	3.62	83.30	22.60	20.80	11.30
mk 2040.05 **54.05. ....** 	1740	4.69	257.00	31.60	43.70	15.80
mk 2040.06 **54.06. ....** 	2320	6.26	576.00	41.40	72.00	20.70
mk 2040.03 **54.03. ....** 	2060	5.57	150.00	150.00	37.40	37.40
mk 2040.73 **54.73. ....** 	2110	5.72	150.00	150.00	37.10	37.40
mk 2040.07 **54.07. ....** 	2580	6.96	441.00	208.00	73.40	52.10
mk 2040.08 **54.08. ....** 	3500	9.46	949.00	272.00	119.00	68.00
mk 2040.10 **54.10. ....** 	3060	8.26	585.00	585.00	97.50	97.50

Selection Based on Load and Length

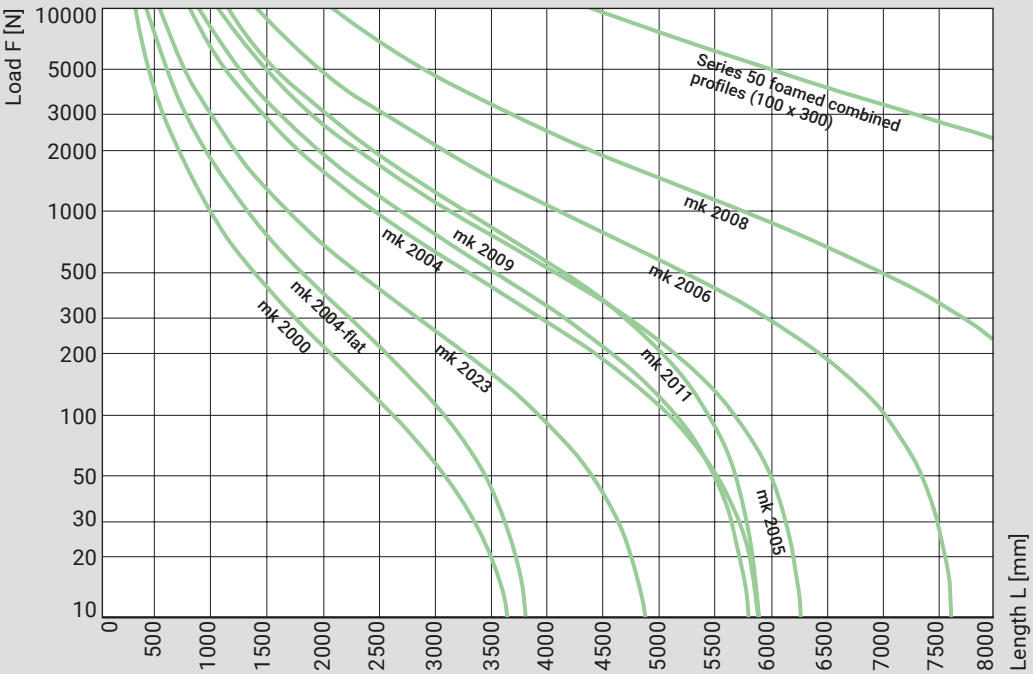
Example



F = 400 N
L = 2000 mm
=> suitable profile mk 2004-flat

with $\frac{f}{L} \leq \frac{1}{1000}$

With point load at centre and profile weight for the case: $\frac{f}{L} = \frac{1}{1000}$

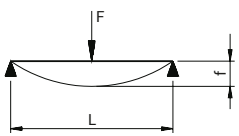


Calculating the Deflection

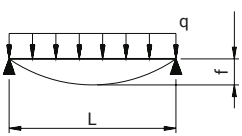
Use our online tool at **www.mk-group.com/en/deflection**

$$\sigma_b = \frac{M_{bmax}}{W_{x,y}} \qquad S = \frac{R_{p0,2}}{\sigma_b}$$

$R_{p0.2}$ = 200 N/mm² (AlMgSi 0.5 F25)
$R_{p0.2}$ = 215 N/mm² (AlMgSi 0.7 F27)

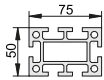
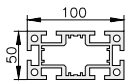
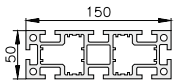
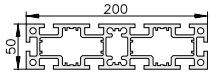
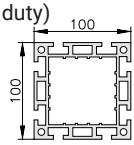
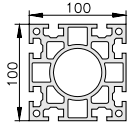
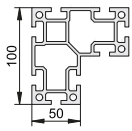


$$M_{bmax} = \frac{F \cdot L}{4} \qquad f = \frac{F \cdot L^3}{48 \cdot E \cdot I_{x,y}}$$



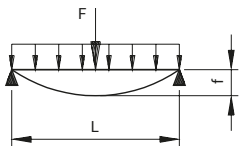
$$M_{bmax} = \frac{q \cdot L^2}{8} \qquad f = \frac{5}{384} \cdot \frac{q \cdot L^4}{E \cdot I_{x,y}}$$

Mounting Profiles with Properties

10	Area A [mm²]	Mass m [kg/m]	Moments of inertia Ix [cm⁴]	Moments of inertia Iy [cm⁴]	Section moduli Wx [cm³]	Section moduli Wy [cm³]
Series 50 Profiles						
mk 2000 **51.00. ....** 	1080	2.85	29.90	29.90	12.00	12.00
mk 2023 **51.23. ....** 	1400	3.78	89.3	39.6	23.8	15.8
mk 2004 **51.04. ....** 	1810	4.87	200.00	55.40	40.00	22.10
mk 2006 **51.06. ....** 	2600	7.00	597.00	80.50	79.70	32.10
mk 2008 **51.08. ....** 	3370	9.09	1300.00	107.00	130.00	42.70
mk 2005 (light duty) **51.05. ....** 	2650	7.00	335.00	335.00	67.00	67.00
mk 2011 **51.11. ....** 	3670	9.70	383.00	383.00	76.70	76.70
mk 2009 **51.09. ....** 	2320	6.27	239	239	42	42

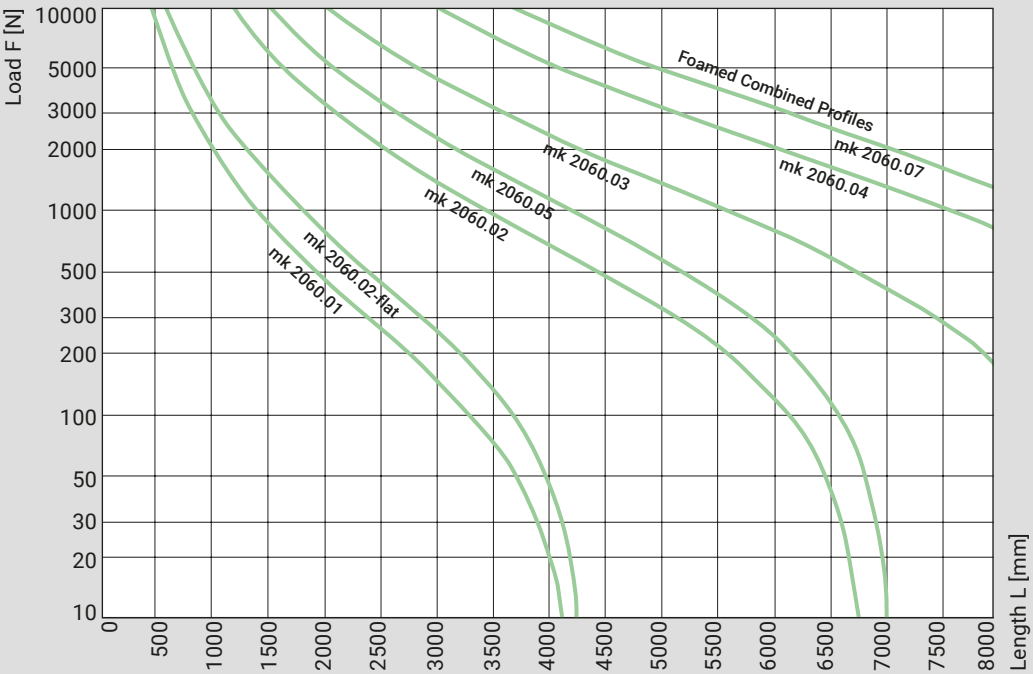
Selection Based on Load and Length

Example



F = 800 N
L = 4500 mm
=> suitable profile mk 2060.05
with $\frac{f}{L} \leq \frac{1}{1000}$

With point load at centre and profile weight for the case: $\frac{f}{L} = \frac{1}{1000}$



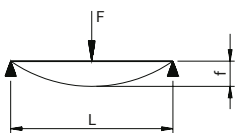
11

Calculating the Deflection

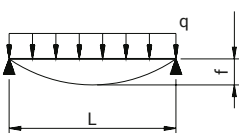
Use our online tool at **www.mk-group.com/en/deflection**

$$\sigma_b = \frac{M_{bmax}}{W_{x,y}} \qquad S = \frac{R_{p0,2}}{\sigma_b}$$

$R_{p0.2}$ = 200 N/mm² (AlMgSi 0.5 F25)
$R_{p0.2}$ = 215 N/mm² (AlMgSi 0.7 F27)

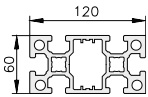
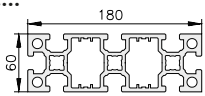
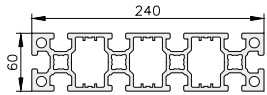
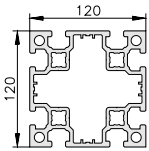
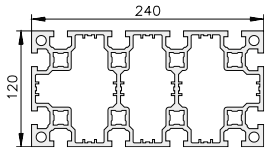


$$M_{bmax} = \frac{F \cdot L}{4} \qquad f = \frac{F \cdot L^3}{48 \cdot E \cdot I_{x,y}}$$

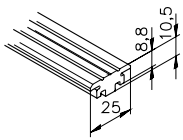


$$M_{bmax} = \frac{q \cdot L^2}{8} \qquad f = \frac{5}{384} \cdot \frac{q \cdot L^4}{E \cdot I_{x,y}}$$

Mounting Profiles with Properties

14	Area	Mass	Moments of inertia		Section moduli	
	A [mm²]	m [kg/m]	Ix [cm⁴]	Iy [cm⁴]	Wx [cm³]	Wy [cm³]
Series 60 Profiles						
mk 2060.01 **60.01. ....** 	1600	4.31	60.20	60.20	20.00	20.00
mk 2060.02 **60.02. ....** 	2580	6.95	404.00	103.00	67.30	34.50
mk 2060.03 **60.03. ....** 	3540	9.57	1210.00	147.00	134.00	48.90
mk 2060.04 **60.04. ....** 	4520	12.20	2660.00	190.00	221.00	63.30
mk 2060.05 **60.05. ....** 	3800	10.30	660.00	660.00	110.00	110.00
mk 2060.07 **60.07. ....** 	6700	18.10	4090.00	1180.00	340.00	169.00

Clamping Profiles for Series 25

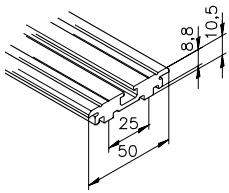


Profile mk 2038.20

0.44 kg/m

Stock length	**38.20.6100**
Cut	**38.20. ....**

Used for ø 6 mm guide rod



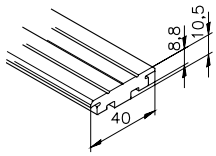
Profile mk 2038.21

0.88 kg/m

Stock length	**38.21.6100**
Cut	**38.21. ....**

Used for ø 6 mm guide rod

Clamping Profiles for Series 40

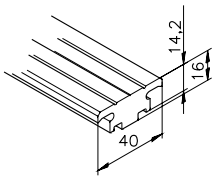


Profile mk 2038.30

0.79 kg/m

Stock length	**38.30.6100**
Cut	**38.30. ....**

Used for ø 6 mm guide rod

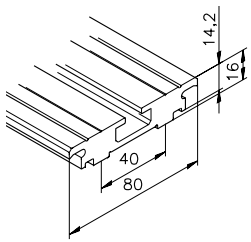


Profile mk 2038.31

1.07 kg/m

Stock length	**38.31.6100**
Cut	**38.31. ....**

Used for ø 10 mm guide rod

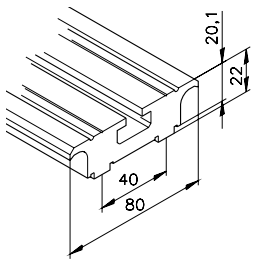


Profile mk 2038.32

0.44 kg/m

Stock length	**38.32.6100**
Cut	**38.32. ....**

Used for ø 10 mm guide rod

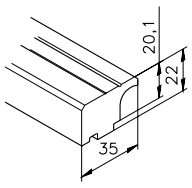


Profile mk 2038.33

2.96 kg/m

Stock length	**38.33.6100**
Cut	**38.33. ....**

Used for ø 16 mm guide rod



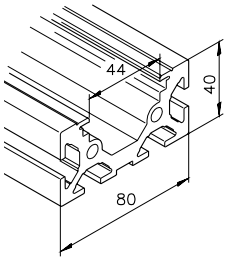
Profile mk 2038.07

1.50 kg/m

Stock length	**38.07.6100**
Cut	**38.07. ....**

Used for ø 16 mm guide rod

Clamping Profiles for Series 40

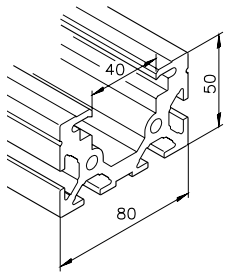


Profile mk 2038.75

3.41 kg/m

Stock length	**38.75.6100**
Cut	**38.75. ....**

Used for ø 6 mm guide rod
Internal guide



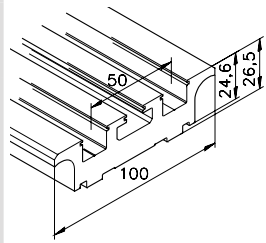
Profile mk 2038.77

4.34 kg/m

Stock length	**38.77.6100**
Cut	**38.77. ....**

Used for ø 10 mm guide rod
Internal guide

Clamping Profiles for Series 50

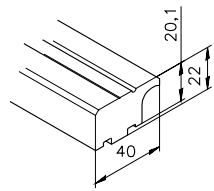


Profile mk 2038.46

3.97 kg/m

Stock length	**38.46.6100**
Cut	**38.46. ....**

Used for ø 20 mm guide rod



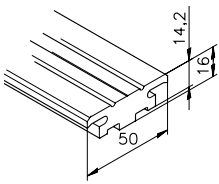
Profile mk 2038.12

1.77 kg/m

Stock length	**38.12.6100**
Cut	**38.12. ....**

Used for ø 16 mm guide rod

Clamping Profiles for Series 50

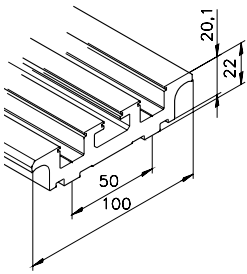


Profile mk 2038.41

1.36 kg/m

Stock length	**38.41.6100**
Cut	**38.41. ....**

Used for ø 10 mm guide rod



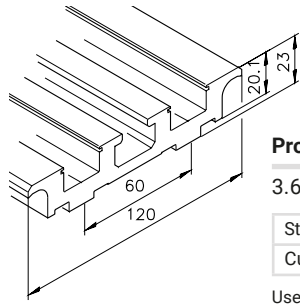
Profile mk 2038.44

3.09 kg/m

Stock length	**38.44.6100**
Cut	**38.44. ....**

Used for ø 16 mm guide rod

Clamping Profiles for Series 60



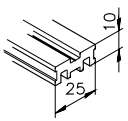
Profile mk 2038.36

3.62 kg/m

Stock length	**38.36.6100**
Cut	**38.36. ....**

Used for ø 16 mm guide rod

Adapter Profiles for Series 25

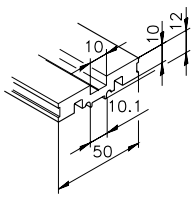


Profile mk 2038.50

0.46 kg/m

Stock length	**38.50.6100**
Cut	**38.50. ....**

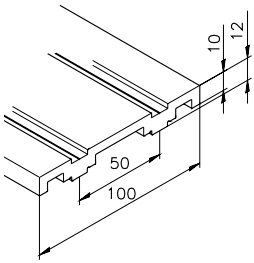
Adapter Profiles for Series 50



Profile mk 2038.60

1.04 kg/m

Stock length	**38.60.6100**
Cut	**38.60. ....**

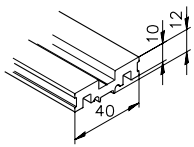


Profile mk 2038.61

1.90 kg/m

Stock length	**38.61.6100**
Cut	**38.61. ....**

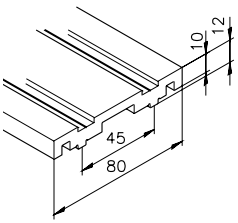
Adapter Profiles for Series 40 and 50



Profile mk 2038.55

0.77 kg/m

Stock length	**38.55.6100**
Cut	**38.55. ....**



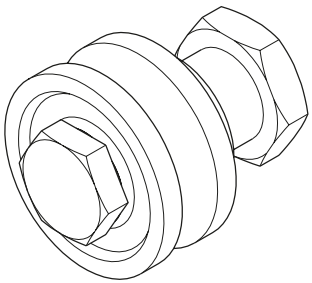
Profile mk 2038.56

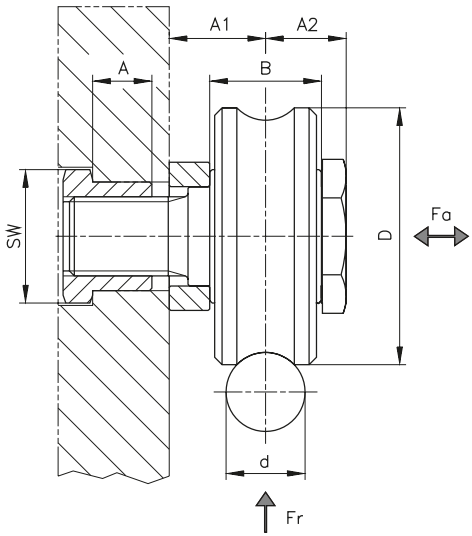
1.67 kg/m

Stock length	**38.56.6100**
Cut	**38.56. ....**

Guide Rollers

for ø 6, ø 10, ø 16, ø 20 guide rods





Technical Values

Item no.	D [mm]	B [mm]	A [mm]	A1 [mm]	A2 [mm]	SW [mm]	d for Rod	Consisting of: Track roller	Bolt	Spacer ring	Bushing
B60.02.017 centric	17	8	6	7	7	13	ø 6*	K101100003	25.51.3201	25.51.3301	25.51.3101
B60.02.018 eccentric	17	8	6	7	7	13	ø 6*	K101100003	25.51.3201	25.51.3301	25.51.3102
B60.02.015 centric	35	15.9	12	12.5	13	22	ø 10*	K101100001	05.06.0003	14.04.0003	06.01.0013
B60.02.016 eccentric	35	15.9	12	12.5	13	22	ø 10*	K101100001	05.06.0003	14.04.0003	06.01.0014
B60.02.013 centric	52	22.6	12	19.5	16.3	27	ø 16*	K101100002	05.06.0007	14.04.0004	06.01.0018
B60.02.014 eccentric	52	22.6	12	19.5	16.3	27	ø 16*	K101100002	05.06.0007	14.04.0004	06.01.0017
B60.02.011 centric	72	25.8	18	22	18	36	ø 20*	K101100006	05.06.0009	14.04.0020	06.01.0021
B60.02.012 eccentric	72	25.8	18	22	18	36	ø 20*	K101100006	05.06.0009	14.04.0020	06.01.0022

*For item numbers, see page 351

Guide rollers also available in stainless steel for all diameters.

