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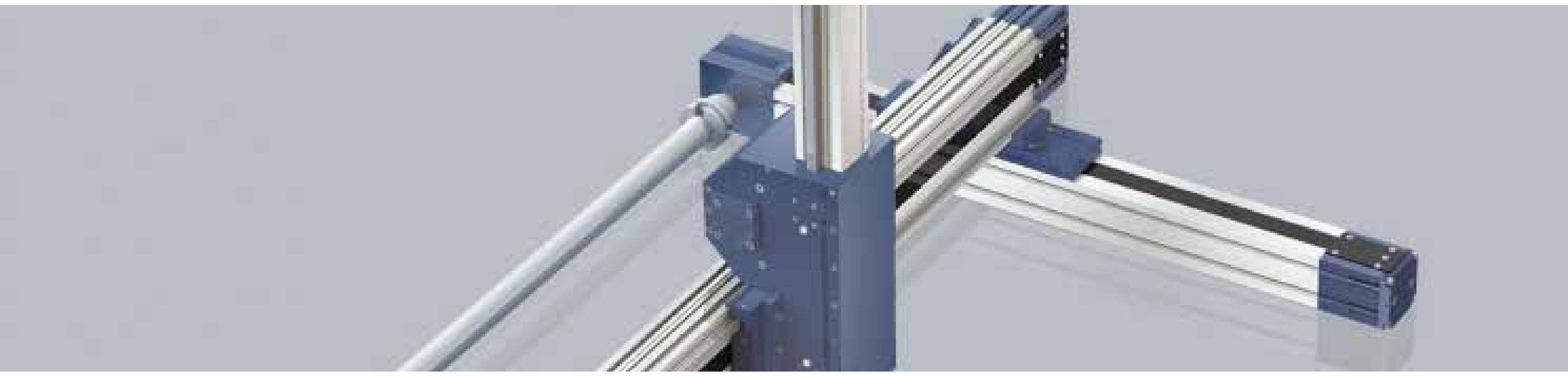

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ROLLON®

Linear Evolution

Linear Line

www.rollon.com

When you move, we move.

RollonSrl was set up in 1975 as a manufacturer of linear motion components. Today Rollon group is a leading name in the design, production and sale of linear rails, telescopic rails and actuators, with headquarters based in Italy and offices and distributors located throughout the world. Rollon products are used in many industries with creative and efficient solutions in a wide range of applications used on a daily basis.

When you move, we move.

Content

Compact Rail

X Rail

Easy Rail

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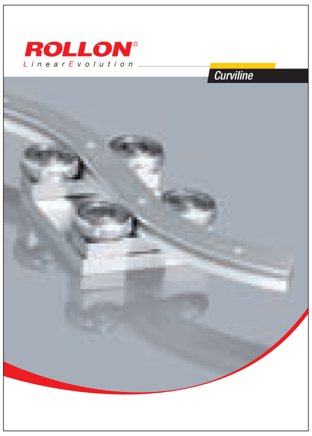
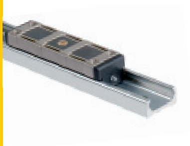
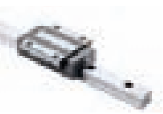
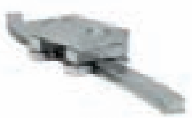
Curviline



Technical features overview

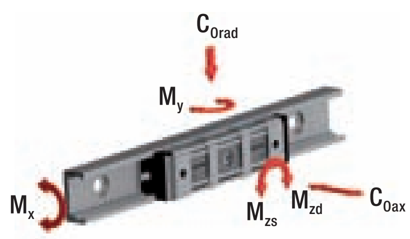
Reference			Section	Shape of rail	Hardened raceways	Self-alignment	Slider		Anticorrosion
Family		Product					Balls	Rollers	
Compact Rail		TLC KLC ULC			√	+++			
X-Rail		TEX TES UEX UES				+++			
Easy Rail		SN			√				
		SNK			√				
Mono Rail		MR			√				
		MMR			√				
Curviline		CKR CVR							

Reported data must be verified according to the application.

For a complete overview about technical data, please consult our catalogues at www.rollon.com.

* The maximum value is defined depending on the application.
** Longer stroke is available for jointed version.
*** C 50

Size	Max. load capacity per slider [N]		Max. dynamic load capacity [N] C 100	Massimo momento [Nm]			Max. rail length [mm]	Max. running speed* [m/s]	Max. acceleration [m/s²]	Operating temperature
	C_0 rad	C_0 ax		M_x	M_y	M_z				
18-28-35 -43-63	15000	10000	36600	350	689	1830	4080**	9	20	-30°C/+120°C
20-30-45	1740	935					3120	1.5	2	-30°C/+100°C TEX-UEX -30°C/+120°C TES-UES
22-28-35 -43-63	122000	85400	122000	1120,7	8682	12403	1970	0,8		-30°C/+130°C
43	10858	7600	10858	105	182	261	2000**	1,5		-20°C/+70°C
15-20-25-30-35-45-55	249000		155000***	5800	6000	6000	4000**	3,5	20	-10°C/+60°C
7-9-12-15	8385		5065	171,7	45,7	45,7	1000**	3	250	-40°C/+80°C
16,5-23	1615	1130					3240	1,5	2	-30°C/+80°C



ROLLON®

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Compact Rail

Product explanation

Compact Rail is the product family of roller slider systems

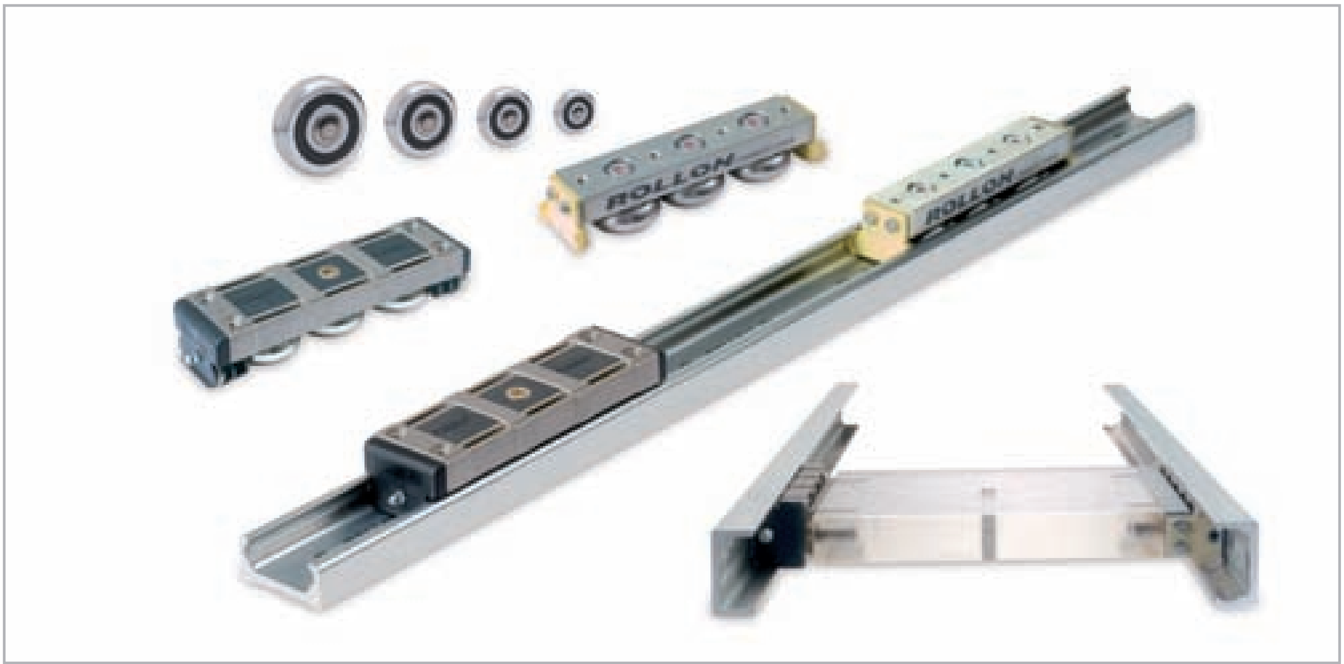


Fig. 1

Compact Rail is the product family of guide rails consisting of roller sliders with radial bearings which slide on the internal, induction hardened and ground raceways of a C-profile made from cold-drawn roller bearing carbon steel.

Compact Rail consists of three product series: the fixed bearing rail, the compensating bearing rail and the compensation rail. All products are available in zinc plating, with nickel plating also available as an option. There are five different sizes of guide rails and many different version and lengths of the slide bearing.

The most important characteristics:

- Compact size
- Corrosion resistant surface
- Not sensitive to dirt due to internal tracks
- Hardened and ground raceways
- Custom design TR-rail, also ground on the back of the rail and one side surface
- Self-aligning in two planes
- Quieter than recirculating ball systems
- High operating speeds
- Wide temperature range
- Easy adjustment of slider in the guide rail
- Zinc plated surface, on request chemically nickel plated

Preferred areas of application:

- Cutting machines
- Medical technology
- Packaging machines
- Photographic lighting equipment
- Construction and machine technology (doors, protective covers)
- Robots and manipulators
- Automation
- Handling

Fixed bearing rails (T-rails)

Fixed bearing rails are used as the main load bearing in radial and axial forces.

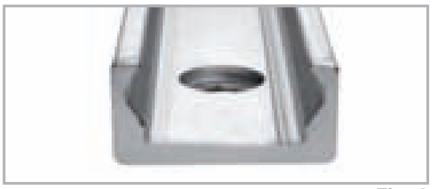


Fig. 2

Fixed bearing rails (TR-rails)

The TR rail is also available as a custom design. The TR rail is ground on the back of the rail and one side surface to allow for a closer mating onto the surface.

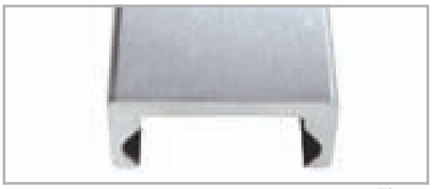


Fig. 3

Floating bearing rails (U-rails)

The floating bearing rails are used for load bearing of radial forces and, in combination with the fixed bearing rail or compensation rail, as a support bearing for occurring moments.

Fig. 4

Compensation bearing rails (K-rails)

The compensation bearing rails are used for the load bearing of radial and axial forces. Tolerance compensation in two planes can be implemented in combination with the compensating rail.

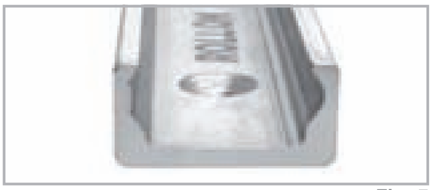


Fig. 5

System (T+U-system)

The combination of fixed bearing rail and floating bearing rail allows for deviations in parallelism.

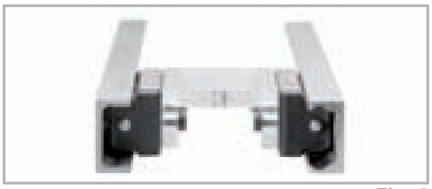


Fig. 6

System (K+U-system)

The combination of compensation rail and floating bearing rail allows for deviations in parallelism and height offset.

Fig. 7

N-slider

Constructed with a closed, chemically nickel plated aluminum die cast body that is available for sizes 18, 28, 43 and 63. Spring preloaded wipers and a self-lubrication kit are integrated in the end caps (except for size 18, see pg. 58). Configurable with three rollers as standard, in sizes 28 and 43 a longer carriage with up to five rollers is also available.

Fig. 8

CS-slider

Constructed with zinc-plated steel body and sturdy wipers (optional) made of polyamide. Available for all sizes. Depending on the load case, slider is configurable with up to six rollers.

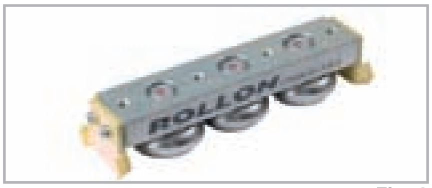


Fig. 9

CD-slider

Constructed with asymmetrical zinc-plated steel body and sturdy wipers (optional) made of polyamide. With this design the fixing of the moving parts, upward or downward is possible. The Slider is available for sizes 28, 35 und 43. Available with three or five rollers, depending on load case and load direction set with the corresponding configuration.

Fig. 10

Rollers

Also available individually in all sizes. Available as eccentric or concentric rollers. Optionally available with splash-proof plastic seal (2RS) or with steel cover disc (2Z).

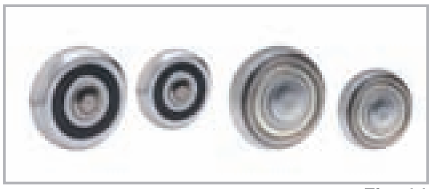


Fig. 11

Wipers

Wipers are available for slider types CS and CD and are made of sturdy polyamide. They keep the raceways free of contamination and thus ensure a longer service life.

Fig. 12

Alignment fixture

The alignment fixture AT / AK is used during installation of joined rails for precise alignment of the rail transition from one to another.

Fig. 13

Technical data

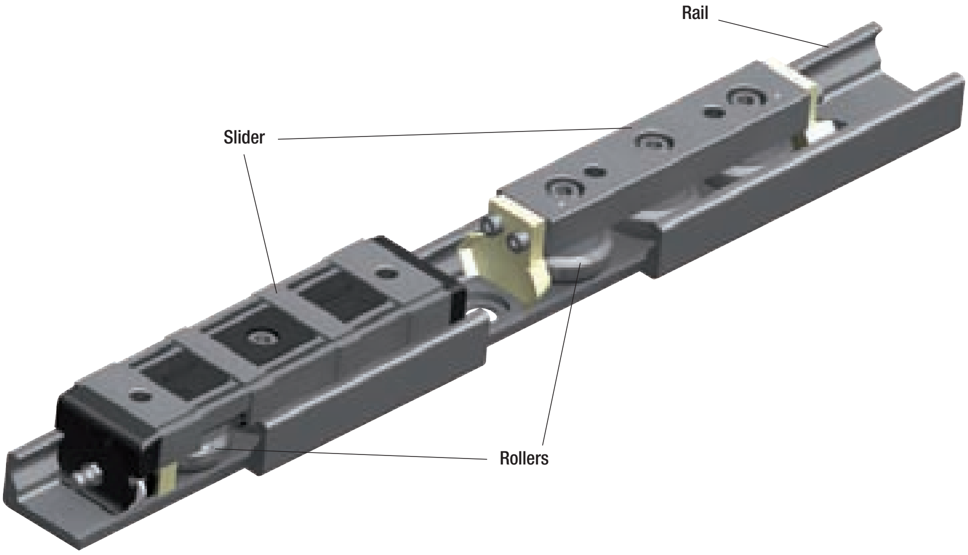


Fig. 14

Performance characteristics:

- Available sizes for T-rail, TR-rail, U-rail: 18, 28, 35, 43, 63
- Available sizes for K-rail: 43, 63
- Max. operating speed: 9 m/s (354 in/s)
(depending on application)
- Max. acceleration: 20 m/s^2 (787 in/s^2)
(depending on application)
- Max. radial load capacity: 15,000 N (per slider)
- Temperature range: -30 °C to +120 °C (-22 °F to +248 °F)
briefly up to max. +170 °C (+338 °F)
- Available rail lengths from 160 mm to 3,600 mm (6.3 in to 142 in)
in 80-mm increments (3.15 in),
longer single rails up to max. 4,080 mm (160.6 in) on request
- Roller pins lubricated for life
- Roller seal/shield: 2RS (splash-proof), 2Z (steel cover disk)
- Roller material: steel 100Cr6
- Rail raceways induction hardened and ground
- Rails and slider bodies are standard zinc-plated according to ISO 2081
- Rail material of T- and U-rails in sizes 18:
cold-drawn roller bearing carbon steel C43 F
- Rail material of K-rails, as well as T- and U-rails in size 28 to 63:
CF53

Remarks:

- The sliders are equipped with rollers that are in alternating contact with both sides of the raceway. Markings on the body around the roller pins indicate correct arrangement of the rollers to the external load
- By a simple adjustment of the eccentric rollers, the slider has clearance set by the desired preload in the rail
- Rails in joined design are available for longer transverse distances (see pg. CR-64)
- The K rails are not suitable for vertical installation
- Screws of property class 10.9 must be used
- Differences in screw sizes must be observed
- During rail installation it must be basically ensured that the fixing holes of the adjacent construction are sufficiently caught hold of (see pg. CR-58, tab. 41)
- The general illustrations show N-sliders as example

Configurations and behavior of the slider under yawing moment M_z

Individual slider under load moment M_z

When an overhanging load in an application with a single slider per rail cause an M_z moment in one direction, a 4 to 6 roller Compact Rail slider is available These sliders are available in both configuration A and B in regards to the roller arrangement to counter the acting M_z moment. The moment capacity of these sliders in the Mz-direction varies significantly through spacing L_1 und L_2 in accordance with the direction of rotation of M_z. Especially in the use of two parallel rails, for example with a T+U-system, it is extremely important to pay attention to the correct combination of the slider configuration A and B, in order to use the maximum load capacities of the slider.

The diagrams below illustrate this concept of the A and B configuration for sliders with 4 and 6 rollers. The maximum allowable M_z-moment is identical in both directions for all 3 and 5 roller sliders.

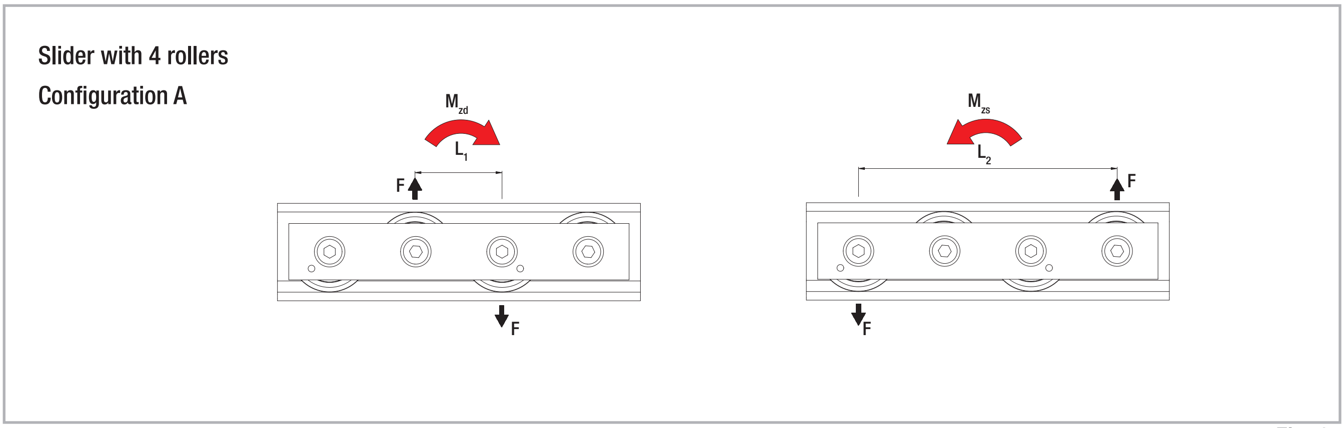


Fig. 15

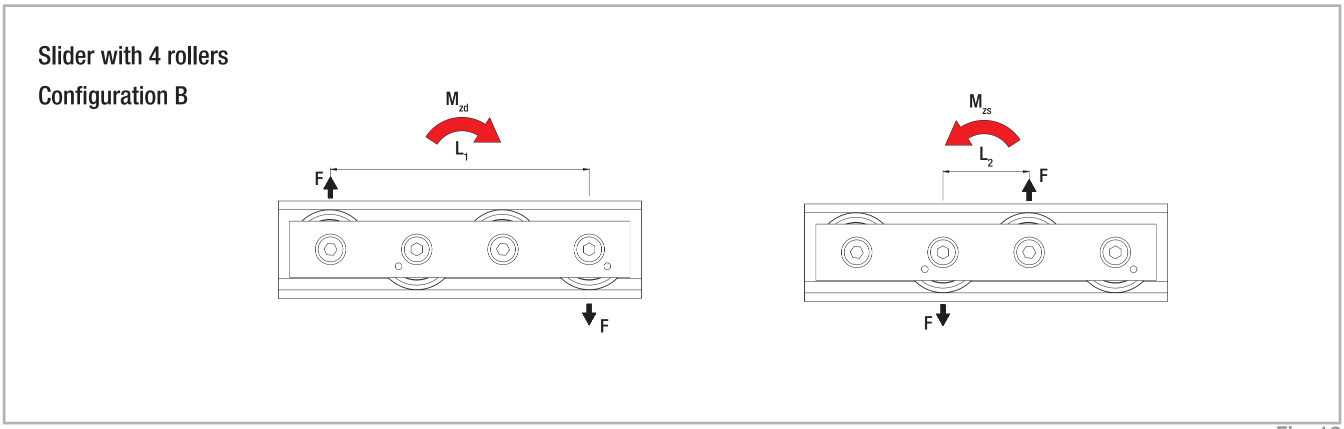


Fig. 16

Two sliders under load moment M_z

If an overhanging load acts in an application with two sliders per rail and thus causes an M_z-moment in one direction, there are differing support reactions with the two sliders. For this reason, an optimal arrangement of different slider configurations to reach the maximum load capacities must be achieved for the application. In practice this means, when using NTE-, NUE- or CS-sliders with 3 or 5 rollers, both sliders are installed rotated by 180° so that the slider is always loaded on the side with the most rollers (with NKE-sliders this is not possible due to the different raceway geometry). For an even number of rollers this has no effect. The CD-slider with installation option from above or below cannot be installed due to the position of the rollers in reference to the installation side therefore they are available in the configurations A and B (see fig. 18).

CS-slider under load moment M_z

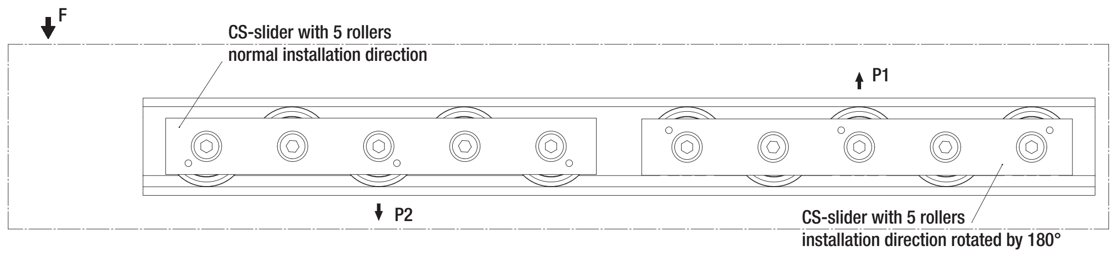


Fig. 17

CD-slider under load moment M_z

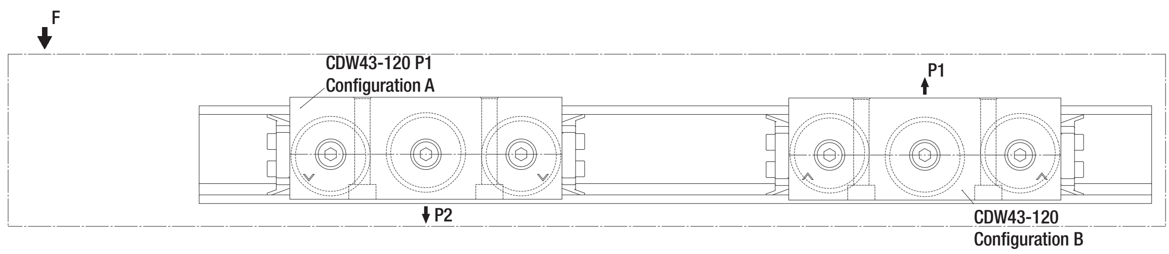


Fig. 18

Representation of slider arrangement for various load cases

Arrangement DS

This is the recommended arrangement for use of two sliders under M_z-moment when using one rail. Also see previous page: Two sliders under load moment M_z.

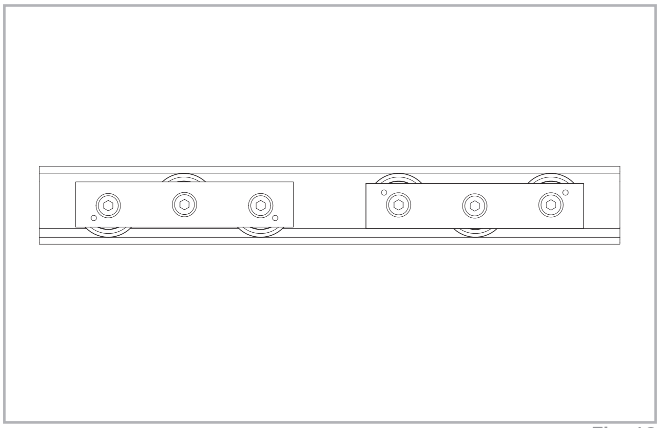


Fig. 19

Arrangement DD

For using pairs of guide rails with two sliders each under load moment M_z, the second system should be designed in arrangement DD. This results in the following combination: Guide rail 1 with two sliders in arrangement DS and guide rail 2 with 2 sliders in arrangement DD. This allows even load and moment distribution between the two parallel rails.

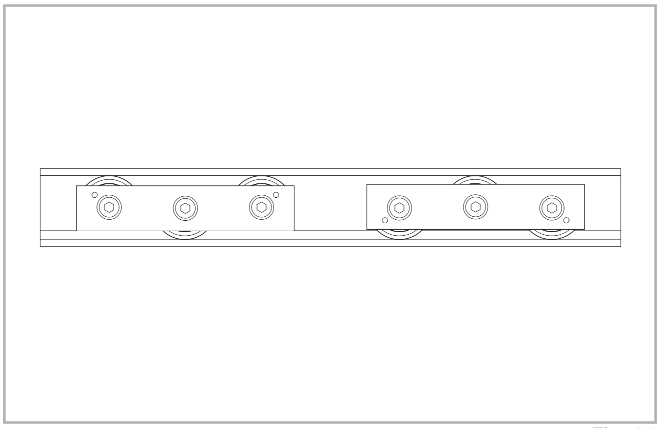


Fig. 20

Arrangement DA

Standard arrangement if no other information is given. This arrangement is recommended if the load point is located within the two outside points of the sliders.

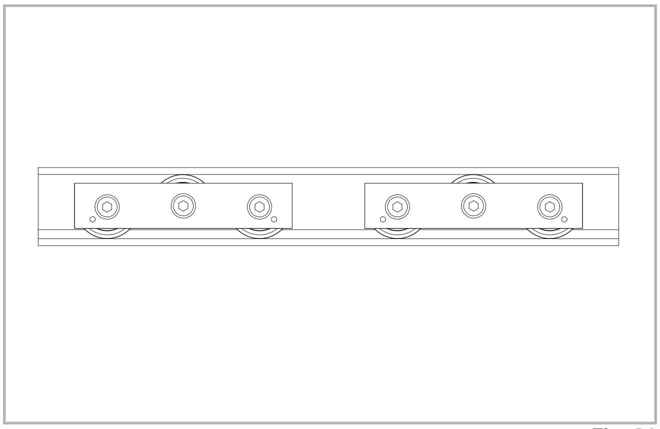


Fig. 21

Load capacities

Slider

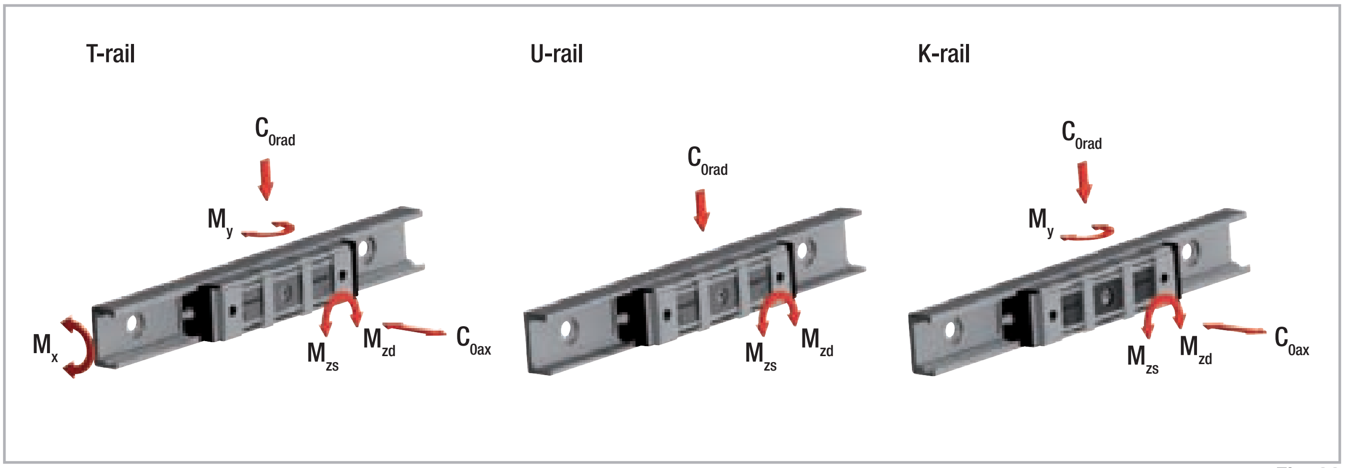


Fig. 22

The load capacities in the following tables each apply for one slider.

When using the slider in U-rails (compensating bearing rails) the values are $C_{0ax} = 0$, $M_x = 0$ and $M_y = 0$. When using the sliders in K-rails (compensation rails) the value is: $M_x = 0$.

Type	Number of rollers	Load capacities and moments							Weight
		C [N]	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]		
							M_{zd}	M_{zs}	[kg]
NT18	3	1530	820	260	1.5	4.7	8.2	8.2	0.03
NU18	3	1530	820	0	0	0	8.2	8.2	0.03
CS18-060-...	3	1530	820	260	1.5	4.7	8.2	8.2	0.04
CS18-080-...-A	4	1530	820	300	2.8	7	8.2	24.7	0.05
CS18-080-...-B	4	1530	820	300	2.8	7	24.7	8.2	0.05
CS18-100-...	5	1830	975	360	2.8	9.4	24.7	24.7	0.06
CS18-120-...-A	6	1830	975	440	3.3	11.8	24.7	41.1	0.07
CS18-120-...-B	6	1830	975	440	3.3	11.8	41.1	24.7	0.07

Tab. 1

Type	Number of rollers	Load capacities and moments							Weight
		C [N]	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]		
							M_{zd}	M_{zs}	[kg]
NTE28	3	4260	2170	640	6.2	16	27.2	27.2	0.115
NUE28	3	4260	2170	0	0	0	27.2	27.2	0.115
NTE28L-3-A	3	4260	2170	640	6.2	29	54.4	54.4	0.141
NTE28L-4-A	4	4260	2170	750	11.5	29	54.4	108.5	0.164
NTE28L-4-B	4	4260	2170	750	11.5	29	108.5	54.4	0.164
NTE28L-4-C	4	4260	2170	750	11.5	29	81.7	81.7	0.164
NTE28L-5-A	5	5065	2580	900	11.5	29	81.7	81.7	0.185
NTE28L-5-B	5	6816	3472	640	6.2	29	54.4	54.4	0.185
NUE28L-3-A	3	4260	2170	0	0	0	54.4	54.4	0.141
NUE28L-4-A	4	4260	2170	0	0	0	54.4	108.5	0.164
NUE28L-4-B	4	4260	2170	0	0	0	108.5	54.4	0.164
NUE28L-4-C	4	4260	2170	0	0	0	81.7	81.7	0.164
NUE28L-5-A	5	5065	2580	0	0	0	81.7	81.7	0.185
NUE28L-5-B	5	6816	3472	0	0	0	54.4	54.4	0.185
CS28-080-...	3	4260	2170	640	6.2	16	27.2	27.2	0.155
CS28-100-...-A	4	4260	2170	750	11.5	21.7	27.2	81.7	0.195
CS28-100-...-B	4	4260	2170	750	11.5	21.7	81.7	27.2	0.195
CS28-125-...	5	5065	2580	900	11.5	29	81.7	81.7	0.24
CS28-150-...-A	6	5065	2580	1070	13.7	36.2	81.7	136.1	0.29
CS28-150-...-B	6	5065	2580	1070	13.7	36.2	136.1	81.7	0.29
CD28-080-...	3	4260	2170	640	6.2	16	27.2	27.2	0.215
CD28-125-...	5	5065	2580	900	11.5	29	81.7	81.7	0.3
CS35-100-...	3	8040	3510	1060	12.9	33.7	61.5	61.5	0.27
CS35-120-...-A	4	8040	3510	1220	23.9	43.3	52.7	158.1	0.33
CS35-120-...-B	4	8040	3510	1220	23.9	43.3	158.1	52.7	0.33
CS35-150-...	5	9565	4180	1460	23.9	57.7	158.1	158.1	0.41
CS35-180-...-A	6	9565	4180	1780	28.5	72.2	158.1	263.4	0.49
CS35-180-...-B	6	9565	4180	1780	28.5	72.2	263.4	158.1	0.49
CD35-100-...	3	8040	3510	1060	12.9	33.7	61.5	61.5	0.39
CD35-150-...	5	9565	4180	1460	23.9	57.7	158.1	158.1	0.58

Tab. 2

Type	Number of rollers	Load capacities and moments							Weight
		C [N]	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]		
							M_{zd}	M_{zs}	[kg]
NTE43	3	12280	5500	1570	23.6	60	104.5	104.5	0.385
NUE43	3	12280	5500	0	0	0	104.5	104.5	0.385
NKE43	3	12280	5100	1320	0	50.4	96.9	96.9	0.385
NTE43L-3-A	3	12280	5500	1570	23.6	108.6	209	209	0.45
NTE43L-4-A	4	12280	5500	1855	43.6	108.6	209	418	0.52
NTE43L-4-B	4	12280	5500	1855	43.6	108.6	418	209	0.52
NTE43L-4-C	4	12280	5500	1855	43.6	108.6	313.5	313.5	0.52
NTE43L-5-A	5	14675	6540	2215	43.6	108.6	313.5	313.5	0.59
NTE43L-5-B	5	19650	8800	1570	23.6	108.6	209	209	0.59
NUE43L-3-A	3	12280	5500	0	0	0	209	209	0.45
NUE43L-4-A	4	12280	5500	0	0	0	209	418	0.52
NUE43L-4-B	4	12280	5500	0	0	0	418	209	0.52
NUE43L-4-C	4	12280	5500	0	0	0	313.5	313.5	0.52
NUE43L-5-A	5	14675	6540	0	0	0	313.5	313.5	0,59
NUE43L-5-B	5	19650	8800	0	0	0	209	209	0.59
NKE43L-3-A	3	12280	5100	1320	0	97.7	188.7	188.7	0.45
NKE43L-4-A	4	12280	5100	1320	0	97.7	188.7	377.3	0.52
NKE43L-4-B	4	12280	5100	1320	0	97.7	377.3	188.7	0.52
NKE43L-4-C	4	12280	5100	1320	0	97.7	283	283	0.52
NKE43L-5-A	5	14675	6065	1570	0	97.7	283	283	0.59
NKE43L-5-B	5	19650	8160	1820	0	97.7	188.7	188.7	0.59
CS43-120-...	3	12280	5500	1570	23.6	60	104.5	104.5	0.53
CS43-150-...-A	4	12280	5500	1855	43.6	81.5	104.5	313.5	0.68
CS43-150-...-B	4	12280	5500	1855	43.6	81.5	313.5	104.5	0.68
CS43-190-...	5	14675	6540	2215	43.6	108.6	313.5	313.5	0.84
CS43-230-...-A	6	14675	6540	2645	52	135.8	313.5	522.5	1.01
CS43-230-...-B	6	14675	6540	2645	52	135.8	522.5	313.5	1.01

Tab. 3

Type	Number of rollers	Load capacities and moments							Weight
		C [N]	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]		[kg]
							M_{zd}	M_{zs}	
CSK43-120-...	3	12280	5100	1320	0	50.4	96.9	96.9	0.53
CSK43-150-A	4	12280	5100	1320	0	54.3	96.9	290.7	0.68
CSK43-150-B	4	12280	5100	1320	0	54.3	290.7	96.9	0.68
CSK43-190-...	5	14675	6065	1570	0	108.7	290.7	290.7	0.84
CSK43-230-A	6	14675	6065	1570	0	108.7	290.7	484.5	1.01
CSK43-230-B	6	14675	6065	1570	0	108.7	484.5	290.7	1.01
CD43-120-...	3	12280	5500	1570	23.6	60	104.5	104.5	0.64
CD43-190-...	5	14675	6540	2215	43.6	108.6	313.5	313.5	0.95
CDK43-120-...	3	12280	5100	1320	0	50.4	96.9	96.9	0.64
CDK43-190-...	5	14675	6065	1570	0	108.7	290.7	290.7	0.95
NTE63	3	30750	12500	6000	125	271	367	367	1.07
NUE63	3	30750	12500	0	0	0	367	367	1.07
NKE63	3	30750	11550	5045	0	235	335	335	1.07
CS63-180-2ZR	3	30750	12500	6000	125	271	367	367	1.66
CS63-235-2ZR-A	4	30750	12500	7200	250	413	367	1100	2.17
CS63-235-2ZR-B	4	30750	12500	7200	250	413	1100	367	2.17
CS63-290-2ZR	5	36600	15000	8500	250	511	1100	1100	2.67
CS63-345-2ZR-A	6	36600	15000	10000	350	689	1100	1830	3.17
CS63-345-2ZR-B	6	36600	15000	10000	350	689	1830	1100	3.17
CSK63-180-2ZR	3	30750	11550	5045	0	235	335	335	1.66
CSK63-235-2ZR-A	4	30750	11550	5045	0	294	335	935	2.17
CSK63-235-2ZR-B	4	30750	11550	5045	0	294	935	335	2.17
CSK63-290-2ZR	5	36600	13745	6000	0	589	935	935	2.67
CSK63-345-2ZR-A	6	36600	13745	6000	0	589	935	1560	3.17
CSK63-345-2ZR-B	6	36600	13745	6000	0	589	1560	935	3.17

Tab. 4

Product dimensions

Rail T, U, K

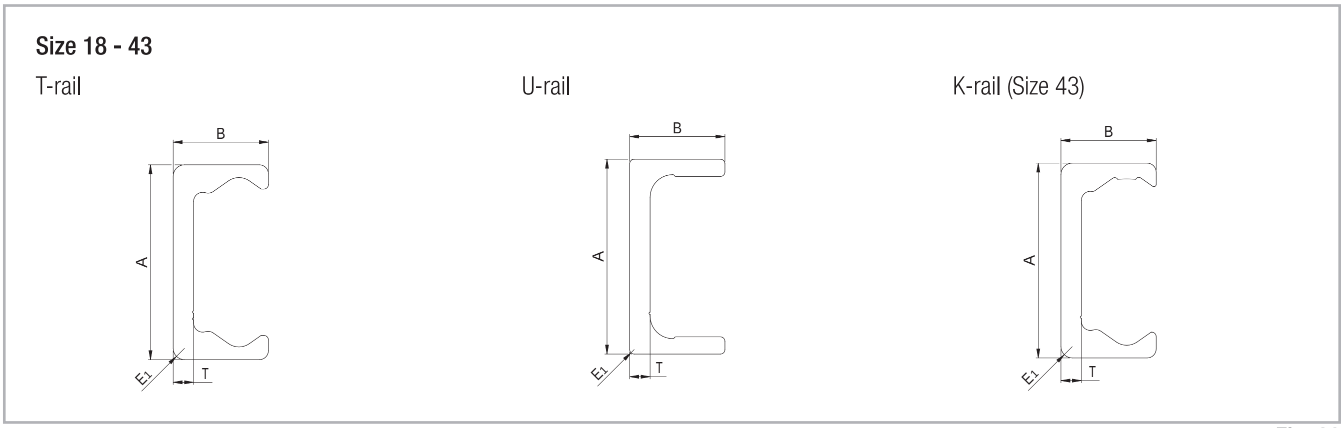


Fig. 23

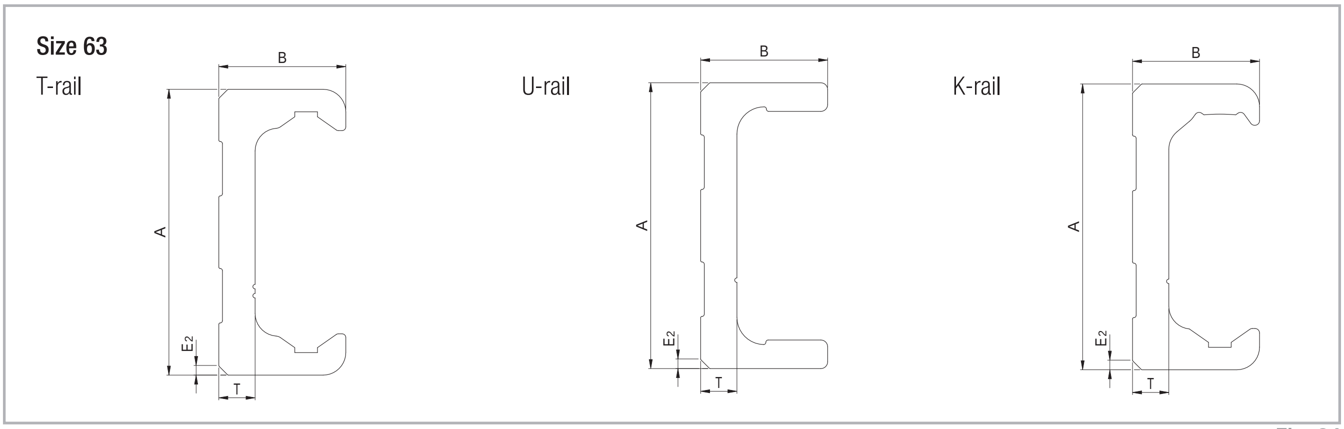


Fig. 24

Holes

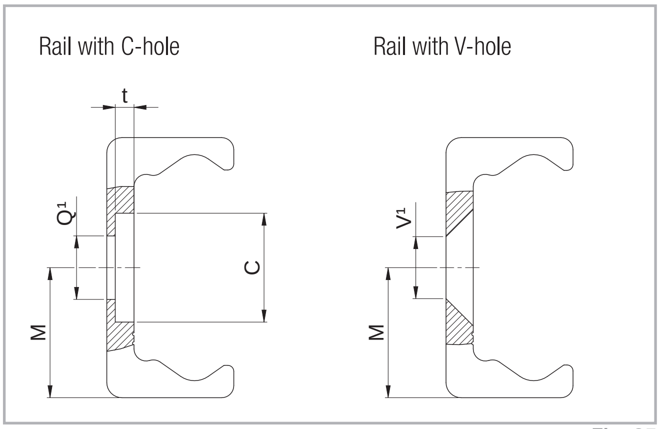


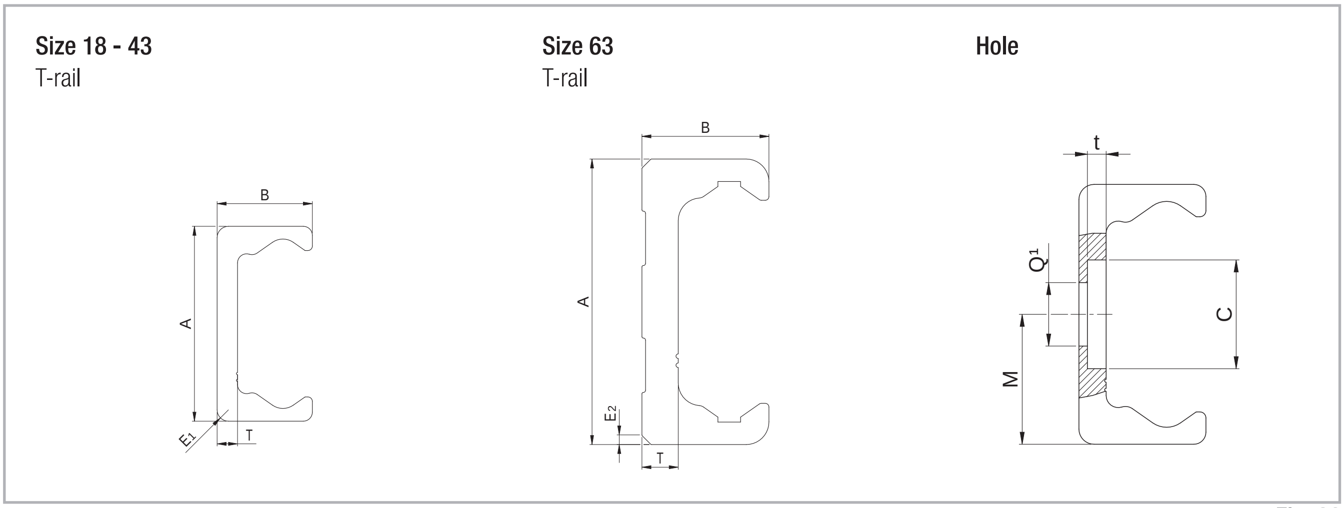
Fig. 25

Q[1] Fixing holes for Torx® screws with low head (custom design) included in scope of supply
V[1] Fixing holes for countersunk head screws according to DIN 7991

Type	Size	A [mm]	B [mm]	M [mm]	E_1 [mm]	T [mm]	C [mm]	Weight [kg/m]	E_2 [°]	t [mm]	Q[1] [mm]	V[1] [mm]
TLC TLV	18	18	8.25	9	1.5	2.8	9.5	0.55	-	2	M4	M4
	28	28	12.25	14	1	3	11	1.0	-	2	M5	M5
	35	35	16	17.5	2	3.5	14.5	1.65	-	2.7	M6	M6
	43	43	21	21.5	2.5	4.5	18	2.6	-	3.1	M8	M8
	63	63	28	31.5	-	8	15	6.0	2x45	5.2	M8	M10
ULC ULV	18	18	8.25	9	1	2.6	9,5	0.55	-	1.9	M4	M4
	28	28	12	14	1	3	11	1.0	-	2	M5	M5
	35	35	16	17.5	1	3.5	14.5	1.65	-	2.7	M6	M6
	43	43	21	21.5	1	4.5	18	2.6	-	3.1	M8	M8
	63	63	28	31.5	-	8	15	6.0	2x45	5.2	M8	M10
KLC KLV	43	43	21	21.5	2.5	4.5	18	2.6	-	3.1	M8	M8
	63	63	28	31.5	-	8	15	6.0	2x45	5.2	M8	M10

Tab. 5

Rail TR (ground custom design)



Q[1] Fixing holes for Torx® screws with low head (custom design) included in scope of supply

Fig. 26

Type	Size	A [mm]	B [mm]	M [mm]	E_1 [mm]	T [mm]	C [mm]	Weight [kg/m]	E_2 [°]	t [mm]	Q[1] [mm]
TRC	18	17.95	8	8.95	1.5	2.8	9.5	0.55	-	2	M4
	28	27.83	12.15	13.83	1	2.9	11	1.0	-	2	M5
	35	34.8	15.9	17.3	2	3.4	14.5	1.6	-	2.7	M6
	43	42.75	20.9	21.25	2.5	4.4	18	2.6	-	3.1	M8
	63	62.8	27.9	31.3	-	7.9	15	6.0	2x45	5.2	M8

Tab. 6

Rail length

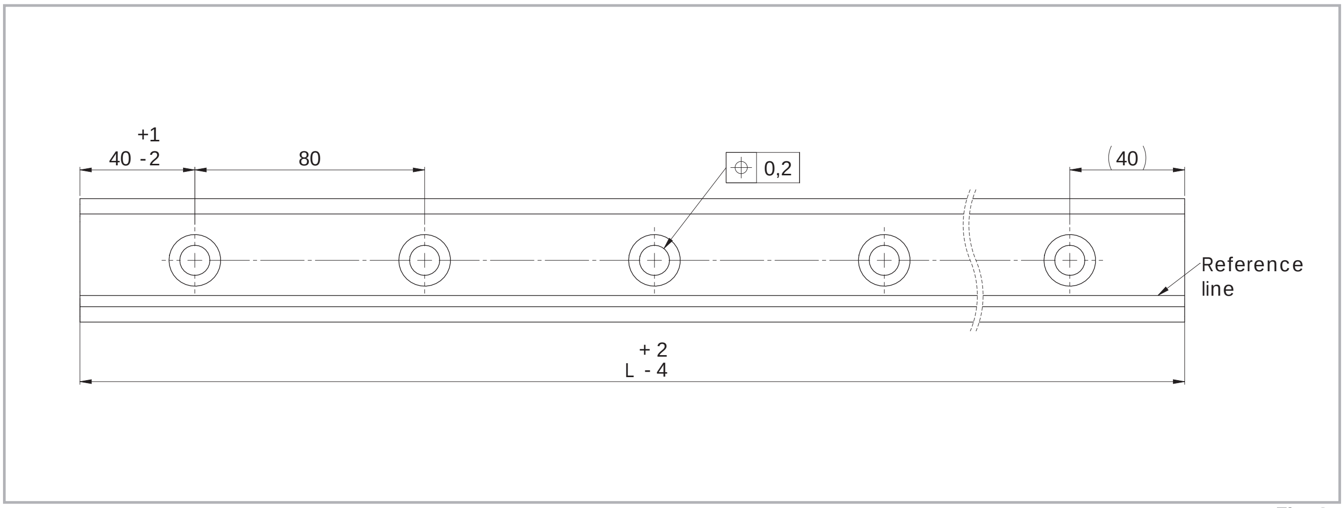


Fig. 27

Type	Size	Min length [mm]	Max length [mm]	Available standard lengths L [mm]
TLC TLV ULC ULV	18	160	2000	160 - 240 - 320 - 400 - 480 - 560 - 640 - 720 - 800 - 880 - 960 - 1040 - 1120 - 1200 - 1280 - 1360 - 1440 - 1520 - 1600 - 1680 - 1760 - 1840 - 1920 - 2000 - 2080 - 2160 - 2240 - 2320 - 2400 - 2480 - 2560 - 2640 - 2720 - 2800 - 2880 - 2960 - 3040 - 3120 - 3200 - 3280 - 3360 - 3440 - 3520 - 3600
	28	240	3200	
	35	320	3600	
	43	400	3600	
	63	560	3600	
KLC KLV	43	400	3600	
	63	560	3600	
TRC	18	160	2000	
	28	240	2000	
	35	320	2000	
	43	400	2000	
	63	560	2000	

Longer single rails up to max. 4,080 mm on request
Longer rail systems see pg. CR-68 Joined rails

Tab. 7

N-version slider, normal

N-series

Size 18

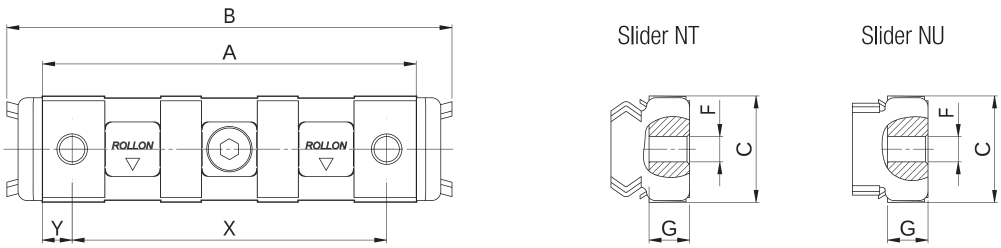


Fig. 28

Sizes 28 and 43 (not available in size 35)

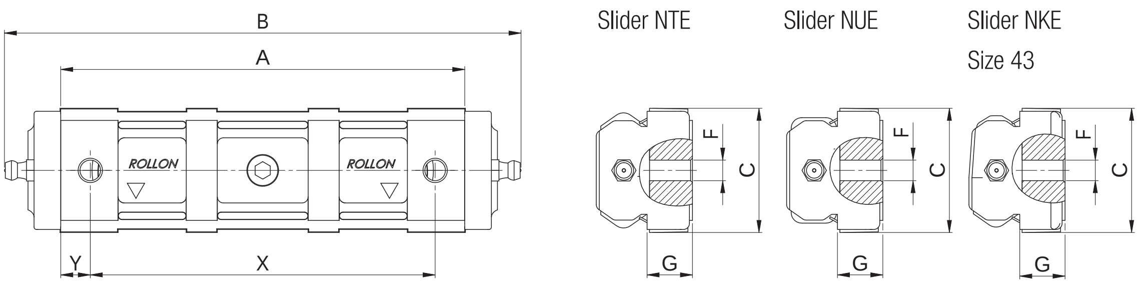


Fig. 29

Size 63

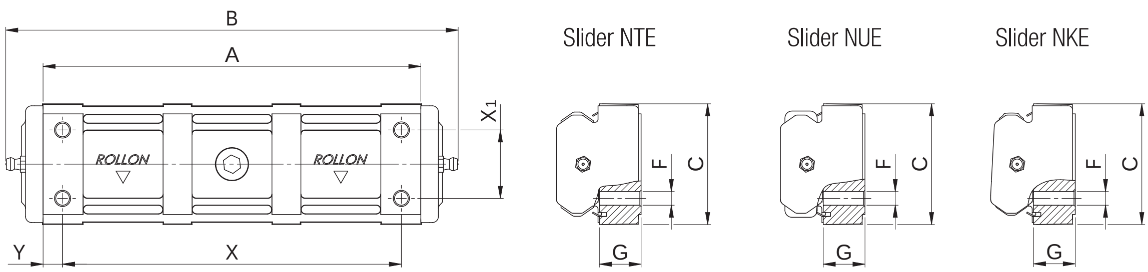


Fig. 30

Type	Size	A [mm]	B [mm]	C [mm]	G [mm]	F [mm]	X [mm]	Y [mm]	X_1 [mm]	No. of holes	Roller type used*	Number of Rollers
NT NU	18	62	74	17.6	6.4	M5	52	5	-	2	CPA18-CPN18	3
NTE NUE	28	88	124	26,5	9.3	M5	78	5	-	2	CPA28-CPN28	3
NTE NUE	43	134	170	40	13.7	M8	114	10	-	2	CPA43-CPN43	3
NKE	43	134	170	40	13.7	M8	114	10	-	2	CRA43-CRN43	3
NTE NUE	63	188	225	60	20.2	M8	168	10	34	4	CPA63-CPN63	3
NKE	63	188	225	60	20.2	M8	168	10	34	4	CRA63-CRN63	3

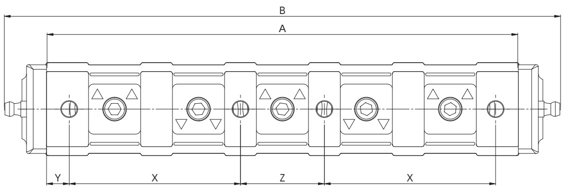
* Information about the roller type, see pg. CR-29, tab. 18

Tab. 8

N-version slider, long

N...L-series

Sizes 28 and 43



Slider NTE | Slider NUE | Slider NKE Size 43

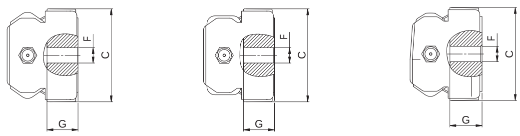


Fig. 31

Slider configurations N...L

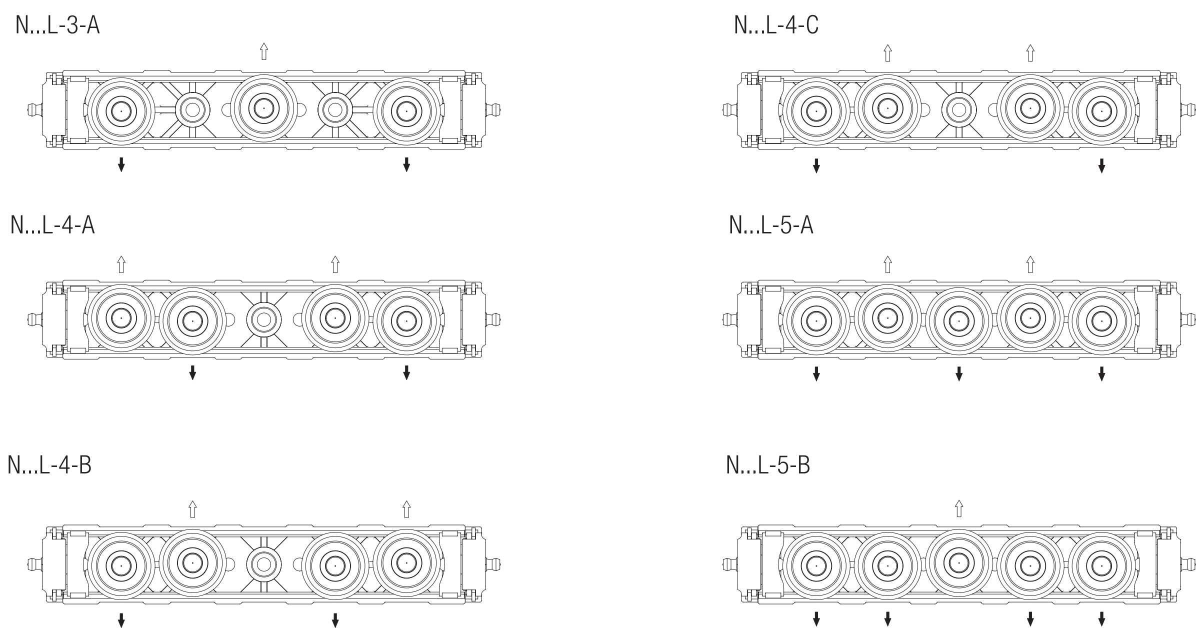


Fig. 32

Type	Size	A [mm]	B [mm]	C [mm]	G [mm]	F [mm]	X [mm]	Y [mm]	Z [mm]	No. of holes	Roller type used*	Number** of Rollers
NTE28L NUE28L	28	140	176	26.5	9	M5	52	5	26	4	CPA28	3 4 5
NTE43L NUE43L	43	208	245	41	13.7	M8	75.5	10	37	4	CPA43	3 4 5
NKE43L											CRA43	

