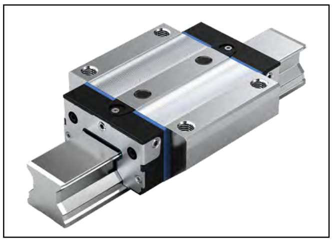
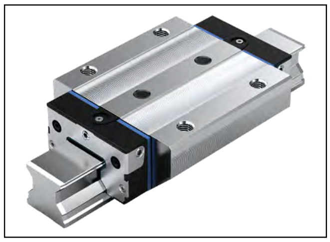
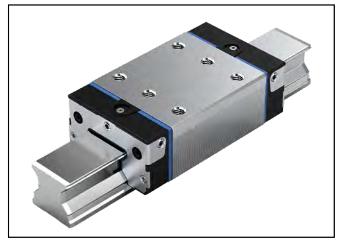
Formats



FNS – Flanged, normal, standard height

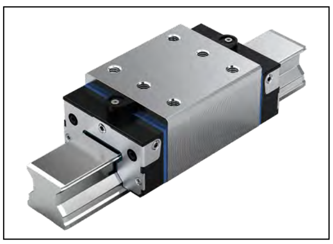


FLS – Flanged, long, standard height

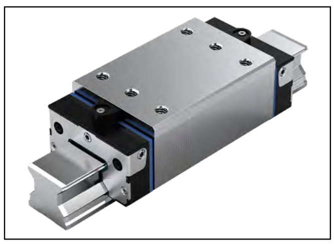


SNS – Slimline, normal, standard height

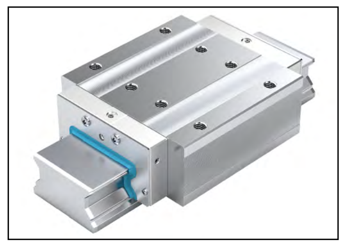
SLS – Slimline, long, standard height



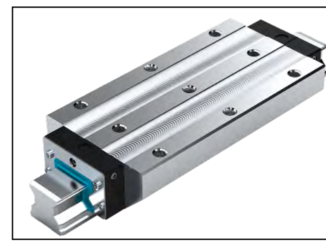
SNH – Slimline, normal, high



SLH – Slimline, long, high



BLS – Wide, long, standard height



FXS – Flanged, extra long, standard height

Definition of the format of Roller Runner Blocks

Criterion	Designation	Code (example)		
		F	**N**	**S**
Width	**F**lange	F		
	Slimline	S		
	Breit **(Wide)**	B		
Length	**N**ormal		N	
	Long		L	
	E**x**tra long		X	
Height	**S**tandard height			S
	High			H

Format with flange –
Design for mounting from above and below

Narrow and wide format –
Design for mounting from above

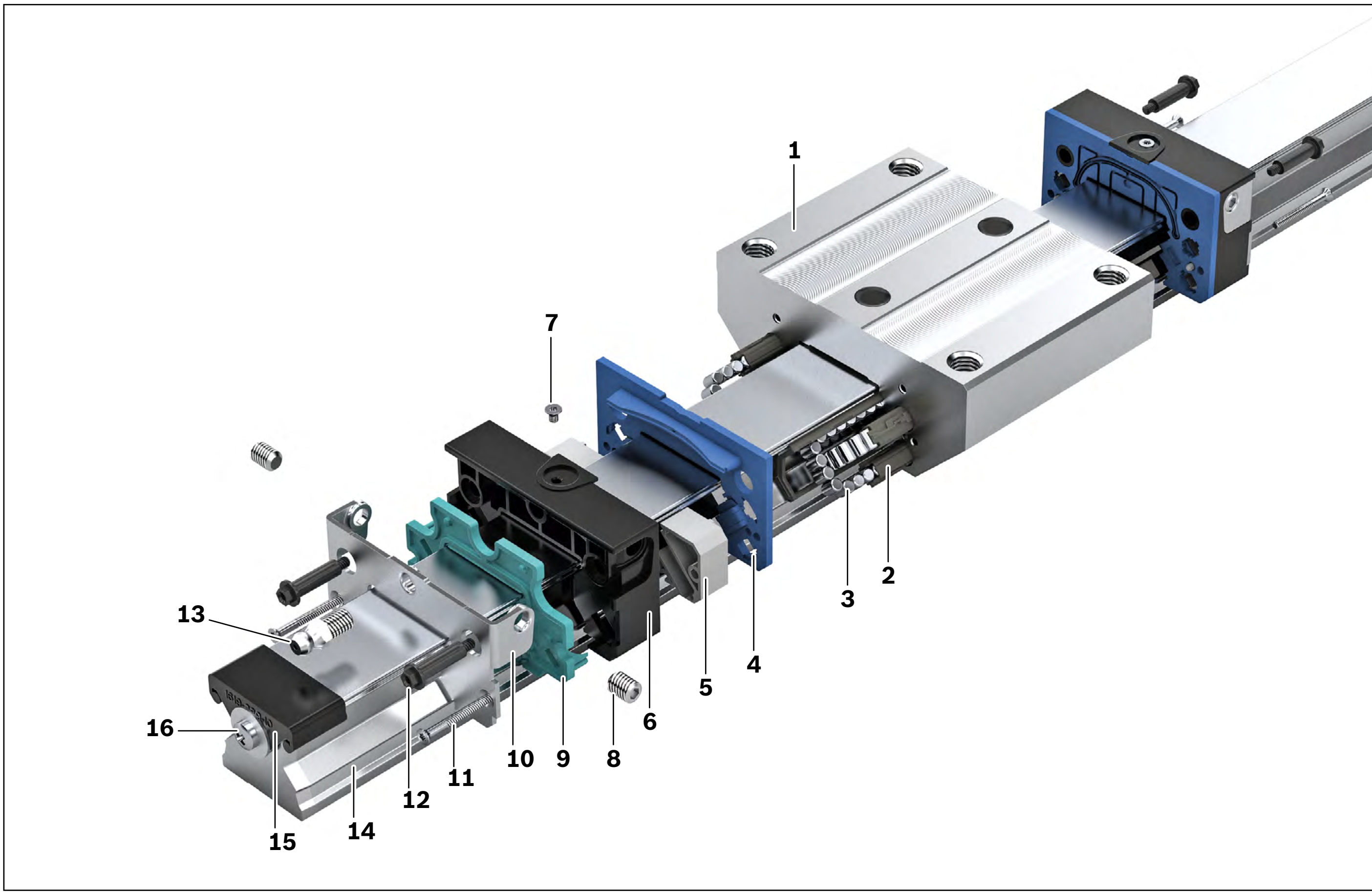
Definition of the format of Roller Guide Rails

Criterion	Designation	Code (example)		
		S	**N**	**S**
Width	**S**limline	S		
	Breit **(Wide)**	B		
Length	**N**ormal		N	
Height	**S**tandard height			S
	O Without groove			O

Roller Guide Rail with the proven cover strip for covering mounting holes

- One cover for all bore holes saves time and costs
- Made of stainless spring steel as per DIN EN 10088
- Easy and safe during mounting
- Clip on and secure

Structure and attachments



Components and their materials

Position	Component	Roller Runner Block		Roller Guide Rails	
		Steel	**Resist CR**	**Steel**	**Resist CR**
1	Roller Runner Block	Heat-treated steel	Hard chrome-plated heat-treated steel		
2	Return channel	Plastic	Plastic		
3	Cylinder rollers	Anti-friction bearing steel	Anti-friction bearing steel		
4	Diversion plate	Plastic	Plastic		
5	Diversion component	Plastic	Plastic		
6	Roller guide	Plastic	Plastic		
7	Screw plug	Carbon steel	Carbon steel		
8	Set screw	Corrosion resistant steel	Corrosion resistant steel		
9	Sealing plate	Plastic	Plastic		
10	Threaded plate	Corrosion resistant steel	Corrosion resistant steel		
11	Oval-head screws	Corrosion resistant steel	Corrosion resistant steel		
12	hexagonal screws	Carbon steel	Carbon steel		
13	Lube nipple	Carbon steel	Carbon steel		
14	Roller Guide Rail			Heat-treated steel	Hard chrome-plated heat-treated steel
15	Protective cap			Plastic	Plastic
16	Screw/disc			Corrosion resistant steel	Corrosion resistant steel

General notes

- Combinations of different accuracy classes

When combining Roller Guide Rails and Roller Runner Blocks of varying accuracy classes, the tolerances for the dimensions H and A3 change. See "Accuracy classes and their tolerances."

Intended use

- The Roller Rail Systems are linear guideways capable of absorbing forces from all transverse directions and moments about all axes. The Roller Rail System is intended exclusively for guiding and positioning tasks when installed in a machine.
- The product is intended exclusively for professional use and not for private use.
- Use for the intended purpose also includes the requirement that users must have read and understood the related documentation completely, in particular the "Safety Instructions".

Misuse

Use of the product in any other way than as described under "Intended use" is considered to be misuse and is therefore not permitted. If unsuitable products are installed or used in safety-critical applications, this may lead to uncontrolled operating statuses in the application which can cause personal injury and/or damage to property.
The product may only be used in safety-critical applications if this use has been expressly specified and permitted in the product documentation.
Bosch Rexroth AG will not accept any liability for injury or damage caused by misuse of the product. The risks associated with any misuse of the product shall be borne by the user alone.
Misuse of the product includes:

- The transport of persons

General safety instructions

- The safety rules and regulations of the country in which the product is used must be observed.
- All current and applicable accident prevention and environmental regulations must be adhered to.
- The product may only be used when it is in technically perfect condition.
- The technical data and environmental conditions stated in the product documentation must be complied with.
- The product must not be put into service until it has been verified that the final product (for example a machine or system) into which the product has been installed complies with the country-specific requirements, safety regulations and standards for the application.
- Rexroth Roller Rail Systems may not be used in zones with potentially explosive atmospheres as defined in the ATEX directive 94/9/EC.
- Rexroth Roller Rail Systems must never be altered or modified. The user may only perform the work described in the "Quick User Guide" or the "Mounting instructions for Roller Rail System".
- The product is never allowed to be disassembled.
- At high travel speeds a certain amount of noise is caused by the product. If necessary, appropriate measures should be taken to protect hearing.
- The special safety requirements for specific sectors (e.g. crane construction, theaters, food technology) set forth in laws, directives and standards must be complied with.
- In all cases, the provisions of the following standard should be noted and followed. DIN 637, Safety regulations for dimensioning and operation of Profiled Rail Systems with recirculating rolling elements.

Directives and standards

Rexroth Roller Rail Systems RSHP guides are designed for reliability and high precision in dynamic, linear applications. The machine tool industry and other sectors must observe a series of standards and directives. These requirements can vary significantly worldwide. It is therefore essential to understand the legislation and standards that apply in each particular region.

DIN EN ISO 12100

This standard describes the safety of machinery – general principles for design, risk assessment and risk reduction. It gives a general overview and contains a guide to the major developments governing machines and their intended use.

Directive 2006/42/EC

The European Machinery Directive describes the basic safety and health requirements for the design and manufacture of machinery. The manufacturer of a machine or his authorized representative has a duty to ensure that a risk assessment has been performed in order to determine the health and safety requirements which have to be fulfilled for that machine. The machine must be designed and built taking into consideration the results of the risk assessment.

Directive 2001/95/EC

This directive covers general safety requirements for any product placed on the market and intended for consumers, or likely to be used by consumers under reasonably foreseeable conditions, including products that are made available to consumers in the context of service provision for use by them

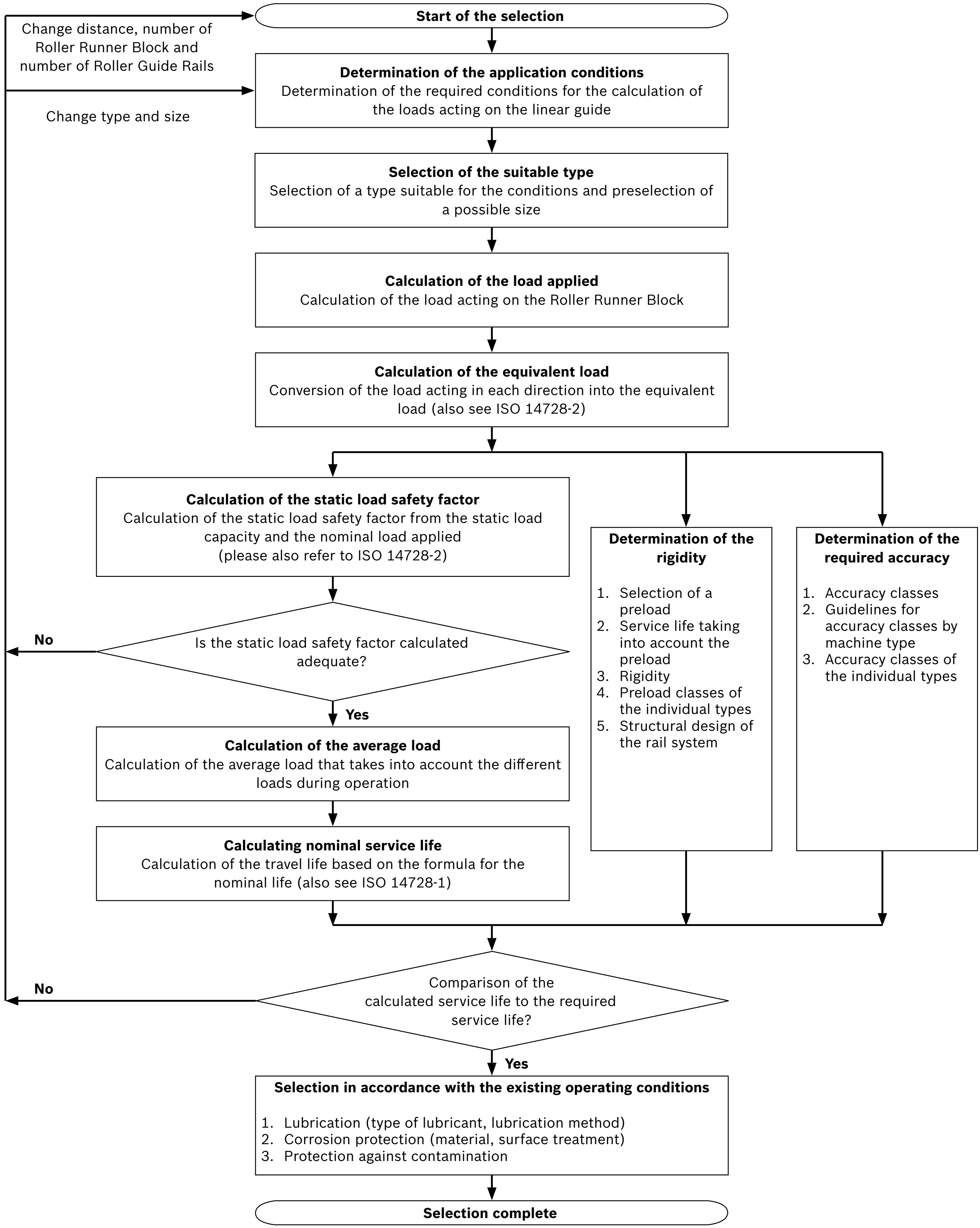
Directive 1999/34/EC

This directive concerns the liability for defective products and applies to industrially manufactured movable objects, irrespective of whether or not they have been incorporated into another movable or immovable object.

REGULATION (EC) No. 1907/2006 (REACH)

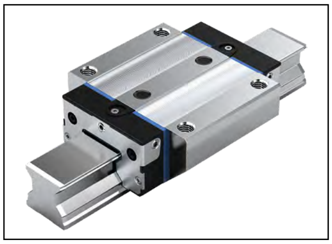
This regulation relates to restrictions on the marketing and use of certain dangerous substances and preparations. "Substances" means chemical elements and their compounds as they occur in the natural state or as produced by industry. "Preparations" means mixtures or solutions composed of two or more substances.