Load Specifications per Roller

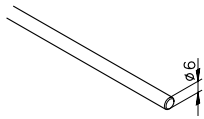
Value	Roller for ø 6 mm rod	Roller for ø 10 mm rod	Roller for ø 16 mm rod	Roller for ø 20 mm rod
so*	4	4	4	4
Fr	175N	1000N	2000N	3250N
Fa	60N	300N	500N	825N
Static load capacity Cow	890N	5100N	9500N	16600N
Dynamic load capacity Cw	1270N	8500N	16800N	29500N

*Static load safety factor against plastic deformation on the roller contact in the track roller.

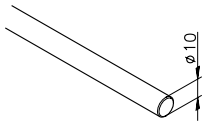
For stainless steel guide rods, these values must be reduced by 30%.

Guide Rods

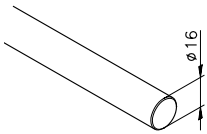
The stock length for Cf 53 and X46 Cr13 with corrosion resistance (magnetisable) is 4000 mm. For galvanised Cf 53 with corrosion protection, it is 3000 mm.



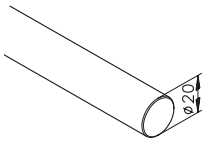
Guide rod 6
0.22 kg/m



Guide rod 10
0.62 kg/m



Guide rod 16
1.58 kg/m



Guide rod 20
2.47 kg/m

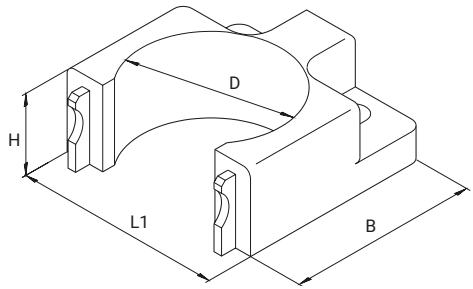
Wipers

Polyamide

The wipers act as a safety element (for protection against pinch points while guiding the roller) and also wipe coarse dirty from the guide rod.

With the wipers for rod diameters 10 and 16, a sealing lip clings to the guide rod and wipes away even finer particles.

The wipers for rod diameters 10 and 16 are also available on request with felt strips and lubrication nipples for lubrication with oil.



Item no.

	Cf 53 11,213	Cf 53** 11,213	X46 Cr13 14,034
ø 6 mm	**7003AK....***	**7003DC....***	**7003EC....***
ø 10 mm	**7003AA....***	**7003DH....***	**7003EH....***
ø 16 mm	**7003AM....***	**7003DP....***	**7003EP....***
ø 20 mm	**7003CM....***	**7003DT....***	**7003ET....***

....* Shaft length in mm
** Galvanised

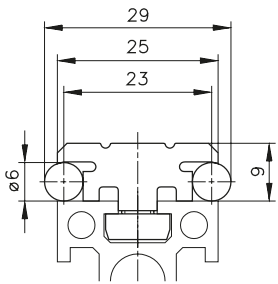
Technical Values

Item no.	**d for Rod**	**L1** [mm]	**B** [mm]	**H** [mm]	**D** [mm]
B03.00.014	ø 6***	25	22.5	11	19
B03.00.003	ø 10	50	46	20	37
B03.00.004	ø 16	70	64	30	56
B03.00.013	ø 20***	100	80	35	76

***Wiper without sealing lip

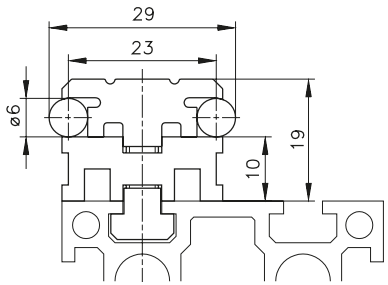
Profile Guide PF 6-38.20/50

The profile guide PF 6-38.20 with or without an adapter profile can be combined with the profiles from series 25 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile guide PF 6-38.20
B51.04.025

1.5 kg/m
L1 up to 6000 mm



Profile Guide PF 6-38.20/50
B51.04.029

With adapter profile

2 kg/m
L1 up to 6000 mm

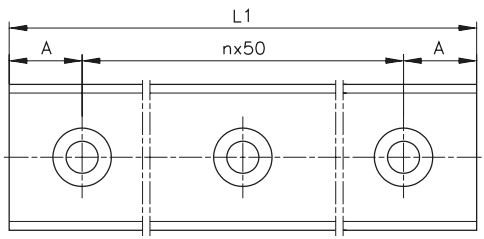
Borehole spacing specifications

Scope of application: 75 ≤ L1 ≤ 6000

12.5 ≤ A < 37.5

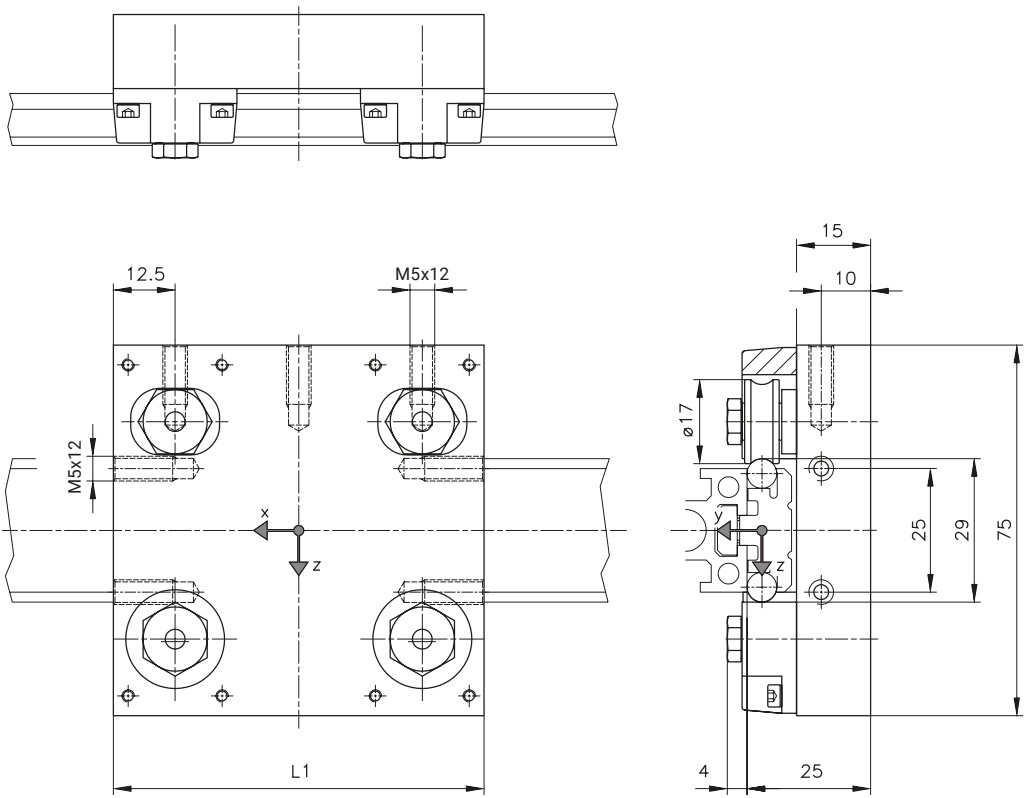
$$N = \frac{L1-(2 \times A)}{50} + 1$$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.20-04

for Profile Guide PF 6-38.20/50



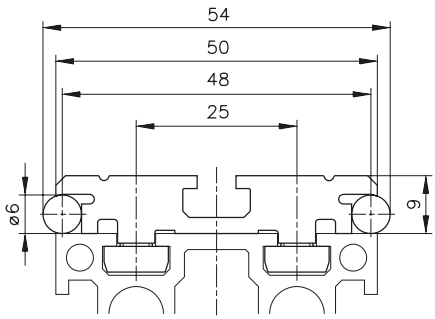
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.25.041	LW 38.20-04	75	200	350	2.5	8.5	5	0.35	5009CA0075
B90.25.041	LW 38.20-04	100	200	350	2.5	13	8.0	0.43	5009CA0100

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 15 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

Profile Guide PF 6-38.21

The profile guide PF 6-38.21 can be combined with the profiles from series 25 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile guide PF 6-38.21
B51.04.030

2 kg/m
L1 up to 6000 mm

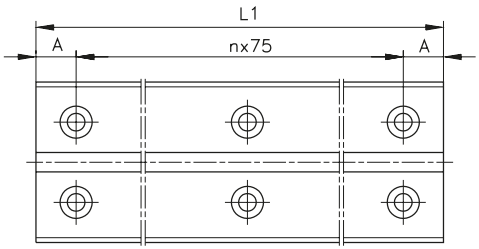
Borehole spacing specifications

Range: 100 ≤ L1 ≤ 6000

12.5 ≤ A < 50

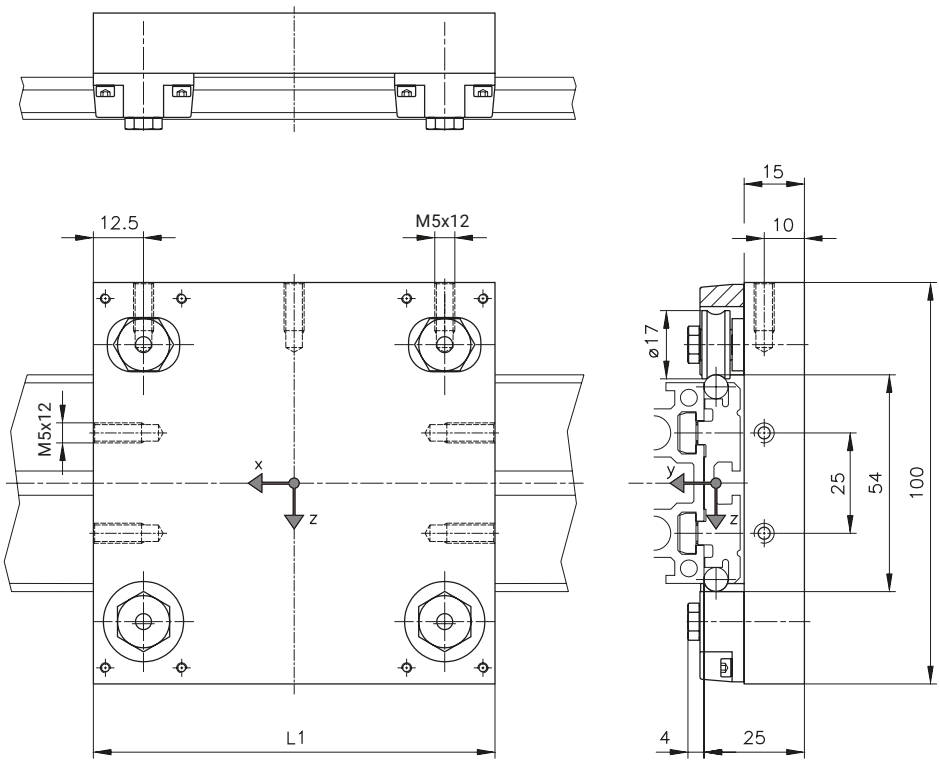
$$N = \left(\frac{L1-(2 \times A)}{75}+1\right) \times 2$$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.21-04

For profile guide PF 6-38.21



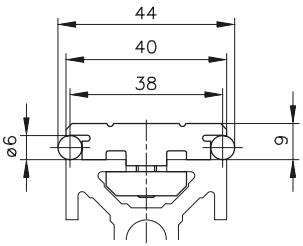
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.25.042	LW 38.21-04	100	200	350	5	13	8	0.55	5009CB0100
B90.25.042	LW 38.21-04	150	200	350	5	21	13	0.75	5009CB0150

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 15 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

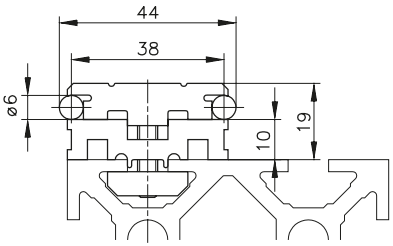
Profile Guide PF 6-38.30/55

The profile guide PF 6-38.30 with or without an adapter profile can be combined with the profiles from series 40 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile Guide PF 6-38.30
B51.04.042

1.8 kg/m
L1 up to 6000 mm



Profile Guide PF 6-38.30/55
B51.04.043

With adapter profile

2.6 kg/m
L1 up to 6000 mm

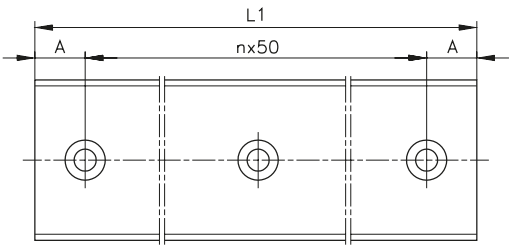
Borehole spacing specifications

Range: 75 ≤ L1 ≤ 6000

12.5 ≤ A < 37.5

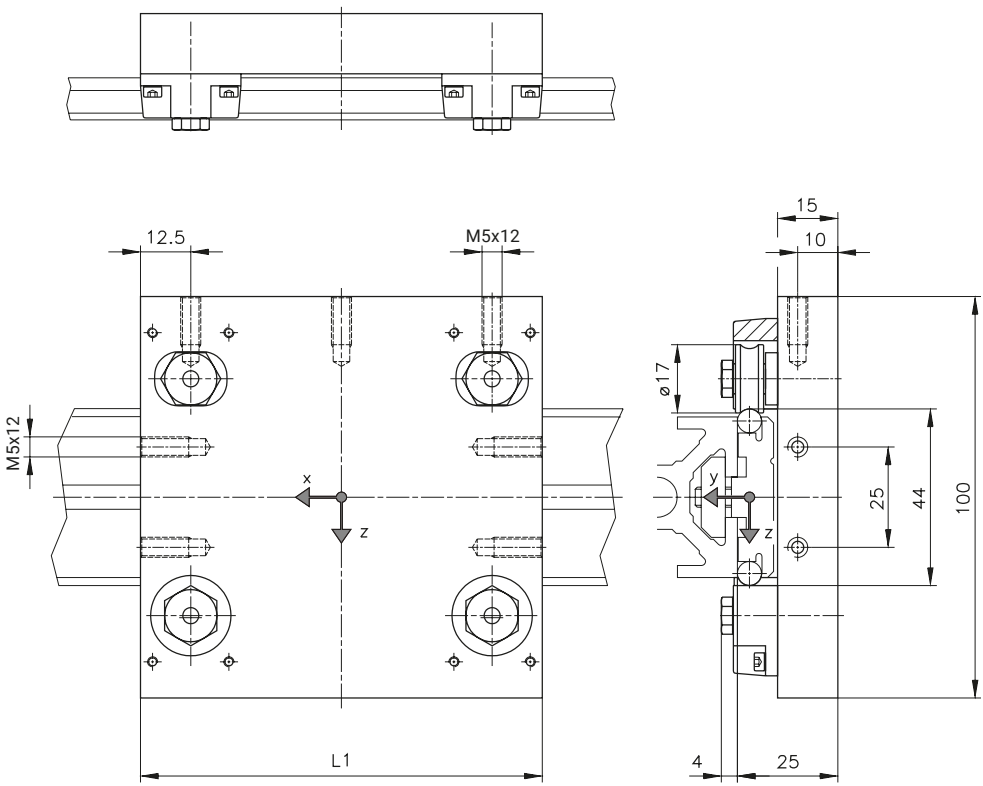
$$N = \frac{L1-(2 \times A)}{50} + 1$$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.30-04

for Profile Guide PF 6-38.30/55



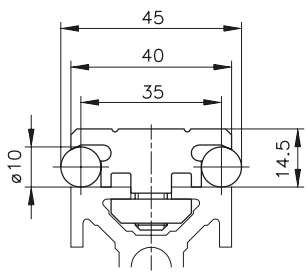
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.40.041	LW 38.30-04	100	200	350	4	13	8	0.55	5009CC0100
B90.40.041	LW 38.30-04	160	200	350	4	23	14	0.8	5009CC0160

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 15 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

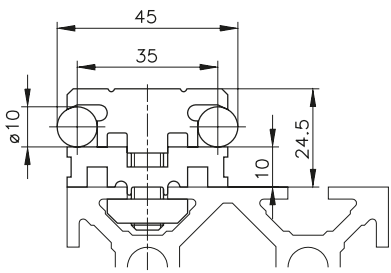
Profile Guide PF 10-38.31/55

The profile guide PF 10-38.31 with or without an adapter profile can be combined with the profiles from series 40 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile Guide PF 10-38.31
B51.04.046

2.8 kg/m
L1 up to 6000 mm



Profile Guide PF 10-38.31/55
B51.04.047

With adapter profile

3.6 kg/m
L1 up to 6000 mm

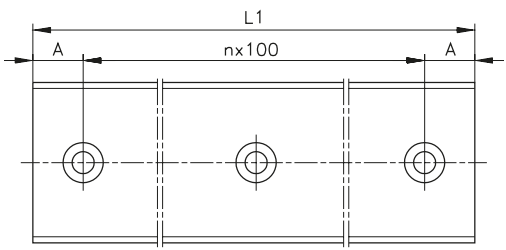
Borehole spacing specifications

Range: 150 ≤ L1 ≤ 6000

25 ≤ A < 75

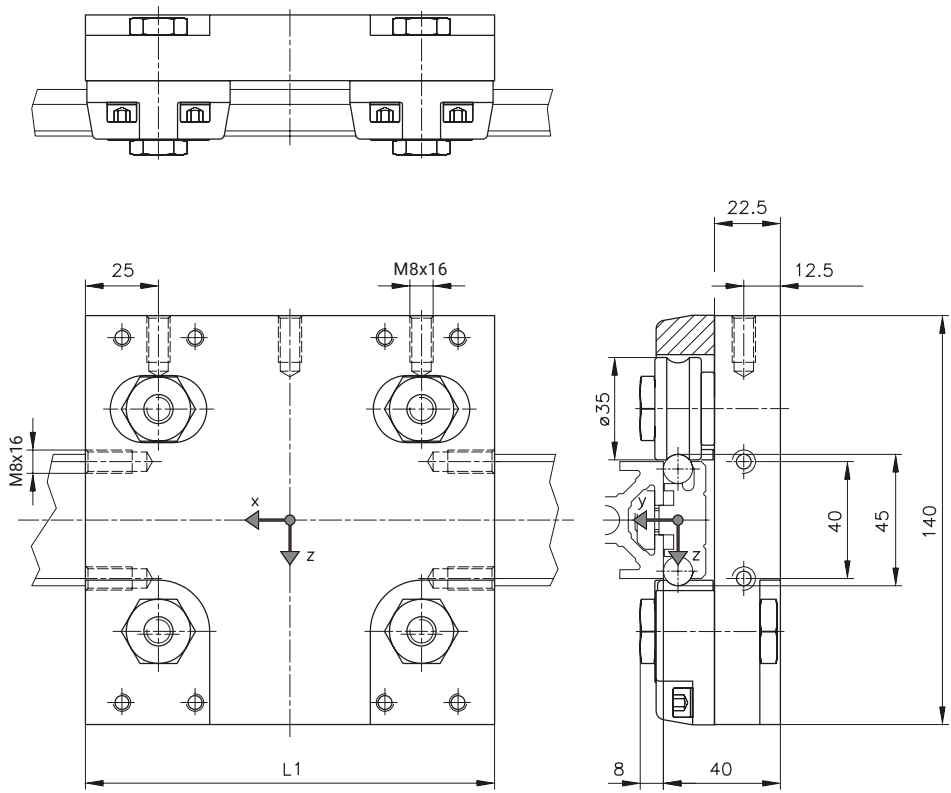
$$N = \frac{L1-(2 \times A)}{100} + 1$$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.31-04

for Profile Guide PF 10-38.31/55



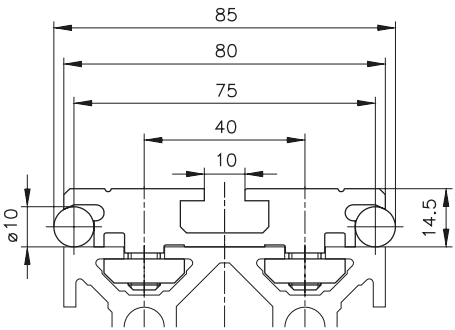
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.40.042	LW 38.31-04	140	1000	2000	18	90	45	2	5009CD0140
B90.40.042	LW 38.31-04	240	1000	2000	18	190	95	2.8	5009CD0240