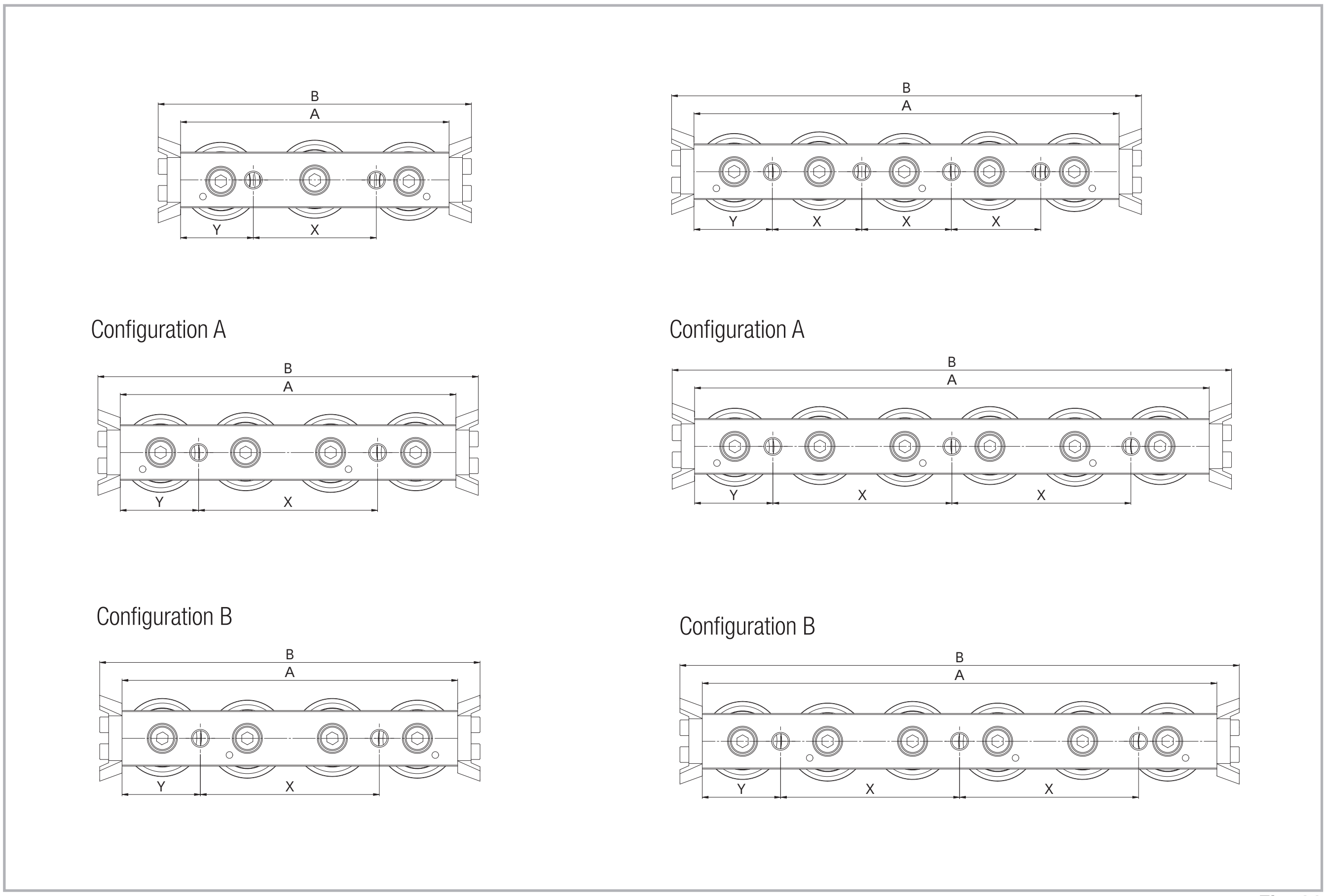
* Information about the roller type, see pg. CR-29, tab. 18

** The number of roller varies according to the configuration, see pg. CR-19, fig. 32

Tab. 9

C-version slider

CS-series



Representation of slider with wiper

Fig. 33

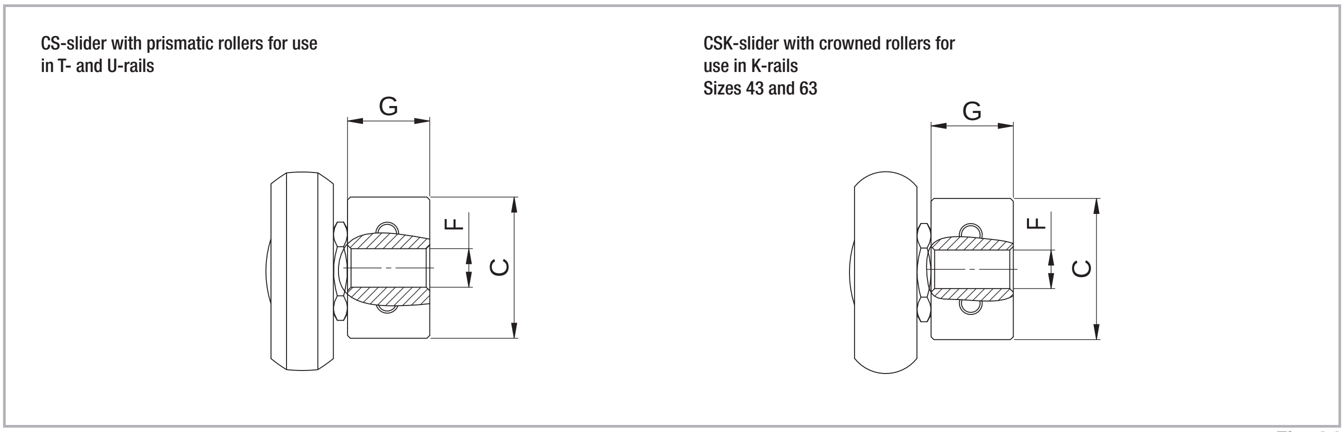


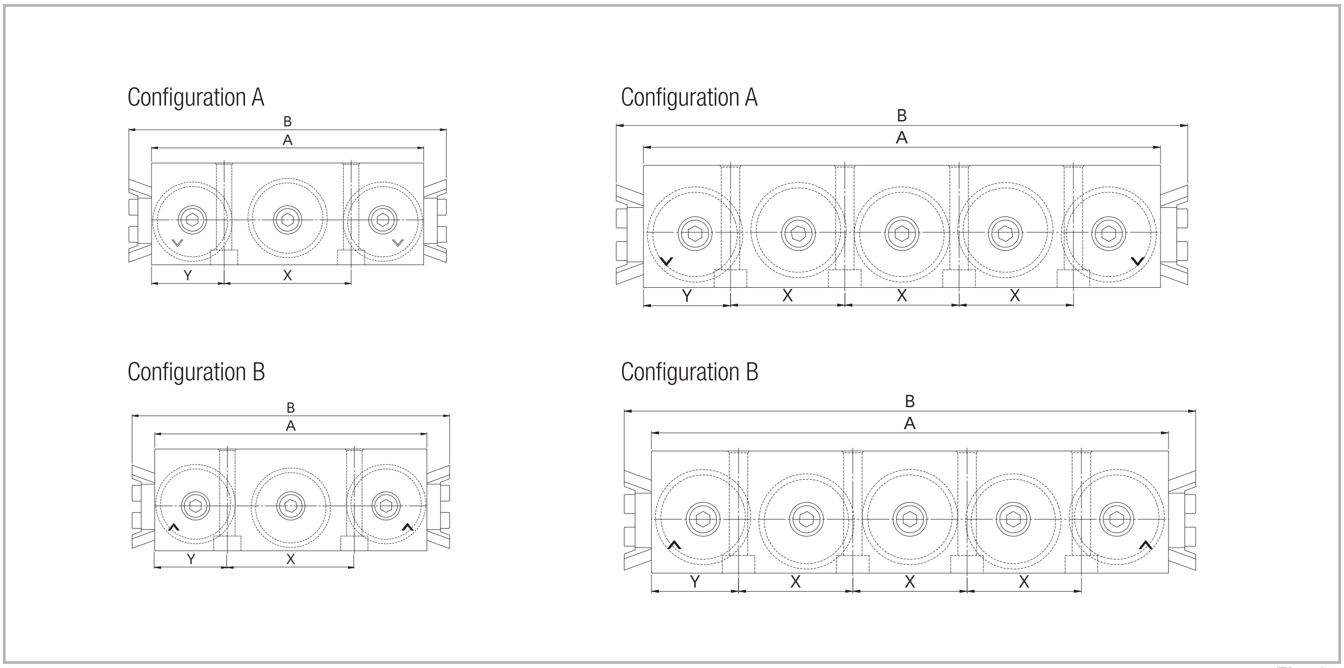
Fig. 34

Type	Size	A [mm]	B [mm]	C [mm]	G [mm]	F [mm]	X [mm]	Y [mm]	No. of holes	Roller type used*	Number of Rollers
CS	18	60	76	9.5	5.7	M5	20	20	2	CPA18-CPN18	3
		80	96	9.5	5.7	M5	40	20	2	CPA18	4
		100	116	9.5	5.7	M5	20	20	4	CPA18	5
		120	136	9.5	5.7	M5	40	20	3	CPA18	6
	28	80	100	14.9	9.7	M5	35	22.5	2	CPA28-CPN28	3
		100	120	14.9	9.7	M5	50	25	2	CPA28	4
		125	145	14.9	9.7	M5	25	25	4	CPA28	5
		150	170	14.9	9.7	M5	50	25	3	CPA28	6
	35	100	120	19.9	11.9	M6	45	27.5	2	CPA35-CPN35	3
		120	140	19.9	11.9	M6	60	30	2	CPA35	4
		150	170	19.9	11.9	M6	30	30	4	CPA35	5
		180	200	19.9	11.9	M6	60	30	3	CPA35	6
	43	120	140	24.9	14.5	M8	55	32.5	2	CPA43-CPN43	3
		150	170	24.9	14.5	M8	80	35	2	CPA43	4
		190	210	24.9	14.5	M8	40	35	4	CPA43	5
		230	250	24.9	14.5	M8	80	35	3	CPA43	6
	63	180	200	39.5	19.5	M8	54	9	4	CPA63	3
		235	255	39.5	19.5	M8	54	9.5	5	CPA63	4
		290	310	39.5	19.5	M8	54	10	6	CPA63	5
		345	365	39.5	19.5	M8	54	10.5	7	CPA63	6
CSK	43	120	140	24.9	14.5	M8	55	32.5	2	CRA43-CRN43	3
		150	170	24.9	14.5	M8	80	35	2	CRA43	4
		190	210	24.9	14.5	M8	40	35	4	CRA43	5
		230	250	24.9	14.5	M8	80	35	3	CRA43	6
	63	180	200	39.5	19.5	M8	54	9	4	CRA63	3
		235	255	39.5	19.5	M8	54	9.5	5	CRA63	4
		290	310	39.5	19.5	M8	54	10	6	CRA63	5
		345	365	39.5	19.5	M8	54	10.5	7	CRA63	6

* Information about the roller type, see pg. CR-29, tab. 18

Tab. 10

CD-series



Representation of slider with wiper

Fig. 35

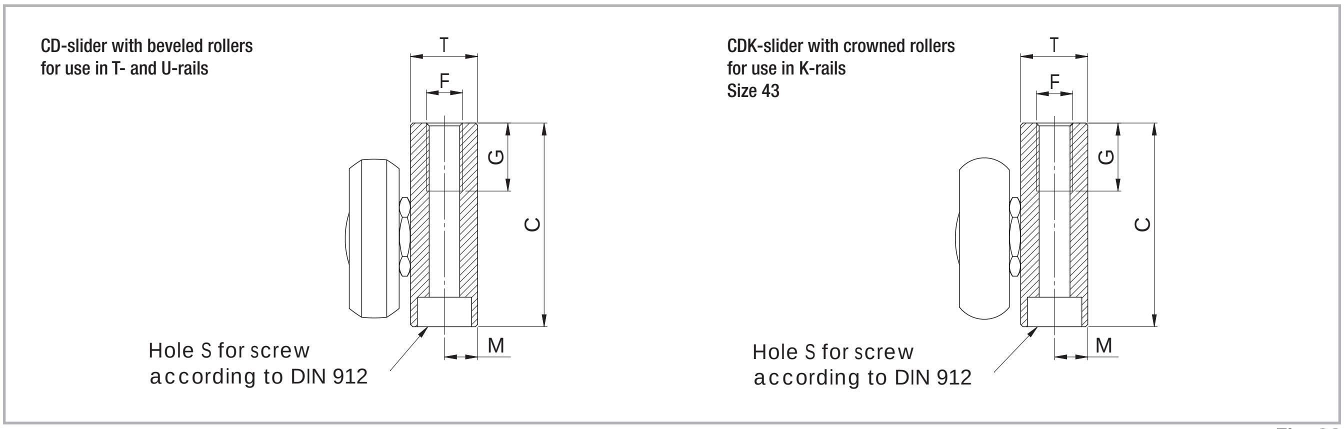


Fig. 36

Type	Size	A [mm]	B [mm]	C [mm]	T [mm]	M [mm]	S	G [mm]	F	X [mm]	Y [mm]	No. of holes	Roller type used*	Number of Rollers
CD	28	80	100	29.9	9.9	4.9	M5	15	M6	36	22	2	CPA28	3
		125	145	29.9	9.9	4.9	M5	15	M6	27	22	4	CPA28	5
	35	100	120	34.9	11.8	5.9	M6	15	M8	45	27.5	2	CPA35	3
		150	170	34.9	11.8	5.9	M6	15	M8	30	30	4	CPA35	5
	43	120	140	44.9	14.8	7.3	M6	15	M8	56	32	2	CPA43	3
		190	210	44.9	14.8	7.3	M6	15	M8	42	32	4	CPA43	5
CDK	43	120	140	44.9	14.8	7.3	M6	15	M8	56	32	2	CRA43	3
		190	210	44.9	14.8	7.3	M6	15	M8	42	32	4	CRA43	5

* Information about the roller type, see pg. CR-29, tab. 18

Tab. 11

T-rail with N- / C-slider

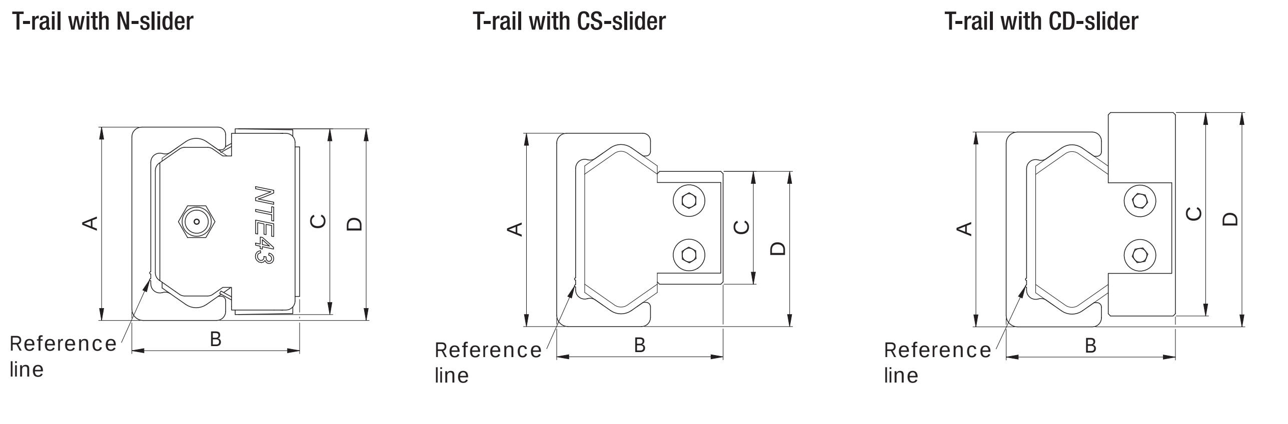


Fig. 37

Configuration	Size	A [mm]		B [mm]		C [mm]		D [mm]	
TL... / NT	18	18	+0.25 -0.10	16.5	+0.15 -0.15	17.6	0 -0.20	18.3	+0.25 -0.25
TL... / NTE	28	28	+0.25 -0.10	24	+0.25 -0.10	26.5	+0.10 -0.20	28	+0.15 -0.35
	43	43	+0.35 -0.10	37	+0.25 -0.10	40	0 -0.30	41.9	+0,20 -0.35
	63	63	+0.35 -0.10	50.5	+0.25 -0.10	60	+0.10 -0.20	62	0 -0.50
TL... / NTE...L	28	28	+0.25 -0.10	24	+0.25 -0.10	26.5	+0.10 -0.20	28	+0.15 -0.35
	43	43	+0.35 -0.10	37	+0.25 -0.10	41	0 -0.30	42.4	+0.20 -0.35
TL... / CS	18	18	+0.25 -0.10	15	+0.15 -0.15	9.5	0 -0.05	14	+0.05 -0.25
	28	28	+0.25 -0.10	23.9	+0.15 -0.15	14.9	0 -0.10	21.7	+0.05 -0.35
	35	35	+0.35 -0.10	30.2	+0.10 -0.30	19.9	+0.05 -0.15	27.85	+0.10 -0.30
	43	43	+0.35 -0.10	37	+0.15 -0.15	24.9	0 -0.15	34.3	+0.10 -0.30
	63	63	+0.35 -0.10	49.8	+0.15 -0.15	39.5	+0.15 0	51.6	+0.15 -0.30
TL... / CD	28	28	+0.25 -0.10	24.1	+0.20 -0.20	29.9	0 -0.50	32	+0.05 -0.35
	35	35	+0.35 -0.10	30.1	+0.20 -0.20	34.9	0 -0.50	37.85	+0.10 -0.30
	43	43	+0.35 -0.10	37.3	+0.20 -0.20	44.9	0 -0.50	47	+0.10 -0.30

Tab. 12

TR-rail with N- / C-slider

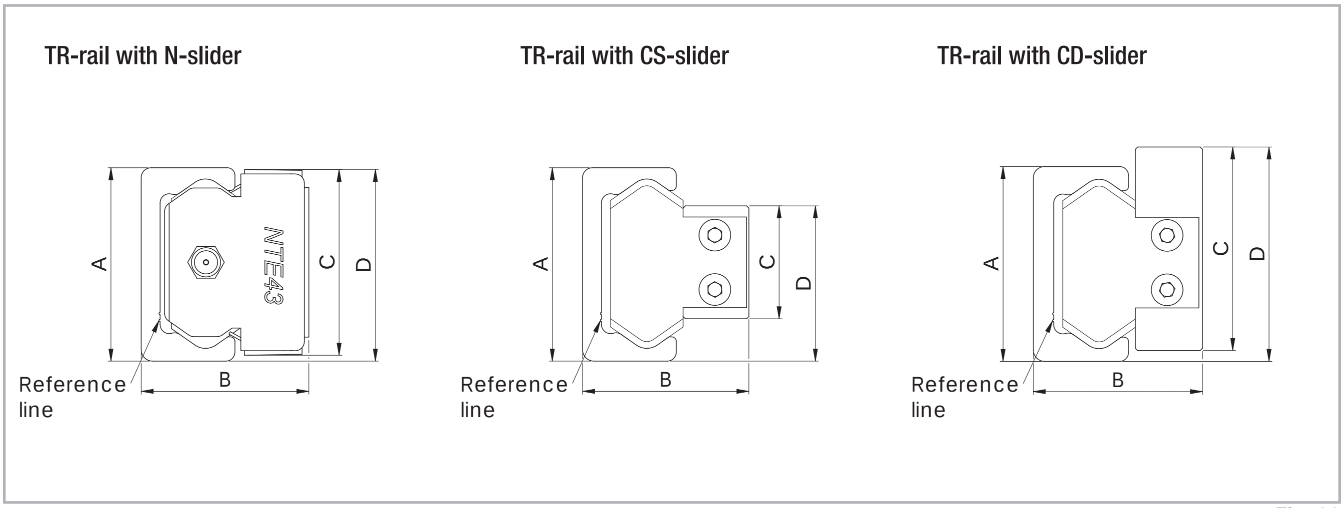


Fig. 38

Configuration	Size	A [mm]		B [mm]		C [mm]		D [mm]	
TR... / NT	18	17.95	+0.10 -0.05	16.4	+0.10 -0.05	17.6	0 -0.20	17.9	+0.15 -0.15
TR... / NTE	28	27.83	+0.10 -0.05	23.9	+0.15 -0.10	26.5	+0.10 -0.20	27.2	+0.15 -0.15
	43	42.75	+0.10 -0.05	36.9	+0.15 -0.10	40	0 -0.30	41.3	+0.15 -0.20
	63	62.8	+0.10 -0.05	50.4	+0.20 -0.10	60	+0,10 -0.30	61.3	+0.15 -0.20
TR... / NTE...L	28	27.83	+0.10 -0.05	23.9	+0.15 -0.10	26.5	+0.10 -0.20	27.2	+0.15 -0.15
	43	42.75	+0.10 -0.05	36.9	+0.15 -0.10	41	0 -0.30	41.8	+0.15 -0.20
TR... / CS	18	17.95	+0.10 -0.05	14.9	+0.10 -0.10	9.5	0 -0.05	13.8	+0.15 -0.15
	28	27.83	+0.10 -0.05	23.8	+0.10 -0.10	14.9	0 -0.10	21.3	+0.10 -0.20
	35	34.75	+0.10 -0.05	30.1	+0.10 -0.30	19.9	+0,05 -0.15	27.35	+0.10 -0.20
	43	42.75	+0.10 -0.05	36.9	+0.15 -0.10	24.9	0 -0.15	33.5	+0.10 -0.20
	63	62.8	+0.10 -0.05	49.7	+0.10 -0.15	39.5	+0.15 0	51.05	+0.15 -0.10
TR... / CD	28	27.83	+0.10 -0.05	24	+0.10 -0.20	29.9	0 -0.50	31.63	+0.10 -0.20
	35	34.75	+0.10 -0.05	30	+0.10 -0.20	34.9	0 -0.50	37.35	+0.10 -0.20
	43	42.75	+0.10 -0.05	37.2	+0.10 -0.20	44.9	0 -0.50	46.4	+0.10 -0.20

Tab. 13

U-rail with N- / C-slider

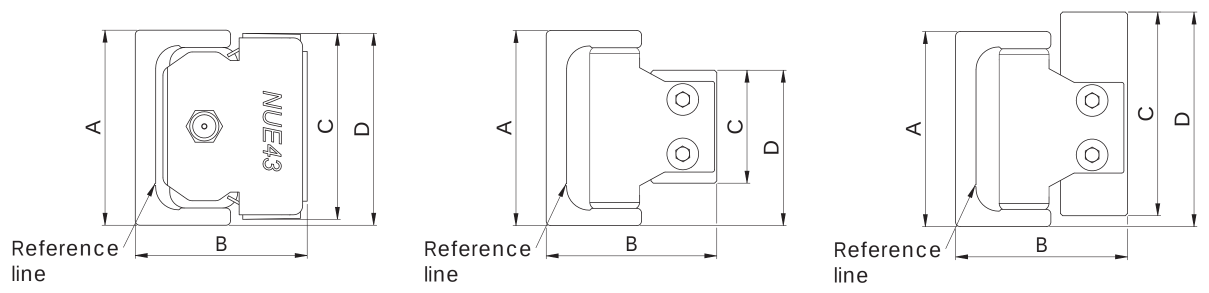


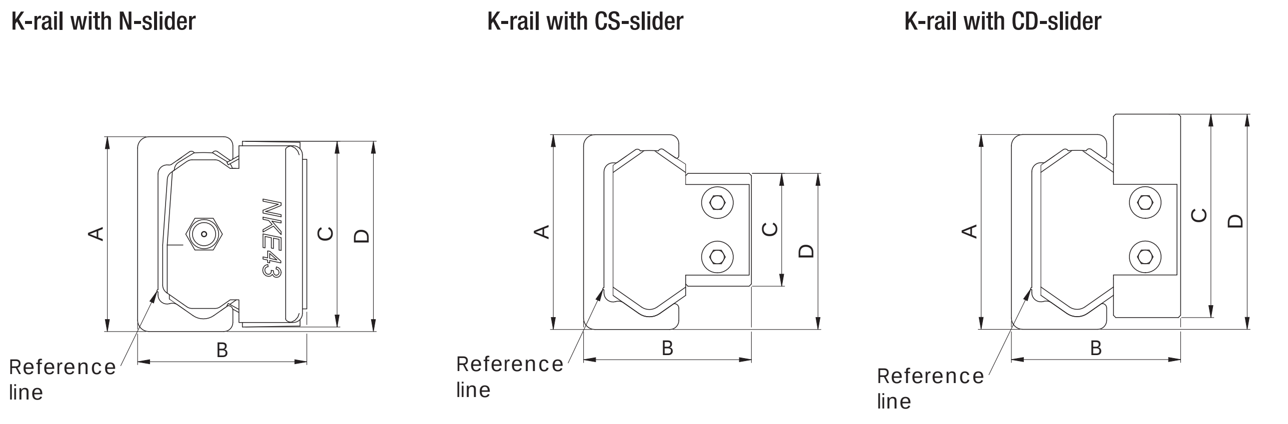
Fig. 39

Configuration	Size	A [mm]		B	C [mm]		D [mm]	
UL... / NU	18	18	+0.25 -0.10	16.5	17.6	0 -0.20	18.3	+0.25 -0.25
UL... / NUE	28	28	+0.25 -0.10	24	26.5	0 -0.20	28	+0.15 -0.35
	43	43	+0.35 -0.10	37	40	0 -0.30	41.9	+0.20 -0.30
	63	63	+0.35 -0.10	50.5	60	-0.20	62	0 -0.50
UL... / NUE...L	28	28	+0.25 -0.10	24	26.5	0 -0.20	28	+0.15 -0.35
	43	43	+0.35 -0.10	37	41	0 -0.30	42.4	+0.20 -0.35
UL... / CS	18	18	+0.25 -0.10	15	9.5	0 -0.05	14	+0.05 -0.25
	28	28	+0.25 -0.10	23.9	14.9	0 -0.10	21.7	+0.05 -0.35
	35	35	+0.35 -0.10	30.2	19.9	+0.05 -0.15	27.85	+0.10 -0.30
	43	43	+0.35 -0.10	37	24.9	0 -0.15	34.3	+0.15 -0.30
	63	63	+0.35 -0.10	49.8	39.5	+0.15 0	51.6	+0.15 -0.30
UL... / CD	28	28	+0.25 -0.10	24.1	29.9	0 -0.50	32	+0.05 -0.35
	35	35	+0.35 -0.10	30.1	34.9	0 -0.50	37.85	+0.10 -0.30
	43	43	+0.35 -0.10	37.3	44.9	0 -0.50	47	+0.10 -0.30

Tab. 14

* see pg. CR-40 Offset T+U-system
see pg. CR-42 Offset K+U-system

K-rail with N- / C-slider



The K-rail enables the slider a rotation around its longitudinal axis (see pg. CR-42)

Fig. 40

Configuration	Size	A [mm]		B [mm]		C [mm]		D [mm]	
KL... / NKE	43	43	+0.35 -0.10	37	+0.25 -0.10	40	0 -0.30	41.9	+0.20 -0.35
	63	63	+0.35 -0.10	50.5	+0.25 -0.10	60	+0.10 -0.20	62	0 -0.50
KL... / NKE...L	43	43	+0.35 -0.10	37	+0.25 -0.10	41	0 -0.30	42.7	+0.20 -0.35
KL... / CSK	43	43	+0.35 -0.10	37	+0.15 -0.15	24.9	0 -0.15	34.3	+0.10 -0.30
	63	63	+0.35 -0.10	49.8	+0.15 -0.15	39.5	+0.15 0	51.6	+0.15 -0.30
KL... / CDK	43	43	+0.35 -0.10	37.3	+0.20 -0.20	44.9	0 -0.50	47	+0.10 -0.30

Tab. 15

Offset of fixing holes

Principle representation of offset with T-rails

Fig. 41

Configuration	Size	δ nominal [mm]	δ maximum [mm]	δ minimum [mm]
TLC / NT	18	0.45	0.95	-0.25
TLC / NTE	28	0.35	0.85	-0.4
	43	0.35	0.9	-0.5
	63	0.35	0.8	-0.55
KLC / NKE	43	0.35	0.9	-0.5
	63	0.35	0.8	-0.55
ULC / NU	18	0.4	0.9	-0.25
ULC / NUE	28	0.4	0.85	-0.3
	43	0.4	0.85	-0.45
	63	0.35	0.8	-0.45
TLV / NT	18	0.45	0.8	-0.2
TLV / NTE	28	0.35	0.7	-0.35
	43	0.35	0.75	-0.45
	63	0.35	0.65	-0.55
KLV / NKE	43	0.35	0.75	-0.45
	63	0.35	0.65	-0.55
ULV / NU	18	0.4	0.75	-0.2
ULV / NUE	28	0.4	0.7	-0.25
	43	0.4	0.7	-0.4
	63	0.35	0.65	-0.45
TLC / CS	18	0.35	0.75	-0.2
	28	0.25	0.6	-0.35
	35	0.35	0.7	-0.35
	43	0.35	0.8	-0.35
	63	0.35	0.6	-0.35
KLC / CSK	43	0.35	0.8	-0.35
	63	0.35	0.6	-0.35

Tab. 16

Configuration	Size	δ nominal [mm]	δ maximum [mm]	δ minimum [mm]
ULC / CS	18	0.3	0.7	-0.2
	28	0.3	0.6	-0.3
	35	0.35	0.7	-0.35
	43	0.4	0.75	-0.35
	63	0.35	0.6	-0.25
TLV / CS	18	0.35	0.6	-0.15
	28	0.25	0.45	-0.3
	35	0.35	0.55	-0.3
	43	0.35	0.65	-0.3
	63	0.35	0.45	-0.35
KLV / CSK	43	0.35	0.65	-0.3
	63	0.35	0.45	-0.35
ULV / CS	18	0.3	0.55	-0.15
	28	0.3	0.45	-0.25
	35	0.35	0.55	-0.3
	43	0.4	0.6	-0.3
	63	0.35	0.45	-0.25
TRC / NT	18	0.15	0.65	-0.2
TRC / NTE	28	0.15	-0.5	-0.25
	43	0.05	0.4	-0.3
	63	0	0.4	-0.4
TRC / CS	18	0.05	0.45	-0.2
	28	0.05	0.3	-0.25
	35	0.1	0.35	-0.2
	43	0.05	0.35	-0.25
	63	0	0.2	-0.2

Tab. 17

Accessories

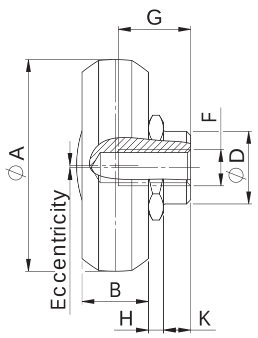
Rollers

Version 1

Prismatic (T- and U-rail)

CPN
Concentric roller

CPA
Eccentric roller

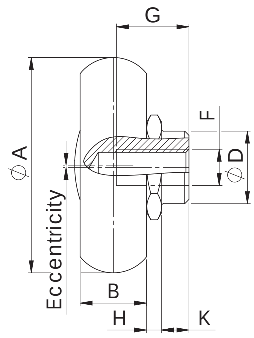


Version 2

Crowned (K-rail)

CRN
Concentric roller

CRA
Eccentric roller



Seals: 2RS is the splash-proof seal, 2Z (2ZR for size 63) is the steel cover disc
Note: The rollers are lubricated for life

Fig. 42

Type	A [mm]	B [mm]	D [mm]	e [mm]	H [mm]	K [mm]	G [mm]	F	C [N]	C_{0rad} [N]	Weight [kg]
CPN18-2RS	14	4	6	-	1.55	1.8	5.5	M4	765	410	0.004
CPN18-2Z	14	4	6	-	1.55	1.8	5.5	M4	765	410	0.004
CPA18-2RS	14	4	6	0.4	1.55	1.8	5.5	M4	765	410	0.004
CPA18-2Z	14	4	6	0.4	1.55	1.8	5.5	M4	765	410	0.004
CPN28-2RS	23.2	7	10	-	2.2	3.8	7	M5	2130	1085	0.019
CPN28-2Z	23.2	7	10	-	2.2	3.8	7	M5	2130	1085	0.019
CPA28-2RS	23.2	7	10	0.6	2.2	3.8	7	M5	2130	1085	0.019
CPA28-2Z	23.2	7	10	0.6	2.2	3.8	7	M5	2130	1085	0.019
CPN35-2RS	28.2	7.5	12	-	2.55	4.2	9	M5	4020	1755	0.032
CPN35-2Z	28.2	7.5	12	-	2.55	4.2	9	M5	4020	1755	0.032
CPA35-2RS	28.2	7.5	12	0.7	2.55	4.2	9	M5	4020	1755	0.032
CPA35-2Z	28.2	7.5	12	0.7	2.55	4.2	9	M5	4020	1755	0.032
CPN43-2RS	35	11	12	-	2.5	4.5	12	M6	6140	2750	0.06
CPN43-2Z	35	11	12	-	2.5	4.5	12	M6	6140	2750	0.06
CPA43-2RS	35	11	12	0.8	2.5	4.5	12	M6	6140	2750	0.06
CPA43-2Z	35	11	12	0.8	2.5	4.5	12	M6	6140	2750	0.06
CPN63-2ZR	50	17.5	18	-	2.3	6	16	M8	15375	6250	0.19
CPA63-2ZR	50	17.5	18	1.2	2.3	6	16	M10	15375	6250	0.19
CRN43-2Z	35.6	11	12	-	2.5	4.5	12	M6	6140	2550	0.06
CRA43-2Z	35.6	11	12	0.8	2.5	4.5	12	M6	6140	2550	0.06
CRN63-2ZR	49.7	17.5	18	-	2.3	6	16	M8	15375	5775	0.19
CRA63-2ZR	49.7	17.5	18	1.2	2.3	6	16	M10	15375	5775	0.19

Tab. 18

Wipers for C-slider

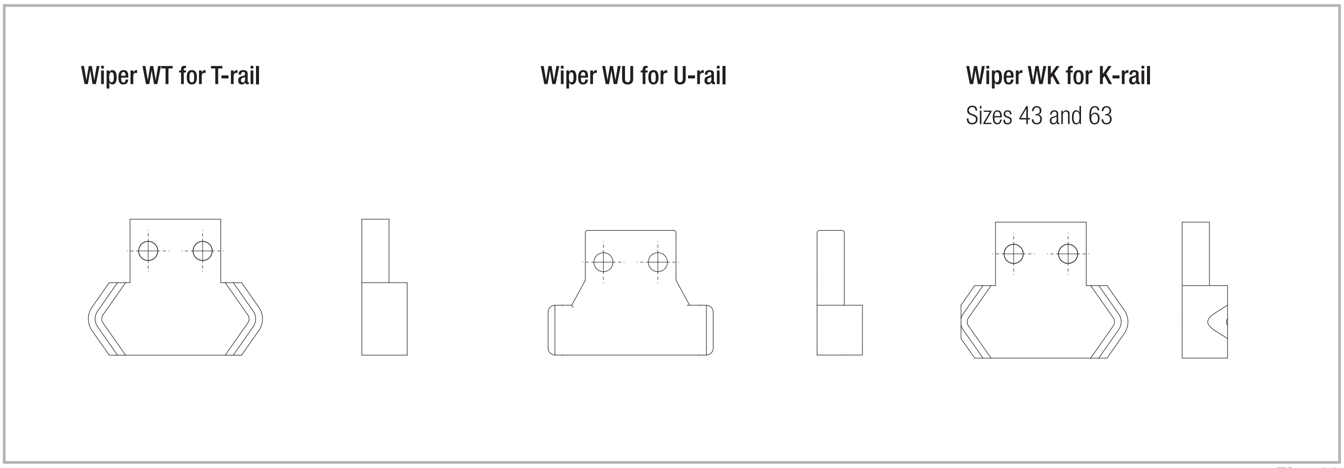


Fig. 43

Alignment fixture AT (for T- and U-rail)

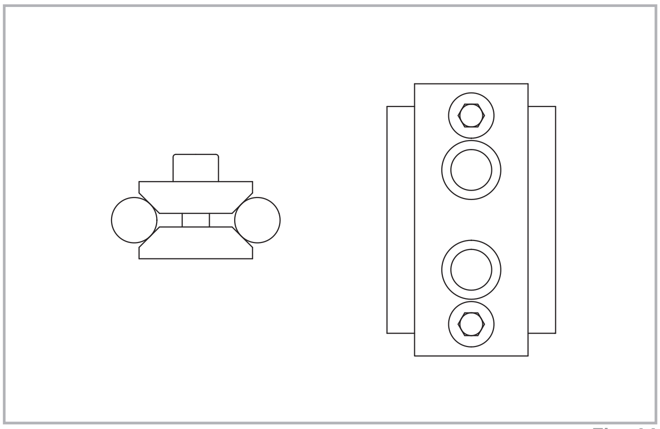


Fig. 44

Rail size	Alignment fixture
18	AT 18
28	AT 28
35	AT 35
43	AT 43
63	AT 63

Tab. 19

Alignment fixture AK (for K-rail)

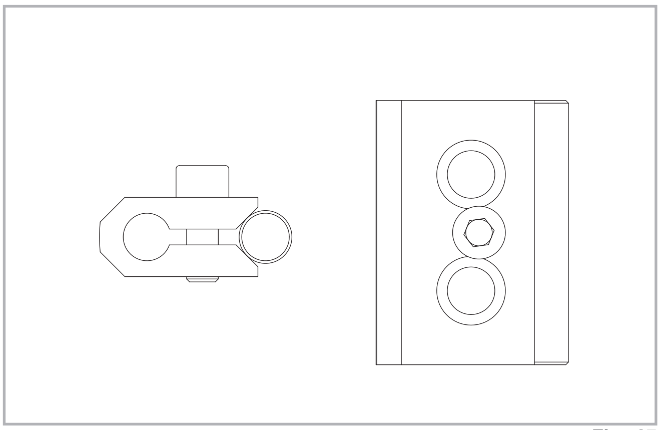


Fig. 45

Rail size	Alignment fixture
43	AK 43
63	AK 63

Tab. 20

Fixing screws

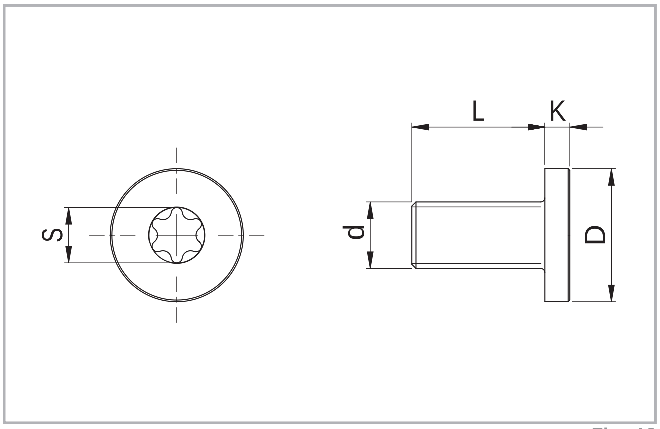


Fig. 46

Rail size	d	D [mm]	L [mm]	K [mm]	S	Tightening torque [Nm]
18	M4 x 0.7	8	8	2	T20	3
28	M5 x 0.8	10	10	2	T25	9
35	M6 x 1	13	13	2,7	T30	12
43	M8 x 1.25	16	16	3	T40	22
63	M8 x 1.25	13	20	5	T40	35

Tab. 21

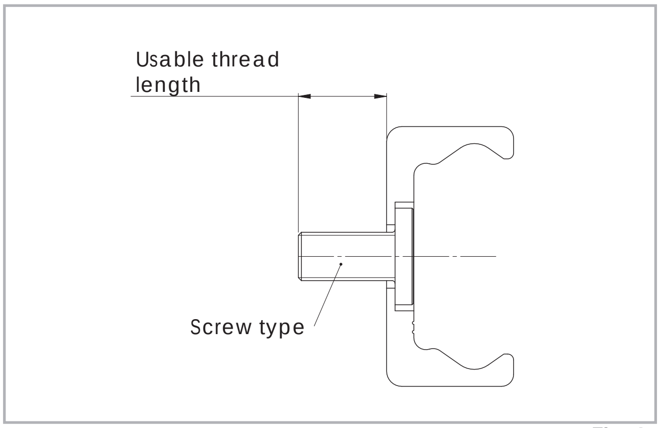


Fig. 47

Rail size	Screw type	Usable thread length [mm]
18	M4 x 8	7.2
28	M5 x 10	9
35	M6 x 13	12.2
43	M8 x 16	14.6
63	M8 x 20	17.2

Tab. 22

Manual clamp elements

Compact Rail guides can be secured with manual clamping elements. Areas of application are:

- Table cross beams and sliding beds
- Width adjustment, stops
- Positioning of optical equipment and measuring tables

The HK series is a manually activated clamping element. By using the freely adjustable clamping lever (except for HK 18, which uses hexagon socket bolt M6 DIN 913 with 3 mm drive) press the contact profile synchronously on the free surfaces fo the rail. The floating mounted contact profiles guarantee symmetrical introduction of force on the guide rail.

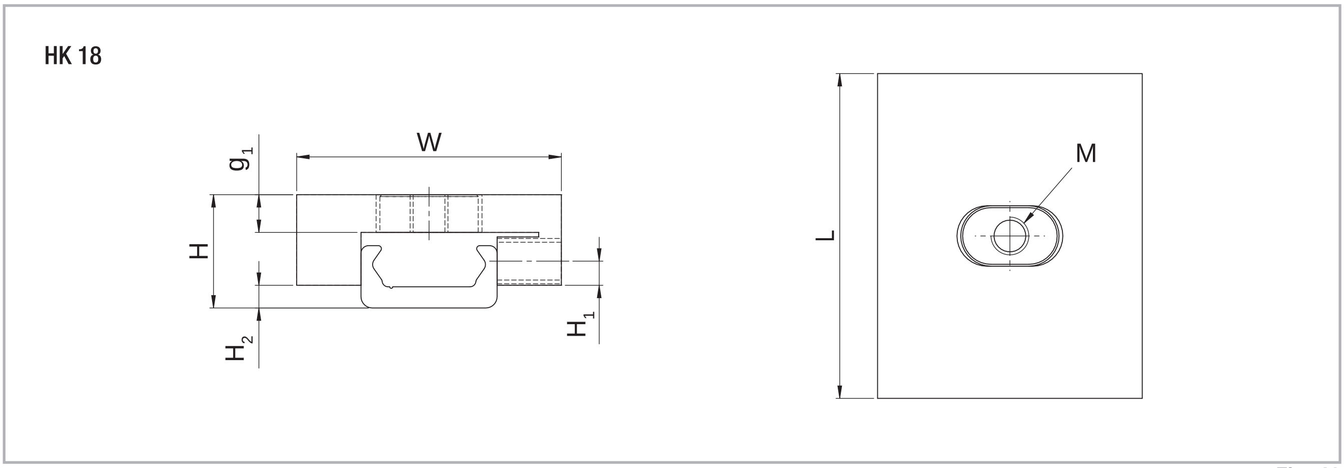


Fig. 48

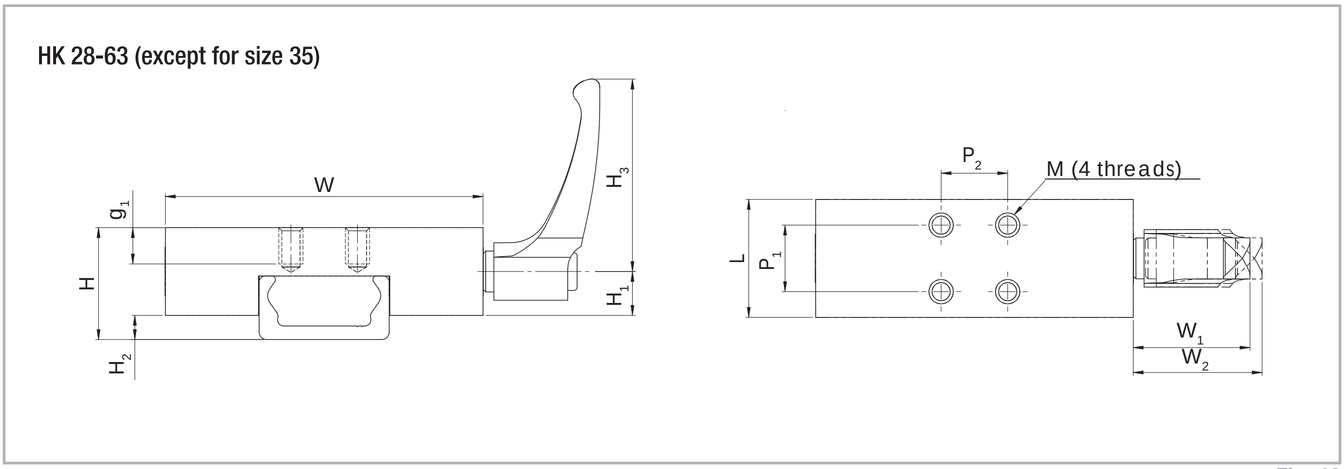


Fig. 49

Type	Size	Holding force [N]	Tightening torque [Nm]	Dimensions [mm]											M
				H	H_1	H_2	H_3	W	W_1	W_2	L	P_1	P_2	g_1	
HK1808A	18	150	0.5	15	3.2	3	-	35	-	-	43	0	0	6	M5
HK2808A	28	1200	7	24	17	5	64	68	38.5	41.5	24	15	15	6	M5
HK4308A	43	2000	15	37	28.5	8	78	105	46.5	50.5	39	22	22	12	M8
HK6308A	63	2000	15	50.5	35	9.5	80	138	54.5	59.5	44	26	26	12	M8

Tab. 23

Technical instructions

Linear accuracy

Linear accuracy is defined as the maximum deviation of the slider in the rail based on the side and support surface during straight line movement.

The linear accuracy, depicted in the graphs below, applies to rails that are carefully installed with all the provided screws on a level and rigid foundation.

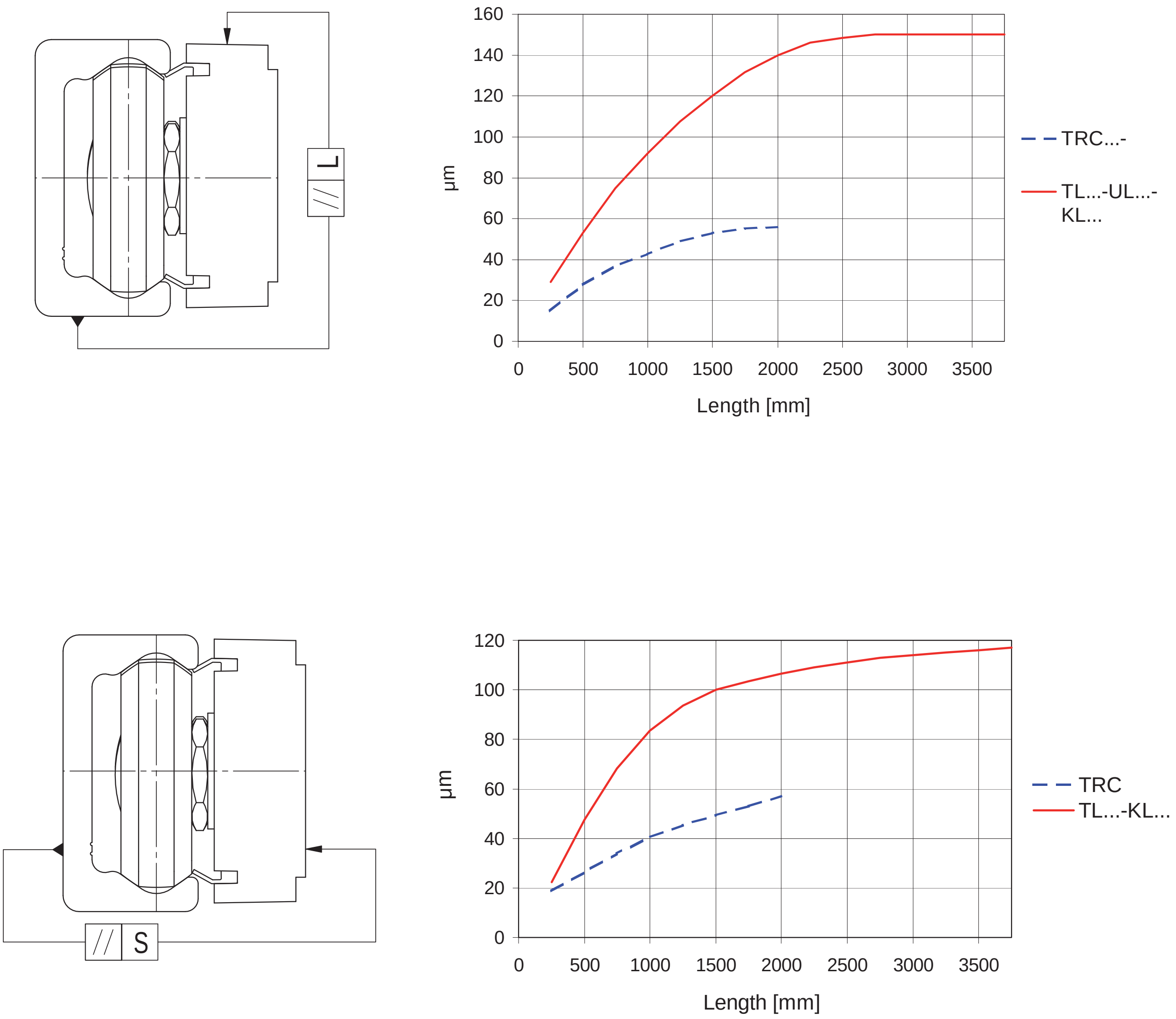
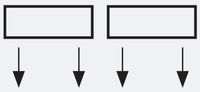
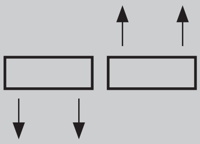


Fig. 50

Deviation of accuracy with two 3 roller sliders in one rail

Type	TL..., UL..., KL... TRC
ΔL [mm] Slider with equal arrangement 	0.2
ΔL [mm] Slider with opposite arrangement 	1.0
ΔS [mm]	0.05

Tab. 24

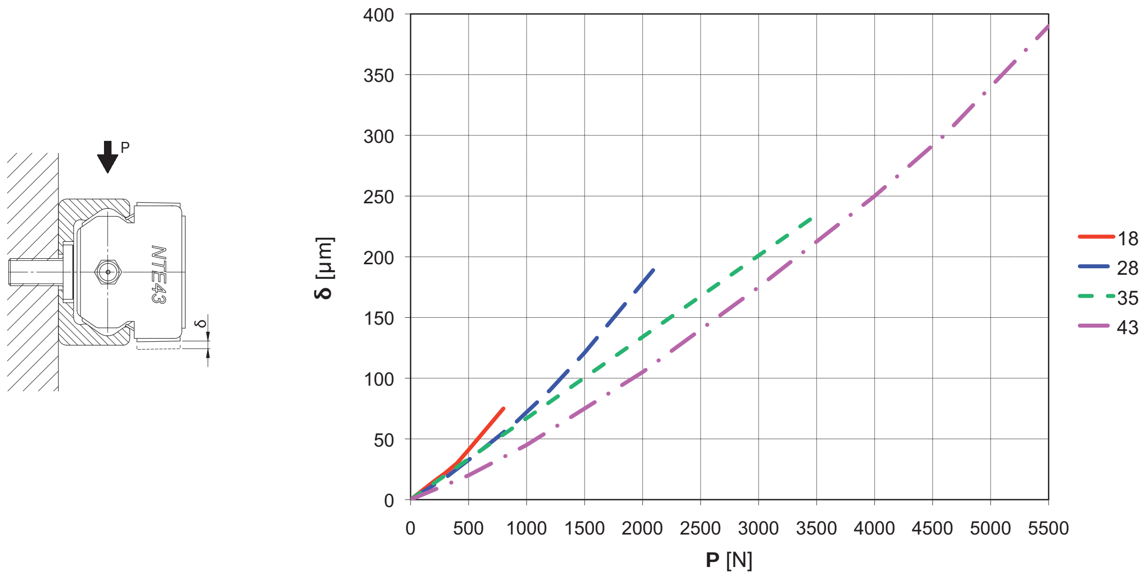
Rigidity

Total deformation

In the following deformation diagrams the total deviation of the linear guide is indicated under the effect of external loads P or moments M.
As seen from the graphs, the rigidity can be increased by supporting the sides of the rails. The graph values indicate only the deformation of the linear guide, the supporting structure is assumed infinitely rigid. All graphs refer to sliders with 3 rollers and K1 preload (standard setting). An increased preload, K2, reduces the deformation values by 25 %.

