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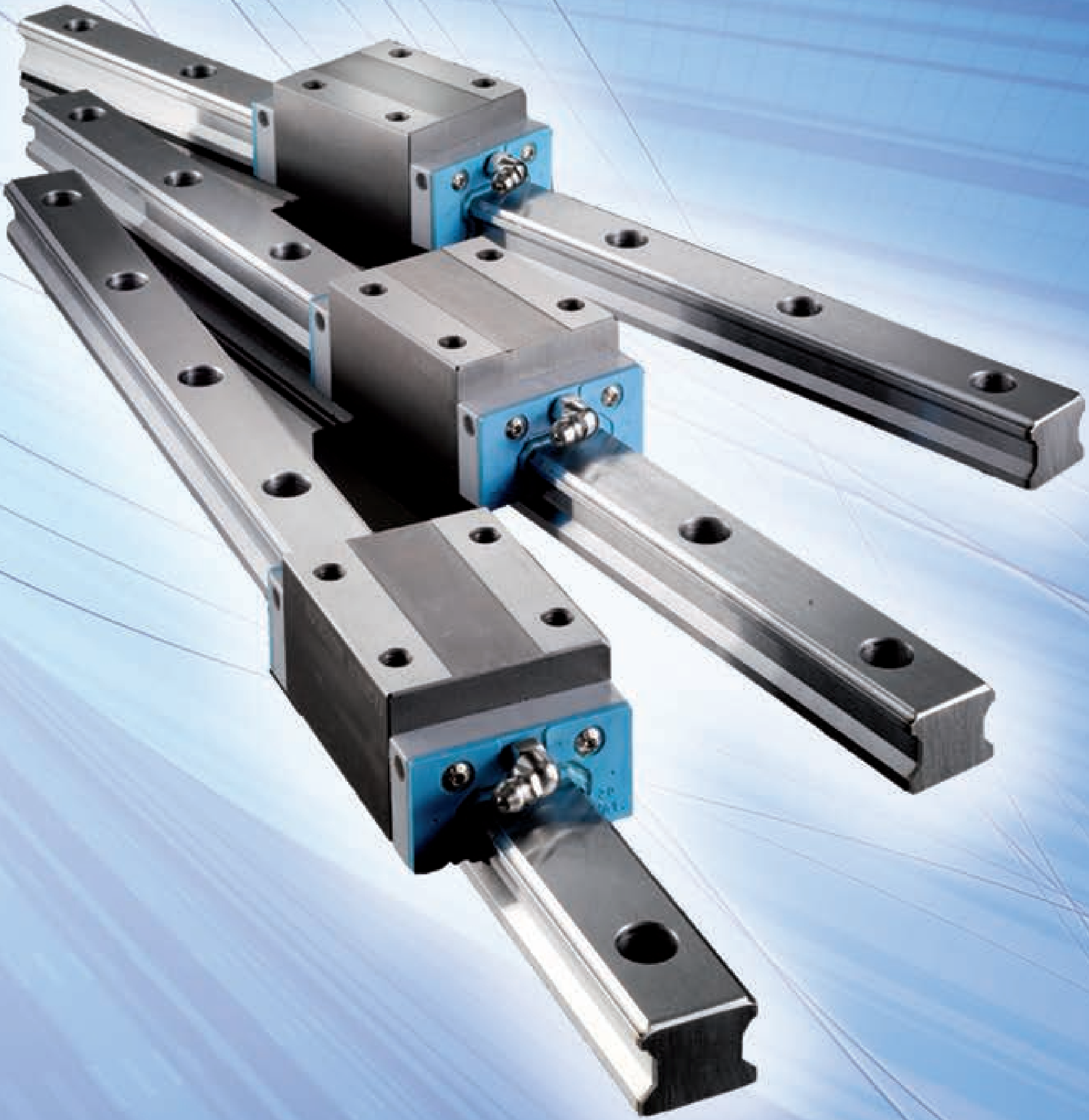
We get you moving!



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With You

WE GET YOU MOVING...

NTN-SNR as part of the NTN Corporation has been one of the most innovative companies in this sector for decades. The NTN Group is the third-largest roller bearing manufacturer in the world.
This position allows us to provide our customers with a high level of added value regarding service, quality and product range. As a result, we have been able to build a strong image as a competent partner for our customers. Our companies are characterized by global presence and a consistent quality system.

NTN-SNR has been established in the linear technology market since 1985 and strives to offer a complete and competitive product range. This catalogue provides an overview of our profile rail range. This innovative range is based on a patented ball chain system and a broad product range. Our external long-term tests prove that our production strictly adheres to the high NTN-SNR quality standards. We also provide a wide range of technical innovations.

Our sales support and applications engineers are always on hand to you to offer you optimal support. Globally! Supplies from our European Warehouse in Germany ensure fast delivery.
Rail guides are used in a variety of applications such as: machine tool construction, packaging and printing machine construction, building of general and special machines, aeronautical construction, automation and assembly lines, the timber and semiconductor industries, medical technology and many others. Our consulting and planning service is based on many years of interdisciplinary experience.
This technical catalogue forms the basis of our discussions with you. Our sales and applications engineers will gladly help you with their expertise. We are looking forward to your enquiries. Our goal is to achieve joint, constructive solutions. Product quality, economic efficiency and high user benefits are the basis of a strategic partnership between NTN-SNR and you – our customer.

NTN-SNR will not be liable for any faults or omissions in this technical catalogue that might have occurred in spite of all the care taken in its compilation. We reserve the right to full or partial changes of our products and data in the current document, resulting from our continuous research and development work, without prior notice.

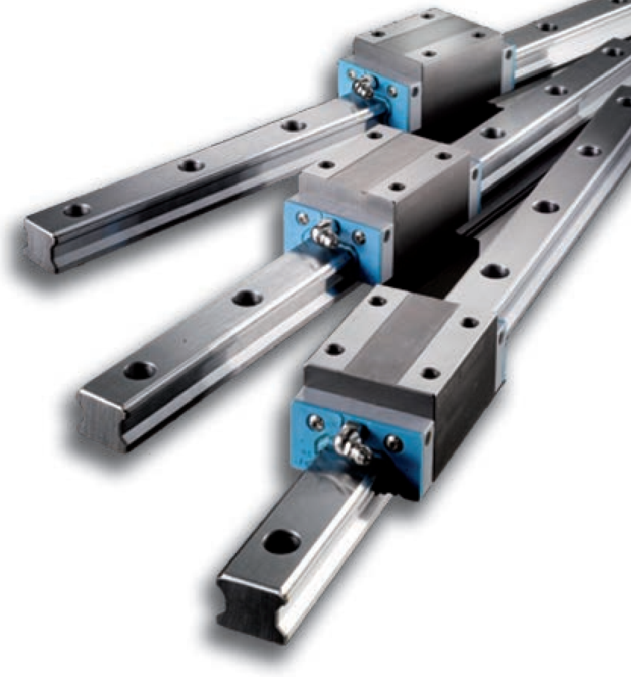
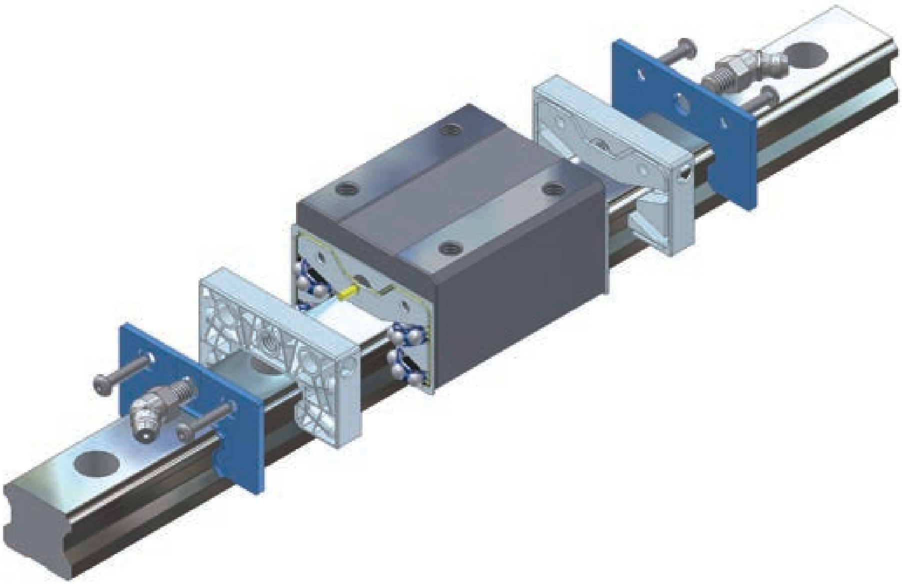


Table of contents

1. Basics of linear guides

Man has moved heavy loads since ancient times using rotation and linear movement or a combination of both. These movements are still found in many machines. The friction bearings initially used have mostly been replaced by roller bearings. Rolling elements in machines were established more than a hundred years ago, while rolling elements for linear movements have only become common in the last few decades.

Figure 1.1 NTN-SNR profile rail guides



1.1 Design principles

High surface pressure results when a ball touches a flat surface at one point (Figure 1.2). Grooves in modern profile rail guides are manufactured with a defined radius to increase the contact area. The ratio of the groove radius to the ball diameter in percent is called osculation. This significantly increases the load capacity, service life time and rigidity of the balls for equal surface pressure.

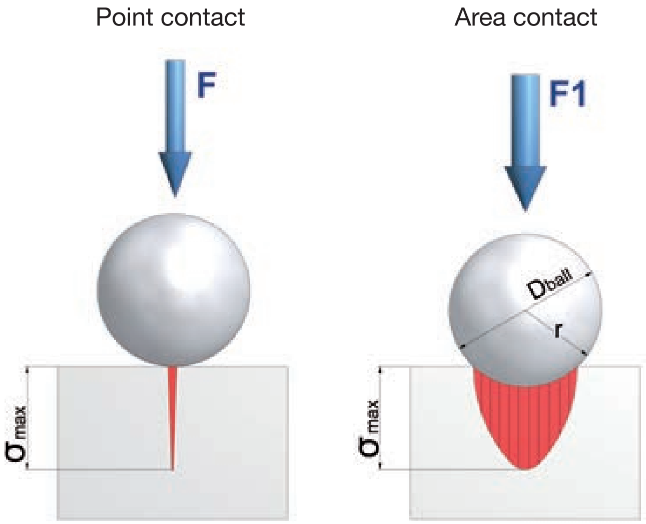


Figure 1.2 NTN-SNR profile rail guides

There are two basic design principles for profile rail guides with balls as rolling elements - circular arc grooves and Gothic arc grooves (Figure 1.3).