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 25 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

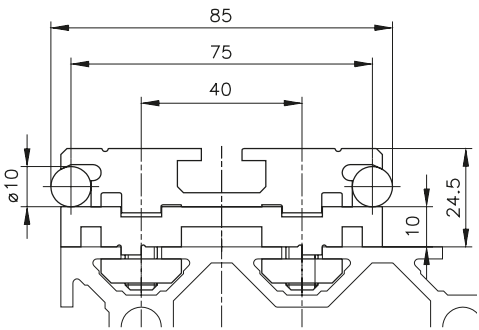
Profile Guide PF 10-38.32/56

The profile guide PF 10-38.32 with or without an adapter profile can be combined with the profiles from series 40 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile Guide PF 10-38.32
B51.04.048

4 kg/m
L1 up to 6000 mm



Profile Guide PF 10-38.32/56
B51.04.049

With adapter profile

5.8 kg/m
L1 up to 6000 mm

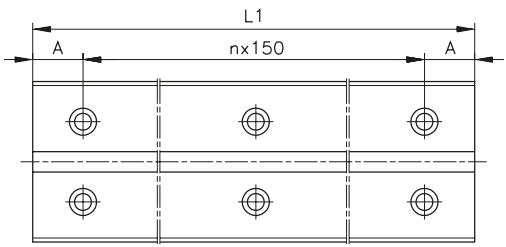
Borehole spacing specifications

Range: 200 ≤ L1 ≤ 6000

25 ≤ A < 100

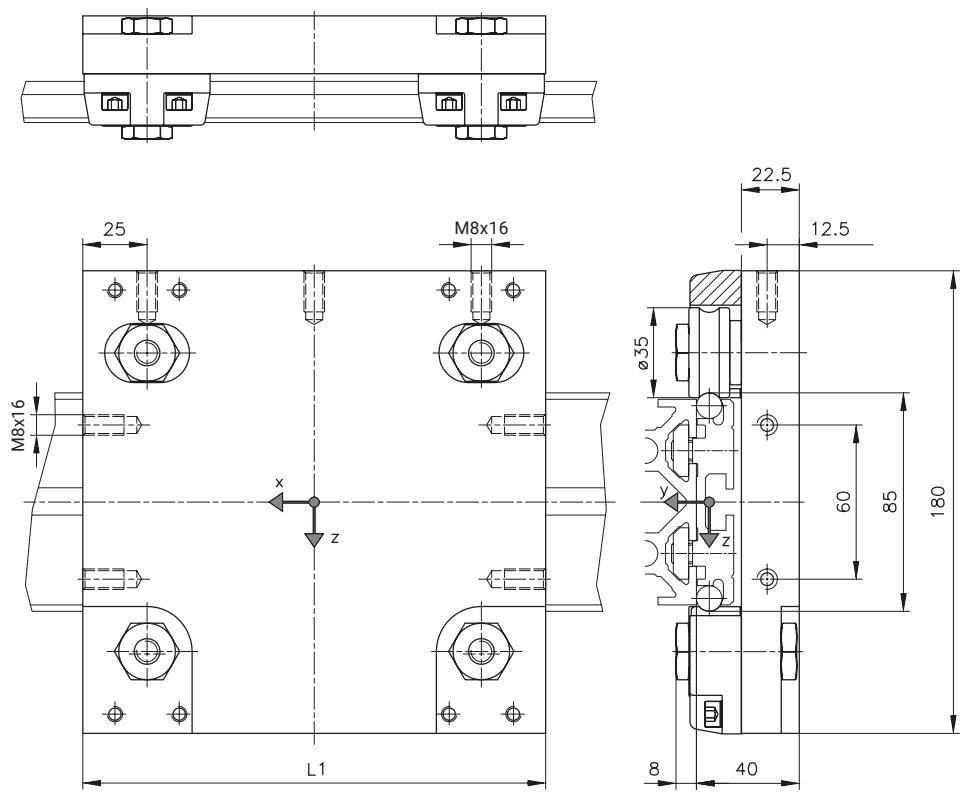
$$N = \left(\frac{L1-(2 \times A)}{150}+1\right) \times 2$$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.32-04

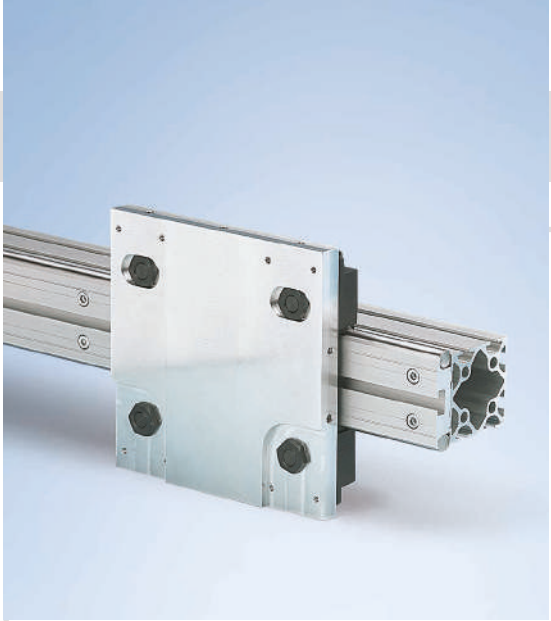
for Profile Guide PF 10-38.32/56



Technical Values

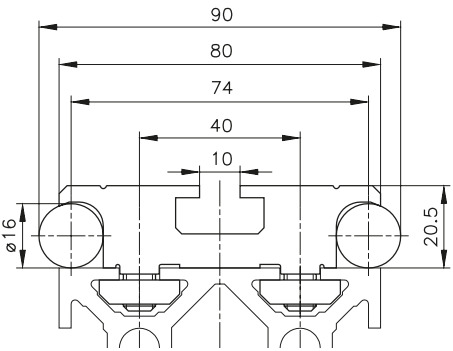
Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.40.043	LW 38.32-04	180	1000	2000	40	130	65	2.8	5009CE0180
B90.40.043	LW 38.32-04	280	1000	2000	40	230	115	3.8	5009CE0280

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 25 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%



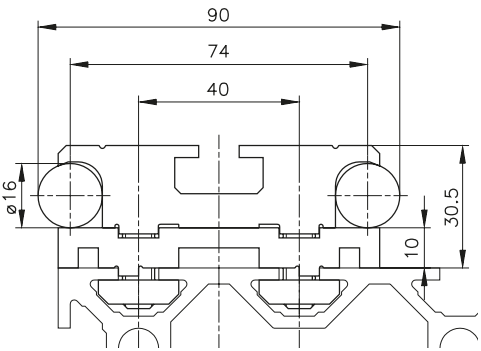
Profile Guide PF 16-38.33/56

The profile guide PF 16-38.33 with or without an adapter profile can be combined with the profiles from series 40 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile Guide PF 16-38.33
B51.04.052

7 kg/m
L1 up to 6000 mm



Profile Guide PF 16-38.33/56
B51.04.053

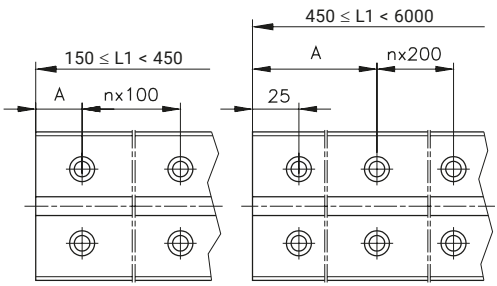
With adapter profile

8.8 kg/m
L1 up to 6000 mm

Borehole spacing specifications

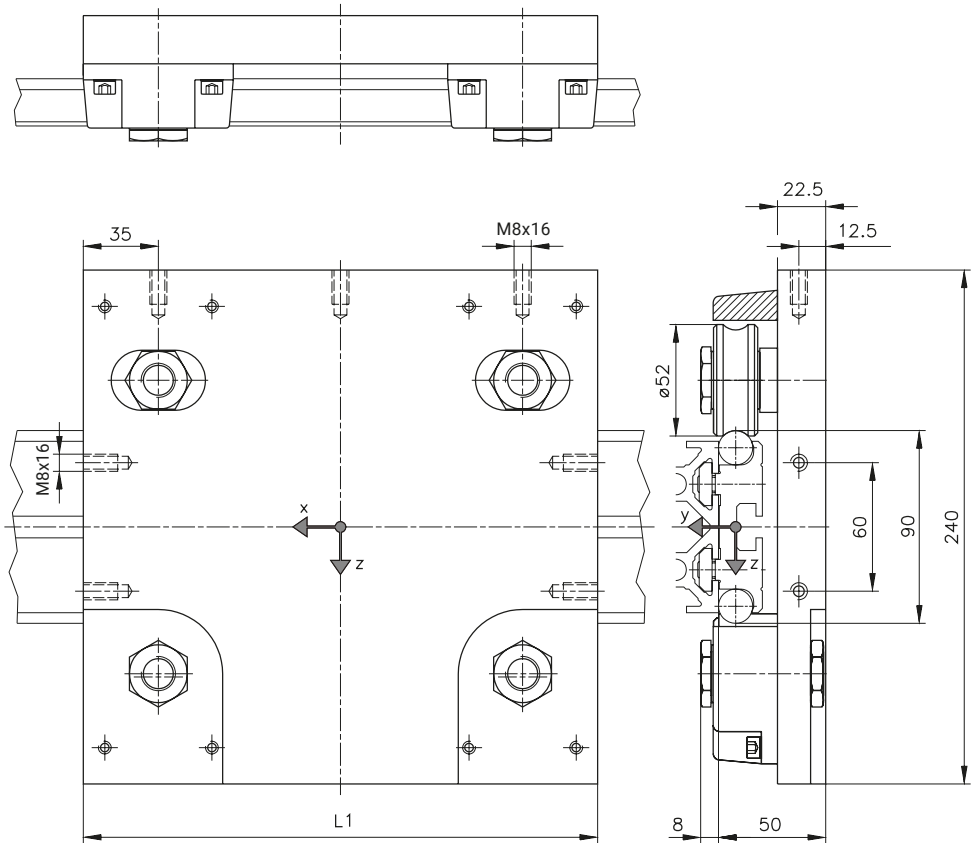
Range: 150 ≤ L1 < 450	450 ≤ L1 < 6000
25 ≤ A < 75	125 ≤ A < 225
$N = \left(\frac{L1-(2 \times A)}{100} + 1 \right) \times 2$	$N = \left(\frac{L1-(2 \times A)}{200} + 3 \right) \times 2$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.33-04

for Profile Guide PF 16-38.33/56



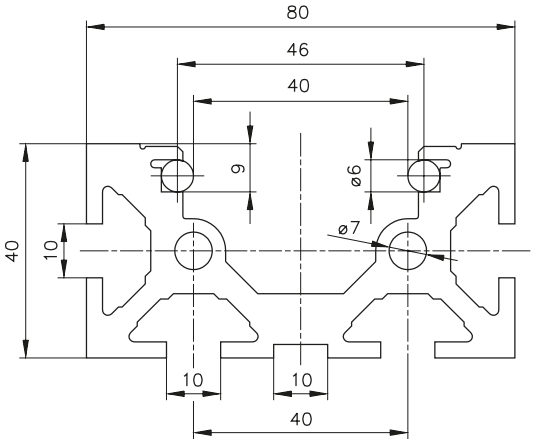
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.40.044	LW 38.33-04	240	1600	4000	60	340	140	5.5	5009CF0240
B90.40.044	LW 38.33-04	400	1600	4000	60	660	260	8	5009CF0400

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 30 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

Internal Profile Guide PF 6-38.75

The profile guide PF 6-38.75 can be combined with the roller carriage shown on the next page. When combined, they form a linear unit.

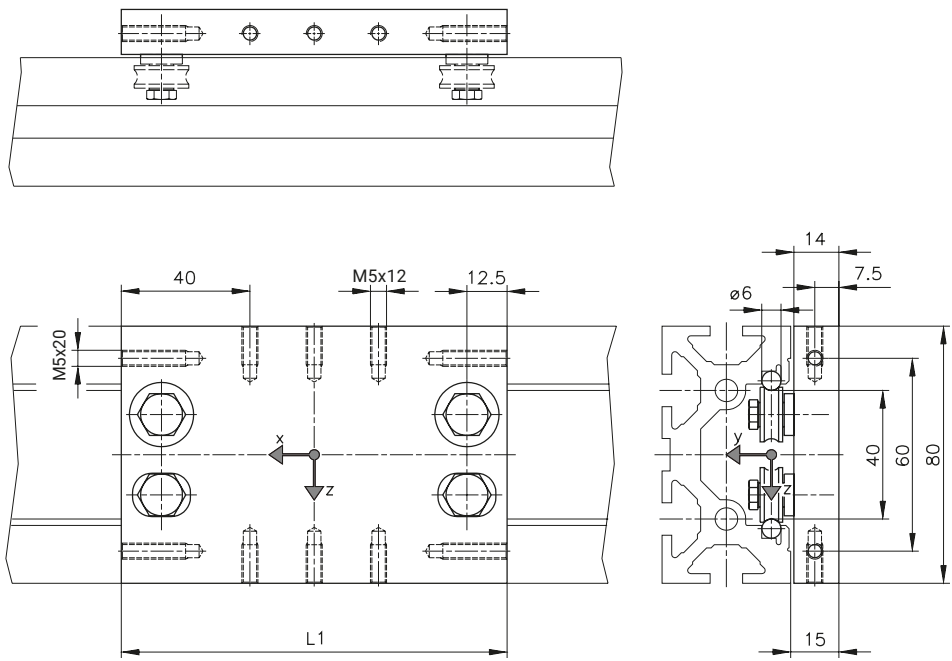


Profile Guide PF 6-38.75
B51.04.140

3.9 kg/m
L1 up to 6000 mm

Roller Carriage LW 38.75-44

For profile guide PF 6-38.75



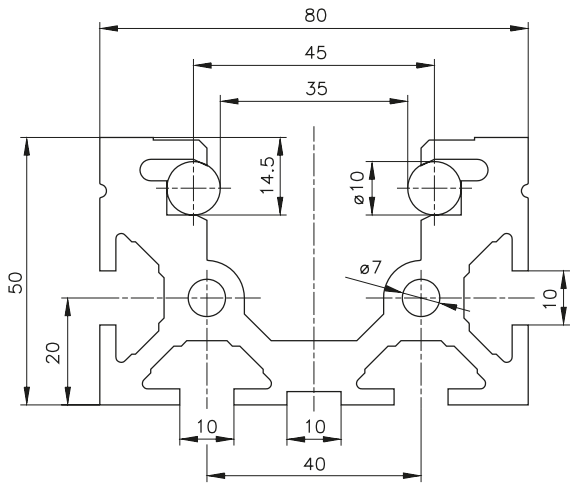
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.40.441	LW 38.75-44	120	200	350	5	15	10	0.5	5009CN0120

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 15 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

Internal Profile Guide PF 10-38.77

The profile guide PF 10-38.77 can be combined with the roller carriage shown on the next page. When combined, they form a linear unit.

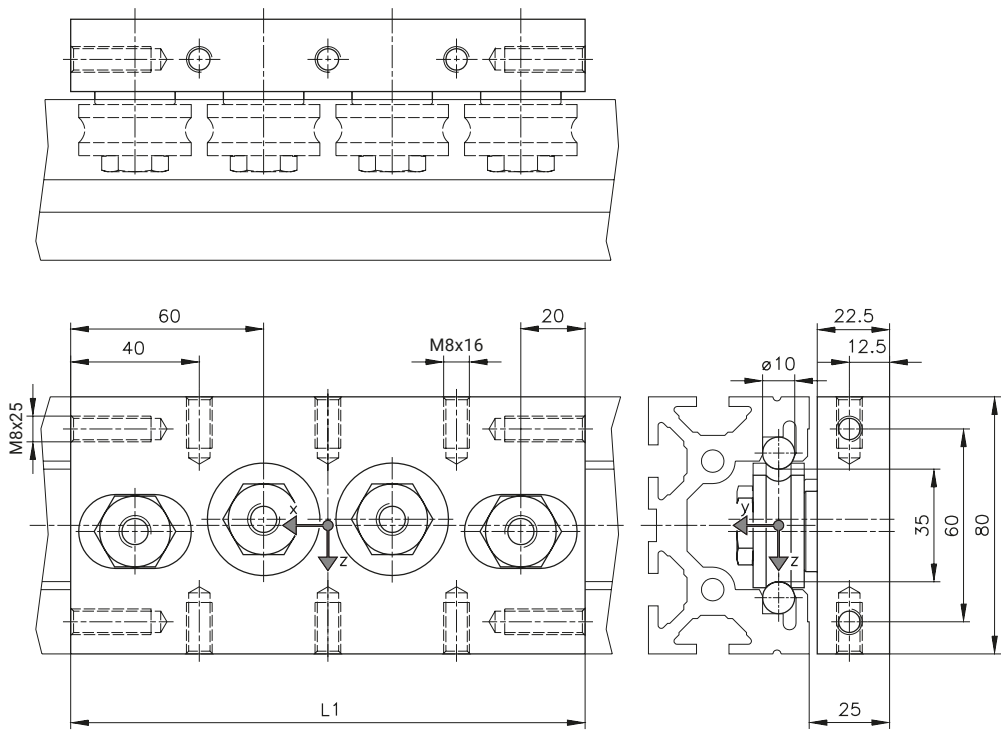


Profile guide PF 10-38.77
B51.04.142

5.6 kg/m
L1 up to 6000 mm

Roller Carriage LW 38.77-44

For profile guide PF 10-38.77



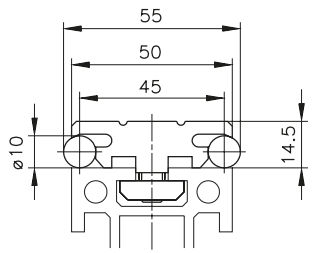
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.40.443	LW 38.77-44	160	1000	1500	20	60	40	1.5	5009CO0160

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 25 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

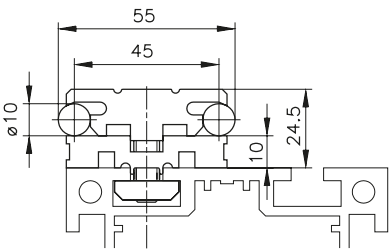
Profile Guide PF 10-38.41/60

The profile guide PF 10-38.41 with or without an adapter profile can be combined with the profiles from series 50 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile guide PF 10-38.41
B51.04.020