Selection of a linear guide according to DIN 637

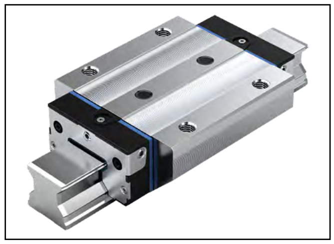


Product description of high-precision version

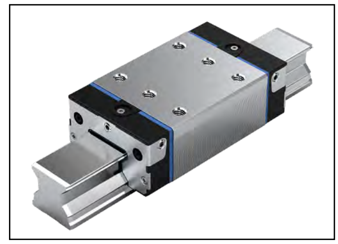
Formats of High-Precision Roller Runner Blocks



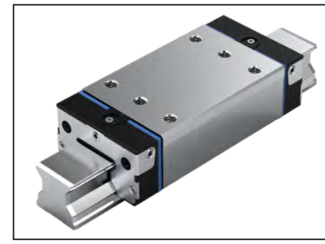
FNS – Flanged, normal, standard height



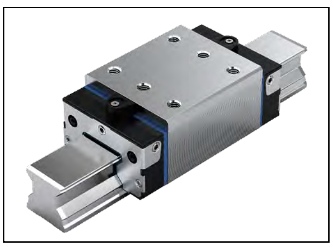
FLS – Flanged, long, standard height



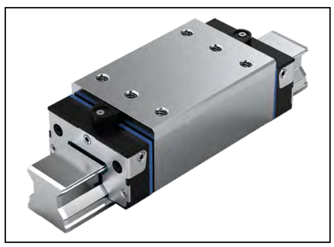
SNS – Slimline, normal, standard height



SLS – Slimline, long, standard height



SNH – Slimline, normal, high



SLH – Slimline, long, high

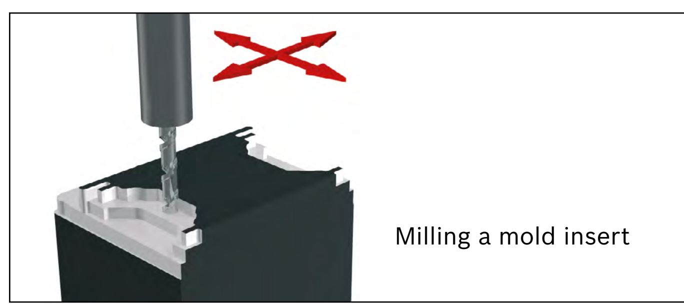
Application examples

Rexroth High-Precision Roller Runner Blocks are particularly suited for the following applications:

Grinding

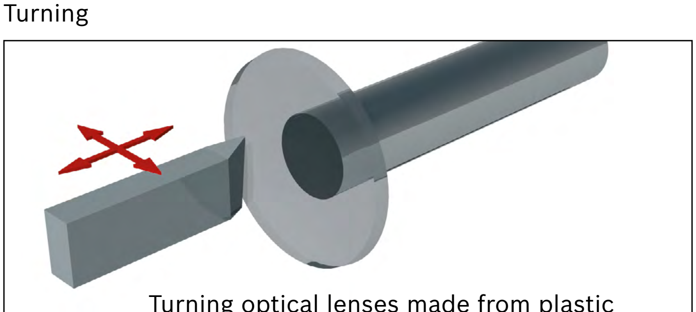
Internal cylindrical grinding

Milling



Hard milling

Turning



High-precision turning

These are only a few examples. Naturally, other applications can be realized. Feel free to ask any questions that you may have.
We have an appropriate solution.

Product description of high-precision version

Highlights

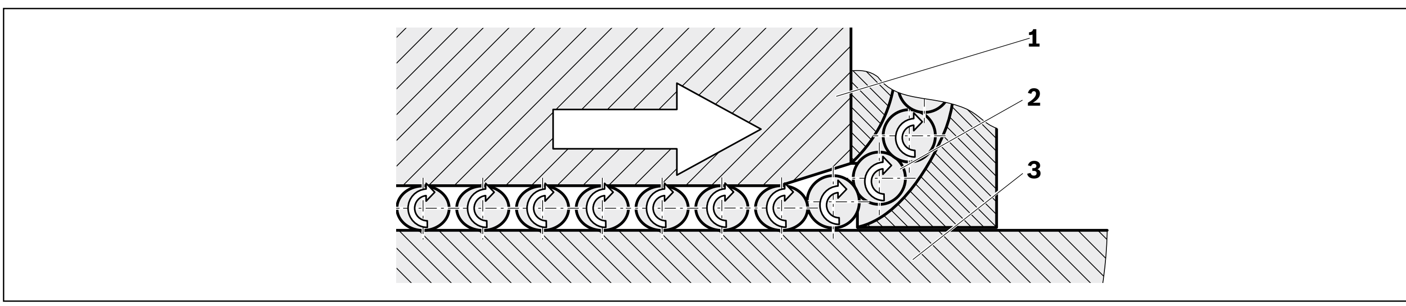
- Improved travel accuracy
- Significantly reduced frictional oscillations and low friction force level, particularly under external load
- Maximum precision
- Selected qualities
- The minimum amount preservation minimizes the impairment of the environment by the preserving agent.
- Optimize entry zones increases the discharge accuracy.

Compare:

Conventional Roller Runner Block

If the Roller Runner Block comprises of a conventional entry zone, this may only be designed for a specific load point.

Entry-zone geometry for conventional Roller Runner Block



1 Roller Runner Block **2** Rollers **3** Roller Guide Rail

Roller entry

- The rollers are guided up to the start of the entry zone via the roller deflection.
- If the distance between the Roller Runner Block (1) and the Roller Guide Rail (3) is smaller than the roller diameter, the roller (2) is put under load (preload) in pulses.
- The preload is increased in the entry zone and reaches its maximum in the load bearing zone. By doing so, the roller transmits its force from the Roller Runner Block to the Roller Guide Rail.
- Due to the kinematic and geometric relations, a distance between the individual rollers is set.

Entry zone

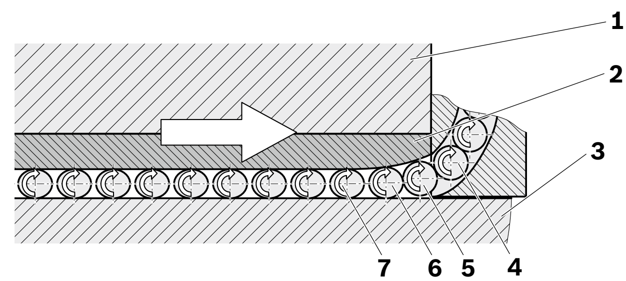
The conventional Roller Runner Blocks comprise of a fix entry zone. The depth of the entry zone shall be suitable for a high load, since a fault-free roller entry is to be guaranteed under very high loads, as well.

- On the one hand, as many load-bearing rollers as possible should be in the Roller Runner Block in order to reach an ideal load-carrying capacity.
  ⇒ Entry zone as short as possible
- On the other hand, the load during the entry of the rollers should be increased as slowly as possible and thus in a harmonic manner in order to reach the maximum of the geometric travel accuracy.
  ⇒ Entry zone which is as flat (long) as possible

There is a conflict of aims between short and long entry zones.

High-Precision Roller Runner Block

New entry-zone geometry for Roller Runner Block in high-precision version
The Roller Runner Block in high-precision version comprise of an innovative entry zone. This allows the rollers to enter the load-bearing zone harmonically, i.e. without any impulse loads.



1 Roller Runner Block
2 Steel bearing plate
3 Roller Guide Rail
4 – 7 rollers

Roller entry

- The rollers (4) are guided up to the start of the entry zone via the roller deflection.
- The roller (5) can be entered.
- If the distance between the steel load-bearing plate and the Roller Guide Rail is smaller than the roller diameter, the roller is put under load again slowly and evenly (preload).
- The preload is increased harmonically until the rollers (7) have reached their maximum preload.

Innovative solutions by Rexroth:

The optimized entry zone
The functionality of the entry zone is decisive. The steel bearing plates are manufactured with such precision that they can withstand increasing load as curvature becomes more convex. Thus, the rollers can enter particularly smoothly.
The rollers thus no longer crash their way into the load-bearing zone through an oblique entry zone, rather transition smoothly on a tangential, ideally angled elastic line into the load-bearing zone.
The smooth entry of the rollers and the optimized adaptation of the entry zone to the load represent a decisive benefit of the High-Precision Roller Runner Blocks.

Characteristic features

1 Maximum travel accuracy
2 Reduced friction force oscillations
3 The conflict of aims is resolved

Product description of high-precision version

Fluctuation of friction forces

Definition

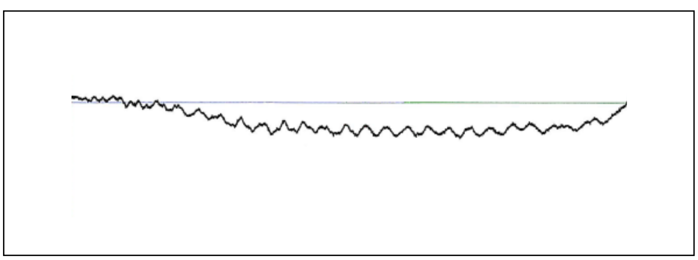
The overall driving force of a Roller Runner Block consist of the following components:

1 Roller friction
2 Sealing friction
3 Friction in the roller deflections and roller returns

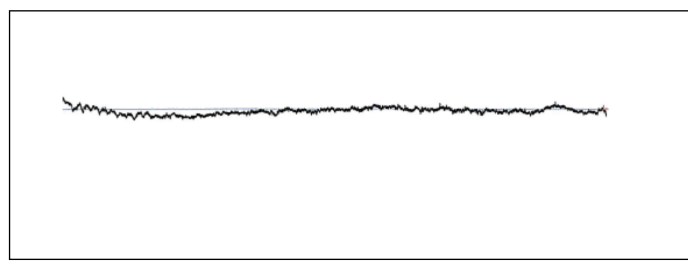
In operation, the fluctuations of the friction force can be particularly disturbing.

These fluctuations are essentially impacted by the following effect:
The rollers need to be inserted into the loaded load-bearing zone from the load-free zone. The harmonic entry zone and the optimized roller entry are used to reduce the fluctuations to a minimum, which means that the linear drive will also be easier to control

Conventional Roller Runner Block



High-Precision Roller Runner Block



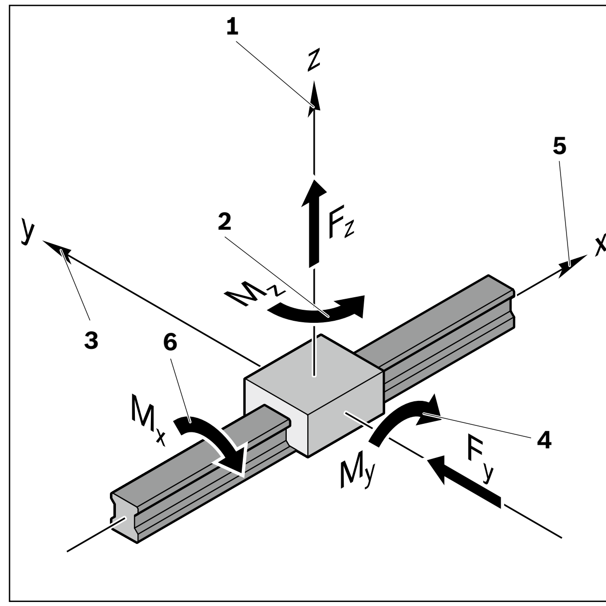
Travel accuracy

Definition

In an ideal case, a Roller Runner Block moves transitively in relation to the x-axis over the Roller Guide Rail. In practice, however, deviations occur in all six degrees of freedom. The term travel accuracy describes the deviation from this ideal line.

Six different degrees of freedom

1 Height deviation (linear deviation in Z)
2 Yaw (rotary motion around Z)
3 Side deviation (linear deviation in Y)
4 Pitching (rotary motion around Y)
5 Translation (linear movement in X)
6 Rollers (rotary motion around x)



Causes of travel inaccuracy

The Travel inaccuracy is impacted by the following points.

1. Inaccurate mounting base on which the Roller Guide Rail is mounted.
2. Parallelism between the contact areas of the Roller Guide Rail and the running tracks.
3. Elastic deformations of the Roller Guide Rail by the mounting screws.
4. Accuracy fluctuations caused by the rollers entering and exiting.

Potential for optimization

With respect to 1: Contact surfaces of the Roller Guide Rails should be produced as precisely as possible (outside of the scope of influence of Rexroth).
With respect to 2: Any deviation should be equalized by the selection of the accuracy class of the Roller Guide Rail.
With respect to 3: Reduce the tightening torque. The tightening torque of the fastening screws has a proportional impact. A reduction of the tightening torque decreases the compressive strain of the rail material.
⇒ Lower geometric process fluctuations

⚠ NOTE: With this measure, the transferable forces and moments can be reduced.

With respect to 4: The optimized entry zone of Rexroth - High-Precision Roller Runner Blocks reduces the speed fluctuations to a minimum.

Further potential for improvements:

- Use of long Roller Runner Blocks
- Installation of additional Roller Runner Blocks for each Roller Guide Rail.

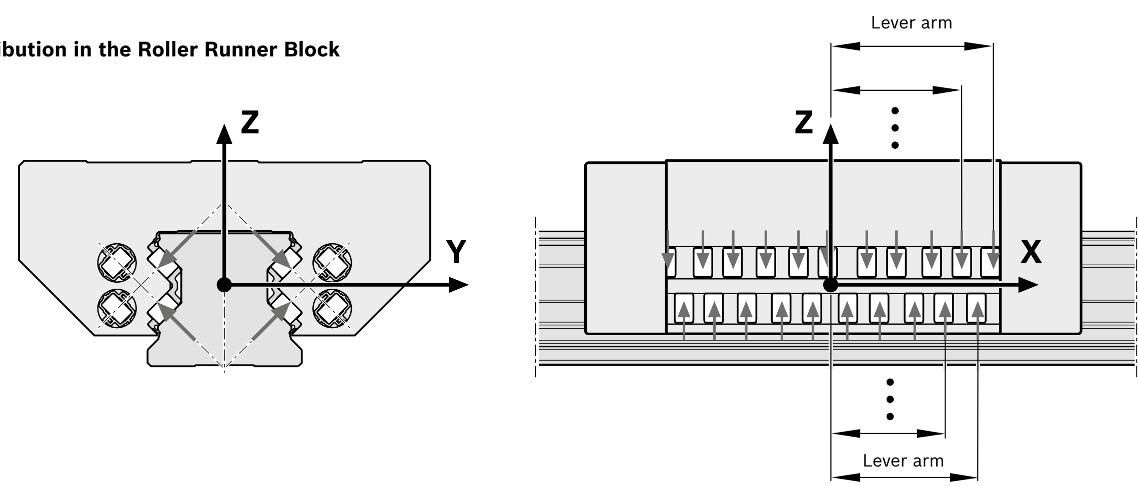
Product description of high-precision version

The measured deviations have the following cause

A roller circulation contains a number n of supporting rollers which are under load. If the Roller Runner Block is moved into the direction of travel, via the entry zone, a new roller enters the load-bearing zone and n + 1 roller are supporting. Thus, the internal balance of the four supporting rollers is disturbed. The Roller Runner Block enters a rotational movement since the rollers can arbitrarily enter the supporting roller lines. In order to restore the balance, the Roller Runner Block is moving into a new balance position. If the Roller Runner Block is moved further, a supporting roller exits the load-bearing zone at the roller exit. Thus, the internal balance of the four supporting roller lines is disturbed again and the Roller Runner Block enters a rotational movement.
The effect can be clearly seen in the right-hand diagram.