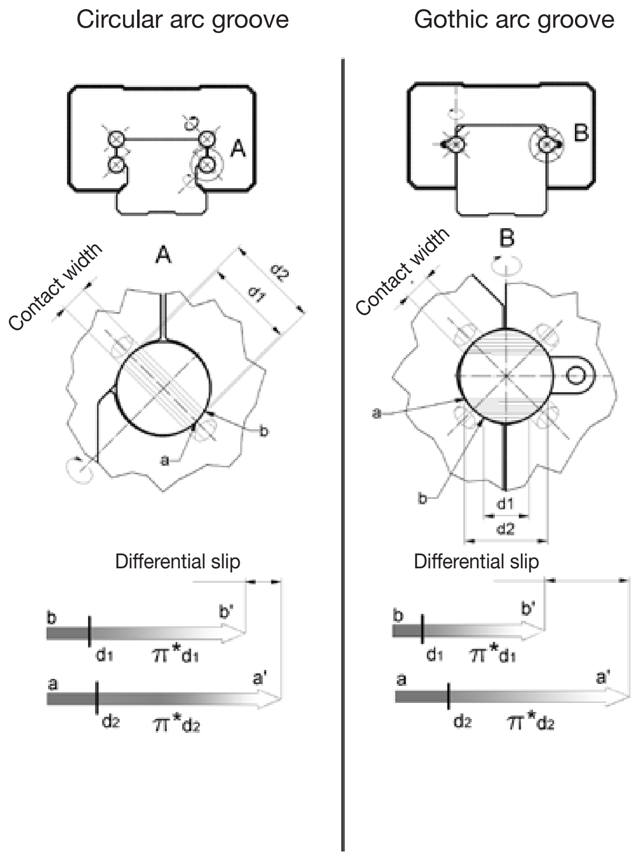
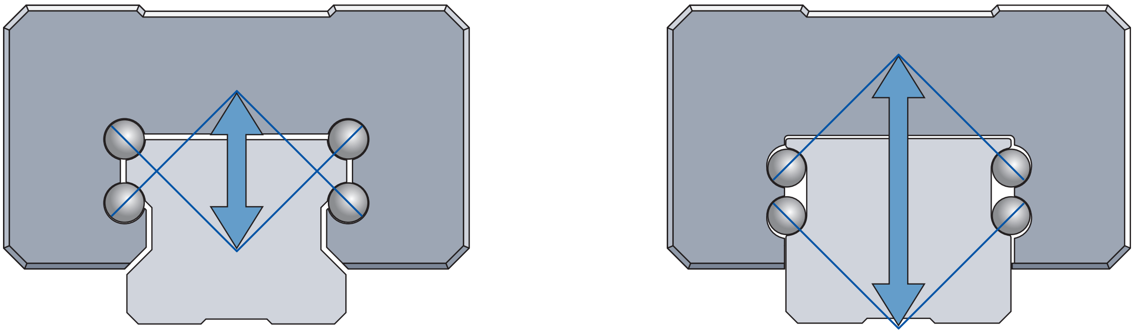


Figure 1.3 Groove geometry

Circular arc grooves have one contact surface on the profile rail and one on the carriage. This creates 2-point contact. The special shape of the Gothic-arc groove creates two contact surfaces on the profile rail and two on the carriage, resulting in 4-point contact with the rolling element. A detailed view of the rolling elements shows that differential slip results from the difference between contact diameters d1 and d2. The differential slip is significantly greater for arrangements with Gothic arc grooves than for circular arc grooves. This leads to a higher friction coefficient, higher driving resistance, higher wear and higher energy consumption. The standard profile rail guides by NTN-SNR therefore all have circular arc grooves. The geometry of the Gothic arc groove is only used for miniature profile rail guides, for the compactness of its design.

The race way configuration is another characteristic of profile rail guides. The following alternatives are used: DF-configuration and DB-configuration of the race ways, corresponding to the terms used for roller bearing systems (Figure 1.4).

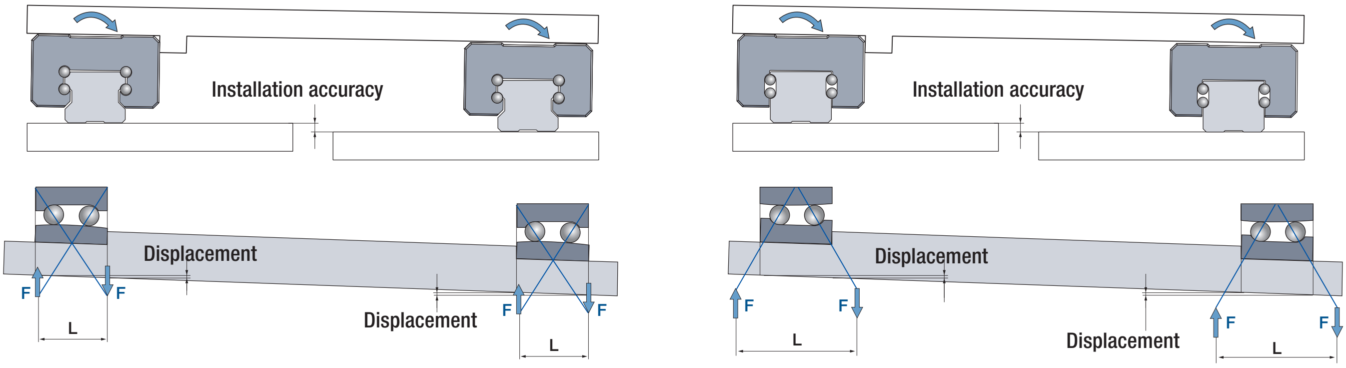


Profile rail guide with DF-configuration

Profile rail guide with DB-configuration

Figure 1.4 - DF- and DB-configuration

Profile rail guide systems can be exposed to torque stress resulting from installation faults (Figure 1.5). When the distance between the active points is low, the resulting internal loads is low as well. The NTN-SNR profile rail guides are therefore produced using the DF-configuration.


Profile rail guide with DF-configuration

Profile rail guide with DB-configuration

Figure 1.5 Internal forces for DF- and DB-configuration

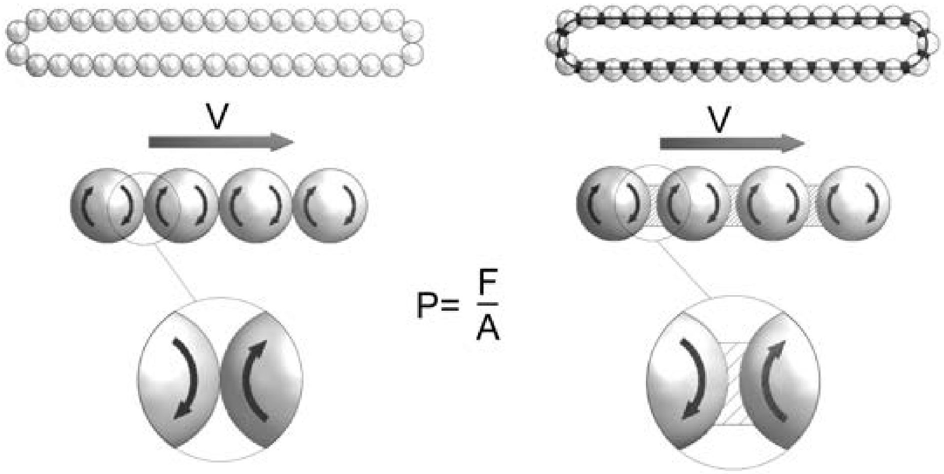
The most important characteristics of NTN-SNR profile rail guides are therefore:

- Wider permitted installation tolerances
- Very good self-adjustment properties
- Lower costs for manufacture and preparation of the mounting surfaces

1.2 Ball chain technology

Cages for guiding the rolling elements, which have been used for over 100 years in roller bearings, are also part of the newly developed profile rail guides. Profile rail guides with ball chains differ from conventional series in the following characteristics:

> Higher maximum velocity
> Less heat generation
> Less noise generation
> Very smooth running
> Optimised lubrication system
> Even load distribution
> Longer service life



P = Surface pressure
F = Force between balls
A = Contact area

Figure 1.6 Schematic view of the contact surfaces

The rotating balls in conventional profile rail guides have point contact between each other (Figure 1.6). The rotation speed at the contact point is double that of the speed of the balls. The contact area (A) is so small that the surface pressure (P) tends towards infinity. This leads to heating and wear of the balls and the profile rail guide system. The chain in profile rail guides with ball chains has the function of a cage. Contact between the balls is prevented (Figure 1.6). The ball and the chain also have a relatively large contact area (A) that significantly reduces the surface pressure (P). The rotation speeds at the contact surfaces of ball and chain correspond. The ball chain is further used to transport the lubricant and to create a lubrication film on the balls. The design of the runner block allows effective supply with lubricant from the lubricant connection to the circulation areas of the ball chains (Figure 1.7).

Conventional profile rail guides allow contact between the balls during operation, which may lead to increased lubricant consumption, higher friction, noise and heat. Profile rail guides with ball chain minimise these effects.

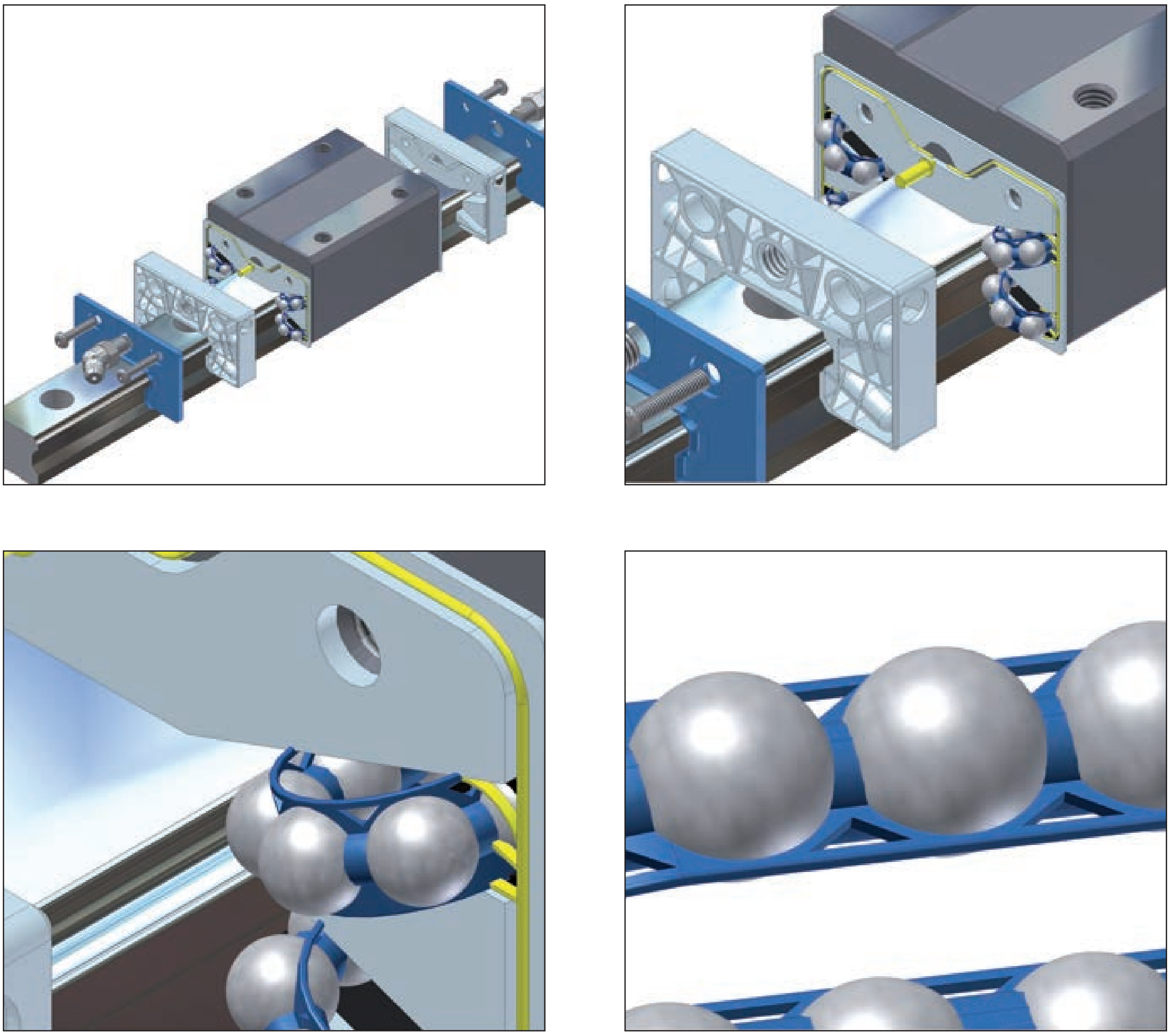


Figure 1.7 Profile rail guides with ball chains

The noise generation of profile rail guides is mainly determined by their design. Direct knocking of balls against each other is the main reason for increased noise generation in conventional models. In addition, the contact of the balls with the surfaces of the re-circulating hole affects noise generation (Figure 1.8).