3 kg/m
L1 up to 6000 mm



Profile Guide PF 10-38.41/60
B51.04.015

With adapter profile

4.2 kg/m
L1 up to 6000 mm

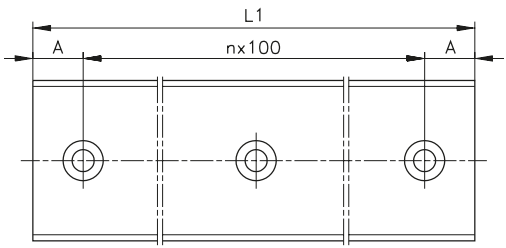
Borehole spacing specifications

Range: 150 ≤ L1 ≤ 6000

25 ≤ A < 75

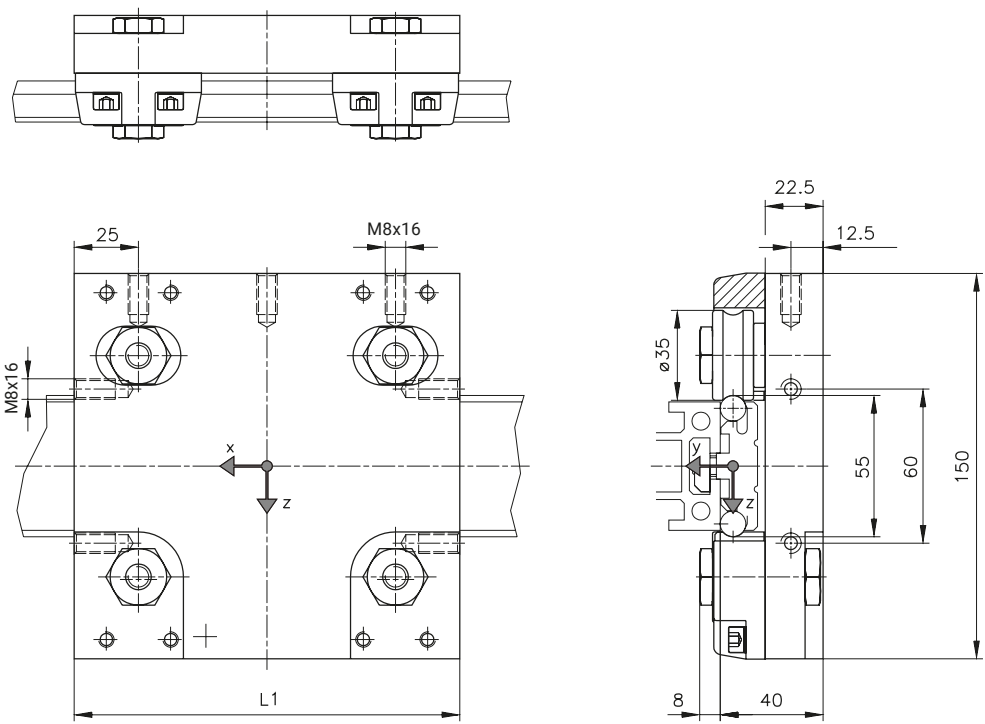
$$N = \frac{L1-(2 \times A)}{100} + 1$$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.41-04

for Profile Guide PF 10-38.41/60



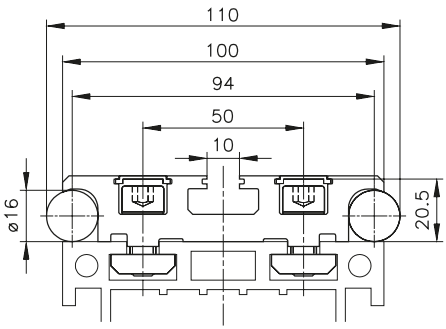
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.50.042	LW 38.41-04	150	1000	2000	25	100	50	2.2	5009CG0150
B90.50.042	LW 38.41-04	250	1000	2000	25	200	100	3	5009CG0250

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 25 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

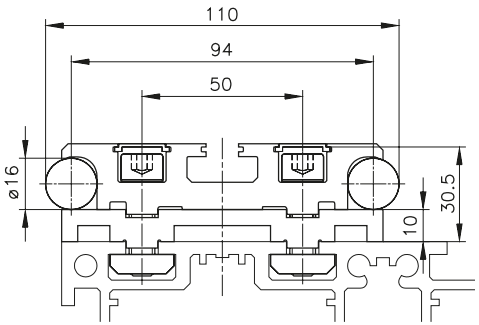
Profile Guide PF 16-38.44/61

The profile guide PF 16-38.44 with or without an adapter profile can be combined with the profiles from series 50 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile guide PF 16-38.44
B51.04.004

6.8 kg/m
L1 up to 6000 mm



Profile guide PF 16-38.44/61
B51.04.016

With adapter profile

8.8 kg/m
L1 up to 6000 mm

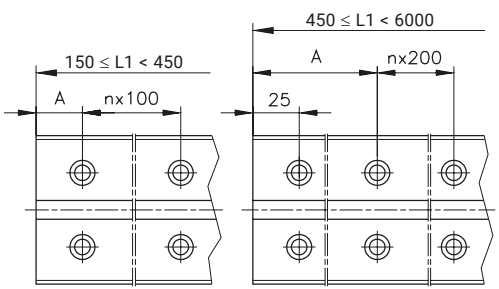
Borehole spacing specifications

Range of app.: 150 ≤ L1 < 450 450 ≤ L1 < 6000

25 ≤ A < 75 125 ≤ A < 225

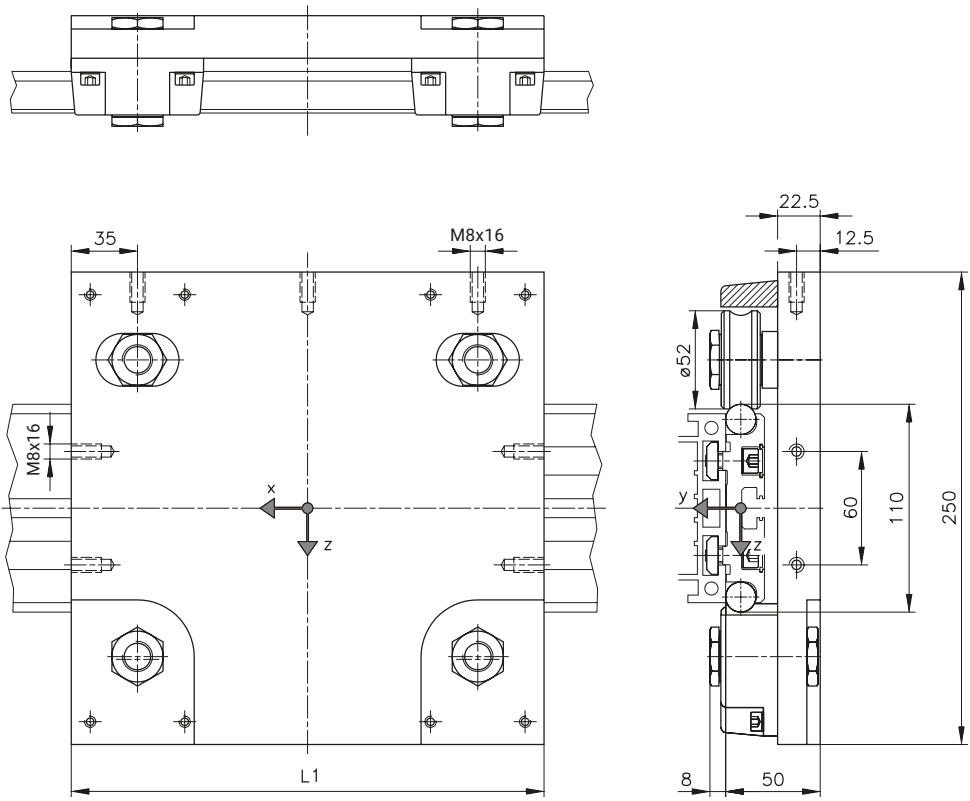
$$N = \left(\frac{L1-(2 \times A)}{100} + 1\right) \times 2 \qquad N = \left(\frac{L1-(2 \times A)}{200} + 3\right) \times 2$$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.44-04

for Profile Guide PF 16-38.44/61



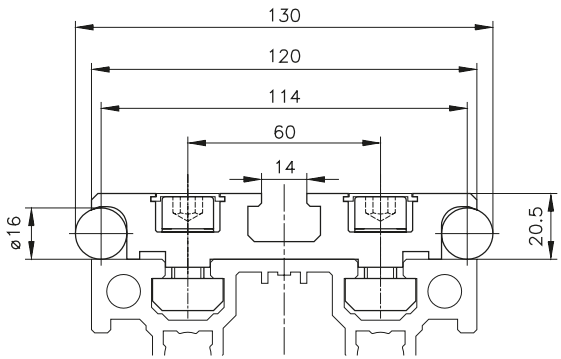
Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.50.044	LW 38.44-04	250	1600	4000	80	360	150	5.5	5009CI0250
B90.50.044	LW 38.44-04	450	1600	4000	80	760	300	8.5	5009CI0450

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s²; with s_0 = 4
- Max. acceleration a = 50 m/s² with reduced load
- Load application point max. 30 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%

Profile guide PF 16-38.36

The profile guide PF 16-38.36 can be combined with the profiles from series 60 and the roller carriage shown on the next page. When combined, they form a linear unit.



Profile guide PF 16-38.36
B51.04.109

9.5 kg/m
L1 up to 6000 mm

Borehole spacing specifications

Range of app.: 150 ≤ L1 < 450 450 ≤ L1 < 6000

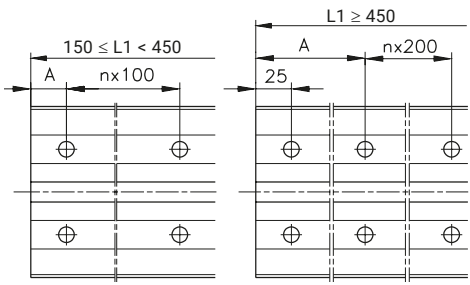
25 ≤ A < 75

$$N = \left(\frac{L1-(2 \times A)}{100} +1\right) \times 2$$

125 ≤ A < 225

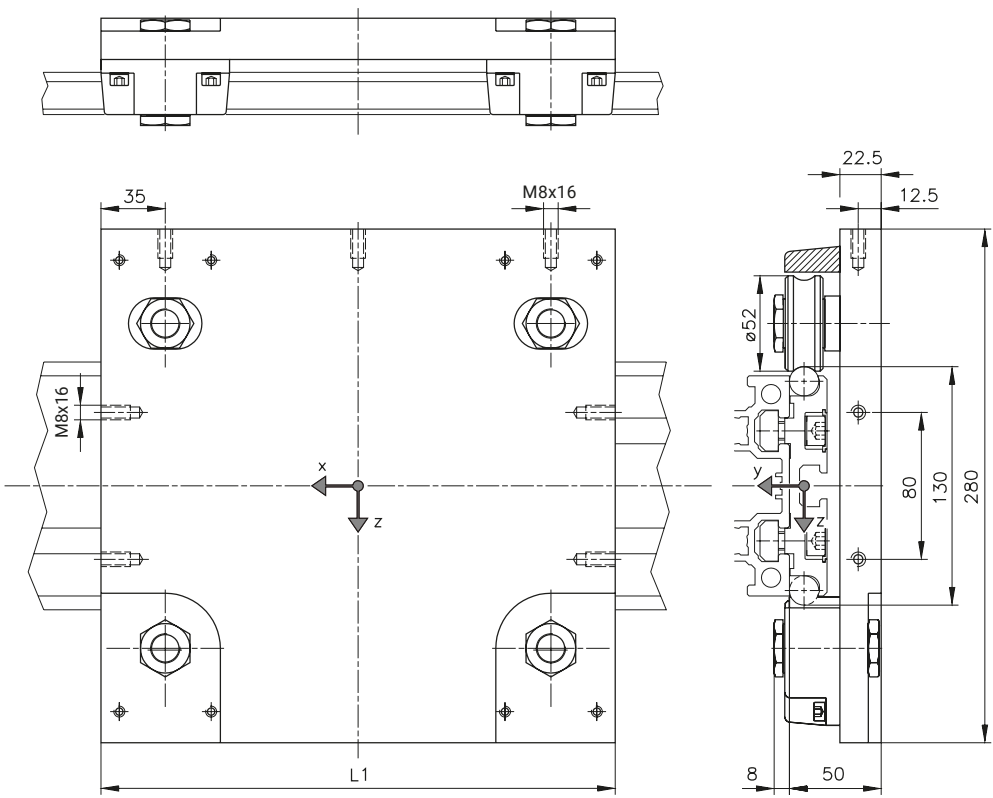
$$N = \left(\frac{L1-(2 \times A)}{200} +3\right) \times 22$$

L1 = length of the profile guide
A = distance from the first borehole to the profile edge
N = number of screws



Roller Carriage LW 38.36-04

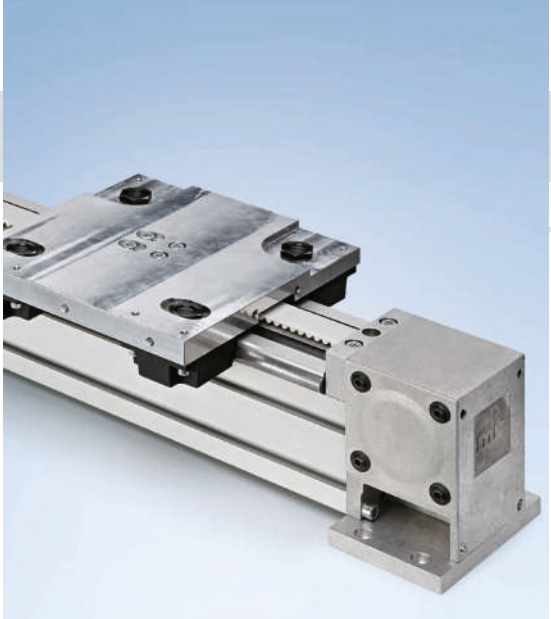
For profile guide PF 16-38.36



Technical Values

Item no.	Designation	L1 [mm]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	$m_{carriage}$ [kg]	Plate, individual
B90.60.042	LW 38.36-04	280	1600	4000	100	420	170	6.5	5009CL0280
B90.60.042	LW 38.36-04	480	1600	4000	100	820	330	10	5009CL0480

- Max. load specifications for v ≤ 10 m/s and a ≤ 10 m/s^2; with s_0 = 4
- Max. acceleration a = 50 m/s^2 with reduced load
- Load application point max. 30 mm off-centre
- For X46 Cr13 rods and rollers, the load capacity must be reduced by 30%



Linear Modules LZR

Linear modules with timing belts (LZR) have a modular design and are installed on the track roller assemblies. Their basic components include the mounting profile, profile guide and plate carriage and the timing belt drive components required to transmit power, such as the deflection bearers and connectors.

The LZR design facilitates the attachment of motors as standard. With the appropriately drilled shafts, the deflection bearers allow the motor to be attached directly on any side. In addition, shaft ends for flanged mounting of a gearmotor with a hollow shaft, adaptations with a motor flange and coupling and an indirect drive are available on request.

For electromotive drives using a stepper motor or servomotor, we recommend using the optional single-piece drive shafts.

The linear modules can be combined in two-axis and three-axis systems and in area gantries and three-dimensional gantries.

Order designation

LZR 2025-38.20-16

- System designation
- Mounting profile
- Clamping profile
- Timing belt width

Level of Accuracy that can be achieved by Linear Modules with Timing Belts

The LZR with a 8M-30-type timing belt can achieve the following values without a load:

Repeatability:		0.1 mm
Positioning accuracy:	±	0.2 mm
Reversal error:		0.2 mm

These values vary depending on the stroke length and application.

Sample order

Linear module	**LZR 2025-38.20-16**
Item no.	**B38.25.001**
Stroke	= .....mm
Length	L = ...mm
Roller carriage length	L1 = ...mm
Drive shaft borehole	ø = ...mm
Travel speed	v = ...m/s
Acceleration	a = ...m/s^2

Notes on the Load Specifications

For information about load specifications for track roller assemblies, refer to the information beginning on page 42.

Notes on the Load Specifications for Timing Belts
The standard timing belts used are PU (polyurethane) with steel cord tension members. Other types, including conductive belts, are available on request.

The maximum track roller assembly travel speed of v = 10 m/s can be achieved using timing belts with no reduction of the load capacities.

From a > 10 m/s² onwards, the values must be reduced by the usual load factors (e.g. without load peaks s = 1 to high load peaks s = 2.5).

The allowable tension loads are based on a 0.4% elongation of the timing belt.

The breaking strength of the belts is significantly higher. The normal usable belt pull strength (Fu) and required pretension (Fv) is approximately:

$F_{allowable} = F_v + F_u$ with $F_v = F_u$

Timing Belts	AT 5-16	5M-15	8M-30
$F_{breaking}$	3900 N	3600 N	14900 N
$F_{allowable}$	1200 N	1150 N	4000 N
$F_v = F_u$	600 N	575 N	2000 N

The usable starting torque results from the maximum usable belt pull strength, of the engaged teeth and the pitch diameter of the timing belt pulley.

The values for the mk LZR modules are:

Timing belt	AT 5-16	5M-15	8M-30
D_{Pitch}	41.4 mm	50.9 mm	71.3 mm
Z	26	32	28
M_{Drive}	12 Nm	15 Nm	70 Nm

Motor Selection/ Drive Design

For the drive selection, several factors must be considered, including the timing belt (especially the allowable belt pull strength and required stiffness) and the motor (especially the starting torque, the revolutions per minute and the resulting performance). The most important consideration is the required driving force. As a simple starting point for the calculations, the transition point from acceleration to constant speed can be used.