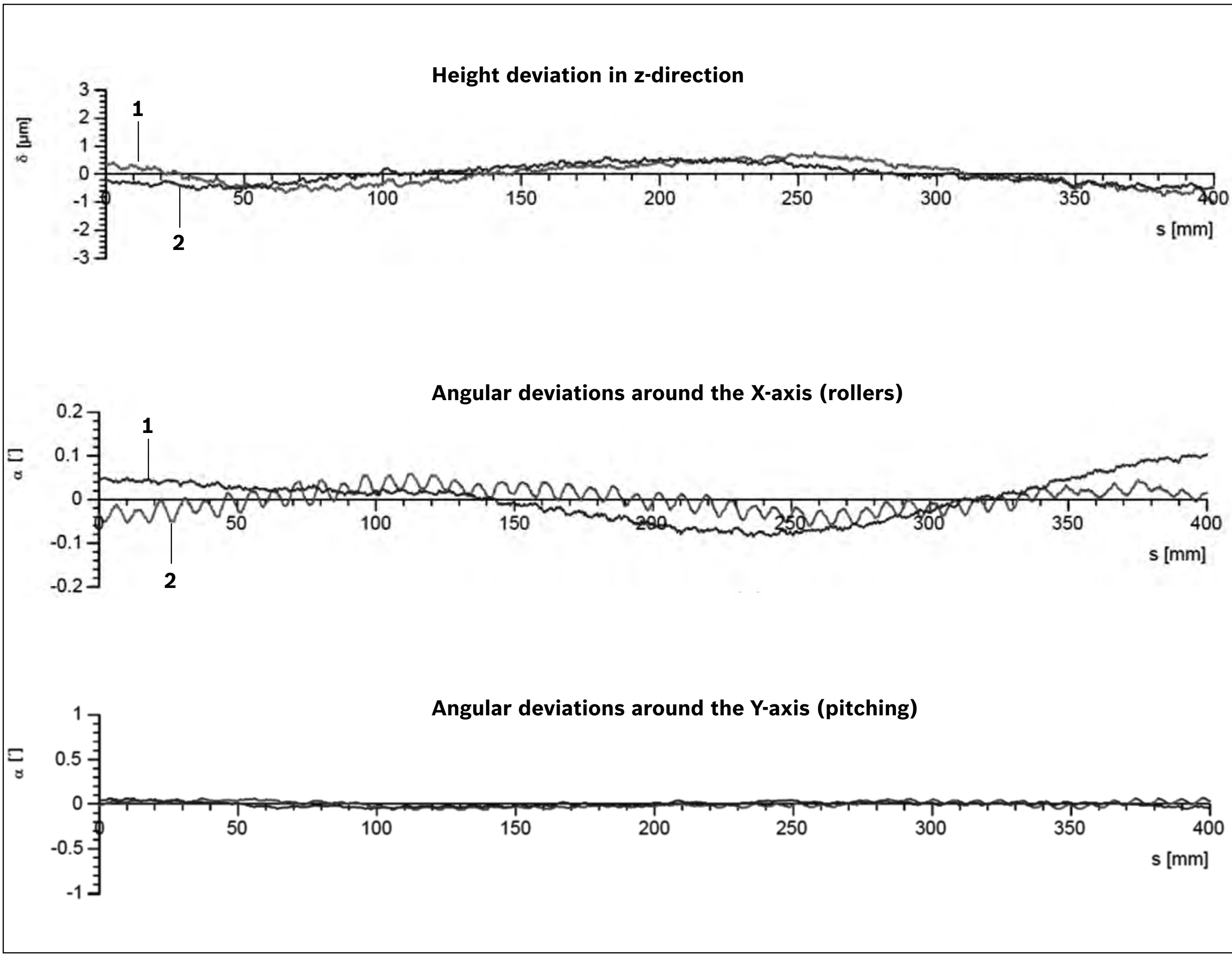
As it has been verified in practical applications, the period of short-wave inaccuracies roughly corresponds to twice the roller diameter.
The remaining long-wave deviation is caused by the described causes 1, 2 and 3 (inaccurate support, parallelism errors and elastic deformation of the Roller Guide Rails due to the fastening screws).

Force distribution in the Roller Runner Block



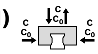
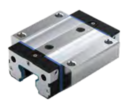
Direct comparison of the sequence accuracy of two Roller Runner Blocks

It can be clearly seen that the short-wave inaccuracy can be significantly reduced by the new optimized design of the entry zone.



1) High-precision version
2) Conventional version

Product overview of Roller Runner Block with load ratings

Roller Runner Block				Page	Size	25	35	45	55	65	100	125
					Load capacities[1] (N) 							
Standard Roller Runner Block made of steel		FNS	R1851 ... 2.	54	C	26900	61000	106600	140400	237200		
			R1851 ... 7. Resist CR	66	C_0	59500	119400	209400	284700	456300		
		FLS	R1853 ... 2.	56	C	33300	74900	132300	174000	295900		
			R1853 ... 7. Resist CR	66	C_0	76400	155400	276400	374900	606300		
		SNS	R1822 ... 2.	58	C	26900	61000	106600	140400	237200		
			R1822 ... 7. Resist CR	66	C_0	59500	119400	209400	284700	456300		
		SLS	R1823 ... 2.	60	C	33300	74900	132300	174000	295900		
			R1823 ... 7. Resist CR	66	C_0	76400	155400	276400	374900	606300		
		SNH	R1821 ... 2.	62	C	26900	61000	106600	140400			
			R1821 ... 7. Resist CR	66	C_0	59500	119400	209400	284700			
		SLH	R1824 ... 2.	64	C	33300	74900	132300	174000			
			R1824 ... 7. Resist CR	66	C_0	76400	155400	276400	374900			
					Size				**55/85**	**65/100**		
Wide Roller Runner Blocks made of steel		BLS	R1872 ... 10	90	C			–	165000	265500		
			R1872 ... 60 Resist CR	90	C_0			–	345300	525600		
					Size					**65**	**100**	**125**
Heavy-Duty Roller Runner Block made of steel		FXS	R1854 10	96	C	–				366800	–	–
					C_0	–				792800	–	–
		FNS	R1861 10	98	C	–					461000	757200
			R1861 60 Resist CR	98	C_0	–					811700	1324000
		FLS	R1863 ... 10	100	C	–					632000	1020000
			R1863 ... 60 Resist CR	100	C_0	–					1218000	1941900

1) Determination of the dynamic load capacities and load moments is based on a stroke travel of 100,000 m according to DIN ISO 14728-1. However, often only 50,000 m is actually stipulated. For comparison: Multiply values C, M_t and M_L from the table by 1.23.

Product overview of Roller Guide Rails with lengths

Roller Guide Rails				Page	Size 25	Size 35	Size 45	Size 55	Size 65
					Rail length (mm)				
Standard Roller Guide Rails made of steel[1] and Resist CR[3], can be screwed from above	 with cover strip and strip clamp	SNS SNO	R1805 .3. ..	70	3986	3996	3986	3956	3971
			R1845 ... .. Resist CR	82/84					
	 with cover strip and protective caps	SNS SNO	R1805 .6. ..	72					
			R1845 ... .. Resist CR	82/84					
	 for cover strip	SNS SNO	R1805 .2. ..	74					
			R1845 ... .. Resist CR	82/84					
	 with plastic mounting hole plugs	SNS SNO	R1805 .5. ..	76					
			R1845 ... .. Resist CR	82/84					
	 with steel mounting hole plugs	SNS SNO	R1806 .5. ..	78					
			R1846 ... .. Resist CR	82/84					
Standard Roller Guide Rails made of steel[2] and Resist CR[3], can be screwed from below		SNS SNO	R1807 .0. ..	80					
			R1847 ... .. Resist CR	82/84					

					55/85	65/100
Wide Roller Guide Rails made of steel	 with cover strip	BNS	R1875 .6. ..	92	3956	3971
			R1873 .6. .. Resist CR	92		

					100	125
Heavy-Duty Roller Guide Rails made of steel with cover strip / with steel mounting hole plugs	 	SNS	R1835 .6. .. R1836 .5. ..	102 104	3986	2760
			R1865 .6. .. Resist CR	102	2500	2000

1) Size 35: also deliverable as one piece up to a length of 5996 mm, size 45: also deliverable as one piece up to a length of 5981 mm, Size 55: also deliverable as one piece up to a length of 5936 mm, size 65: also deliverable as one piece up to a length of 5921 mm,
2) Size 35: also deliverable as one piece up to a length of 5996 mm
3) Resist CR: Roller Guide Rails made of steel with corrosion-resistant coating in matte-silver or black, hard chrome plated

General technical data and calculations

General notes

General technical data and calculations apply to all Roller Rail Systems, i.e. Roller Runner Blocks and Roller Guide Rails. Specific technical data are listed separately for the individual Roller Runner Blocks and Roller Guide Rails.

Preload classes

To cover the widest possible range of applications, the Rexroth Roller Runner Blocks (FW) are available in different preload classes.

The following preload classes are available:
- FW with preload class C2
- FW with preload class C3

Risk analysis on request:
- FW with preload class C1, C4, C5

To prevent reductions to the service life, the preload should not exceed 1/3 of the load on bearing F.

In general, the rigidity of the Roller Runner Block rises with increasing preload.

Guide systems with parallel rails

When choosing the preload class, also pay attention to the permissible parallelism offset of the rails (see "Accuracy class selection criterion").

Travel speed

$v_{max} = 4^{1)}$ m/s

1) Sizes:
55/85, 65/100, 65 FXS: 3 m/s
100 and 125 2 m/s

Acceleration

$a_{max} = 150\ m/s^2$

Requirement:
There must be preload, even during operation under load.

Operating temperature range

−10 °C ... +80 °C

Up to 100°C is permissible for a short time.
For operation at lower minus temperatures, please consult us.

Friction

The table contains guideline values for the friction forces of the complete, sealed and oiled Roller Runner Block without connection elements.
When starting up the Roller Runner Block, the friction force may have a value of 1.5- to 2-fold normal, depending on downtime, selection, quantity and state of the lubricant as well as contamination of the Roller Guide Rail. This applies for all Roller Runner Blocks in all preload classes.
The friction coefficient μ amounts to 0.0004 to 0.001 (without the friction of the sealings).

Size	**Friction force F_R (N)**		
		with double-lip seal DS	**with longitudinal seal AS**
25		30	–
35		35	80
45		40	120
55		45	140
65		60	–
55/85		70	–
65/100		90	–
100		400[1)]	–
125		600[1)]	–

1) The friction is approx. 50 % higher immediately after lubrication.

Seals

Seals are used to prevent dirt, chips etc. from working their way into the inside of the Roller Runner Block, thereby preventing reductions to its service life.
This also prevents the discharge of lubricant.

Standard

Seals are fitted at the Rexroth Roller Runner Block by default. They have a uniform sealing effect for Roller Guide Rails with and without cover strips.

FKM seals

FKM seal are available as additional elements and are mounted by the customer.
They are intended for the use in environments with many fine dirt or metal particles.

- Use in environments with dirt or metal particles and, additionally, cooling and cutting liquids.
- Interchangeable during servicing.

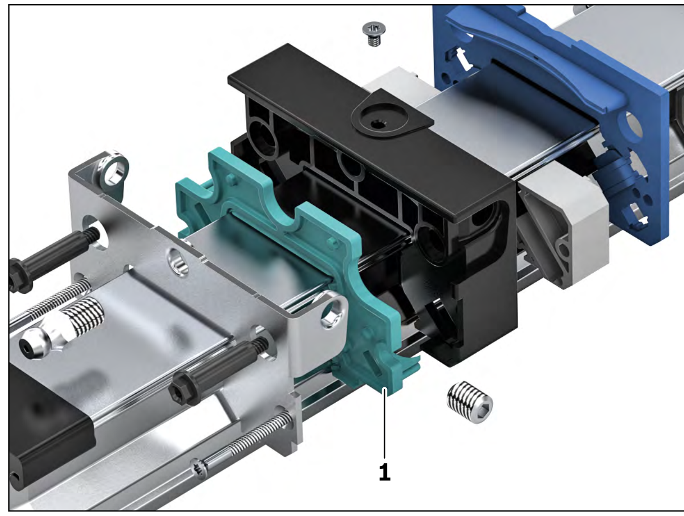
Cover plate wiper

Cover plate wipers are available as additional elements and are mounted by the customer.

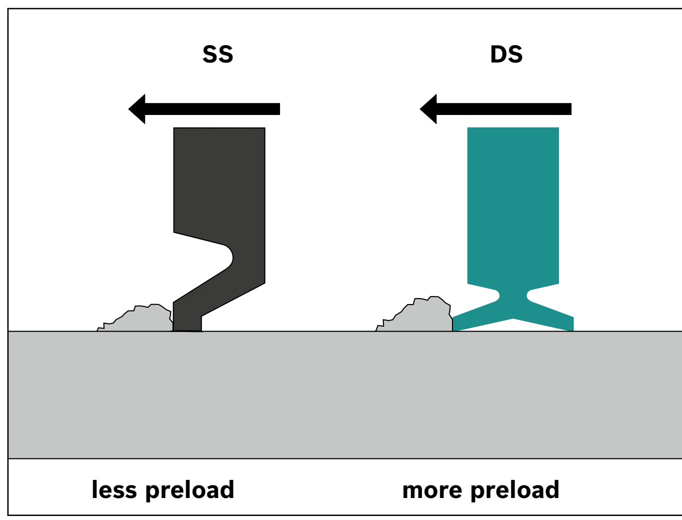
- For the use in environments with hot coarse chips or beads of sweat.

Seals

The sealing plate on the front side (1) protects the interior of the Ball Runner Block against dirt, chips and fluids. Additionally, it prevents the discharge of lubricant. Due to the optimized form of the sealing lips, the occurring friction is reduced to a minimum. Sealing plates are optionally available with black standard sealings (SS) or green double-lip sealings (DS).

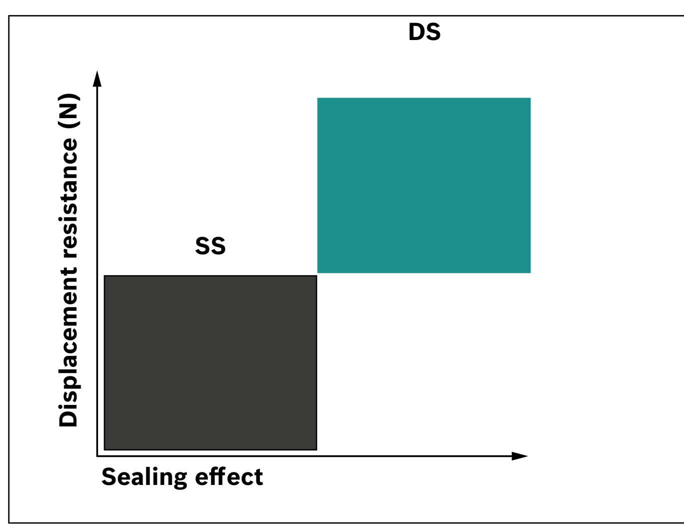


Double-lip seal DS (sealing with very good sealing effect)
For applications in which the rail guide is heavily charged with chips, wood dust, cooling lubricants etc., Rexroth recommends the double-lip sealing. It comprises an excellent wiping action but a greater friction force and lower relubrication interval.



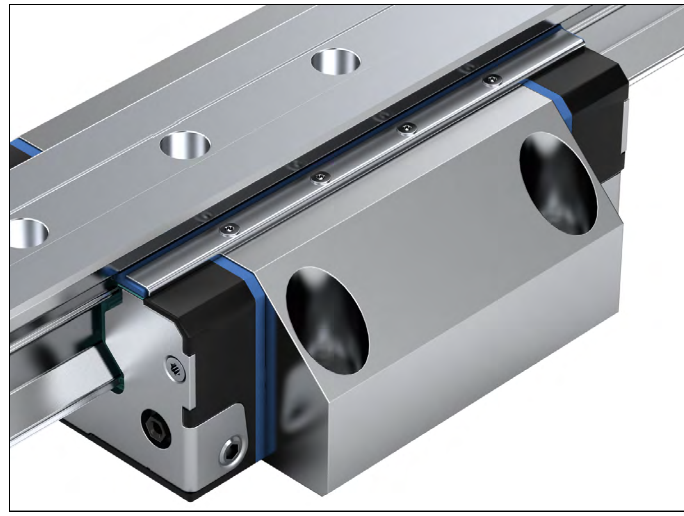
In preparation:
Standard seal SS (universal sealing with good sealing effect)
For most application cases, the standard seal is suitable. It comprises of a good wiping action but also enables long relubrication intervals.

Sealing effect and displacement resistance
The displacement resistance can be impacted by the geometry and the material. The diagram shows the effects of different sealing versions on the sealing effect and the displacement resistance.