These effects are significantly reduced by the use of ball chains. The patented structure of the ball chain further contains gaps for lubricant depots. The combination of the flexibility of the ball chain and the lubricant acts like a buffer and significantly reduces the noise level (Figure 1.9).

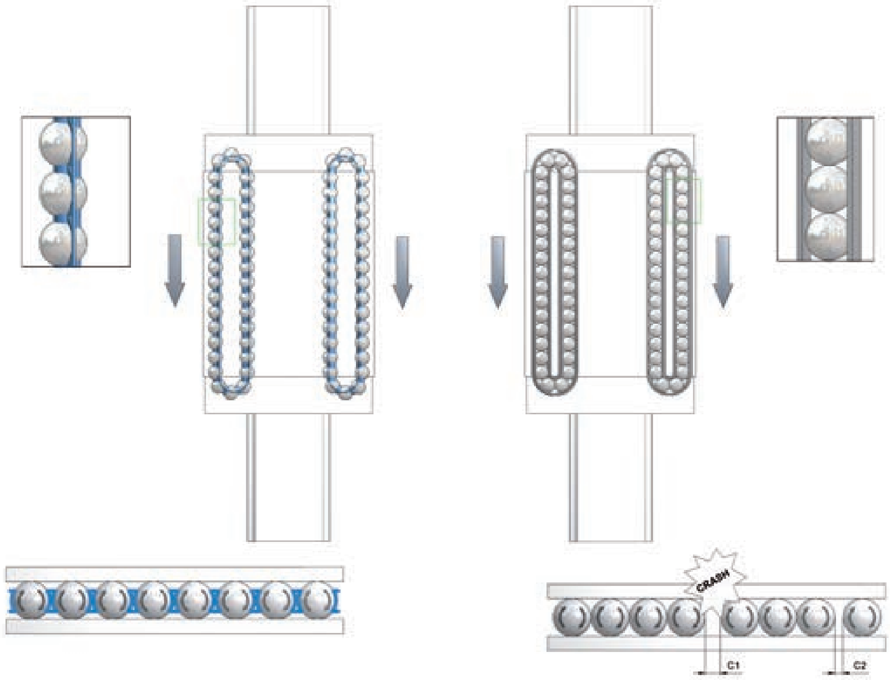


Figure 1.8 Comparison of the designs of profile rail guides

It is not possible to keep the distance of the balls (C1, C2) constant in conventional profile rail guides (Figure 1.8). These irregular distances between the balls lead to uneven running behaviour.

At the same time, the balls are continuously supplied with lubricant, which reduces wear of the metal. This significantly extends the service life of the lubricant and the maintenance intervals.

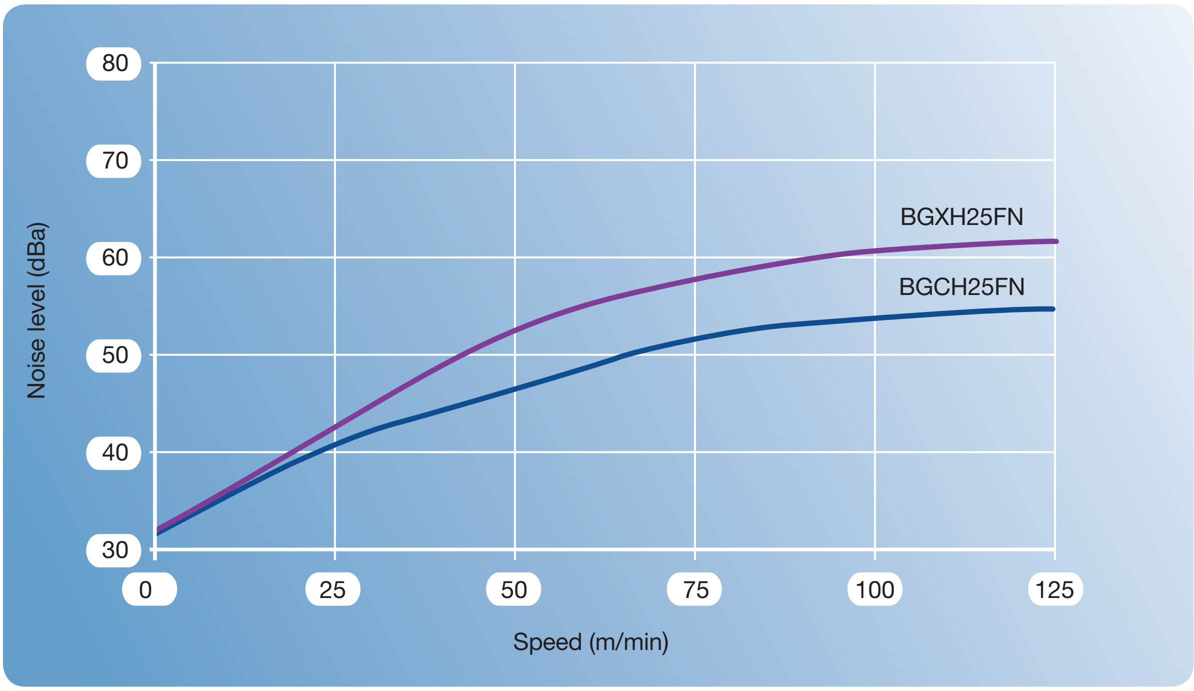


Figure 1.9 Noise generation of profile rail guides of Design Size 25

The chain in profile rail guides with ball chain has the function of a cage. It holds the balls at a constant distance from each other and controls their circulation. The structure of the carriages makes it impossible to implement a closed ball chain circulation. At the end of the ball chains, a space of about 1 ball diameter remains. The design of the ends of the NTN-SNR ball chain and the use of a spacer ball compensate for this space (Figure 1.10).

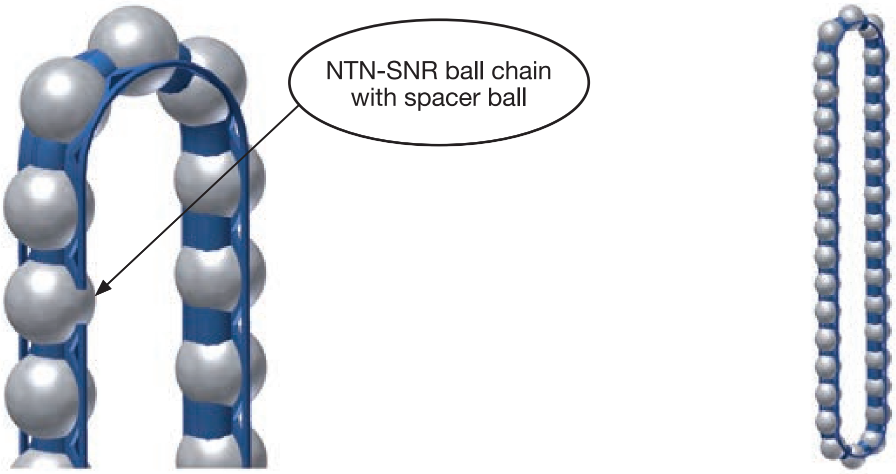


Figure 1.10 NTN-SNR ball chain

This design of the ball chain ends in connection with the spacer ball closes the circulation and makes the movement of the runner block smooth and quiet. (Figure 1.11).

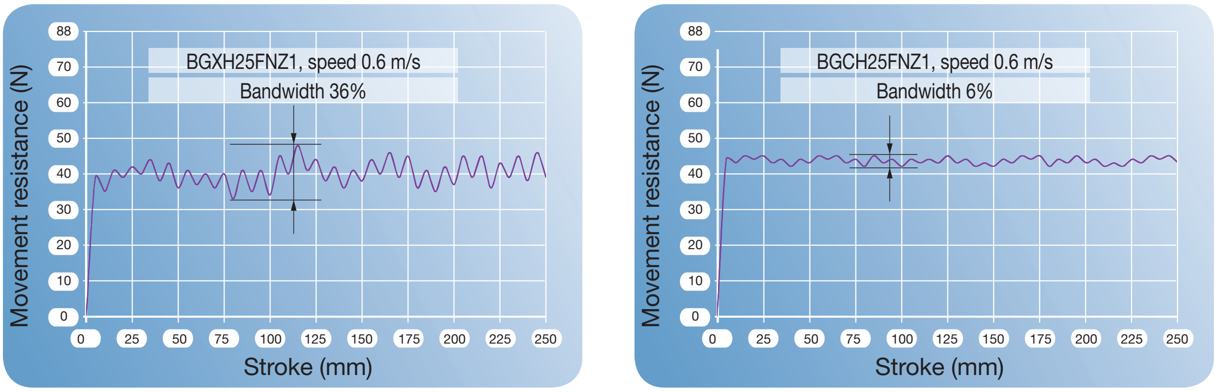
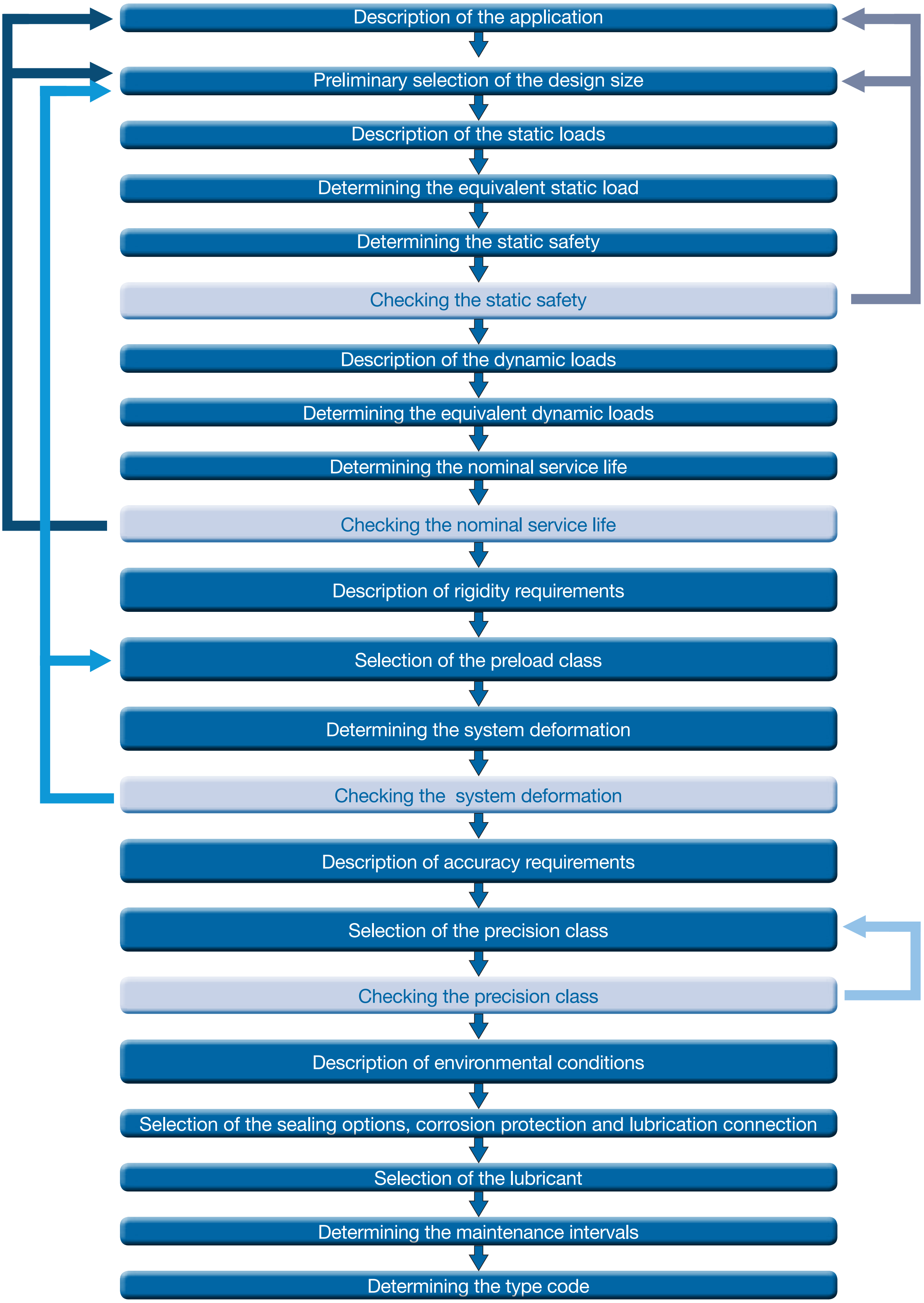