Size 18 - 43

Radial load



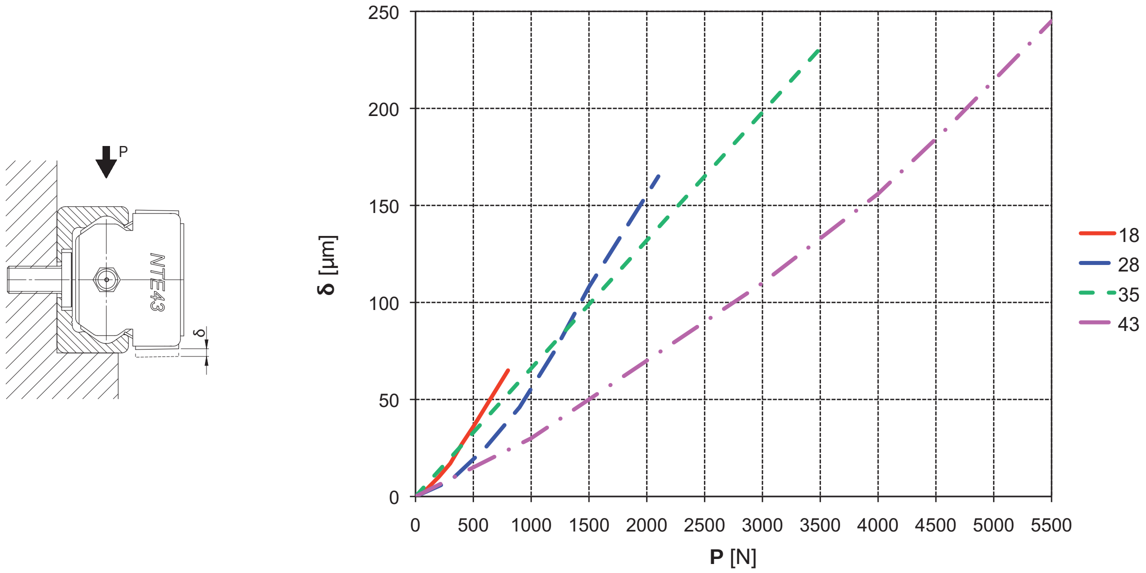
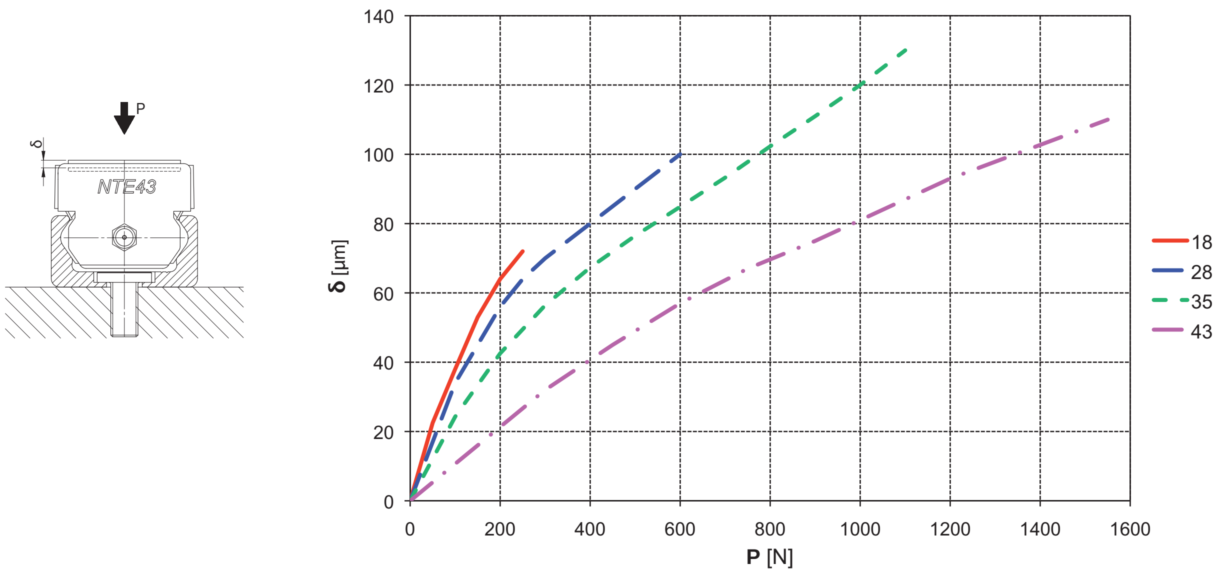


Fig. 51

Axial load



Moment Mx

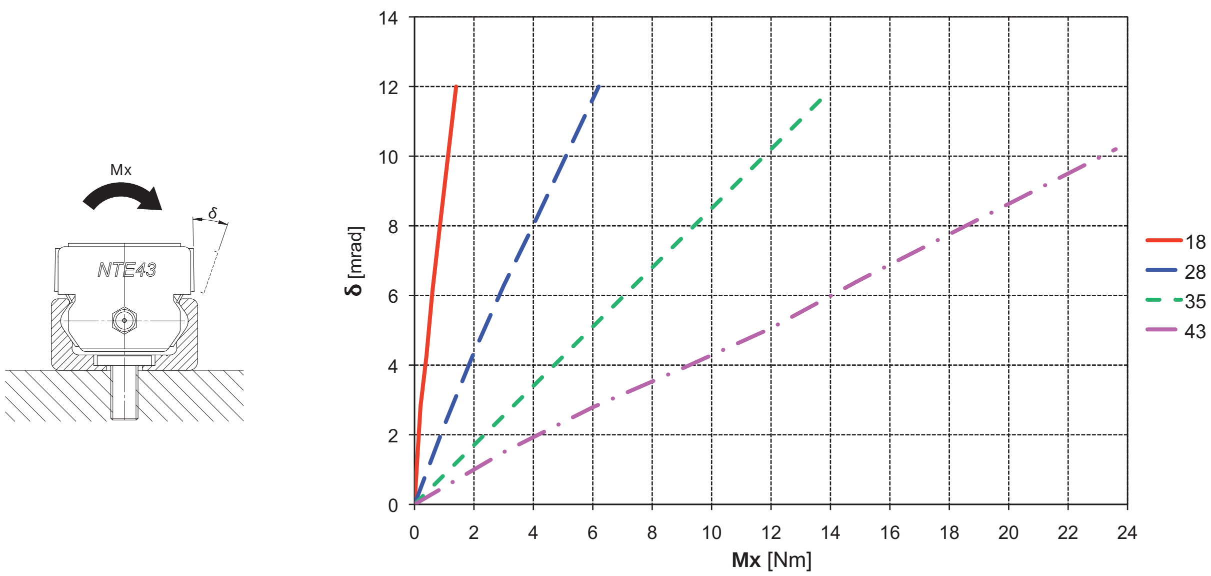
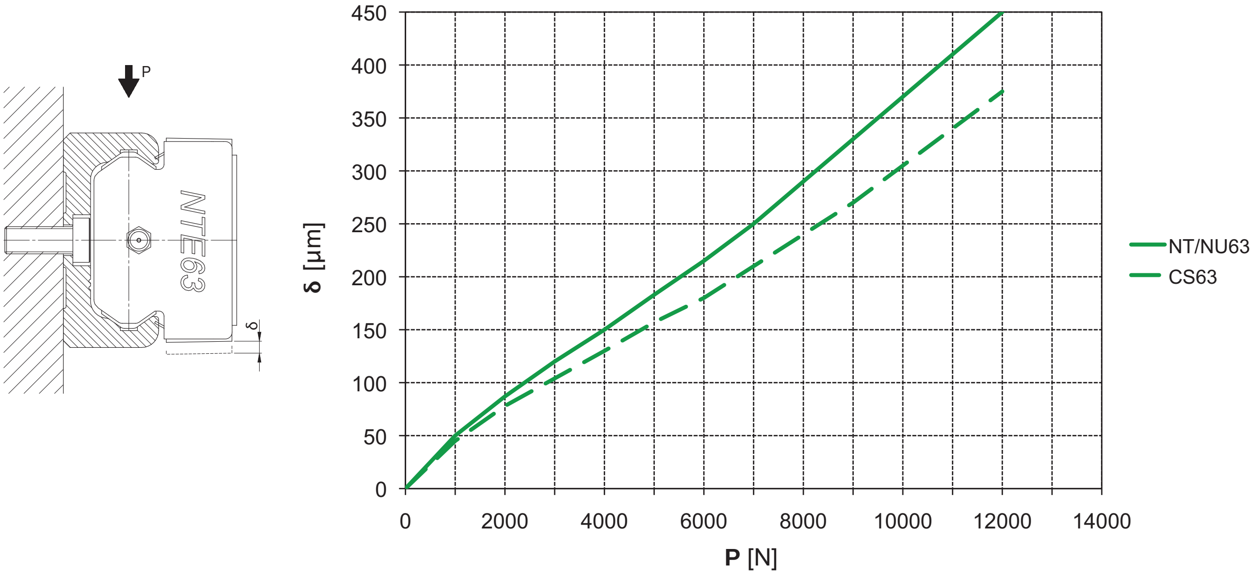


Fig. 52

Size 63

Radial load



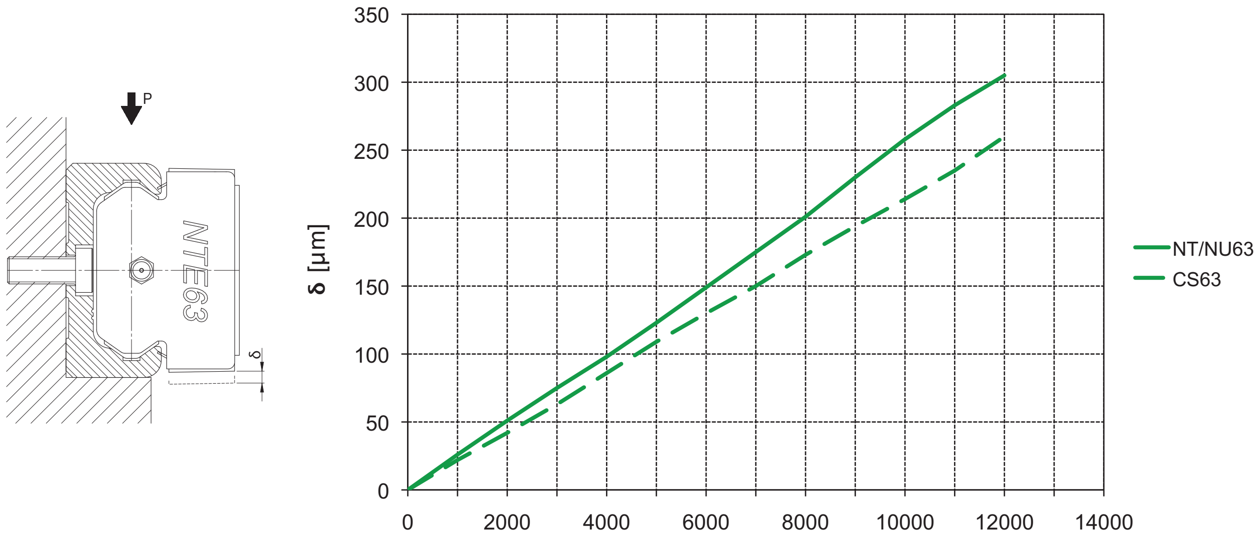
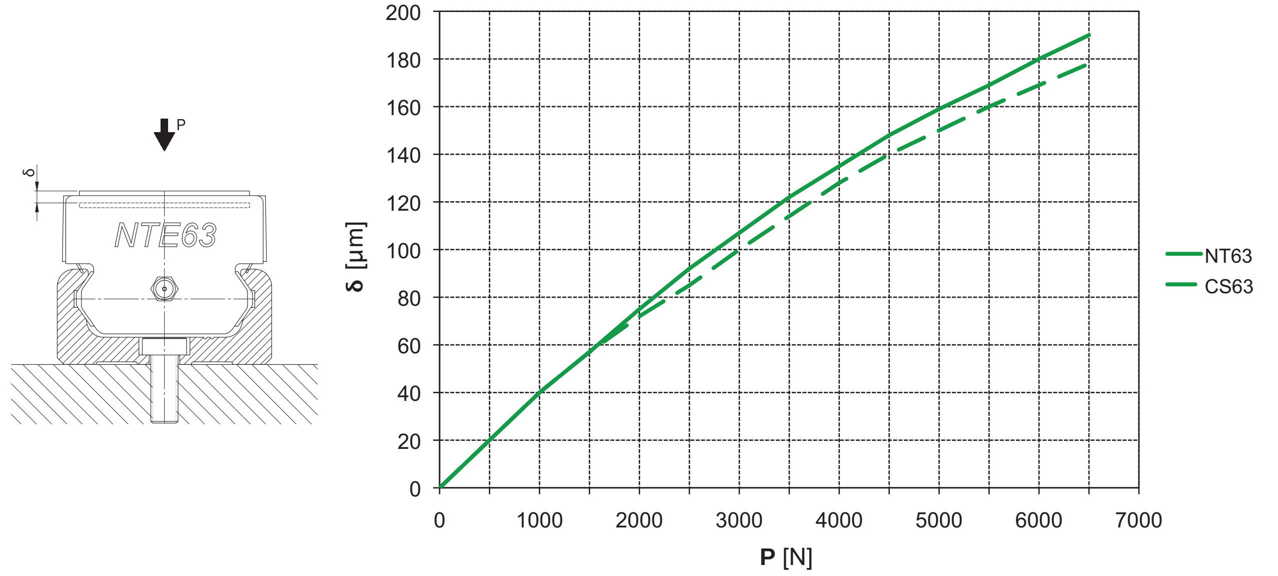


Fig. 53

Axial load



Moment Mx

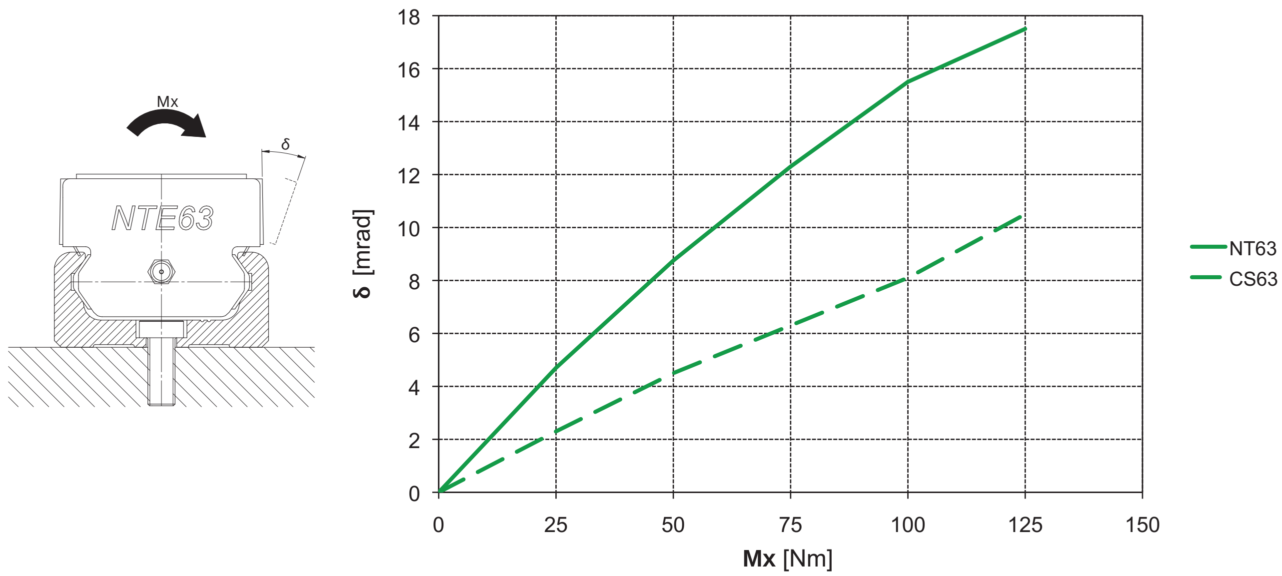


Fig. 54

Supported sides

If a higher system rigidity is required, a support of the rail sides is recommended, which can also be used as the reference surface (see fig. 55). The minimum required support depth can be taken from the adjacent table (see tab. 25).

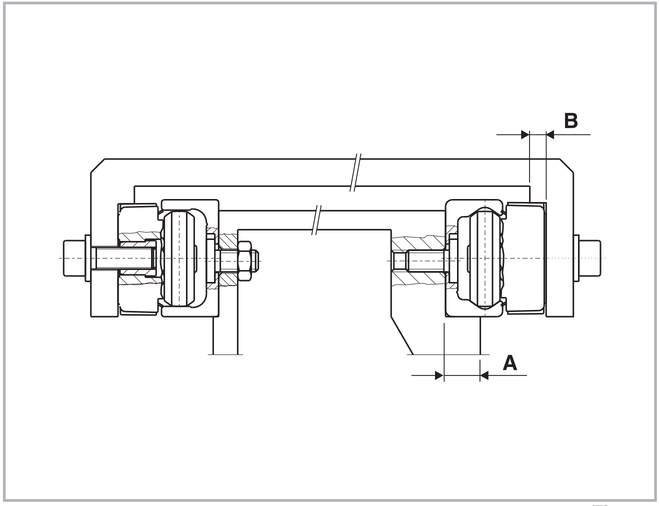


Fig. 55

Rail size	A [mm]	B [mm]
18	5	4
28	8	4
35	11	5
43	14	5
63	18	5

Tab. 25

T+U-system tolerance compensation

Axial deviations in parallelism

This problem occurs fundamentally by insufficient precision in the axial parallelism of the mounting surfaces, which results in an excessive load on the slider and thus causes drastically reduced service life.

The use of fixed bearing and compensating bearing rail (T+U-system) solves the unique problem of aligning two track, parallel guide systems. By using a T+U-system, the T-rail takes over the motion of the track while the U-rail serves as a support bearing and takes only radial forces and M_z moments.

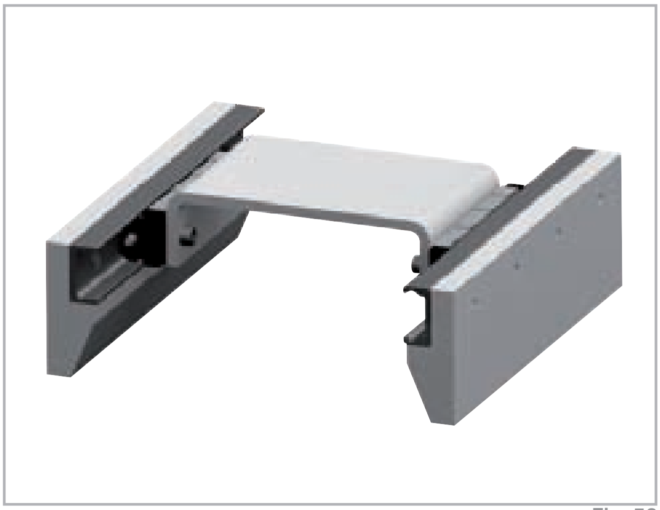


Fig. 56

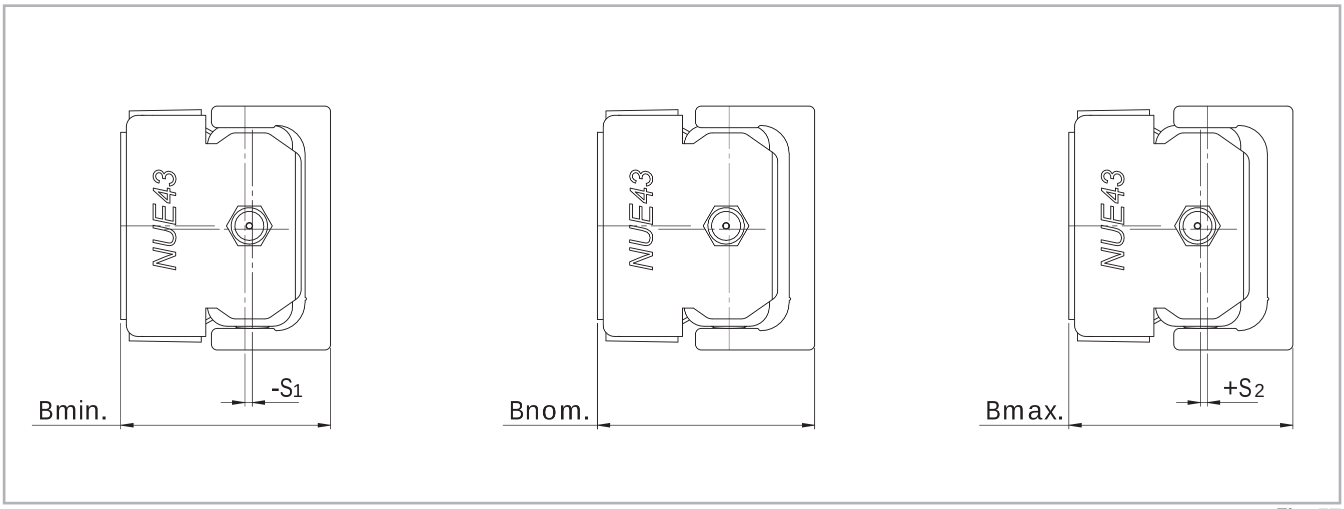


Fig. 57

T+U-system maximum offset

U-rails have flat parallel raceways that allow free lateral movement of the sliders. The maximum axial offset that can be compensated for in each slider of the U-rail is made up of the combined values S_1 and S_2 listed in table 26. Considered from a nominal value B_{nom} as the starting point, S_1 indicates the maximum offset into the rail, while S_2 represents the maximum offset towards the outside of the rail.

Slider type	S_1 [mm]	S_2 [mm]	B_{min} [mm]	B_{nom} [mm]	B_{max} [mm]
NU18	0	1.1	16.5	16.5	17.6
CS18	0.3	1.1	14.7	15	16.1
NUE28 NUE28L	0	1.3	24	24	25.3
CS28 CD28	0.6	1.3	23.3	23.9	25.2
CS35	1.3	2.7	28.9	30.2	32.9
CD35	1.3	2.7	28.8	30.1	32.8
NUE43 NUE43L	0	2.5	37	37	39.5
CS43	1.4	2.5	35.6	37	39.5
CD43	1.4	2.5	35.9	37.3	39.8
NUE63	0	3.5	50.5	50.5	54
CS63	0.4	3.5	49.4	49.8	53.3

Tab. 26

The application example in the adjacent drawing (see fig. 59) shows that the T+U-system implements a problem-free function of the slider even with an angled offset in the mounting surfaces.

If the length of the guide rails is known, the maximum allowable angle deviation of the screwed surfaces can be determined using this formula (the slider in the U-rail moves here from the innermost position S_1 to outermost position S_2):

$\alpha = \arctan \frac{S^*}{L}$	S^* = Sum of S_1 and S_2 L = Length of rail

Fig. 58

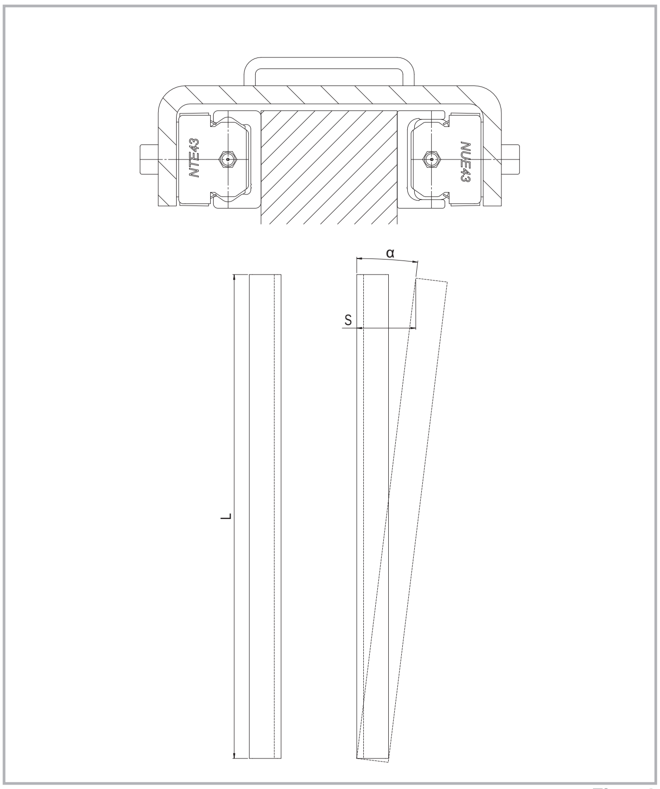


Fig. 59

The following table (tab. 27) contains guidelines for this maximum angle deviation α, achievable with the longest guide rail from one piece.

Size	Rail length [mm]	Offset S [mm]	Angle α [°]
18	2000	1.4	0.040
28	3200	1.9	0.034
35	3600	4	0.063
43	3600	3.9	0.062
63	3600	3.9	0.062

Tab. 27

The T+U-system can be designed in different arrangements (see fig. 60). A T-rail accepts the vertical components of load P. A U-rail attached underneath the component to be guided prevents the vertical panel from swinging and is used as moment support. In addition a vertical offset in the structure, as well as possible existing unevenness of the support surface, is compensated for.

Fig. 60

K+U-system tolerance compensation

Deviations in parallelism in two planes

The K+U-system, like the T+U-system, can compensate for axial deviations in parallelism. Additionally, the K+U system has the option of rotating the slider in the rail, which will compensate for other deviations in parallelism, e.g. height offset.

The unique raceway contour of the K-rail allows the slider a certain rotation around its longitudinal axis, with the same linear precision as with a T-rail. With the use of a K+U-system, the K-rail accounts for the main loads and the motion of the track. The U-rail is used as a support bearing and takes only radial forces and M_z moments. The K-rail must always be installed so that the radial load of the slider is always supported by at least 2 load bearing roller sliders, which lie on the V-shaped raceway (reference line) of the rail.

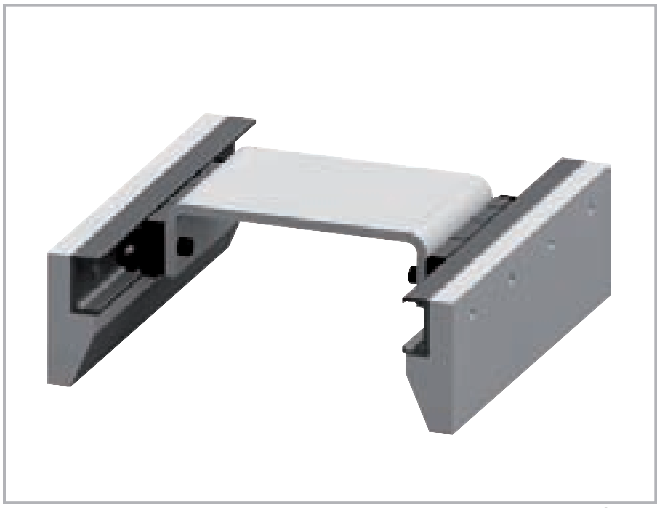


Fig. 61

K-rails and sliders are available in both sizes 43 and 63.

The custom NKE-slider may only be used in K-rails and cannot be exchanged with other Rollon sliders. The maximum allowable rotation angle of the NKE- and NUE-sliders are shown in the following table 28 and figure 62. α_1 is the maximum rotation angle counterclockwise, α_2 is clockwise.

Slider type	α_1 [°]	α_2 [°]
NKE43 and NUE43	2	2
NKE63 and NUE63	1	1

Tab. 28

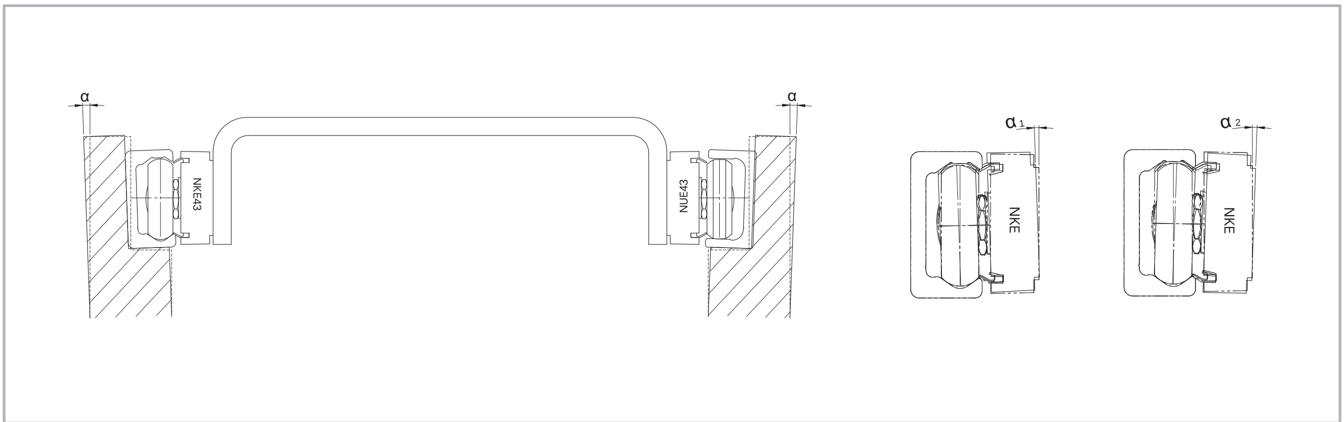


Fig. 62

K+U-system maximum offset

It must be noted that the slider in the U-rail will turn during the movement and rotation of the slider in the K-rail to allow an axial offset. During the combined effect of these movements, you must not exceed the maximum values (see tab. 29). If a maximum rotated NUE- slider is observed (2° for size 43 and 1° for size 63), the maximum and minimum position of the slider in the U rail results from the values B_{0max} and B_{0min}, which are already considered by the additional rotation caused axial offset. B_{0nom} is a recommended nominal starting value for the position of a NUE-slider in the U-rail of a K+U-system.

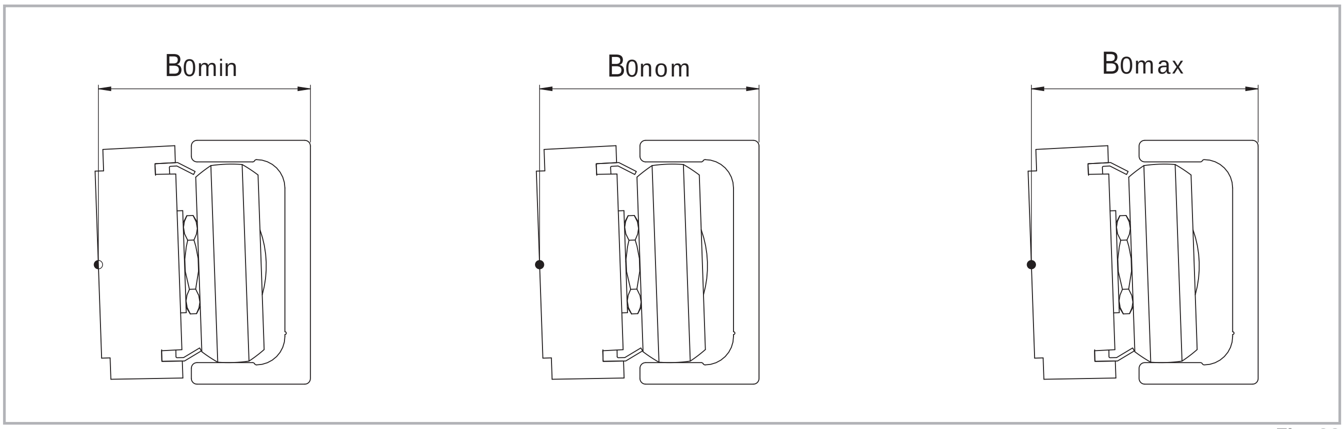


Fig. 63

Slider type	B_{0min} [mm]	B_{0nom} [mm]	B_{0max} [mm]
NUE43 NUE43L	37.6	38.85	40.1
CS43	37.6	38.85	40.1
CD43	37.9	39.15	40.4
NUE63	50.95	52.70	54.45
CS63	49.85	51.80	53.75

Tab. 29

If a K-rail is used in combination with a U-rail, with guaranteed problem-free running and without extreme slider load, a pronounced height difference between the two rails can also be compensated for. The following illustration shows the maximum height offset b of the mounting surfaces in relation to the distance a of the rails (see fig. 64).

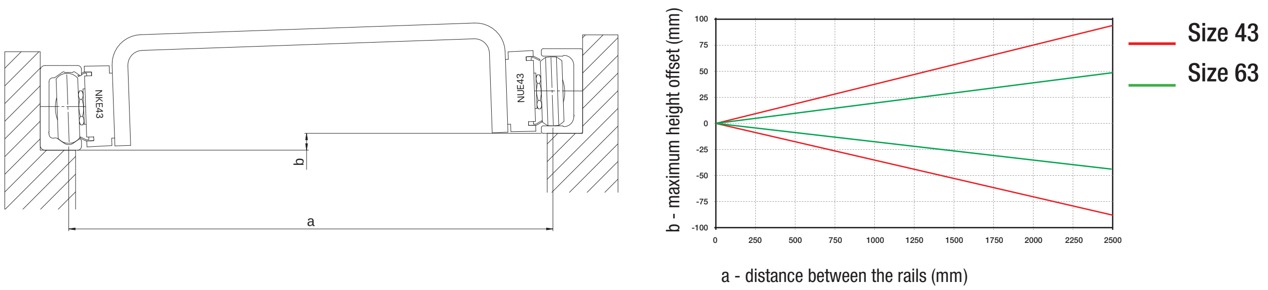


Fig. 64

Even the K+U-system can be used in different arrangements. If the same example as with the T+U-system is observed (see pg. CR-41, fig. 60), this solution, in addition to the prevention of vibrations and moments, also enables the compensation of larger deviations in parallelism in the vertical direction, without negative consequences to the guide. This is particularly important for longer strokes as it is more difficult to obtain a correct vertical parallelism.

Fig. 65

Preload

Preload classes

The factory installed systems, consisting of rails and sliders, are available in two preload classes:

Standard preload K1 means a rail-slider combination with minimum preload which means the rollers are adjusted free of clearance for optimal running properties.

Usually preload K2 is used for rail-slider systems for increasing the rigidity (see pg. CR-35). When using a system with K2 preload a reduction of the loading capacities and service life must be taken into consideration (see tab. 30).

Preload class	Reduction y
K1	-
K2	0.1

Tab. 30

This coefficient y is used in the calculation formula for checking the static load and lifetime (see pg. CR-50, fig. 75 and pg. CR-54, fig. 92).

The excess is the difference between the contact lines of the rollers and the raceways of the rail.

Preload class	Excess* [mm]	Rail type
K1	0.01	all
K2	0.03	T, U...18
	0.04	T, U...28
	0.05	T, U...35
	0.06	T, U, K...43, T, U, K...63

* Measured on the largest interior dimension between the raceways

Tab. 31

External preload

The unique design of the Compact Rail product family enables applying a partial external preload on selected locations along the entire guide.
An external preload can be applied by pressure along the side surfaces of the guide rail according to the drawing below (see fig. 66). This local preload results in higher rigidity only at the locations where it is necessary (e.g. on reversing points with high dynamic auxiliary forces).
This partial preload increases the service life of the linear guide by avoiding a continually increased preload over the entire length of the guide. Also the required drive force of the linear carriage in the non-preloaded areas is reduced.
The amount of the externally applied preload is determined using two dial indicators by measuring the deformation of the rail sides. These are deformed by thrust blocks with pressure screws. The external preload must be applied when the slider is not directly located in the pressure zone.

Size	A [mm]
18	40
28	55
35	75
43	80
63	120

Tab. 32

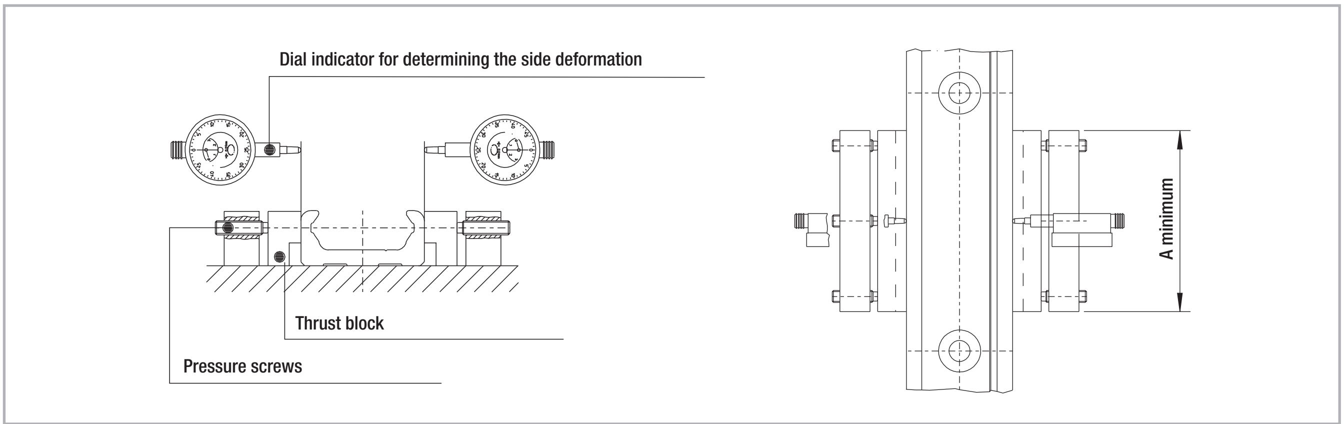


Fig. 66

The graph below indicates the value of the equivalent load as a function of the total deformation of both rail sides. The data relates to sliders with three rollers (see fig. 67).

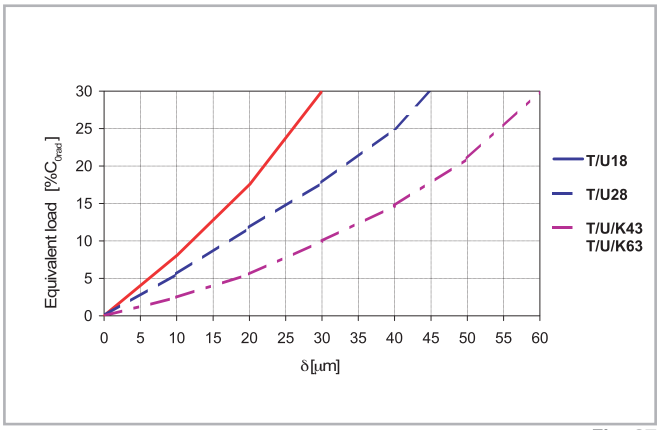


Fig. 67

Drive force

Frictional resistance

The drive force required for moving the slider is determined by the combined resistance of the rollers, wipers and seals.

The surface machining of the raceways and rollers have a minimal coefficient of friction, which remains almost the same in both the static and dynamic state. The wiper and longitudinal seals are designed for an optimum protection of the system, without a significant negative influence on the quality of motion. The overall friction of the Compact Rail also depends from external factors such as lubrication, preload and additional forces. Table 33 below contains the coefficients of friction for each slider type (for CSW and CDW sliders no friction occurs to μ_s).

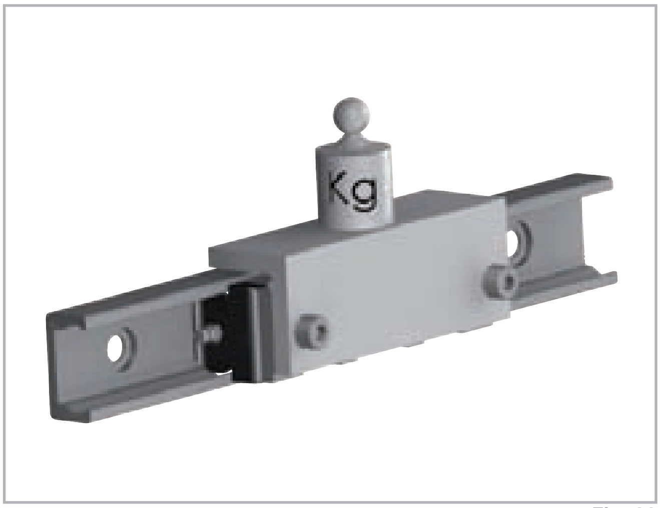


Fig. 68

Size	μ Roller friction	μ_w Wiper friction	μ_s Friction of longitudinal seals
18	0.003	$\frac{\ln(m \cdot 1000)^*}{0.98 \cdot m \cdot 1000}$	0.0015
28	0.003	$\frac{\ln(m \cdot 1000)^*}{0.06 \cdot m \cdot 1000}$	$\frac{\ln(m \cdot 1000)^*}{0.15 \cdot m \cdot 1000}$
35	0.005		
43	0.005		
63	0.006		

* Kilograms must be used for load m

Tab. 33

The values given in Table 33 apply to external loads, which, with sliders with three rollers, are at least 10 % of the maximum load rating. For calculating the driving force for lower loads, please contact our Application Engineering Department.

Calculation of drive force

The minimum required drive force for the slider is determined with the coefficients of friction (see tab. 33) and the following formula (see fig. 69):

$F = (\mu + \mu_w + \mu_s) \cdot m \cdot g$	m = mass (kg) g = 9.81 m/s²

Fig. 69

Example calculation:

If a NTE43 slider is used with a radial load of 100 kg, the result is μ = 0.005; from the formula the following is calculated:

$$\mu_s = \frac{\ln(100000)}{0.15 \cdot 100000} = 0.00076$$

$$\mu_w = \frac{\ln(100000)}{0.06 \cdot 100000} = 0.0019$$

Fig. 70

This is the minimum drive force for this example:

$$F = (0.005 + 0.0019 + 0.00076) \cdot 100 \cdot 9.81 = 7.51\ N$$

Fig. 71

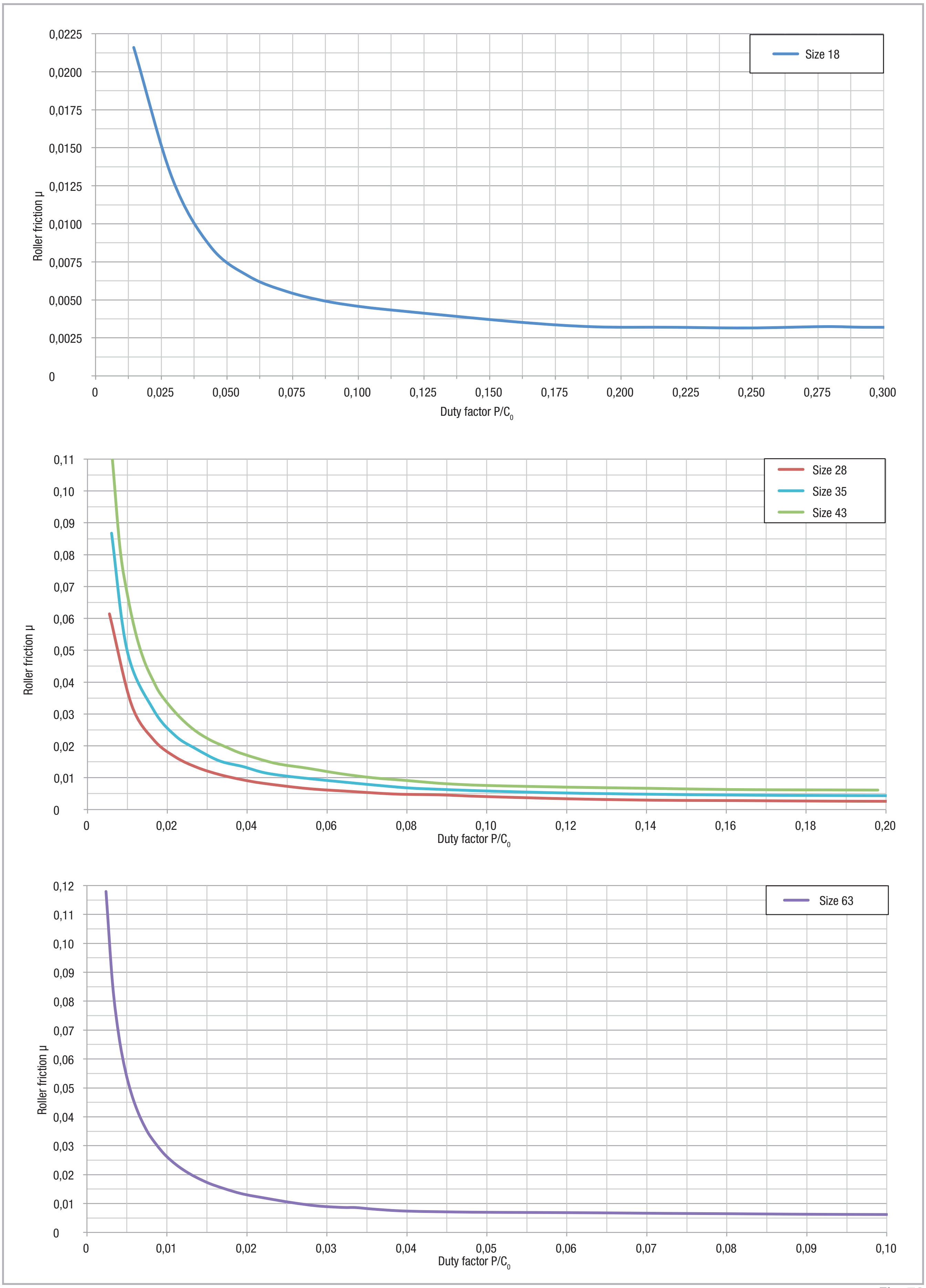

Size 18
Roller friction μ
0,0225
0,0200
0,0175
0,0150
0,0125
0,0100
0,0075
0,0050
0,0025
0
0,025
0,050
0,075
0,100
0,125
0,150
0,175
0,200
0,225
0,250
0,275
0,300
Duty factor P/C0
Size 28
Size 35
Size 43
Roller friction μ
0,11
0,10
0,09
0,08
0,07
0,06
0,05
0,04
0,03
0,02
0,01
0
0,02
0,04
0,06
0,08
0,10
0,12
0,14
0,16
0,18
0,20
Duty factor P/C0
Size 63
Roller friction μ
0,12
0,11
0,10
0,09
0,08
0,07
0,06
0,05
0,04
0,03
0,02
0,01
0
0,01
0,02
0,03
0,04
0,05
0,06
0,07
0,08
0,09
0,10
Duty factor P/C0

Fig. 72

Static load

The radial load capacity rating, C_{0rad} the axial load capacity rating C_{0ax}, and moments M_x, M_y, M_z indicate the maximum permissible values of the load (see pg. CR-9ff), higher loads will have a detrimental effect on the running quality. A safety factor, S_0, is used to check the static load, which takes into account the basic parameters of the application and is defined more in detail in the following table:

Safety factor S_0

No shock nor vibration, smooth and low-frequency reverse, high assembly accuracy, no elastic deformations	1 - 1.5
Normal installation conditions	1.5 - 2
Shock and vibration, high-frequency reverse, significant elastic deformation	2 - 3.5

Fig. 73

The ratio of the actual load to maximum permissible load may be as large as the reciprocal of the accepted safety factor, S_0, at the most.

$\frac{P_{0rad}}{C_{0rad}} \leq \frac{1}{S_0}$	$\frac{P_{0ax}}{C_{0ax}} \leq \frac{1}{S_0}$	$\frac{M_1}{M_x} \leq \frac{1}{S_0}$	$\frac{M_2}{M_y} \leq \frac{1}{S_0}$	$\frac{M_3}{M_z} \leq \frac{1}{S_0}$

Fig. 74

The above formulas are valid for a single load case.
If two or more forces are acting simultaneously, please check the following formula:

$$\frac{P_{0rad}}{C_{0rad}} + \frac{P_{0ax}}{C_{0ax}} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} + y \leq \frac{1}{S_0}$$

P_{0rad} = effective radial load (N)
C_{0rad} = permissible radial load (N)
P_{0ax} = effective axial load (N)
C_{0ax} = permissible axial load (N)
M_1, M_2, M_3 = external moments (Nm)
M_x, M_y, M_z = maximum permissible moments in the different loading directions (Nm)
y = reduction due to preload

Fig. 75

The safety factor S_0 can lie on the lower given limit if the occurring forces can be determined with sufficient precision. If shock and vibration are present, the higher value should be selected. For dynamic applications higher safety is required. Please contact the Application Engineering Department.

Calculation formulas

Examples of formulas for determining the forces on the most heavily loaded slider

For an explanation of the parameters in the formulas see pg. CR-53, fig. 90

Horizontal movement

Static test

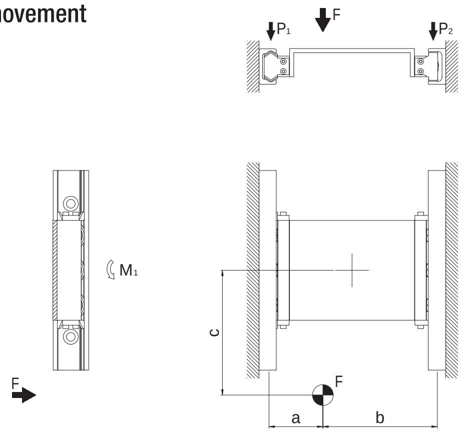


Fig. 76

Slider load:

$$P_1 = F \cdot \frac{b}{a+b}$$

$$P_2 = F - P_1$$

in addition each slider is loaded by a moment:

$$M_1 = \frac{F}{2} \cdot c$$

Fig. 77

Horizontal movement

Static test

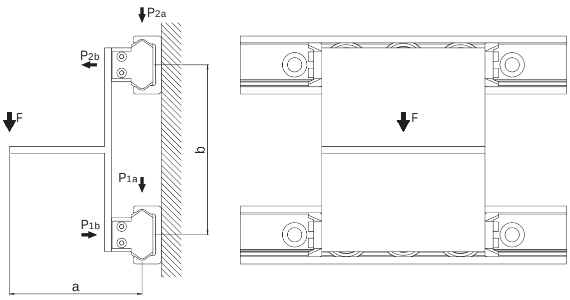


Fig. 78

Slider load:

$$P_{1a} \cong P_{2a} = \frac{F}{2}$$

$$P_{2b} \cong P_{1b} = F \cdot \frac{a}{b}$$

Fig. 79

Horizontal movement

Static test

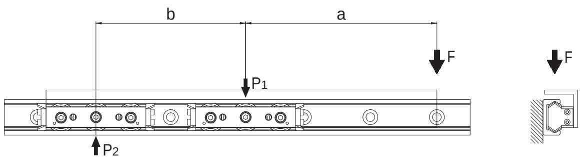


Fig. 80

Slider load:

$$P_2 = F \cdot \frac{a}{b}$$

$$P_1 = P_2 + F$$

Fig. 81

Note: Applies only if the distance between centers of the sliders b > 2x slider length

Horizontal movement

Static test

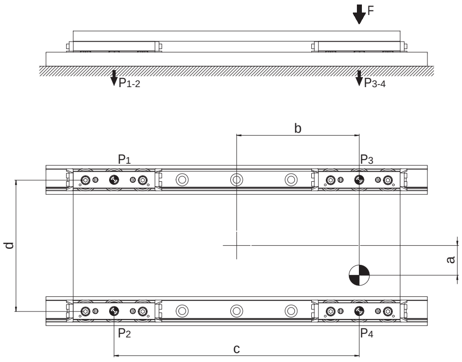


Fig. 82

Note: It is defined that slider no. 4 is always located closest to the point where the force is applied.

Slider load:

$$P_1 = \frac{F}{4} - \left(\frac{F}{2} \cdot \frac{b}{c}\right) - \left(\frac{F}{2} \cdot \frac{a}{d}\right)$$

$$P_2 = \frac{F}{4} - \left(\frac{F}{2} \cdot \frac{b}{c}\right) + \left(\frac{F}{2} \cdot \frac{a}{d}\right)$$

$$P_3 = \frac{F}{4} + \left(\frac{F}{2} \cdot \frac{b}{c}\right) - \left(\frac{F}{2} \cdot \frac{a}{d}\right)$$

$$P_4 = \frac{F}{4} + \left(\frac{F}{2} \cdot \frac{b}{c}\right) + \left(\frac{F}{2} \cdot \frac{a}{d}\right)$$

Fig. 83

Vertical movement

Static test

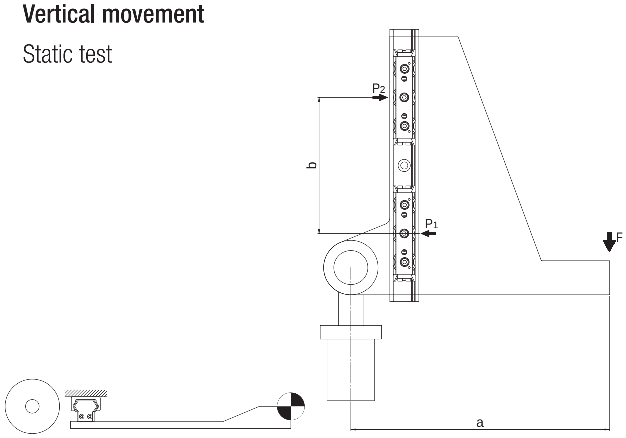


Fig. 84

Slider load:

$$P_1 \cong P_2 = F \cdot \frac{a}{b}$$

Fig. 85

Note: Applies only if the distance between centers of the sliders b > 2x slider length

Horizontal movement

Static test

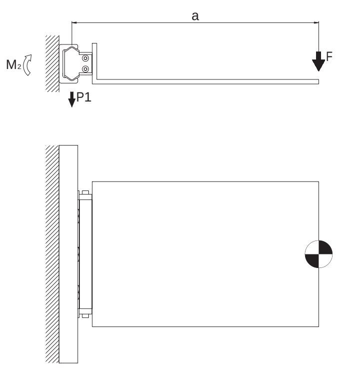


Fig. 86

Slider load:

$$P_1 = F$$

$$M_2 = F \cdot a$$

Fig. 87

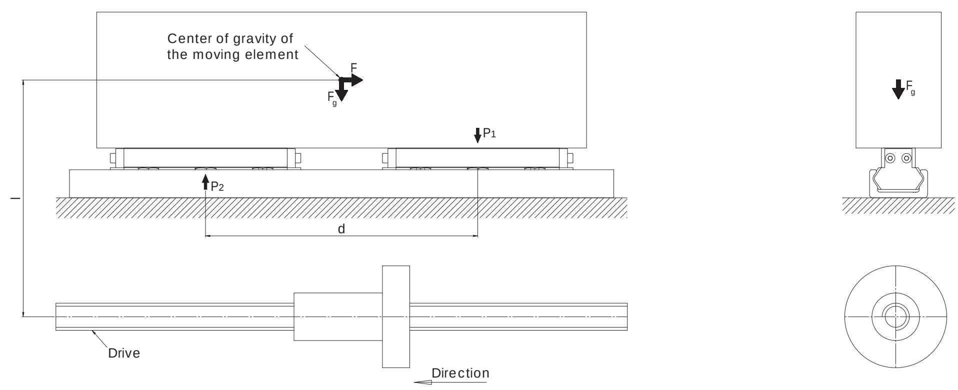


Fig. 88

Horizontal movement

Test with a moving element of the weight-force F_g at the instant the direction of movement changes

Inertial force	Slider load at time of reverse	
$F = m \cdot a$	$P_1 = \dfrac{F \cdot l}{d} + \dfrac{F_g}{2}$	$P_2 = \dfrac{F_g}{2} - \dfrac{F \cdot l}{d}$

Fig. 89

Explanation of the calculation formula

F	=	effective force (N)
F_g	=	weight-force (N)
P_1, P_2, P_3, P_4	=	effective load on the slider (N)
M_1, M_2	=	effective moment (Nm)
m	=	mass (kg)
a	=	acceleration (m/s²)

Fig. 90

Service life calculation

The dynamic load capacity C is a conventional variable used for calculating the service life. This load corresponds to a nominal service life of 100 km. For values of the individual slider see pg. CR-9. Load capacities. The following formula (see fig. 91) links the calculated theoretical service life to the dynamic load capacity and the equivalent load:

$$L_{Km} = 100 \cdot \left(\frac{C}{P} \cdot \frac{f_c}{f_i} \cdot f_h\right)^3$$

L_{km} = theoretical service life (km)
C = dynamic load capacity (N)
P = effective equivalent load (N)
f_c = contact factor
f_i = application coefficient
f_h = stroke factor

Fig. 91

The equivalent load P corresponds in its effects to the sum of the forces and moments working simultaneously on a slider. If these different load components are known, P results as follows:

$$P = P_r + \left(\frac{P_a}{C_{0ax}} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} + y\right) \cdot C_{0rad}$$

Fig. 92

Here the external loads are assumed as constant in time. Brief loads, which do not exceed the maximum load capacities, do not have any relevant effect on the service life and can therefore be neglected.
The contact factor f_c refers to applications in which several sliders pass the same rail section. If two or more sliders move over the same point of a rail, the contact factor according to table 34 to be taken into account in the formula for calculation of the service life.

Number of sliders	1	2	3	4
f_c	1	0.8	0.7	0.63

Tab. 34

The application coefficient f_i takes into account the operational conditions in the service life calculation. It has a similar significance to the safety factor S_0 in the static load test. It is calculated as described in the following table:

f_i	
Neither shocks nor vibrations, smooth and low-frequency direction change; clean operating conditions; low speeds (<1 m/s)	1 - 1.5
Slight vibrations, average speeds (1 - 2.5 m/s) and average frequency of direction change	1.5 - 2
Shocks and vibrations, high speeds (> 2.5 m/s) and high-frequency direction change; extreme dirt contamination	2 - 3.5

Tab. 35

The stroke factor f_h takes into account the higher load of the raceways and rollers during short strokes on the same total length of run. The corresponding values are taken from the following graph (for strokes longer than 1 m, f_h =1):

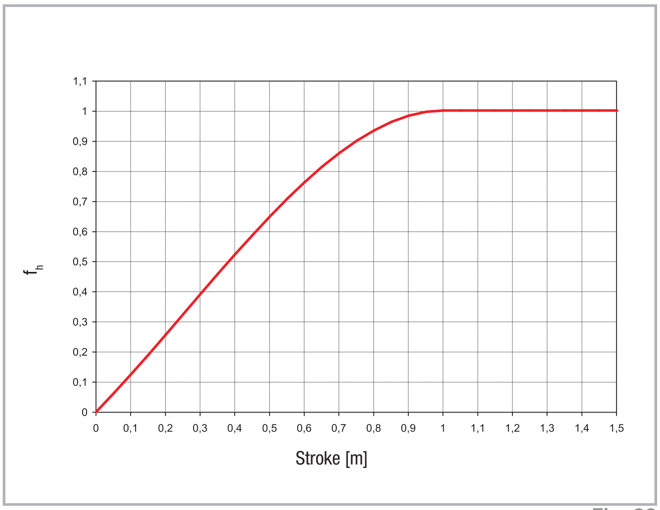


Fig. 93

Lubrication

Roller pin lubrication

The bearings inside the Rollers are lubricated for life. Custom lubrication of the roller sliders for use in high temperature environments or in the food industry is available upon request. For more information, please contact the Rollon Application Engineering department.

Lubrication of the raceways

Proper lubrication during normal conditions:

- reduces friction
- reduces wear
- reduces the load of the contact surfaces through elastic deformations
- reduces running noise
- increases quiet running

To reach the calculated service life (see pg. CR-54), a film of lubricant should always be present between the raceway and roller, this also serves to protect against corrosion of the ground raceways.

N-slider lubrication

Lubrication when using N-sliders

NTE-, NUE- and NKE-sliders (except for types NT/NU18) are equipped with a self-lubrication kit for periodic lubrication of the slider.
This provides a progressive release of lubricant (see tab. 36) on the raceway during operation of the slider. The expected service life is up to 2 million cycles, depending on the type of application. The zerk fittings (see fig. 94) provide the lubrication.

Lubricant	Thickening agent	Temperature range [°C]	Dynamic viscosity [mPas]
Mineral oil	Lithium soap	-30... to +120	< 1000

Tab. 36

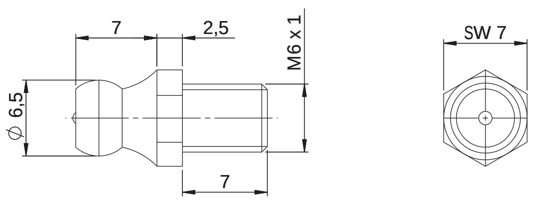


Fig. 94

Replacement of N-slider wiper head

Sliders NTE, NUE and NKE are equipped with a safety system made of longitudinal sealing lips and rigid, spring-preloaded, and therefore self-adjusting, wipers on both sides of the head for automatic cleaning of the raceways. The slider heads can be removed for replacement. To do this it is necessary to loosen the zerk fittings (except for types NT/NU18), which should be refastened after installing the new heads with the following tightening torque:

Slider type	Tightening torque [Nm]
NTE, NUE28	0.4 - 0.5
NTE, NUE, NKE43 and 63	0.6 - 0.7

Tab. 37

C-slider lubrication

Lubrication when using C-sliders

The C series sliders can be provided with wipers made of polyamide, to remove the contaminants on the raceways. Since the sliders do not have a self-lubrication kit, manual lubrication of the raceways is required. A guideline is to lubricate the raceways every 100 km or every 6 months.

We recommend a roller bearing lubricant with a lithium base of average consistency as a lubricant (see tab. 38).

Lubricant	Thickening agent	Temperature range [°C]	Dynamic viscosity [mPas]
Roller bearing lubricant	Lithium soap	-30 to +170	4500

Tab. 38

Corrosion protection

The Compact Rail product family has a standard corrosion protection system by means of electrolytic-zinc plating according to ISO 2081. If increased corrosion protection is required, application-specific surface treatments are available upon request, e.g. as nickel-plated design with FDA approval for use in the food industry. For more information contact the Rollon Application Engineering Department.

Speed and acceleration

The Compact Rail product family is suitable for high operating speeds and accelerations.

Size	Speed [m/s]	Acceleration [m/s²]
18	3	10
28	5	15
35	6	15
43	7	15
63	9	20

Tab. 39

Operating temperatures

The temperature range for continuous operation is: -30 °C / +120 °C with occasional peaks up to +150 °C.
Peaks up to +170 °C can also be reached with the use of C-series sliders (except size 63) not equipped with polyamide wipers.

Installation instructions

Fixing holes

V-holes with 90° bevels

The selection of rails with 90° countersunk holes is based on the precise alignment of the threaded holes for installation. Here the complex alignment of the rail to an external reference is omitted, since the rail aligns during installation by the self-centering of the countersunk screws on the existing hole pattern.

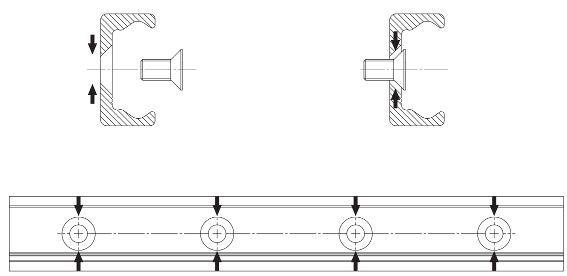


Fig. 95

C-holes with cylindrical counterbore

The cylindrical screw has, as shown, some play in the countersunk fixing hole, so that an optimum alignment of the rail can be achieved during installation (see fig. 96).

The area T is the diameter of the possible offset, in which the screw center point can move during the precise alignment.

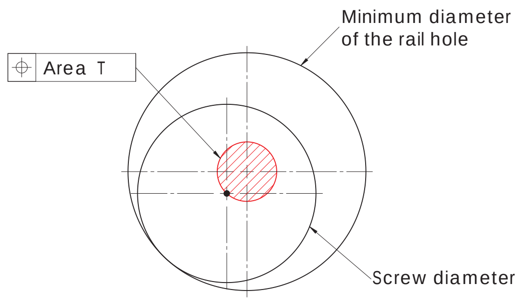


Fig. 96

Rail type	Area T [mm]
TLC18 - ULC18	∅ 1.0
TLC28 - ULC28	∅ 1.0
TLC35 - ULC35	∅ 1.5
TLC43 - ULC43 - KLC43	∅ 2.0
TLC63 - ULC63 - KLC63	∅ 1.0

Tab. 40

The minimum chamfers on the fixing threads are listed on the table below.