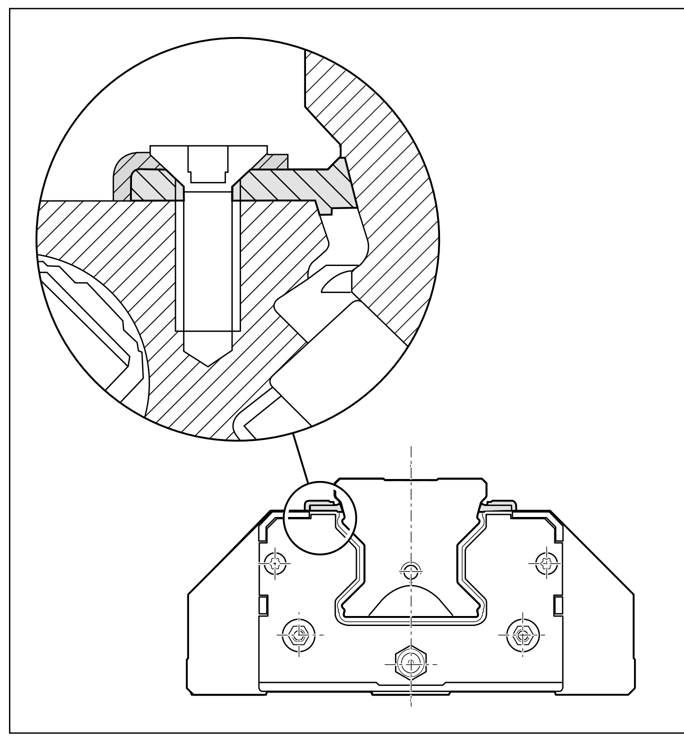


Longitudinal seal

- Area of use:
  Installation positions, horizontal over-head and wall installation
- Advantage:
  Early failure of the Runner Block is avoided.
- Sealing lip above the complete Runner Block length (including fins for the front-side sealing)



- Sealing lip with sharp edges for optimizing the friction
- Upright, pre-tensioned sealing lip for a targeted deflection of dirt away from the sealing edge.
- Fixation via retaining plate (screwed)
- Optimum fastener at the Runner Block with 4 screws each
- High level of rigidity and clamping with edged retaining plate



General technical data and calculations

Forces and moments

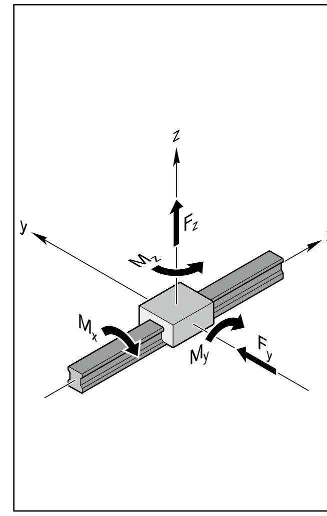
In Rexroth Roller Rail Systems the tracks are arranged at a pressure angle of 45°. This results in the same high load capacity of the entire system in all four main directions of loading. The Roller Runner Blocks may be subjected to both forces and load moments.

Forces in the four main directions of loading

- Tension F_z (positive z-direction)
- Pressure $-F_z$ (negative z-direction)
- Side load F_y (positive y-direction)
- Side load $-F_y$ (negative y-direction)

Moments

- Moment M_x (around the y-axis)
- Moment M_y (around the y-axis)
- Moment M_z (around the z-axis)



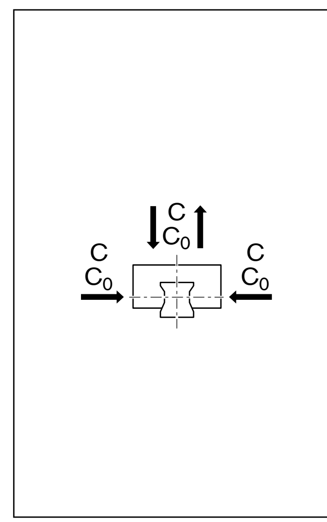
Definition of load capacities

Dynamic load capacity C

The radial load (whose extent and direction does not change) that a linear anti-friction bearing can theoretically absorb for a nominal life covering 10^5 m
(according to ISO 14728-1).
Note: The dynamic load capacities in the tables are above the ISO values. These values have been confirmed in tests.

Static load rating C_0

Static load in the load direction that corresponds to a calculated load in the center of the contact point with the greatest load between the rolling element and the track zone (rail) of 4000 MPa.
Note: With this stress at the contact point, permanent overall deformation of the rolling element and the track zone occurs that corresponds to about 0.0001 times the rolling element diameter (according to DIN ISO 14 728-1).



Definition of load moment capacities

Dynamic torsional moment load capacity M_t

Comparative dynamic moment around the longitudinal axis x, which causes a load equivalent to the dynamic load capacity C.

Static torsional moment load capacity M_{t0}

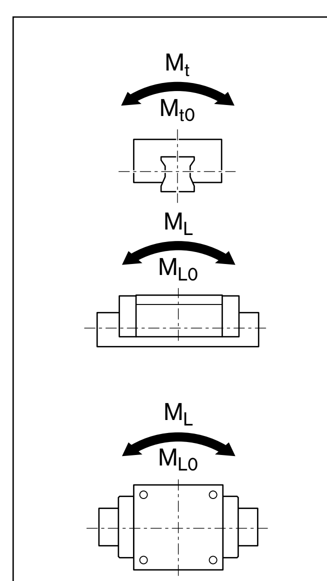
The comparable static moment around the longitudinal axis x, which causes a load corresponding to the static load capacity C_0.

Dynamic longitudinal moment load capacity M_L

The dynamic comparable dynamic moment around the transverse axis y or the vertical axis z that induces a load corresponding to the dynamic load capacity C.

Static longitudinal moment load capacity M_{L0}

The static comparable dynamic moment around the transverse axis y or the vertical axis z that induces a load corresponding to the static load capacity C_0.



Definition and calculation of the nominal life

The calculated service life which an individual linear rolling bearing or a group of apparently identical rolling element bearings operating under the same conditions can attain with a 90% probability using contemporary, commonly used materials and manufacturer quality under conventional operating conditions (according to DIN ISO 14 728-1).

Nominal life in meters

$$(1)\quad L_{10} = \left(\frac{C}{F_m}\right)^{10/3} \cdot 10^5\ \text{m}$$

Service life in operating hours with constant stroke and constant stroke repetition rate

$$(2)\quad L_{h\,10} = \frac{L_{10}}{2 \cdot s \cdot n \cdot 60}\ \text{h}$$

If the stroke length s and the stroke repetition rate n are constant over the total service life, you can use formula (2) to determine the service life in operating hours.

Nominal service life at variable travel speed

$$(3)\quad L_{h\,10} = \frac{L_{10}}{60 \cdot v_m}$$

As an alternative, it is possible to use formula (3) to calculate the service life in operating hours using the average travel speed v_m.

This average travel speed v_m is calculated with speeds that can be changed on a stepwise basis using discrete time steps q_{tn} of the individual load stages (4).

$$(4)\quad v_m = \frac{|v_1| \cdot q_{t1} + |v_2| \cdot q_{t2} + \ldots + |v_n| \cdot q_{tn}}{100\%}$$

Modified life expectancy

$$L_{na} = a_1 \cdot \left(\frac{C}{F_m}\right)^{10/3} \cdot 10^5\ \text{m}$$

$$L_{ha} = \frac{L_{na}}{2 \cdot s \cdot n \cdot 60}\ \text{h}$$

If a 90 percent requisite reliability is not enough, you must reduce the service life values by a factor of a_1 in accordance with the table below.

Requisite reliability (%)	L_{na}	**Factor a_1**
90	L_{10a}	1.00
95	L_{5a}	0.64
96	L_{4a}	0.55
97	L_{3a}	0.47
98	L_{2a}	0.37
99	L_{1a}	0.25

Notes

DIN ISO 14728-1 limits the validity of the formula (1) to dynamically equivalent loads $F_m < 0.5$. However, in our tests we verified that under ideal operating conditions this service life formula can be applied up to loads of $F_m = C$. Under some circumstances, with stroke lengths below 2 · Roller Runner Block length B_1 (see the dimension tables) a load rating reduction may be required. Please consult us.

General technical data and calculations

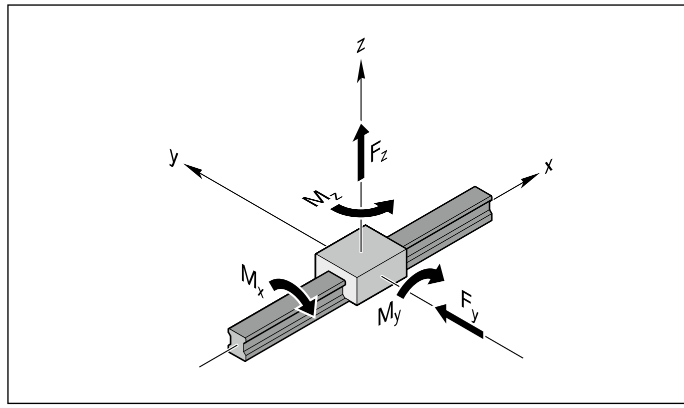
Load on bearing for calculating the service life

Combined equivalent bearing load
Using formula (5), you can combine all the partial loads that occur in a load case into one single comparison load. i.e. the combined equivalent load on bearing.

Notes
Including moments as stated in formula (5) only applies to an individual Roller Guide Rails with just one Roller Runner Block. The formula is simpler for other combinations.

The forces and moments plotted in the coordinate system can also have an effect in the opposite direction. Reduce an external load that affects the Roller Runner Block at any angle to F_y and F_z and insert the amounts into formula (5). The structure of the Roller Runner Block permits this simplified calculation.

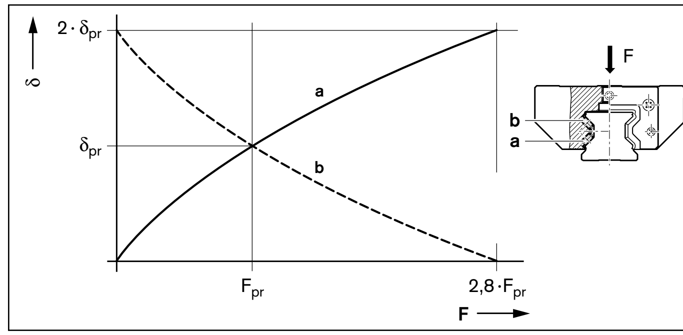
$$F_{comb} = |F_y| + |F_z| + C \cdot \frac{|M_x|}{M_t} + C \cdot \frac{|M_y|}{M_L} + C \cdot \frac{|M_z|}{M_L} \quad (5)$$



Considering the internal preload force F_{pr}

To increase the rigidity and precision of the guide system, it is advisable to use pre-tensioned Roller Runner Blocks (cf. "System preload selection criterion").

When using Roller Runner Blocks of preload classes C2 and C3, it may be necessary to consider the internal preload force; this is because both rows of rollers a and b are pre-tensioned against one another by a specific oversize at an internal preload force F_{pr} and deform by the amount δ_{pr} (see the diagram).



a = Loaded (lower) row of rollers
b = Non-loaded (upper) row of rollers
δ = Deformation of the rollers at F
δ_{pr} = Deformation of the rollers at F_{pr}
F = Load on the Roller Runner Block
F_{pr} = Internal preload force

Effective equivalent load on bearing

From an external load amounting to 2.8 times the internal preload force F_{pr} onward, a row of rollers becomes preload-free.

Note

Under highly dynamic load conditions, the combined equivalent bearing load should be $F_{comb} < 2.8 \cdot F_{pr}$ to prevent damage to anti-friction bearings due to slippage.

$$(6) \quad F_{eff} = F_{comb}$$

Case 1

$F_{comb} > 2.8 \cdot F_{pr}$

In this case, the internal preload force F_{pr} does not affect the service life.

$$(7) \quad F_{eff} = \left(\frac{F_{comb}}{2.8 \cdot F_{pr}} + 1\right)^{3/2} \cdot F_{pr}$$

Case 2

$F_{comb} \le 2.8 \cdot F_{pr}$

The preload force F_{pr} is included in the calculation of the effective equivalent load on bearing.

General technical data and calculations

Dynamic equivalent load on bearing

The determination of the dynamic equivalent load on bearing F_m for the calculation of the service life is implemented according to track ratios q_{sn} according to formula (8).

$$(8)\quad F_m = \sqrt[\frac{10}{3}]{(F_{eff\,1})^{\frac{10}{3}} \cdot \frac{q_{s1}}{100\,\%} + (F_{eff\,2})^{\frac{10}{3}} \cdot \frac{q_{s2}}{100\,\%} + \ldots + (F_{eff\,n})^{\frac{10}{3}} \cdot \frac{q_{sn}}{100\,\%}}$$

Equivalent static load on bearing

With a combined vertical and horizontal external static load in conjunction with a static torsional or longitudinal moment, calculate the static equivalent load on bearing $F_{0\,comb}$ according to formula (9).

$$(9)\quad F_{0\,comb} = |F_{0y}| + |F_{0z}| + C_0 \cdot \frac{|M_{0x}|}{M_{t0}} + C_0 \cdot \frac{|M_{0y}|}{M_{L0}} + C_0 \cdot \frac{|M_{0z}|}{M_{L0}}$$

Notes

The static equivalent load on bearing $F_{0\,comb}$ must not exceed the static load capacity C_0. Formula (9) only applies when using a single Roller Guide Rail.

Reduce an external load that affects the Roller Runner Block at any angle to F_{0y} and F_{0z} and insert the amounts into formula (9).

Definitions and calculation for dynamic and static load ratios

Using the ratio of load rating to load of the Roller Runner Block, you can make a preselection of the guideway. The dynamic loading ratio C/F_{max} and the static loading ratio $C_0/F_{0\,max}$ should be selected according to the application. The necessary load ratings are calculated from this. The load rating overview yields the corresponding dimensions and format.

Recommended values for load ratios

The table below contains guideline values for the load ratios.

The values are offered merely as a rough guide reflecting typical customer requirements (e.g. service life, accuracy, rigidity) by sector and application.

$$\text{Dynamic ratio} = \frac{C}{F_{max}}$$

Case 1: Static load $F_{0\,max} > F_{max}$:

$$\text{Static ratio} = \frac{C_0}{F_{0\,max}}$$

Case 2: Static load $F_{0\,max} < F_{max}$:

$$\text{Static ratio} = \frac{C_0}{F_{max}}$$

Machine type/sector	**Application example**	**C/F_{max}**	**$C_0/F_{0\,max}$**
Machine tools	General	6 ... 9	> 4
	Turning	6 ... 7	> 4
	Milling	6 ... 7	> 4
	Grinding	9 ... 10	> 4
	Engraving	5	> 3
Rubber and plastics processing machinery	Injection molding	8	> 2
Woodworking and wood processing machines	Sawing, milling	5	> 3
Area of mounting/handling technology and industrial robots	Handling	5	> 3
Oil hydraulics and pneumatics	Raising/lowering	6	> 4

Static load safety factor S_0

You must verify mathematically any structural design involving rolling contact with regard to the static load safety factor. The static load safety factor for a linear guide results from the following equation:

$$S_0 = \frac{C_0}{F_{0\,max}} \qquad (10)$$

In this connection, $F_{0\,max}$ represents the maximum load amplitude that can occur, which can affect the linear guide. It does not matter whether this load is exerted only for a short period. It may represent the peak amplitude of an overall dynamic loading. For dimensioning, the data shown in the table applies.

Conditions of use	Static load safety factor S_0
Overhead arrangements and applications representing a high hazard potential	≥ 12
High dynamic load when at standstill, contamination.	8 – 12
Normal dimensioning of machinery and plant without full knowledge of the load parameters or connection details.	5 – 8
Full knowledge of all the load data. Vibration-free operation is ensured.	3 – 5
If there are health and safety hazards, paragraph 5.1.3 of DIN 637 is to be observed.	