Figure 1.11 Movement resistance

1.3 Selection criteria



2 System technology

2.1 Definitions

Service life time

The service life time L is the running distance that a component can handle before the first signs of material fatigue become apparent on the tracks or the rolling elements.

Nominal service life time L_{10}

This is the calculated service life time of a single profile rail guide system or of a group of equivalent profile rail guide systems operating under equal conditions that can be reached with a probability of 90%, assuming the use of currently common materials of average manufacturing quality and common operating conditions.

Dynamic load rating C

The size and direction of a constant, radial load that a linear roller bearing can theoretically withstand for a nominal service life of $5x10^4$ m travelled distance (according to ISO 14728-1). When the calculation of the dynamic load rating is based on a nominal service life of 10^5 m, the dynamic load rating for a nominal service life of $5x10^4$ m is multiplied by the conversion factor 1.26.

Static load rating C_0

Static, radial load that corresponds to the middle of the highest-stressed contact area between rolling element and race way of a calculated Hertz-type compression. The Hertz-type compression for the profile rail guide is, according to ISO 14728-1, between 4200 MPa and 4600 MPa and depends on the ball diameter and the lubrication.

This stress leads to a permanent, total deformation of the rolling element that corresponds to a 0.0001 part of the rolling element diameter (according to ISO 14728-1).

2.2 Standards used

DIN 645-1 Roller bearings - profile rail roller guides – Part 1: Dimensions for Series 1 to 3
DIN 645-2 Roller bearings - profile rail roller guides – Part 2: Dimensions for Series 4
DIN ISO 14728-1 Roller bearings - Linear roller bearings – Part 1: Dynamic load ratings and nominal service life (ISO 14728-1: 2004)
DIN ISO 14728-2 Roller bearings – Linear roller bearings – Part 2: Static load ratings (ISO 14728-2: 2004)

The NTN-SNR profile rail guides comply with the RoHS Directive (EU Directive 2002/95/EC). NTN-SNR profile rail guides are not listed in the Machine Directive 2006/42/EC and are therefore not affected by this directive.

2.3 Coordinate system

The profile rail guides can be stressed by forces or torques. The coordinate system (Figure 2.1) shows the forces acting in the main load directions, the torques as well as the six degrees of freedom.

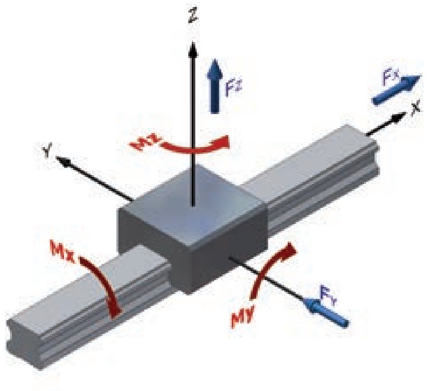


Figure 2.1 Coordinate system

Forces in the main load directions:

F_X	Movement force (X-direction)
F_Y	Tangential load (Y-direction)
F_Z	Radial load (Z-direction)

Torques:

M_X	Torque in roll direction (rotation around the X-axis)
M_Y	Torque in pitch direction (rotation around the Y-axis)
M_Z	Torque in yaw direction (rotation around the Z-axis)

Only five degrees of freedom are relevant for the profile rail guide. The X-direction is the movement direction of the guide, which defines the following accuracy values:

- > Lateral movement (Y-direction)
- > Height movement (Z-direction)
- > Rolling (rotation around the X-axis)
- > Pitching (rotation around the Y-axis)
- > Yawing (rotation around the Z-axis)

2.4 Static safety

The design of profile rail guides must consider unexpected and unforeseeable forces and/or torques that are caused by vibration or shocks or short start/stop cycles (short strokes) during operation or standstill as well as overhanging loads. A safety factor is particularly important in such cases. The static structural safety factor f_S is intended to prevent unacceptable, permanent deformation of the tracks and the rolling elements. It is the ratio of the static load rating C_0 to the maximum occurring force F_{0max}. The highest amplitude is relevant, even when it occurs only for a very short time.

$$f_S = \frac{C_0}{F_{0\max}} * f_H * f_T * f_C \qquad [2.1]$$

f_S	static safety factor / static structural safety
C_0	static load rating [N]
F_{0max}	maximum static load [N]
f_H	Hardness factor
f_T	Temperature factor
f_C	Contact factor

The static safety factor should be greater than 2 for normal operating conditions. The recommended values listed below should be used for the factor f_S under special operating conditions.

Table 2.1 Values of the static safety factor

Operating conditions	f_S
Normal operating conditions	≈ 2
With less shock exposure and vibration	≈ 2 ... 4
With moderate shock exposure and vibration	3 ... 5
With strong shock exposure and vibration	4 ... 8
With partially unknown load parameters	> 8

We recommend that you contact our NTN-SNR application engineers when the loads are partially unknown or difficult to estimate.

2.5 Service life time calculation

The nominal service life time of a profile rail guide in m is calculated with the following equation:

Ball guides

$$L_{10} = \left(\frac{C}{F} * \frac{f_H * f_T * f_C}{f_W} \right)^3 5 * 10^4 \qquad [2.2]$$

Roller guides

$$L_{10} = \left(\frac{C}{F} * \frac{f_H * f_T * f_C}{f_W} \right)^{\frac{10}{3}} * 10^5 \qquad [2.3]$$

L_{10}	Nominal service life time [m]
C	Dynamic load rating [N]
F	Dynamic load [N]
f_H	Hardness factor
f_T	Temperature factor
f_C	Contact factor
f_W	Load factor

The service life time in operating hours can be determined when the stroke length and the stroke frequency remain constant during the service life time.

$$L_h = \frac{L_{10}}{2 \cdot S \cdot n \cdot 60} \qquad [2.4]$$

L_{10}	Nominal service life time [m]
L_h	Service live in hours [h]
S	Stroke length [m]
n	Stroke frequency (double-strokes per minute) [min^{-1}]

It is very difficult to determine the active load for the service life time calculation. The profile rail guide systems are usually exposed to oscillations or vibrations resulting from the process or drive forces. Shocks can damage machine elements when the load peaks are higher than the maximum additional load. This applies to the dynamic as well as the static state of the total system. The service life time also depends on parameters such as the surface hardness of the roller bearings, the tracks and the temperature of the system. The modified service life time calculation takes the abovementioned conditions into consideration.

2.5.1 Influencing factors

Hardness factor for shaft hardness f_H

The hardness of the rolling elements and the tracks must be between 58 HRC and 60 HRC. This value ensures optimal running properties and the best possible functional properties of the profile rail guide.

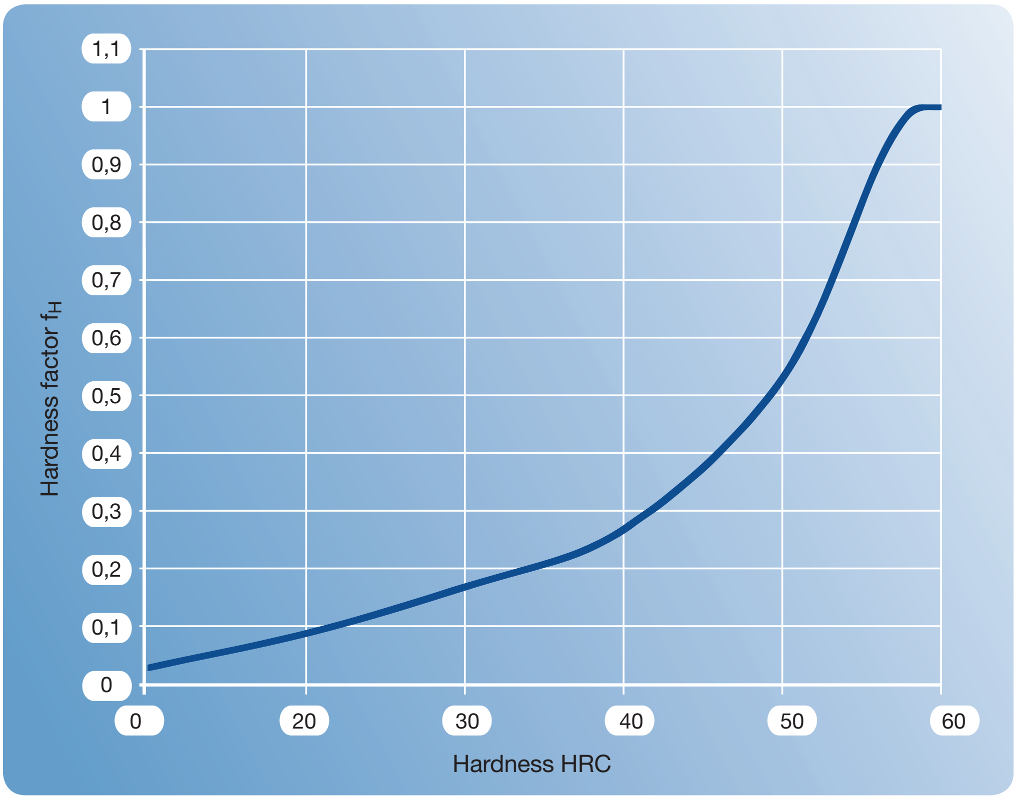


Figure 2.2 Hardness factor f_H

The NTN-SNR profile rail guides comply with the conditions stipulated above. Therefore, the hardness factor does not need to be considered (f_H=1). The hardness corrections (Figure 2.2) are only required when a special version made of customer-specific material with a hardness below 58 HRC is used.