Size	Chamfer [mm]
18	0.5 x 45°
28	0.6 x 45°
35	0.5 x 45°
43	1 x 45°
63	0.5 x 45°

Tab. 41

Example for fixing with Torx® screws (custom design)

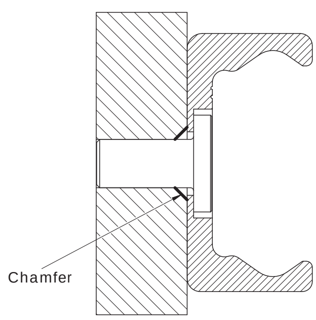


Fig. 97

Adjusting the sliders

Normally the linear guides are delivered as a system consisting of rail and adjusted sliders.

If rail and slider are delivered separately or if the slider is installed in another raceway, the preload must be set again.

Setting the preload:

(1) Check the cleanliness of the tracks.

(2) Insert the slider in the rail (CSW and CDW sliders should be inserted without wipers). Slightly loosen the fixing screws of the roller pins (no marking) to be adjusted.

(3) Position the slider on one end of the rail.

(4) For the U rails there must be a thin support (e.g. set key) under the ends of the slider body to ensure the horizontal alignment of the slider in the flat raceways.

(5) Insert the included special flat wrench from the side between the rail and the slider and slip it onto the hexagon of the eccentric pin to be adjusted.

(6) By turning the flat key clockwise, the roller to be adjusted is pressed against the upper track and the slider is then without play. Avoid a preload that is too high. It generates increased wear and reduces the service life.

(7) While holding the correct position of the roller pin with the adjustment key, the fixing screw can be carefully tightened. The exact tightening torque will be checked later (see fig. 98 and tab. 42).

(8) Move the slider in the rail and check the preload over the entire length of the rail. It should move easily and the slider should not have play at any location of the rail.

(9) For sliders with more than 3 rollers, repeat this process with each eccentric roller pin. Always start with each roller pin to be adjusted. Make sure that all rollers have even contact to the tracks.

(10) Now tighten the fixing screws with the specified tightening torque from the table while the flat key holds the angle adjustment of the pin. A special thread in the roller pin secures the set position.

(11) Now install the wiper of the CSW- and CDW-sliders and ensure a proper lubrication of the raceways.

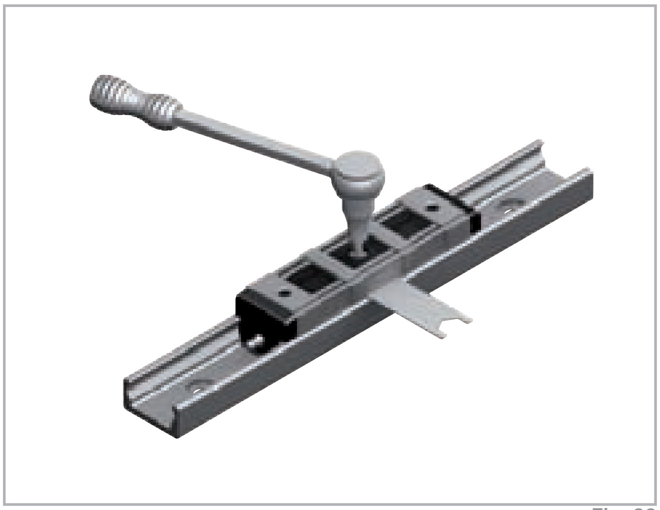


Fig. 98

Slider size	Tightening torque [Nm]
18	3
28	7
35	12
43	12
63	35

Tab. 42

Installing the single rail

The T- and K-rails can be installed in two positions relative to the external force. For axial loading of the slider (fig. 99. pos. 2), the load capacity is reduced because of the decline in contact area caused by the change in position. Therefore, the rails should be installed in such a way that the load on the rollers acts in the radial direction (fig. 99, pos. 1). The number of fixing holes in the rail in combination with screws of property class 10.9 is dimensioned in accordance with the load capacity values. For critical applications with vibrations or higher demand for rigidity, a support of the rail (fig. 99, pos. 3) is advantageous.

This reduces deformation of the sides and the load on the screws. The installation of a rail with countersunk holes requires an external reference for alignment. This reference can also be used simultaneously as rail support if required. All information in this section on alignment of the rails, refers to rails with cylindrical countersunk holes. Rails with countersunk holes self-align using the specified fixing hole pattern (see pg. CR-58, fig. 95).

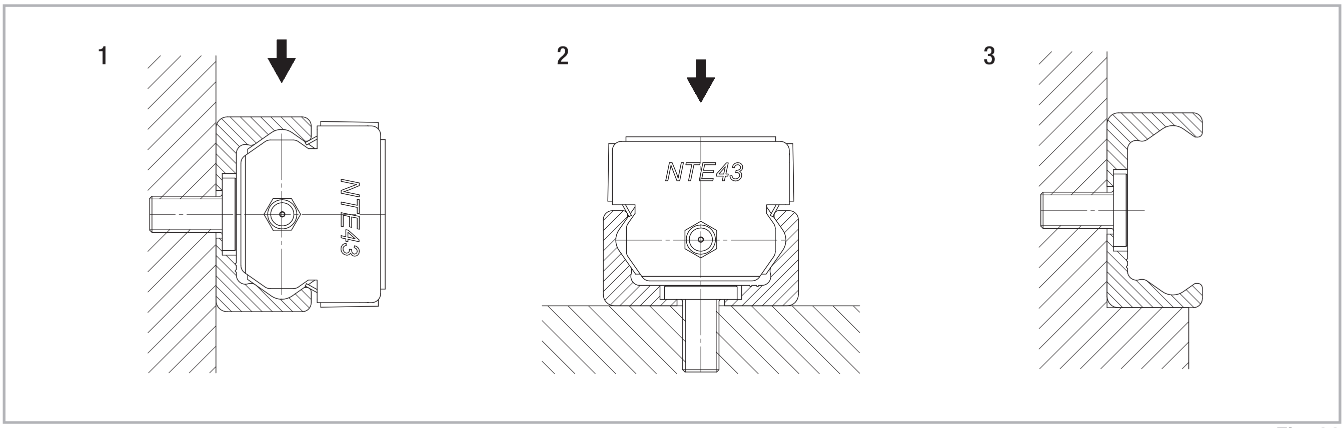


Fig. 99

Rail installation with reference surface as support

(1) Remove unevenness, burrs and dirt from the support surface.

(2) Press the rail against the support surface and insert all screws without tightening them.

(3) Start tightening the fixing screws to the specified torque on one end of the rail while continuing to hold pressure on the rail against the support surface.

Screw type	Tightening torque [Nm]
M4 (T..., U... 18)	3
M5 (T..., U... 28)	9
M6 (T..., U... 35)	12
M8 (T..., U..., K... 43)	22
M8 (T..., U..., K... 63)	35

Tab. 43

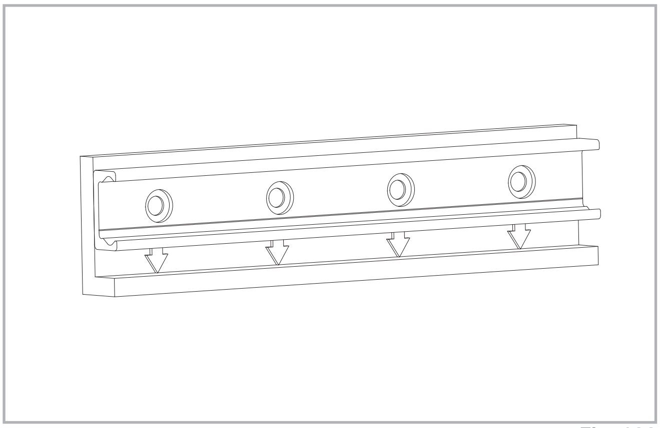


Fig. 100

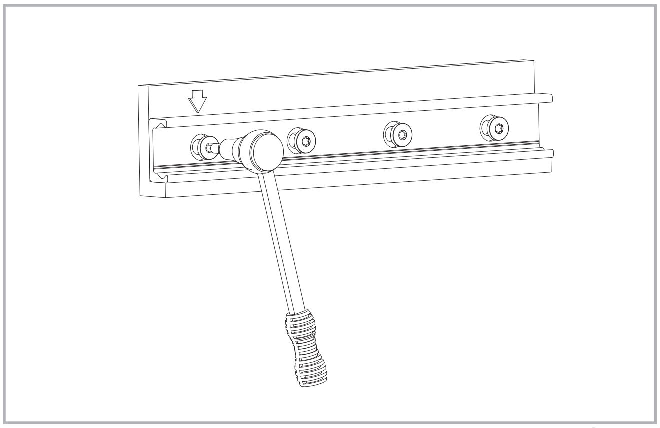


Fig. 101

Rail installation without support

(1) Carefully lay the guide rail with installed slider on the mounting surface and slightly tighten the fixing screws so that the guide rail lightly touches the mounting surface.

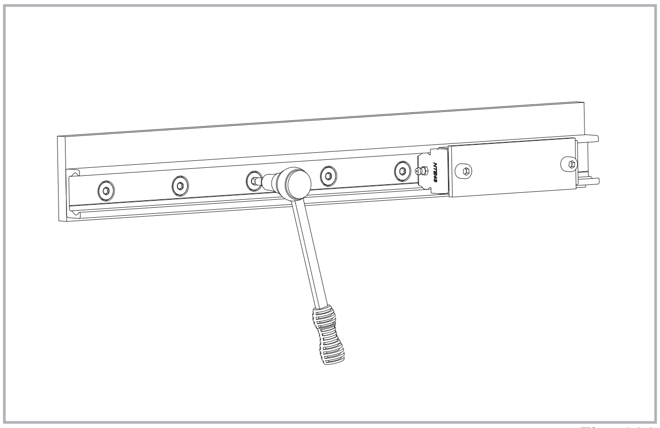


Fig. 102

(2) Install a dial indicator so that the offset of the rail to a reference line can be measured. Now position the slider in the center of the rail and set the dial indicator to zero. Move the slider back and forth between each two hole spacings and carefully align the rail. Fasten the three center screws of this area now with the the specified tightening torque, see pg. fig. 103.

(3) Now position the slider on one end of the rail and carefully align the rail to zero on the dial indicator.

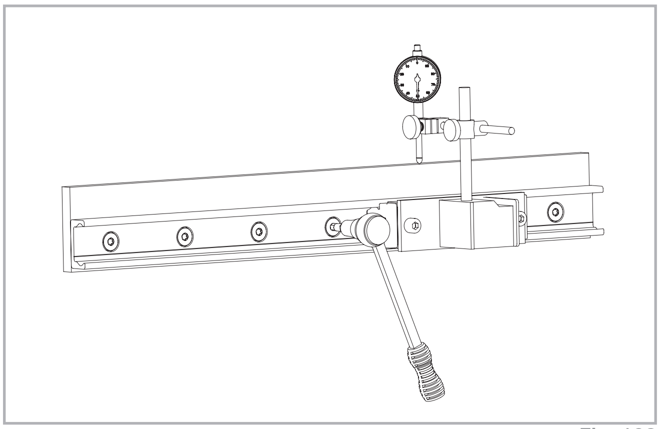


Fig. 103

(4) Begin to tighten the screws as specified while moving the slider together with the dial indicator. Make sure that it does not show any significant deflection. Repeat this procedure from the other end of the rail.

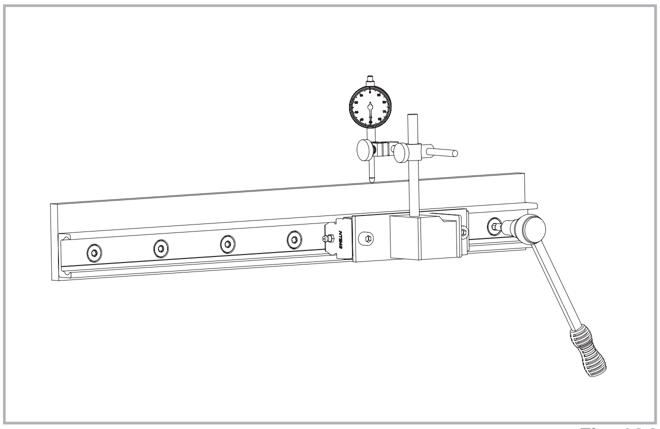


Fig. 104

Parallel installation of two rails

If two T-rails or a T+U-system are installed, the height difference of the two rails must not exceed a certain value (obtainable from the table below) in order to ensure proper guiding. These maximum values result from the maximum allowable twisting angle of the rollers in the raceways (see tab. 44). These values account for a load capacity reduction of 30% on the T-rail and must absolutely be maintained in every case.

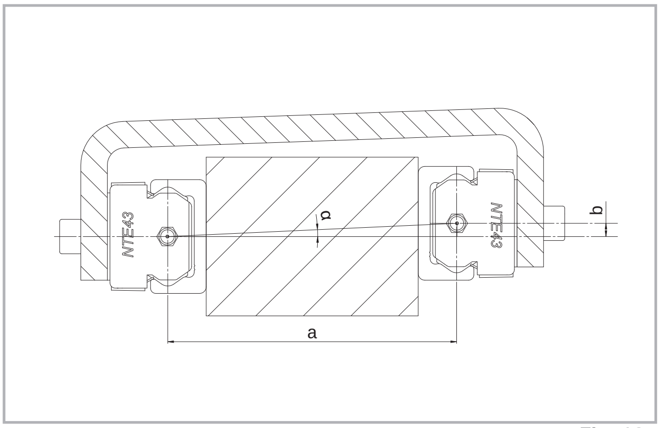


Fig. 105

Size	α
18	1 mrad (0.057°)
28	2.5 mrad (0.143°)
35	2.6 mrad (0.149°)
43	3 mrad (0.171°)
63	5 mrad (0.286°)

Tab. 44

Example:
NTE43: if a = 500 mm; b= a*tanα = 1.5 mm

When using two T-rails, the maximum parallelism deviation must not be exceeded (see tab. 45). Otherwise stresses can occur, which can result in a reduction in load capacity and service life.

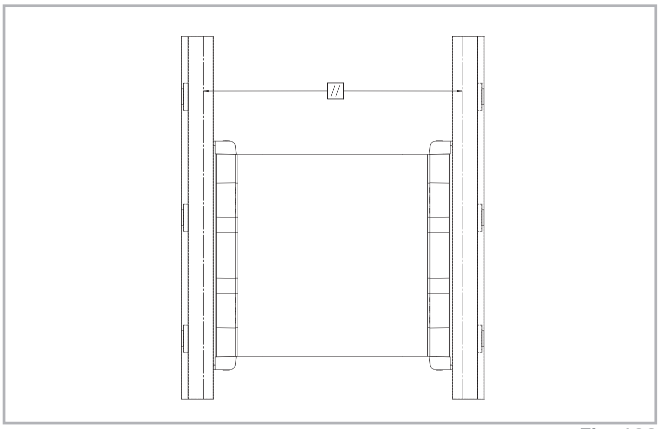


Fig. 106

Rail size	K1	K2
18	0.03	0.02
28	0.04	0.03
35	0.04	0.03
43	0.05	0.04
63	0.06	0.05

Tab. 45

Note: For parallelism problems, it is recommended to use a T+U or K+U system, since these combinations compensate for inaccuracies (see pg. CR-40, or CR-42).

Parallel installation of two T-rails

(1) Clean chips and dirt from the prepared mounting surfaces and fasten the first rail as described in the section on installation of a single rail.
(2) Fasten the second rail on the ends and the center. Tighten the screws in Position A and measure the distance between the raceways of the two rails.

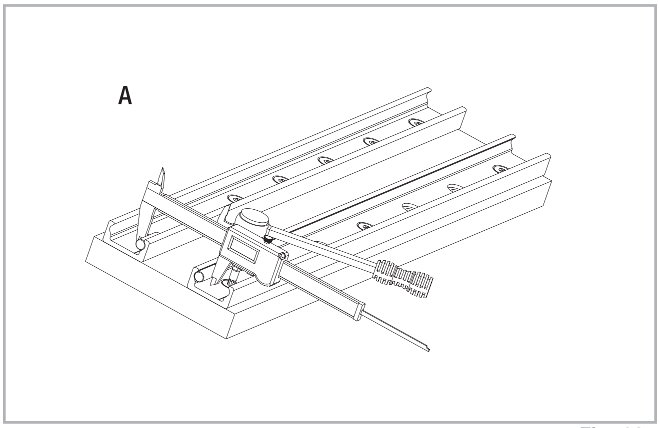


Fig. 107

(3) Fasten the rail in Position B so that the distance between the raceways does not exceed the measured values in Position A while maintaining the tolerances (see pg. CR-63, tab. 45) for parallel rail installation.

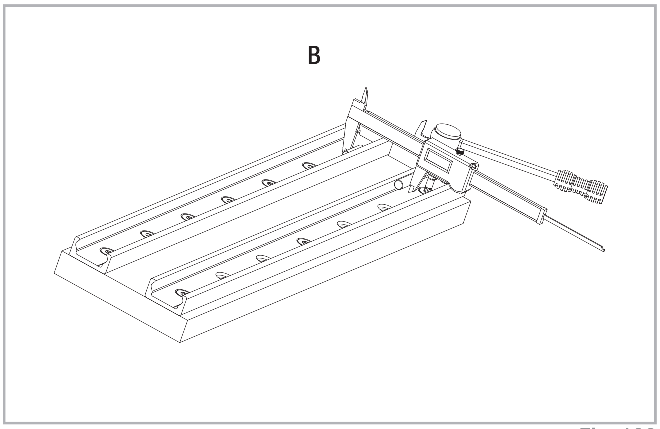


Fig. 108

(4) Fasten the screw in Position C so that the distance of the raceways is as close to an average between the two values from A and B as possible.
(5) Fasten all other screws and check the specified tightening torque of all fixing screws (see pg. CR-61, tab. 43).

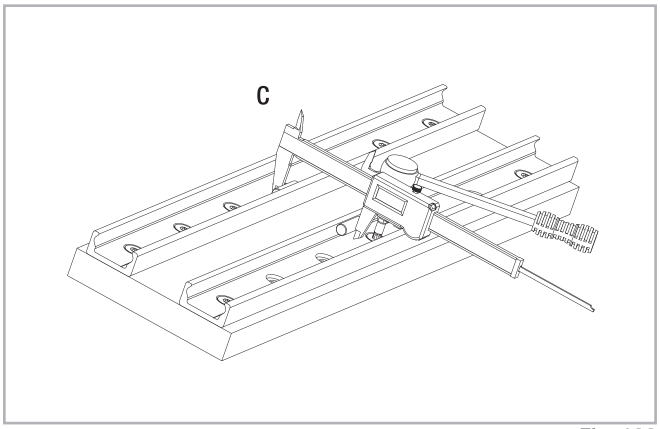


Fig. 109

Installation of the T+U- or the K+U-system

When using a two-track parallel linear guide we recommend the use of a fixed bearing / compensating bearing system: The combination of T+U-rails for compensation of deviations in parallelism or the K+U-system to compensate for deviations in parallelism in two planes.

Installation steps

(1) For a fixed bearing / compensating bearing system the fixed bearing rail is always installed first. This is then used as a reference for the compensating bearing rail.
Then proceed as described in the section on installation of a single rail (see pg. CR-60).
(2) Install the compensating bearing rail and only tighten the fixing screws slightly.
(3) Insert the sliders in the rails and install the element to be moved, without tightening its screws.
(4) Insert the element in the center of the rails and tighten it with the correct tightening torque (see pg. CR-59, tab. 42).

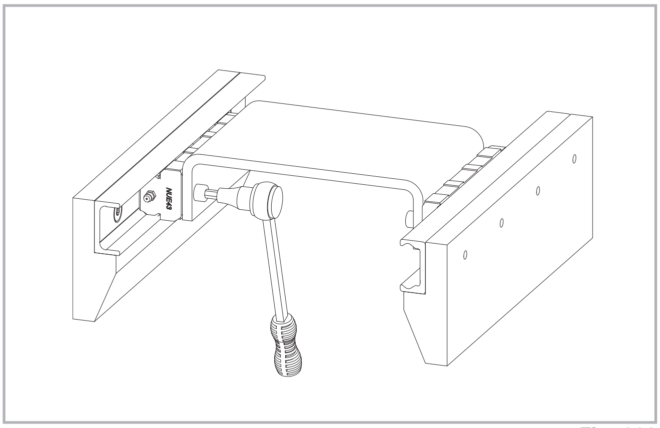


Fig. 110

(5) Tighten the center rail fixing screws to the specified torque (see fig. 111).

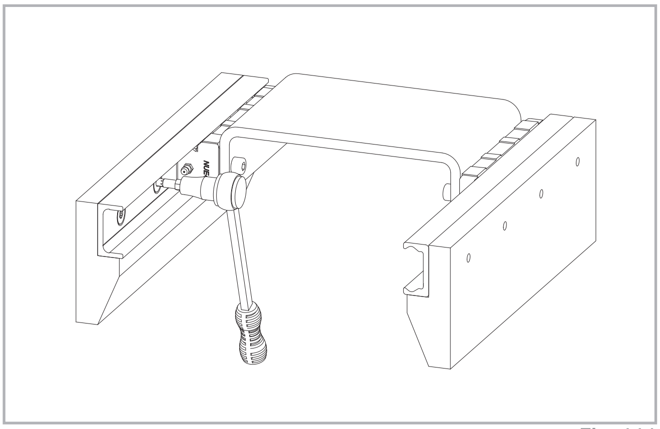


Fig. 111

(6) Move the element to one end of the rail and start tightening the rest of the screws in the direction away from the slider.

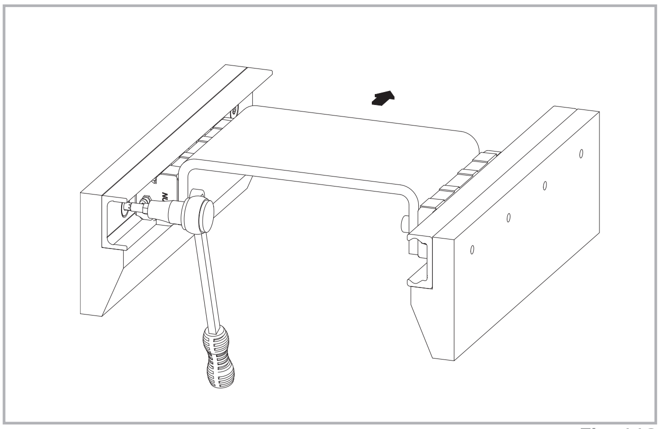


Fig. 112

Joined Rails

If long guide rails are required, two or more rails can be joined to the desired length. When putting guide rails together, be sure that the register marks shown in fig. 113 are positioned correctly.
These are fabricated asymmetric for parallel application of joined guide rails, unless otherwise specified.

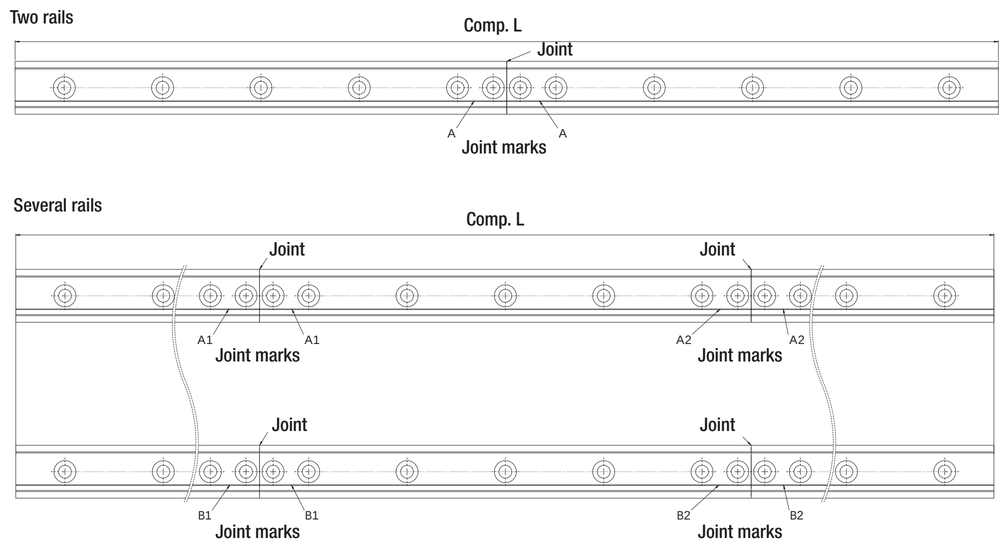


Fig. 113

General information

The maximum available rail length in one piece is indicated in table 7 on page CR-16. Longer lengths are achieved by joining two or more rails (joined rails).
Rollon then machines the rail ends at a right angle to the impact surfaces and marks them. Additional fixing screws are included with the delivery, which ensure a problem-free transition of the slider over the joints, if the following installation procedures are followed. Two additional threaded holes (see fig. 114) are required in the load-bearing structure. The included end fixing screws correspond to the installation screws for the rails for cylindrical counterbores (see pg. CR-58).
The alignment fixture for aligning the rail joint can be ordered using the designation given in the table (see pg. CR-30, tab. 19 and 20).

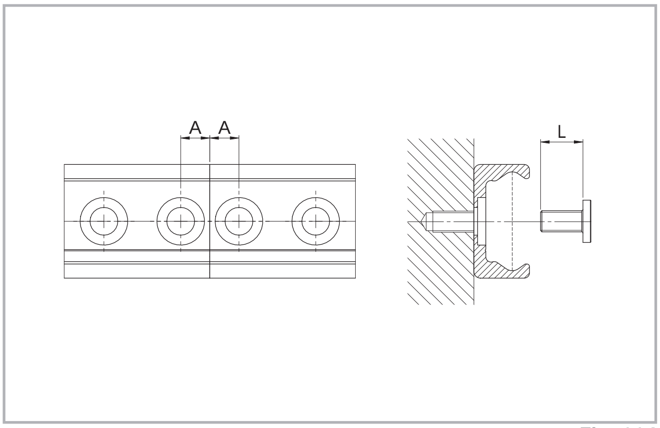


Fig. 114

Rail type	A [mm]	Threaded hole (load-bearing structure)	Screw type	L [mm]	Alignment fixture
T..., U...18	7	M4	see pg. CR-31	8	AT18
T..., U...28	8	M5		10	AT28
T..., U...35	10	M6		13	AT35
T..., U...43	11	M8		16	AT43
T..., U...63	8	M8		20	AT63
K...43	11	M8		16	AK43
K...63	8	M8		20	AK63

Tab. 46

Installation of joined rails

After the fixing holes for the rails are made in the load-bearing structure, the joined rails can be installed according to the following procedure:
(1) Fix the individual rails on the mounting surface by tightening all screws except for each last one on the rail joint.
(2) Install the end fixing screws without tightening them (see fig. 115).

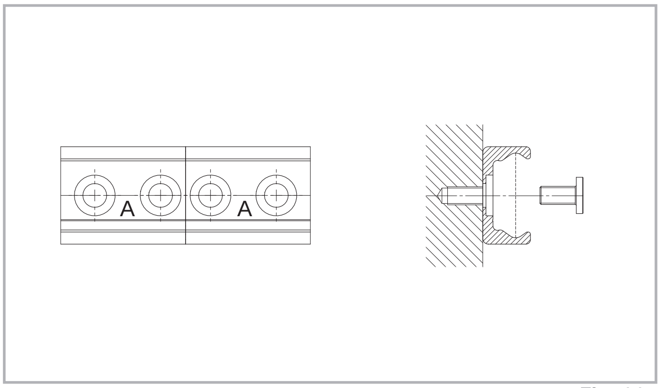


Fig. 115

(3) Place the alignment fixture on the rail joint and tighten both set screws uniformly, until the raceways are aligned (see fig. 116).
(4) After the previous step (3) it must be checked if both rail backs lie evenly on the mounting surface. If a gap has formed there, this must be shimmed.

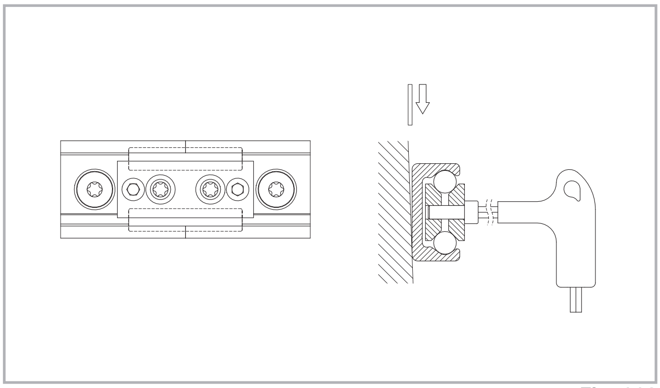


Fig. 116

(5) The bottom of the rails should be supported in the area of the transition. Here a possible existing gap must be looked for, which must be closed if necessary for correct support of the rail ends by shims.

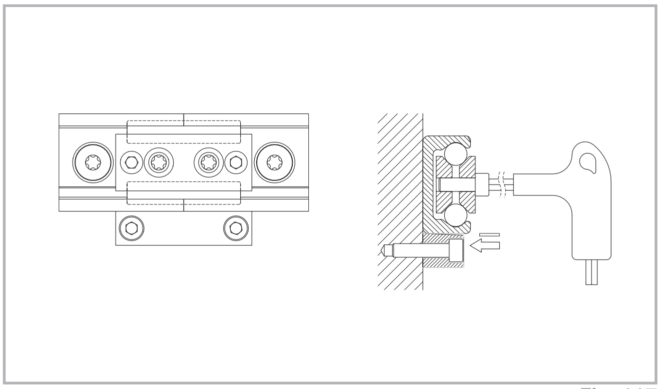


Fig. 117

(6) Insert the key through the holes in the alignment fixture and tighten the screws on the rail ends.
(7) For rails with 90° countersunk holes, tighten the remaining screws starting from the rail joint in the direction of the rail center. For rails with cylindrical counter-sunk holes, first adjust the rail to an external reference, then proceed as described above.
(8) Remove the alignment fixture from the rail.

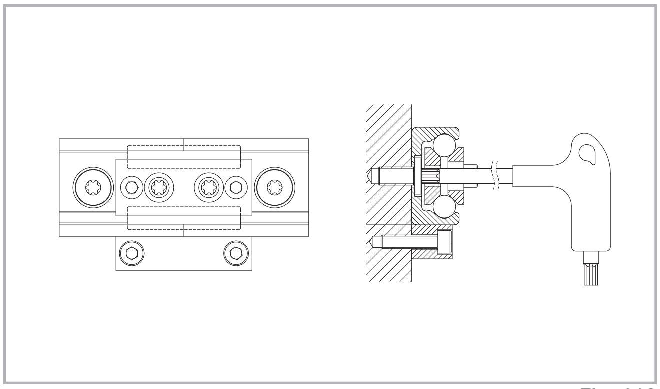


Fig. 118

Fold out ordering key

To make this product catalog as simple as possible for you to use, we have included the following easy-to-read chart.

Your advantages:

- Description and ordering designations easy to read at one glance
- Simplified selection of the correct product
- Links to detailed descriptions in the catalog

Ordering key

Rail / slider system

TLC	4560	/2/	CD	W	28	-125	-2Z	-B	-NIC
									Expanded surface protection if deviation from Standard ISO 2081 *see pg. CR-57*
								Configuration *depending on type of slider see pgs. CR-21 and CR-23*	
							Roller seal *see pg. CR-29*		
						Slider length Dimension A *see pg. CR-17, tab. 8-11*			
					Size *see pg. CR-17*				
				Wiper optional *see pg. CR-30, fig. 43*					
			Slider type *see pg. CR-17*						
		Number of sliders in one rail							
	Rail length in mm *see pg. CR-16, tab. 7*								
Rail type *see pg. CR-13*									

Ordering example: TLC-04560/2/CDW28-125-2Z-B-NIC

Rail composition: 1x3280+1x1280 (only for joint processed rails)

Hole pattern: 40-40x80-40//40-15x80-40 (please always specify the hole pattern separately)

Notes on ordering: The rail length codes are always 5 digits, the slider length codes are always 3 digits; use zeroes as a prefix when lengths are shorter

Rail

TLV	-43	-5680	-NIC
			Expanded surface protection if deviation from Standard ISO 2081 *see pg. CR-57*
		Rail length in mm *see pg. CR-19, table 7*	
	Size *see pg. CR-13*		
Rail type *see pg. CR-13*			

Ordering example: TLV-43-05680-NIC

Rail composition: 1x880+2x2400 (only for joint processed rails)

Hole pattern: 40-10x80-40//40-29x80-40//40-29x80-40 (please always specify the hole pattern separately)

Notes on ordering: The rail length codes are always 5 digits; use zeroes as a prefix when lengths are shorter

Slider

CS	28	-100	-2RS	-B	-NIC
					Expanded surface protection if deviation from Standard ISO 2081 *see pg. CR-57*
				Configuration *depending on type of slider* *see pgs. CR-21 and CR-23*	
			Roller seal *see pg. CR-29*		
		Slider length Dimension A *see pg. CR-17, table 8-11*			
	Size *see pg. CR-17*				
Slider type *see pg. CR-17*					

Ordering example: CS28-100-2RS-B-NIC

Notes on ordering: The slider length codes are always 3 digits; use zeroes as a prefix when lengths are shorter

Wipers

WT	28
	Size *see pg. CR-17*
Wiper type *see pg. CR-30, fig. 43*	

Ordering example: WT28

Notes

Notes

ROLLON®

LinearEvolution

X-Rail

Product explanation

X-Rail: Corrosion resistant or zinc-plated steel linear bearings

Fig. 1

X-Rail is the product family of roller embossed guide rails for applications in which an especially economical price/performance ratio and high corrosion resistance are required.
X-Rail includes two sets of products: a rail with shaped raceways (0 degrees of axial play) and a rail with flat raceways (1 degree of axial play).
All products are available in stainless steel or zinc-plated steel. There are three different sizes of guide rails. The sliders for the guide rails are available in different versions.

The most important characteristics:

- Corrosion resistant, FDA/USDA compliant materials
- Compensates for deviations in mounting structure parallelism
- Not sensitive to dirt due to internal tracks
- Wide temperature range of application
- Easy adjustment of sliders on the guide rails

Preferred areas of application of the X-Rail product family:

- Construction and machine technology
  (e.g., safety doors, washing bay accessories)
- Medical technology
  (e.g., hospital accessories, medical equipment)
- Transport (e.g., rail transport, naval, automotive industry)
- Food and beverage industry (e.g., packaging, food processing)
- Building technology
- Energy technology (e.g., industrial furnaces, boilers)

Fixed bearings (T-rails)

Fixed bearing rails are used for the main load bearing in radial and axial forces.


Fig. 2

Compensating bearings (U-rails)

Compensating bearing rails are used for load bearing of radial forces and, in combination with fixed bearing rails as support bearings for occurring torques.


Fig. 3

System (T+U-System)

A T and U used together offers compensation for deviations in parallelism and tolerances in the mounting structure.


Fig. 4

Rollers

Concentric and eccentric radial ball bearings made of stainless steel or roller bearing steel are available for each slider. Roller sealing is dependent on the material: 2RS rubber seals or 2Z steel shields. All rollers are lubricated for life.


Fig. 5

Technical data

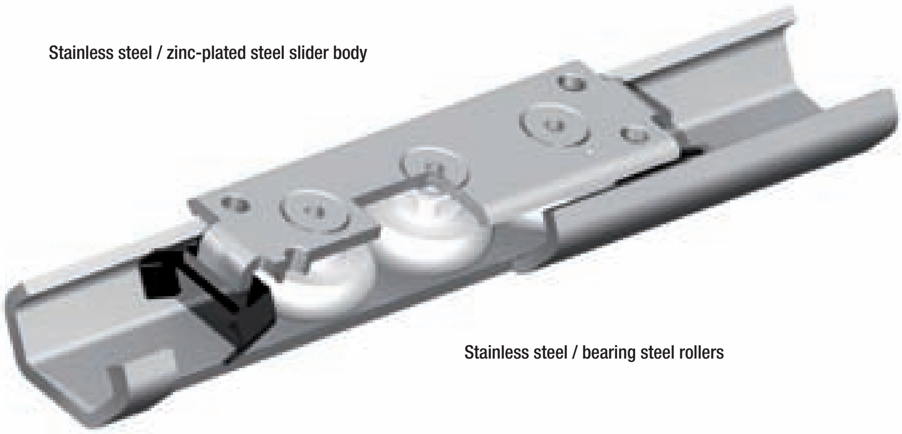


Fig. 6

Performance characteristics:

- Available sizes: 20, 30, 45
- Max. slider operating speeds in the linear bearing rails: 1.5 m/s (59 in/s) (depending on application)
- Max. telescoping speed: 0.8 m/s (31.5 in/s) (depending on application)
- Max. acceleration: 2 m/s² (78 in/s²) (depending on application)
- Max. traverse: 3,060 mm (120 in) (depending on size)
- Max. radial load capacity: 1,740 N (per slider)
- Temperature range for stainless steel rails: -30 °C to +100 °C (-22 °F to +212 °F), or steel rails: -30 °C to +120 °C (-22 °F to +248 °F)
- Available rail lengths from 160 mm to 3,120 mm (6.3 in to 122 in) in 80-mm increments (3.15 in)
- Rollers lubricated for life
- Roller seal/shield:
  CEX... Sliders => 2RS (splashproof seal),
  CES... Sliders => 2Z (dust cover seal)
- Material: Stainless steel rails TEX... / UEX... 1.4404 (AISI 316L), Steel rails TES... / UES... zinc-plated ISO 2081
- Material rollers: Stainless steel 1.4110 (AISI 440)

Remarks:

- The sliders are equipped with rollers that are in alternating contact with both sides of the raceway. Markings on the body around the outer roller pins indicate the correct arrangement of the rollers to the external load.
  Important: Both outside rollers carry the radial load.
- By a simple adjustment of the eccentric roller, the slider has clearance or is set with the desired pre-stress on the rails.
- Sliders of Version 1 (with compact body) come standard with plastic wipers for cleaning the raceways.
- Wipers for sliders of Versions 2 and 3 on request (see pg. XR-6 and XR-7).
- We do not recommend combining (stringing together) the rails.
- Recommended fixing screws according to ISO 7380 with low head height or TORX® screws on request.

Load capacities

Fixed bearings

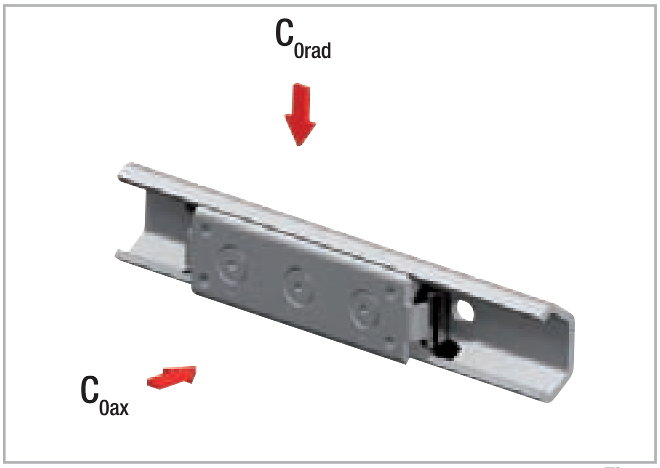


Fig. 7

Configuration	C_{0rad} [N]	C_{0ax} [N]
TEX-20 – CEX20	300	170
TEX-30 – CEX30	800	400
TEX-45 – CEX45	1600	860
TES-20 – CES20	326	185
TES-30 – CES30	870	435
TES-45 – CES45	1740	935

Resulting moment loads must be absorbed through the use of two sliders

Tab. 1

Compensating bearings

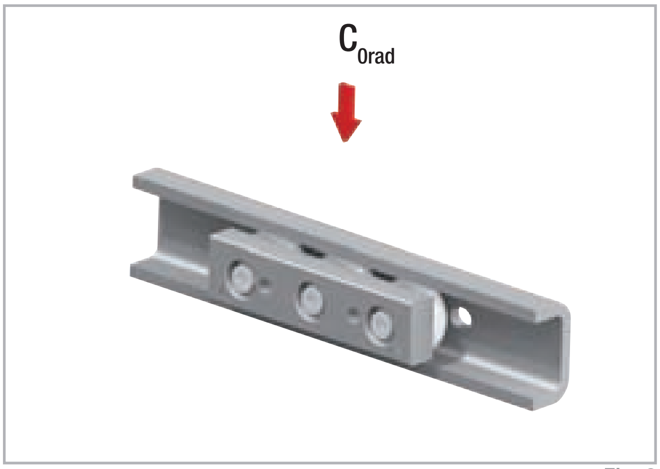


Fig. 8

Configuration	C_{0rad} [N]
UEX-20 – CEXU20	300
UEX-30 – CEXU30	800
UEX-45 – CEXU45	1600
UES-20 – CESU20	326
UES-30 – CESU30	870
UES-45 – CESU45	1740

Tab. 2

Product dimensions

Fixed rails

Rail (TEX = stainless steel / TES = zinc-plated steel)

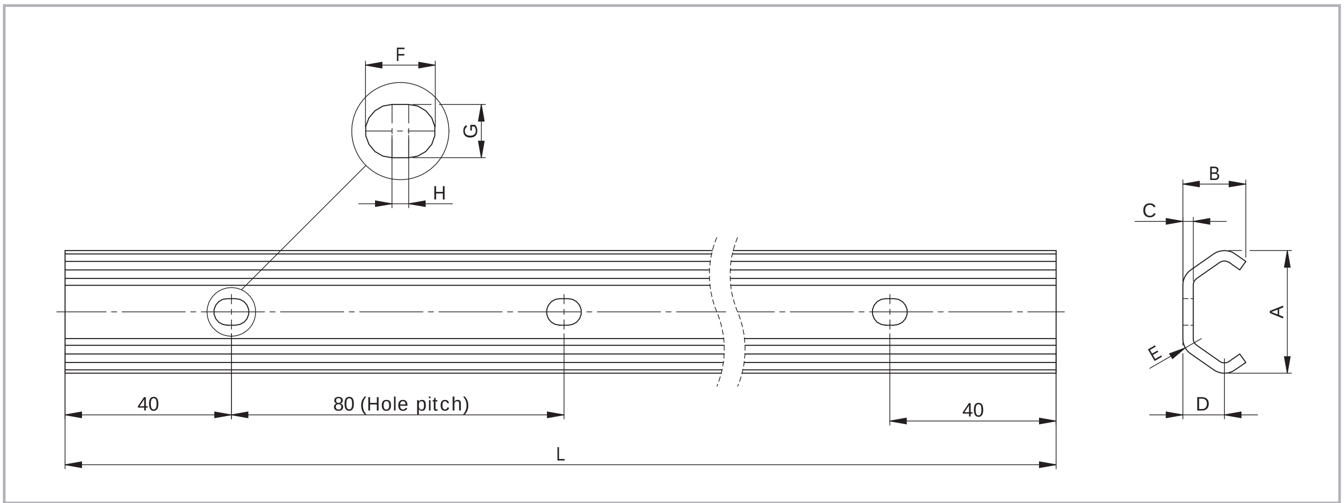


Fig. 9

Rail type	Size	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	Screw Thread Type	Weight [kg/m]
TEX TES	20	19.2	10	2	7	3	7	5	2	M4	0.47
	30	29.5	15	2.5	10	4.5	8.4	6.4	2	M5	0.90
	45	46.4	24	4	15.5	6.5	11	9	2	M8	2.29

Tab. 3

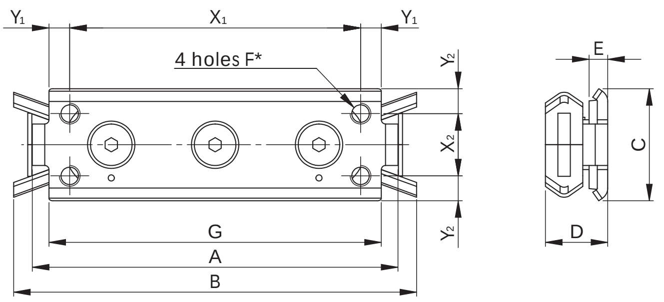
Rail type	Standard length L [mm]
TEX TES	160 - 240 - 320 - 400 - 480 - 560 - 640 - 720 - 800 - 880 - 960 - **1040** - 1120 - 1200 - 1280 - 1360 - 1440 - 1520 - 1600 - 1680 - 1760 - 1840 - 1920 - 2000 - **2080** - 2160 - 2240 - 2320 - 2400 - 2480 - 2560 - 2640 - 2720 - 2800 - 2880 - 2960 - 3040 - **3120**

Tab. 4

Please specify hole pattern separately
Special lengths or pitches available upon request, please contact the sales department
The highlighted rail lenghts are available from stock

Slider (CEX = stainless steel / CES = zinc-plated steel)

Version 1 (with compact body for fixed rails)



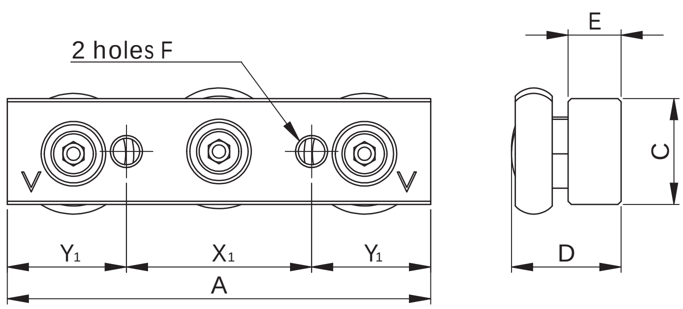
* For size 20: 2 M5 holes on the centreline with distance X_1

Fig. 10

Slider type	Size	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F	G [mm]	X_1 [mm]	Y_1 [mm]	X_2 [mm]	Y_2 [mm]	Weight [kg]
CEX20-80 CES20-80	20	80	90	18	11.5	5.5	M5	71	60	5,5	-	9	0.05
CEX30-88 CES30-88	30	88	97	27	15	4.5	M5	80	70	5	15	6	0.11
CEX45-150 CES45-150	45	150	160	40	22	4	M6	135	120	7.5	23	8.5	0.40

Tab. 5

Version 2 (with solid body for fixed rails)



Slider version with wipers on request

Fig. 11

Slider type	Size	A [mm]	C [mm]	D [mm]	E [mm]	F	X_1 [mm]	Y_1 [mm]	Weight [kg]
CEX20-60 CES20-60	20	60	10	13	6	M5	20	20	0.04
CEX30-80 CES30-80	30	80	20	20.7	10	M6	35	22.5	0.17
CEX45-120 CES45-120	45	120	25	28.9	12	M8	55	32.5	0.47

Tab. 6

Compensating rails

Rail (UEX = stainless steel / UES = zinc-plated steel)

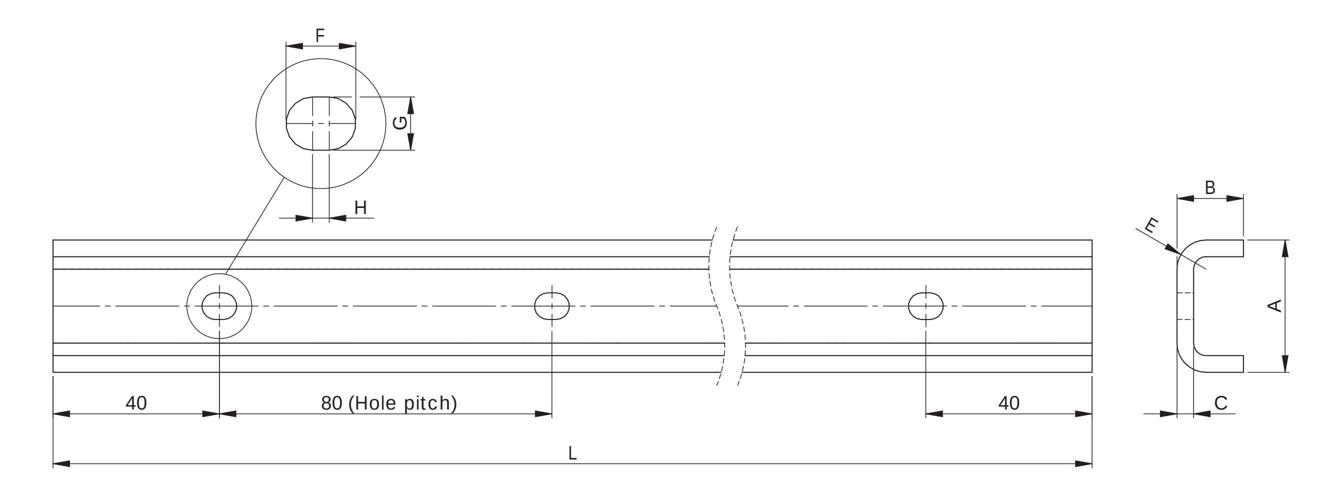


Fig. 12

Rail type	Size	A [mm]	B [mm]	C [mm]	E [mm]	F [mm]	G [mm]	H [mm]	Screw thread type	Weight [kg/m]
UEX UES	20	20.5	11	3	5.5	7	5	2	M4	0.77
	30	31.8	16	4	7	8.4	6.4	2	M5	1.39
	45	44.8	24.5	4.5	9.5	11	9	2	M8	2.79

Tab. 7

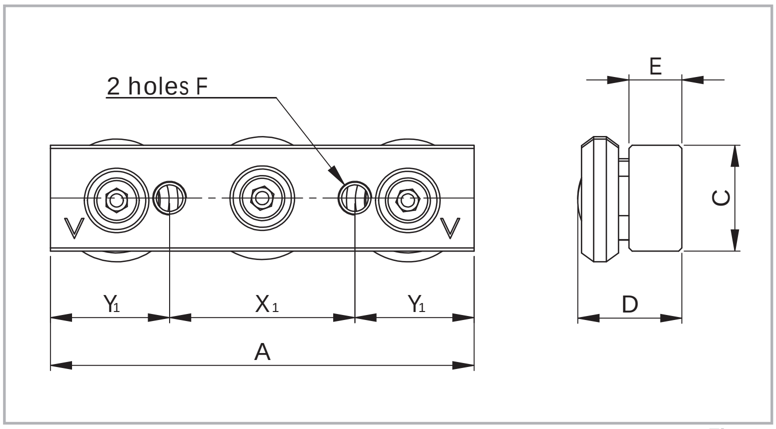
Rail type	Standard length L [mm]
UEX UES	160 - 240 - 320 - 400 - 480 - 560 - 640 - 720 - 800 - 880 - 960 - **1040** - 1120 - 1200 - 1280 - 1360 - 1440 - 1520 - 1600 - 1680 - 1760 - 1840 - 1920 - 2000 - **2080** - 2160 - 2240 - 2320 - 2400 - 2480 - 2560 - 2640 - 2720 - 2800 - 2880 - 2960 - 3040 - **3120**

Tab. 8

Please specify hole pattern separately
Special lengths or pitches available upon request, please contact the sales department
The highlighted rail lenghts are available from stock

Slider (CEXU = stainless steel / CESU = zinc-plated steel)

Version 3 (with solid body for compensating rail)



Slider version with wipers on request

Fig. 13

Slider type	Size	A [mm]	C [mm]	D [mm]	E [mm]	F [mm]	X_1 [mm]	Y_1 [mm]	Weight [kg]
CEXU20-60 CESU20-60	20	60	10	11.55	6	M5	20	20	0.04
CEXU30-80 CESU30-80	30	80	20	19.2	10	M6	35	22.5	0.16
CEXU45-120 CESU45-120	45	120	25	25.5	12	M8	55	32.5	0.45

Tab. 9

Mounted sliders and rails

Fixed rails

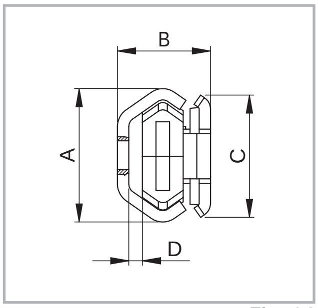


Fig. 14

Version 1
(Slider with compact body)

Configuration	A [mm]	B [mm]	C [mm]	D [mm]
TEX-20 – CEX20-80 TES-20 – CES20-80	19.2	16	18	2.5
TEX-30 – CEX30-88 TES-30 – CES30-88	29.5	20.5	27	3.5
TEX-45 – CEX45-150 TES-45 – CES45-150	46.4	31	40	5

Tab. 10

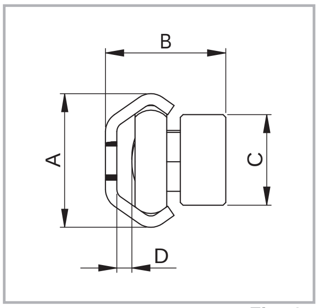


Fig. 15

Version 2
(Slider with solid body)

Configuration	A [mm]	B [mm]	C [mm]	D [mm]
TEX-20 – CEX20-60 TES-20 – CES20-60	19.2	17.8	10	2.6
TEX-30 – CEX30-80 TES-30 – CES30-80	29.5	26.5	20	3.3
TEX-45 – CEX45-120 TES-45 – CES45-120	46.4	38	25	5.1

Tab. 11

Compensating rails

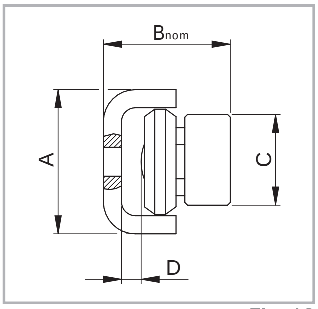


Fig. 16

Version 3
(Slider with solid body)

Configuration	A [mm]	B_{nom} [mm]	C [mm]	D [mm]
UEX-20 – CEXU20-60 UES-20 – CESU20-60	20.5	18.25 ± 0.6	10	2.5
UEX-30 – CEXU30-80 UES-30 – CESU30-80	31.8	27.95 ± 1.0	20	3.5
UEX-45 – CEXU45-120 UES-45 – CESU45-120	44.8	37.25 ± 1.75	25	5

Tab. 12

Accessories

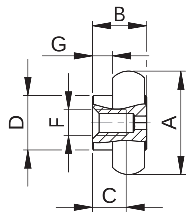
Roller Pins

Version 1

(Slider with compact body for fixed rails)

CRPNX / CRPN

Concentric rollers



CRPAX / CRPA

Eccentric rollers

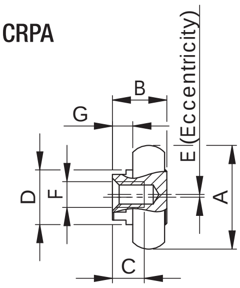


Fig. 17

Roller type	for slider	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F	G [mm]	Weight [kg]
CRPNX20-2RS	CEX20-80	14	8.5	6	8	-	M4	4.0	0.006
CRPN20-2Z	CES20-80								
CRPAX20-2RS	CEX20-80					0.5			
CRPA20-2Z	CES20-80								
CRPNX30-2RS	CEX30-88	22.8	12	7	12	-	M5	4.5	0.02
CRPN30-2Z	CES30-88								
CRPAX30-2RS	CEX30-88					0.6			
CRPA30-2Z	CES30-88								
CRPNX45-2RS	CEX45-150	35.6	18	12	16	-	M6	6.0	0.068
CRPN45-2Z	CES45-150								
CRPAX45-2RS	CEX45-150					0.8			
CRPA45-2Z	CES45-150								

Load rate per roller: radial 50 %, axial 33 % of the given slider load rate
2RS (splashproof seal for CEX slider), 2Z (dust cover seal for CES slider)

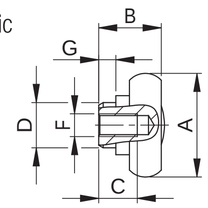
Tab. 13

Version 2

(Slider with solid body for fixed rails)

CRNX / CRN

Concentric rollers



CRAX / CRA

Eccentric rollers

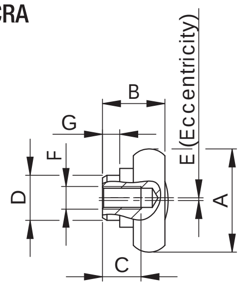


Fig. 18

Roller type	for slider	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F	G [mm]	Weight [kg]
CRNX20-2RS	CEX20-60	14	8.7	6	6	-	M4	1.8	0.006
CRN20-2Z	CES20-60								
CRAX20-2RS	CEX20-60					0.5			
CRA20-2Z	CES20-60								
CRNX30-2RS	CEX30-80	22.8	14	9	10	-	M5	3.8	0.022
CRN30-2Z	CES30-80								
CRAX30-2RS	CEX30-80					0.6			
CRA30-2Z	CES30-80								
CRNX45-2RS	CEX45-120	35.6	20.5	14.5	12	-	M6	4.5	0.07
CRN45-2Z	CES45-120								
CRAX45-2RS	CEX45-120					0.8			
CRA45-2Z	CES45-120								

Load rate per roller: radial 50 %, axial 33 % of the given slider load rate
2RS (splashproof seal for CEX slider), 2Z (dust cover seal for CES slider)

Tab. 14

Version 3

(Slider with solid body for compensating rails)

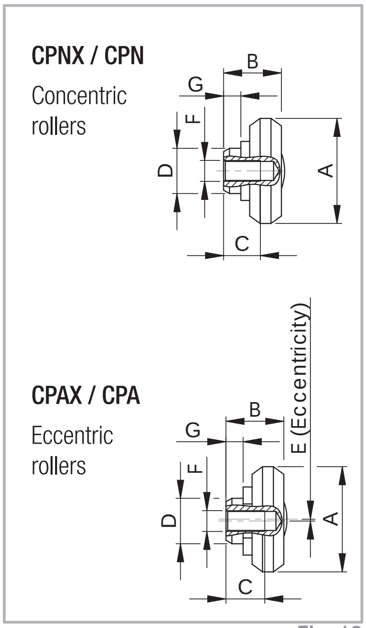


Fig. 19

Roller type	for slider	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F	G [mm]	Weight [kg]
CPNX20-2RS	CEXU20-60	14	7.35	5.5	6	-	M4	1.8	0.004
CPN20-2Z	CESU20-60								
CPAX20-2RS	CEXU20-60					0.4			
CPA20-2Z	CESU20-60								
CPNX30-2RS	CEXU30-80	23.2	13	7	10	-	M5	3.8	0.018
CPN30-2Z	CESU30-80								
CPAX30-2RS	CEXU30-80					0.6			
CPA30-2Z	CESU30-80								
CPNX45-2RS	CEXU45-120	35	18	12	12	-	M6	4.5	0.06
CPN45-2Z	CESU45-120								
CPAX45-2RS	CEXU45-120					0.8			
CPA45-2Z	CESU45-120								

Load rate per roller: radial 50 % of given slider load rate
2RS (splashproof seal for CEX slider), 2Z (dust cover seal for CES slider)

Tab. 15

Fixing screws

We recommend fixing screws according to ISO 7380 with low head height or TORX® screws (see fig. 23) on request.