Key to formulas

Formula	Unit	Designation
a_1	–	Likeliness of experience factor
C	N	Dynamic load capacity
C_0	N	Static load capacity
F_{max}	N	Maximum dynamic load
$F_{0\,max}$	N	Maximum static load
F_{comb}	N	Combined equivalent bearing load
$F_{0\,comb}$	N	Equivalent static load on bearing
F_{eff}	N	Effective equivalent load on bearing
$F_{eff\,1-n}$	N	Uniform effective individual loads
F_m	N	Dynamic equivalent load on bearing
F_{pr}	N	Preload force
F_y	N	External load due to a resulting force in the y-direction
F_{0y}	N	External load due to a static force in the y-direction
F_z	N	External load due to a resulting force in the z-direction
F_{0z}	N	External load due to a static force in the z-direction
M_t	Nm	Dynamic torsional moment load capacity[1]
M_{t0}	Nm	Static torsional moment load capacity[1]
M_L	Nm	Dynamic longitudinal moment load capacity[1]
M_{L0}	Nm	Static longitudinal moment load capacity[1]

Formula	Unit	Designation
M_x	Nm	Load due to the resultant moment around the x-axis
M_{0x}	Nm	Load due to the static moment around the x-axis
M_y	Nm	Load due to the resultant moment around the y-axis
M_{0y}	Nm	Load due to the static moment around the y-axis
M_z	Nm	Load due to the resultant moment around the z-axis
M_{0z}	Nm	Load due to the static moment around the z-axis
L_{10}	m	Nominal life (travel range)
$L_{h\,10}$	h	Nominal life (time)
L_{na}	m	Modified life expectancy (travel range)
L_{ha}	h	Modified life expectancy (time)
n	min^{-1}	Stroke repetition rate (full cycles)
s	m	Stroke length
S_0	–	Static load safety factor
v_m	m/min	Average linear speed
v_1 ... v_n	m/min	Travel speeds of phases 1 ... n
q_{t1} ... q_{tn}	%	Discrete time steps for v_1 ... v_n of phases 1 ... n
q_{s1} ... q_{sn}	%	Travel portions for phases 1 ... n

1) Refer to the table for the values

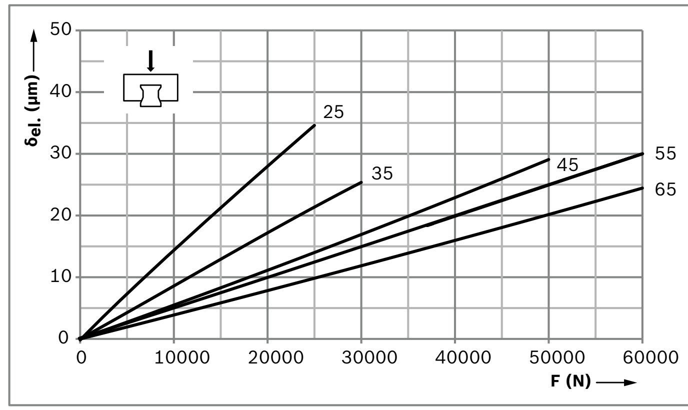
Rigidity of FNS Standard Roller Runner Block

Rigidity of Roller Rail System for preload C2
Standard FNS R1851 Roller Runner Block

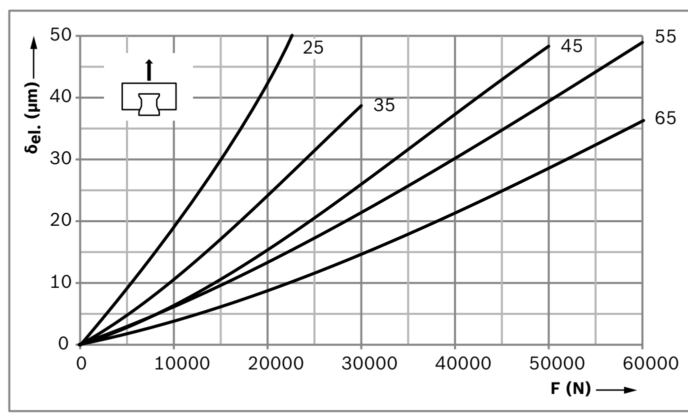
Roller Runner Block mounted with 6 screws:

- Externally with 4 screws of strength class 12.9
- In the middle with 2 screws of strength class 8.8

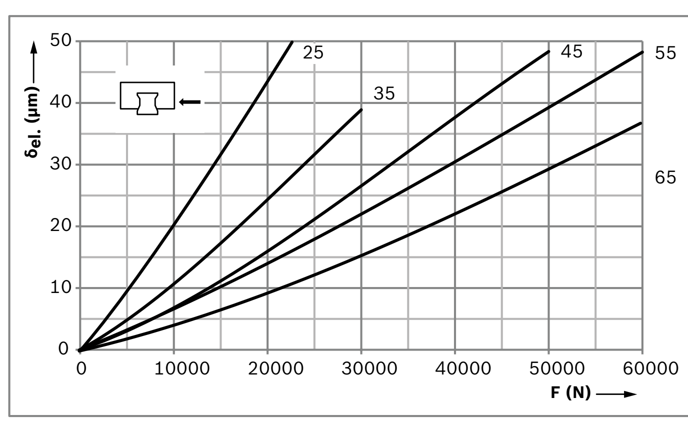
Down load



Lift-off load



Side load



Preload class
C2 = Preload (acc. to Preload force F_{pr} table)

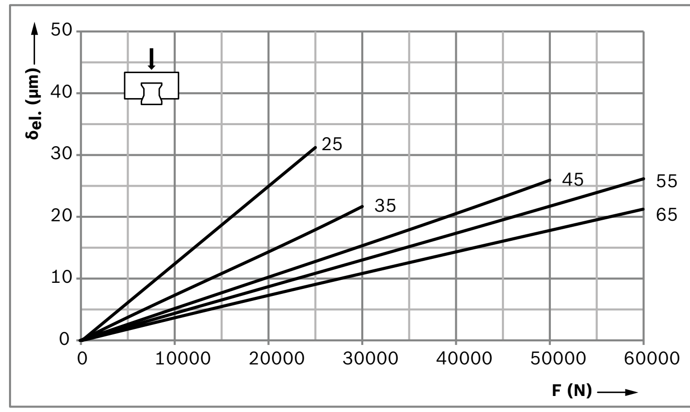
Key to illustration
$\delta_{el.}$ = Elastic deformation (μm)
F = Load (N)

Rigidity of Roller Rail System for preload C3
Standard FNS R1851 Roller Runner Block

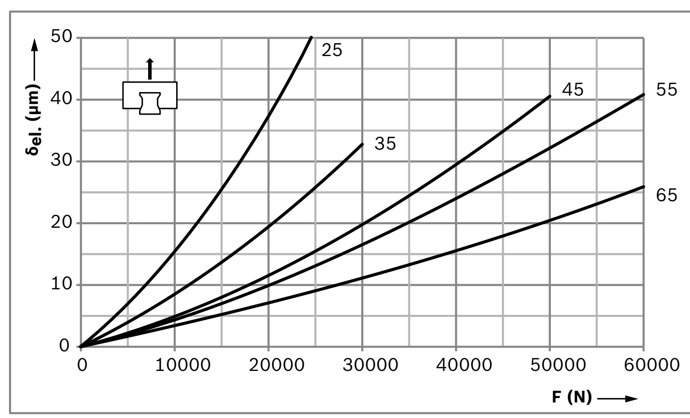
Roller Runner Block mounted with 6 screws:

- Externally with 4 screws of strength class 12.9
- In the middle with 2 screws of strength class 8.8

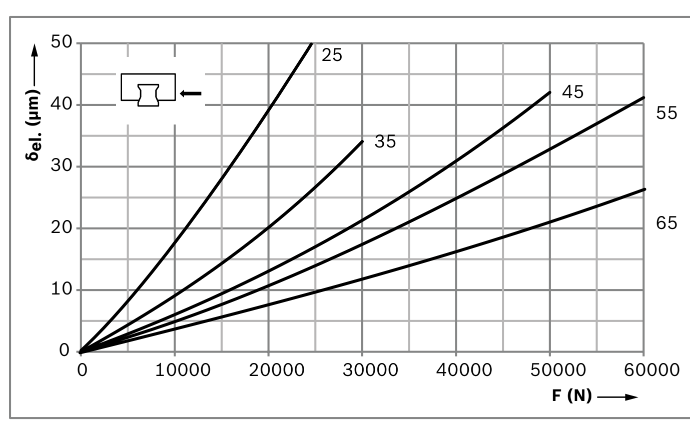
Down load



Lift-off load



Side load



Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

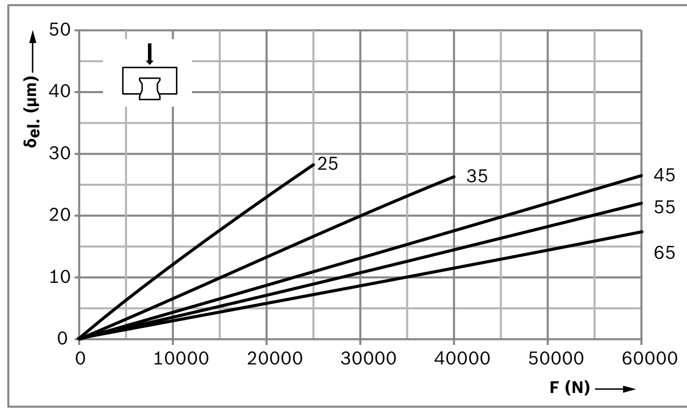
Rigidity of FLS Standard Roller Runner Block

Rigidity of Roller Rail System for preload C2
Standard FLS R1853 Roller Runner Block

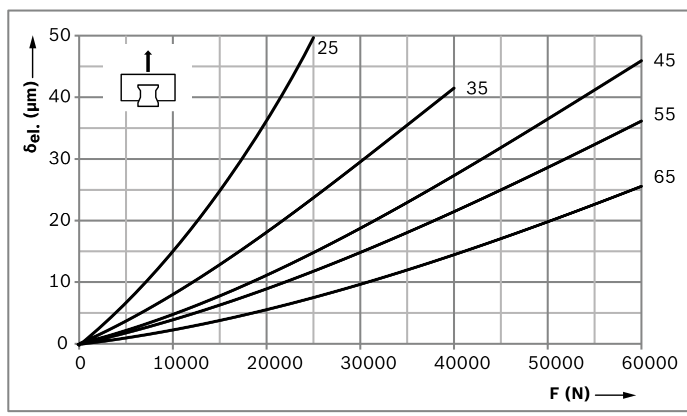
Roller Runner Block mounted with 6 screws:

- Externally with 4 screws of strength class 12.9
- In the middle with 2 screws of strength class 8.8

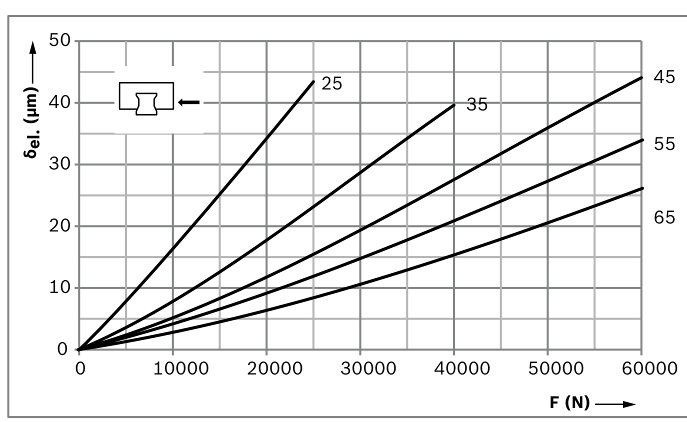
Down load



Lift-off load



Side load



Preload class
C2 = Preload (acc. to Preload force F_{pr} table)

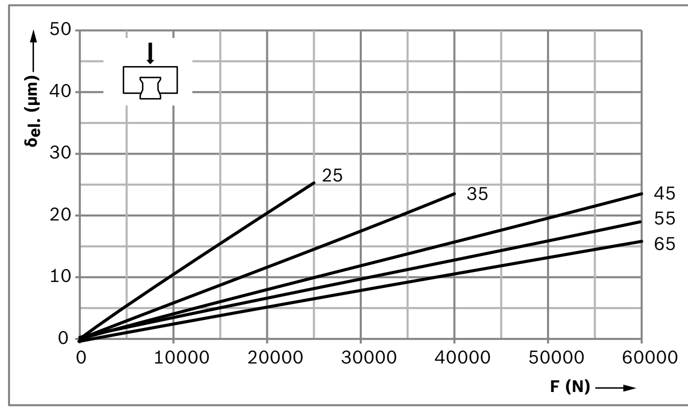
Key to illustration
$\delta_{el.}$ = Elastic deformation (μm)
F = Load (N)

Rigidity of Roller Rail System for preload C3
Standard FLS R1853 Roller Runner Block

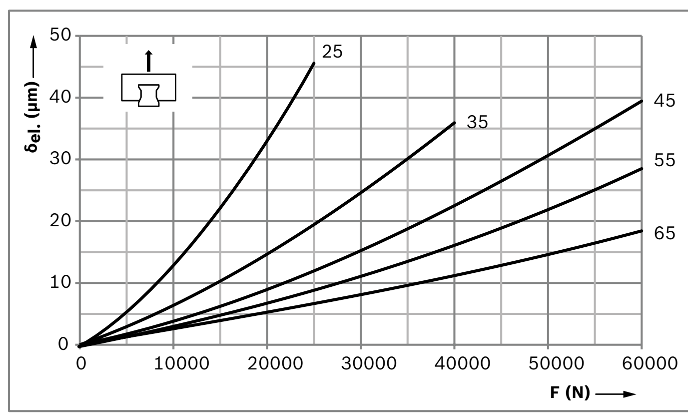
Roller Runner Block mounted with 6 screws:

- Externally with 4 screws of strength class 12.9
- In the middle with 2 screws of strength class 8.8

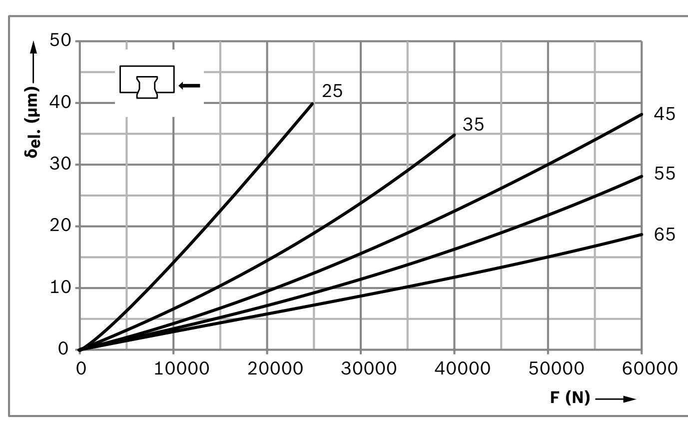
Down load



Lift-off load



Side load



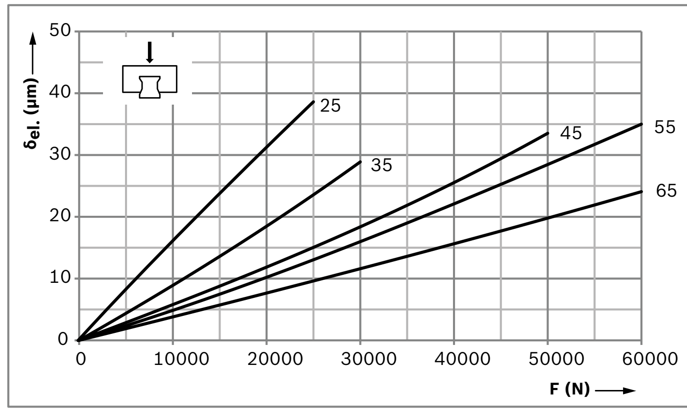
Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

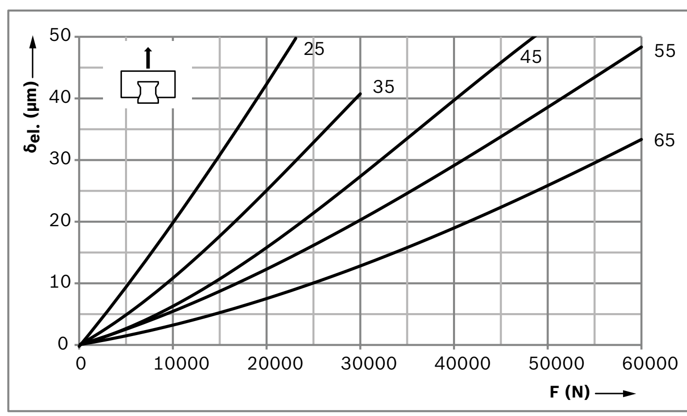
Rigidity of SNS/SNH Standard Roller Runner Block

Rigidity of Roller Rail System for preload C2
SNS R1822 / SNH R1821 Standard Roller Runner Blocks
Roller Runner Block mounted with 6 screws of strength class 12.9