Temperature factor f_T

Corrections to the service life time calculations (Figure 2.3) must be made when the environmental temperature of the profile rail guide exceeds 100°C during operation.

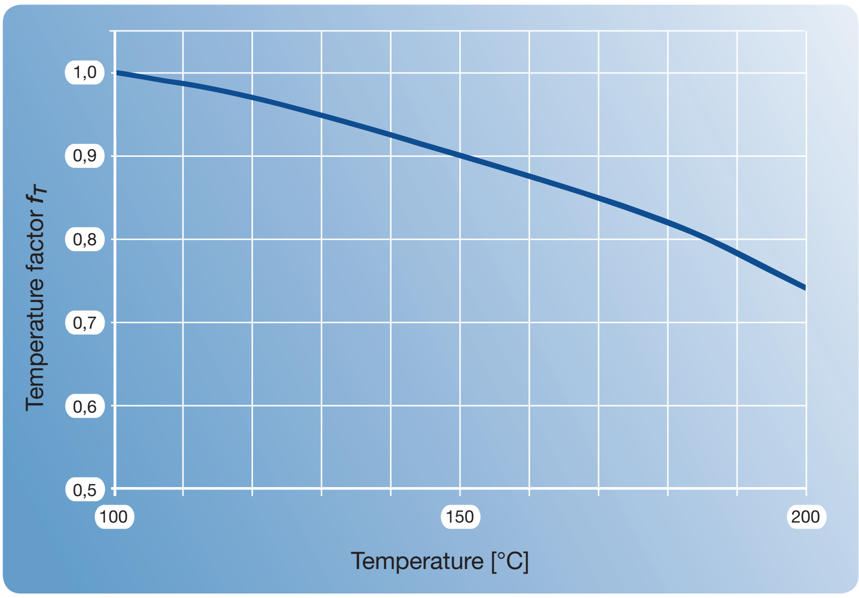


Figure 2.3 Temperature factor f_T

The standard version of the NTN-SNR profile rail guides can be used up to a maximum temperature of 80°C. When the limit of 80°C is exceeded, seals and end caps made of a temperature-resistant material must be used. We recommend that you contact our NTN-SNR application engineers when operation at higher temperatures is required.

Contact factor f_C

When two or more carriages are installed very close to each other, the running movement is affected by torques, installation accuracy and other factors, so that an even load distribution is hard to achieve.. Under such conditions, an appropriate contact factor (Table 2.2) must be taken into account.

Table 2.2 Contact factor

Number of closely spaced carriages	f_C
1	1,00
2	0,81
3	0,72
4	0,66
5	0,61

Load factor f_W

Vibrations and shocks that may occur during operation, for example as a result of high speeds, repeated starting and stopping, process forces or sudden loads, can have a significant effect on the total calculation. It is in some cases very difficult to determine their effects. Empirically determined load factors (Table 2.3) must be used when the actual loads on the profile rail guide cannot be measured or can be significantly higher than calculated.

Table 2.3 Load factor

Operating conditions, velocity v	f_W
Normal operating conditions without vibrations/shocks $V \leq 0{,}25$ m/s	1,0… 1,5
Normal operating conditions with weak vibrations/shocks $0{,}25 < V \leq 1{,}0$ m/s	1,5… 2,0
Normal operating conditions with strong vibrations/shocks $V > 1{,}0$ m/s	2,0… 3,5

2.5.2 Active load - equivalence factors

One-axis application

Profile rail guides are often only used with one carriage or several carriage with little distance between them when the installation space is tight. The service life time of the profile rail guide can be shortened in such cases, due to the increased wear at the carriage ends. Under such operating conditions, the torques must be multiplied by appropriate equivalence factors (Table 2.4 and Table 2.5). The equivalent load is determined as follows:

$$F_{Äq} = k \cdot M \qquad [2.7]$$

$F_{Äq}$	Equivalent load per guide [N]
k	Equivalence factors (Table 2.4 and Table 2.5)
M	corresponds to the active torque [N• m]

Tab. 2.4 Equivalence factor for 1 carriage (Type BG..)

Series	Equivalence factor m^{-1}		
	kx	ky	kz
BG__15_S	143,63	305,22	305,22
BG__15_N	145,36	166,30	166,30
BG__15_L	144,65	140,37	140,37
BG__15_E	144,68	139,61	139,61
BG__20_S	107,47	241,38	241,38
BG__20_N	107,01	138,00	138,00
BG__20_L	106,81	109,48	109,48
BG__20_E	106,96	87,76	87,76
BG__25_S	92,92	207,92	207,92
BG__25_N	93,34	116,68	116,68
BG__25_L	93,10	92,94	92,94
BG__25_E	93,08	77,19	77,19
BG__30_S	77,28	180,31	180,31
BG__30_N	77,19	99,05	99,05
BG__30_L	77,24	85,98	85,98
BG__30_E	77,21	64,81	64,81
BG__35_S	63,23	150,81	150,81
BG__35_N	63,23	83,37	83,37
BG__35_L	63,23	72,56	72,56
BG__35_E	63,22	54,79	54,79
BG__45_N	47,31	71,41	71,41
BG__45_L	47,31	61,02	61,02
BG__45_E	47,31	48,29	48,29
BG__55_N	40,36	57,86	57,86
BG__55_L	40,35	43,58	43,58
BG__55_E	40,36	39,25	39,25

kx	Equivalence factor for 1 carriage in Mx-direction
ky	Equivalence factor for 1 carriage in My-direction
kz	Equivalence factor for 1 carriage in Mz-direction

Tab. 2.4 Equivalence factor for 1 carriage (Type MB..)

Series	Equivalence factor m^{-1}		
	kx	ky	kz
MB_09SL	220,26	194,36	194,36
MB_09SN	216,83	270,71	270,71
MB_09WL	104,95	156,47	156,47
MB_09WN	105,75	237,94	204,81
MB_12SL	154,47	187,55	187,55
MB_12SN	152,09	292,48	292,48
MB_12WL	80,07	145,29	145,29
MB_12WN	80,32	202,22	202,22
MB_15SL	142,94	145,53	145,53
MB_15SN	142,60	219,22	219,22
MB_15WL	48,90	112,84	112,84
MB_15WN	48,83	167,60	167,60

kx	Equivalence factor for 1 carriage in Mx-direction
ky	Equivalence factor for 1 carriage in My-direction
kz	Equivalence factor for 1 carriage in Mz-direction

Two-axis application

The following requirements and operating conditions (Figure 2.4) must be defined for calculating the service life time:

- Stroke length S [mm]
- Velocity diagram (Figure 2.5)
- Velocity V [m/s]
- Acceleration/deceleration a [m/s^2]
- Movement cycles, number of double-strokes per minute n [min^{-1}]
- Arrangement of the profile rail guide (number of rails and runner blocks l_0, l_1, [mm]
- Installation position (horizontal, vertical, diagonal, wall installation, tilted by 180°)
- Mass m [kg]
- Direction of the outer forces
- Positions of the centres of gravity l_2, l_3, l_4, [mm]
- Position of the drive l_5, l_6, [mm]
- Required service life L [km] or [h]

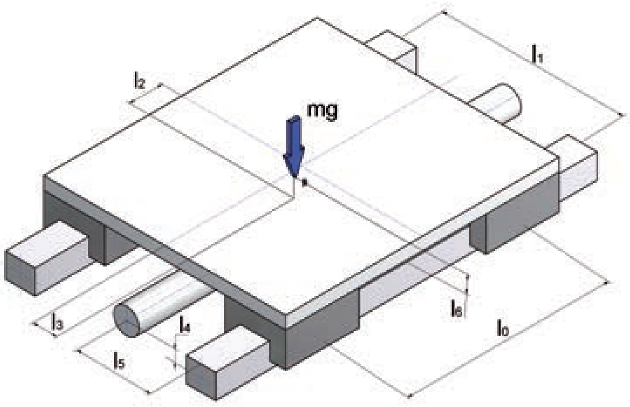


Figure 2.4 Definition of the conditions

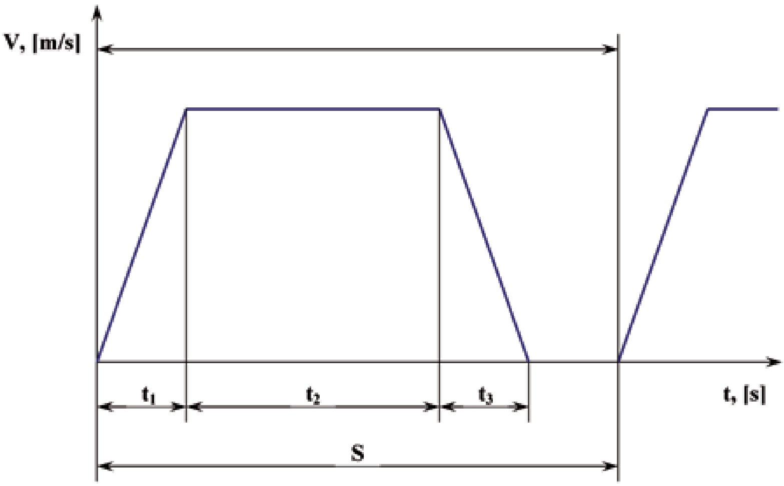


Figure 2.5 Velocity/time diagram

2.5.3 Equivalent loads

The (radial and tangential) loads as well as torque loads may act on the profile rail guide from different directions at the same time (Figure 2.6). In this case, the service life is calculated by using the equivalent load, which includes the radial, tangential and other loads.

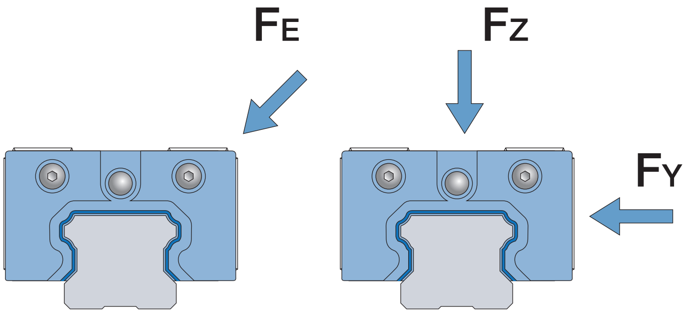


Figure 2.6 Equivalent load F_E

$$F_E = |F_Y| + |F_Z| \qquad [2.8]$$

F_E – Equivalent load [N]
F_Y - Tangential load [N]
F_Z - Radial load [N]

The calculation of the equivalent load F_E considers that the NTN-SNR profile rail guides have the same load-rating capacity in all main directions. The NTN- SNR miniature profile rail guides have minimal varying load-rating capacities in the different load directions.