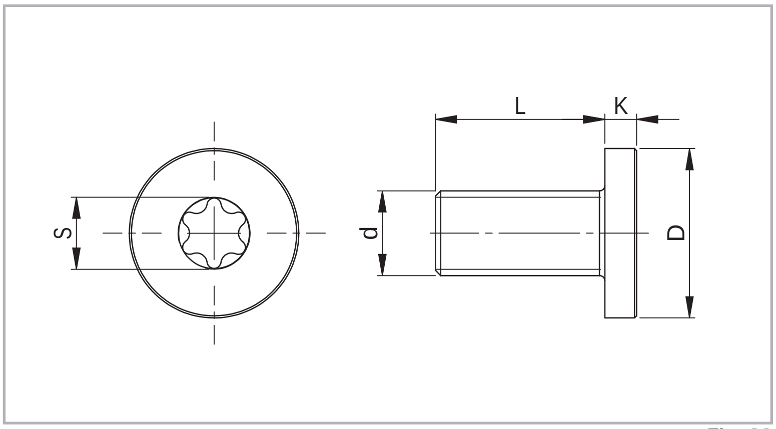


Fig. 20

Rail size	Screw type	d	D [mm]	L [mm]	K [mm]	S	Tightening torque [Nm]
20	M4 x 8	M4 x 0.7	8	8	2	T20	3
30	M5 x 10	M5 x 0.8	10	10	2	T25	9
45	M8 x 16	M8 x 1.25	16	16	3	T40	22

Tab. 16

Technical instructions

Lubrication

All rollers of the X-Rail family are lubricated for life, despite this, a thin film of bearing grease between the rollers and the raceways is recommended.

T+U-System

Fig. 21

Solves axial deviations in parallelism

With the rail system with shaped and flat raceways consisting of T+U rails, Rollon offers an outstanding solution for the alignment of dual track carriages. Therefore, it is possible to avoid slider overload due to distortions caused by axial deviation in parallelism of the mounting surfaces. These distortions can drastically reduce the life of the rails.

In a T+U-System, the slider in the T rail carries axial and radial loads and guides the movement of the U, which has lateral freedom.

U rails have flat parallel raceways that allow free lateral movement for the sliders. The maximum freedom a slider in the U rail can offer can be calculated using the values S_1 and S_2 (see pg. XR-14, fig. 22, tab. 19). With nominal value B_{nom} as the starting point, S_1 indicates the maximum allowed movement into the rail, while S_2 represents the maximum offset towards the outside of the rail.

If the length of the guide rail is known, the maximum allowable angle deviation of the mounting surface (see pg. XR-14, fig. 23). In this case the slide in the U rail has the freedom to travel from the innermost position S_1 to the outermost position S_2.

Maximum offset

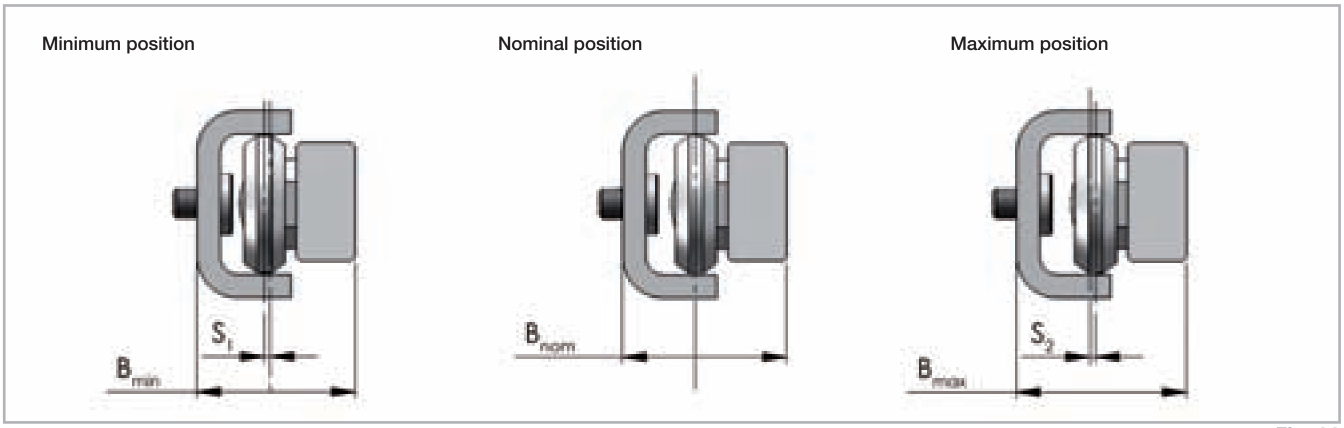


Fig. 22

Slider type (Version 3 with solid body)	S_1 [mm]	S_2 [mm]	B_{min} [mm]	B_{nom} [mm]	B_{max} [mm]
CEXU.../CESU20-60	0.6	0.6	17.65	18.25	18.85
CEXU.../CESU30-80	1	1	26.95	27.95	28.95
CEXU.../CESU45-120	1.75	1.75	35.50	37.25	39

Tab. 17

Guideline for the maximum angle deviation α, achievable with the longest guide rail

$$\alpha = \arctan \frac{S^*}{L}$$

S^* = sum of S_1 and S_2
L = length of the rail

Fig. 23

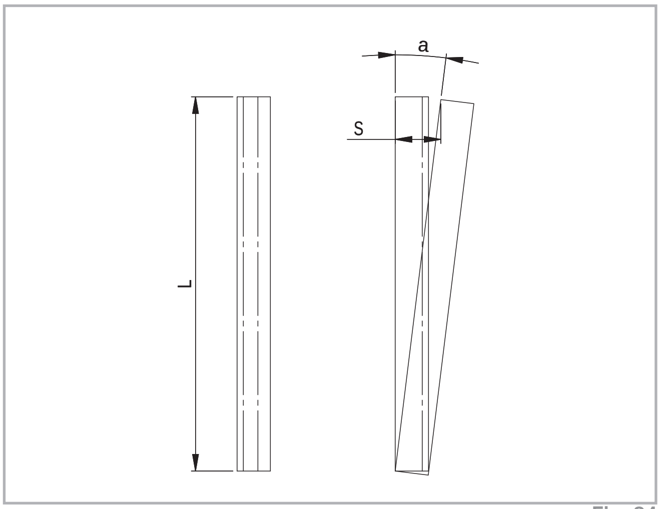


Fig. 24

Size	Rail length [mm]	Offset S* [mm]	Angle α [°]
20	3120	1.2	0.022
30	3120	2	0.037
45	3120	3.5	0.064

Tab. 18

Setting preload

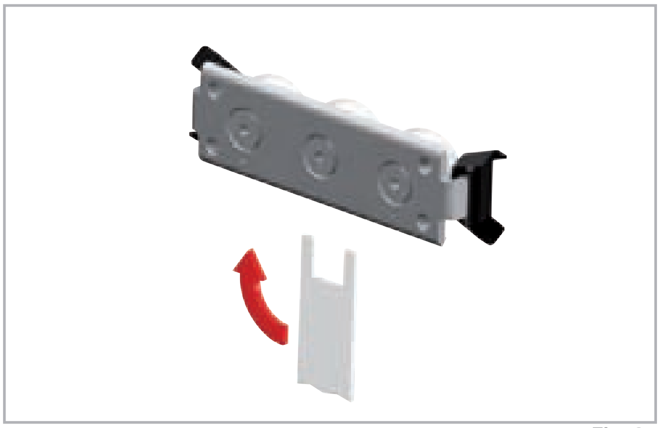


Fig. 25

Size	Tightening torque [Nm]
20	3
30	7
45	12

Tab. 19

If the product is delivered with the sliders in the rails, the sliders are already preloaded. If delivered separately, or if the sliders need to be installed in another rail, the sliders must be readjusted. In this case, follow the instructions below:

- Wipe the raceways of any eventual dirt and debris.
- If necessary, remove existing wipers and insert the sliders into the rails. Slightly loosen the fixing screw of the center roller pin.
- Position the slider(s) at the ends of the rail.
- For the U rails there must be a thin support (e.g. set key) under the ends of the slider body to ensure the horizontal alignment of the slider in the flat raceways.
- The included special flat key is inserted from the side between the rail and the slider and plugged onto the hexagonal or square shaft of the eccentric pin to be adjusted (see fig. 25).
- By turning the flat key clockwise, the eccentric roller is pressed against the upper raceway, thereby removing clearance and setting a correct preload. During this process, absence of play is desired; avoid a setting a preload that is so high that it generates higher friction and reduces service life.
- Hold the roller pin with the adjustment key in the desired position and carefully tighten the fixing screw. The exact tightening torque will be checked later.
- Move the slider in the rail and check the preload over the entire length of the rail. It should move easily and the slider should not have play at any location of the rail.
- Tighten the fixing screw with the specified tightening torque (see tab. 19), while holding the flat key and maintaining the angle position of the pin so as to not change the preload with the screw tightening. Glue for thread locking is recommended.
- Now re-attach the existing wipers if desired.

Fold out ordering key

To make this product catalog as simple as possible for you to use, we have included the following easy-to-read chart.

Your advantages:

- Description and ordering designations easy to read at one glance
- Simplified selection of the correct product
- Links to detailed descriptions in the catalog

Ordering key

Rail / slider system

TEX-	960	/1/	CEX20-60	-2RS	
				Roller seal	*see pg. XR-4 Performance characteristics*
			Slider type	*see pg. XR-7, tab. 5 and 6/ pg. XR-9, tab. 9*	
		Number of sliders in one rail			
	Rail length in mm	*see pg. XR-6, tab. 4 / pg.XR-8, tab. 8*			
Rail type	*see pg. XR-6, tab. 3 / pg. XR-8, tab. 7*				

Ordering example: TEX-00960/1/CEX20-060-2RS

Hole pitch: 40-11 x 80-40

Notes on ordering: The rail length codes are always 5 digits, the slider length codes are always 3 digits; use zeroes as a prefix when lengths are shorter

Rail

TEX-	30-	960	
		Rail length in mm	*see pg. XR-6, tab. 4 / pg. XR-8, tab. 8*
	Size	*see pg. XR-6, tab. 3 / pg. XR-8, tab. 7*	
Rail type	*see pg. XR-6, tab. 5 / pg.XR-8, tab. 7*		

Ordering example: TEX-30-00960

Hole pattern: 40-11 x 80-40

Notes on ordering: The rail length codes are always 5 digits; use zeroes as a prefix when lengths are shorter

Slider

CES30-80	-2Z	
	Roller seal	*see pg. XR-6 Performance characteristics*
Slider type	*see pg. XR-7, tab. 5 and 6/ pg. XR-9, tab. 9*	

Ordering example: CES30-080-2Z

Notes on ordering: The slider length codes are always 3 digits; use zeroes as a prefix when lengths are shorter

Accessories

Roller pins

CRPAX	45	-2RS	
		Roller seal	*see pg. XR-6 Performance characteristics*
	Size	*see pg. XR-11, tab. 13-15*	
Roller type	*see pg. XR-11, tab. 13-15*		

Ordering example: CRPAX45-2RS

Fixing screws

Rail type	Size	Ordering description
TEX / UEX	20	TORX®-screw TC 18 M4x8 NIC
	30	TORX®-screw TC 28 M5x10 NIC
	45	TORX®-screw TC 43 M8x16 NIC
TES / UES	20	TORX®-screw TC 18 M4x8
	30	TORX®-screw TC 28 M5x10
	45	TORX®-screw TC 43 M8x16
DRX	30	TORX®-screw TC 28 M5x10 NIC
DRS	30	TORX®-screw TC 28 M5x10

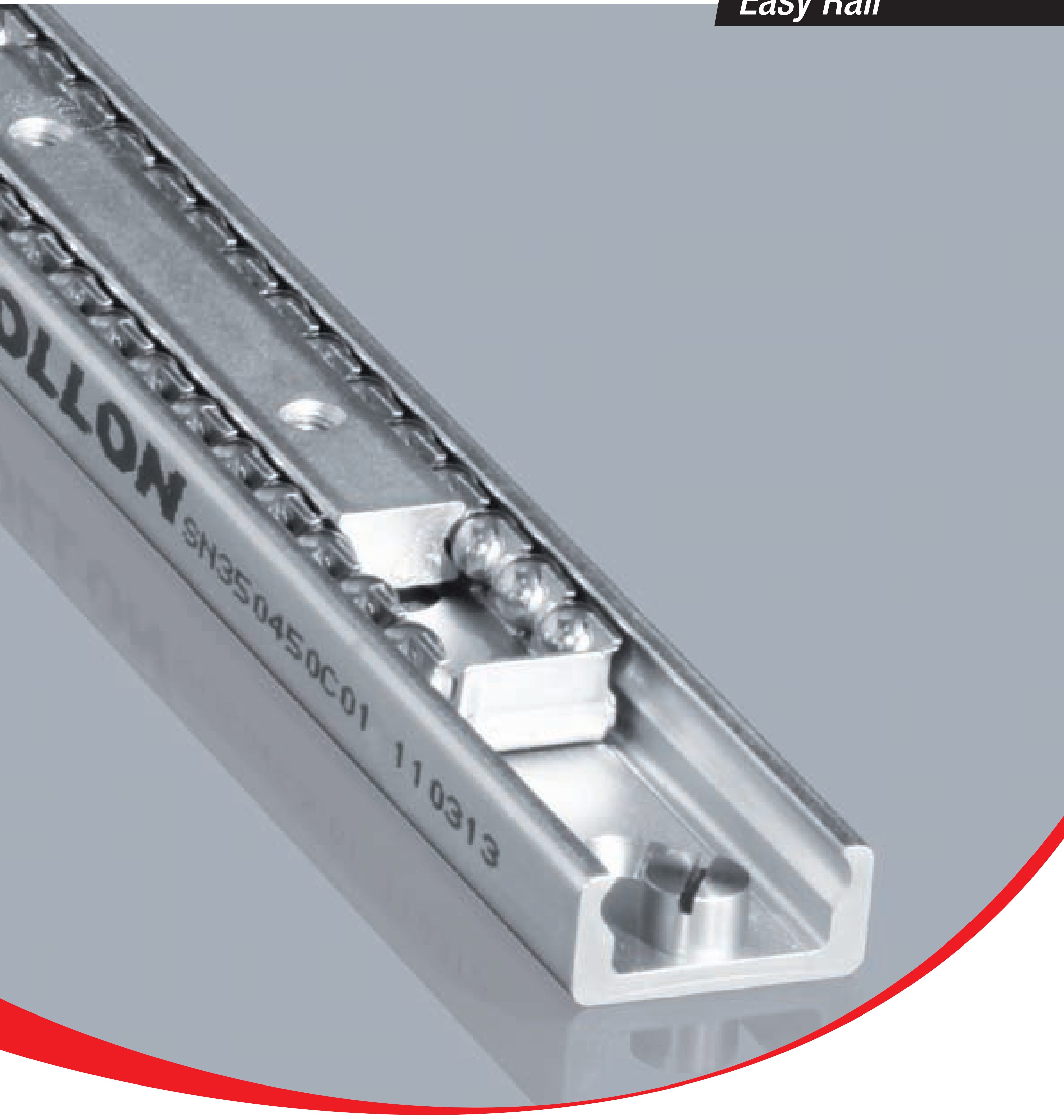
see pg. XR-12, fig. 20, tab. 15

Notes

ROLLON®

Linear Evolution

Easy Rail



Product explanation

Easy Rail is a linear ball rail system (with caged ball bearings for the SN series or with recirculating ball bearings for the SNK series) with single slider or multiple sliders.

Fig. 1

The Easy Rail series is a system of drawn steel linear rails with induction hardened raceways. The system consists of an external ‚C' profile linear rail and one or more internal sliders with caged orrecirculating ball bearings.

The most important characteristics:

- Guide rails and sliders of SN series made of cold-drawn bearing steel
- Ball cage made of steel for the SN series
- Balls made of hardened bearing steel
- Raceways of the guide rails and sliders are induction hardened (ground for the SNK series)
- Long service life
- With recirculating ball bearings for the SNK series

Preferred areas of application of the Easy Rail product family:

- Transportation industry (e.g., exterior and interior rail and bus doors, seat adjustments, interior)
- Construction and machine technology (e.g., housings, protective covers)
- Medical technology (e.g., X-ray equipment, medical tables)
- Automotive technology
- Logistics (e.g., handling units)
- Packaging machines (e.g., beverage industry)
- Special machines
- SNK automation

SN linear bearing, version 1, with single slider

This linear bearing consists of a guide rail and a slider that runs within the ball cage in the guide rail. High load capacities, compact cross-sections and simple and easy mounting characterize this series.

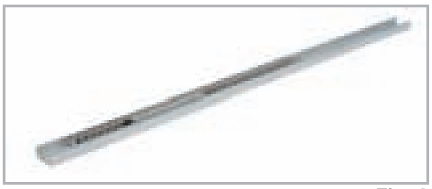


Fig. 2

SN linear bearing, version 2, with multiple independent sliders

Variant with several sliders, which each runs in its own ball cage, independent of each other, in the guide rail. Slider length and stroke for each slider can be different within one rail.

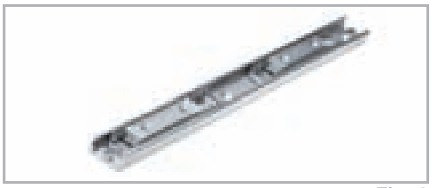


Fig. 3

SN linear bearing, version 3, with multiple synchronized sliders

Several sliders run in a common ball cage within the guide rails. The slider lengths can vary here as well and then form a total unit, which implements the corresponding stroke.

Fig. 4

SNK series linear rails with recirculating ball bearings.

The SNK series consists of a drawn steel C profile rail with hardened and ground raceways and of an internal slider with a recirculating ball bearing system. This product is extremely compact and boasts high load rating and great sliding properties.

Fig. 5

Technical data

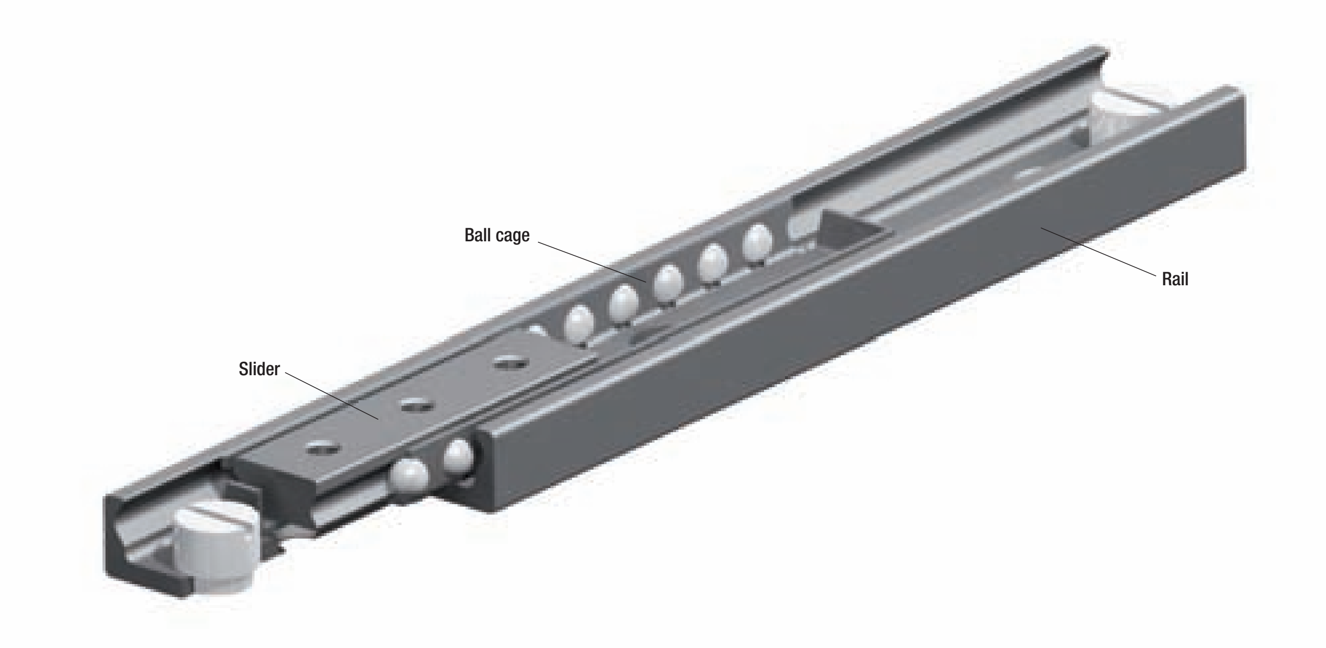


Fig. 6

Performance characteristics:

- Available sizes SN: 22, 28, 35, 43, 63
- Sections available for the SNK series: 43
- Inductive raceways hardened and ground for the SNK series
- Rails and sliders made of cold-drawn bearing steel
- Balls made of hardened bearing steel
- Max. operating speed 1.5 m/s (SNK)
- Temperature range: from -30 °C to +170 °C for the SN series from -20° to 70° for the SNK series
- Electrolytic zinc-plating as per ISO 2081; increased anticorrosive protection on request (see Chapter 4, Technical instructions, pg. 16 Anticorrosive protection)
- Linear accuracy 0.1 mm/m stroke
- 2 different types of preload for the SNK series

Remarks:

- SN can only be horizontally mounted, high performance SNK can be horizontally and vertically mounted.
- External stops are recommended
- Fixing screws of property class 10.9 must be used for all linear bearings

Product dimensions

SN Load capacities

SN linear bearing, version 1, with single slider

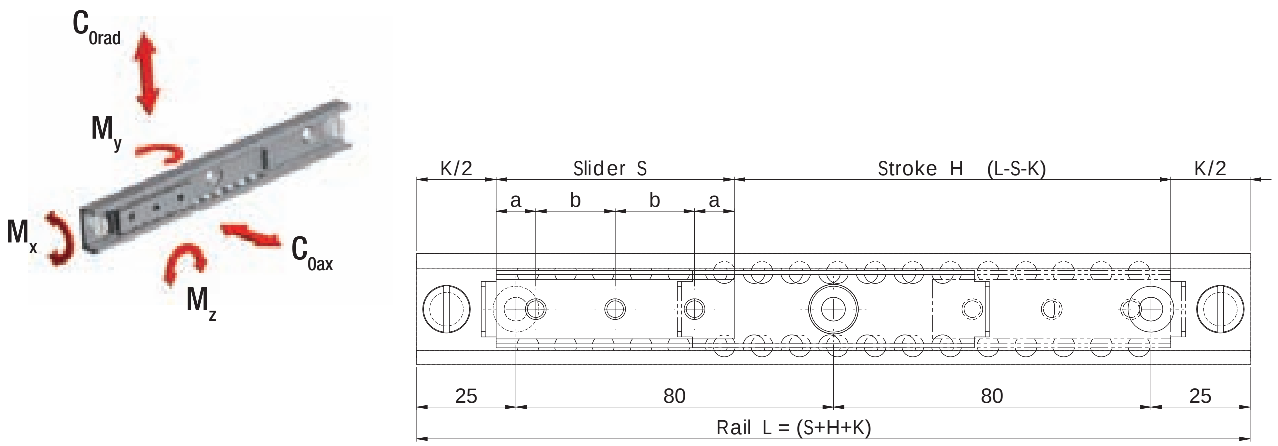


Fig. 7

To ensure that all fixing holes of the rail are accessible, S must be < L/2 - K.
To ensure proper smooth movement it is necessary that H ≤ 7S.

Type	Size	Slider								
						Load capacities and moments				
		Length S [mm]	a [mm]	b [mm]	No. of holes	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
SN	22	40	10	20	2	1320	924	4.4	6	9
		60			3	1980	1386	6.7	14	20
		80			4	2640	1848	8.9	25	35
		130	25	80	2	4290	3003	14.4	65	93
		210			3	6930	4851	23.3	170	243
		290			4	9570	6699	32.2	324	463

Tab. 1

		Rail	
Type	Size	Length L [mm]	K [mm]
SN	22	130 - 210 - 290 - 370 - 450 - 530 - 610 - 690 - 770 - 850 - 930 - 1010 - 1090 - 1170	30

Tab. 2

Type	Size	Slider								
						Load capacities and moments				
		Length S [mm]	a [mm]	b [mm]	No. of holes	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
SN	28	60	10	20	3	3480	2436	17.1	24	35
		80			4	4640	3248	22.7	43	62
		130	25	80	2	7540	5278	36.9	114	163
		210			3	12180	8526	59.7	298	426
		290			4	16820	11774	82.4	569	813
		370			5	21460	15022	105.1	926	1323
		450			6	26100	18270	127.9	1370	1958

Tab. 3

		Rail	
Type	Size	Length L [mm]	K [mm]
SN	28	130 - 210 - 290 - 370 - 450 - 530 - 610 - 690 - 770 - 850 - 930 - 1010 - 1090 - 1170 - 1250 - 1330 - 1410 - 1490 - 1570 -1650	40

Tab. 4

Type	Size	Slider								
						Load capacities and moments				
		Length S [mm]	a [mm]	b [mm]	No. of holes	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
SN	35	130	25	80	2	9750	6825	47.2	148	211
		210			3	15750	11025	76.3	386	551
		290			4	21750	15225	105.3	736	1051
		370			5	27750	19425	134.4	1198	1711
		450			6	33750	23625	163.4	1772	2531
		530			7	39750	27825	192.5	2458	3511
		610			8	45750	32025	221.6	3256	4651

Tab. 5

		Rail	
Type	Size	Length L [mm]	K [mm]
SN	35	290 - 370 - 450 - 530 - 610 - 690 - 770 - 850 - 930 - 1010 - 1090 - 1170 - 1250 - 1330 - 1410 - 1490 - 1570 - 1650 - 1730 - 1810	50

Tab. 6

Type	Size	Slider								
						Load capacities and moments				
		Length S [mm]	a [mm]	b [mm]	No. of holes	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
SN	43	130	25	80	2	13910	9737	96	211	301
		210			3	22470	15729	155.1	551	786
		290			4	31030	21721	214.1	1050	1500
		370			5	39590	27713	273.2	1709	2441
		450			6	48150	33705	332.3	2528	3611
		530			7	56710	39697	391.4	3507	5009
		610			8	65270	45689	450.4	4645	6636

Tab. 7

		Rail	
Type	Size	Length L [mm]	K [mm]
SN	43	290 - 370 - 450 - 530 - 610 - 690 - 770 - 850 - 930 - 1010 - 1090 - 1170 - 1250 -1330 - 1410 - 1490 - 1570 - 1650 - 1730 - 1810 - 1890 - 1970	50

Tab. 8

Type	Size	Slider								
						Load capacities and moments				
		Length S [mm]	a [mm]	b [mm]	No. of holes	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
SN	63	130	25	80	2	26000	18200	238.8	394	563
		210			3	42000	29400	385.8	1029	1470
		290			4	58000	40600	532.8	1962	2803
		370			5	74000	51800	679.8	3194	4563
		450			6	90000	63000	826.7	4725	6750
		530			7	106000	74200	973.7	6554	9363
		610			8	122000	85400	1120.7	8682	12403

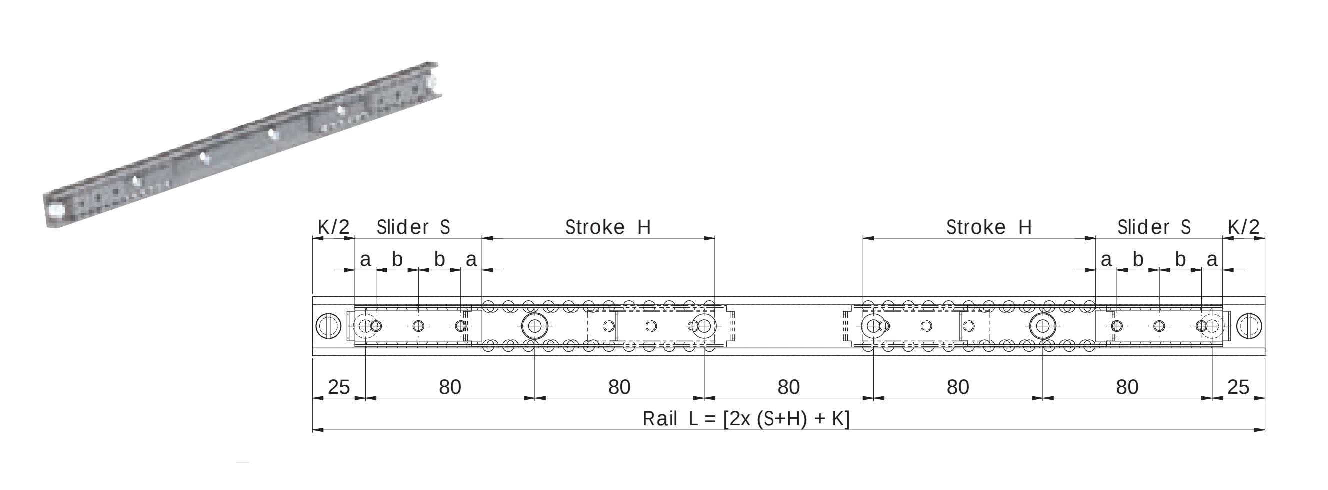
Tab. 9

		Rail	
Type	Size	Length L [mm]	K* [mm]
SN	63	610 - 690 - 770 - 850 - 930 - 1010 - 1090 - 1170 - 1250 - 1330 - 1410 - 1490 - 1570 - 1650 - 1730 - 1810 - 1890 - 1970	80

* For systems of versions 2 in size 63 with two independent sliders, the K dimension changes from 80 mm to 110 mm and for each additional slider by another 30 mm

Tab. 10

Version 2 with multiple independent sliders



For systems of versions 2 in size 63 with two independent sliders, the K dimension changes from 80 mm to 110 mm and for each additional slider by another 30 mm

Fig. 8

Version 2 is a variant of version 1 with several independent sliders. The total load capacity is based on the number of sliders in the rail and on their lengths. The length and stroke of the individual sliders can be different.

To ensure that all fixing holes of the rail are accessible, S must be < L/2 - K.

To ensure proper smooth movement it is necessary that H ≤ 7S.

Version 3 with multiple synchronized sliders

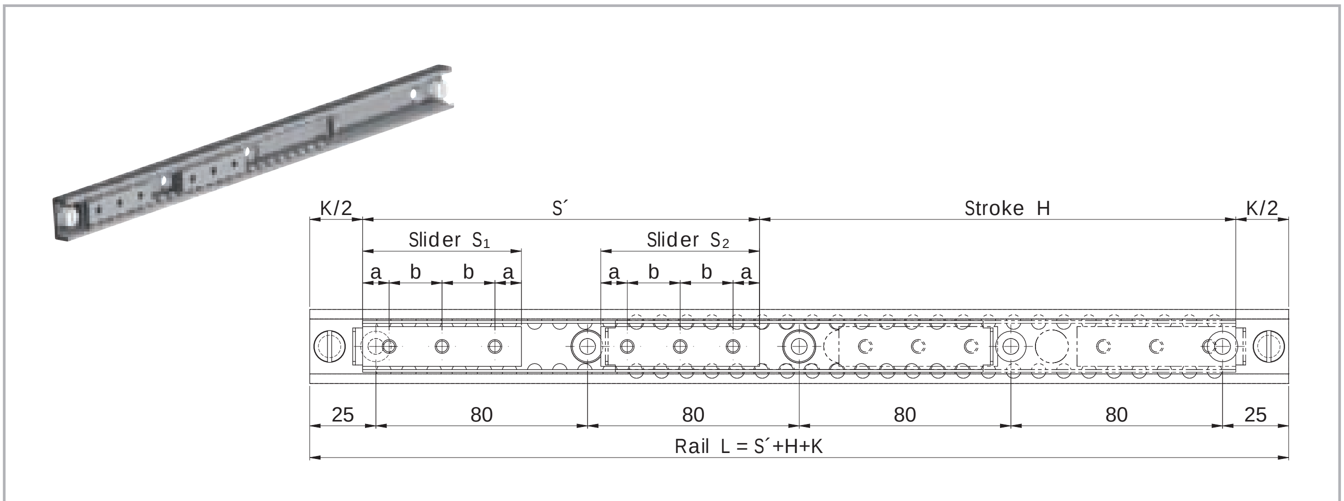
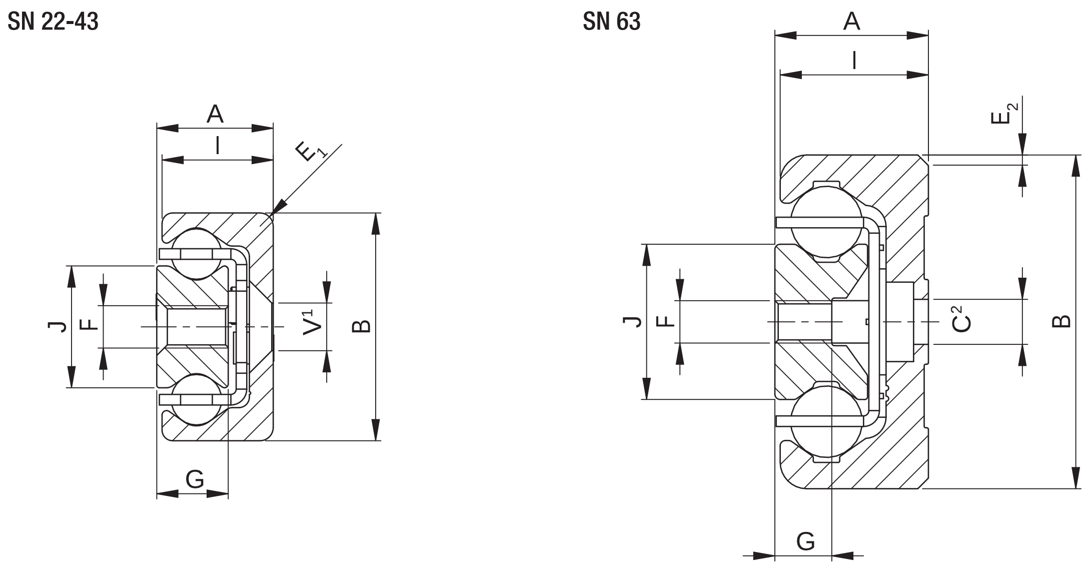


Fig. 9

Version 3 is a variant of version 1 with several synchronized sliders. The total load capacity is based on the number of sliders in the rail. The length of the individual sliders can therefore vary. To ensure that all fixing holes of the rail are accessible, S must be < L/2 - K.

To ensure proper smooth movement it is necessary that H ≤ 7S.

SN Cross-section



[1] Fixing holes (V) for countersunk head screws according to DIN 7991
[2] Fixing holes (C) for socket cap screws according to DIN 7984. Alternative fixing with Torx® screws in special design with low head (on request)

Fig. 10

Type	Size	Cross-section										Rail weight [kg/m]	Slider weight [kg/m]
		A [mm]	B [mm]	I [mm]	J [mm]	G [mm]	E_1 [mm]	E_2 [°]	V	C	F		
SN	22	11	22	10.25	11.3	6.5	3	-	M4	-	M4	0.7	1
	28	13	28	12.25	15	7.5	1	-	M5	-	M5	1	1.5
	35	17	35	16	15.8	10	2	-	M6	-	M6	1.8	2.5
	43	22	43	21	23	13.5	2.5	-	M8	-	M8	2.6	5
	63	29	63	28	29.3	10.5	-	2 x 45	-	M8	M8	6.1	6.9

Tab. 11

SNK - Load capacities

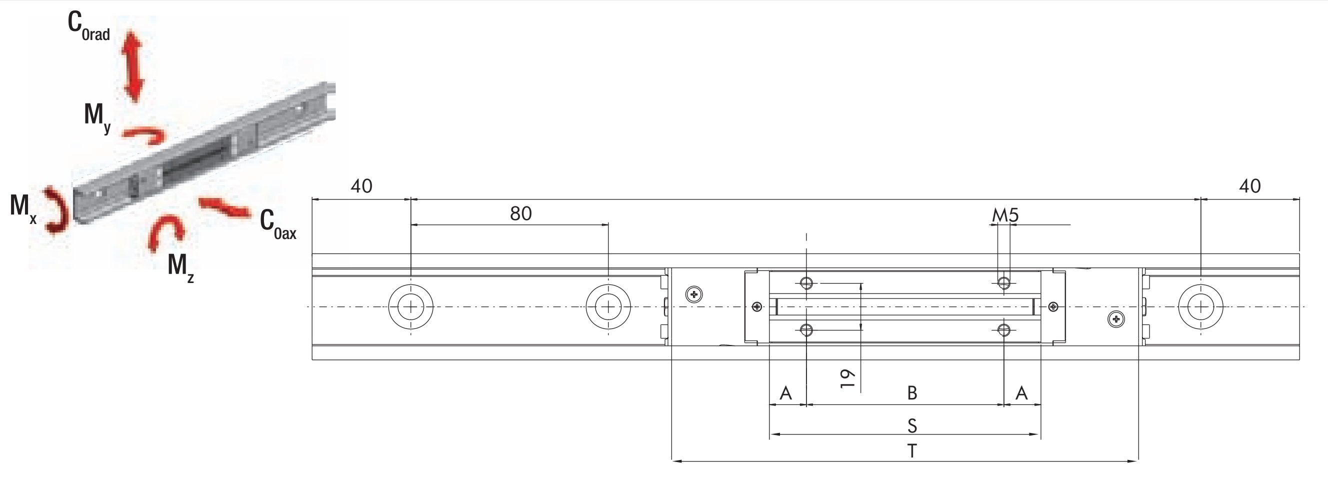


Fig.11

Type	Size	Slider									
		Load capacities and moments									
		Length S [mm]	Length T [mm]	A [mm]	B [mm]	N° of holes	C_{0rad} [N]	C_{0ax} [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
SNK	43	110	198	15	80	4	7842	5489	75	95	136
		150	238	15	60	6	10858	7600	105	182	261

Tab. 12

		Rail
Type	Size	Length L [mm]
TSC/TSV	43	320-400-480-560-640-720-800-880-960-1040-1120-1200 -1280-1360-1440-1520-1600-1680-1760-1840-1920-2000

Tab. 13

SNK Cross-section

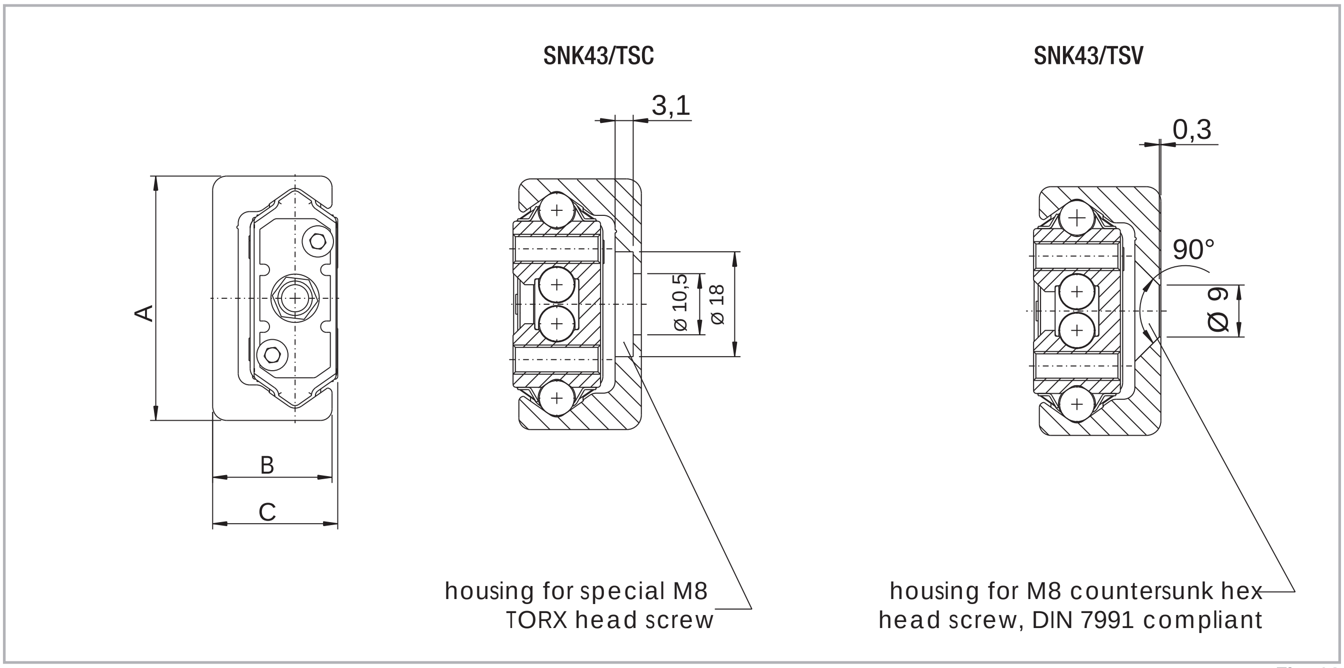


Fig. 12

Type	Size	Cross-section			Rail weight [kg/m]	Slider weight 110 [g]	Slider weight 150 [g]
		A [mm]	B [mm]	C [mm]			
TSC/TSV	43	43	21	22	2,6	360	550

Tab. 14

Technical instructions

Static load

The maximum static loads of the SN series are defined using the slider length and are listed in the tables of the previous pages. These load capacities are valid for a loading point of forces and moments in the center of the slider (for off-center loading, see pg. 13). The load capacities are independent of the position of the slider inside the rails. During the static tests the radial load capacity, C_{0rad}, the axial load capacity, C_{0ax}, and moments M_x, M_y and M_z indicate the maximum permissible values of the loads. Higher loads negatively affect the running properties and the mechanical strength. A safety factor, S_0, is used to check the static load, which takes into account the basic parameters of the application and is defined in more detail in the following table:

Safety factor S_0

Neither shocks nor vibrations, smooth and low-frequency reverse, high assembly accuracy, no elastic deformations	1 - 1.5
Normal installation conditions	1.5 - 2
Shocks and vibrations, high-frequency reverse, significant elastic deformation	2 - 3.5

Tab. 15

The ratio of the actual load to maximum permissible load may be as large as the reciprocal of the accepted safety factor, S_0, at the most.

$$\frac{P_{0rad}}{C_{0rad}} \leq \frac{1}{S_0} \qquad \frac{P_{0ax}}{C_{0ax}} \leq \frac{1}{S_0} \qquad \frac{M_1}{M_x} \leq \frac{1}{S_0} \qquad \frac{M_2}{M_y} \leq \frac{1}{S_0} \qquad \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

Fig. 13

The formulas above apply for a single load case. If there are two or more of the described forces simultaneously, the following check must be made:

$$\frac{P_{0rad}}{C_{0rad}} + \frac{P_{0ax}}{C_{0ax}} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

P_{0rad} = effective radial load
C_{0rad} = permissible radial load
P_{0ax} = effective axial load
C_{0ax} = permissible axial load
M_1 = effective moment in the x-direction
M_x = permissible moment in the x-direction
M_2 = effective moment in the y-direction
M_y = permissible moment in the y-direction
M_3 = effective moment in the z-direction
M_z = permissible moment in the z-direction

Fig. 14

Off-center load P of the slider (SN series):

For an off-center load of the slider, the different load distribution on the balls must be accounted for with a reduction of the load capacity C. As shown in the diagram at the right, this reduction of the distance, d, from the loading point is dependent on the slider center. The value, q, is the position factor, the distance, d, is expressed in fractions of slider length S. The permissible load, P, decreases as follows:

$P = q \cdot C_{0rad}$	for a radial load
$P = q \cdot C_{0ax}$	for an axial load

Fig. 15

For the static load and the service life calculation, P_{0rad} and P_{0ax} must be replaced by the equivalent values calculated as follows (see pg. 14, fig. 16):

$P_{0rad} = \frac{P}{q}$	if the external load, P, acts radially
$P_{0ax} = \frac{P}{q}$	if the external load, P, acts axially

Fig. 16

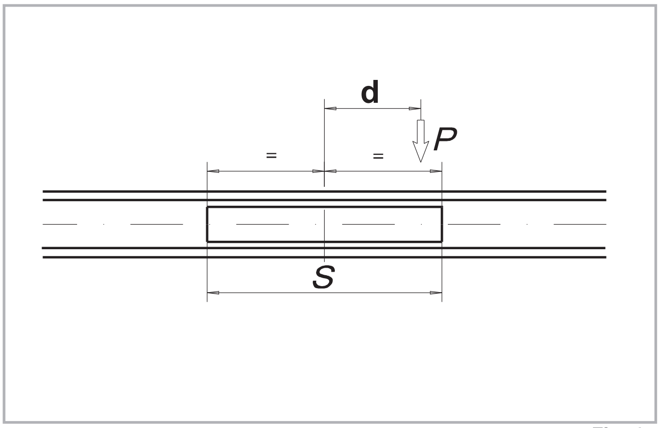


Fig. 17

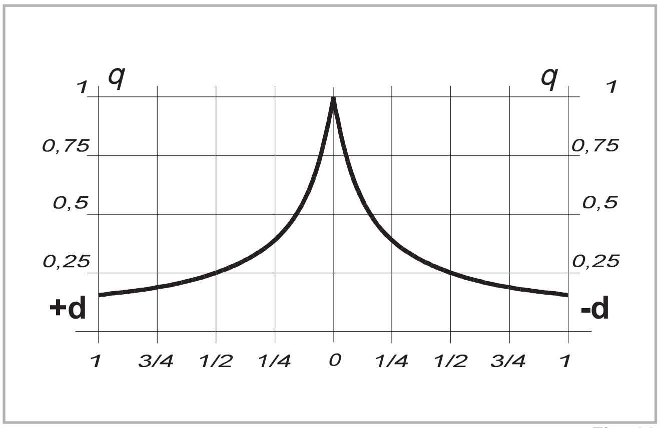


Fig. 18

Service life

The service life of a linear bearing depends on several factors, such as effective load, operating speed, installation precision, occurring impacts and vibrations, operating temperature, ambient conditions and lubrication. The service life is defined as the time span between initial operation and the first fatigue or wear indications on the raceways.

In practice, the end of the service life must be defined as the time of bearing decommissioning due to its destruction or extreme wear of a component.
This is taken into account by an application coefficient (f_i in the formula below), so the service life consists of:

Series SN

$$L_{km} = 100 \cdot \left(\frac{C_{0rad}}{W} \cdot \frac{1}{f_i} \right)^3$$

L_{km} = calculated service life (km)
C_{0rad} = load capacity (N)
W = equivalent load (N)
f_i = application coefficient (see tab. 13)

Fig. 19

Series SNK

$$L_{Km} = 100 \cdot \left(\frac{C}{P} \cdot \frac{f_c}{f_i} \cdot f_h \right)^3$$

L_{km} = theoretical service life (km)
C = dynamic load capacity (N)
P = effective equivalent load (N)
f_c = contact factor
f_i = application coefficient
f_h = stroke factor

Fig. 20

Number of sliders	1	2	3	4
f_c	1	0.8	0.7	0.63

Tab. 16

Application coefficient f_i

Neither impacts nor vibrations, smooth and low-frequency direction change, clean operating conditions, low speed (<0.5 m/s)	1 - 1.5
Slight vibrations, average speeds (between 0.5 and 0.7 m/s) and average direction change	1.5 - 2
Impacts and vibrations, high-frequency direction change, high speeds (>0.7 m/s), very dirty environment	2 - 3.5

Tab. 13

If the external load, P, is the same as the dynamic load capacity, C_{0rad}, (which of course must never be exceeded), the service life at ideal operating conditions (f_i =1) amounts to 100 km. Naturally, for a single load P, the following applies: W = P. If several external loads occur simultaneously, the equivalent load is calculated as follows:

$$W = P_{rad} + \left(\frac{P_{ax}}{C_{0ax}} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \right) \cdot C_{0rad}$$

Fig. 21

Clearance and preload

The linear ball bearings of the SN and SNK series are mounted as standard with no play. For more information, contactourtechnicalservice.

Preload classes		
Increased clearance	No clearance	Increased preload
G_1	Standard	K_1

Tab. 18

** for higher preload, contact our technical office*

Coefficient of friction

With correct lubrication and installation on level and rigid surfaces and sufficient parallelism for rail pairs, the friction value is less than or equal to 0.01. This value can vary depending on the installation situation (see pg. ER-19, Instructions for use). Per la seria SNK il coefficiente di attrito é uguale o inferiore a 0,06.

Linear accuracy

With installation of the rails using all bolts on a perfectly plane support surface with the fixing holes in a straight line, the linear accuracy of the sliders to an external reference results from the following equation:

$\boxed{//} = \frac{\sqrt{H}}{300}$ (mm)	H = Stroke

Fig. 22

Speed

The linear bearings of the SN series can be used up to an operating speed of 0.8 m/s (31.5 in/s). With high-frequency direction changes and the resulting high accelerations, as well as with long ball cages, there is a risk of cage creep (see pg. ER-19, Instructions for use). The SNK series rails, on the other hand, reach a maximum speed of 1.5 m/s. There is no risk of cage displacement with SNK seriesrails.

Temperature

The SN series can be used in ambient temperatures from -30 °C to +170 °C (-22 °F to +338 °F). The SNK series can be used at ambient temperatures between -20 °C and + 70 °C. A lithium lubricant for high operating temperatures is recommended for temperatures above +130 °C (+266 °F).

Anticorrosive protection

- The SN series has a standard anticorrosive protection by electrolytic zinc-plating according to ISO 2081. If increased anticorrosive protection is required, the rails are available chemically nickel-plated and with stainless steel bearing balls.
- Numerous application-specific surface treatments are available upon request, e.g., as a nickel-plated design with FDA approval for use in the food industry.
  For more information please contact Application Technology.

Lubrication SN

- Recommended lubrication intervals are heavily dependent upon the ambient conditions. Under normal conditions, lubrication is recommended after 100 km operational performance or after an operating period of 6 months. In critical application cases the interval should be shorter. Please clean the raceways carefully before lubrication. Raceways and spaces of the ball cage are lubricated with a lithium lubricant of average consistency (roller bearing lubricant).
- Different lubricants for special applications are available upon request.
  Example: Lubricant with FDA approval for use in the food industry.
  For more information please contact Application Technology.

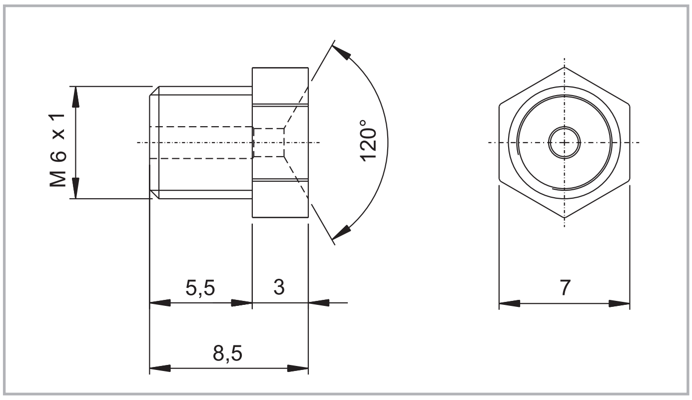
Lubrication SNK

Lubrication when using N-sliders SNK43

The SNK43 sliders are fitted with a self lubricating kit provided to periodically lubricate the slider.
This provides a progressive release of lubricant (see tab. 36) on the raceway during operation of the slider. The expected service life is up to 2 million cycles, depending on the type of application. The zerk fittings (see fig. 23) provide the lubrication.

Lubricant	Thickening agent	Temperature range [°C]	Dynamic viscosity [mPas]
Mineral oil	Lithium soap	-30... to +120	< 1000
Roller bearing lubricant	Lithium soap	-30 to +170	4500

Tab. 19



Grease applicator M6x1 DIN 3405 compliant

Fig. 23

Fixing screws

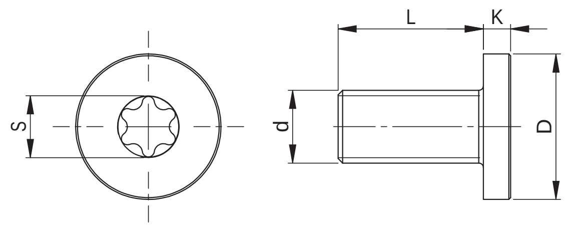


Fig. 24

The rails of the SN series in sizes 22 to 43 mm are fixed with countersunk head screws according to DIN 7991.
The SNK43 series rails are fastened with countersunk head screws according to DIN 7991 or with TorxR head screws (special design, see fig. 24).

Size	Screw type	d	D [mm]	L [mm]	K [mm]	S	Tightening torque
63	M8 x 20	M8 x 1.25	13	20	5	T40	34,7
SNK43	M8 x 16	M8 x 1,25	16	16	3	T40	22

Tab. 20

Tightening torques of the standard fixing screws to be used

Property class	Size	Tightening torque [Nm]
10.9	22	4.3
	28	8.5
	35	14.6
	43	34.7
	63	34.7

Tab. 21

Installation instructions

- Internal stops only fitted on the SN series are used to stop the unloaded slider and the ball cage. Please use external stops as end stops for a loaded system.
- To achieve optimum running properties, high service life and rigidity, it is necessary to fix the linear bearings with all accessible holes on a rigid and level surface.

Joined Rails

If long guide rails are required, two or more rails can be joined to the desired length. When putting guide rails together, be sure that the register marks shown in fig. 25 are positioned correctly.
These are fabricated asymmetric for parallel application of joined guide rails, unless otherwise specified.

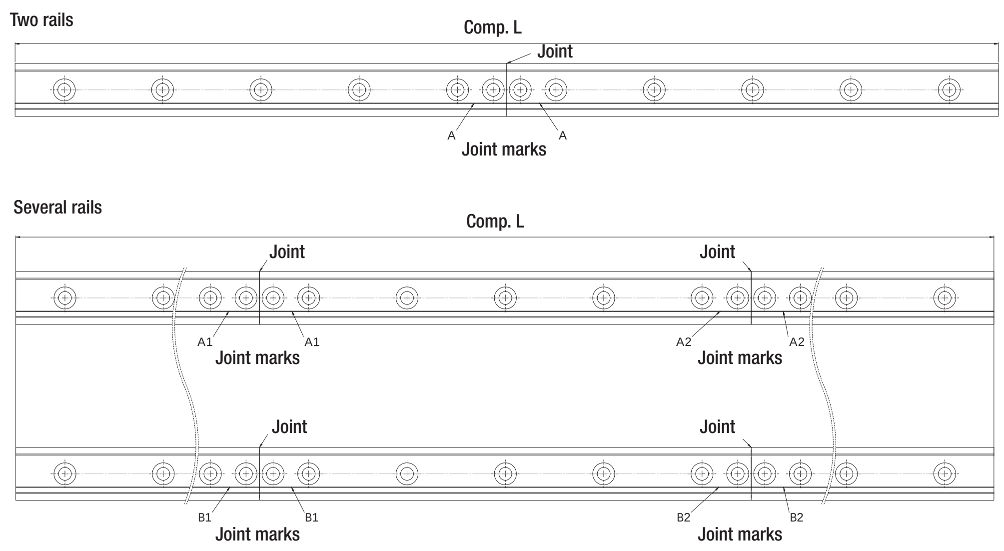


Fig. 25

General information

The maximum available rail length in one piece is indicated in table 13 on page ER-10. Longer lengths are achieved by joining two or more rails (joined rails).
Rollon then machines the rail ends at a right angle to the impact surfaces and marks them. Additional fixing screws are included with the delivery, which ensure a problem-free transition of the slider over the joints, if the following installation procedures are followed. Two additional threaded holes are required in the load-bearing structure. The included end fixing screws correspond to the installation screws for the rails for cylindrical counterbores.
The alignment fixture for aligning the rail joint can be ordered using the designation given in the table (tab. 22).

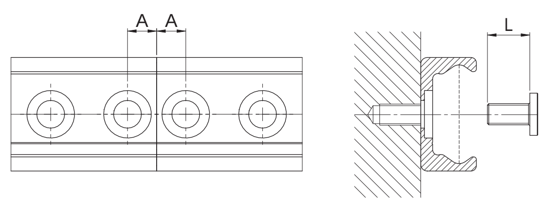


Fig. 26

Rail type	A [mm]	Threaded hole (load-bearing structure)	Screw type	L [mm]	Alignment fixture
TVC/TVS	11	M8	see pg. CR-31	16	AT43

Tab. 22

Instructions for use

- For linear bearings of the SN series, the sliders are guided through a ball cage inside the rails. When the sliders run their course relative to the rails, the ball cage moves along for half the slider stroke. The stroke ends as soon as the slider reaches the end of the cage.
  Normally the cage moves synchronously to the balls at half the speed of the slider. Any occurring cage slip affects the synchronous movement of the ball cage negatively, causing it to reach the internal stops prematurely (cage creep). This reduces the stroke. However, the stroke value can be normalized at any time by moving the slider to the stop in the stopped cage. This moving of the slider relative to the cage will have increased resistance, which is dependent on the working load.
- The causes of cage creep can be installation accuracy, dynamics, and load changes. The effects can be minimized by observing the following advice:
  - The stroke should always remain constant and come as close as possible to the nominal stroke of the linear bearing.
  - For applications with various strokes, make sure that the drive is sufficiently dimensioned to guarantee a movement of the slider relative to the cage. A coefficient of friction of 0.1 should be calculated for this.
  - Another possibility is to include a maximum stroke without load in the working cycle in order to resynchronize the slider and ball cage.