Constant acceleration (a = constant):

$$v = a \cdot t = \sqrt{2 \cdot a \cdot s}$$

Constant speed (v = constant):

$$v = \frac{s}{t}$$

Max. driving force:

$F_{Drive} = F_a + F_{Roll} + F_{Empty} + F_{Additional}$
$F_a = m \cdot (a+g)$

with m = moving mass in kg
a = const. acceleration in m/s²
g = 10 m/s², for vertical travel
g = 0 m/s², for horizontal travel

$F_{Roll} = F_N \cdot \mu_{Roll}$

with $F_N = F_G$ for horizontal travel
μ_{Roll} = 0.05 for lightly preloaded track roller

F_{Empty} = 50 to 100 N depending on the module and pre-tension of the timing belt

$F_{Additional}$ = additional loads from the application

$F_{Drive} = m \cdot (a+g) + FN \cdot 0.05 + 100\ N + F_{Additional}$

For timing belt selection:

Indicated $F_{Drive} < F_u$

For motor selection:

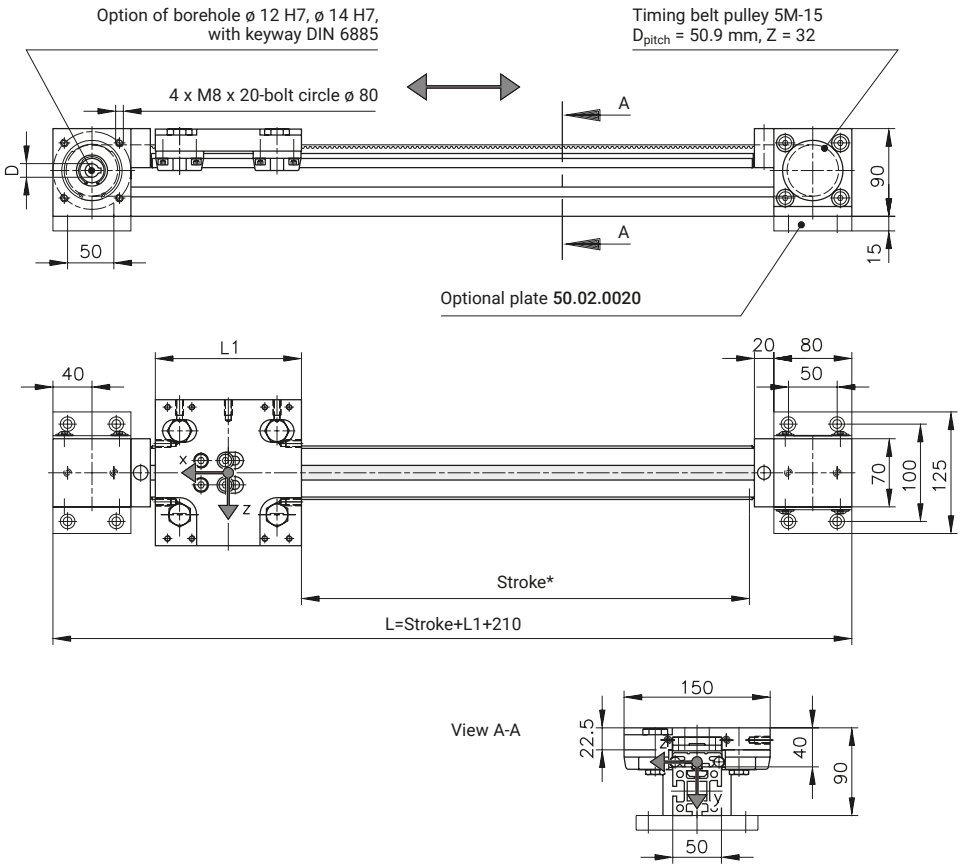
$$M_{req} = \frac{F_{Drive} \cdot D_{Pitch}\ [m]}{2 \cdot \eta}$$

$$n_{req} = \frac{v \cdot 60}{D_{Pitch}\ [m] \cdot \pi}$$

$$P_{req} = \frac{F_{Drive} \cdot v}{\eta}$$

With D_{Pitch} in m of timing belt pulley η = 50 too 75% depending on selected drive (gearbox, motor, etc.)
v in m/s

LZR 2000-38.41-15 with Plate Carriage

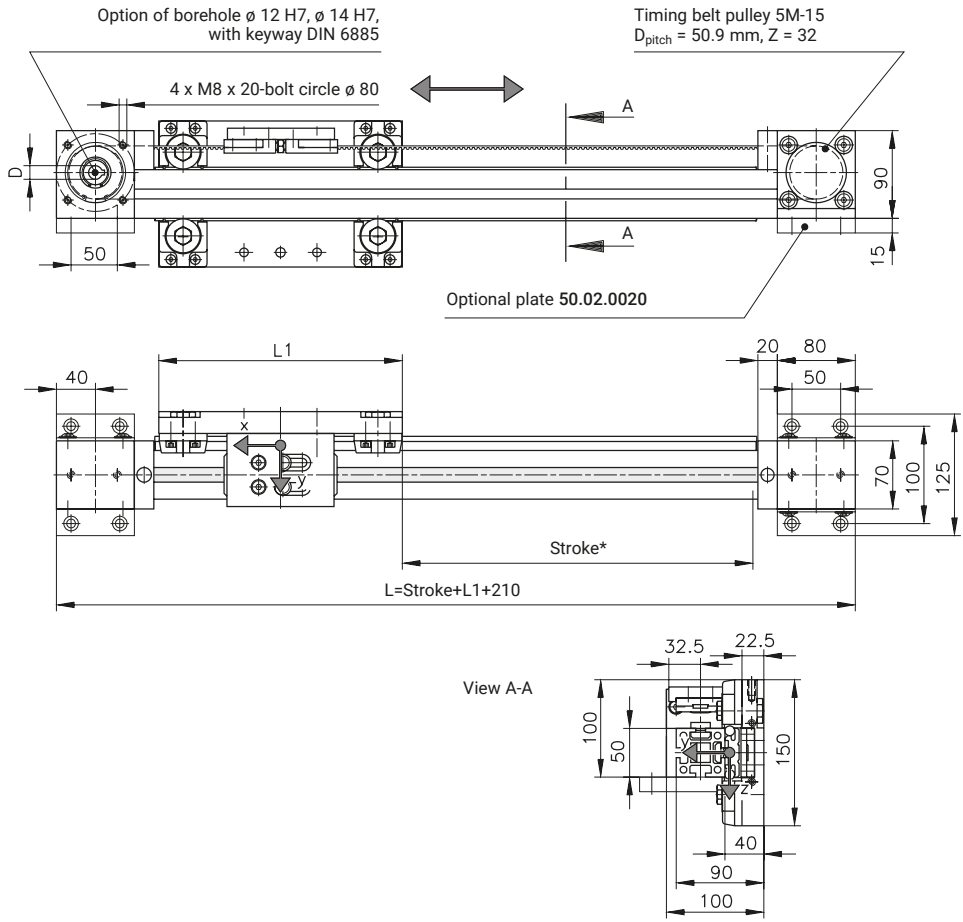


Load Specifications for LZR 2000-38.41-15 with Plate Carriage

Item no.	L1 [mm]	Fx** [N]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]
B38.02.003	150	1150	1000	2000	25	100	50
B38.02.003	250	1150	1000	2000	25	200	100

* Maximum stroke between the mechanical stops. Note the discharge section!
** $F_x = F_{allowable}$; F_u = 575 N = F_v

LZR 2000-38.41-15 with Side Plate Carriage

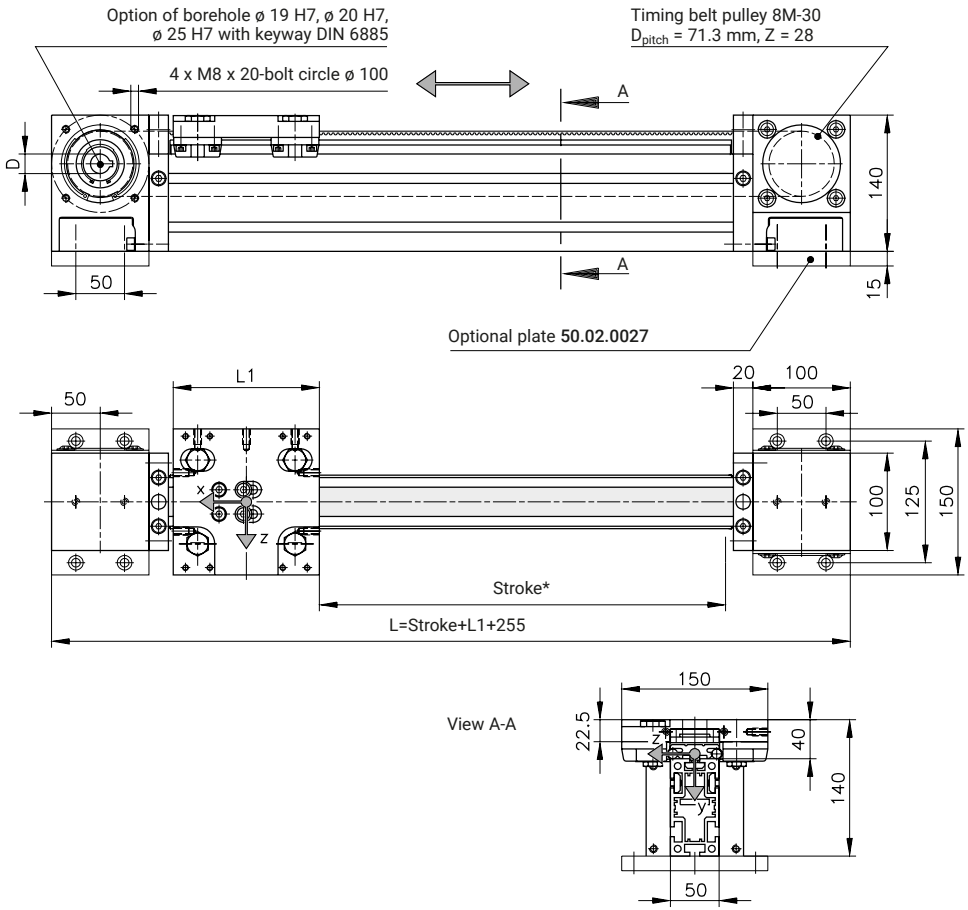


Load Specifications for LZR 2000-38.41-15 with Side Plate Carriage

Item no.	L1 [mm]	Fx** [N]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]
B38.02.007	250	1150	1000	2000	25	200	100

* Maximum stroke between the mechanical stops. Note the discharge section!
** $F_x = F_{allowable}$; F_u = 575 N = F_v

LZR 2004-38.41-30 with Plate Carriage



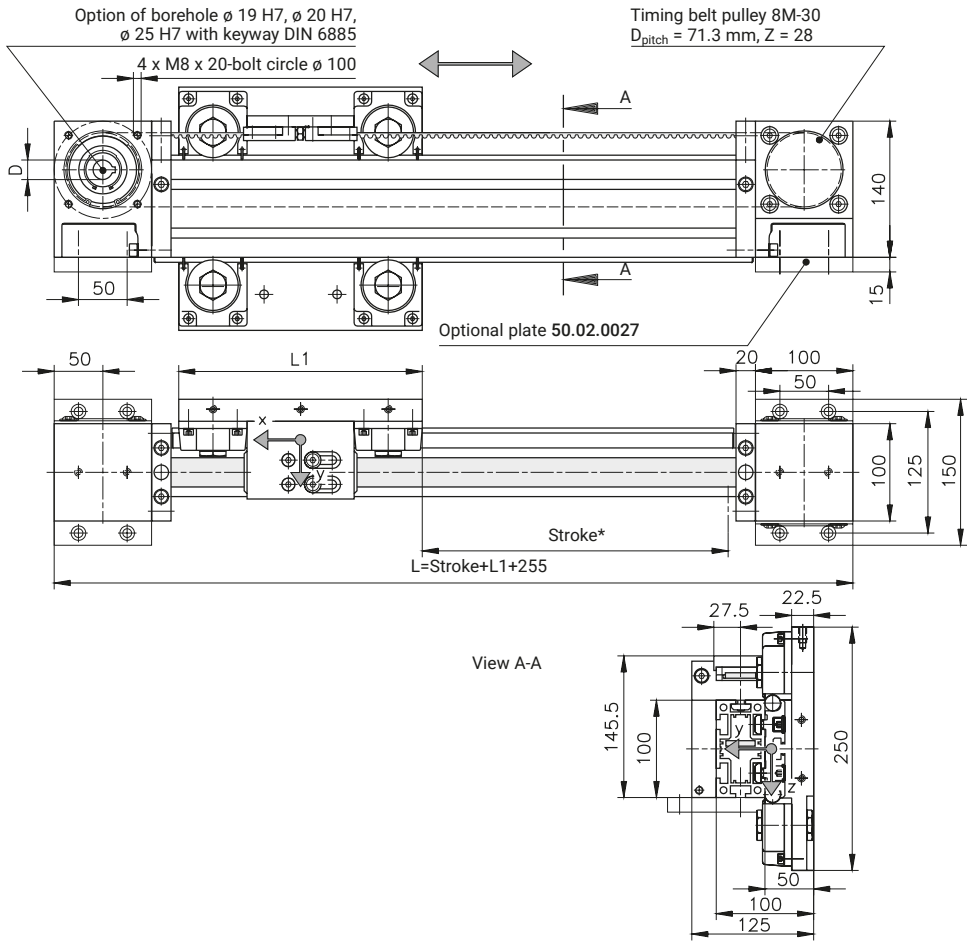
11

Load Specifications for LZR 2004-38.41-30 with Plate Carriage

Item no.	L1 [mm]	Fx** [N]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]
B38.02.004	150	4000	1000	2000	25	100	50
B38.02.004	250	4000	1000	2000	25	200	100

* Maximum stroke between the mechanical stops. Note the discharge section!
** $F_x = F_{allowable}$; F_u = 2000 N = F_v

LZR 2004-38.44-30 with Side Plate Carriage

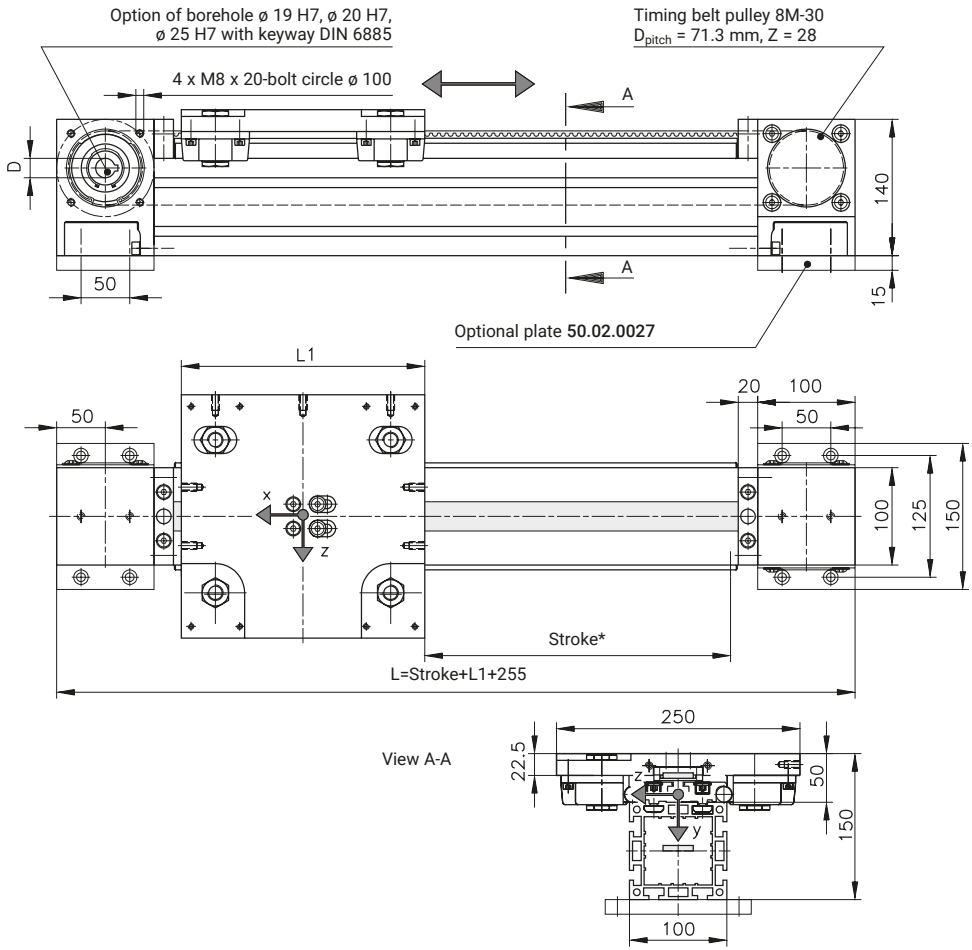


Load Specifications for LZR 2004-38.44-30 with Side Plate Carriage

Item no.	L1 [mm]	Fx** [N]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]
B38.02.005	250	4000	1600	4000	80	350	150
B38.02.005	450	4000	1600	4000	80	760	300

* Maximum stroke between the mechanical stops. Note the discharge section!
** $F_x = F_{allowable}$; F_u = 2000 N = F_v

LZR 2005-38.44-30 with Plate Carriage

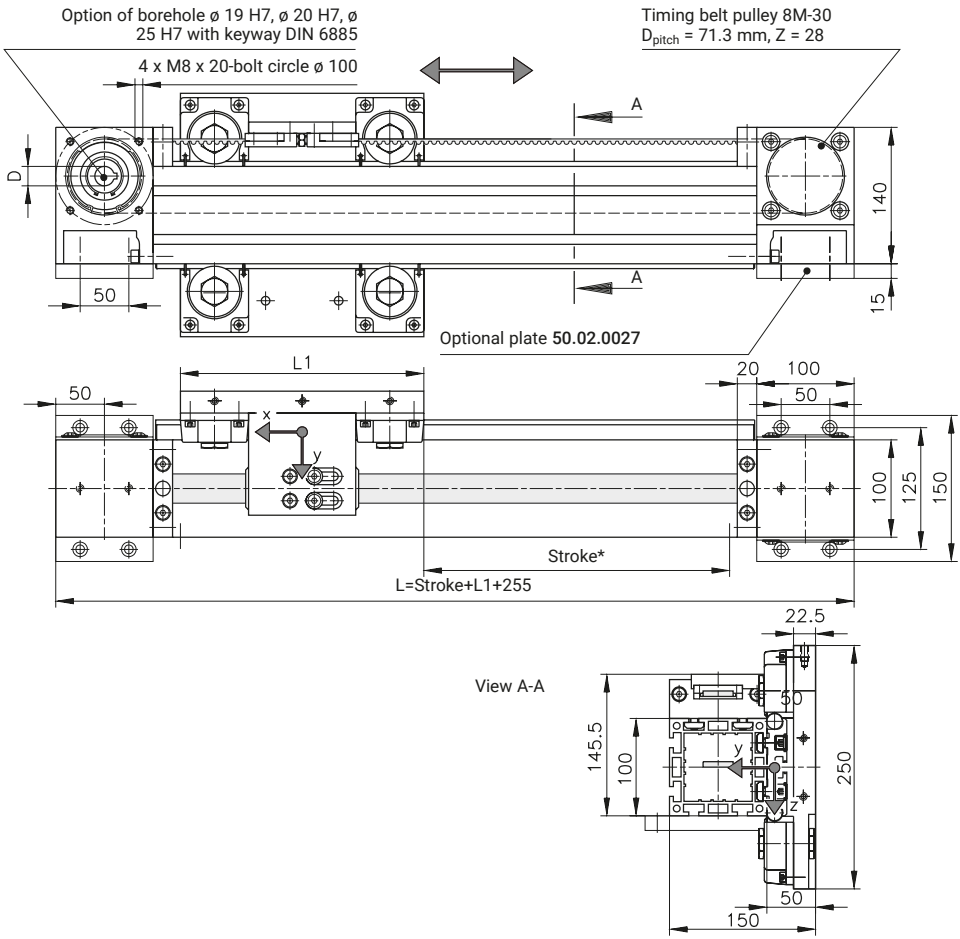


Load Specifications for LZR 2005-38.44-30 with Plate Carriage

Item no.	L1 [mm]	Fx** [N]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]
B38.02.006	250	4000	1600	4000	80	350	150
B38.02.006	450	4000	1600	4000	80	760	300

* Maximum stroke between the mechanical stops. Note the discharge section!
** $F_x = F_{allowable}$; F_u = 2000 N = F_v