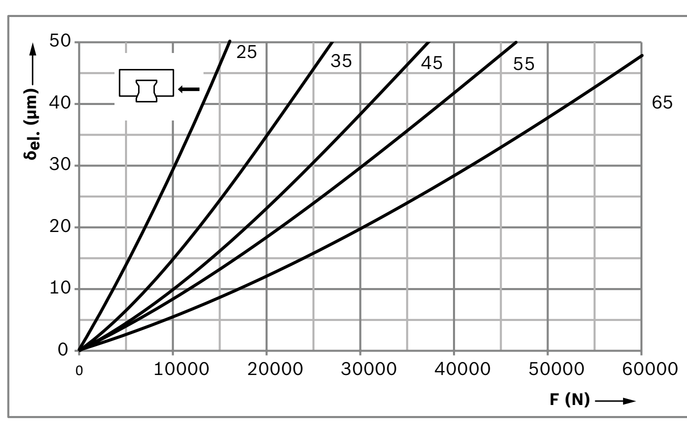
Down load



Lift-off load



Side load



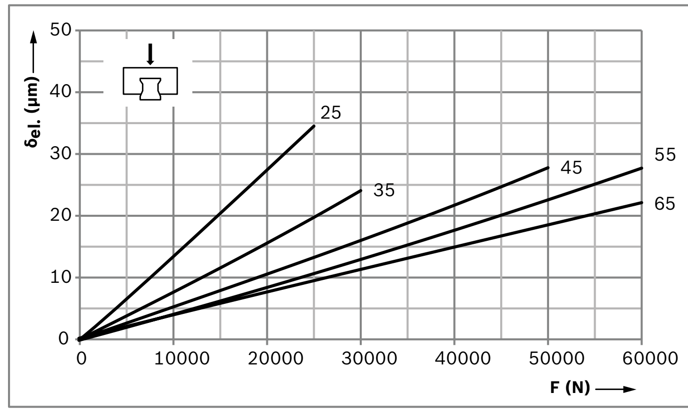
Preload class
C2 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (μm)
F = Load (N)

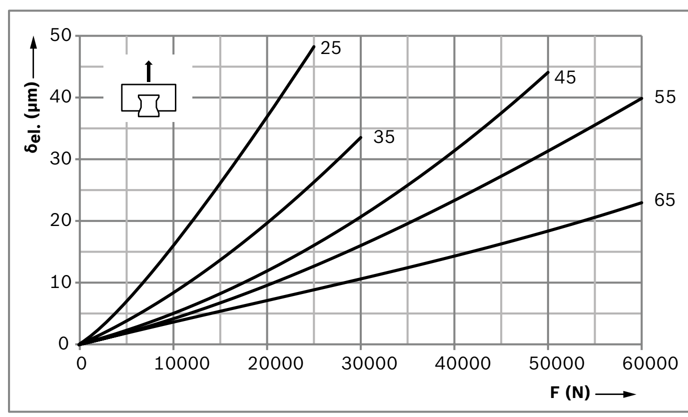
Rigidity of Roller Rail System for preload C3
SNS R1822 / SNH R1821 Standard Roller Runner Blocks

Roller Runner Block mounted with 6 screws of strength class 12.9

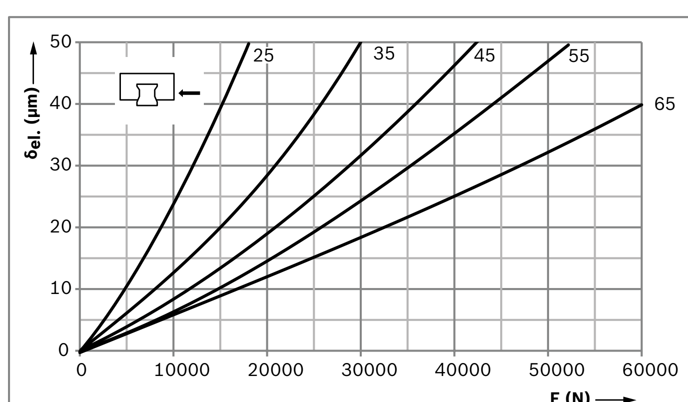
Down load



Lift-off load



Side load



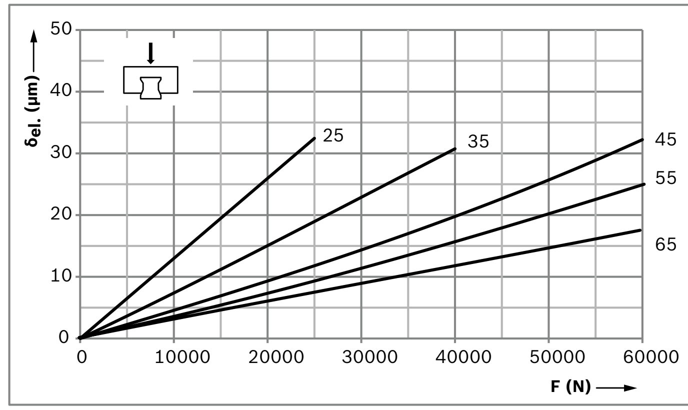
Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

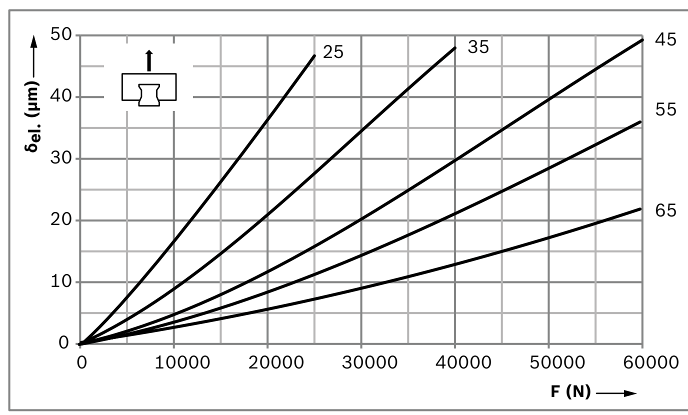
Rigidity of SLS/SLH Standard Roller Runner Block

Rigidity of Roller Rail System for preload C2
SLS R1823/SLH R1824 Standard Roller Runner Blocks
Roller Runner Block mounted with 6 screws of strength class 12.9

Down load



Lift-off load



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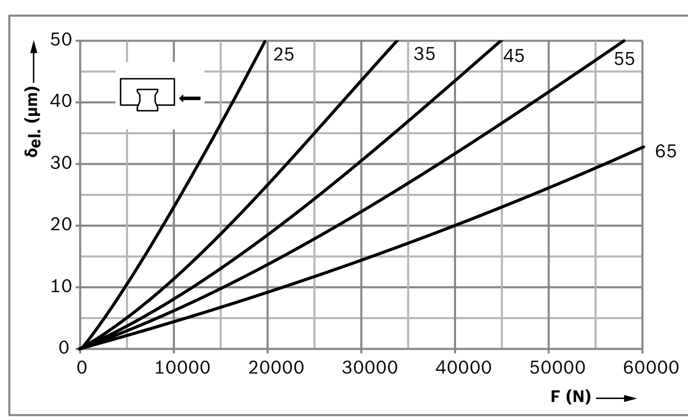
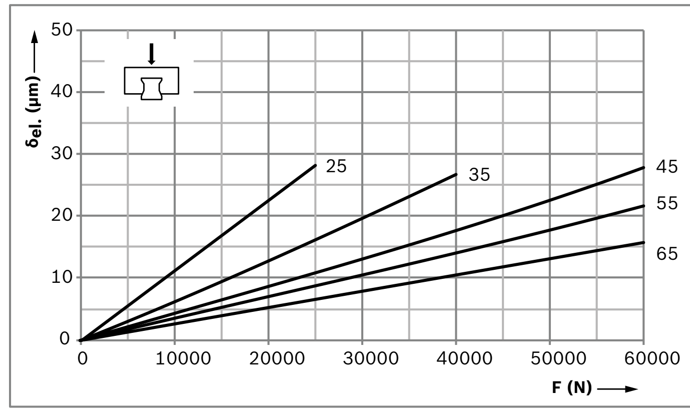


Preload class
C2 = Preload (acc. to Preload force F_{pr} table)

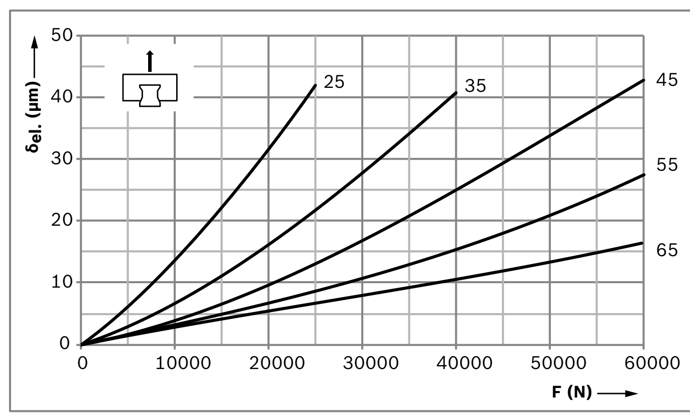
Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

Rigidity of Roller Rail System for preload C3
SLS R1823/SLH R1824 Standard Roller Runner Blocks
Roller Runner Block mounted with 6 screws of strength class 12.9

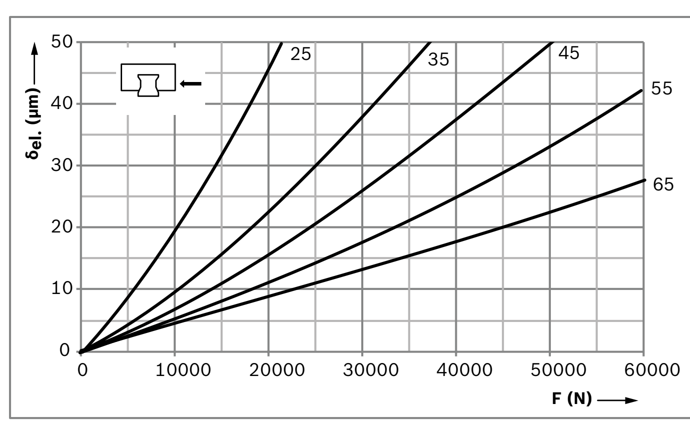
Down load



Lift-off load



Side load



Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

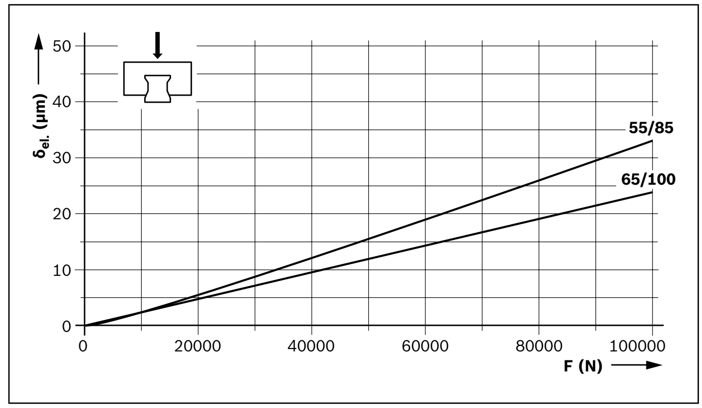
Rigidity of BLS Wide Roller Runner Block

Rigidity of Roller Rail System for preload C2
BLS R1872 Wide Roller Runner Blocks

Roller Runner Block mounted with 8 screws:

- Only reference edges at top are used
- All screws of strength class 12.9

Down load



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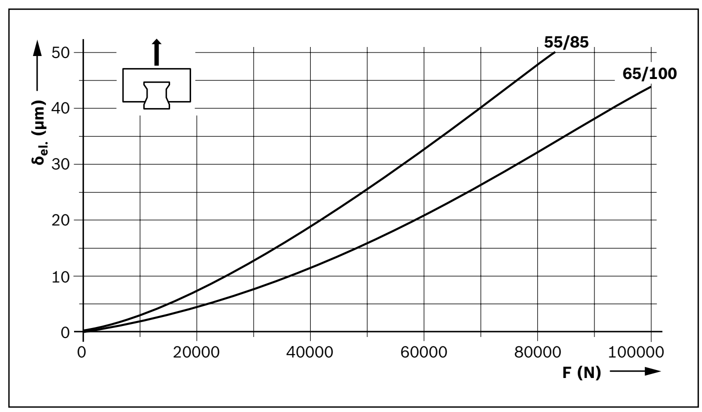

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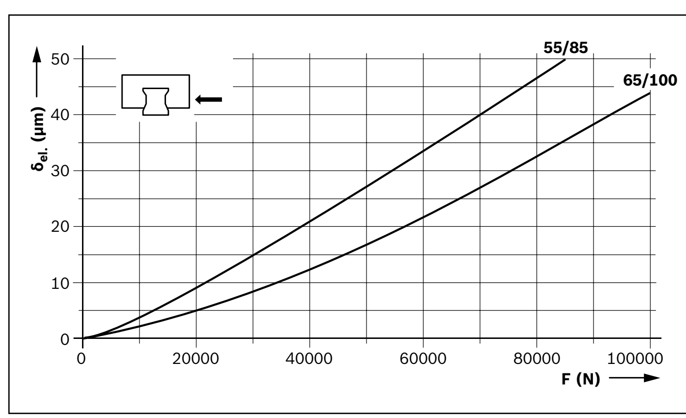


Preload class
C2 = Preload (acc. to Preload force F_{pr} table)

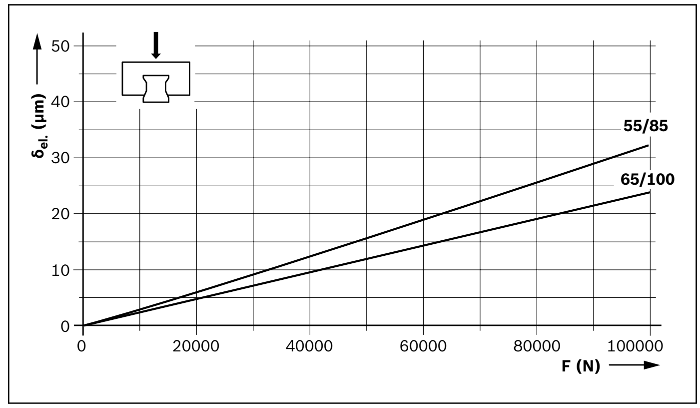
Key to illustration
$\delta_{el.}$ = Elastic deformation (μm)
F = Load (N)

Rigidity of Roller Rail System for preload C2
BLS R1872 Wide Roller Runner Blocks

Roller Runner Block mounted with 8 screws:

- All 4 reference edges at top and bottom are used
- All screws of strength class 12.9

Down load



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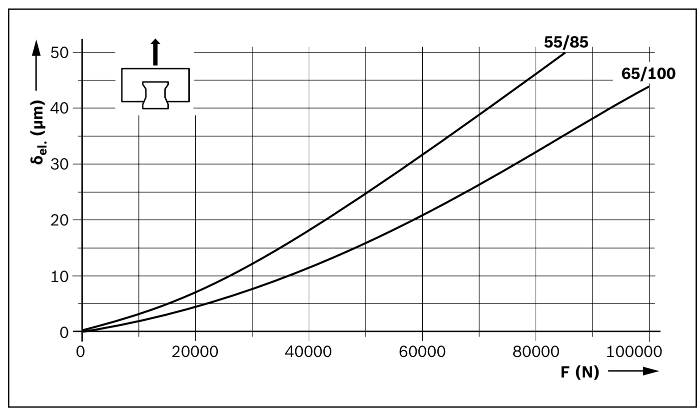

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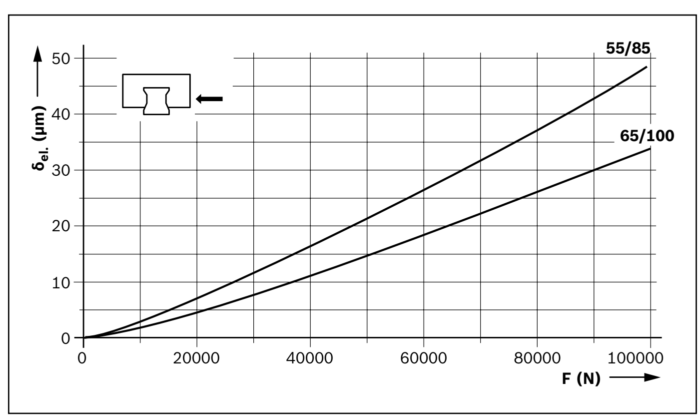