  Parallelism errors or inaccuracies in the installation or in the mounting surfaces of mounted pairs can influence the cage creep.
- Series SN linear bearings should only be used for horizontal movement.
- SNK: Always handle the slider out of the rail by its plastic retainer to prevent ball bearings from escaping.

SN Standard configurations

Size 22

Ordering description	Slider	Stroke	Rail
SN22-40-60-130	40	60	130
SN22-40-140-210	40	140	210
SN22-40-220-290	40	220	290
SN22-60-40-130	60	40	130
SN22-60-120-210	60	120	210
SN22-60-200-290	60	200	290
SN22-60-280-370	60	280	370
SN22-60-360-450	60	360	450
SN22-80-100-210	80	100	210
SN22-80-180-290	80	180	290
SN22-80-260-370	80	260	370
SN22-80-340-450	80	340	450
SN22-80-420-530	80	420	530
SN22-80-500-610	80	500	610
SN22-130-130-290	130	130	290
SN22-130-210-370	130	210	370
SN22-130-290-450	130	290	450
SN22-130-370-530	130	370	530
SN22-130-450-610	130	450	610
SN22-130-530-690	130	530	690
SN22-130-610-770	130	610	770
SN22-130-690-850	130	690	850
SN22-130-770-930	130	770	930
SN22-130-850-1010	130	850	1010
SN22-210-210-450	210	210	450
SN22-210-290-530	210	290	530
SN22-210-370-610	210	370	610
SN22-210-450-690	210	450	690
SN22-210-530-770	210	530	770
SN22-210-610-850	210	610	850
SN22-210-690-930	210	690	930
SN22-210-770-1010	210	770	1010
SN22-210-930-1170	210	930	1170
SN22-290-290-610	290	290	610
SN22-290-370-690	290	370	690
SN22-290-450-770	290	450	770
SN22-290-530-850	290	530	850
SN22-290-610-930	290	610	930
SN22-290-690-1010	290	690	1010
SN22-290-850-1170	290	850	1170

Tab. 17

Size 28

Ordering description	Slider	Stroke	Rail
SN28-60-30-130	60	30	130
SN28-60-110-210	60	110	210
SN28-60-190-290	60	190	290
SN28-60-270-370	60	270	370
SN28-60-350-450	60	350	450
SN28-80-90-210	80	90	210
SN28-80-170-290	80	170	290
SN28-80-250-370	80	250	370
SN28-80-330-450	80	330	450
SN28-80-410-530	80	410	530
SN28-80-490-610	80	490	610
SN28-130-120-290	130	120	290
SN28-130-200-370	130	200	370
SN28-130-280-450	130	280	450
SN28-130-360-530	130	360	530
SN28-130-440-610	130	440	610
SN28-130-520-690	130	520	690
SN28-130-600-770	130	600	770
SN28-130-680-850	130	680	850
SN28-130-760-930	130	760	930
SN28-130-840-1010	130	840	1010
SN28-210-200-450	210	200	450
SN28-210-280-530	210	280	530
SN28-210-360-610	210	360	610
SN28-210-440-690	210	440	690
SN28-210-520-770	210	520	770
SN28-210-600-850	210	600	850
SN28-210-680-930	210	680	930
SN28-210-760-1010	210	760	1010
SN28-210-920-1170	210	920	1170
SN28-210-1080-1330	210	1080	1330
SN28-290-280-610	290	280	610
SN28-290-360-690	290	360	690
SN28-290-440-770	290	440	770
SN28-290-520-850	290	520	850
SN28-290-600-930	290	600	930
SN28-290-680-1010	290	680	1010
SN28-290-840-1170	290	840	1170
SN28-290-1000-1330	290	1000	1330
SN28-290-1160-1490	290	1160	1490
SN28-370-360-770	370	360	770
SN28-370-440-850	370	440	850
SN28-370-520-930	370	520	930
SN28-370-600-1010	370	600	1010
SN28-370-760-1170	370	760	1170
SN28-370-920-1330	370	920	1330
SN28-370-1080-1490	370	1080	1490
SN28-450-440-930	450	440	930
SN28-450-520-1010	450	520	1010
SN28-450-680-1170	450	680	1170
SN28-450-840-1330	450	840	1330
SN28-450-1000-1490	450	1000	1490
SN28-450-1160-1650	450	1160	1650

Tab. 18

Size 35

Ordering description	Slider	Stroke	Rail
SN35-130-110-290	130	110	290
SN35-130-190-370	130	190	370
SN35-130-270-450	130	270	450
SN35-130-350-530	130	350	530
SN35-130-430-610	130	430	610
SN35-130-510-690	130	510	690
SN35-130-590-770	130	590	770
SN35-130-670-850	130	670	850
SN35-130-750-930	130	750	930
SN35-130-830-1010	130	830	1010
SN35-210-190-450	210	190	450
SN35-210-270-530	210	270	530
SN35-210-350-610	210	350	610
SN35-210-430-690	210	430	690
SN35-210-510-770	210	510	770
SN35-210-590-850	210	590	850
SN35-210-670-930	210	670	930
SN35-210-750-1010	210	750	1010
SN35-210-910-1170	210	910	1170
SN35-210-1070-1330	210	1070	1330
SN35-210-1230-1490	210	1230	1490
SN35-290-270-610	290	270	610
SN35-290-350-690	290	350	690
SN35-290-430-770	290	430	770
SN35-290-510-850	290	510	850
SN35-290-590-930	290	590	930
SN35-290-670-1010	290	670	1010
SN35-290-830-1170	290	830	1170
SN35-290-990-1330	290	990	1330
SN35-290-1150-1490	290	1150	1490
SN35-290-1310-1650	290	1310	1650
SN35-370-350-770	370	350	770
SN35-370-430-850	370	430	850
SN35-370-510-930	370	510	930
SN35-370-590-1010	370	590	1010
SN35-370-750-1170	370	750	1170
SN35-370-910-1330	370	910	1330
SN35-370-1070-1490	370	1070	1490
SN35-370-1230-1650	370	1230	1650
SN35-450-430-930	450	430	930
SN35-450-510-1010	450	510	1010
SN35-450-670-1170	450	670	1170
SN35-450-830-1330	450	830	1330
SN35-450-990-1490	450	990	1490
SN35-450-1150-1650	450	1150	1650
SN35-450-1310-1810	450	1310	1810
SN35-530-590-1170	530	590	1170
SN35-530-750-1330	530	750	1330
SN35-530-910-1490	530	910	1490
SN35-530-1070-1650	530	1070	1650
SN35-530-1230-1810	530	1230	1810
SN35-610-670-1330	610	670	1330
SN35-610-830-1490	610	830	1490
SN35-610-990-1650	610	990	1650
SN35-610-1150-1810	610	1150	1810

Tab. 19

Size 43

Ordering description	Slider	Stroke	Rail
SN43-130-110-290	130	110	290
SN43-130-190-370	130	190	370
SN43-130-270-450	130	270	450
SN43-130-350-530	130	350	530
SN43-130-430-610	130	430	610
SN43-130-510-690	130	510	690
SN43-130-590-770	130	590	770
SN43-130-670-850	130	670	850
SN43-130-750-930	130	750	930
SN43-130-830-1010	130	830	1010
SN43-210-190-450	210	190	450
SN43-210-270-530	210	270	530
SN43-210-350-610	210	350	610
SN43-210-430-690	210	430	690
SN43-210-510-770	210	510	770
SN43-210-590-850	210	590	850
SN43-210-670-930	210	670	930
SN43-210-750-1010	210	750	1010
SN43-210-910-1170	210	910	1170
SN43-210-1070-1330	210	1070	1330
SN43-210-1230-1490	210	1230	1490
SN43-210-1390-1650	210	1390	1650
SN43-290-270-610	290	270	610
SN43-290-350-690	290	350	690
SN43-290-430-770	290	430	770
SN43-290-510-850	290	510	850
SN43-290-590-930	290	590	930
SN43-290-670-1010	290	670	1010
SN43-290-830-1170	290	830	1170
SN43-290-990-1330	290	990	1330
SN43-290-1150-1490	290	1150	1490
SN43-290-1310-1650	290	1310	1650
SN43-290-1470-1810	290	1470	1810
SN43-370-350-770	370	350	770
SN43-370-430-850	370	430	850
SN43-370-510-930	370	510	930
SN43-370-590-1010	370	590	1010
SN43-370-750-1170	370	750	1170
SN43-370-910-1330	370	910	1330
SN43-370-1070-1490	370	1070	1490
SN43-370-1230-1650	370	1230	1650
SN43-370-1390-1810	370	1390	1810
SN43-450-430-930	450	430	930
SN43-450-510-1010	450	510	1010
SN43-450-670-1170	450	670	1170
SN43-450-830-1330	450	830	1330
SN43-450-990-1490	450	990	1490
SN43-450-1150-1650	450	1150	1650
SN43-450-1310-1810	450	1310	1810
SN43-450-1470-1970	450	1470	1970
SN43-530-590-1170	530	590	1170
SN43-530-750-1330	530	750	1330
SN43-530-910-1490	530	910	1490
SN43-530-1070-1650	530	1070	1650
SN43-530-1230-1810	530	1230	1810
SN43-530-1390-1970	530	1390	1970
SN43-610-670-1330	610	670	1330
SN43-610-830-1490	610	830	1490
SN43-610-990-1650	610	990	1650
SN43-610-1150-1810	610	1150	1810
SN43-610-1310-1970	610	1310	1970

Tab. 20

Size 63

Ordering description	Slider	Stroke	Rail
SN63-130-400-610	130	400	610
SN63-130-480-690	130	480	690
SN63-130-560-770	130	560	770
SN63-130-640-850	130	640	850
SN63-130-720-930	130	720	930
SN63-130-800-1010	130	800	1010
SN63-210-320-610	210	320	610
SN63-210-400-690	210	400	690
SN63-210-480-770	210	480	770
SN63-210-560-850	210	560	850
SN63-210-640-930	210	640	930
SN63-210-720-1010	210	720	1010
SN63-210-880-1170	210	880	1170
SN63-210-1040-1330	210	1040	1330
SN63-210-1200-1490	210	1200	1490
SN63-210-1360-1650	210	1360	1650
SN63-290-240-610	290	240	610
SN63-290-320-690	290	320	690
SN63-290-400-770	290	400	770
SN63-290-480-850	290	480	850
SN63-290-560-930	290	560	930
SN63-290-640-1010	290	640	1010
SN63-290-800-1170	290	800	1170
SN63-290-960-1330	290	960	1330
SN63-290-1120-1490	290	1120	1490
SN63-290-1280-1650	290	1280	1650
SN63-370-320-770	370	320	770
SN63-370-400-850	370	400	850
SN63-370-480-930	370	480	930
SN63-370-560-1010	370	560	1010
SN63-370-720-1170	370	720	1170
SN63-370-880-1330	370	880	1330
SN63-370-1040-1490	370	1040	1490
SN63-370-1200-1650	370	1200	1650
SN63-370-1360-1810	370	1360	1810
SN63-450-400-930	450	400	930
SN63-450-480-1010	450	480	1010
SN63-450-640-1170	450	640	1170
SN63-450-800-1330	450	800	1330
SN63-450-960-1490	450	960	1490
SN63-450-1120-1650	450	1120	1650
SN63-450-1280-1810	450	1280	1810
SN63-530-560-1170	530	560	1170
SN63-530-720-1330	530	720	1330
SN63-530-880-1490	530	880	1490
SN63-530-1040-1650	530	1040	1650
SN63-530-1200-1810	530	1200	1810
SN63-530-1360-1970	530	1360	1970
SN63-610-640-1330	610	640	1330
SN63-610-800-1490	610	800	1490
SN63-610-960-1650	610	960	1650
SN63-610-1120-1810	610	1120	1810
SN63-610-1280-1970	610	1280	1970

Tab. 21

The most commonly used standard configurations are shown in the tables. Other deviating configurations and customer-specific adaptations are possible. For more information please contact Application Technology.

Fold out ordering key

To make this product catalog as simple as possible for you to use, we have included the following easy-to-read chart.

Your advantages:

- Description and ordering designations easy to read at one glance
- Simplified selection of the correct product
- Links to detailed descriptions in the catalog

Ordering key

SN Version 1 with a slider

SN	35	290	430	770	K1	NIC
						Expanded surface protection *see pg. ER-16, Anticorrosive protection*
					Clearance and preload, if deviating from standard *see pg. ER-15, tab. 14*	
				Rail length *see pg. ER-5, tab. 2, 4, 6, 8, 10*		
			Stroke *see pg. ER-5, fig. 7, tab. 1 to 10*			
		Slider length *see pg. ER-5, tab. 1, 3, 5, 7, 9*				
	Size *see pg. ER-4, Performance characteristics*					
Product type						

Ordering example 1: SN35-0290-0430-0770

Ordering example 2: SN35-0290-0430-0770-K1-NIC

Notes on ordering: Rail and slider lengths, as well as strokes, are always stated with 4 digits. Please use zeroes to fill in for lengths with less than 4 digits

SN version 2 with multiple independent sliders

SN	43	2	290	350	1330	G1	NIC
							Expanded surface protection *see pg. ER-16, Anticorrosive protection*
						Clearance and preload, if deviating from standard *see pg. ER-15, tab. 18*	
					Rail length *see pg. ER-5, tab. 2, 4, 6, 8, 10*		
				Stroke of the individual sliders *see pg. ER-5, fig. 7, tab. 1 to 10*			
			Slider length *see pg. ER-5, tab. 1, 3, 5, 7, 9*				
		Number of sliders					
	Size *see pg. ER-4, Performance characteristics*						
Product type							

Ordering example 1: SN43-2x0290-0350-1330

Ordering example 2: SN43-2x0290-0350-1330-G1-NIC

If the individual slider lengths and/or strokes are different, please order according to ordering example 3.

Ordering example 3: SN28-1x0200-0300/1x0250-0415-1240

Notes on ordering: Rail and slider lengths, as well as strokes, are always stated with 4 digits. Please use zeroes to fill in for lengths with less than 4 digits

SN Version 3 with multiple synchronized sliders

SN	63	850	(370+290)	400	1330	K1	NIC
							Expanded surface protection *see pg. ER-16, Anticorrosive protection*
						Clearance and preload, if deviating from standard *see pg. ER-15, tab. 18*	
					Rail length *see pg. ER-5, tab. 2, 4, 6, 8, 10*		
				Stroke *see pg. ER-5, fig. 7, tab. 1 to 10*			
			Individual length of slider *see pg. ER-5, tab. 1, 3, 5, 7, 9*				
		Apparent length, S´ of the slider *see pg. ER-8, fig. 9*					
	Size *see pg. ER-4 Performance characteristics*						
Product type							

Ordering example 1: SN63-0850(370+290)-0400-1330

Ordering example 2: SN63-0850(370+290)-0400-1330-K1-NI C

Notes on ordering: Rail and slider lengths, as well as strokes, are always stated with 4 digits. Please use zeroes to fill in for lengths with less than 4 digits

Serie SNK

SNK	43	110	1	2320	TSC	NIC
						For surface protection different from standard ISO 2081 see *see pg. ER-16*
					Tipo di guida *see pg. ER-10 e ER-11*	
				Rail length *see pg. ER-10 tab 13*		
			Number of sliders for each rail			
		Slider length *see pg. ER-10.*				
	Size *see pg. ER-4 Performance characteristics*					
Product type						

Ordering example: TSC-02320/1/SNK43-110-2Z-NIC

Rail kit: 1x2000+1x320 (only for joined rails)

Drilling pattern: 40-40x80-40//40-15x80-40 (always state the drilling pattern separately)

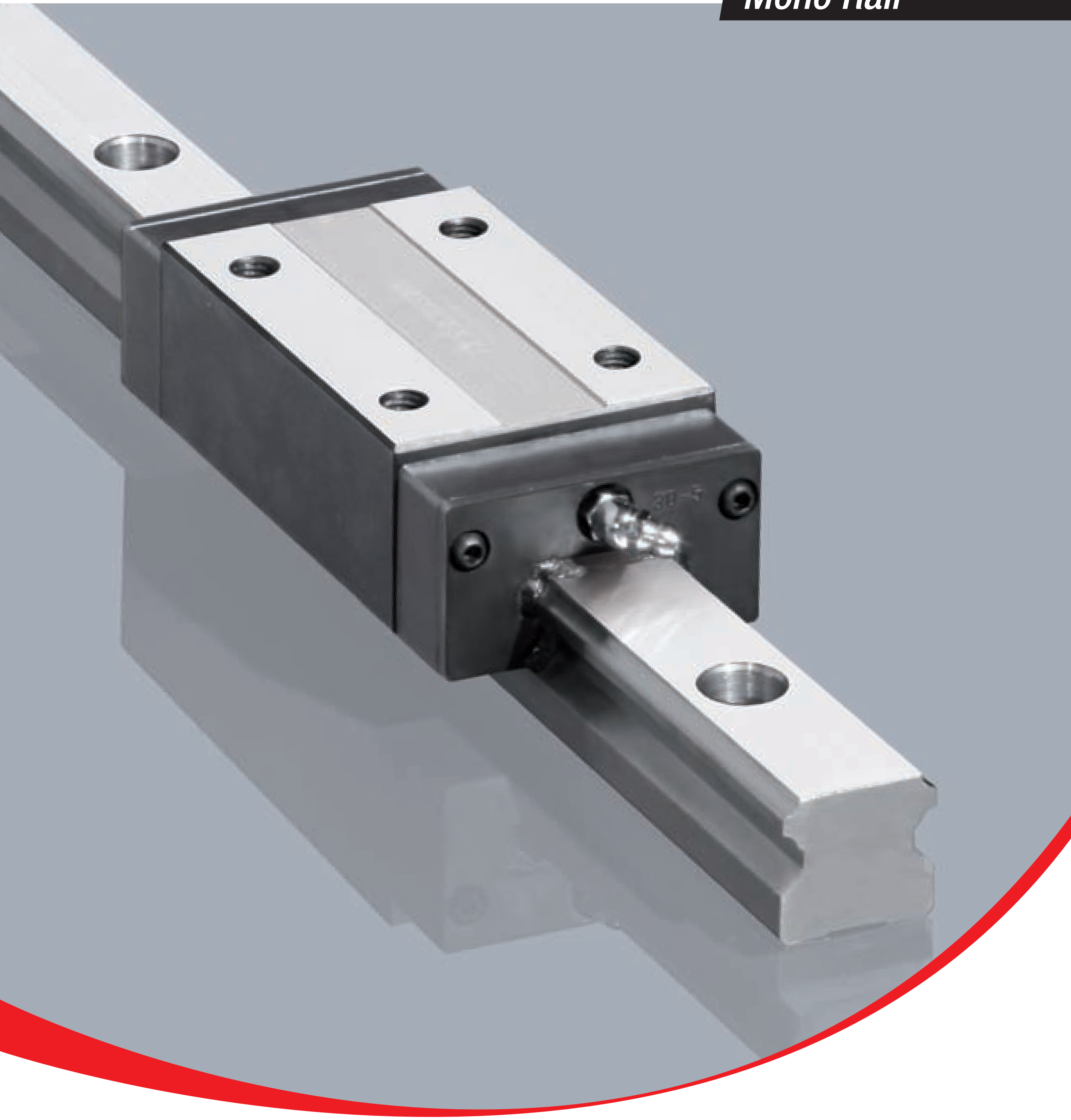
Note for ordering: Rail lengths are always shown with five figures, and slider lengths are indicated with three figures preceded by zeros

Notes

ROLLON®

Linear Evolution

Mono Rail



Product explanation

Mono Rails are profile rails for the highest degree of precision

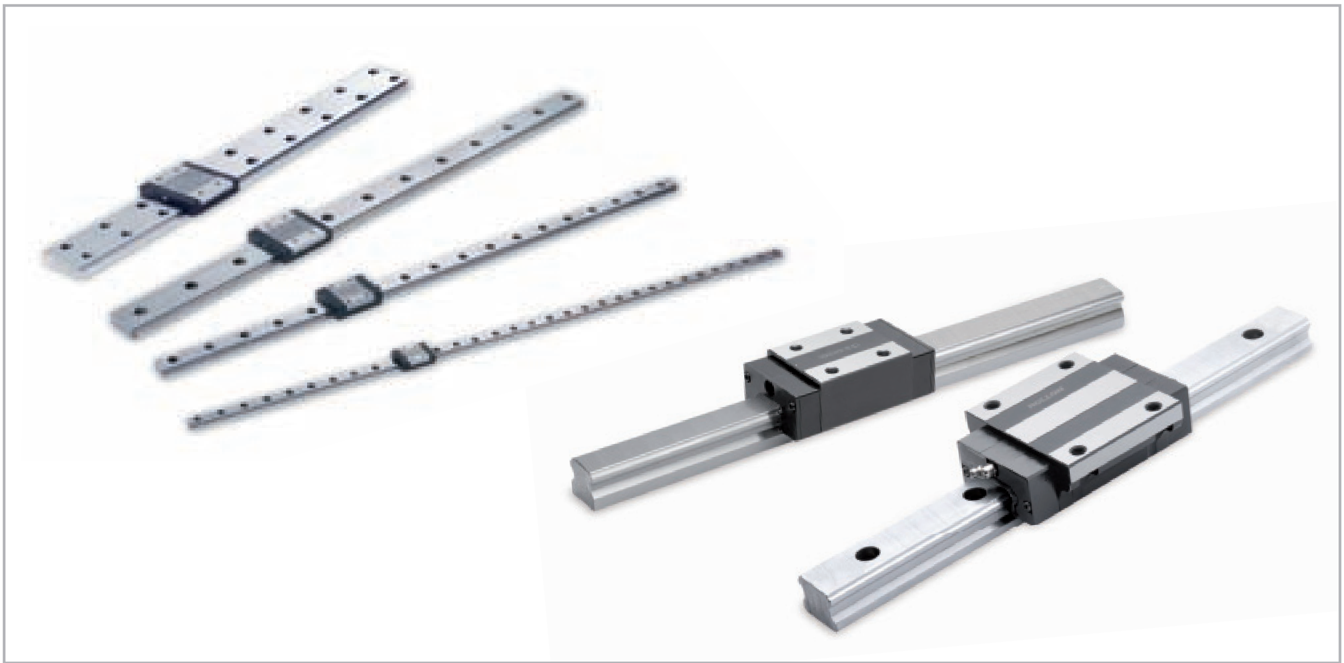


Fig. 1

The running grooves are ground in semicircular profile and have a contact angle of 45° in X-arrangement so that the same load capacity is guaranteed in all principle directions. Use of large steel balls enables high load and moment capacities. All carriages in size 55 are equipped with ball chains.

The most important characteristics:

- X-arrangement with 2-point contact of the raceways
- Uniform loading capacity in all main directions
- High ability for self-regulating
- Small differential slip in comparison to 4-point contact
- Very quiet running and low operating noise
- Low maintenance due to advanced lubrication chamber
- Small displacement force in preload compared to 4-point contact
- Mono Rail profile rails meet the market standard and can replace linear rails of the same design from other manufacturers while maintaining the main dimensions
- Miniature Mono Rails available in a standard or large version

Preferred areas of application:

- Construction and machine technology (safety doors, feeding)
- Packaging machines
- Special purpose machinery
- Logistics (e.g., handling units)
- Medical technology (e.g., X-ray equipment, hospital gurneys)
- Semiconductors and electronics industry

MRS / MRT

Standard carriage with flange in two different heights. MRT is the lower version.

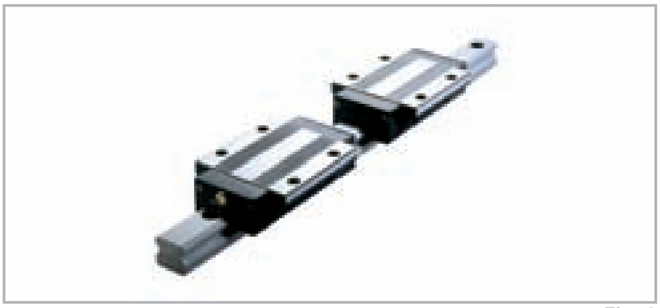


Fig. 2

MRS...W / MRZ...W / MRT...W

Carriage without flange, also called block. Available in three different heights. MRT is the lower version; MRZ is the intermediate size.

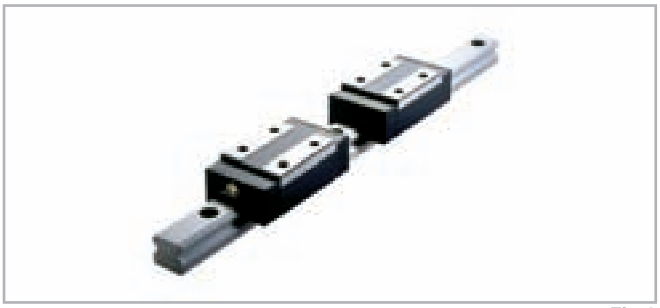


Fig.3

MRS...L

Carriage in long version for holding larger loads. MRS...L is the version with flange.

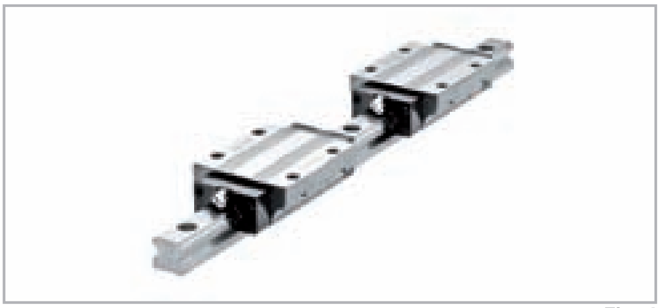


Fig. 4

MRS...LW / MRT...LW

Carriage in long version without flange. Available in two different heights. MRT is the lower version.

Fig. 5

MRT...S

Carriage with flange in short version for lower loads with equally high precision.

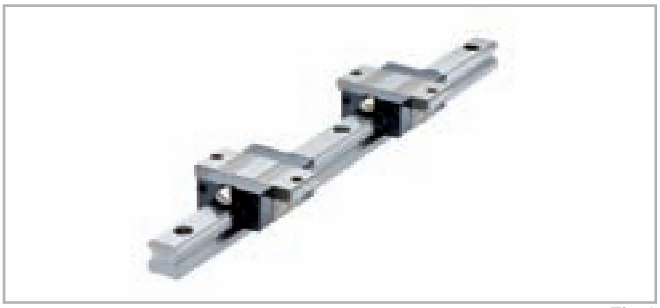


Fig.6

MRT...SW

Carriage without flange in short version for lower loads with equally high precision.

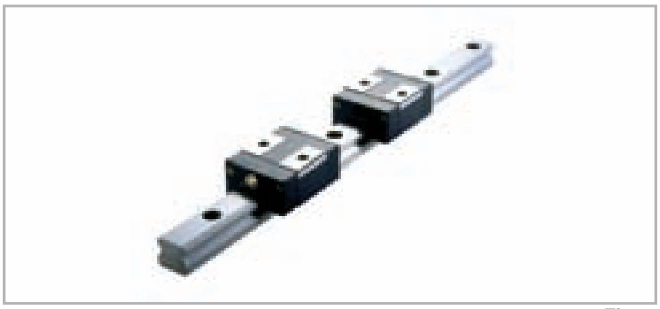


Fig. 7

MRR...F

Guide rail MRR...F for bolting from below with threaded holes. Design with smooth surface without bevels.

Fig. 8

Standard width

Compact technology and high performance in its smallest structural shape.

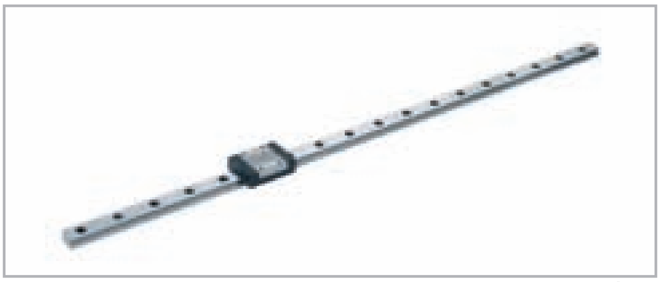


Fig. 9

Large width

Wide miniature profile rails, with a compact size, allow the acceptance of higher forces and moments. Especially suited for single rail applications.

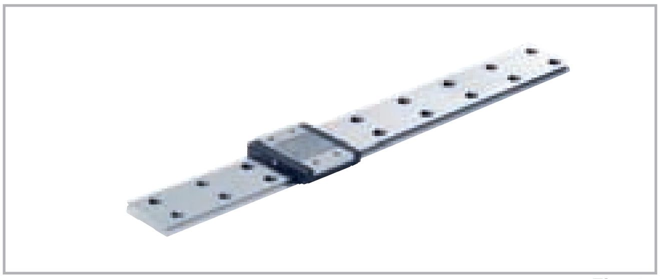


Fig. 10

Integrated redirection

During the carriage movements, the plastic end caps are subjected to permanent shocks caused by the continuous change of direction of movement. These shock loads have a critical influence on the running properties and speed. Automation and production demands of modern industry call for high operating speeds. The integrated ball redirection, i.e., the direct connection of ball redirection and body, creates an optimum solution for the miniature profile rails.

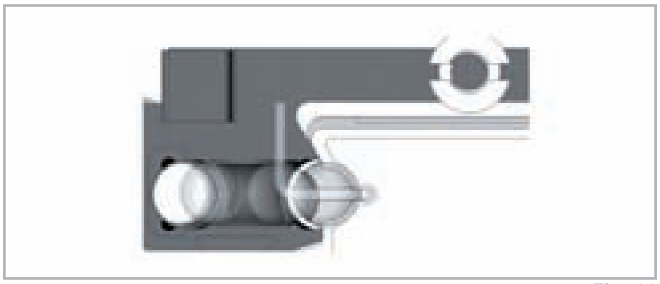


Fig. 11

Technical data

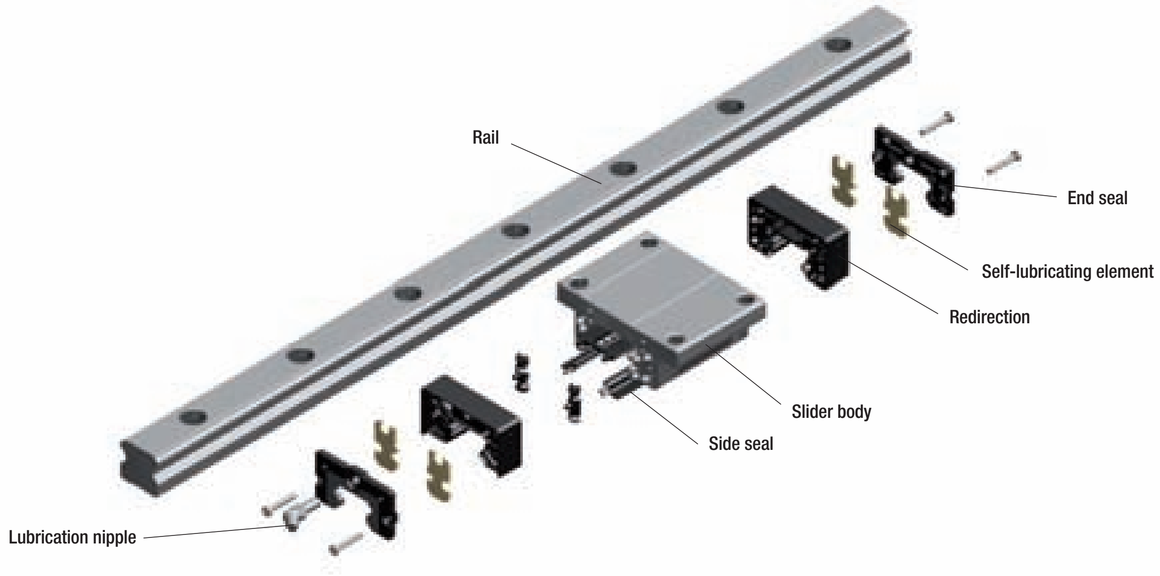


Fig. 12

Performance characteristics:

- Mono Rail available sections: 15, 20, 25, 30, 35, 45, 55
- Standard version Miniature Mono Rail available sections: 7, 9, 12, 15
- Large version Miniature Mono Rail available sections: 9, 12, 15
- Max. operating speed: 3.5 m/s (137.79 in/s) (depending on application)
- Max. operating temperature: +80 °C (+176 °F) (depending on application)
- Available rail lengths up to approx. 4,000 mm (157.5 in) for Mono Rail (see Ordering key, Table 31)
- Four preload classes for Mono Rail: G1, K0, K1, K2
- Three precision classes: N, H, P
- Three preload classes for the Miniature Mono Rails: V0, VS, V1
- Lengths for single rails are available up to 1,000mm (39.37 in) for theMiniature Mono Rail

Remarks:

- Combining rails is possible (joining)
- The fixing holes on the carriages with flange can also be used as through holes for fastening from below. Here, the reduction in size of the screw diameter must be observed
- Various surface coatings on request, e.g. black coating, hard chrome plating, nickel plating
- Manual and pneumatic clamping elements available as accessories. Depending on the height of the carriage, additional adapter plates must be used
- Dimensions H_2 and L of the carriage change when using metal deflectors and other seals. Refer to Sec. 4 Accessories, pg. MR-16f
- The carriages in size 55 are equipped with ball chains
- Primary lubricated systems have an increased displacement resistance

Mono Rail load capacities

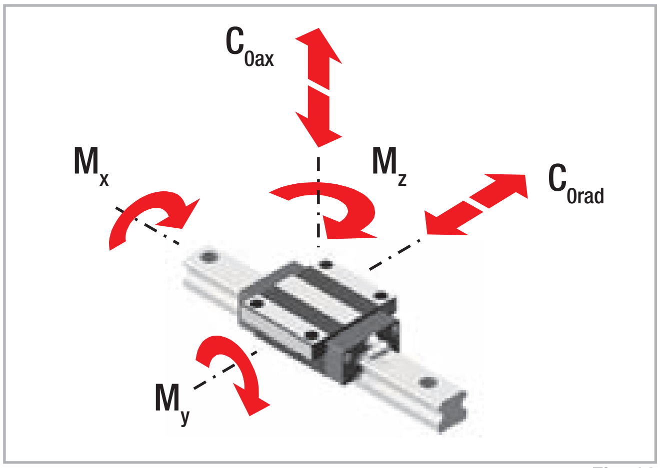


Fig. 13

Type	Load capacities [N]		Static moments [Nm]		
	dyn. C	stat. C_{0rad} stat. C_{0ax}	M_x	M_y	M_z
MRS15 MRS15W MRT15W	8500	13500	100	68	68
MRT15SW	5200	6800	51	18	18
MRS20 MRS20W MRT20W	14000	24000	240	146	146
MRT20SW	9500	14000	70	49	49
MRS20L MRS20LW	16500	30000	300	238	238
MRS25 MRT25 MRS25W MRT25W MRZ25W	19500	32000	368	228	228
MRT25S MRT25SW	12500	17500	175	69	69
MRS25L MRS25LW MRT25LW	26000	46000	529	455	455

Tab. 1

Type	Load capacities [N]		Static moments [Nm]		
	dyn. C	stat. C_{0rad} stat. C_{0ax}	M_x	M_y	M_z
MRS30 MRS30W MRT30W	28500	48000	672	432	432
MRT30SW	17500	24000	336	116	116
MRS30L MRS30LW MRT30LW	36000	64000	896	754	754
MRS35 MRS35W MRT35W	38500	62000	1054	620	620
MRT35SW	25000	36500	621	209	209
MRS35L MRS35LW MRT35LW	48000	83000	1411	1098	1098
MRS45 MRS45W MRT45W	65000	105000	2363	1378	1378
MRS45L MRS45LW MRT45LW	77000	130000	2925	2109	2109
MCS55 MCS55W MCT55W	123500	190000	4460	3550	3550
MCS55L MCS55LW MCT55LW	155000	249000	5800	6000	6000

Tab. 2

Miniature Mono Rail load capacities

Standard width

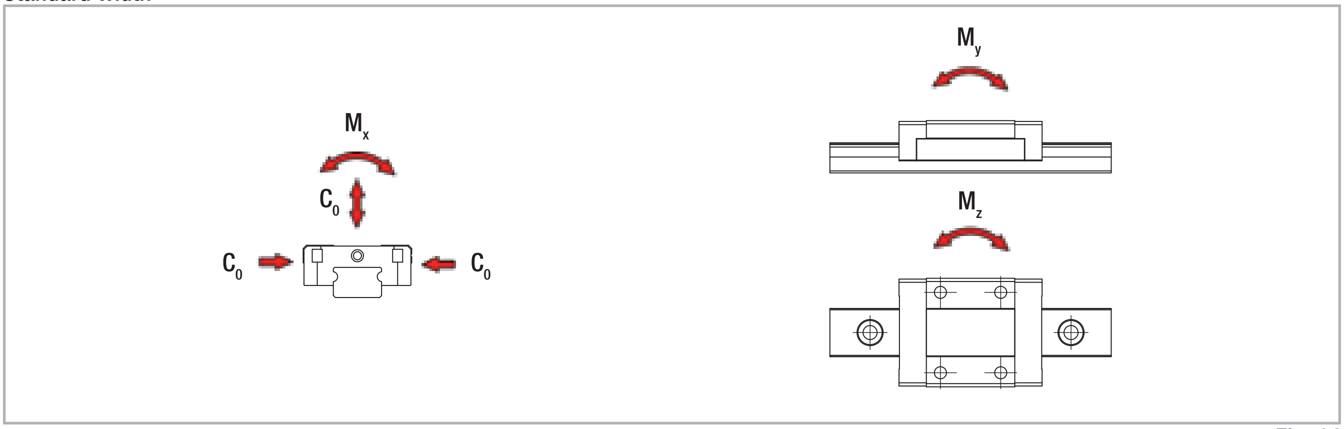


Fig. 14

Type	Load capacities [N]		Static moments [Nm]		
	dyn. C_{100}	stat. C_0	M_x	M_y	M_z
MR07MN	890	1400	5.2	3.3	3.3
MR09MN	1570	2495	11.7	6.4	6.4
MR12MN	2308	3465	21.5	12.9	12. 9
MR15MN	3810	5590	43.6	27	27

Tab. 3

Large width

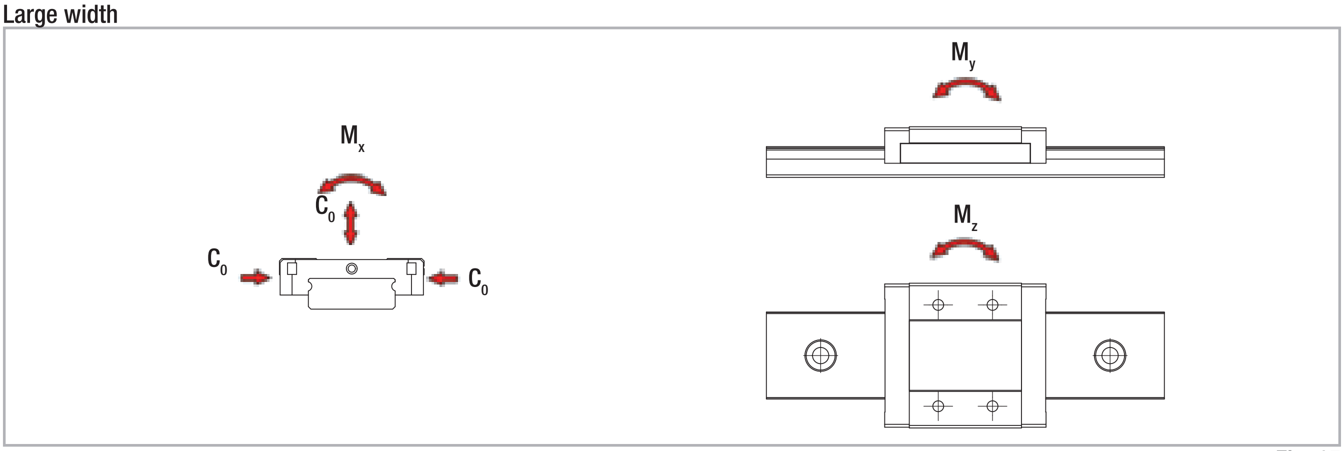


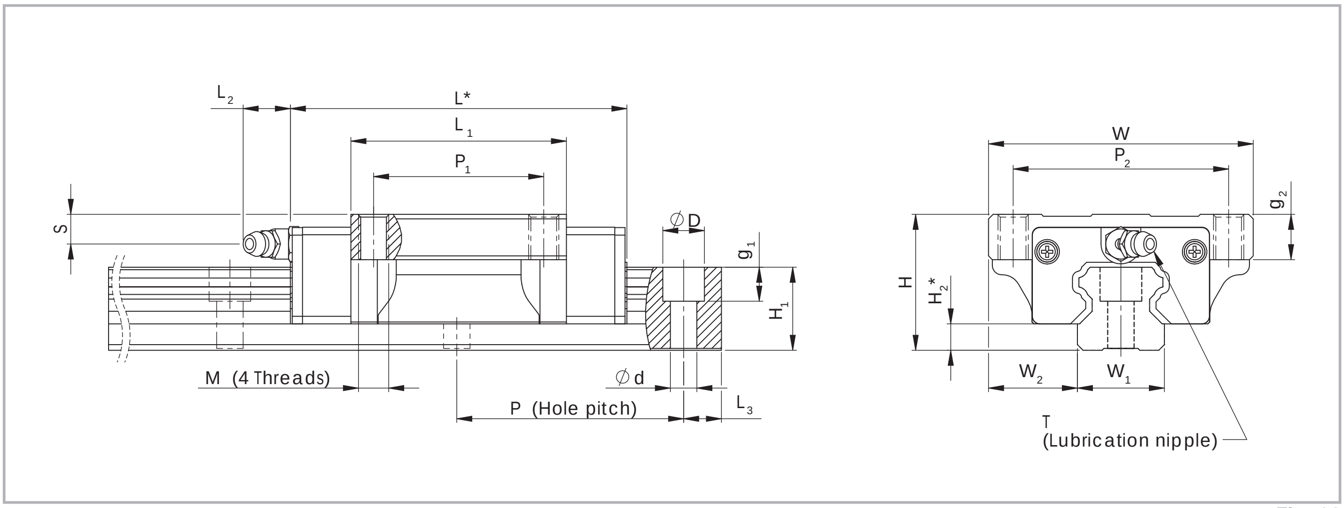
Fig. 15

Type	Load capacities [N]		Static moments [Nm]		
	dyn. C_{100}	stat. C_0	M_x	M_y	M_z
MR09WN	2030	3605	33.2	13.7	13.7
MR12WN	3065	5200	63.7	26.3	26.3
MR15WN	5065	8385	171.7	45.7	45.7

Tab. 4

Product dimensions

MRS series – carriage with flange



* Dimensions H2 and L change when using metal deflectors and other seals (see pg. MR-12, tab. 12)

Fig. 16

Type	System [mm]				Slider MRS [mm]									Weight [kg]	Rail MRR [mm]							Weight [kg/m]
	H	W	W_2	H_2	L	P_2	P_1	M	g_2	L_1	L_2	T	S		W_1	H_1	P	d	D	g_1	L_3*	
MRS15	24	47	16	4,6	69	38	30	M5	8	40	5	∅3	4,3	0.19	15	14	60	4.5	7.5	5.8	20	1.4
MRS20	30	63	21.5	5	81.2	53	40	M6	9	48.8	12	M6 x 1	7	0.4	20	18		6	9.5	9		2.6
MRS20L					95.7					63.4				0.52								
MRS25	36	70	23.5	7	91	57	45	M8	12	57			7.8	0.57	23	22		7	11	9.5		3.6
MRS25L					113					79.1				0.72								
MRS30	42	90	31	9	114	72	52	M10		72			7	1.1	28	26	80	9	14	12.5		5.2
MRS30L					135.3					94.3				1.4								
MRS35	48	100	33	9,5	114	82	62		13	80			8	1.6	34	29						7.2
MRS35L					139.6					105.8				2								
MRS45	60	120	37.5	14	142.5	100	80	M12	15	105	17	M8 x 1	8.5	2.7	45	38	105	14	20	17.5	22.5	12.3
MRS45L					167					129.8				3.6								

* Only applies when using max. rail lengths (see Ordering key, tab. 31)

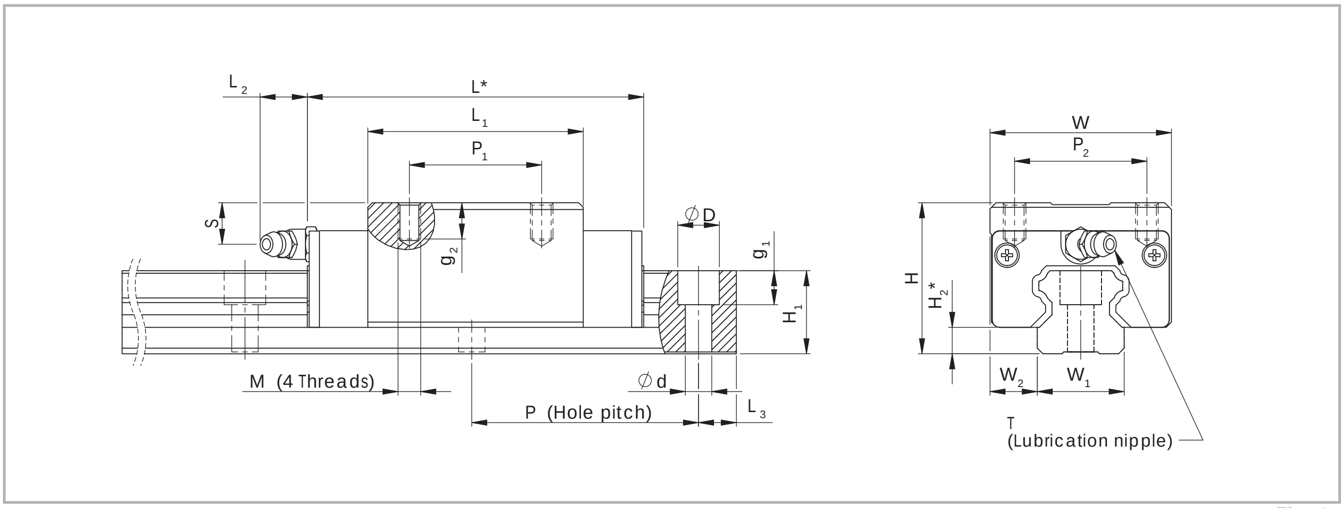
Tab. 5

Type	System [mm]				Slider MCS [mm]									Weight [kg]	Rail MCR [mm]							Weight [kg/m]
	H	W	W_2	H_2	L	P_2	P_1	M	g_2	L_1	L_2	T	S		W_1	H_1	P	d	D	g_1	L_3*	
MCS55	70	140	43,5	12,7	181.5	116	95	M14	21	131	12	M8 x 1	20	5.4	53	38	120	16	23	20	30	14.5
MCS55L					223.7					173				7.1								

* Only applies when using max. rail lengths (see Ordering key)

Tab. 6

MRS series – carriage without flange



* Dimensions H2 and L change when using metal deflectors and other seals (see pg. MR-12, tab. 12)

Fig. 17

Type	System [mm]				Slider MRS [mm]									Weight [kg]	Rail MRR [mm]							Weight [kg/m]
	H	W	W_2	H_2	L	P_2	P_1	M	g_2	L_1	L_2	T	S		W_1	H_1	P	d	D	g_1	L_3*	
MRS15W	28	34	9.5	4,6	69	26	26	M4	6.4	40	5	∅3	8,3	0.21	15	14	60	4.5	7.5	5.8	20	1.4
MRS20W	30	44	12	5	81.2	32	36	M5	8	48.8	12	M6 x 1	7	0.31	20	18		6	9.5	9		2.6
MRS20LW					95.7		50			63.4				0.47								
MRS25W	40	48	12.5	7	91	35	35	M6	9.6	57			11.8	0.45	23	22		7	11	9.5		3.6
MRS25LW					113		50			79.1				0.56								
MRS30W	45	60	16	9	114	40	40	M8	12.8	72			10	0.91	28	26	80	9	14	12.5		5.2
MRS30LW					135.3		60			94.3				1.2								
MRS35W	55	70	18	9,5	114	50	50			80			15	1.5	34	29						7.2
MRS35LW					139.6		72			105.8				1.9								
MRS45W	70	86	20.5	14	142.5	60	60	M10	16	105	17	M8 x 1	18.5	2.3	45	38	105	14	20	17.5	22.5	12.3
MRS45LW					167		80			129.8				2.8								

* Only applies when using max. rail lengths (see Ordering key, tab. 31)

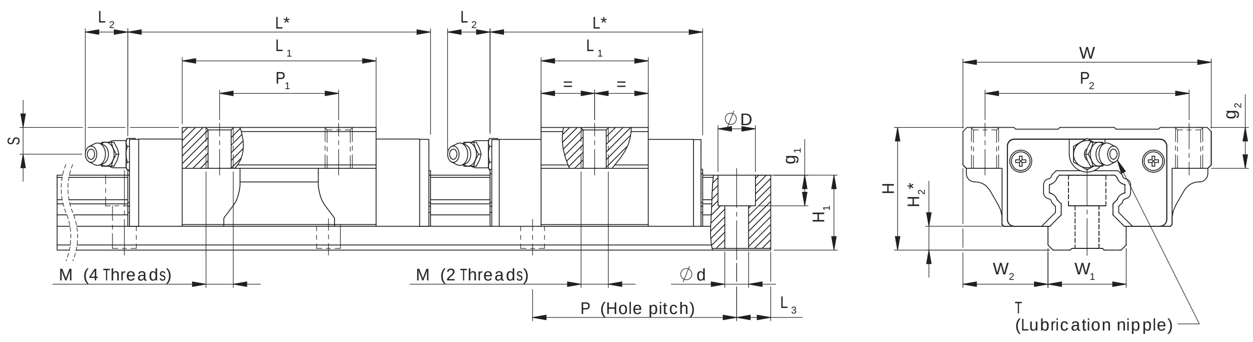
Tab. 7

Type	System [mm]				Slider MCS [mm]									Weight [kg]	Rail MCR [mm]							Weight [kg/m]
	H	W	W_2	H_2	L	P_2	P_1	M	g_2	L_1	L_2	T	S		W_1	H_1	P	d	D	g_1	L_3*	
MCS55W	80	100	23.5	12.7	181.5	75	75	M12	19	131	12	M8 x 1	30	5.2	53	38	120	16	23	20	30	14.5
MCS55LW					223.7		95			173				6.7								

* Only applies when using max. rail lengths (see Ordering key)

Tab. 8

MRT series – carriage with flange



* Dimensions H_2 and L change when using metal deflectors and other seals (see pg. MR-12, tab. 12)

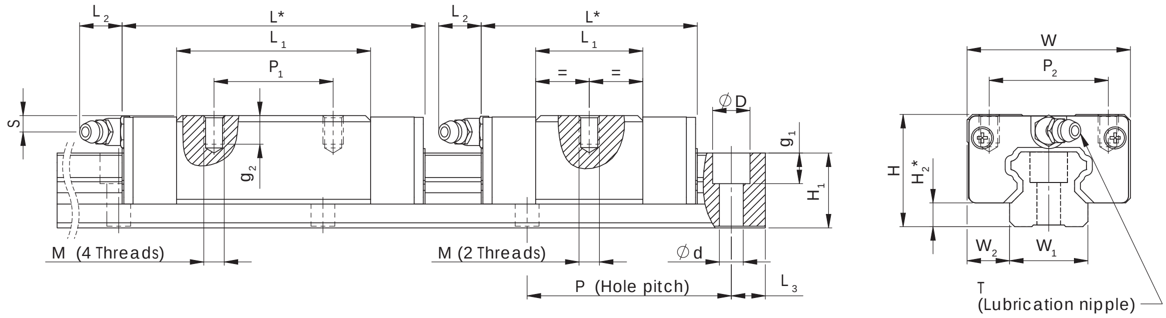
Fig. 18

Type	System [mm]				Slider MRT [mm]									Weight [kg]	Rail MRR [mm]							Weight [kg/m]
	H	W	W_2	H_2	L	P_2	P_1	M	g_2	L_1	L_2	T	S		W_1	H_1	P	d	D	g_1	L_3*	
MRT25	33	73	25	7	91	60	35	M8	9	57	12	M6 x 1	4.8	0.5	23	22	60	7	11	9,5	20	3.6
MRT25S					65		-			31.5				0.33								

* Only applies when using max. rail lengths (see Ordering key, tab. 31)

Tab. 9

MRT series – carriage without flange



* Dimensions H_2 and L change when using metal deflectors and other seals (see pg. MR-12, tab. 12)

Fig. 19

Type	System [mm]				Slider MRT [mm]									Weight [kg]	Rail MRR [mm]							Weight [kg/m]
	H	W	W_2	H_2	L	P_2	P_1	M	g_2	L_1	L_2	T	S		W_1	H_1	P	d	D	g_1	L_3*	
MRT15W	24	34	9.5	4.6	69	26	26	M4	5.6	40	5	∅3	4.3	0.17	15	14		4.5	7.5	5.8		1.4
MRT15SW					50.6		-			21.6				0.1								
MRT20W	28	42	11	5	81.2	32	32	M5	7	48.8			5	0.26	20	18		6	9.5	9		2.6
MRT20SW					60.3		-			28				0.17			60					
MRT25W					91		35			57				0.38								
MRT25SW	33	48	12.5	7	65.5	35	-	M6	8.4	31.5			4.8	0.21	23	22		7	11	9.5		3.6
MRT25LW					113		50			79.1				0.53							20	
MRT30W					114		40			72	12	M6 x 1		0.81								
MRT30SW	42	60	16	9	80	40	-			38.6			7	0.48	28	26						5.2
MRT30LW					135.3		60	M8	11.2	94.3				1.06			80	9	14	12.5		
MRT35W					114		50			80				1.2								
MRT35SW	48	70	18	9.5	79.7	50	-			45.7			8	0.8	34	29						7.2
MRT35LW					139.6		72			105.8				1.6								
MRT45W	60	86	20.5	14	142.5	60	60	M10	14	105	17	M8 x 1	8.5	2.1	45	38	105	14	20	17.5	22.5	12.3
MRT45LW					167		80			129.8				2.6								

* Only applies when using max. rail lengths (see Ordering key, tab. 31)

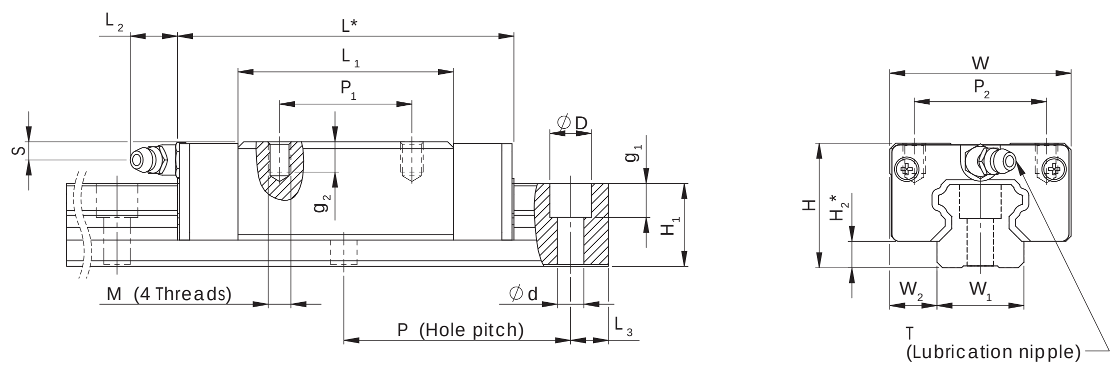
Tab. 10

Type	System [mm]				Slider MCT [mm]									Weight [kg]	Rail MCR [mm]							Weight [kg/m]
	H	W	W_2	H_2	L	P_2	P_1	M	g_2	L_1	L_2	T	S		W_1	H_1	P	d	D	g_1	L_3*	
MCT55W	68	100	23.5	12.7	181.5	75	75	M12	15	131	13	M8 x 1	18	5	53	38	120	16	23	20	30	14.5
MCT55LW					223.7		95			173				6.6								

* Only applies when using max. rail lengths (see Ordering key)

Tab. 11

MRZ series – carriage without flange



* Dimensions H2 and L change when using metal deflectors and other seals (see pg. MR-12, tab. 12)

Fig. 20

Type	System [mm]				Slider MRZ [mm]									Weight [kg]	Rail MRR [mm]							Weight [kg/m]
	H	W	W_2	H_2	L	P_2	P_1	M	g_2	L_1	L_2	T	S		W_1	H_1	P	d	D	g_1	L_3*	
MRZ25W	36	48	12.5	7	90.3	35	35	M6	10	57	15.6	M6x1	7.8	0.4	23	22	60	7	11	9.5	20	3.6
MRZ25LW					113		50		8	79.1				0.5								

* Only applies when using max. rail lengths (see Ordering key, tab. 31)

Tab. 12

MRR...F series – rails mounted from below

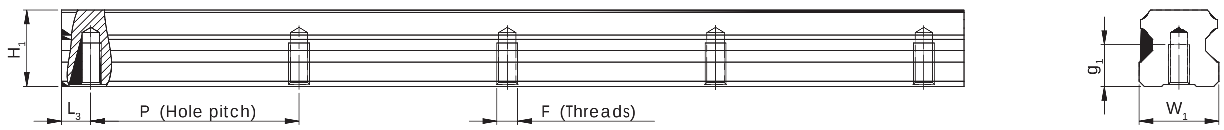


Fig. 21

Rail type	W_1 [mm]	H_1 [mm]	L_3* [mm]	P [mm]	F	g_1 [mm]
MRR15...F	15	14	20	60	M5	8
MRR20...F	20	18			M6	10
MRR25...F	23	22				12
MRR30...F	28	26		80	M8	15
MRR35...F	34	29				17
MRR45...F	45	38	22.5	105	M12	24

* Only applies when using max. rail lengths (see Ordering key)

Tab. 13

Miniature Mono Rail standard width

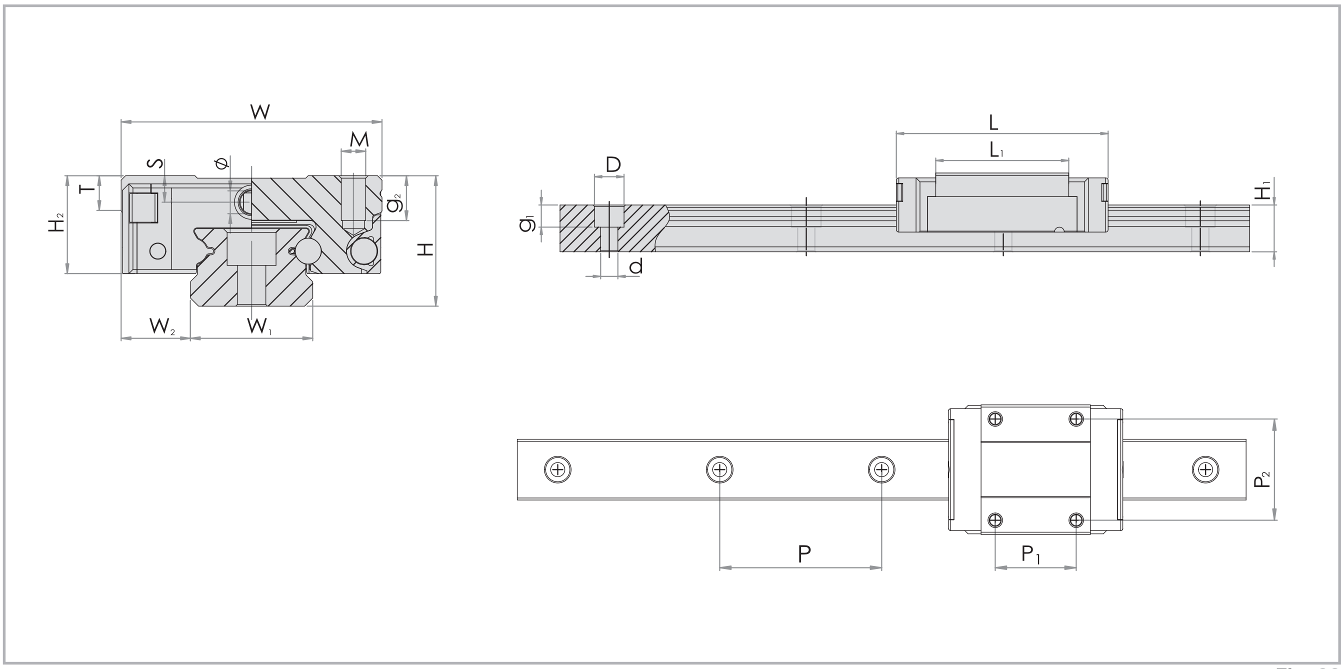


Fig. 22

Type	System [mm]			
	H	W	W_2	H_2
MR07MN	8	17	5	6.5
MR09MN	10	20	5.5	7.8
MR12MN	13	27	7.5	10
MR15MN	16	32	8.5	12

Tab. 14

Type	Slider [mm]										Rail [mm]						
	L	P_2	P_1	M	g_2	L_1	T	S	Ø	Weight [kg]	W_1	H_1	P	d	D	g_1	Weight [kg/m]
MR07MN	23.7	12	8	M2	2.5	14.3	2.8	1.6	1.1	0.008	7	4.7	15	2.4	4.2	2.3	0.215
MR09MN	30.6	15	10	M3	3.0	20.5	3.3	2.2	1.3	0.018	9	5.5	20	3.5	6	3.5	0.301
MR12MN	35.4	20	15	M3	3.5	22.0	4.3	3.2	1.3	0.034	12	7.5	25	3.5	6	4.5	0.602
MR15MN	43.0	25	20	M3	5.5	27.0	4.3	3.3	1.8	0.061	15	9.5	40	3.5	6	4.5	0.93

Tab. 15

Miniature Mono Rail large width

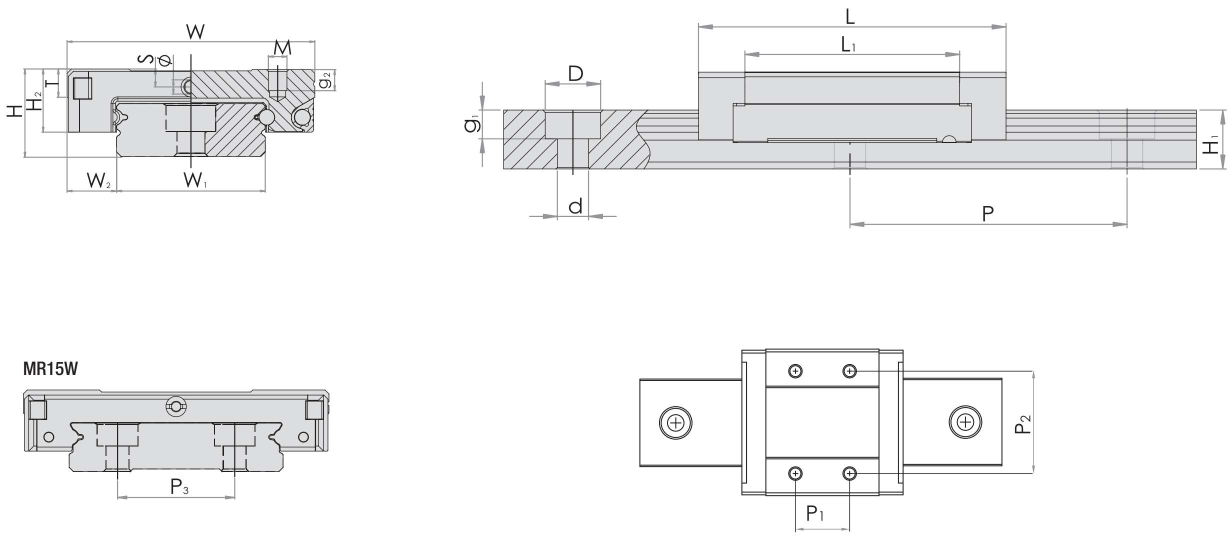


Fig. 23

Type	System [mm]			
	H	W	W_2	H_2
MR09WN	12	30	6	8.6
MR12WN	14	40	8	10.1
MR15WN	16	60	9	12

Tab. 16

Type	Slider [mm]										Rail [mm]							
	L	P_2	P_1	M	g_2	L_1	T	S	Ø	Weight [kg]	W_1	H_1	P	P_3	d	D	g_1	Weight [kg/m]
MR09WN	39.1	21	12	M3	3	27.9	4	2.6	1.3	0.037	18	7.3	30	-	3.5	6		0.94
MR12WN	44.4	28	15	M3	3.5	31.0	4.5	3.1	1.3	0.065	24	8.5	40	-	4.5	8	4.5	1.472
MR15WN	55.3	45	20	M4	4.5	38.5	4.5	3.3	1.8	0.137	42	9.5	40	23	4.5	8		2.818

Tab. 17

Accessories

Safety equipment and covers

End seal

Carriages of Mono Rail profile rails are equipped with end seals for contamination protection as standard.