LZR 2005-38.44-30 with Side Plate Carriage

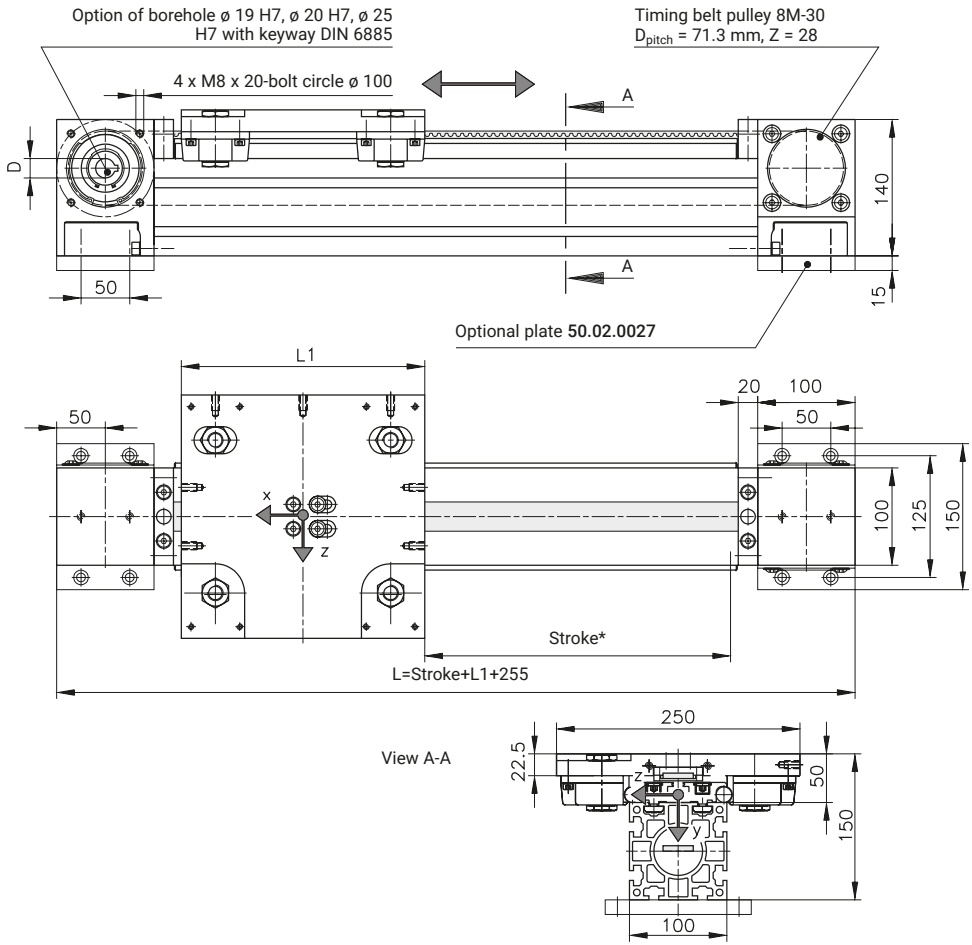


Load Specifications for LZR 2005-38.44-30 with Side Plate Carriage

Item no.	L1 [mm]	Fx** [N]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]
B38.02.009	250	4000	1600	4000	80	350	150
B38.02.009	450	4000	1600	4000	80	760	300

* Maximum stroke between the mechanical stops. Note the discharge section!
** $F_x = F_{allowable}$; F_u = 2000 N = F_v

LZR 2011-38.44-30 with Plate Carriage



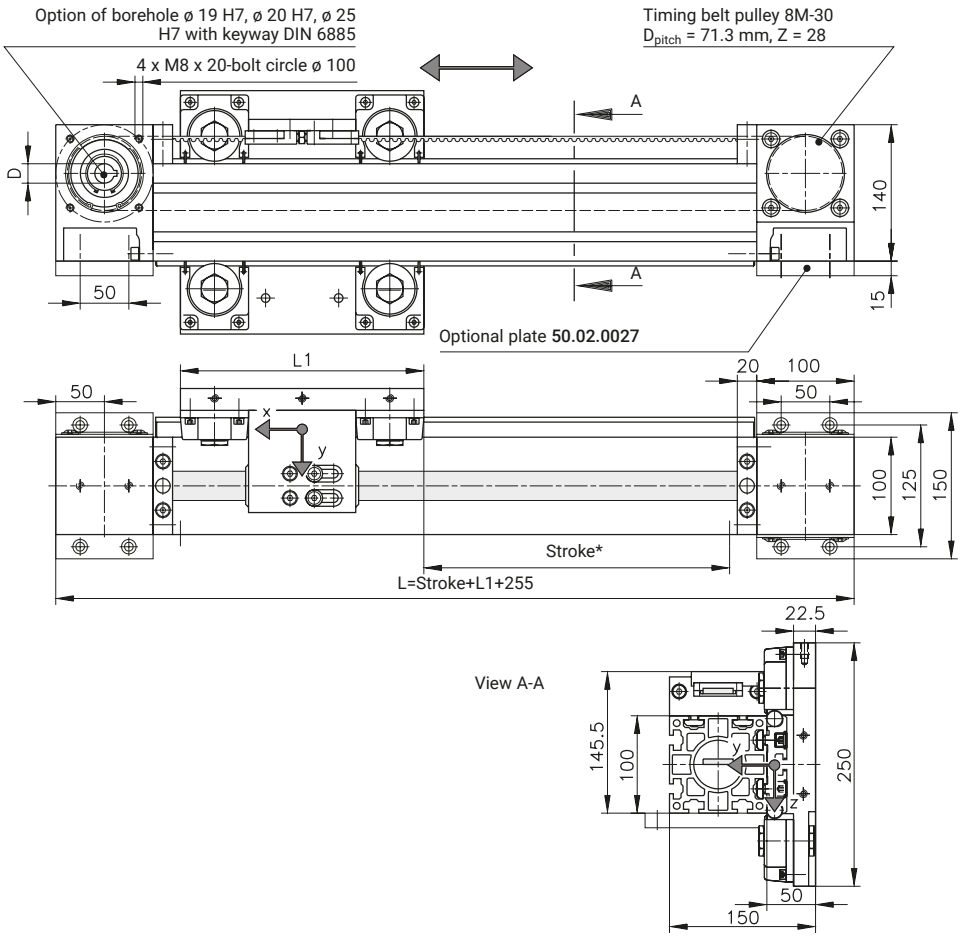
11

Load Specifications for LZR 2011-38.44-30 with Plate Carriage

Item no.	L1 [mm]	Fx** [N]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]
B38.02.011	250	4000	1600	4000	80	350	150
B38.02.011	450	4000	1600	4000	80	760	300

* Maximum stroke between the mechanical stops. Note the discharge section!
** $F_x = F_{allowable}$; F_u = 2000 N = F_v

LZR 2011-38.44-30 with Side Plate Carriage



Load Specifications for LZR 2011-38.44-30 with Side Plate Carriage

Item no.	L1 [mm]	Fx** [N]	F_{y0} [N]	F_{z0} [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]
B38.02.010	250	4000	1600	4000	80	350	150
B38.02.010	450	4000	1600	4000	80	760	300

* Maximum stroke between the mechanical stops. Note the discharge section!
** $F_x = F_{allowable}$; F_u = 2000 N = F_v

Recirculating Ball Bearing Guides

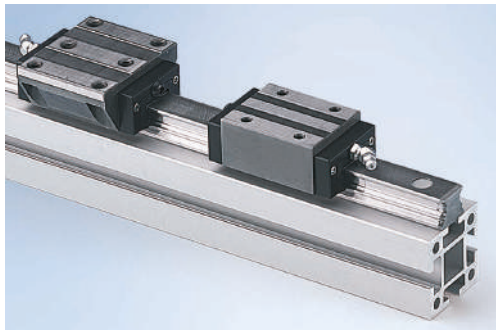
11

» Compact linear units with recirculating ball bearing guide. «

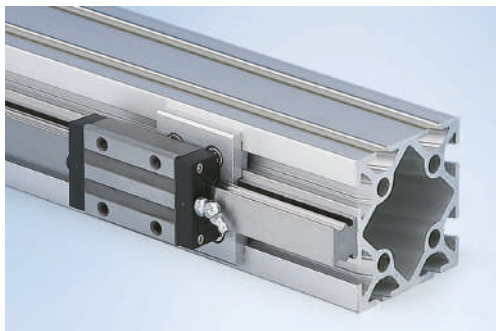
Recirculating ball bearing guides feature high load capacity along with outstanding precision. They have a very compact design. The recirculating ball bearing units can bear loads along multiple axes and are extremely stiff thanks to the steel rails mounted on the guide profile.

A recirculating ball bearing unit consists of a track and a guide carriage with four rows of interior ball bearings, which are recirculated in closed channels with plastic recirculation mechanisms. The recirculating ball bearing unit's roller carriage consists of hardened, ground steel and can be slid directly from the guard rail onto the track.

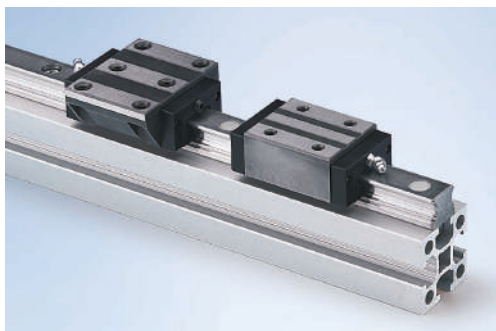
Our standard guide carriages are lightly pre-tensioned, making them suitable for most common applications. You may require higher pre-tension or no pre-tension, depending on your requirements. The guide carriages are custom-tailored to your specific conditions.

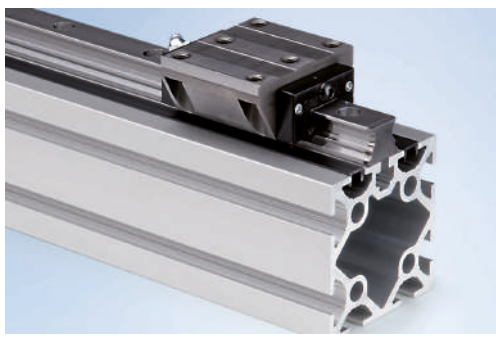


Benefits of mk Recirculating Ball Bearing Guides



- High load capacity and high stiffness
- Compact design
- Just one track for different types of roller carriage
- Lightly pre-tensioned (standard), available with play or high pre-tension
- Medium to high acceleration up to a = 30m/s²
- Medium to high speed up to v = 5 m/s
- Four-row multi-axial recirculating ball bearing guide bears loads in all directions (forces and torques)
- High precision with appropriate contact surfaces





Recirculating Ball Bearing Units

General design

mk recirculating ball bearing units consist of a track and the guide carriage.

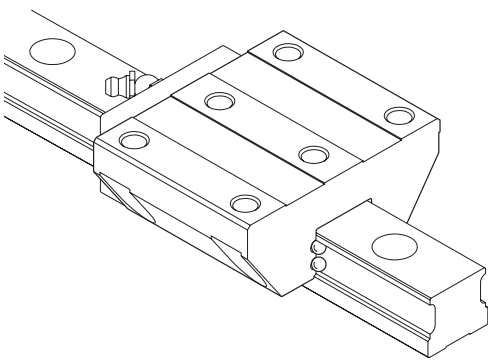
The roller carriage for the recirculating ball bearing unit is made from hardened and ground steel. Closed channels with plastic recirculation mechanisms recirculate the four rows of ball bearings. The roller carriage can be slid directly from the guard rail onto the track.

The recirculating ball bearing units can carry loads from any direction and have very rigid, heavy-duty linear guides.

The standard mk guide carriages are lightly pre-tensioned, making them suitable for most common applications. If multiple carriages are arranged on a rail or in parallel, then we recommend using carriages with no pre-tension and little play to provide better misalignment compensation and ease of movement.

For products with high rigidity or fluctuating loads, we recommend carriages with strong pre-tension and precise, rigid contact surfaces. mk can supply these versions on request.

The specified maximum load specifications already take into account a static safety factor of s0 = 5 in relation to plastic deformation on the roller contact, and s0 = 2 for screw connections with 8.8 screws.



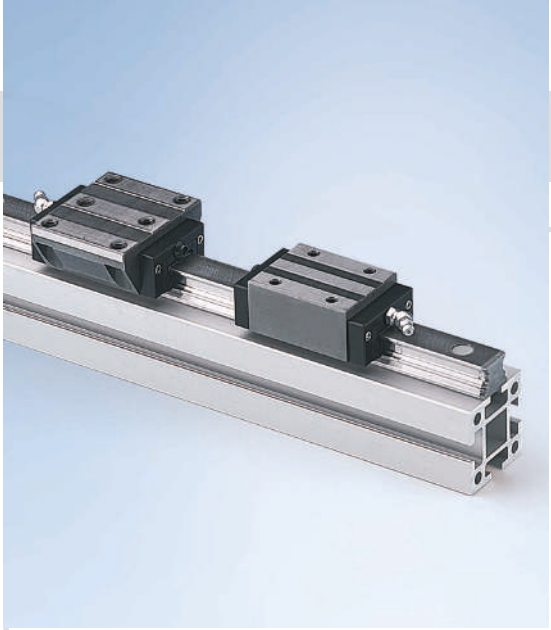
Sample order for a guide

Recirculating ball bearing guide	**KU 25.10**
Item no.	**B51.04.404**
Size	= .....mm
Length	L = ...mm

Sample order for a carriage

Guide carriage	**KU 25.11**
Item no.	**K116041125**
Size	= .....mm
Carriage	Normal

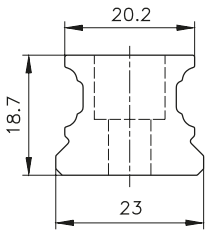
Notes



Recirculating Ball Bearing Guide KU 25.10

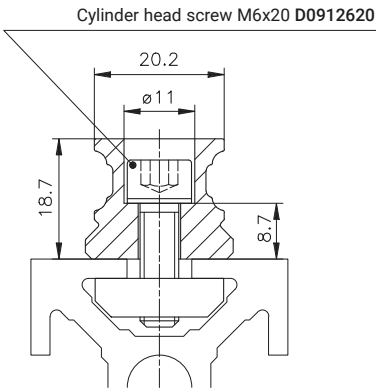
The track KU 25.10 must be combined into one unit with the guide carriages KU 25.11 and KU 25.13. However, they must be ordered individually.

The KU 25.10 track is especially suitable for Series 40 and 50. Due to its small contact surface, it is not suitable for the 14 mm slot in Series 60.



Track KU 25.10
K116041025

m = 2.7 kg/m



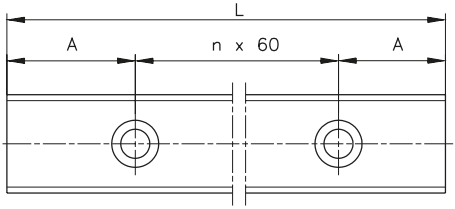
Track KU 25.10 with mounting elements
B51.04.404

Borehole spacing specifications

Support rail, L up to 1980 mm, single piece

Scope of application for A: 20 ≤ A < 50

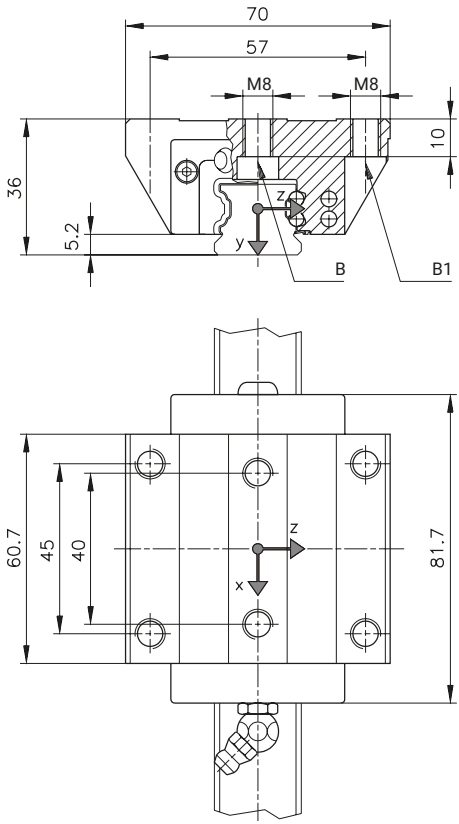
$$N = \frac{L1-(2 \times A)}{60} + 1 \text{ (+1 per joint)}$$



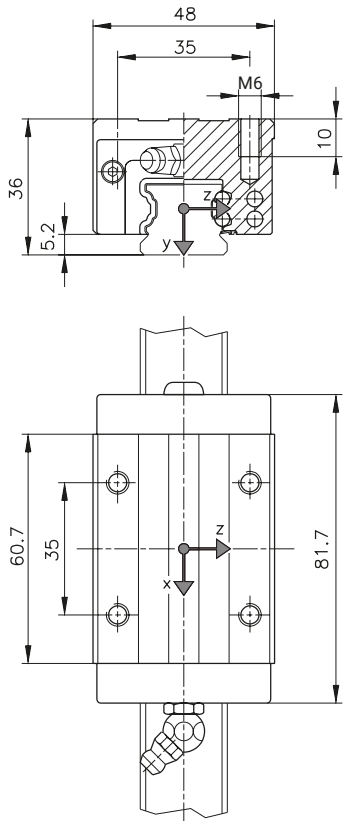
L1 = length of the support rail
A = distance from the first borehole to the profile edge (symmetrical)
N = number of screws

Guide Carriages

Guide carriage, normal
KU 25.11



Guide carriage, narrow
KU 25.13



B= through-bore for screw M6 DIN 6912
B1= through-bore for screw M6 DIN EN ISO 4762

Load specifications

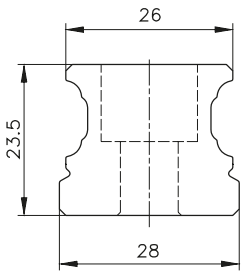
Item no.	Designation	F_{y0} [N]	F_{z0}* [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	C_0 [N]	C_0 [N]	$m_{carriage}$ [kg]
K116041125	KU 25.11	7000	7000	75	75	75	37,000	17,900	0.71
K116041325	KU 25.13	7000	7000	75	75	75	37,000	17,900	0.56

*Lateral load without close fit,
only frictional connection on design profile with screw 8.8 – reduced to 2000N

Recirculating Ball Bearing Guide KU 30.10

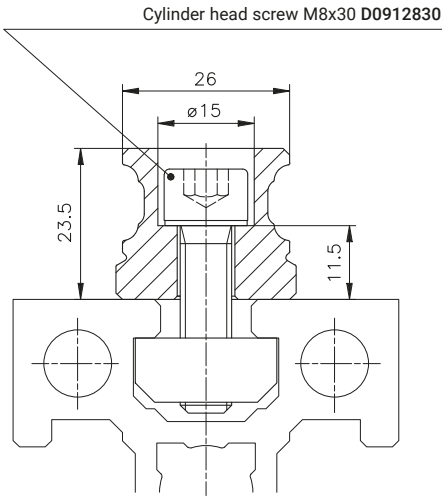
The track KU 30.10 must be combined into one unit with the guide carriages KU 30.11 and KU 30.13. However, they must be ordered individually.

The KU 30.10 track is especially suitable for Series 60.