Dynamic equivalent load

It is common that different, varying process forces affect the total system during operation. The profile rail guides are, for example, exposed to changing loads during upward and downward movements for picking and placing applications. Where such varying loads occur, they must be considered in the service life time calculations. The calculation of the dynamically equivalent load determines the load on a carriage for each individual movement phase n1, n2...nn (see Chapter 2.4.2) and is summarised in a resulting load for the total cycle. The load change can take place in various ways:

- > Stepwise (Figure 2.7)
- > Linear (Figure 2.8)
- > Sinusoidal (Figure 2.9 and 2.10)

Stepwise load change

$$F_m = \sqrt[3]{\frac{1}{S}\left(F_1^3 \cdot S_1 + F_2^3 \cdot S_2 + \ldots + F_n^3 \cdot S_n\right)} \qquad [2\text{-}9]$$

F_m	Dynamic equivalent load [N]
F_n	Load change [N]
S	Total travel [mm]
S_n	Travel during load change Fn [mm]

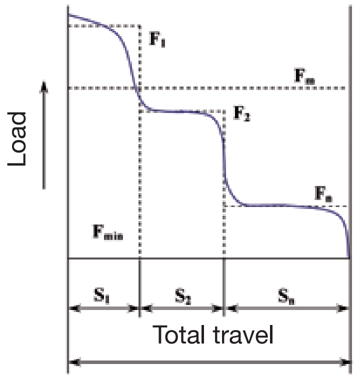


Figure 2.7 Stepwise load change

Linear load change

$$F_m \cong \frac{1}{3}\left(F_{MIN} + 2 \cdot F_{MAX}\right) \qquad [2\text{-}10]$$

F_{MIN}	Minimum load [N]
F_{MAX}	Maximum load [N]

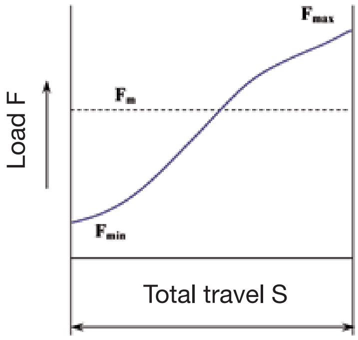


Figure 2.8 Linear load change

Sinusoidal load change

$$F_m \cong 0{,}65 * F_{MAX} \qquad [2.11]$$

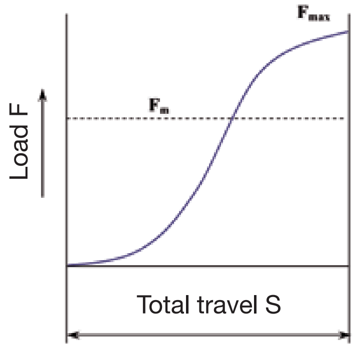


Figure 2.9 Sinusoidal load change (a)

Sinusoidal load change

$$F_m \cong 0{,}75 \cdot F_{MAX} \qquad [2.12]$$

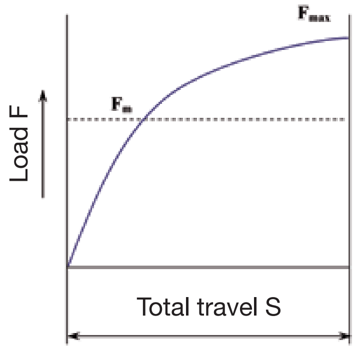


Figure 2.10 Sinusoidal load change (b)

2.5.4 Calculation examples

Example 1
Horizontal installation position with overhanging load
One carriage block is used
BGCH20FN series
Acceleration due to gravity=9.8 m/s^2
Mass m=10 kg
l_2=200 mm, l_3=100 mm
C=17,71 kN
C0=30,50 kN
Normal operating conditions without vibrations f_W = 1,5

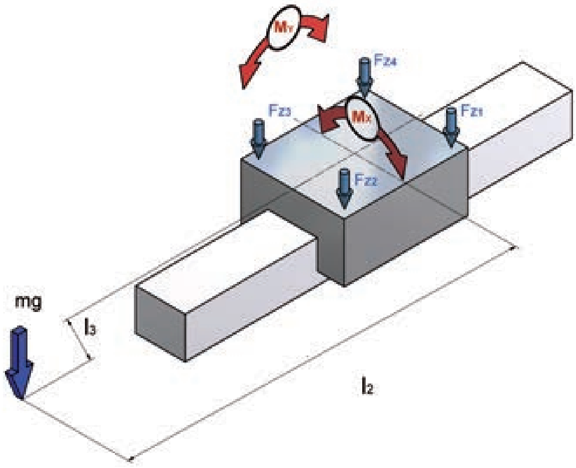


Figure 2.11 Calculation example 1

Calculation:
The equivalent load for the linear guide is calculated, taking the formula [2.7] and the equivalence factors (Table 2.5) into account.

$$Fz_1 = mg - k_X * mg * l_3 - k_Y * mg * l_2 = 10 * 9{,}8 - 107 * 10 * 9{,}8 * 0{,}1 - 138 * 10 * 9{,}8 * 0{,}2 = -3.655{,}4$$

$$Fz_2 = mg - k_X * mg * l_3 + k_Y * mg * l_2 = 10 * 9{,}8 - 107 * 10 * 9{,}8 * 0{,}1 + 138 * 10 * 9{,}8 * 0{,}2 = 1.754{,}2$$

$$Fz_3 = mg + k_X * mg * l_3 - k_Y * mg * l_2 = 10 * 9{,}8 - 107 * 10 * 9{,}8 * 0{,}1 - 138 * 10 * 9{,}8 * 0{,}2 = 3.851{,}4$$

$$Fz_4 = mg + k_X * mg * l_3 - k_Y * mg * l_2 = 10 * 9{,}8 + 107 * 10 * 9{,}8 * 0{,}1 - 138 * 10 * 9{,}8 * 0{,}2 = -1.558{,}2$$

The static safety factor for the maximum load of 3,547.6 N is calculated according to [2.1].

$$f_S = \frac{C_0}{F_{0MAX}} = \frac{30.500}{3.851{,}4} = 7{,}9$$

The nominal service life time for the maximum load 3,547.6 N is calculated according to [2.5].

$$Fz_2 = mg - k_X * mg * l_3 + k_Y * mg * l_2 = 10 * 9{,}8 - 107 * 10 * 9{,}8 * 0{,}1 + 138 * 10 * 9{,}8 * 0{,}2 = 1.754{,}2$$

Example 2
Horizontal installation position with overhanging load and 2 rails arranged in parallel. Two carriages per rail, arrangement with mobile table
BGCH30FN series
Acceleration due to gravity=9.8 m/s^2
Mass m=400 kg
l_0=600 mm, l_1=450 mm, l_2=400 mm, l_3=350 mm
C=36,71 kN
C_0=54,570 kN
Normal operating conditions without vibrations f_W=1,5

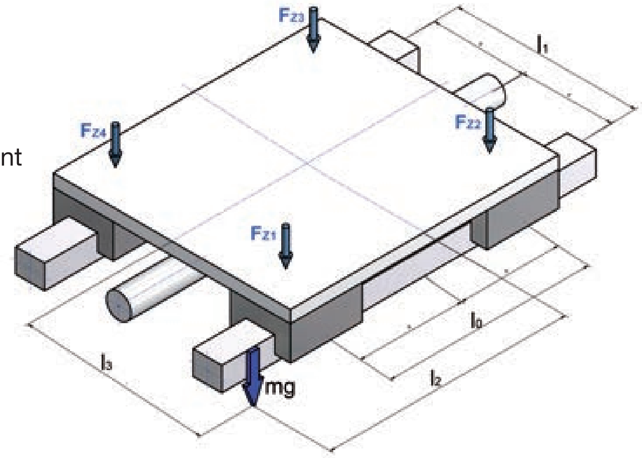


Figure 2.12 Calculation example 2

Calculation:
a) The active radial load per carriage at constant velocity is calculated as follows:

$$F_{Z1} = \frac{mg}{4} + \frac{mg \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot l_3}{2 \cdot l_1} = \frac{400 \cdot 9{,}8}{4} + \frac{400 \cdot 9{,}8 \cdot 400}{2 \cdot 600} + \frac{400 \cdot 9{,}8 \cdot 350}{2 \cdot 450} = 3.811{,}11\,[N]$$

$$F_{Z2} = \frac{mg}{4} - \frac{mg \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot l_3}{2 \cdot l_1} = \frac{400 \cdot 9{,}8}{4} - \frac{400 \cdot 9{,}8 \cdot 400}{2 \cdot 600} + \frac{400 \cdot 9{,}8 \cdot 350}{2 \cdot 450} = 1.197{,}77\,[N]$$

$$F_{Z3} = \frac{mg}{4} - \frac{mg \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot l_3}{2 \cdot l_1} = \frac{400 \cdot 9{,}8}{4} - \frac{400 \cdot 9{,}8 \cdot 400}{2 \cdot 600} - \frac{400 \cdot 9{,}8 \cdot 350}{2 \cdot 450} = -1.851{,}11\,[N]$$

$$F_{Z4} = \frac{mg}{4} + \frac{mg \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot l_3}{2 \cdot l_1} = \frac{400 \cdot 9{,}8}{4} + \frac{400 \cdot 9{,}8 \cdot 400}{2 \cdot 600} - \frac{400 \cdot 9{,}8 \cdot 350}{2 \cdot 450} = 762{,}23\,[N]$$

b) The statistical safety factor is calculated for carriage 1 according to [2.1] for a maximum load of 3,811.11 N.

$$f_S = \frac{C_0}{F_{0MAX}} = \frac{54.570}{3.811{,}11} = 14{,}0$$

c) The service life time of the four runner blocks is calculated according to [2.5]

$$L_1 = \left(\frac{C}{F_{Z1}} \cdot \frac{f_H \cdot f_T \cdot f_C}{f_W}\right)^3 \cdot 5 \cdot 10^4 = \left(\frac{36.710}{3.811{,}11} \cdot \frac{1}{1{,}5}\right)^3 \cdot 5 \cdot 10^4 = 13.240.211\,[m] = 13.240\,[km]$$

$$L_2 = \left(\frac{C}{F_{Z2}} \cdot \frac{f_H \cdot f_T \cdot f_C}{f_W}\right)^3 \cdot 5 \cdot 10^4 = \left(\frac{36.710}{1.197{,}77} \cdot \frac{1}{1{,}5}\right)^3 \cdot 5 \cdot 10^4 = 426.509.871\,[m] = 426.510\,[km]$$

$$L_3 = \left(\frac{C}{F_{Z3}} \cdot \frac{f_H \cdot f_T \cdot f_C}{f_W}\right)^3 \cdot 5 \cdot 10^4 = \left(\frac{36.710}{1.851{,}11} \cdot \frac{1}{1{,}5}\right)^3 \cdot 5 \cdot 10^4 = 115.545.411\,[m] = 115.545\,[km]$$

$$L_4 = \left(\frac{C}{F_{Z4}} \cdot \frac{f_H \cdot f_T \cdot f_C}{f_W}\right)^3 \cdot 5 \cdot 10^4 = \left(\frac{36.710}{762{,}23} \cdot \frac{1}{1{,}5}\right)^3 \cdot 5 \cdot 10^4 = 1.654.974.350\,[m] = 1.654.974\,[km]$$

The nominal service life time for the most highly stressed carriage 1 corresponds to the service life time of the total system for the application described above and is 13,240 km.