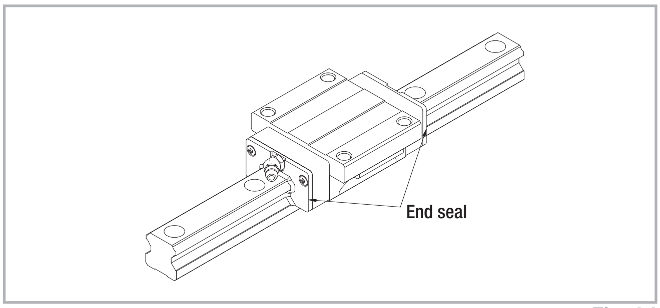


Fig. 24

Side seal

To prevent permeation of foreign matter from below, the carriages for this area are offered with appropriate seals.

No side seals are available for carriages in long or short version (...S / S...W and ...L / L...W).

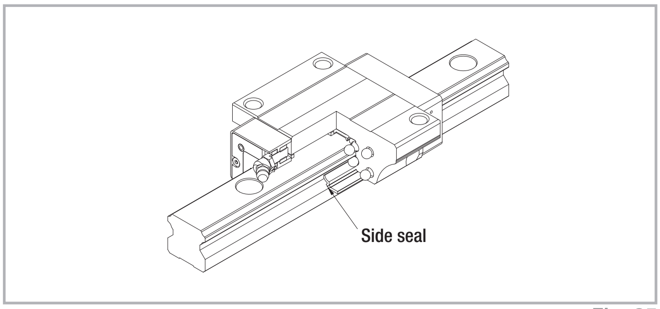


Fig. 25

Double seal

To improve the protection from contamination at higher loads the carriage can be provided with double end seals.

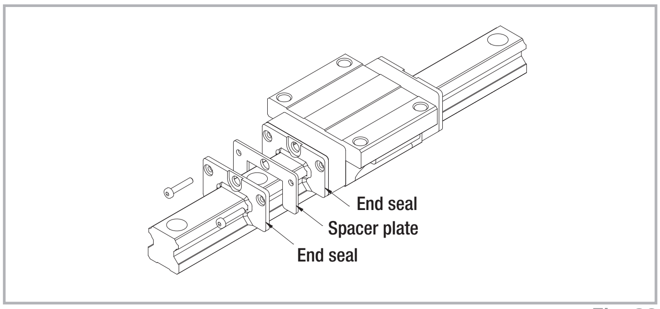


Fig. 26

Metal deflector (non-contacting)

Metal cuttings or coarse contamination can damage the end seals of the carriage. Metal deflector covers protect seal lips against damage.

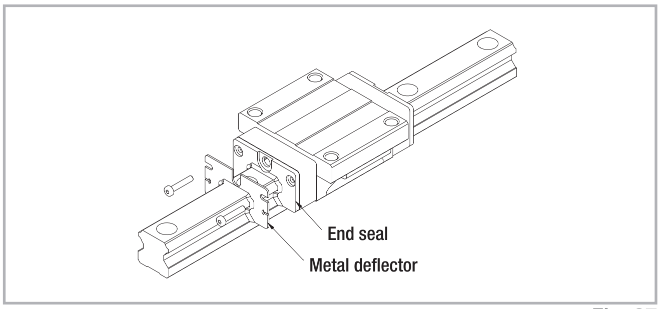


Fig. 27

Seal variants:

A: Carriage with end and side seal

C: Carriage with end and side seals and metal deflector

D: Carriage with double end seal and side seal

E: Carriage with double end seal and side seal and metal deflector

Changes of floor clearance and length changes of the carriages when using the corresponding seal variants

Seal variant		A, C, D, E,	A	C	D	E
Slider type[1]	Size	Changed dimension H_2* [mm]	Changed length L* [mm]			
MRS MRS...W MRT MRT...W	15	2.5	73	75	79	83
	20	2.9	85	87	91	95.2
	25	4.9	94.7	97.7	101.4	106.6
	30	6.9	117	119	132	136
	35	7.6	118	120	128	132.6
	45	12.05	146.7	148.7	157.4	161.9
MCS MCS...W MCT MCT...W	55	-	-	192	191	200
MRS...L MRS...LW MRT...LW	20	-	-	99.5	103.5	107.7
	25	-	-	117.7	121.4	126.6
	30	-	-	138.3	151.3	155.3
	35	-	-	143.6	151.6	156.2
	45	-	-	171.2	179.9	184.4
MCS...L MCS...LW MCT...LW	55	-	-	234.2	233.2	242.2
MRT...S MRT...SW	15	-	-	54.6	58.6	62.6
	20	-	-	64.1	68.1	72.3
	25	-	-	70.2	73.9	79.1
	30	-	-	83	96	100
	35	-	-	83.7	91.7	96.3

Tab. 18

[1] No side seals are available for carriages in long or short version (...S / S...W and ...L / L...W)

* For comparison see Chapter 3 Product dimensions, pg. MR-8ff

Metal cover strip

A rail cover strip made of corrosion resistant steel is available to improve the seal after guide rail installation. The metal cover strip is 0.3 mm wide and can have a maximum length of 50 m.

Size	Width [mm]
15	10
20	13
25	15
30	20
35	24
45	32
55	38

Tab. 19

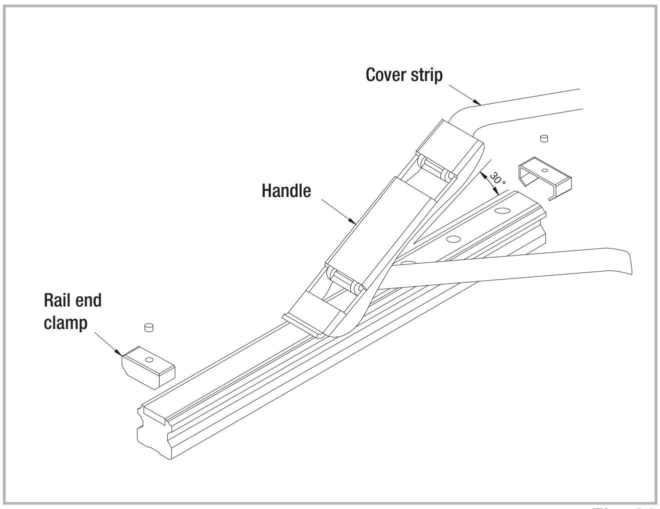


Fig. 28

Flush cap

Metal debris and other foreign substance can collect in the fixing holes of the rails and thus end up the carriage.

To prevent penetration of contamination in the carriage, the fixing holes should be capped with perforated caps flush with the rail surface.

Flush caps are made of wear and oil resistant synthetic resin. Various sizes of perforated caps for the counter sunk holes for hexagon socket bolts M3 to M22 are included as standard in the scope of supply.

Flush caps are driven in flush with the rail surface with light hammer taps using a flat piece of metal (see fig. 29).

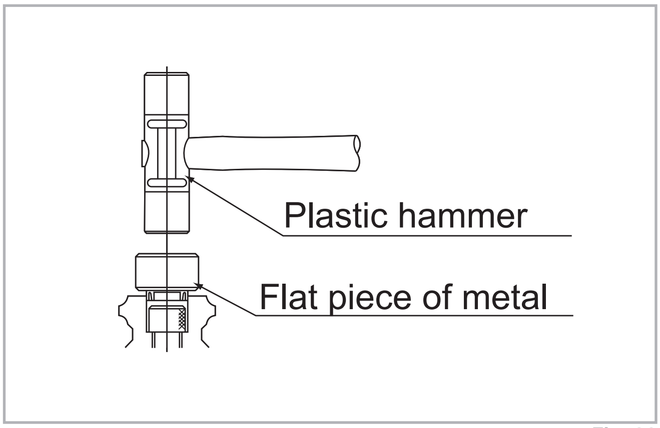


Fig. 29

Clamping elements

Mono Rail profile rails can be secured with manual or pneumatic clamping elements. Areas of application are:

- Table cross beams and sliding beds
- Width adjustment, stops
- Positioning of optical equipment and measuring tables

Manual clamp elements HK

The HK series is a manually activated clamping element.

Contact profiles press synchronously on the free surfaces of the profile rail by using the freely adjustable clamping lever.

The floating mounted contact profiles guarantee symmetrical introduction of force on the guide rail.

Special characteristics of the clamping elements HK:

- Simple and safe design
- Floating contact profile
- Precise positioning
- Holding force up to 2,000 N

Variants:

An additional adapter plate must be used depending on the height of the carriage (see pg. MR-22, tab. 22).

Activation:

Standard with hand lever, further activation options, e.g. using DIN 912 screw, possible on request.

Pneumatic clamp elements MK / MKS

The patented wedge slide gear puts into effect high holding forces. The pressurised medium moves the wedge slide gear in the longitudinal direction.

Contact profiles press with high force on the free surfaces of the profile rail by the resulting cross movement. MK is an element that closes with pneumatic pressure. The custom design MKS closes with spring energy storage and is opened via air impingement.

Special characteristics of clamp elements MK / MKS:

- Short shape
- High clamp forces
- Precise positioning
- High axial and horizontal rigidity

Areas of application of MK:

- Positioning axes
- Setting vertical axes
- Positioning lifting gear
- Clamping machine tables

Variants:

An additional adapter plate must be used depending on the height of the carriage (see pg. MR-22, tab. 23).

Connection options:

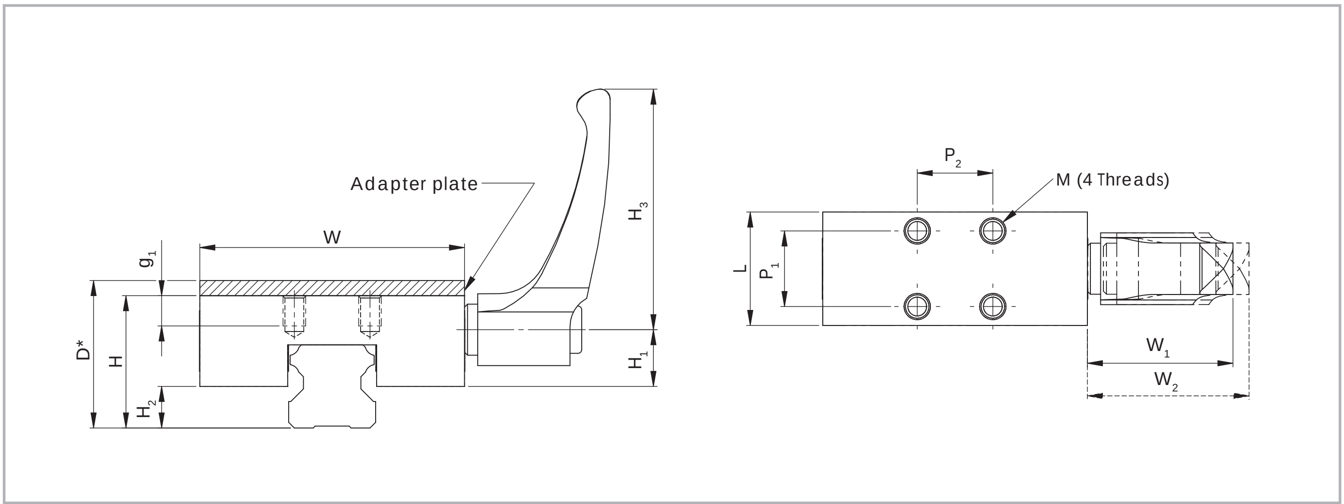
The basic MK / MKS series versions are equipped with air connections on both sides, i.e. the factory default settings air connections and the ventilation filter can be exchanged to the opposite side surfaces.

Custom design MKS opens with impingement of an air pressure of > 5.5 bar.

Areas of application of MKS:

- Clamping with drop in pressure (Normally Open)
- Clamping without power required (Normally Closed)

Manual clamp HK



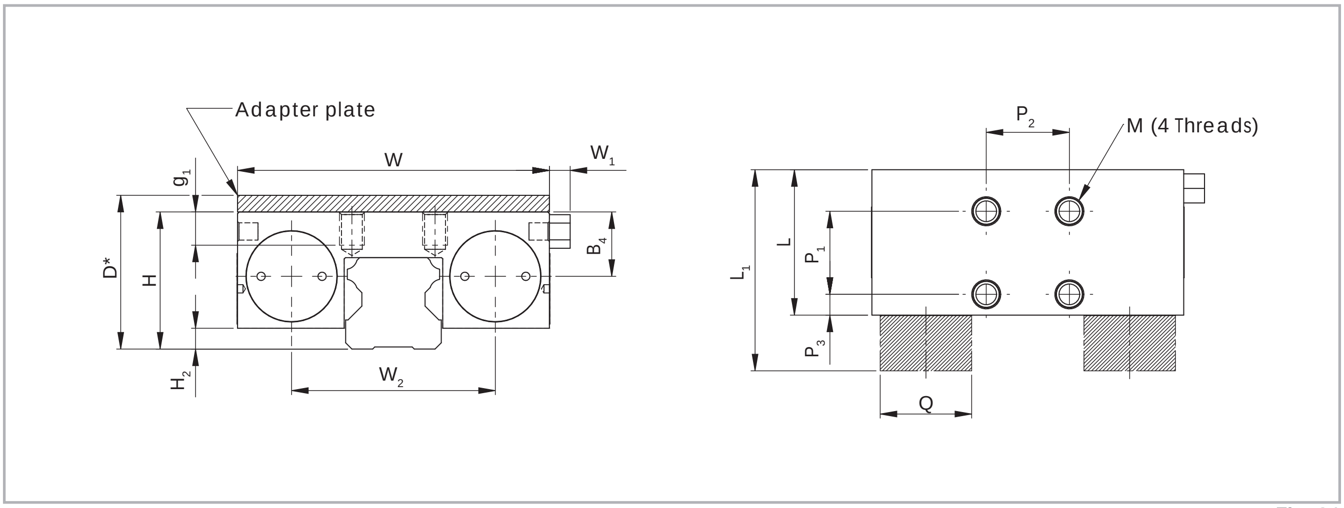
* Changed dimensions when using the adapter plate, see pg. MR-22, tab. 22

Fig. 30

Type	Size	Holding force [N]	Tightening torque [Nm]	Dimensions [mm]											M
				H	H_1	H_2	H_3	W	W_1	W_2	L	P_1	P_2	g_1	
HK1501A	15	1200	5	24	12.5	6.5	44	47	30.5	33.5	25	17	17	5	M4
HK2006A	20			28	17.5	5		60			24	15	15	6	M5
HK2006A				30		7									
HK2501A	25		7	36	15	12	63	70	38.5	41.5	30	20	20	8	M6
HK2514A				33		11.5									
HK3001A	30	2000	15	42	21.5	12	78	90	46.5	50.5	39	22	22		
HK3501A	35			48		16		100				24	24	10	M8
HK4501A	45			60	26.5	18		120			44	26	26	14	M10
HK5501A	55		22	70	31	21	95	140	56.5	61.5	49	30	30	16	M14

Tab. 20

Pneumatic clamp MK / MKS



* Changed dimensions when using the adapter plate, see pg. MR-22, tab. 23

Fig. 31

Type	Size	MK holding force [N]	MKS holding force [N]	Dimensions [mm]													M
				H	H_2	W	W_1	W_2	B_4	L_1*	L	P_1	P_2	P_3	Q [∅]	g_1	
MK / MKS 1501A	15	650	400	24	2.5	55	6	34	12	58	39	15	15	15.5	16	4.5	M4
MK / MKS 2001A	20	1000	600	28		66		43	14.4	61		20	20	5	20	5	M5
MK / MKS 2501A	25	1200	750	36	8	75	5	49	15.5	56	35				22	8	M6
MK / MKS 3001A	30	1750	1050	42	7	90		58	20.5	68	39	22	22	8.5	25	10	M8
MK / MKS 3501A	35	2000	1250	48	11.5	100		68		67		24	24	7.5	28		
MK / MKS 4501A	45	2250	1450	60	16.5	120		78.8	26.8	82	49	26	26	11.5	30	15	M10
MK / MKS 5501A	55			70	21.5	128		87	30.5			30	30	9.5		18	

* Only for model MKS

Tab. 21

Adapter plate

For HK clamps

Clamp	Size	Slider type	Adapter plate	D
HK1501A	15	MRS, MRT...W, MRT...SW	-	24
		MRS...W	PHK 15-4	28
HK2006A	20	MRT...S, MRT...W, MRT...SW	-	28
		MRS, MRS...L, MRS...W, MRS...LW	-	30
HK2514A	25	MRT, MRT...S, MRT...W, MRT...SW, MRT...LW	-	33
HK2501A		MRS, MRS...L,	-	36
		MRS...W, MRS...LW	PHK 25-4	40
HK3001A	30	MRS, MRS...L, MRT...W, MRT...SW, MRT...LW	-	42
		MRS...W, MRS...LW	PHK 30-3	45
HK3501A	35	MRS, MRS...L, MRT...W, MRT...SW, MRT...LW	-	48
		MRS...W, MRS...LW	PMK 35-7	55
HK4501A	45	MRS, MRS...L, MRT...W, MRT...LW	-	60
		MRS...W, MRS...LW	PHK 45-10	70
On request	55	MRT...W, MRT...LW	-	68
HK5501A		MRS, MRS...L	-	70
		MRS...W, MRS...LW	PHK 55-10	80

Tab. 22

For MK / MKS clamps

Clamp	Size	Slider type	Adapter plate	D
MK / MKS 1501A	15	MRS, MRT...W, MRT...SW	-	24
		MRS...W	PMK 15-4	28
MK / MKS 2001A	20	MRT...S, MRT...W, MRT...SW	-	28
		MRS, MRS...L, MRS...W, MRS...LW	PMK 20-2	30
On request	25	MRT, MRT...S, MRT...W, MRT...SW, MRT...LW	-	33
MK / MKS 2501A		MRS, MRS...L, MRZ	-	36
		MRS...W, MRS...LW	PMK 25-4	40
MK / MKS 3001A	30	MRS, MRS...L, MRT...W, MRT...SW, MRT...LW	-	42
		MRS...W, MRS...LW	PMK 30-3	45
MK / MKS 3501A	35	MRS, MRS...L, MRT...W, MRT...SW, MRT...LW	-	48
		MRS...W, MRS...LW	PMK 35-7	55
MK / MKS 4501A	45	MRS, MRS...L, MRT...W, MRT...LW	-	60
		MRS...W, MRS...LW	PMK 45-10	70
On request	55	MRT...W, MRT...LW	-	68
MK / MKS 5501A		MRS, MRS...L	-	70
		MRS...W, MRS...LW	PMK 55-10	80

Tab. 23

Technical instructions

Mono Rail precision

Precision means the guide accuracy or the maximal deviation of the carriage based on the side and support surfaces during the movement along the rails.

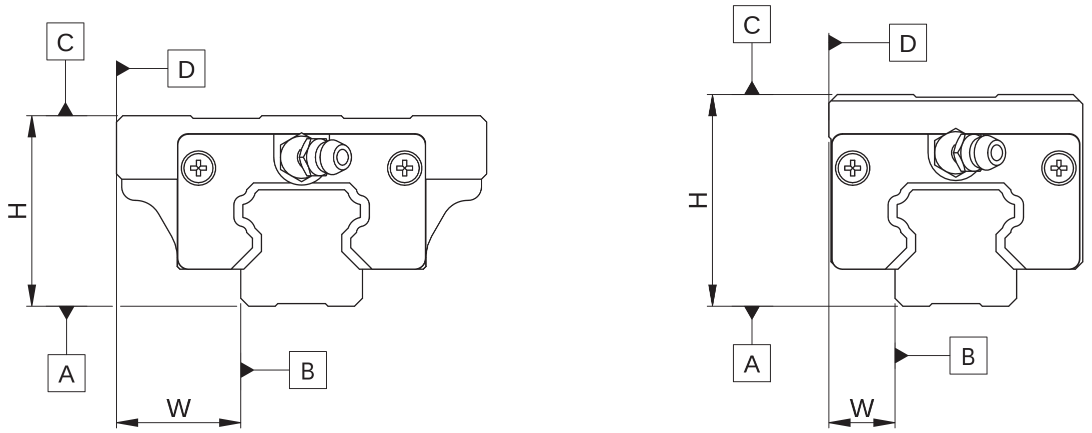


Fig. 32

	Precision class [mm]		
	Normal [N]	High [H]	Precise [P]
Height tolerance H Side tolerance W	± 0.1	± 0.04	0 to -0.04
Guide accuracy of raceway C based on surface A	ΔC see graph in fig. 33		
Guide accuracy of raceway D based on surface B	ΔD see graph in fig. 33		

Tab. 24

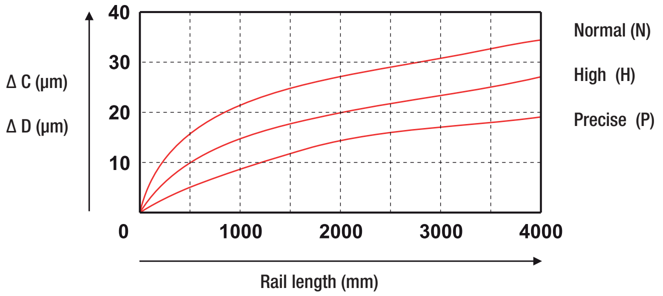


Fig. 33

Miniature Mono Rail precision

There are three precision classes to choose from for the Mono Rail Miniature profile rails: Classes P, H, and N are manufactured.

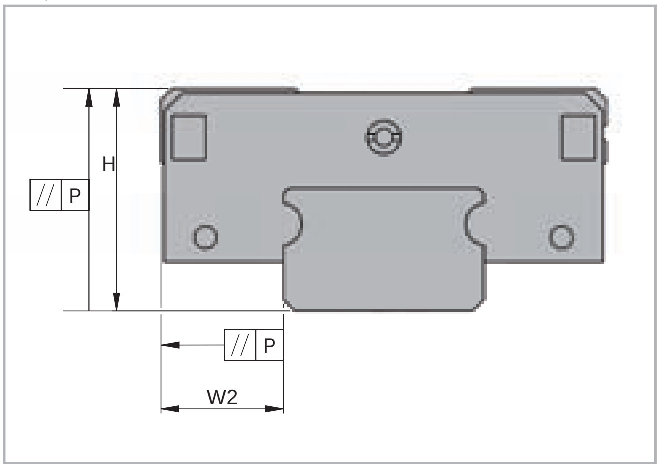


Fig. 34

	Precision classes	Precision P [µm]	High H [µm]	Normal N [µm]
H	Tolerance of height H	± 10	± 20	± 40
ΔH	Permissible height difference of different carriages at the same position on the rail	7	15	25
W_2	Tolerance of width W_2	± 15	± 25	± 40
ΔW_2	Permissible width difference of different carriages at the same position on the rail	10	20	30

Tab. 25

Running accuracy

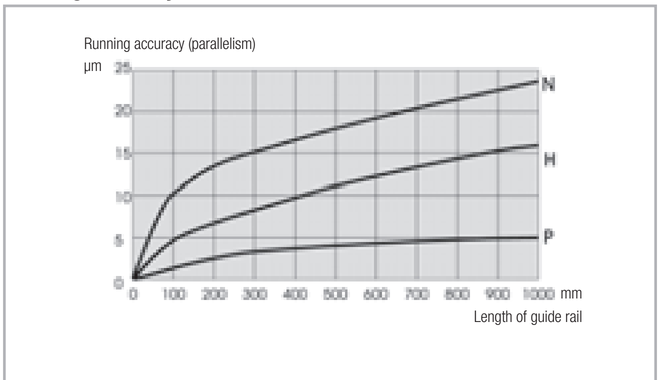


Fig. 35

Mono Rail Radial clearance / preload

Radial clearance describes the value for the radial movement of the carriage at a constant vertical load, while the carriage moves in longitudinal direction.

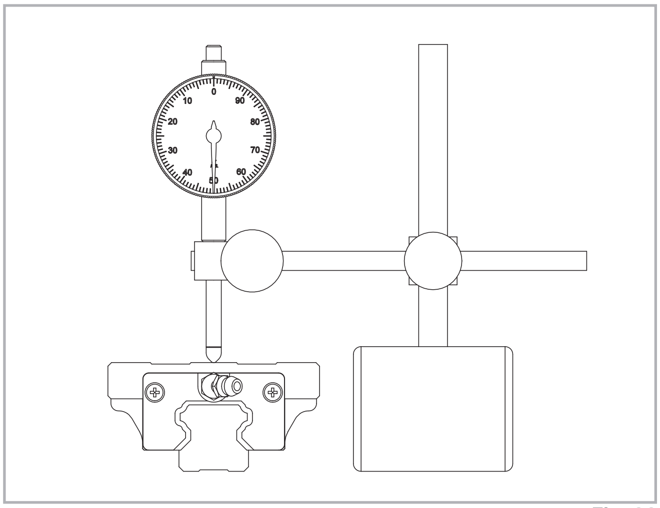


Fig. 36

Preload is defined as an effective load on the rolling element in the interior of the carriage in order to remove an existing clearance or to increase the rigidity.

The Mono Rail profile rails are available in the four different preload classes G1, K0, K1 and K2 (see tab. 26). The preload influences the rigidity, precision and torque resistance and also affects the service life and displacement force.

The radial clearance for the respective preload classes are listed in table 20.

Degree of preload	Preload class	Preload
With clearance	G1	0
No clearance	K0	0
Small preload	K1	0,02 x C*
Average preload	K2	0,05 x C*

* C is the dynamic load capacity, see pg. MR-9, tab. 1f

Tab. 26

Size	Radial clearance of the preload classes [µm]			
	G1 Impact free movement, compensation of assembly tolerances	K0 Impact free and easy movement	K1 Small moments, one rail application, low vibrations	K2 Average vibrations and moments, light impacts
15	+4 to +14	-4 to +4	-12 to -4	-20 to -12
20	+5 to +15	-5 to +5	-14 to -5	-23 to -14
25	+6 to +16	-6 to +6	-16 to -6	-26 to -16
30	+7 to +17	-7 to +7	-19 to -7	-31 to -19
35	+8 to +18	-8 to +8	-22 to -8	-35 to -22
45	+10 to +20	-10 to +10	-25 to -10	-40 to -25
55	+12 to +22	-12 to +12	-29 to -12	-46 to -29

Tab. 27

Miniature Mono Rail Preload

The Mono Rail Miniature profile rails are available in the three different preload classes V_0, V_S and V_1 (see table 28). The preload influences the rigidity, precision and torque resistance and also affects the product service life and displacement force.

Type	Preload classes		
	Small clearance Very quiet running **V_0** **[µm]**	**Standard** Very quiet and precise running **V_S** **[µm]**	**Small preload** High rigidity, vibration reduced, high precision, good load balance **V_1** **[µm]**
MR07	+4 to +2	+2 to 0	0 to -3
MR09	+4 to +2	+2 to 0	0 to -4
MR12	+5 to +2	+2 to 0	0 to -5
MR15	+6 to +3	+3 to 0	0 to -6

Tab. 28

Anticorrosive protection

There are numerous application-specific surface treatments available for profile rails of the Mono Rail product family, for example, black coating (X), hard chrome plating (XC) or nickel plating (NIC), also with FDA-approval for use in the food industry. For more information please contact Application Technology. All linear rails of the Miniature Mono Rail series are made of stain less steel.

Mono Rail lubrication

Profile rails must generally be lubricated before commissioning. They can be lubricated with oil or grease.
The correct lubricant selection has a large influence on the service life and the function of the profile rail, insufficient lubrication and tribocorrosion can ultimately lead to total failure.

As well as reducing friction and wear, lubricants also serve as sealant, noise damper and corrosion protection for the linear guide. Different lubricants for special applications are available upon request.
Example: Lubricant with FDA approval for use in the food industry.
For more information please contact Application Technology.

Important instructions for lubrication

- Mono Rail profile rails must be lubricated for operation.
- The carriage must be moved back and forth during lubrication.
- The lubricant is inserted through a lubrication nipple.
- There should be a thin film of lubricant on the rail surface at all times.
- Please inform us in advance if the guides are to be used in acid or base containing environments or in clean rooms.
- Primary lubricated systems have an increased displacement resistance.
- Please contact Application Technology if the oil lubrication is used for vertical use.
- If the stroke is < 2 or > 15 times the carriage length, the lubrication intervals should be shortened.

Grease lubrication

We recommend the use of a lithium emulsified lubricant NLGI Class 2 for lubrication.

Oil lubrication

We recommend a synthetic oil for operating temperatures between 0 °C and +70 °C. For application-specific custom lubrication, please contact Application Technology.

Relubrication

- Relubrication of the system must be done before the lubricant used is dirty or shows discolouration.
- Relubrication is performed at operating temperature. The carriage must be moved back and forth during relubrication.
- If the stroke is < 2 or > 15 times the carriage length, the lubrication intervals should be more often.

Lubrication intervals

Operating speed, stroke length and ambient conditions influence the selection of time between lubrication intervals. Establishing a safe lubrication interval is based exclusively on the experienced practiced values determined on site. However, a lubrication interval should not be longer than one year in any case.

Miniature Mono Rail lubrication

Function

The contact points between ball and track are separated from each other by a microscopically thin oil film. The lubrication effects:

- Reduction of friction
- Reduction of wear
- Corrosion protection
- Better thermal distribution and therefore increased of service life

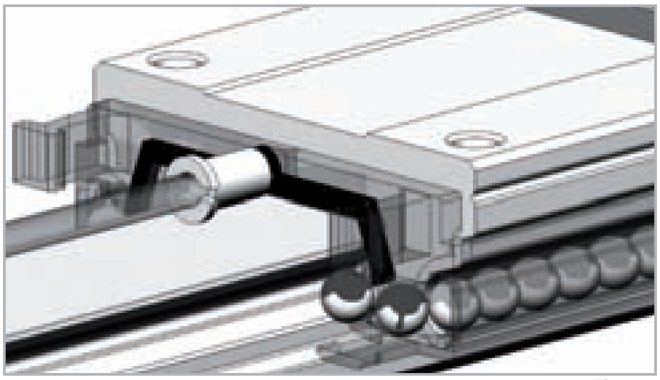


Fig. 37

Important instructions for lubrication

- Mono Rail Miniature profile rails must be lubricated for operation.
- The carriage must be moved back and forth during lubrication.
- The lubricant can also be applied to the tracks.
- The lubricant can be injected into the lubrication holes on both sides of the carriage.
- There should be a thin film of lubricant on the rail surface at all times.
- Please inform us in advance if the guides are to be used in acid or base containing environments or in clean rooms.
- Please contact the sales department if the oil lubrication should be used for vertical use of the guide.
- If the stroke is < 2 or > 15 times the carriage length, the lubrication intervals should be more often.

Type	First lubrication [cm^3]
MR07MN	0.12
MR09MN	0.23
MR12MN	0.41
MR15MN	0.78

Tab. 29

Type	First lubrication [cm^3]
MR09WN	0.30
MR12WN	0.52
MR15WN	0.87

Tab. 30

Grease lubrication

When using grease lubrication, we recommend synthetic-oil based lithium grease with a viscosity according to ISO VG 32 to ISO VG 100.

Oil lubrication

We recommend CLP or CGLP synthetic oil conforming to DIN 51517 or HLP to DIN 51524 and a viscosity range conforming to ISO VG 32 to ISO VG 100 for operating temperatures between 0 °C and +70 °C. We recommend a viscosity according to ISO VG 10 for use at low temperatures. For application-specific special lubrication please contact the Rollon Application engineering department.

ISO VG 10 ≙ Viscosity of 10 $\frac{mm^2}{s}$ at 40 °C

ISO VG 32 ≙ Viscosity of 32 $\frac{mm^2}{s}$ at 40 °C

ISO VG 100 ≙ Viscosity of 100 $\frac{mm^2}{s}$ at 40 °C

Fig. 38

Lubrication intervals

Operating speed, stroke length and ambient conditions influence the selection of time between lubrication intervals. Establishing a safe lubrication interval is based exclusively on the experienced practiced values determined on site. However, a lubrication interval should not be longer than one year in any case.

Relubrication

- Relubrication of the system must be done before the lubricant used is dirty or shows discolouration.
- An application of approx. 50 % of the quantity used for first lubrication is sufficient for relubrication (see tab. 31).
- Relubrication is performed at operating temperature.
  During relubrication, the carriage should be moved back and forth.
- If the stroke is < 2 or > 15 times the carriage length, the lubrication intervals should be more often.

Initial lubrication and relubrication
Self-lubricating

The carriages of the following sizes have a self-lubrication element to extend lubrication intervals.

Size	Initial lubrication grease [cm³]	Relubrication [cm³]	Initial lubrication oil [cm³]
15	1.3	1.1	1.5
20	2.3	2	2.5
25	2.8	2.5	3.5
30	3.5	3	4.5
55	5.5	4	5.5

The given lubrication quantities apply to preload K1 and speeds ≤ 1 m/s

Tab. 31

Not self-lubricating

The carriages of sizes 35 and 45 are not self-lubricating due to the design.

Size	Initial lubrication grease [cm³]	Relubrication [cm³]	Initial lubrication oil [cm³]
35	3.5	3	3.5
45	4.5	3.5	4.5

The given lubrication quantities apply to preload K1 and speeds ≤ 1 m/s

Tab. 32

Mono Rail lubrication nipple

The following lubrication nipples are part of the standard delivery:

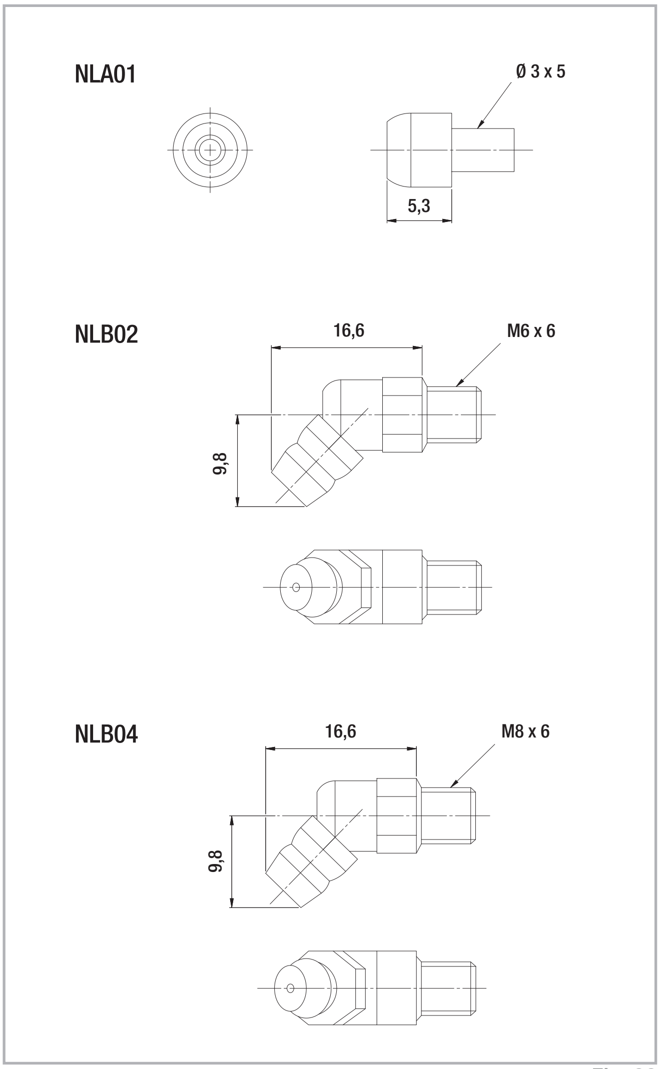


Fig. 39

Lubrication nipple	Size
NLA01	15
NLB02	20
	25
	30
	35
NLB04	45
	55

Tab. 33

Other lubrication nipples, such as lubrication adapters with hose inlet or with quick-coupling, are available on request. Please observe that the thread lengths (see fig. 39) can be changed when using additional deflectors and end seals. For more information please contact Application Technology.

Friction / displacement resistance

Mono Rail profile rails have a low friction characteristic and thus low displacement resistance. The low start-up friction (breakaway force) is almost identical to the moving friction (running resistance).

The displacement resistance is dependent upon several factors:

- Friction of the sealing system
- Friction of the balls with each other
- Friction between balls and redirection
- Rolling resistance of the balls in the running grooves
- Resistance of lubricant in the carriage
- Resistance by contamination in the lubricant
- Preload for increase of rigidity
- Moment load

Resistance of the seals

Type	f [N]
MRS15	0.15
MRS20	0.2
MRS25	0.35
MRS30	0.7
MRS35	0.8
MRS45	0.9
MCS55	1.0

Tab. 34

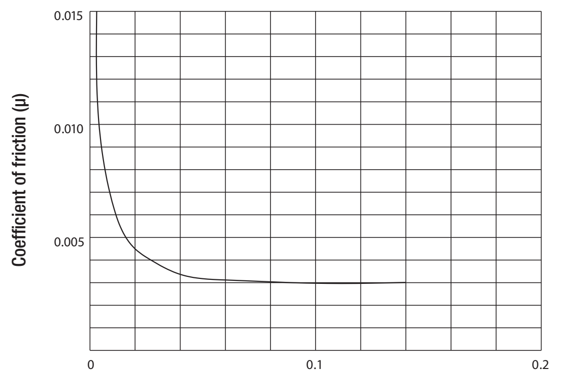


Fig. 40

Displacement resistance

The following formula is used for general approximate calculation of the displacement resistance. Please note that the level of preload or the viscosity of the lubricant used can also influence the displacement resistance.

$F_m = \mu \cdot F + f$	F_m = Displacement resistance (N) F = Load (N) μ = Coefficient of friction f = Resistance of the seals (N)

Fig. 41

Mono Rail profile rails have a coefficient of friction of approx.
$\mu = 0.002 - 0.003$.

Mono Rail loading

The given static load capacity for each carriage represents the maximum permissible load value, which if exceeded causes permanent deformations of the raceways and adverse effects of the running properties.
Checking the load must be done as follows:

- through determination of the simultaneously occurring forces and moments for each carriage
- by comparison of these values with the corresponding load capacities.

The ratio of the actual load to maximum permissible load may be as large as the reciprocal of the accepted safety factor, S_0, at the most.

$$\frac{P_{0rad}}{C_{0rad}} \leq \frac{1}{S_0} \qquad \frac{P_{0ax}}{C_{0ax}} \leq \frac{1}{S_0} \qquad \frac{M_1}{M_x} \leq \frac{1}{S_0} \qquad \frac{M_2}{M_y} \leq \frac{1}{S_0} \qquad \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

Fig. 42

The above formulas are valid for a single load case.
If two or more forces are acting simultaneously, please check the following formula:

$$\frac{P_{0rad}}{C_{0rad}} + \frac{P_{0ax}}{C_{0ax}} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

P_{0rad} = effective radial load (N)
C_{0rad} = permissible radial load (N)
P_{0ax} = effective axial load (N)
C_{0ax} = permissible axial load (N)
M_1, M_2, M_3 = external moments (Nm)
M_x, M_y, M_z = maximum permissible moments in the different loading directions (Nm)

Fig. 43

Safety factor

Operating conditions	S_0
Normal operation	1 ~ 2
Loading with vibration or shock effect	2 ~ 3
Loading with strong vibration or impacts	≥ 3

Tab. 35

The safety factor S_0 can lie on the lower given limit if the occurring forces can be determined with sufficient precision. If shock and vibration are present, the higher value should be selected. For dynamic applications higher safety is required. Please contact the Application Engineering Department.

Miniature Mono Rail loading

Static load (P_0) and static moment (M_0)

Permissible static load

The permissible static load of the Mono Rail Miniature profile rail is limited by:

- Static load of each linear guide
- Permissible load of the fixing screws
- Permissible load of all components used in the surrounding construction
- Static safety factor, which is required by the corresponding application

The equivalent static load and the static moment are the largest load, or the largest moment, which are calculated based on formulas 3 and 4.

Static load capacity C_0

The static load capacity C_0 of ball recirculating guides is defined according to DIN 636, Part 2 as the only load which gives a Hertzian stress of 4,200 MPa with the existing lubrication between track and balls in the center of the highest loaded contact surface.

Note: In the loading center, there is a permanent deformation of approx 0.01 % of the ball diameter under this load (according to DIN 636, Part 2).

Static safety factor S_0

When observing the static safety factor S_0 the Mono Rail Miniature profile rails allow a permissible operation and high running precision as is required for each application. Calculation of the static safety factor S_0: see fig. 44

S_0 static safety factor

C_0 static load capacity in loading direction (N)

P_0 equivalent static load (N)

M_0 static moment in loading direction (Nm)

M equivalent static moment in loading direction (Nm)

		Operating conditions	S_0
$S_0 = C_0 / P_0$	Formula 1	Normal operation	1 ~ 2
$S_0 = M_0 / M$	Formula 2	Loading with vibration or shock effect	2 ~ 3
$P_0 = F_{max}$	Formula 3	High precision and smooth running	≥ 3
$M_0 = M_{max}$	Formula 4		

Fig. 44

Dynamic load capacity C

If the dynamic loads work vertically on the last zones with equal size and direction, the calculated service life of the linear guide can theoretically reach 100 km piston travel (as per DIN 636, Part 2).

Combined loads in combination with moments

If both loads and moments work on the profile rails, the equivalent dynamic load is calculated with formula 9. According to DIN 636, Part 1, the equivalent load should not exceed ½ C.

Equivalent dynamic load and speed

With changing load and speed, these must be considered individually since each parameter helps determine the service life.

Equivalent dynamic load

If only the load changes, the equivalent dynamic load can be calculated with formula 5.

Equivalent speed

If only the speed changes, the equivalent speed is calculated with formula 6. If speed and load change, the equivalent dynamic load is calculated with formula 7.

Combined dynamic load

With combined exterior load in an arbitrary angle, the equivalent dynamic load is calculated with formula 8.

$$P = \sqrt[3]{\frac{q_1 \cdot F_1^3 + q_2 \cdot F_2^3 + \cdots q_n \cdot F_n^3}{100}}$$ Formula 5

$$\overline{v} = \frac{q_1 \cdot v_1 + q_2 \cdot v_2 + \cdots q_n \cdot v_n}{100}$$ Formula 6

$$P = \sqrt[3]{\frac{q_1 \cdot v_1 \cdot F_1^3 + q_2 \cdot v_2 \cdot F_2^3 + \cdots q_n \cdot v_n \cdot F_n^3}{100}}$$ Formula 7

$$P = |F_X| + |F_Y|$$ Formula 8

$$P = |F_X| + |F_Y| + \left(\frac{|M_1|}{M_x} + \frac{|M_2|}{M_y} + \frac{|M_3|}{M_z}\right) \cdot C_0$$ Formula 9

P	= equivalent dynamic load (N)
q	= stroke (in %)
F_1	= individual load levels (N)
v	= average speed (m/min)
$\overline{v}$	= individual speed levels (m/min)
F	= external dynamic load (N)
F_Y	= external dynamic load – vertical (N)
F_X	= external dynamic load – horizontal (N)
C_0	= static load capacity (N)
M_1, M_2, M_3	= external moments (Nm)
M_x, M_y, M_z	= maximum permissible moments in the different loading directions (Nm)

Fig. 45

Mono Rail service life

Calculation of service life:

The dynamic load capacity C is a conventional variable used for calculating the service life. This load corresponds to a nominal service life of 50 km. The relationship between calculated service life L_{km} (in km), dynamic load capacity C (in N) and equivalent load P (in N) is given in the formula to the right:

$$L_{km} = \left(\frac{C}{P} \cdot \frac{f_c}{f_i}\right)^3 \cdot 50\ km$$

f_c = contact factor
f_i = application coefficient

Fig. 46

The equivalent load P corresponds in its effects to the sum of the forces and moments working simultaneously on a slider. If these different load components are known, P results from the equation to the right:

$$P = |P_{0ax}| + |P_{0rad}| + \left(\frac{|M_1|}{M_x} + \frac{|M_2|}{M_y} + \frac{|M_3|}{M_z}\right) \cdot C_{0rad}$$

Fig. 47

Contact factor f_c

The contact factor f_c refers to applications in which several carriages pass the same rail section. If two or more carriages are moved over the same point on a rail, the static and dynamic loading values must be multiplied with the numbers from the table below:

Number of carriages	1	2	3	4	5
f_c	1	0.81	0.72	0.66	0.61

Tab. 36

Application coefficient f_i

The application coefficient f_i can be understood as the dynamic safety factor. Refer to the table below for the values:

Operational conditions	Speed	f_i
Neither external impacts nor vibrations	Low speed V ≤ 15 m/min.	1 - 1.5
Light impacts or vibrations	Average speed 15 < V ≤ 60 m/min.	1.5 - 2
Average and high external impacts or vibrations	High speed V > 60 m/min.	2 - 3.5

Tab. 37

Miniature Mono Rail service life

An example of a profile rail or a lot of identical profile rails under the same running conditions, which use ordinary materials with normal manufacturer‘s quality and operating conditions, can reach 90 % of the calculated service life (as per DIN 636 Part 2). By taking 50 km traverse as a basis, the dynamic load capacity is usually 20 % over the values as per DIN. The relationship between the two load capacities can be seen from formulas 10 and 11.

Calculation of service life

Formulas 12 and 13 are used for calculating the service life, if equivalent dynamic load and average speed are constant.

$$C_{(50)} = 1,26 \cdot C_{(100)} \qquad \text{Formula 10}$$

$$C_{(100)} = 0,79 \cdot C_{(50)} \qquad \text{Formula 11}$$

$$L = \left(\frac{C_{100}}{P}\right)^3 \cdot 10^5 \qquad \text{Formula 12}$$

$$L_h = \frac{L}{2 \cdot s \cdot n \cdot 60} = \frac{L}{V_m} \cdot \left(\frac{C_{100}}{P}\right)^3 \qquad \text{Formula 13}$$

L = service life based on 100,000 (m)
L_h = service life (h)
C = dynamic load capacity (N)
P = equivalent dynamic load (N)
S = stroke length (m)
n = stroke frequency (min $^{-1}$)
V_m = average speed (m/min)

Fig. 48

Mono Rail installation instructions

The given radii and shoulder heights in the table must be observed when assembling rails and carriages on the stop edges to ensure perfect seating of carriages or raceways.

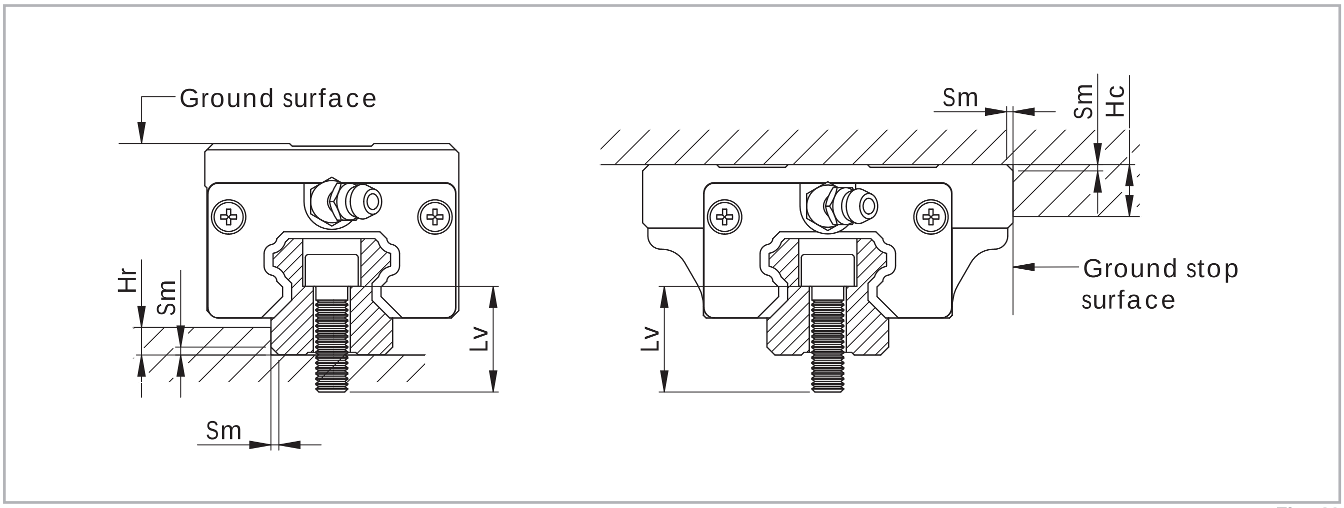


Fig. 49

Size	Maximum level of incline Sm [mm]	Maximum height of rail shoulder Hr [mm]	Maximum height of rail shoulder when using the side seal Hr* [mm]	Maximum height of slider shoulder Hc [mm]	Required bolt lengths (rails) Lv [mm]
15	0.8	4	1.9	5	M4 x 16
20		4.5	2.4	6	M5 x 20
25	1.2	6	3.9	7	M6 x 25
30		8	5.9	8	M8 x 30
35		8.5	6.6	9	
45	1.6	12	10.5	11	M12 x 40
55		13	-	12	M14 x 45

* For use of various seals, see pg. MR-16, fig. 24ff

Tab. 38

Assembly precision

The maximum permissible deviations of the rail surfaces for assembly are given in the following drawing (see fig. 50) and the table below (see tab. 39):

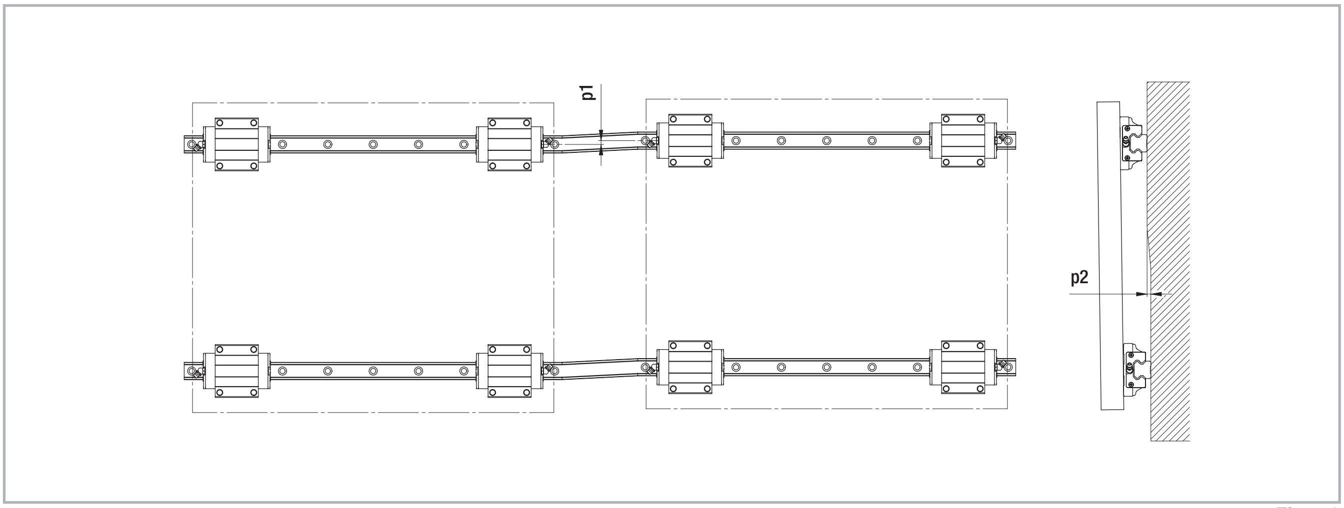


Fig. 50

<table>
<tr><th rowspan="2">Size</th><th colspan="4">Permissible tolerance for parallelism p1
[µm]</th><th colspan="4">Permissible tolerance for parallelism p2
[µm]</th></tr>
<tr><th>K2</th><th>K1</th><th>K0</th><th>G1</th><th>K2</th><th>K1</th><th>K0</th><th>G1</th></tr>
<tr><td>15</td><td>-</td><td>18</td><td rowspan="2">25</td><td rowspan="2">35</td><td>-</td><td rowspan="3">85</td><td rowspan="3">130</td><td rowspan="2">190</td></tr>
<tr><td>20</td><td>18</td><td>20</td><td>50</td></tr>
<tr><td>25</td><td>20</td><td>22</td><td>30</td><td>42</td><td>70</td><td>195</td></tr>
<tr><td>30</td><td>27</td><td>30</td><td>40</td><td>55</td><td>90</td><td>110</td><td>170</td><td>250</td></tr>
<tr><td>35</td><td>30</td><td>35</td><td>50</td><td>68</td><td>120</td><td>150</td><td>210</td><td>290</td></tr>
<tr><td>45</td><td>35</td><td>40</td><td>60</td><td>85</td><td>140</td><td>170</td><td>250</td><td>350</td></tr>
<tr><td>55</td><td>45</td><td>50</td><td>70</td><td>95</td><td>170</td><td>210</td><td>300</td><td>420</td></tr>
</table>

Tab. 39

The bolt sizes to be used and optimum tightening torques for rail assembly are listed in the table below (see tab. 40).