Track KU 30.10
K116041030

m = 4.3 kg/m



Track KU 30.10 with mounting elements
B51.04.406

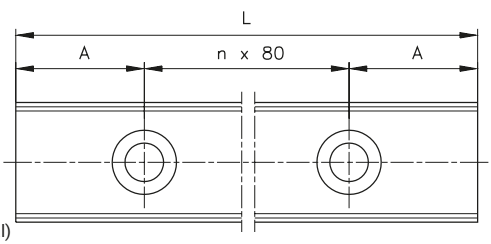
Borehole spacing specifications

Support rail, L1 up to 2000 mm, single piece

Scope of application for A: 20 ≤ A < 60

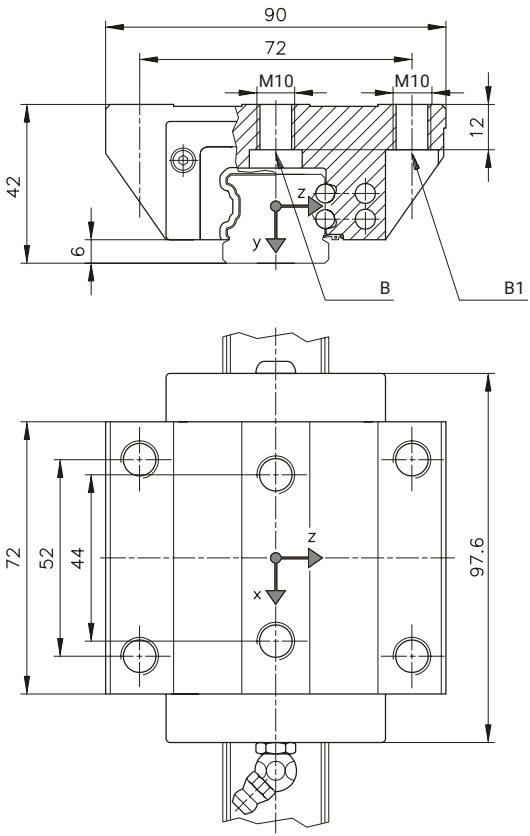
$$N = \frac{L1-(2 \times A)}{80} + 1 \text{ (+1 per joint)}$$

L1 = length of the support rail
A = distance from the first borehole to the profile edge (symmetrical)
N = number of screws

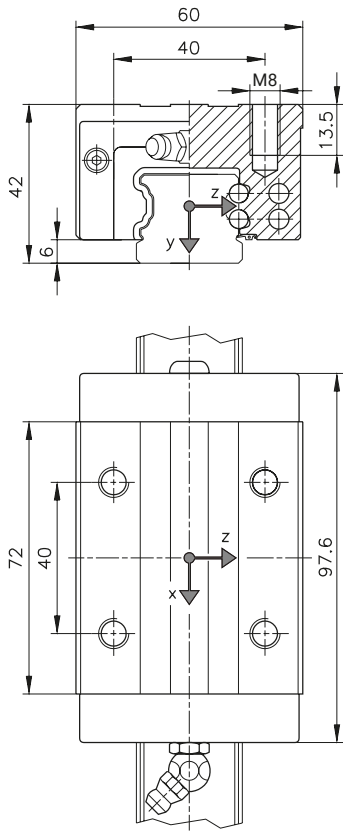


Guide Carriages

Guide carriage, normal
KU 30.11



Guide carriage, narrow
KU 30.13



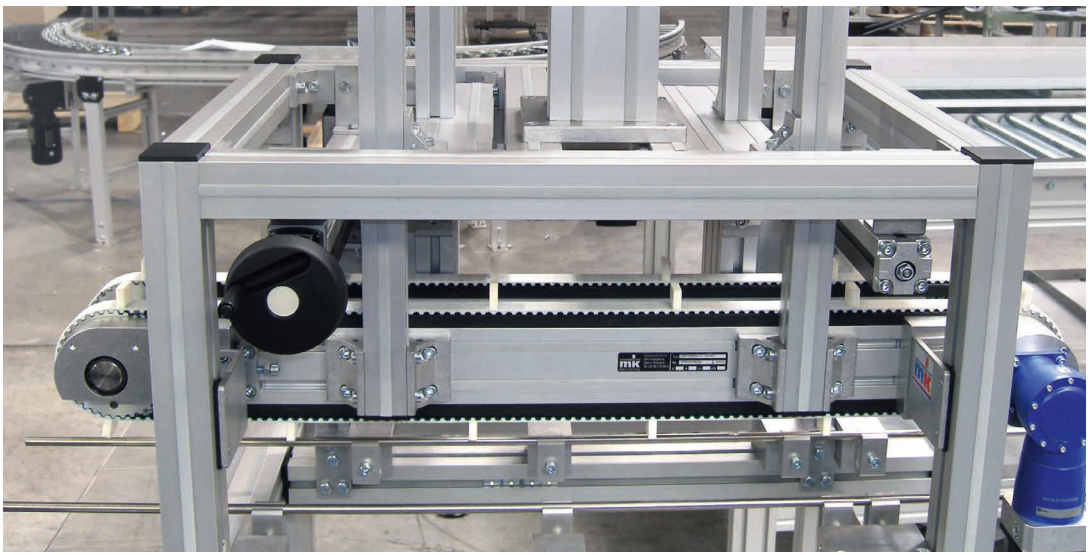
B= through-bore for screw M8 DIN 6912
B1= through-bore for screw M8 DIN EN ISO 4762

Load specifications

Item no.	Designation	F_{y0} [N]	F_{z0}* [N]	M_{x0} [Nm]	M_{y0} [Nm]	M_{z0} [Nm]	C_0 [N]	C_0 [N]	$m_{carriage}$ [kg]
K116041130	KU 30.11	10000	10000	140	140	140	55,000	27,500	1.4
K116041330	KU 30.13	10000	10000	140	140	140	55,000	27,500	1.09

*Lateral load without close fit,
only frictional connection on structural profile with screw 8.8 – reduced to 3500N

Application Examples

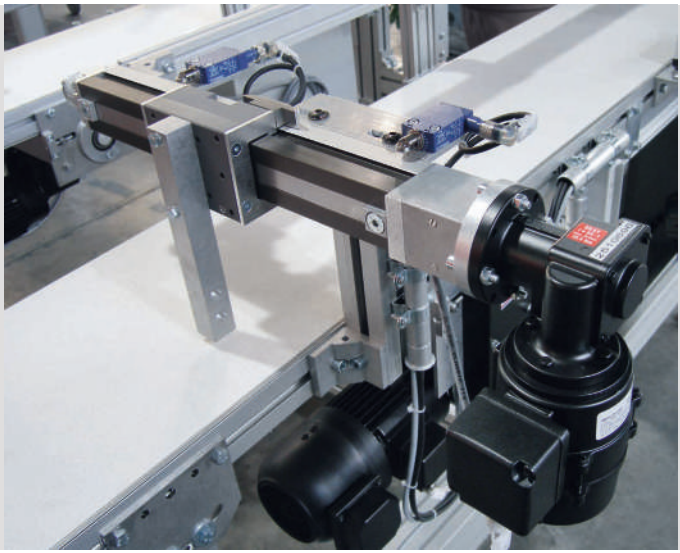


Dual VST 2015 with coupling via timing belts for width adjustment of the ZRF-P 2040.02 cycle conveyor

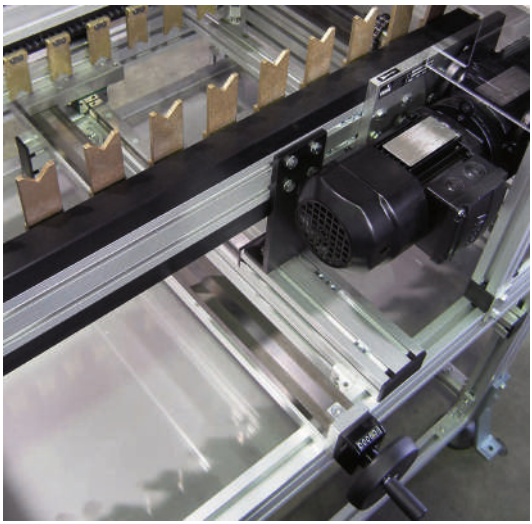
Dual VST 2015 with manual digital display for adjusting the stop bar

System 2015 adjusting units with handwheel and scaling

Electromotive VST 2015 with recirculating ball bearing guide



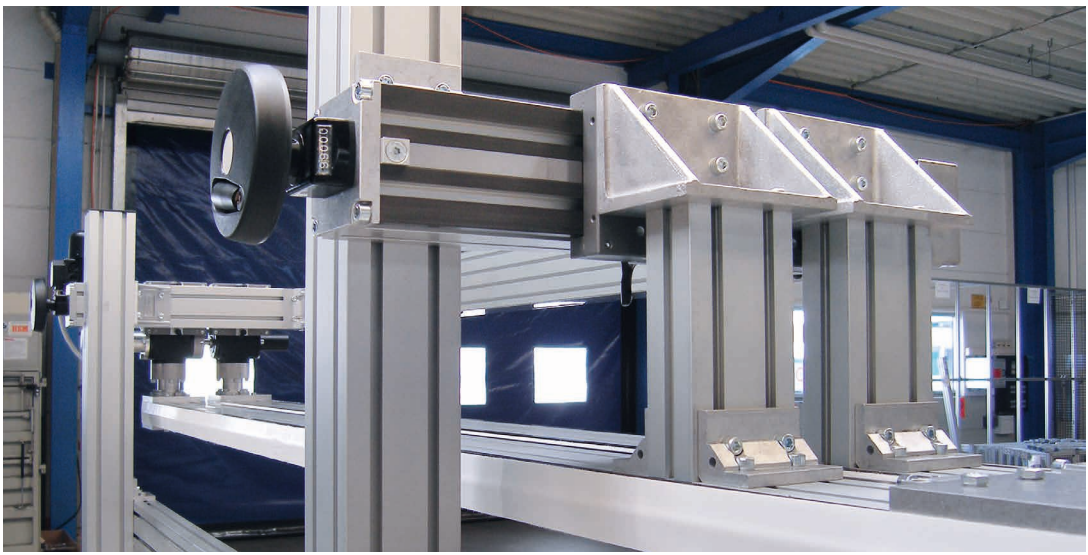
Dual electromotive VST 2015 for automatic width adjustment with scanning via safety limit switch



Dual VST 2015 with parallel recirculating ball bearing guide for supporting the load

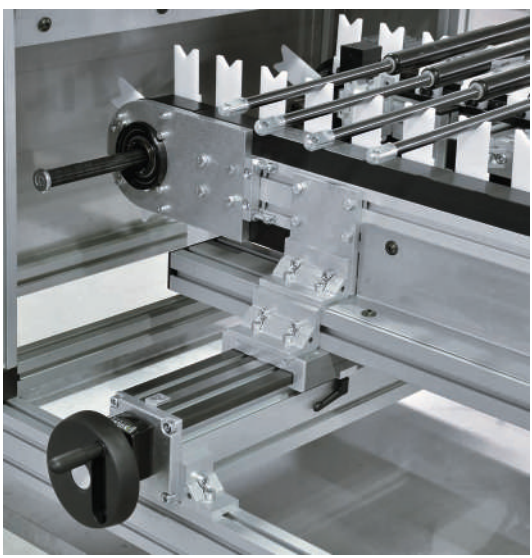
Manual two-axis adjustment system for holding a marking device with VST 2015

Application Examples



Dual VST 2011 for manual lane width adjustment on a side conveyor

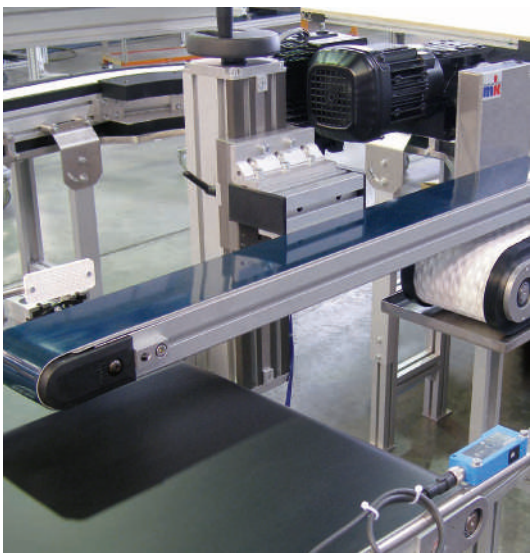
11



VST 2011 adjusting unit used for semi-automatic conveyor width adjustment in a chain conveyor system

Electromotive VST 2011 with custom measuring system on LZR 2005-38.44-30

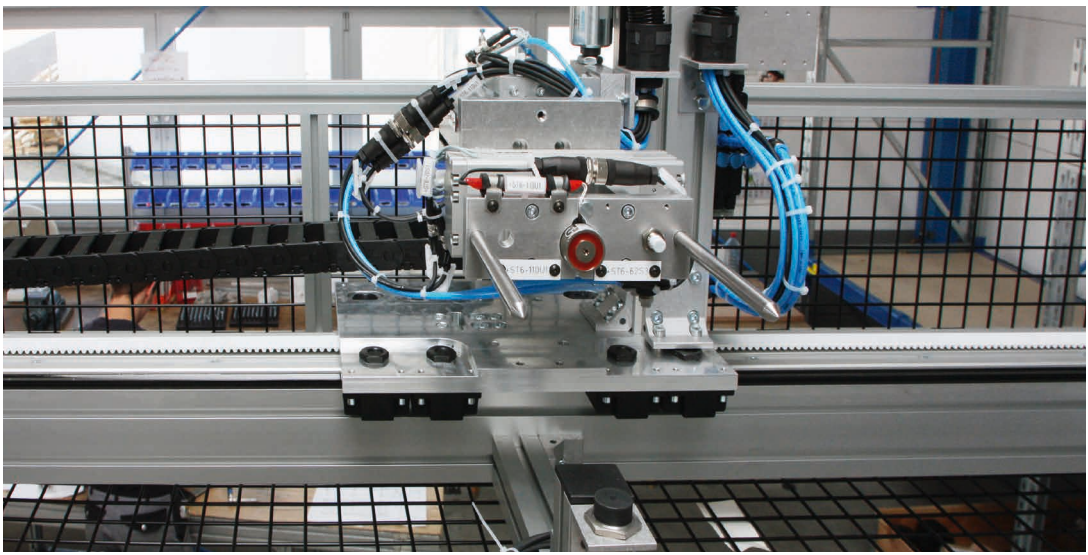
VST 2011 with two counter-rotating slide carriages and digital display for adjusting the width of the pneumatic centring unit on the modular belt conveyor



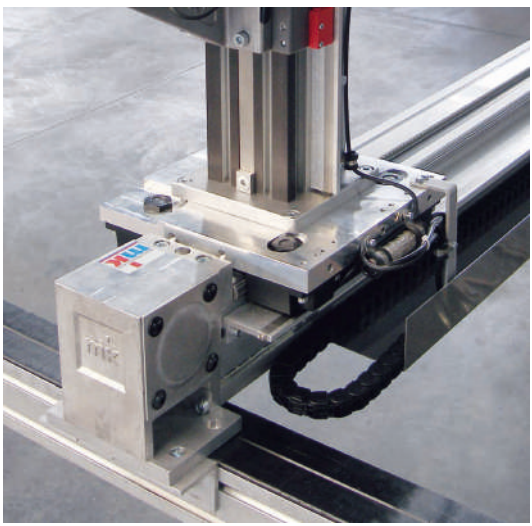
VST 2011-H with handwheel as add-on kit for the belt conveyor with incline adjustment

System mk 2011 adjusting unit for brush cantilever

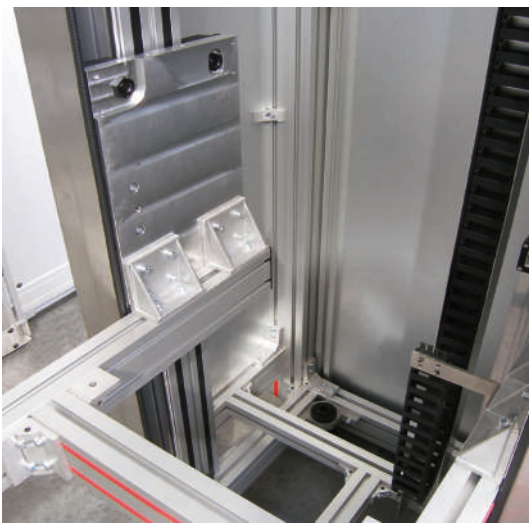
Application Examples



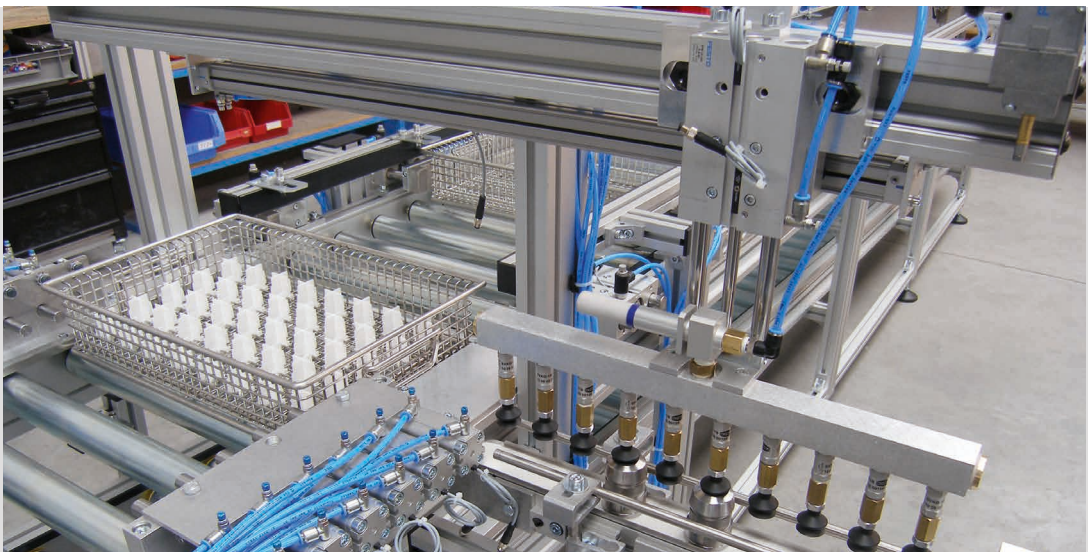
Horizontal slides comprised of linear module type LZR 2005-38.44-30 with fork grippers and swivel unit for moving and emptying workpiece baskets



Linear module type LZR 2005-38.44-30 as a direct length measuring system with measuring head on the roller carriage

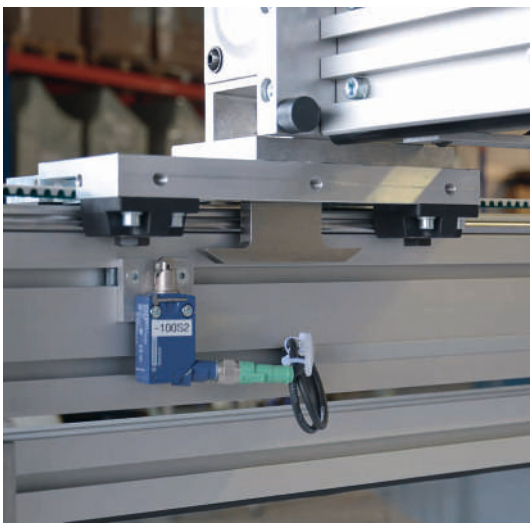


Double-LZR 2005-38.44-30 with side carriage plate and cantilever for conveyor as lift