Example 3

Vertical installation position (e.g. transport lift, Z-axis of a lifting device) with inertia forces, 2 rails arranged in parallel, 2 carriages per rail, BGCH20FN series.

$V=1$ m/s

$a=0,5$ m/s^2

$S_1=1000$ mm

$S_2=2000$ mm

$S_3=1000$ mm

Mass $m=100$ kg

Acceleration due to gravity=9.8 m/s^2

$l_0=300$ mm, $l_1=500$ mm, $l_5=250$ mm, $l_6=280$ mm

$C=17,71$ kN

$C_0=30,50$ kN

$f_w=2,0$ (according to Table 2.3)

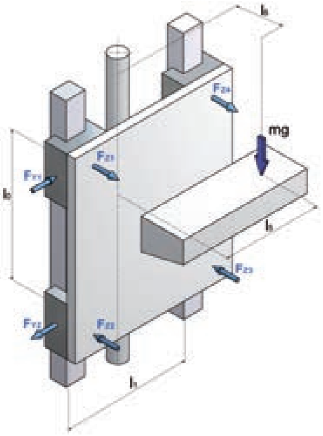
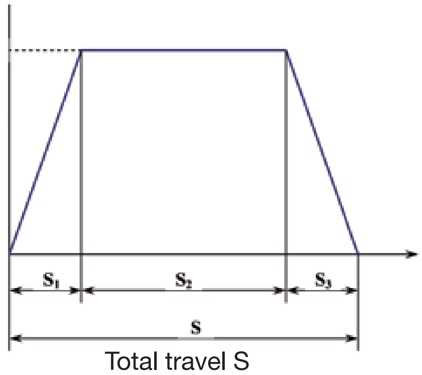


Figure 2.13 Calculation example 3



Total travel S

Figure 2.14 Velocity/distance diagram

Calculation:

a) The active loads are calculated per carriage

During the acceleration phase

Radial loads

$$F_{BeschZ1}=\frac{m(g+a)\cdot l_6}{2\cdot l_0}=\frac{100\cdot(9,8+0,5)\cdot 280}{2\cdot 300}=480,67\,[N]$$

$$F_{BeschZ2}=-\frac{m(g+a)\cdot l_6}{2\cdot l_0}=-\frac{100\cdot(9,8+0,5)\cdot 280}{2\cdot 300}=-480,67\,[N]$$

$$F_{BeschZ3}=-\frac{m(g+a)\cdot l_6}{2\cdot l_0}=-\frac{100\cdot(9,8+0,5)\cdot 280}{2\cdot 300}=-480,67\,[N]$$

$$F_{BeschZ4}=\frac{m(g+a)\cdot l_6}{2\cdot l_0}=\frac{100\cdot(9,8+0,5)\cdot 280}{2\cdot 300}=480,67\,[N]$$

Tangential loads

$$F_{BeschY1} = \frac{m(g+a)\cdot l_5}{2\cdot l_0} = \frac{100\cdot(9{,}8+0{,}5)\cdot 250}{2\cdot 300} = 429{,}17\,[N]$$

$$F_{BeschY2} = -\frac{m(g+a)\cdot l_5}{2\cdot l_0} = -\frac{100\cdot(9{,}8+0{,}5)\cdot 250}{2\cdot 300} = -429{,}17\,[N]$$

$$F_{BeschY3} = -\frac{m(g+a)\cdot l_5}{2\cdot l_0} = -\frac{100\cdot(9{,}8+0{,}5)\cdot 250}{2\cdot 300} = -429{,}17\,[N]$$

$$F_{BeschY4} = \frac{m(g+a)\cdot l_5}{2\cdot l_0} = \frac{100\cdot(9{,}8+0{,}5)\cdot 250}{2\cdot 300} = 429{,}17\,[N]$$

At constant velocyit

Radial loads

$$F_{KonstZ1} = \frac{mg\cdot l_6}{2\cdot l_0} = \frac{100\cdot 9{,}8\cdot 280}{2\cdot 300} = 457{,}33\,[N]$$

$$F_{KonstZ2} = -\frac{mg\cdot l_6}{2\cdot l_0} = -\frac{100\cdot 9{,}8\cdot 280}{2\cdot 300} = -457{,}33\,[N]$$

$$F_{KonstZ3} = -\frac{mg\cdot l_6}{2\cdot l_0} = -\frac{100\cdot 9{,}8\cdot 280}{2\cdot 300} = -457{,}33\,[N]$$

$$F_{KonstZ4} = \frac{mg\cdot l_6}{2\cdot l_0} = \frac{100\cdot 9{,}8\cdot 280}{2\cdot 300} = 457{,}33\,[N]$$

Tangential loads

$$F_{KonstY1} = \frac{mg\cdot l_5}{2\cdot l_0} = \frac{100\cdot 9{,}8\cdot 250}{2\cdot 300} = 429{,}17\,[N]$$

$$F_{KonstY2} = -\frac{mg\cdot l_5}{2\cdot l_0} = -\frac{100\cdot 9{,}8\cdot 250}{2\cdot 300} = -429{,}17\,[N]$$

$$F_{KonstY3} = -\frac{mg\cdot l_5}{2\cdot l_0} = -\frac{100\cdot 9{,}8\cdot 250}{2\cdot 300} = -429{,}17\,[N]$$

$$F_{KonstY4} = \frac{mg\cdot l_5}{2\cdot l_0} = \frac{100\cdot 9{,}8\cdot 250}{2\cdot 300} = 429{,}17\,[N]$$

During the deceleration phase

Radial loads

$$F_{VerzZ1} = \frac{m(g-a)\cdot l_6}{2\cdot l_0} = \frac{100\cdot(9{,}8-0{,}5)\cdot 280}{2\cdot 300} = 434\,[N]$$

$$F_{VerzZ2} = -\frac{m(g-a)\cdot l_6}{2\cdot l_0} = -\frac{100\cdot(9{,}8-0{,}5)\cdot 280}{2\cdot 300} = -434\,[N]$$

$$F_{VerzZ3} = -\frac{m(g-a)\cdot l_6}{2\cdot l_0} = -\frac{100\cdot(9{,}8-0{,}5)\cdot 280}{2\cdot 300} = -434\,[N]$$

$$F_{VerzZ4} = \frac{m(g-a)\cdot l_6}{2\cdot l_0} = \frac{100\cdot(9{,}8-0{,}5)\cdot 280}{2\cdot 300} = 434\,[N]$$

Tangential loads

$$F_{VerzY1} = \frac{m(g-a)\cdot l_5}{2\cdot l_0} = \frac{100\cdot(9{,}8-0{,}5)\cdot 250}{2\cdot 300} = 387{,}50\,[N]$$

$$F_{VerzY2} = -\frac{m(g-a)\cdot l_5}{2\cdot l_0} = -\frac{100\cdot(9{,}8-0{,}5)\cdot 250}{2\cdot 300} = -387{,}50\,[N]$$

$$F_{VerzY3} = -\frac{m(g-a)\cdot l_5}{2\cdot l_0} = -\frac{100\cdot(9{,}8-0{,}5)\cdot 250}{2\cdot 300} = -387{,}50\,[N]$$

$$F_{VerzY4} = \frac{m(g-a)\cdot l_5}{2\cdot l_0} = \frac{100\cdot(9{,}8-0{,}5)\cdot 250}{2\cdot 300} = 387{,}50\,[N]$$

b) The combined radial and tangential loads are calculated per carriage according to [2.8].

During the acceleration phase

$$F_{BeschE1} = |F_{BeschZ1}| + |F_{BeschY1}| = 909{,}84\,[N]$$

$$F_{BeschE2} = |F_{BeschZ2}| + |F_{BeschY2}| = 909{,}84\,[N]$$

$$F_{BeschE3} = |F_{BeschZ3}| + |F_{BeschY3}| = 909{,}84\,[N]$$

$$F_{BeschE4} = |F_{BeschZ4}| + |F_{BeschY4}| = 909{,}84\,[N]$$

At constant velocity

$$F_{KonstE1} = \left|F_{KonstZ1}\right| + \left|F_{KonstY1}\right| = 886{,}47\ [N]$$

$$F_{KonstE2} = \left|F_{KonstZ2}\right| + \left|F_{KonstY2}\right| = 886{,}47\ [N]$$

$$F_{KonstE3} = \left|F_{KonstZ3}\right| + \left|F_{KonstY3}\right| = 886{,}47\ [N]$$

$$F_{KonstE4} = \left|F_{KonstZ4}\right| + \left|F_{KonstY4}\right| = 886{,}47\ [N]$$

During the deceleration phase

$$F_{VerzE1} = \left|F_{VerzZ1}\right| + \left|F_{VerzY1}\right| = 821{,}50\ [N]$$

$$F_{VerzE2} = \left|F_{VerzZ2}\right| + \left|F_{VerzY2}\right| = 821{,}50\ [N]$$

$$F_{VerzE3} = \left|F_{VerzZ3}\right| + \left|F_{VerzY3}\right| = 821{,}50\ [N]$$

$$F_{VerzE4} = \left|F_{VerzZ4}\right| + \left|F_{VerzY4}\right| = 821{,}50\ [N]$$

c) The static safety factor for the maximum load on the linear guide during the acceleration phase is calculated according to [2.1].

$$f_S = \frac{C_0}{F_{0MAX}} = \frac{30.500}{909{,}84} = 33{,}5$$

d) The active, dynamic, equivalent load is calculated according to [2.9]

$$F_{m1} = \sqrt[3]{\frac{1}{4.000}\left(F^3_{BeschE1} \cdot S_1 + F^3_{KonstE1} \cdot S_2 + F^3_{VerzE1} \cdot S_3\right)} =$$

$$= \sqrt[3]{\frac{1}{4.000} \cdot \left(909{,}84^3 \cdot 1.000 + 886{,}47^3 \cdot 2.000 + 821{,}50^3 \cdot 1.000\right)} = 877{,}29\ [N]$$

$$F_{m2} = \sqrt[3]{\frac{1}{4.000}\left(F^3_{BeschE2} \cdot S_1 + F^3_{KonstE2} \cdot S_2 + F^3_{VerzE2} \cdot S_3\right)} =$$

$$= \sqrt[3]{\frac{1}{4.000} \cdot \left(909{,}84^3 \cdot 1.000 + 886{,}47^3 \cdot 2.000 + 821{,}50^3 \cdot 1.000\right)} = 877{,}29\ [N]$$

$$F_{m3} = \sqrt[3]{\frac{1}{4.000}\left(F^3_{BeschE3} \cdot S_1 + F^3_{KonstE3} \cdot S_2 + F^3_{VerzE3} \cdot S_3\right)} =$$

$$= \sqrt[3]{\frac{1}{4.000} \cdot \left(909{,}84^3 \cdot 1.000 + 886{,}47^3 \cdot 2.000 + 821{,}50^3 \cdot 1.000\right)} = 877{,}29\ [N]$$

$$F_{m4} = \sqrt[3]{\frac{1}{4.000}\left(F^3_{BeschE4} \cdot S_1 + F^3_{KonstE4} \cdot S_2 + F^3_{VerzE4} \cdot S_3\right)} =$$

$$= \sqrt[3]{\frac{1}{4.000} \cdot \left(909{,}84^3 \cdot 1.000 + 886{,}47^3 \cdot 2.000 + 821{,}50^3 \cdot 1.000\right)} = 877{,}29 \left[N\right]$$

e) The nominal service life time is calculated according to [2.5].