Preload class
C2 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

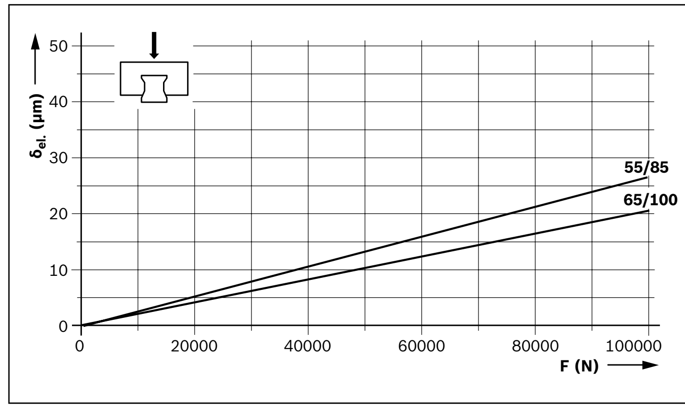
Rigidity of BLS Wide Roller Runner Block

Rigidity of Roller Rail System for preload C3
BLS R1872 Wide Roller Runner Blocks

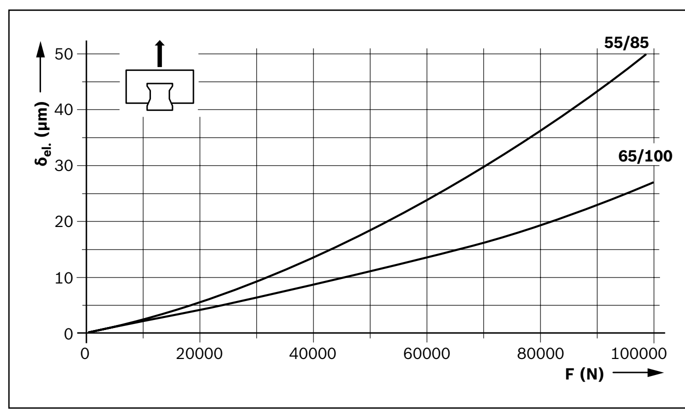
Roller Runner Block mounted with 8 screws:

- Only reference edges at top are used
- All screws of strength class 12.9

Down load



Lift-off load



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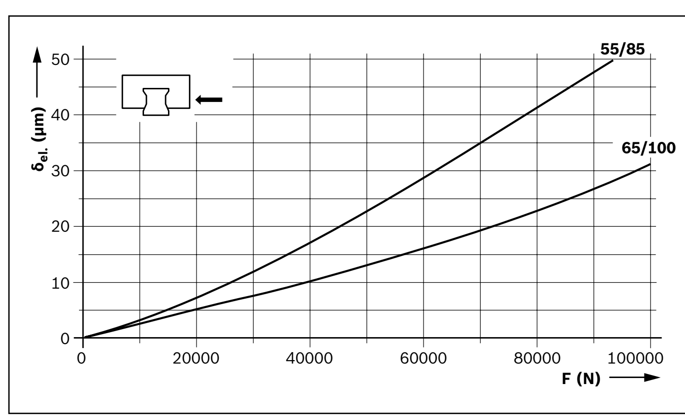


Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

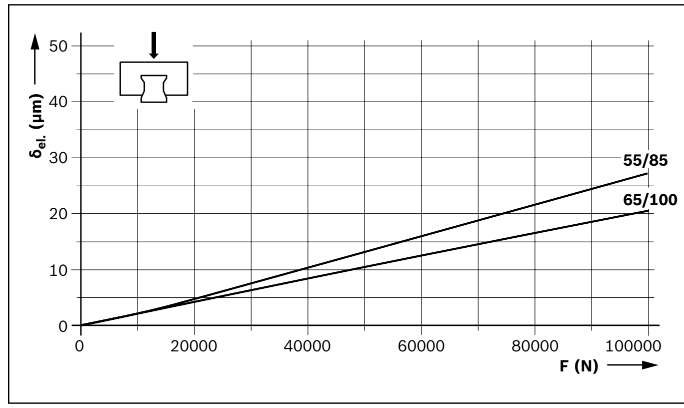
Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

Rigidity of Roller Rail System for preload C3
BLS R1872 Wide Roller Runner Blocks

Roller Runner Block mounted with 8 screws:

- All 4 reference edges at top and bottom are used
- All screws of strength class 12.9

Down load



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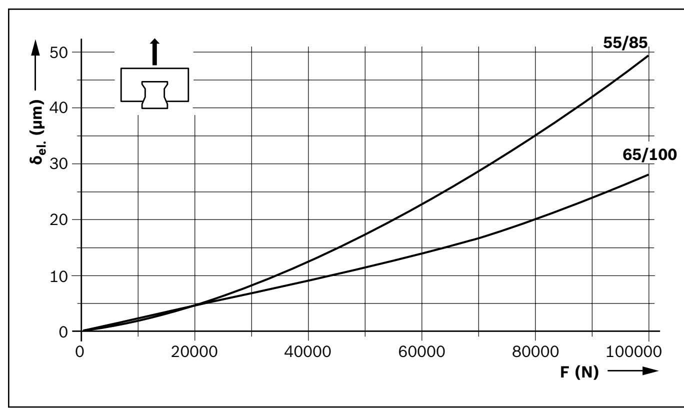

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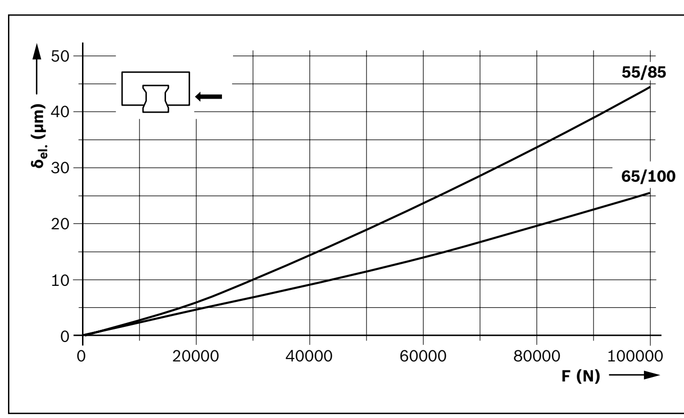


Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (μm)
F = Load (N)

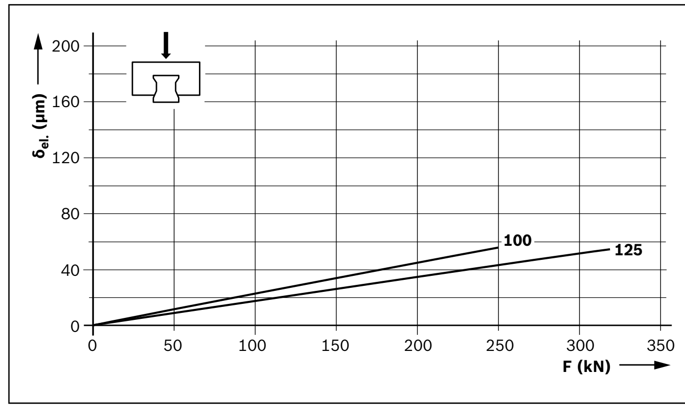
Rigidity of FNS Heavy-Duty Roller Runner Block

Rigidity of Roller Rail System for preload C3
FNS R1861 Heavy-Duty Roller Runner Block

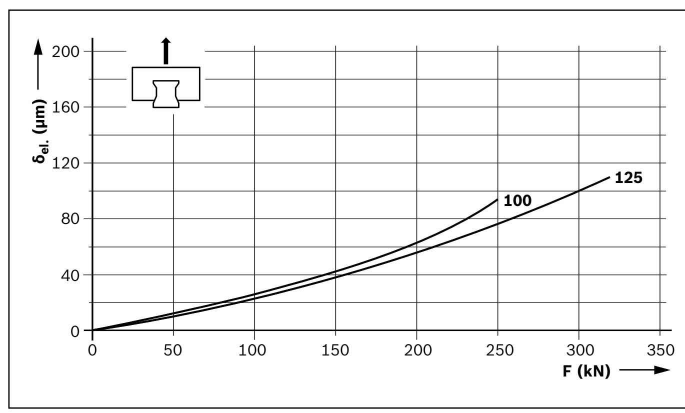
Roller Runner Block mounted with 9 screws:

- Externally with 6 screws of strength class 12.9
- Centrally with 3 screws of strength class 8.8

Down load



Lift-off load



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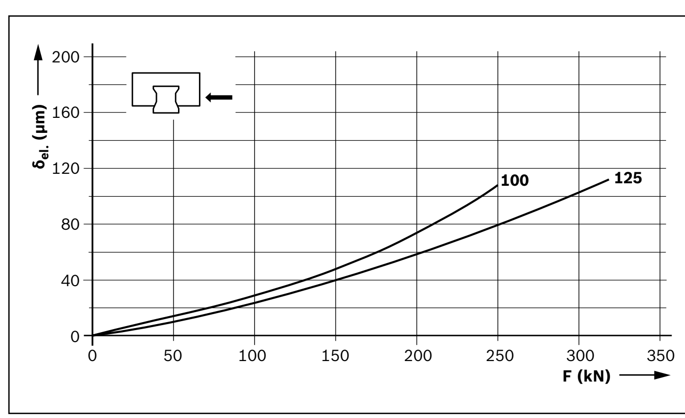


Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

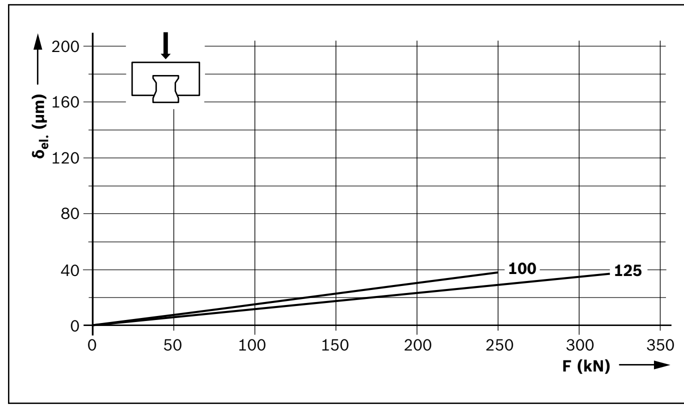
Rigidity of FLS Heavy-Duty Roller Runner Block

Rigidity of Roller Rail System for preload C3
FLS R1863 Heavy-Duty Roller Runner Block

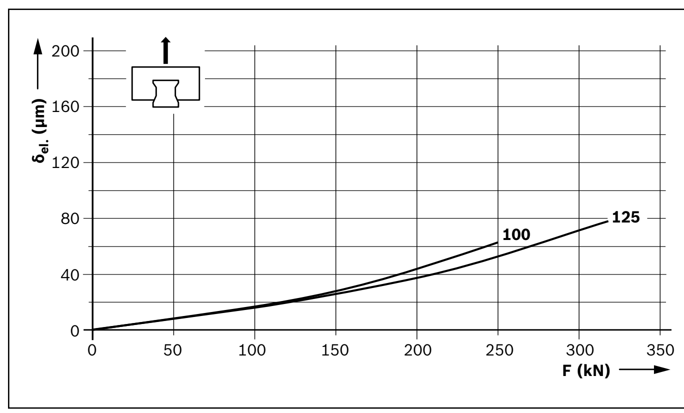
Roller Runner Block mounted with 9 screws:

- Externally with 6 screws of strength class 12.9
- Centrally with 3 screws of strength class 8.8

Down load



Lift-off load



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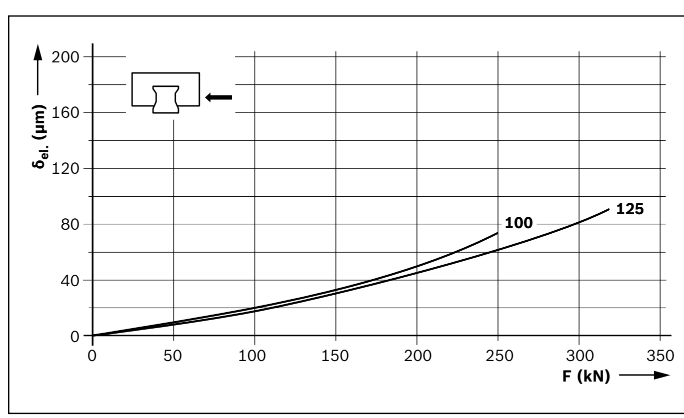


Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

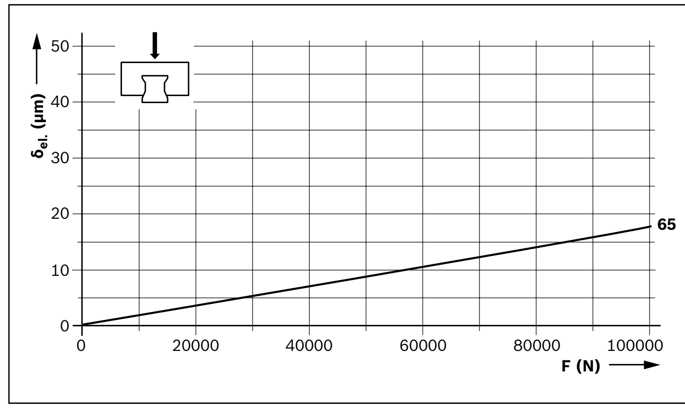
Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

Rigidity of FXS Heavy-Duty Roller Runner Block

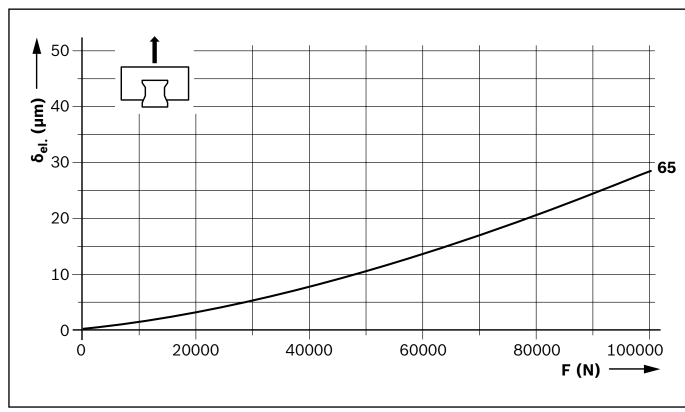
Rigidity of Roller Rail System for preload C2
FXS R1854 Heavy-Duty Roller Runner Block
Roller Runner Block mounted with

- 4 screws, strength class 12.9
- 2 screws, strength class 8.8

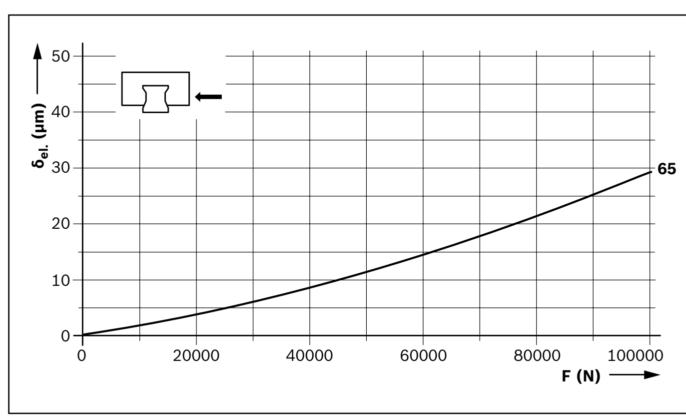
Down load



Lift-off load



Side load



Preload class
C2 = Preload (acc. to Preload force F_{pr} table)

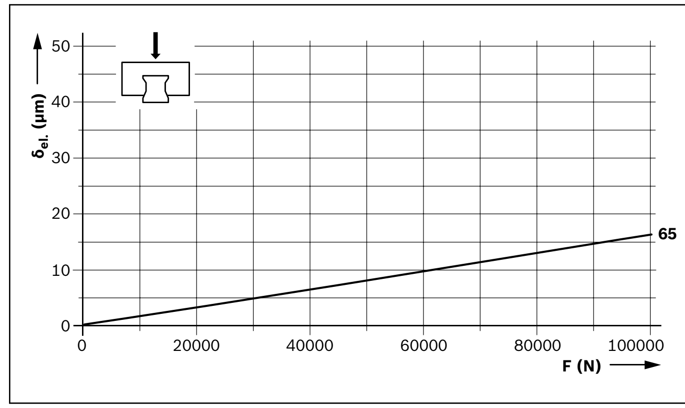
Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

Rigidity of Roller Rail System for preload C3
FXS R1854 Heavy-Duty Roller Runner Block