Bolt	Tightening torque M_t [Nm]		
	Steel	Cast iron	Aluminium
M4	4	3	2
M5	9	6	4
M6	14	9	7
M8	30	20	15
M12	118	78	59
M14	157	105	78

Tab. 40

Miniature Mono Rail installation instructions

Shoulder heights and radius of stop edges

Rounding of the stop edges of the surrounding construction should be made so as to avoid contact with the edges of the carriage and the rail. Please observe the following table with the information on the radius and height of the stop surfaces.

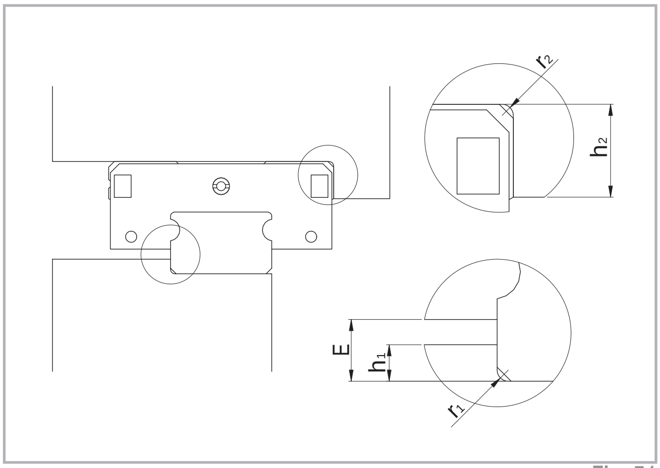


Fig. 51

Dimensions of the stop edges

Type	h_1 [mm]	r_{1max} [mm]	h_2 [mm]	r_{2max} [mm]	E [mm]
MR07M	1.2	0.3	2.8	0.3	1.5
MR09M	1.5	0.3	3	0.3	2.2
MR12M	2.5	0.5	4	0.5	3
MR15M	2.5	0.5	4.5	0.5	4

Tab. 41

Type	h_1 [mm]	r_{1max} [mm]	h_2 [mm]	r_{2max} [mm]	E [mm]
MR09W	2.5	0.3	3	0.3	3.4
MR12W	2.5	0.5	4	0.5	3.9
MR15W	2.5	0.5	4.5	0.5	4

Tab. 42

Geometric and positional accuracy of the mounting surfaces

Inaccuracies of the mounting surface negatively influence the running accuracy and reduce the service life of the Mono Rail Miniature profile rails. If the inaccuracies of the mounting surfaces exceed the values calculated using formulas 14, 15 and 16, the service life is shortened according to formulas 12 und 13.

Mounting surface

The mounting surface should be ground or milled very finely and have a surface roughness of R_a 1.6.

Reference surface

Rail: Both sides of the rails can be used as a reference surface without further marks.

Slider: The reference surface is located across from the running side identified with a notch mark.

Calculation of the positional accuracy

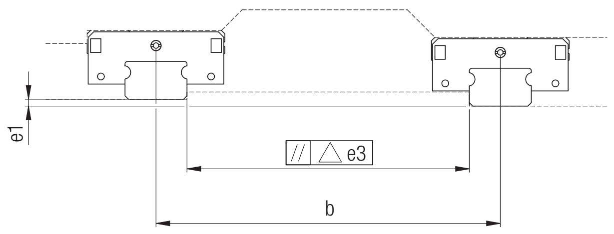


Fig. 52

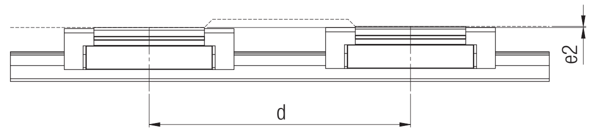


Fig. 53

e1 (mm) = b (mm) · f1 · 10^{-4}	Formula 14
e2 (mm) = d (mm) · f2 · 10^{-5}	Formula 15
e3 (mm) = f3 · 10^{-3}	Formula 16

Fig. 54

Type	V_0, V_S			V_1		
	f1	f2	f3	f1	f2	f3
MR07MN	5	11	4	3	10	3
MR09MN	5	11	6	4	10	4
MR12MN	6	13	8	4	12	6
MR15MN	7	11	12	5	10	8

Tab. 43

Type	V_0, V_S			V_1		
	f1	f2	f3	f1	f2	f3
MR09WN	2	7	6	2	5	4
MR12WN	3	8	8	2	5	5
MR15WN	2	9	11	1	6	7

Tab. 44

Tightening torque for fixing screws (Nm)

Screw quality 12.9	Steel	Cast iron	Non-ferrous metal
M2	0.6	0.4	0.3
M3	1.8	1.3	1
M4	4	2.5	2

Tab. 45

Composite rails

Guide rails longer than the one part maximum length (see Ordering key), are put together from two or more rails.
When putting guide rails together, be sure that the register marks shown in fig. 55 are positioning correctly.
These are fabricated axisymmetric for parallel application of composite guide rails, unless otherwise specified.

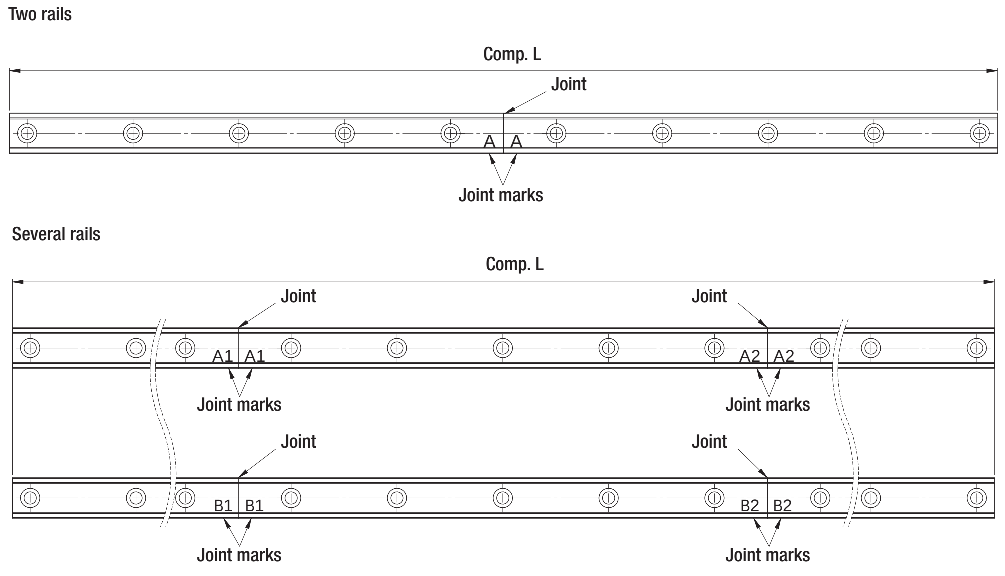


Fig. 55

Assembly process

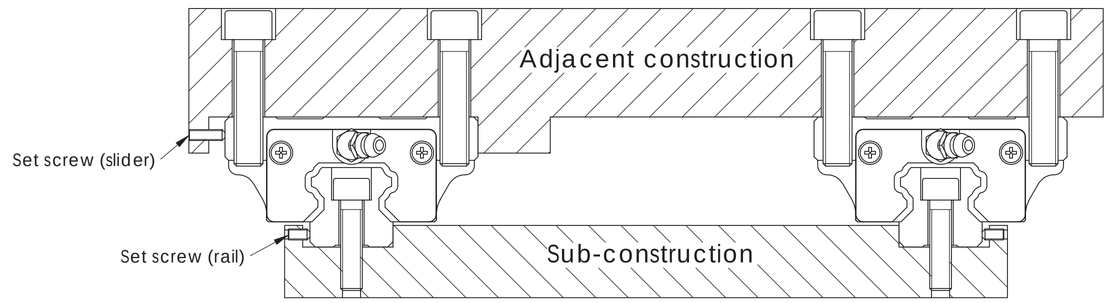


Fig. 56

Fixing guide rails:

(1) Whet the assembly surface with a whetstone and also remove burrs, unevenness and dirt (see fig. 57).

Note: All linear guides are preserved with anticorrosion oil at the factory. This protection must be removed before installation.

In doing so, please ensure that the surfaces are coated with low-viscosity oil for the purpose of further protection against corrosion.

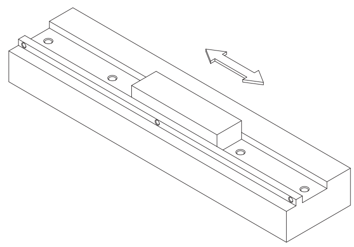


Fig. 57

(2) Carefully lay the guide rail on the assembly surface (see fig. 58) and slightly tighten the fixing screws so that the guide rail lightly touches the assembly surface (align the guide rail along the shoulder edge of the assembly surface, see fig. 59).

Note: The fixing screws of the linear guide must be clean. Check if the fixing holes are located in the correct place when you insert the bolts. A forced tightening of a fixing screw in an offset hole can negatively affect accuracy.

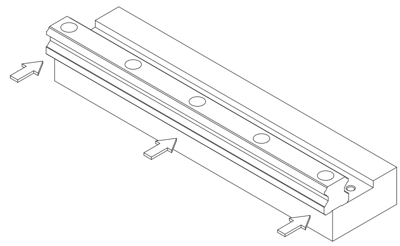


Fig. 58

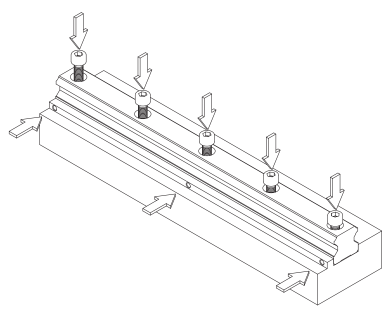


Fig. 59

(3) Tighten the thrust bolts on the guide rail until there is close contact on the side stop surface (see fig. 60).

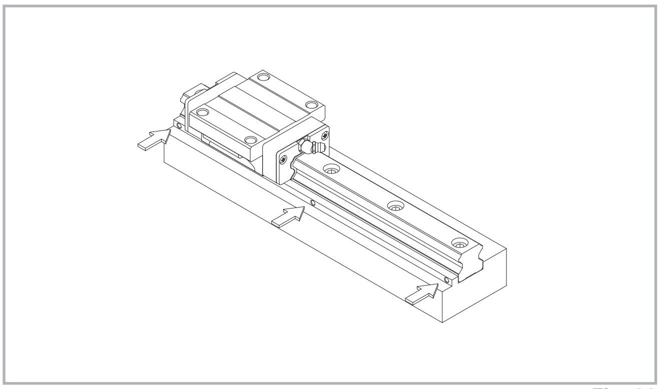


Fig. 60

(4) Tighten the fixing screws with a torque wrench to the prescribed torque (see pg. MR-38, tab. 40).
Note: For a high degree of accuracy, the fixing screws of the guide rail must be tightened in sequence outward from the centre (see fig. 61).
(5) Assemble the other rails in the same manner to complete the installation of the guide rails.

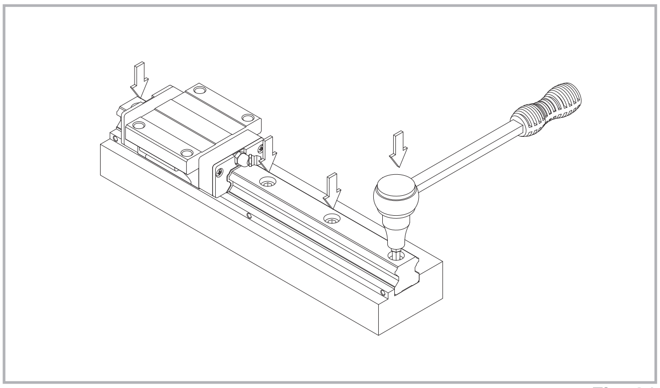


Fig. 61

Table assembly:
(6) Set the table carefully on the carriage and tighten the fixing screws only lightly.
(7) Press the carriage on the main guide side with the thrust bolts against the shoulder edge of the table and position the table.
(8) Tighten the fixing screws on the main side and the lateral side completely tight to finish the installation. Note:
To attach the table uniformly, tighten the fixing screws diagonally (see fig. 62). This method saves time when straightening the guide rail and makes the manufacture of positioning pins unnecessary, which considerably reduces assembly time.

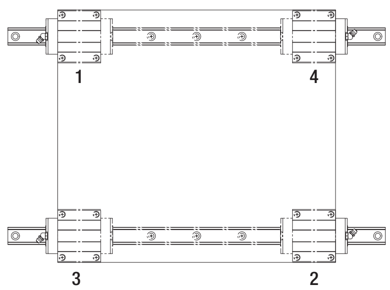


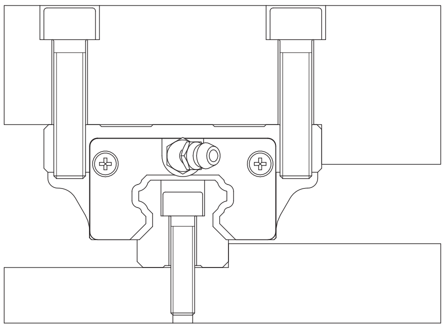
Fig. 62

Installation examples

The following drawings illustrate some assembly examples for rail/carriage combinations corresponding to the structure of various machine frames:

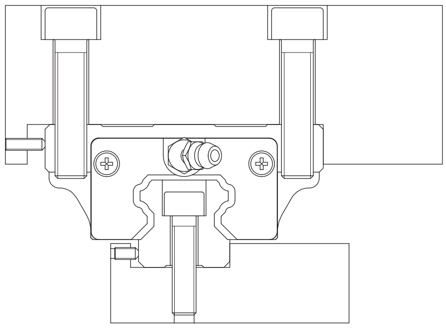
Example 1:

Assembly of carriage and rail on shoulder edges



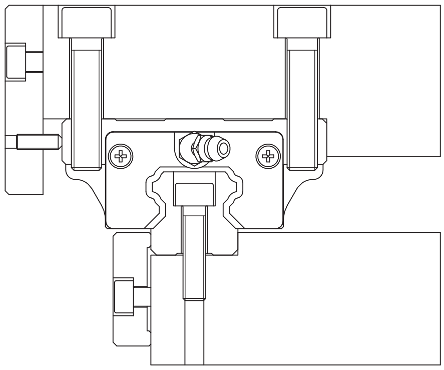
Example 2:

Securing carriage and rail using set screws



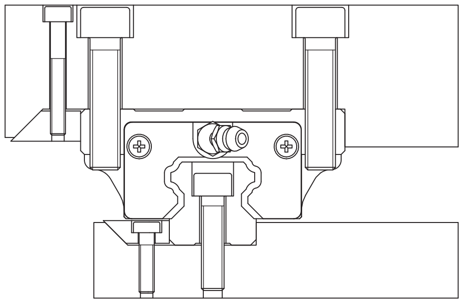
Example 3:

Securing carriage and rail using set pressure plates



Example 4:

Securing carriage and rail using taper gibs



Example 5:

Securing carriage and rail using bolts

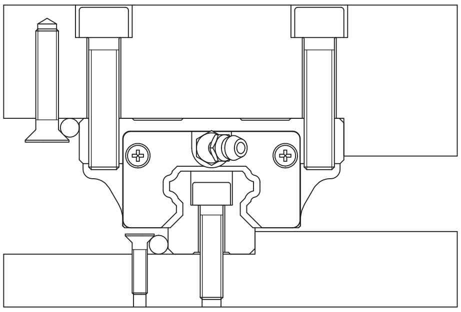


Fig. 63

Fold out ordering key

To make this product catalog as simple as possible for you to use, we have included the following easy-to-read chart.

Your advantages:

- Description and ordering designations easy to read at one glance
- Simplified selection of the correct product
- Links to detailed descriptions in the catalog

Ordering key

Rail / Mono Rail slider system

MRS30W	H	K1	A	HC	1	05960	F	T	HC

- **HC** – Surface coating for rail optional *see pg. MR-27, Anticorrosive protection*
- **T** – Joint processed rails optional *see pg. MR-41, Composite rails*
- **F** – Rails bolted from below, optional *see pg. MR-13*
- **05960** – Total rail length
- **1** – Number of carriages
- **HC** – Surface coating for carriage optional *see pg. MR-27, Anticorrosive protection*
- **A** – Seal variants *see pg. MR-16f*
- **K1** – Preload class *see pg. MR-25, tab. 26f*
- **H** – Precision class *see pg. MR-23, tab. 24*
- **MRS30W** – Type

Ordering example: MRS30W-H-K1-A-HC-1-05960F-T-HC

Rail composition: 1x3100+1x2860 (only for joint processed rails)

Hole pattern: 20-38x80-40//40-35x80-20 (please always indicate the hole pattern separately)

Notes on ordering: The rail lengths are always indicated as 5 digits with 0 prefixes

Rail

MRR	20	6860	N	F	T	HC

- **HC** – Surface coating for rail optional *see pg. MR-27, Anticorrosive protection*
- **T** – Joint processed rails optional *see pg. MR-41, Composite rails*
- **F** – Rails bolted from below, optional *see pg. MR-13*
- **N** – Precision class *see pg. MR-23, tab. 24*
- **6860** – Total rail length
- **20** – Size
- **MRR** – Rail type

Ordering example: MRR20-06850-NF-T-HC

Rail composition: 1x2920+1x3940 (only for joint processed rails)

Hole pattern: 10-48x60-30//30-65x60-10 (please always specify the hole pattern separately)

Notes on ordering: The rail lengths are always indicated as 5 digits with 0 prefixes

Carriage

MRS35	N	K0	A	HC	
				Surface coating for carriage optional	*see pg. MR-27, Anticorrosive protection*
			Seal variants	*see pg. MR-16f*	
		Preload class	*see pg. MR-25, tab. 26f*		
	Precision class	*see pg. MR-23, tab. 24*			
Type					

Ordering example: MRS35-N-K0-A-HC

Rail / Miniature Mono Rail slider system

MR	15	M	N	SS	2	V1	P	310	
								Rail length	*see tab. 47 and 48*
							Precision class	*see pg. MR-24, tab. 25*	
						Preload class	*see pg. MR-26, tab. 28*		
					Number of sliders on one rail				
				End seal					
			Slider type						
		Rail type	*see pg. MR-14, tab. 14 / pg. MR-15, tab. 15*						
	Rail width	*see pg. MR-14, tab. 14 / pg. MR-15, tab. 16*							
Product type									

Ordering example: MR15MN-SS-2-V1-P-310

Hole pattern: 15-7x40-15, see fig. 65, tab. 47 / fig. 66, tab. 48

Mono Rail hole pattern

Rail

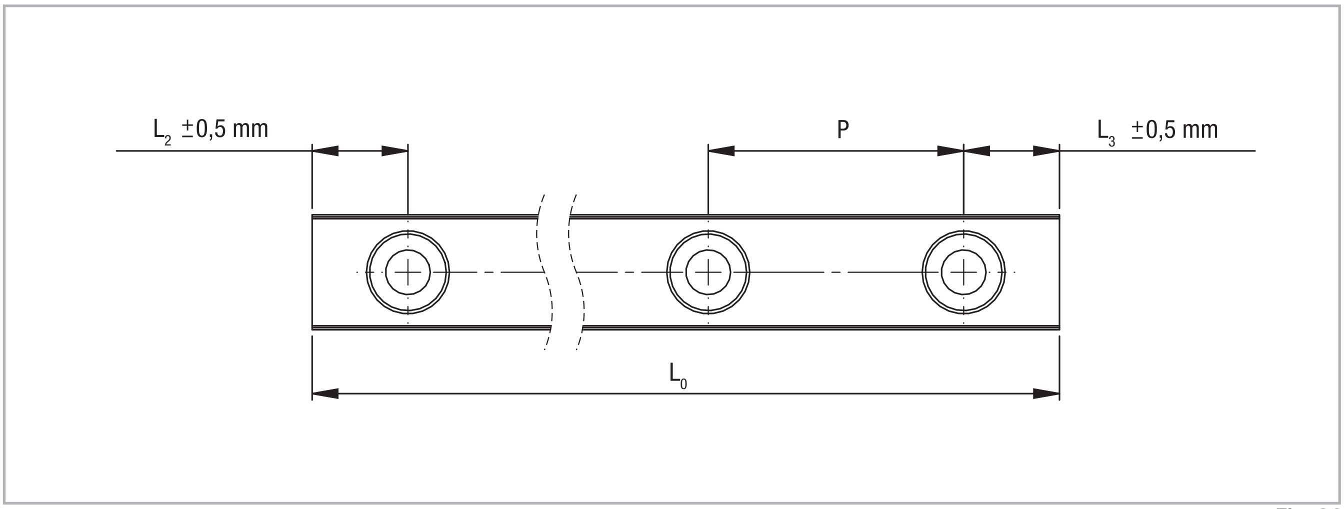


Fig. 64

<table>
<tr><th>Size</th><th>Hole pitch P
[mm]</th><th>L_{2min}, L_{3min}
[mm]</th><th>L_{2max}*, L_{3max}*
[mm]</th><th>L_{0max}
[mm]</th></tr>
<tr><td>15</td><td rowspan="3">60</td><td rowspan="3">7</td><td rowspan="5">20</td><td rowspan="3">4000</td></tr>
<tr><td>20</td></tr>
<tr><td>25</td></tr>
<tr><td>30</td><td rowspan="2">80</td><td rowspan="2">8.5</td><td rowspan="2">3960</td></tr>
<tr><td>35</td></tr>
<tr><td>45</td><td>105</td><td>11.5</td><td>22.5</td><td>3930</td></tr>
<tr><td>55</td><td>120</td><td>13</td><td>30</td><td>3900</td></tr>
</table>

* Only applies when using max. rail lengths

Tab. 46

Miniature Mono Rail hole pattern

Standard width

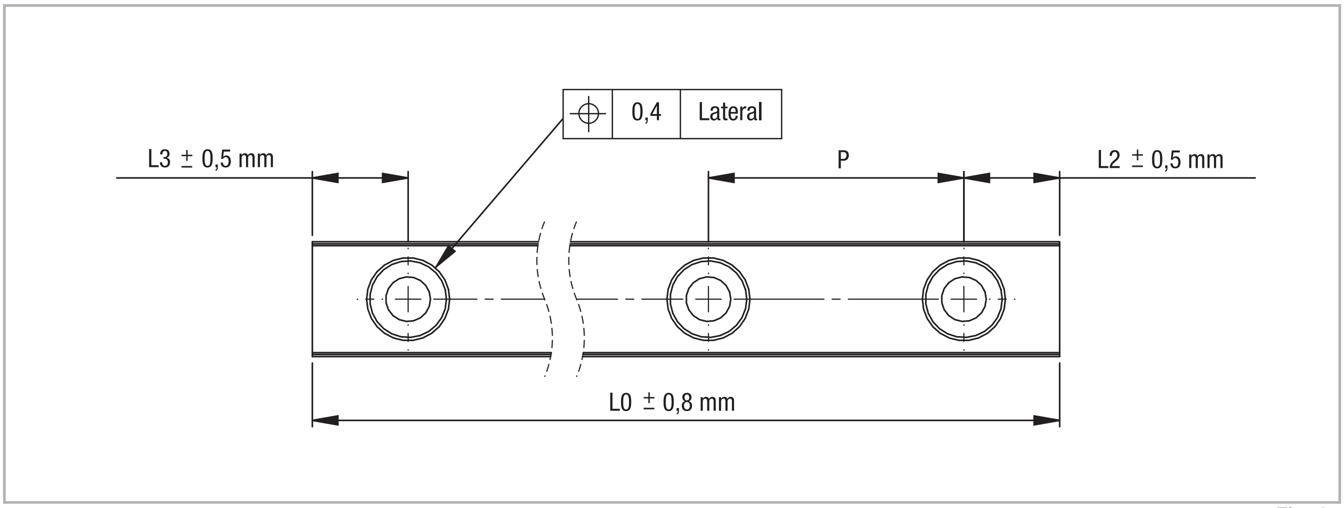


Fig. 65

Size	L_{min} [mm]	Hole pitch P [mm]	L_2, L_{3min} [mm]	L_2, L_{3max} * [mm]	L_{max} [mm]
7	40	15	3	10	1000
9	55	20	4	15	
12	70	25	4	20	
15	70	40	4	35	

* does not apply to minimum (L_{min}) and maximum rail length (L_{max})

Tab. 47

Large width

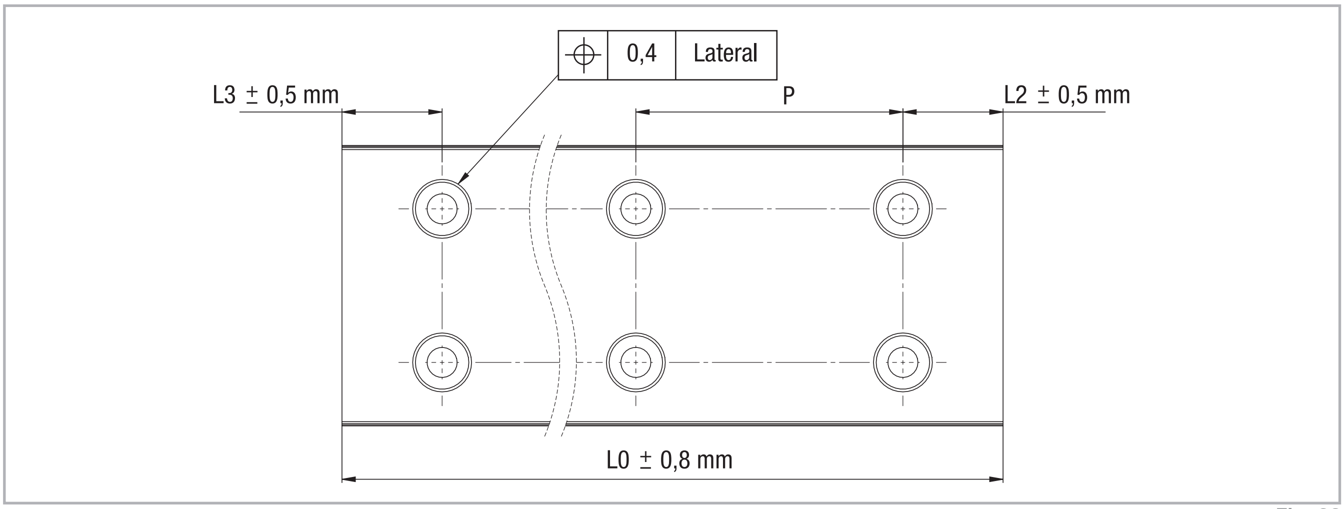


Fig. 66

Size	L_{min} [mm]	Hole pitch P [mm]	L_2, L_{3min} [mm]	L_2, L_{3max} * [mm]	L_{max} [mm]
9	50	30	4	25	1000
12	70	40	5	35	
15	110	40		35	

* does not apply to minimum (L_{min}) and maximum rail length (L_{max})

Tab. 48

Notes

Notes

ROLLON®

LinearEvolution

Curviline

Product explanation

Curviline are curvilinear rails for constant and variable radii

Fig. 1

Curviline is the name of the curvilinear rail product family. They are used for all non-linear special movements. Rails with constant or variable radii may be specified according to customer requirements, resulting in a highly flexible, economical solution. Curviline is available in two rail widths.
The use of standard radii is recommended. All non-standard rail layouts and radii are possible as custom products, however extra lead time may result.

The most important characteristics:

- Straight and curved partial pieces in one rail are possible
- Sliders with four rollers arranged in pairs maintain the preload over the entire rail length
- Custom production according to customer requirements
- Also available in stainless steel

Preferred areas of application of the Curviline product family:

- Packaging machines
- Railway car interior doors
- Special extensions
- Shipbuilding (interior doors)
- Food industry

Constant radii

The layout of CKR guide rails corresponds to a partial section of a complete circle.

Fig. 2

Variable radii

CVR curvilinear rail is a variable combination of various radii and straight partial pieces.

Fig. 3

Slider

The carriage maintains the desired preload over the entire rail layout. Moving roller mountings and the paired application of concentric and eccentric roller pins ensures uniform running even with a complex rail layout.

Fig. 4

Technical data

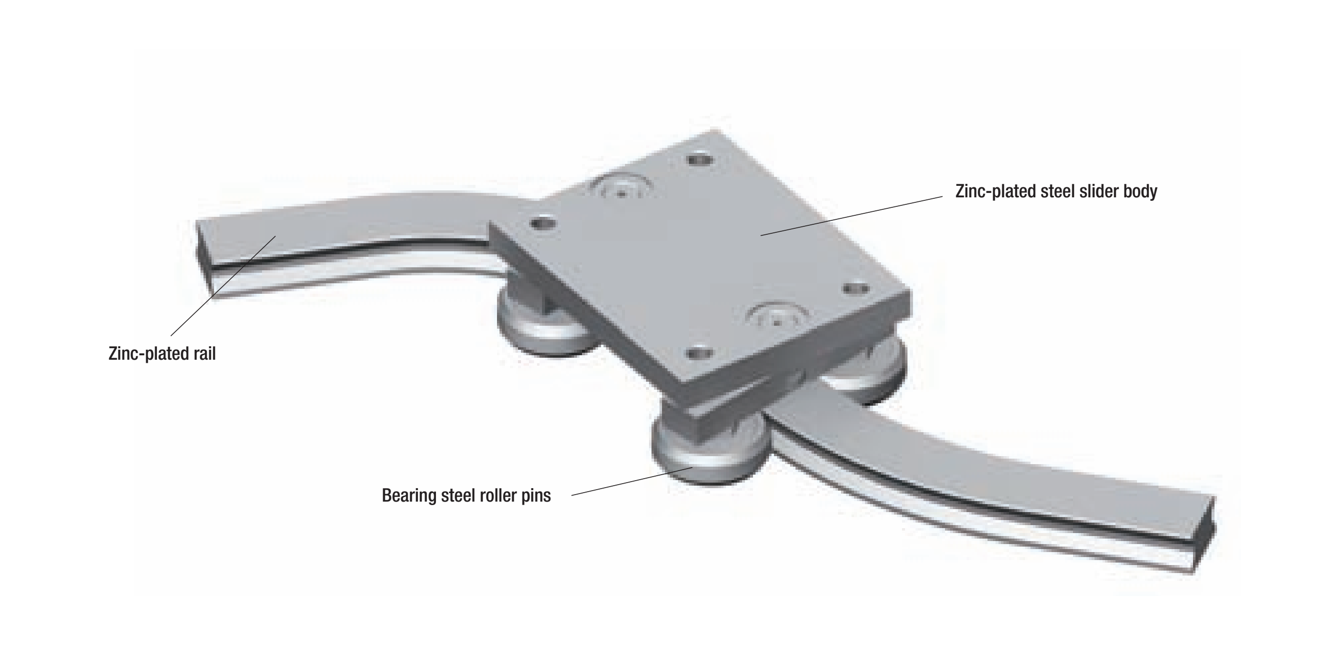


Fig. 5

Performance characteristics:

- Available rail widths: CKR01/CVR01: 16.5 mm (0.65 in) and CKR05/CVR05: 23 mm (0.91 in)
- Max. slider operating speed on the rail: 1.5 m/s (59 in/s) (depending on application)
- Max. acceleration: 2 m/s² (78 in/s²) (depending on application)
- Max. effective length of the rail: 3,240 mm (127.56 in)
- Max. traverse: CCT08: 3,170 mm (124.8 in) and CCT11: 3,140 mm (123.62 in)
- Minimum radius for both sizes: 120 mm (4.72 in). For non-standard radii, please contact Application Technology
- Radius tolerance +/- 0.5 mm (0.02 in), angle tolerance +/- 1°
- Temperature range: -30 °C to +80 °C (-22 °F to +176 °F)
- Rail and runner electrolytic zinc-plated and passivated (Rollon Aloy); increased anticorrosive protection on request (see pg. 10 Anticorrosive protection)
- Rail material: C43, AISI316L for the stainless steel version
- Slider body material: Fe360, AISI316L for the stainless steel version
- Radial ball bearing roller material: 100Cr6, AISI440 for the stainless steel version
- Roller pins lubricated for life

Remarks:

- By a simple adjustment of the eccentric roller pins (markings on bottom of roller), the slider has no clearance or is set with preload on the rails
- The recommended hole pitch is 80 mm (3.15 in) on the extended length
- Please indicate the precise rail shape and the desired hole pattern in a drawing
- Indicate if the design is a right or left version when ordering
- Composite rails are not recommended. For more information please contact Application Technology
- Resulting moment loads must be absorbed through the use of two sliders. For more information please contact Application Technology

Load capacities

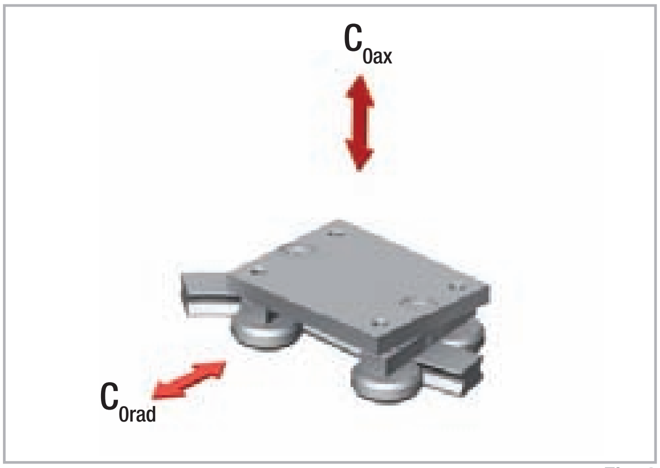


Fig. 6

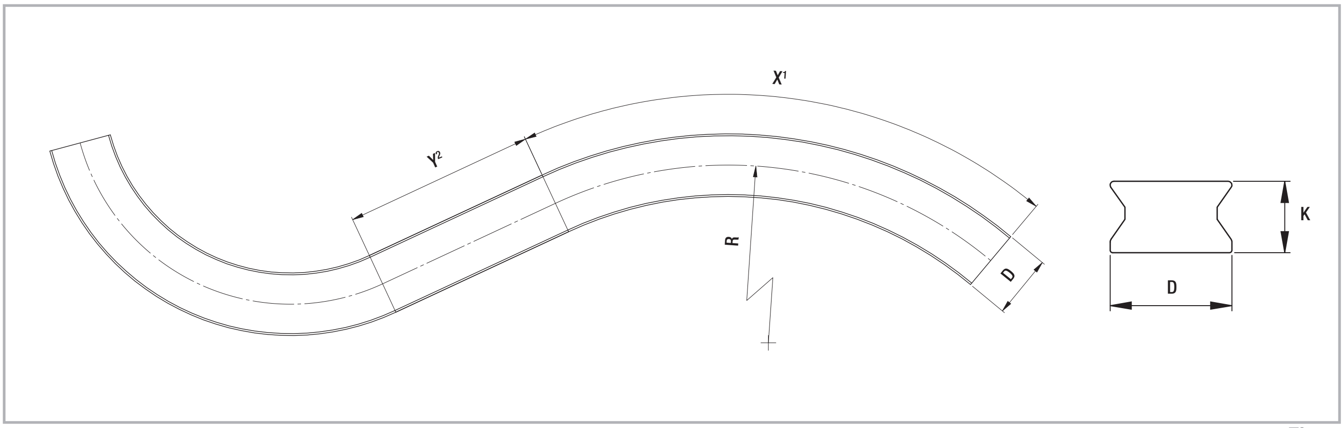
Slider type	C_{0ax} [N]	C_{0rad} [N]
CCT08	400	570
CCT11	1130	1615

Resulting moment loads must be absorbed through the use of two sliders

Tab. 1

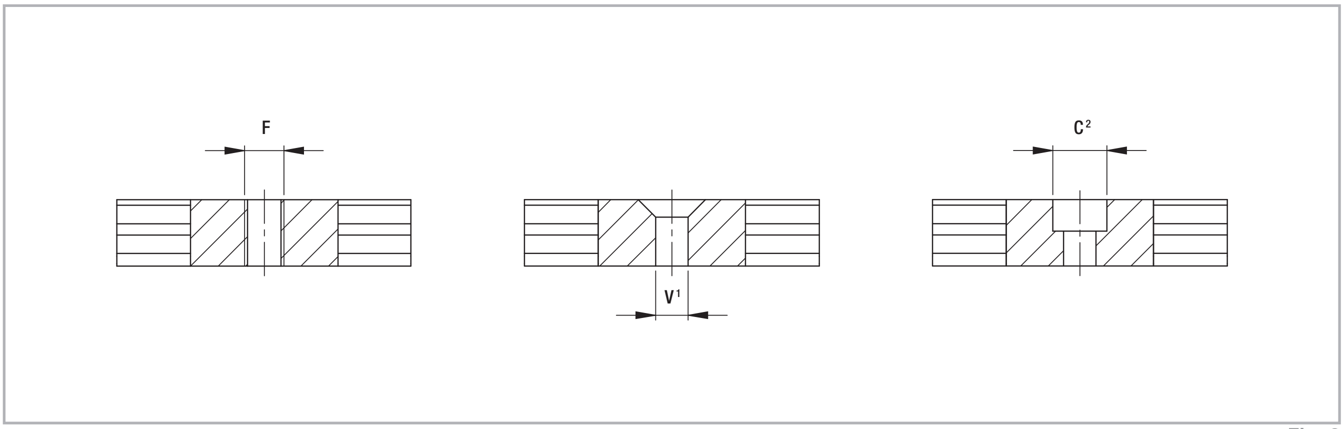
Product dimensions

Constant / variable radii rails



[1] The max. angle (X) is dependent on the radius
[2] For curvilinear rails with variable radii, Y must be at least 70 mm

Fig. 7



[1] Fixing holes (V) for countersunk head screws according to DIN 7991
[2] Fixing holes (C) for socket cap screws according to DIN 912

Fig. 8

Type	D [mm]	K [mm]	F	C	V	X	Standard radii [mm]	Y [mm]	Weight [kg/m]
CKR01 CVR01	16.5	10	up to M6	up to M5	up to M5	dependent on radius	150 - 200 - 250 - 300 - 400 - 500 - 600 - 700 - 800 - 900 - 1000	min. 70	1.2
CKR05 CVR05	23	13.5	up to M8	up to M6	up to M6				2.2

Tab. 2

Please indicate the precise rail layout and the desired hole pattern in a drawing. We recommend 80 mm (3.15 in) on the extended length as a gage for the hole pattern.

Non-standard radii are possible as special products. For more information on rail layouts, radii and hole patterns, please contact Application Technology.

Slider

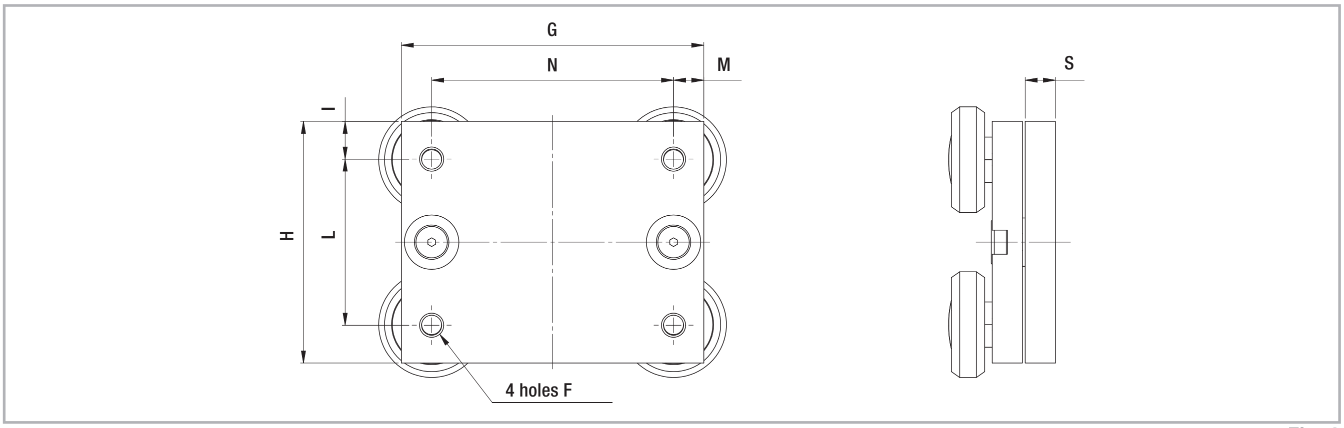


Fig. 9

Type	G [mm]	H [mm]	I [mm]	L [mm]	M [mm]	N [mm]	S [mm]	F	Weight [kg]
CCT08	70	50	10	30	10	50	10	M5	0.45
CCT11	100	80	12.5	55	10	80	10	M8	1.1

Tab. 3

Mounted sliders and rails

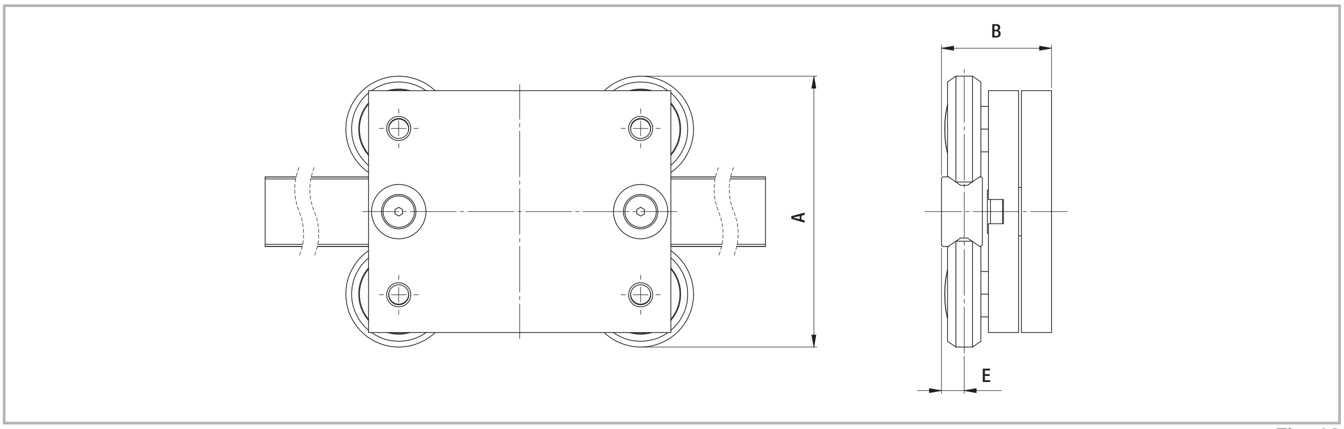


Fig. 10

Configuration	A [mm]	B [mm]	E [mm]
CKR01-CCT08 CVR01-CCT08	60	32.3	5.7
CKR05-CCT11 CVR05-CCT11	89.5	36.4	7.5

Tab. 4

Technical instructions

Anticorrosive protection

The Curviline product family has a standard anticorrosive protection by electrolytic zinc-plating with passivation (Rollon Aloy). If increased anticorrosive protection is required, application-specific surface treatments are available on request, e.g. as nickel-plated design with FDA approval for use in the food industry. The Curviline series is also available in stainless steel. For more information please contact Application Technology.

Lubrication

Roller pin lubrication

All roller pins of the Curviline product family are lubricated for life.

Lubrication of the raceways

Recommended lubrication intervals are heavily dependent upon the ambient conditions, speed and temperature. Under normal conditions, lubrication is recommended after 100 km operational performance or after an operating period of six months. In critical application cases the interval should be shorter. Please clean the raceways carefully before lubrication. We recommend a roller bearing lubricant with a lithium base of average consistency as a lubricant.

Proper lubrication during normal conditions:

- reduces friction
- reduces wear
- reduces the load of the contact surfaces through elastic deformations
- reduces running noise
- increases quiet running

Different lubricants for special applications are available upon request. Example: Lubricant with FDA approval for use in the food industry.
For more information please contact Application Technology.

Setting the preload

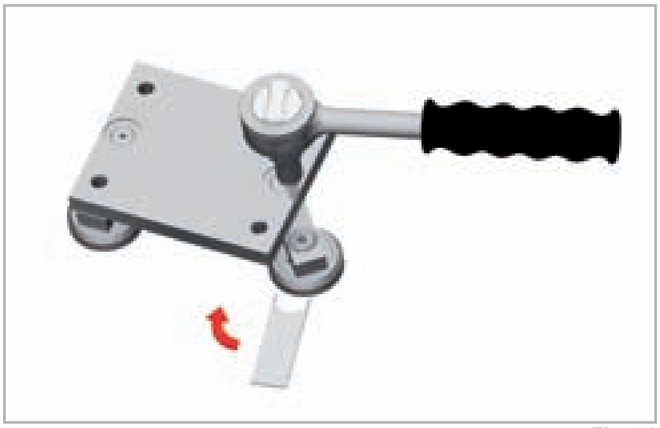


Fig. 11

Type	Tightening torque [Nm]
CCT08	7
CCT11	12

Tab. 5

If the curvilinear rails are delivered as a system, the sliders are already set with no clearance. In this case the fixing screws are secured with Loctite® at the factory.
If delivered separately, or if the sliders should be installed in another track, the eccentric roller pins must be readjusted. Important: The fixing screws must be additionally glued against loosening. The following points must also be observed:

- Wipe the raceways of any eventual dirt and debris.
- Slightly loosen the fixing screws of the roller mounting.
  The eccentric roller pins are marked on the bottom.
- Position the slider(s) at the ends of the rail.
- The special flat key provided is inserted from the side onto the hexagonal of the pin to be set (see fig. 11).
- By turning the flat key clockwise the roller is pressed against the raceway and thus reduces the clearance. Observe that with increasing preload, the friction is also increased and thus the service life reduced.
- Hold the roller pin with the adjustment key in the desired position and carefully tighten the fixing screw. The exact tightening torque will be checked later.
- Move the slider on the rail and check the preload over the entire length of the rail. It should move easily and the slider should not have play at any location of the rail.
- Now tighten the fixing screws with the specified tightening torque (see tab. 5), while the flat key holds the angle adjustment of the pin. A special thread in the roller pin secures the set position.

Fold out ordering key

To make this product catalog as simple as possible for you to use, we have included the following easy-to-read chart.

Your advantages:

- Description and ordering designations easy to read at one glance
- Simplified selection of the correct product
- Links to detailed descriptions in the catalog

Ordering key

Constant radius rail / slider system

CKR01	85°	600	890	/2/	CCT08	NIC	R
							Right or left version
						Expanded surface protection if deviation from Standard *see pg. CL-8 Anticorrosion protection*	
					Slider type	*see pg. CL-7, tab. 3*	
				Number of sliders			
			Rails extended length				
		Radius	*see pg. CL-6, tab. 2*				
	Angle						
Rail type	*see pg. CL-6, tab. 2*						

Ordering example: CKR01-085°-0600-0890/2/CCT08-NIC-R

Note: Information for right and left side installation and for expanded surface protection is only necessary if required

Notes on ordering: Rail lengths and radii always are indicated with four digits, angles always with three digits and a zero as prefix

Exact specifications (angle, radius, hole pattern, etc.) must be represented in a drawing

Variable radius rail / slider system

CVR01	39°	200	//23°	400	297	/2/	CCT08	NIC	R
									Right or left version
								Expanded surface protection if deviation from Standard *see pg. CL-8 Anticorrosion protection*	
							Slider type	*see pg. CL-7, tab. 3*	
						Number of sliders			
					Rails extended length				
				Radius	*see pg. CL-6, tab. 2*				
			Angle						
		Radius	*see pg. CL-6, tab. 2*						
	Angle								
Rail type	*see pg. CL-6, tab. 2*								

Ordering example: CVR01-039°-0200//023°-0400-0297/2/CCT08-NIC-R

Note: Data for angles and respective radii are in sequential order

Note: Information for right and left side installation and for expanded surface protection is only necessary if required

Notes on ordering: Rail lengths and radii always are indicated with four digits, angles always with three digits and a zero as prefix

Exact specifications (layout, angle, radius, hole pattern, etc.) must be represented in a drawing

Constant radius rails

CKR01	120°	600	1152	NIC	R
					Right or left version
				Expanded surface protection if deviation from Standard *see pg. CL-8 Anticorrosion protection*	
			Rails extended length		
		Radius	*see pg. CL-6, tab. 2*		
	Angle				
Rail type	*see pg. CL-6, tab. 2*				

Ordering example: CKR01-120°-0600-1152-NIC-R

Note: Information for right and left side installation and for expanded surface protection is only necessary if required

Notes on ordering: Rail lengths and radii always are indicated with four digits, angles always with three digits and a zero as prefix

Exact specifications (angle, radius, hole pattern, etc.) must be represented in a drawing

Variable radius rails

CVR01	39°	200	//23°	400	297	NIC	R
							Right or left version
						Expanded surface protection if deviation from Standard *see pg. CL-8 Anticorrosion protection*	
					Rails extended length		
				Radius	*see pg. CL-6, tab. 2*		
			Winkel				
		Radius	see *pg. CL-6, tab. 2*				
	Angle						
Schienentyp	see *pg. CL-6, tab. 2*						

Ordering example: CVR01-039°-0200//023°-0400-0297-NIC-R

Note: Data for various angles and respective radii are in sequential order

Note: Information for right and left side installation and for expanded surface protection is only necessary if required

Notes on ordering: Rail lengths and radii always are indicated with four digits, angles always with three digits and a zero as prefix

Exact specifications (layout, angle, radius, hole pattern, etc.) must be represented in a drawing

Slider

CCT08	NIC
	Expanded surface protection if deviation from Standard *see pg. CL-8 Anticorrosion protection*
Slider type	*see pg. CL-7, tab. 3*

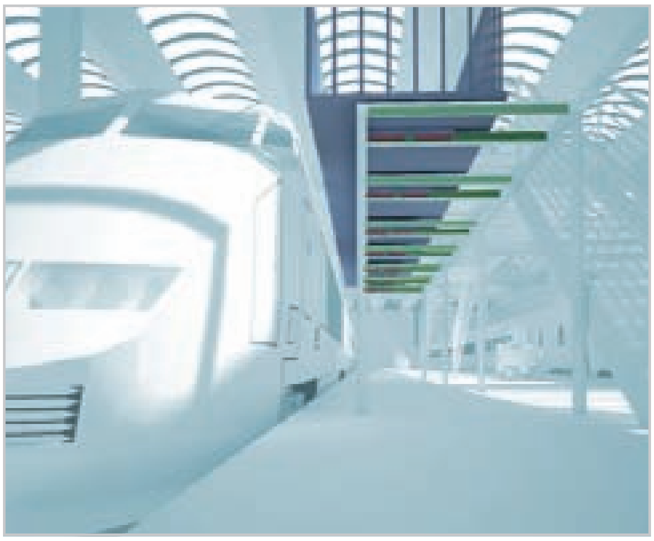
Ordering example: CCT08-NIC

Note: Information for expanded surface protection are only necessary when needed

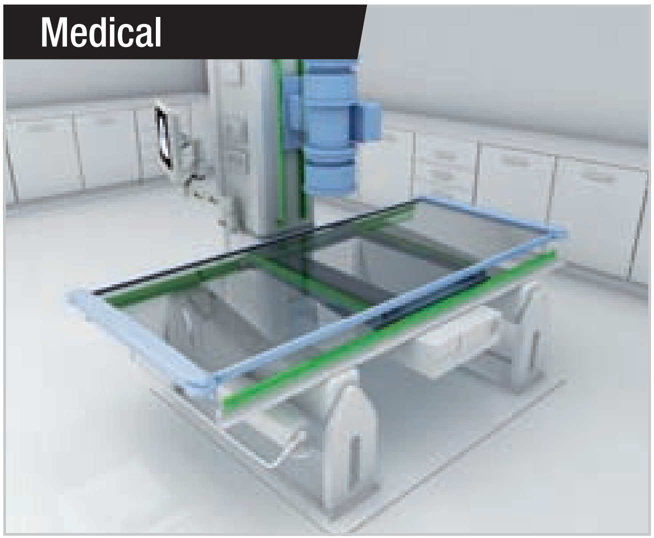
Notes

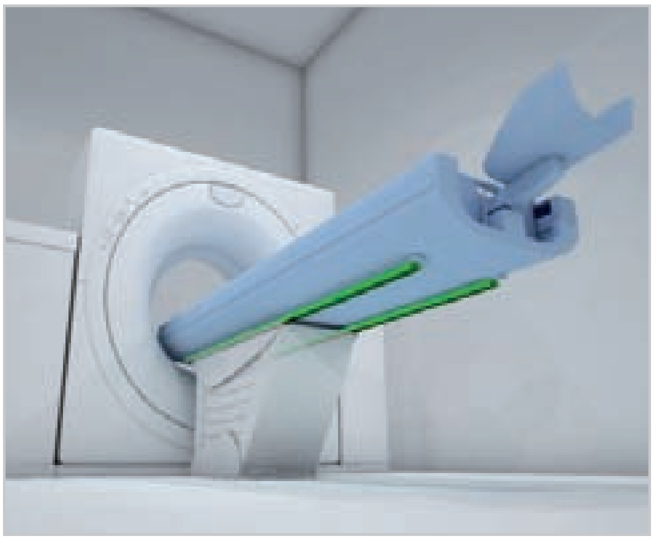
Guides suitable for all applications

Railway

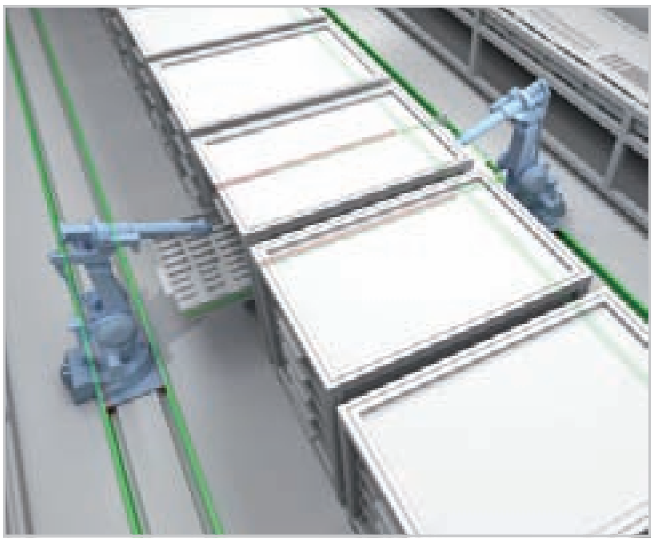


Medical

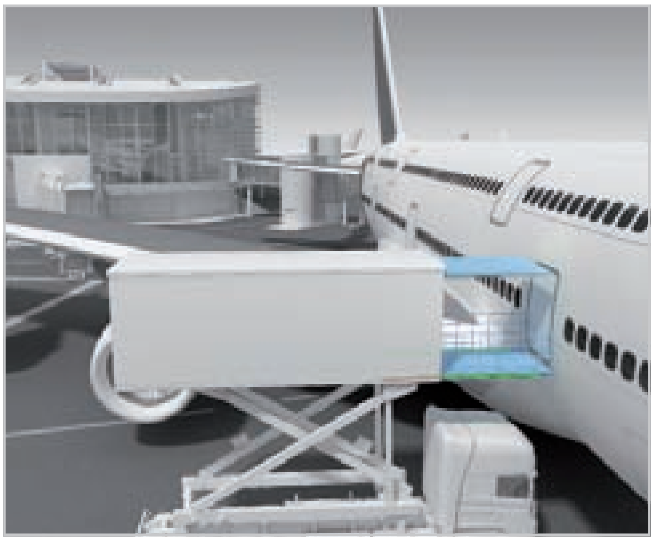




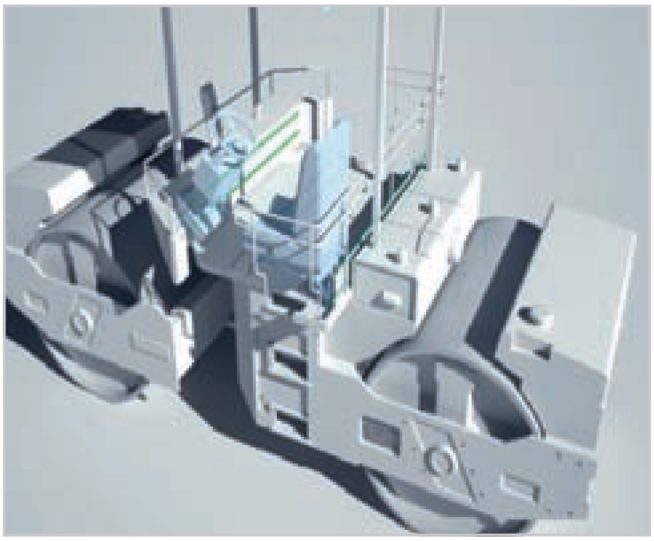
Logistics



Aerospace



Special Vehicles



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