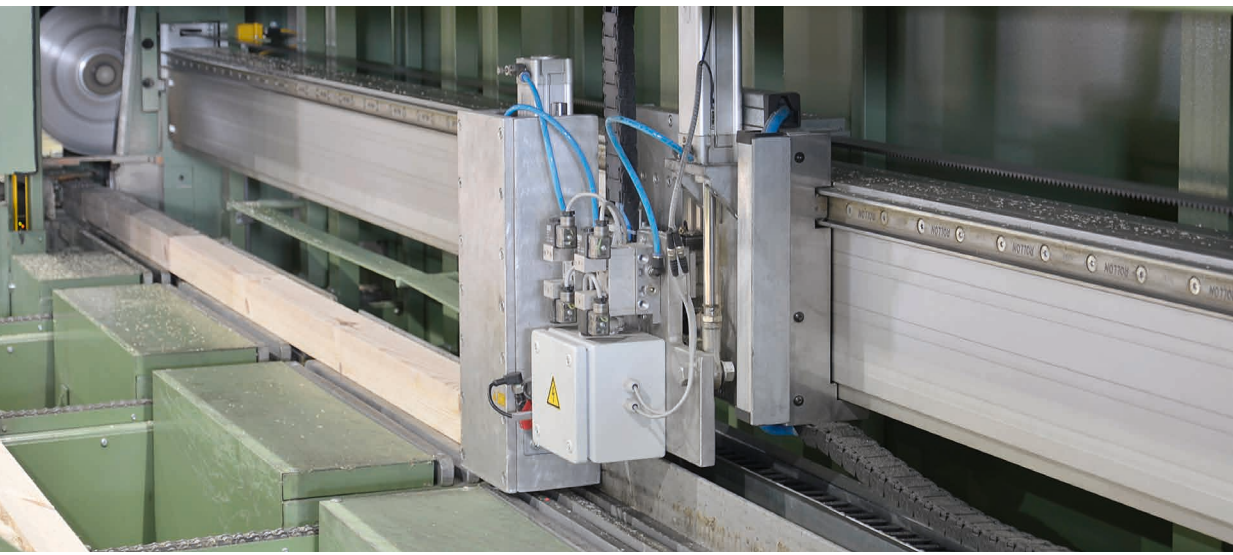
Pneumatic linear module with PF 38.77 and LW 38.77-44
as a transfer unit with 10 vacuum suction grippers

Linear unit LZR 2004-38.41-30 as a
height adjustment unit for an assembly
and testing workstation



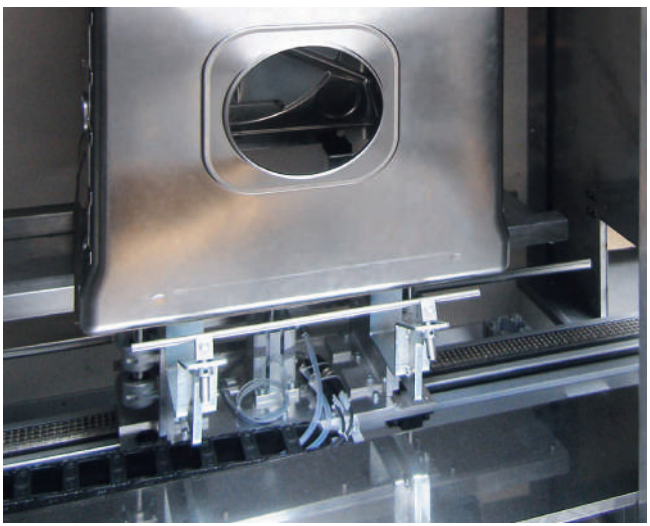
Linear unit LZR 2004-38.41-30
drive coupled via a slip clutch

Application Examples

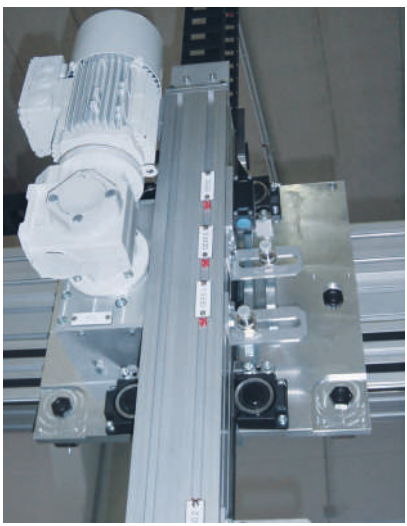


LZR Series 60 linear module based on the mk 2060.07 profile with track rollers and rails from Rollon

11

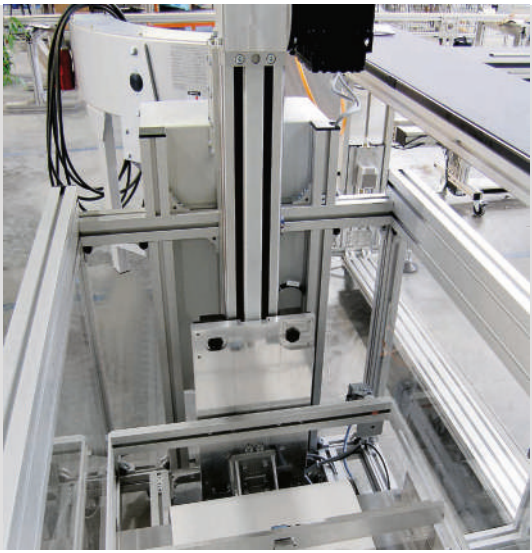


Linear module with chain for HT range and in ESD version Product intake with pneumatic lift for lifting/depositing before, in and after the oven

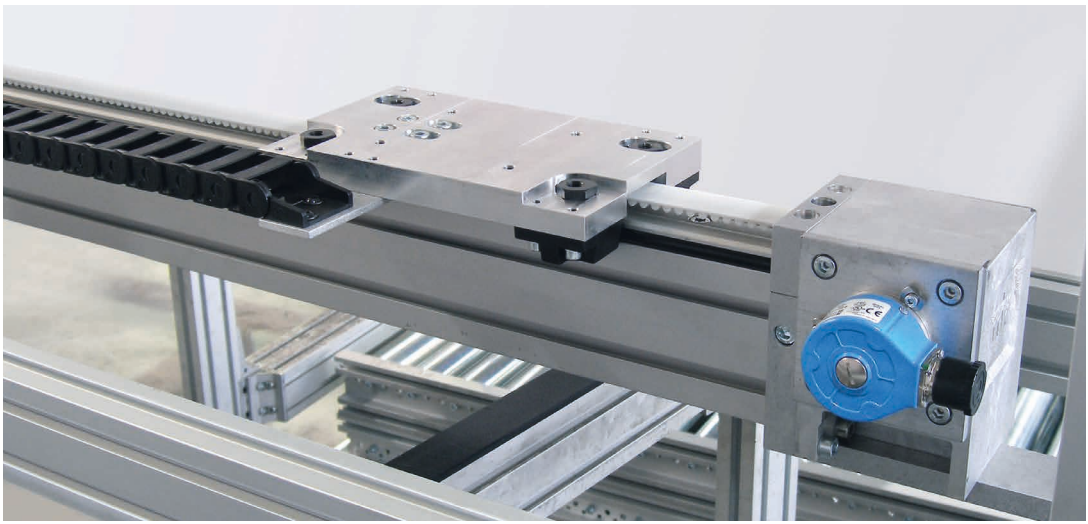


Gantry with LZR 2005 on foamed combined profile Roller carriage with support rollers as cross-carriage with LZR 2005 and Omega drive as X-Z surface gantry

Base LZR 2005-38.44-30 with side roller carriage on foamed combined profile as gantry, with support rollers for torque loads and manual VST 2011 as Z axis



Linear module type LZR 2005-38.44-30 with motor and controller as a lift with a belt conveyor

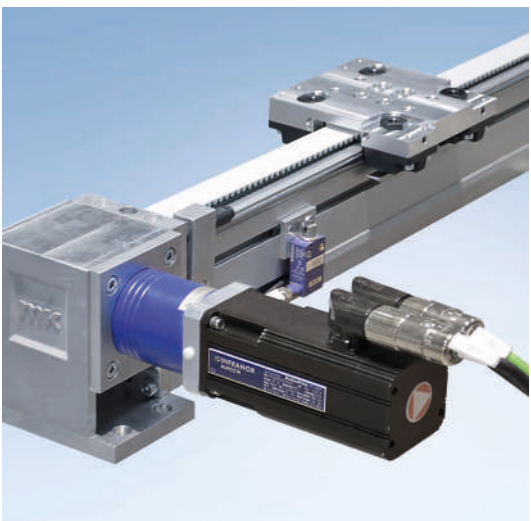


Linear module type LZR 2004-38.41-30 with absolute value rotary encoder mounted on the tail

Application Examples

Dual LZR 2005-38.44 with cantilever for dual ZRF-P 2010 for lift and transfer from a dual ZRF-P as a lift-and-transfer module

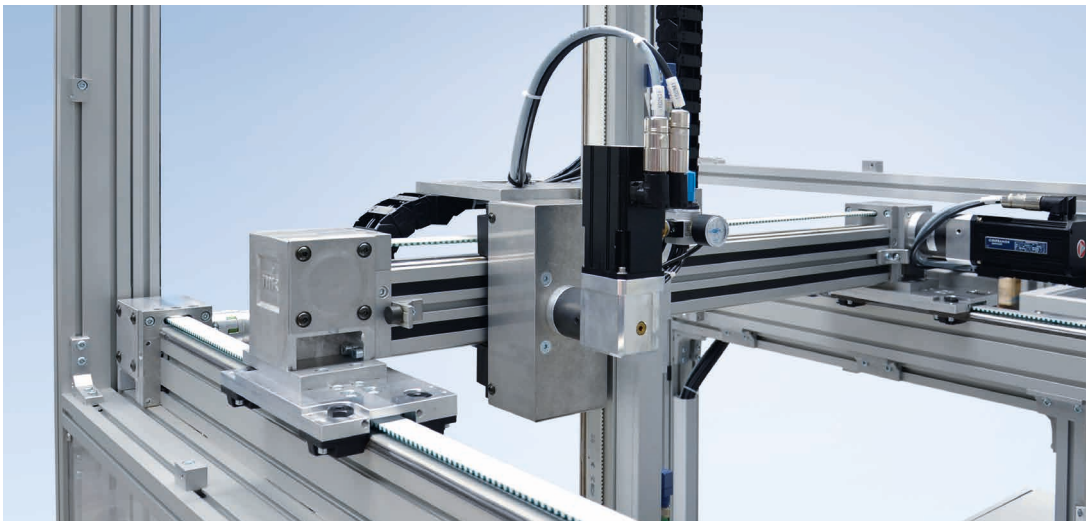
Dual-axis linear module comprising LZR 2011-38.44.30 with side plate carriage



LZR 2004-38.41-30 with servo gearmotor from Infranor

Dual LZR 2005 as lift in steel rack

Dual linear module type LZR 2005-38.44-30 with cantilever for conveyor as a lifting unit

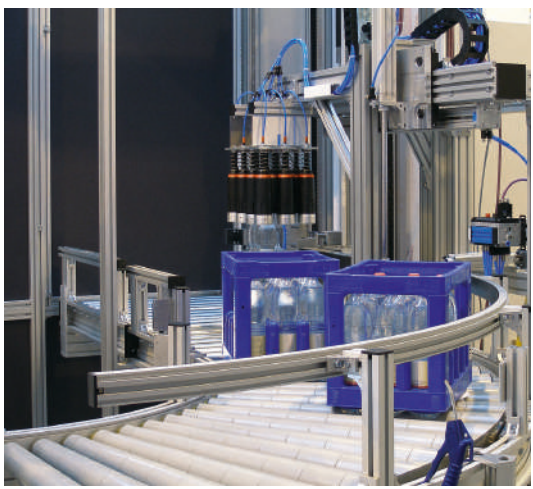


Three-axis gantry with driven linear modules, gripper and controller

Application Examples

Two-dimensional gantry with vacuum gripper as a handling and loading system for steel. Two independent loading systems on a common X axis with gear rack with track rollers and riding rack drive

X-Z gantry with gripper for transferring crankshafts. X axis as LZR with support roller and timing belts, Z axis with timing belt Omega drive and fall arrest

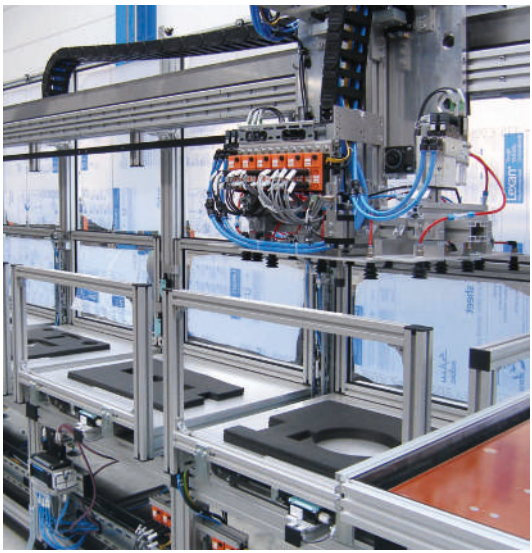


X-Z axis combination with pneumatic drive and vacuum grippers for loading and unloading beverage crates

Gantry stand with telescopic gripper unit

Horizontal axis with foamed combined profile for reinforcement

Lift for storage system



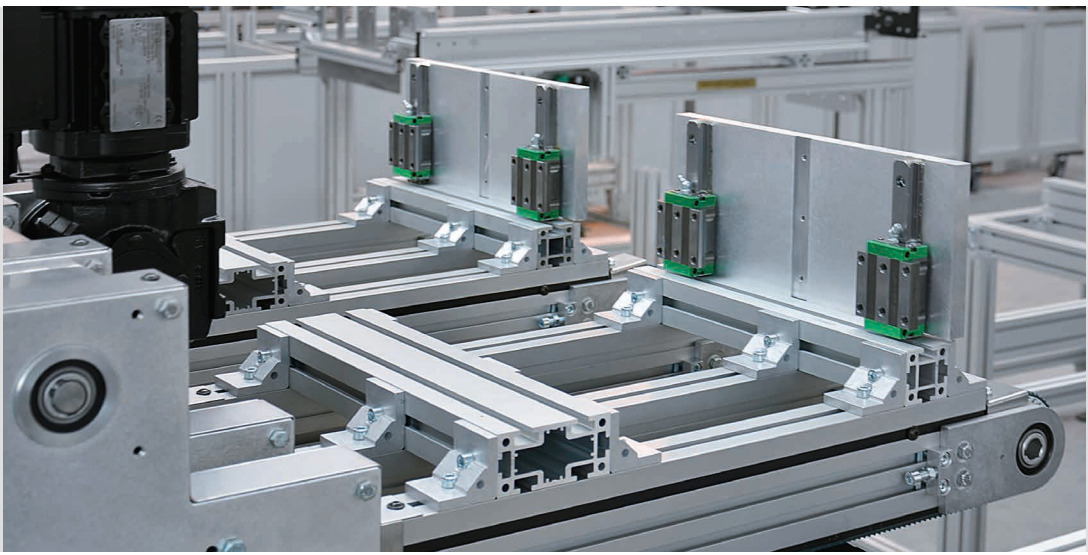
X-Z gantry with additional pneumatic weight balancing as a holder for a vacuum gripping system

Short stroke lift based on PF-38.44 linear guide system

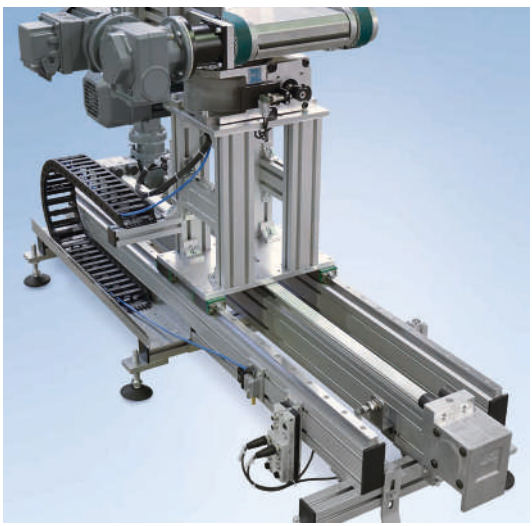
Application Examples

Lift station for lifting and lowering conveyors on two conveyor levels. Cross-conveyor unit with recirculating ball bearing guides positioned horizontally in the frame

Recirculating ball bearing guide for manual lane width adjustment and for clamping the pneumatic centring device and electromotive rotating unit



Lifting unit with KU 25 recirculating ball bearing guide and angle bracket



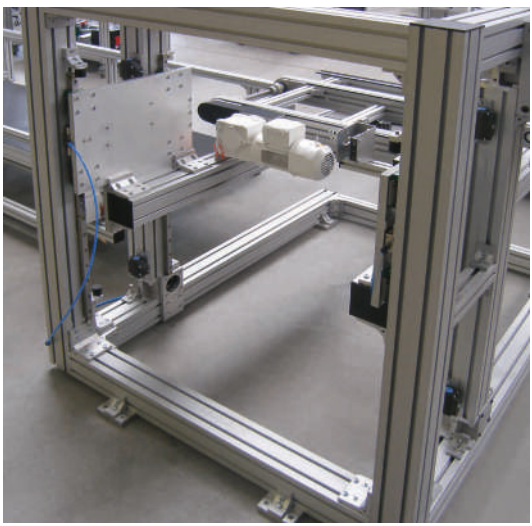
Shuttle system with rotary indexing table for pallet transport, guided via a double linear axis with recirculating ball bearing guide

Frame for stress testing based on KU 30.10 recirculating ball bearing guide

Application Examples

Gantry for handling sleeves. The X axis is moved by a dual linear module with a KU 30.30 recirculating ball bearing guide

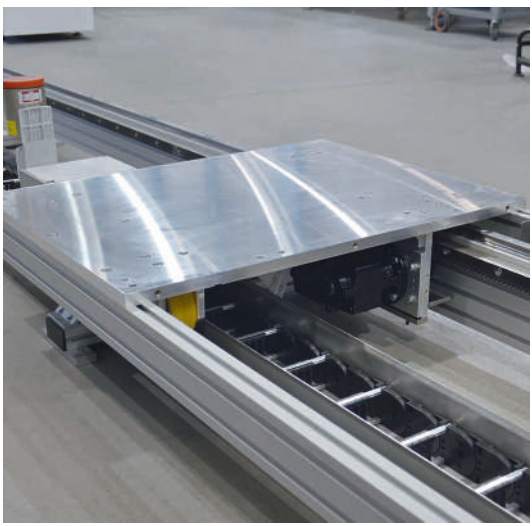
11



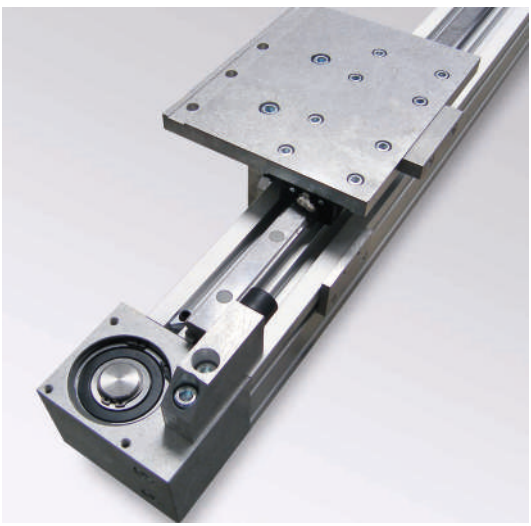
Lifting unit with LZR with recirculating ball bearing guide KU 25 with profile cantilever for supporting the ZRF-P 2010 conveyor

Two-track feed for machine loading. The separator can be adjusted for various diameters using a recirculating ball bearing guide

Timing chain conveyor with alignment unit for camshafts using recirculating ball bearing guide



Transfer shuttle with pallet carriers, carriage with recirculating ball bearing guide



LZR with recirculating ball bearing guide