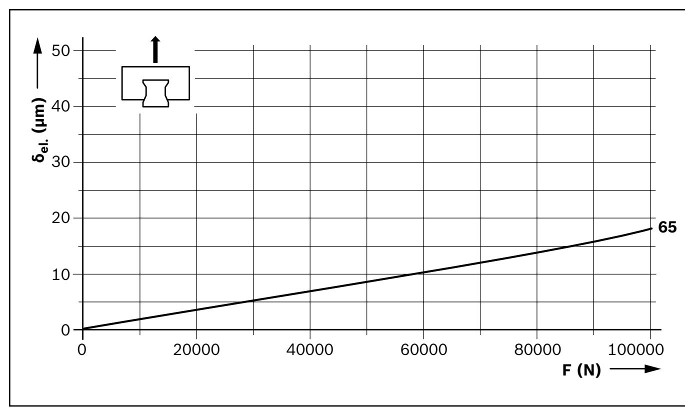
Roller Runner Block mounted with

- 4 screws, strength class 12.9
- 2 screws, strength class 8.8

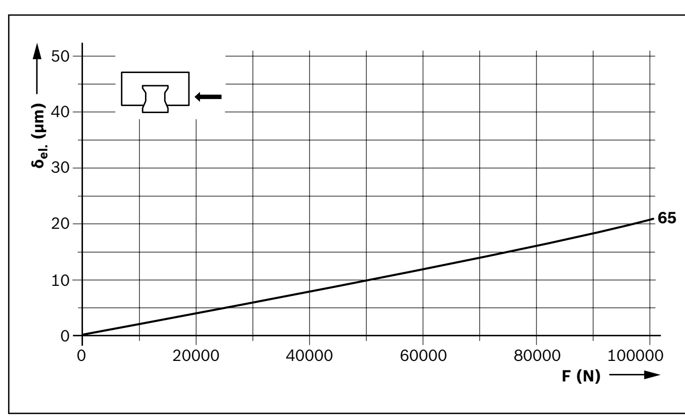
Down load



Lift-off load



Side load



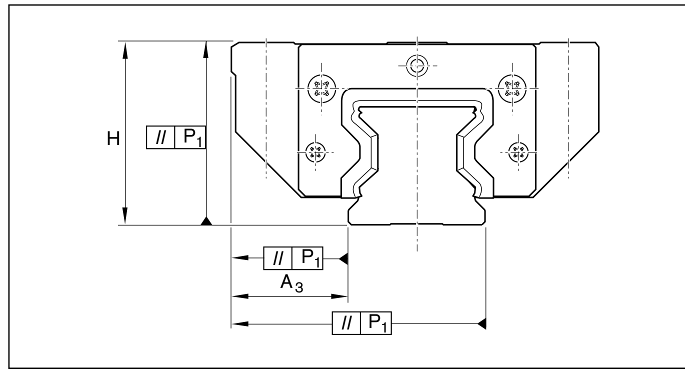
Preload class
C3 = Preload (acc. to Preload force F_{pr} table)

Key to illustration
$\delta_{el.}$ = Elastic deformation (µm)
F = Load (N)

Accuracy classes

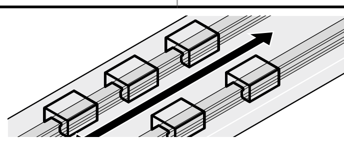
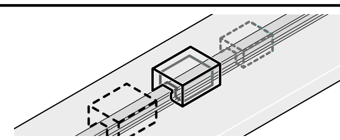
Accuracy classes and their tolerances for Standard Roller Rail Systems

Up to five accuracy classes apply to Standard Roller Rail Systems.
Up to three accuracy classes apply to Heavy-Duty Roller Rail Systems
For details on the available Roller Runner Block and Roller Guide Rails, please refer to the table with "material numbers".



Precision manufacturing process makes interchangeability easy
Rexroth manufactures its Roller Guide Rails and Roller Runner Blocks with such high precision, especially in the roller track zone, that each individual component element is fully interchangeable.

For example, a Roller Runner Block may be used without any problems on various Roller Guide Rails of the same size. Similarly, different Roller Runner Blocks may also be used on one and the same Roller Guide Rail.

	H,	A_3	ΔH, ΔA_3
			
Measured in middle of runner block	For any Roller Runner Block/Roller Guide Rail combinations over the total rail length		For different Roller Runner Blocks in the same rail position

Standard and Heavy-Duty Roller Rail Systems made of steel

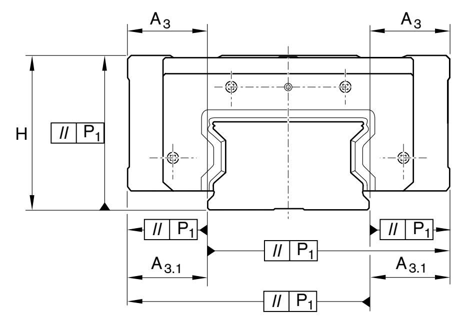
Accuracy classes	Tolerances of the dimensions (μm)		Max. differences of dimensions H and A_3 on one rail (μm)
	H	A_3	ΔH, ΔA_3
H	±40	±20	15
P	±20	±10	7
SP	±10	±7	5
GP[1)]	(±10) 10	±7	5
UP	±5	±5	3

1) Dimension H: (±10) sorted by height (GP) to 10 μm (see "Combination of accuracy classes")

Standard and Heavy-Duty Resist CR Roller Rail Systems, hard chrome plated

Accuracy classes	Tolerances of the dimensions (μm)				Max. differences of dimensions H and A_3 on one rail (μm)	
	H		A_3		ΔH, ΔA_3	
	RW/RS	RS	RW/RS	RS	RW/RS	RS
H	+47 −38	+44 −39	± 23	+19 −24	18	15
P	+27 −18	+24 −19	±13	+9 −14	10	7
SP	+17 8	+14 9	±10	+6 −11	8	5

Accuracy classes and their tolerances for Wide Roller Rail Systems



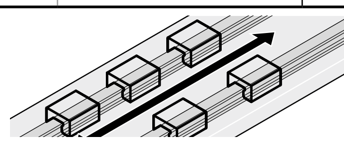
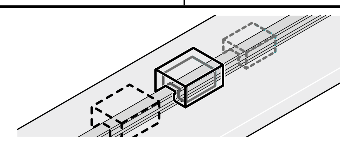
Wide Roller Rail Systems are available in up to three accuracy classes. For details on the available Roller Runner Block and Roller Guide Rails, please refer to the table with "material numbers".

Key to illustration

H = Height tolerance (µm)
A_3 = Side tolerance (µm)
P_1 = Parallelism offset (µm)
L = Rail length (mm)

Abbreviations

RW/RS = Roller Runner Block and Roller Guide Rail, hard chrome plated
RS = Only Roller Guide Rail hard chrome plated

	H	**A_3**	**$A_{3.1}$**	**$\Delta H, \Delta A_3$**	**$\Delta A_{3.1}$**
					
Measured in middle of runner block	For any Roller Runner Block/Roller Guide Rail combinations over the total rail length			For different Roller Runner Blocks in the same rail position	

Wide Roller Rail Systems made of steel

Accuracy classes	**Tolerances of the dimensions (µm)**			**Max. differences of dimensions H and A_3 on one rail (µm)**	
	H	**A_3**	**$A_{3.1}$**	**$\Delta H, \Delta A_3$**	**$\Delta A_{3.1}$**
H	±40	±20	+26/−24	15	17
P	±20	±10	+15/−13	7	9
SP	±10	±7	+12/−10	5	7

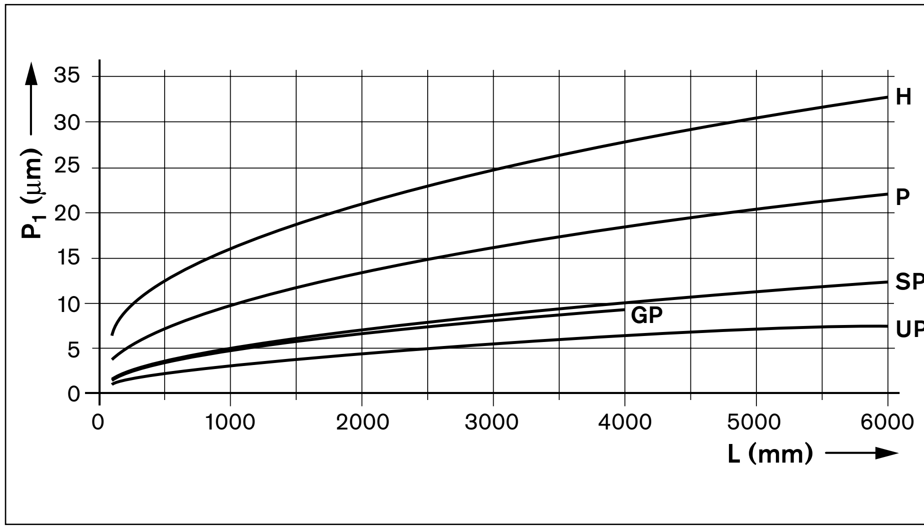
Resist CR Wide Roller Rail Systems, hard chrome plated

Accuracy classes	**Tolerances of the dimensions (µm)**						**Max. differences of dimensions H and A_3 on one rail (µm)**			
	H		**A_3**		**$A_{3.1}$**		**ΔH, ΔA3**		**ΔA3.1**	
	RW/RS	**RS**	**RW/RS**	**RS**	**RW/RS**	**RS**	**RW/RS**	**RS**	**RW/RS**	**RS**
H	+47 −38	+44 −39	± 23	+19 −24	+29 −27	+25 −28	18	15	20	17
P	+27 −18	+24 −19	±13	+9 −14	+18 −16	+14 −17	10	7	12	9
SP	+17 8	+14 9	±10	+9 −14	+18 −16	+14 −17	10	7	12	9

Accuracy classes

Parallelism offset P_1 of the Roller Rail System in operation

Values measured in middle of Runner Block with Roller Rail Systems without surface coating
For hard chrome plated Roller Guide Rails, the values can increase up to 2 µm.



Key to illustration
P_1 = Parallelism offset (µm)
L = Rail length (mm)

Combinations of accuracy classes

Tolerances for combination of accuracy classes

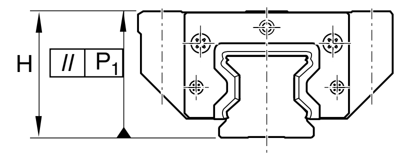
Accuracy classes Roller Runner Block	Tolerances of the dimensions (µm)	Accuracy classes for Roller Guide Rails				
		H	**P**	**SP**	**GP**	**UP**
H	Tolerance of dimension H	±40	±24	±15	±10	±11
	Tolerance of dimension A_3	±20	±14	±12	±12	±11
	Max. diff. dimensions H and A_3 on one rail	15	15	15	15	15
P	Tolerance of dimension H	±36	±20	±11	±6	±7
	Tolerance of dimension A_3	±16	±10	±8	±8	±7
	Max. diff. dimensions H and A_3 on one rail	7	7	7	7	7
SP	Tolerance of dimension H	±35	±19	±10	(±10)[1)] ±5	±6
	Tolerance of dimension A_3	±15	±9	±7	±7	±6
	Max. diff. dimensions H and A_3 on one rail	5	5	5	5	5
UP	Tolerance of dimension H	±34	±18	±9	±4	±5
	Tolerance of dimension A_3	±14	±8	±6	±6	±5
	Max. diff. dimensions H and A_3 on one rail	3	3	3	3	3

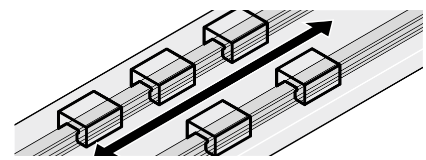
1) Dimension H: (±10) sorted by height (GP) to 10 µm (see "Combination: SP Roller Runner Block with GP Roller Guide Rails")

Combination: SP Roller Runner Block with GP Roller Guide Rails

Dimension H: (±10) sorted by height (GP) to ±5 ... 10 µm: Valid with an arbitrary combination of Roller Runner Blocks of accuracy class SP and Roller Guide Rails R1805 .68 .. with the same sorting, e.g. $-1^{\pm 2,5}$ µm, over the total rail length. Sorting markings on the Roller Guide Rail and the additional label, e.g. GP-1, GP +3 etc.
Indicate the number of pieces per sorting with your order, e.g. 2 pieces per sorting.

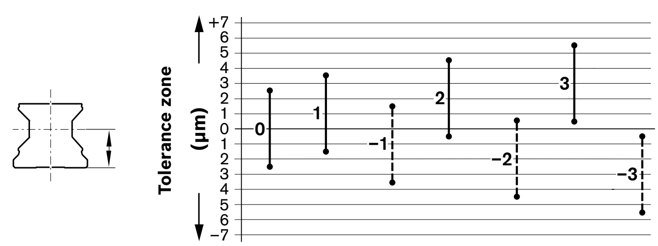
Tolerances for dimension H





Measured in middle of Runner Block over the total rail length

Height sorting of Roller Guide Rails



Recommendations for combining accuracy classes

Recommended with small Roller Runner Block distances and short strokes:
Roller Runner Block in higher accuracy class than Roller Guide Rail.
Recommended with relatively large Roller Runner Block distances and long strokes:
Roller Guide Rail in a higher accuracy class than Roller Runner Block.

Caution
For Resist CR Roller Runner Blocks and Roller Guide Rails, hard chrome plated, deviating tolerances of the dimensions H and A_3 (see "Accuracy classes and their tolerances").

Travel accuracy

By means of perfectly optimized roller entry and roller exit zones in the Roller Runner Block and the optimized screw-on partition in the Roller Guide Rails, a very high travel accuracy with the lowest pulsation is achieved.

Particularly suitable for highly precise, chipping processing, measuring technique, high-precision scanners, eroding technology etc.

Preload

Definition of preload class

Preload force, based on the dynamic load capacity rating C of the particular Roller Runner Block.

Selection of the preload class

Code	Application area
C1 **C4** **C5**	Customization upon request
C2	For guide systems with both high external loading and high demands on overall rigidity; also recommended for single-rail systems. Above average moment loads can be absorbed without significant elastic deflection. Further improved overall rigidity with only medium moment loads.
C3	For highly rigid guide systems, e.g. precision tooling machines etc. Above-average loads and moments are caught with the lowest possible elastic deformation. Roller Runner Block with preload C3 only available in the accuracy classes P, SP (GP) and UP.

Preload force F_{pr}

Roller Runner Block			**Size**	**25**	**35**	**45**	**55**	**65**	**100**	**125**
		Format	**Preload class**	**Preload force F_{pr} (N)**						
Standard Roller Runner Block made of steel[1] **and Resist CR**[2]	R1851 R1822 R1821 R1861	FNS SNS SNH	C1	830	1680	2930	3860	6520		
			C2	2240	4510	7890	10400	17600	36900	60600
			C3	3640	7320	12800	16800	28500	59900	98400
			C4	4770	9610	16800	22100	37400		
			C5	5610	11300	19700	26000	43900		
	R1853 R1823 R1824 R1863	FLS SLS SLH	C1	1010	2060	3640	4790	8140		
			C2	2720	5540	9790	12900	21900	50600	81600
			C3	4420	8990	15900	20900	35500	82200	132600
			C4	5800	11800	20800	27400	46600		
			C5	6810	13900	24500	32200	54700		
Roller Runner Block made of steel[1]	R1854	FXS	C2					29300		
			C3					47700		

Wide Roller Runner Blocks			**Size**				**55/85**	**65/100**		
				Preload force F_{pr} (N)						
Roller Runner Block made of steel[1] **Resist CR**[2]	R1872	BLS	C2				13200	21200		
			C3				21500	34500		

1) All steel parts made of carbon steel
2) Steel Roller Runner Block body with corrosion-resistant coating, matte silver finish, hard chrome plated

Recommended combination based on preload and accuracy class of Roller Runner Block and Roller Guide Rail

Recommendation for preload C2:
Accuracy classes H and P

Recommendation for preload C3:
Accuracy classes P, SP, GP and UP

Combination of hard chrome plated Roller Runner Block with hard chrome plated Roller Guide Rails

When hard chrome-plated Roller Runner Blocks are combined with preload C2 and/or C3 and hard chrome plated Roller Guide Rails, this increases the preload by approx. half a preload class.