$$L_1 = \left(\frac{C}{F_{m1}} \cdot \frac{f_H \cdot f_T \cdot f_C}{f_W}\right)^3 \cdot 5 \cdot 10^4 = \left(\frac{17.710}{877{,}29} \cdot \frac{1}{2{,}0}\right)^3 \cdot 5 \cdot 10^4 = 51.416.933 \left[m\right] = 51.417 \left[km\right]$$

Example 4
Horizontal installation position (e.g. transport frame) with inertial forces, 2 rails arranged in parallel, 2 carriages per rail, BGCH25FN series
V=1 m/s
t_1=1 s
t_2=2 s
t_3=1 s
S=1450 mm
Mass m=150 kg
Acceleration due to gravity=9,8 m/s^2
l_0=600 mm, l_1=400 mm, l_5=150 mm, l_6=500mm
C=24,85 kN
C_0=47,07 kN
f_w=2,0 (according to Table 2.3)

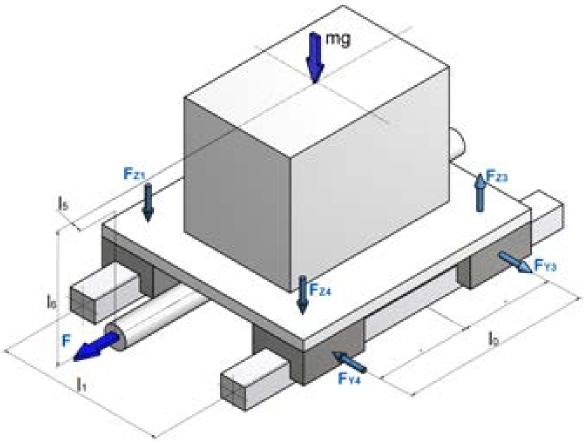


Figure 2.15 Calculation example 4

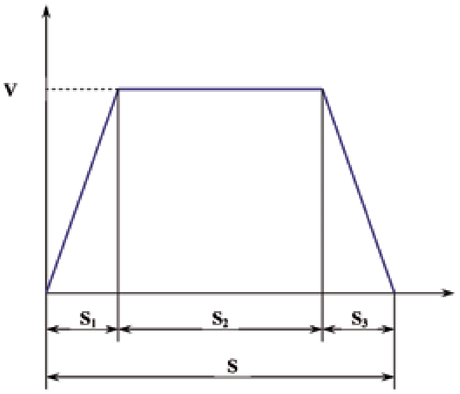


Figure 2.16 Velocity/distance diagram

Calculation:

a) Distance and acceleration calculation

Acceleration phase: $a_1 = \frac{V}{t_1} = \frac{1}{1} = 1 \left[m/s^2\right]$

Deceleration phase $a_3 = \frac{V}{t_3} = \frac{1}{1} = 1 \left[m/s^2\right]$

b) The active loads are calculated per carriage

During the acceleration phase

Radial loads

$$F_{BeschZ1} = F_{BeschZ4} = \frac{mg}{4} - \frac{m \cdot a_1 \cdot l_6}{2 \cdot l_0} = \frac{150 \cdot 9{,}8}{4} - \frac{150 \cdot 1 \cdot 500}{2 \cdot 600} = 305 \left[N\right]$$

$$F_{BeschZ3} = F_{BeschZ2} = \frac{mg}{4} + \frac{m \cdot a_1 \cdot l_6}{2 \cdot l_0} = \frac{150 \cdot 9{,}8}{4} + \frac{150 \cdot 1 \cdot 500}{2 \cdot 600} = 430 \left[N\right]$$

Tangential loads

$$F_{BeschY1} = F_{BeschY2} = F_{BeschY3} = F_{BeschY4} = \frac{m \cdot a_1 \cdot l_5}{2 \cdot l_0} = \frac{150 \cdot 1 \cdot 150}{2 \cdot 600} = 18{,}75 \left[N\right]$$

At constant velocity

Radial loads

$$F_{KonstZ1} = F_{KonstZ2} = F_{KonstZ3} = F_{KonstZ4} = \frac{mg}{4} = \frac{150 \cdot 9{,}8}{4} = 367{,}5 \left[N\right]$$

During the deceleration phase

Radial loads

$$F_{VerzZ1} = F_{VerzZ4} = \frac{mg}{4} + \frac{m \cdot a_3 \cdot l_6}{2 \cdot l_0} = \frac{150 \cdot 9{,}8}{4} + \frac{150 \cdot 1 \cdot 500}{2 \cdot 600} = 430 \left[N\right]$$

$$F_{VerzZ2} = F_{VerzZ3} = \frac{mg}{4} - \frac{m \cdot a_3 \cdot l_6}{2 \cdot l_0} = \frac{150 \cdot 9{,}8}{4} - \frac{150 \cdot 1 \cdot 500}{2 \cdot 600} = 305 \left[N\right]$$

Tangential loads

$$F_{VerzY1} = F_{VerzY2} = F_{VerzY3} = F_{VerzY4} = \frac{m \cdot a_3 \cdot l_5}{2 \cdot l_0} = \frac{150 \cdot 1 \cdot 150}{2 \cdot 600} = 18{,}75 \left[N\right]$$

c) The equivalent radial and tangential loads are calculated per carriage according to [2.8].

During the acceleration phase

$$F_{BeschE1} = F_{BeschE4} = \left|F_{BeschZ1}\right| + \left|F_{BeschY1}\right| = 323{,}75\,[N]$$

$$F_{BeschE2} = F_{BeschE3} = \left|F_{BeschZ2}\right| + \left|F_{BeschY2}\right| = 448{,}75\,[N]$$

At constant velocity

$$F_{KonstE1} = F_{KonstE2} = F_{KonstE3} = F_{KonstE4} = 367{,}5\,[N]$$

During the deceleration phase

$$F_{VerzE1} = F_{verzE4} = \left|F_{VerzZ1}\right| + \left|F_{VerzY1}\right| = 448{,}75\,[N]$$

$$F_{VerzE2} = F_{verzE3} = \left|F_{VerzZ2}\right| + \left|F_{VerzY2}\right| = 323{,}75\,[N]$$

d) The static safety factor for the maximum load on the linear guide during the acceleration and deceleration phase is calculated according to [2.1].

$$f_S = \frac{C_0}{F_{0MAX}} = \frac{47.070}{448{,}75} = 104{,}8$$

e) The active, dynamic, equivalent load is calculated according to [2.9].

$$F_{m1} = F_{m4} = \sqrt[3]{\frac{1}{4.000}\left(F^3_{BeschE1}\cdot S_1 + F^3_{KonstE1}\cdot S_2 + F^3_{VerzE1}\cdot S_3\right)} =$$

$$= \sqrt[3]{\frac{1}{4.000}\cdot\left(323{,}75^3\cdot 1.000 + 367{,}5^3\cdot 2.000 + 448{,}75^3\cdot 1.000\right)} = 382\,[N]$$

$$F_{m2} = F_{m3} = \sqrt[3]{\frac{1}{4.000}\left(F^3_{BeschE2}\cdot S_1 + F^3_{KonstE2}\cdot S_2 + F^3_{VerzE2}\cdot S_3\right)} =$$

$$= \sqrt[3]{\frac{1}{4.000}\cdot\left(448{,}75^3\cdot 1.000 + 367{,}5^3\cdot 2.000 + 323{,}75^3\cdot 1.000\right)} = 382\,[N]$$

f) The service life time of the four carriages is calculated according to [2.5].

$$L = \left(\frac{C}{F_{m1}}\cdot\frac{f_H\cdot f_T\cdot f_C}{f_W}\right)^3\cdot 5\cdot 10^4 = \left(\frac{24.850}{382}\cdot\frac{1}{2{,}0}\right)^3\cdot 5\cdot 10^4 = 1.720.557.170\,[m] = 1.720.557\,[km]$$

2.6 Preload/rigidity

2.6.1 Preload classes

Profile rail guides can be preloaded to increase the rigidity of the system or to improve the spring compression behaviour of the total system. The elastic deformation of the tracks and the balls under load is smaller for preloaded carriages than in non-preloaded ones. The disadvantages of preloaded systems are: increased driving resistance and a resulting reduction in service life time. The preload is not considered in the normal service life time calculation when it is within the ranges specified in Table 2.6. The preload in a profile rail guide system is achieved by using rolling elements that are oversized by a specific factor (Figure 2.17).
The preload is defined by the radial clearance resulting from the over sizing of the rolling elements.

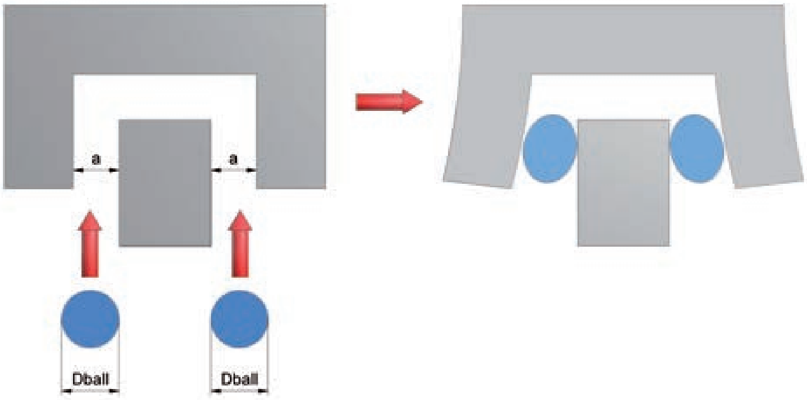


Figure 2.17 Preloading by over sizing of the balls

NTN-SNR profile rail guides are produced in different preload classes (Table 2.6). The individual preload classes correspond to a preload of the rolling elements that is defined by a percentage rate of the dynamic load rating C.

Table 2.6 Preload class

	Preload class	Description
No preload	Z0	0
Low preload	Z1	up to 2% of C
Medium preload	Z2	up to 4% of C
High preload	Z3	up to 8% of C
Special preload	ZX	Description necessary

Table 2.7 can be used to define the preload class.

Table 2.7 Application areas for different preload classes

	Without preload (Z0)	**Low preload (Z1)**	**Medium and high preload (Z2/Z3)**
Application conditions	> Two-rail system > Weak external effects > Low load > Low friction > Low accuracy	> One-rail system > Light load > High accuracy > Self-supporting design > High dynamics	> Strong vibrations > High-performance processing > Strong external effects
Applications	> Welding machines > Cutting machines > Feeding systems > Tool changer > X and Y axes for general industrial applications > Packaging machines	> NC lathes > Precision coordinate tables > Manipulators > Z-axes for general industrial applications > Measuring devices > PC-board drilling machines	> Processing centres > NC lathes > Milling machines > Grinding machines

The preload for the individual types are provided in Table 2.8.

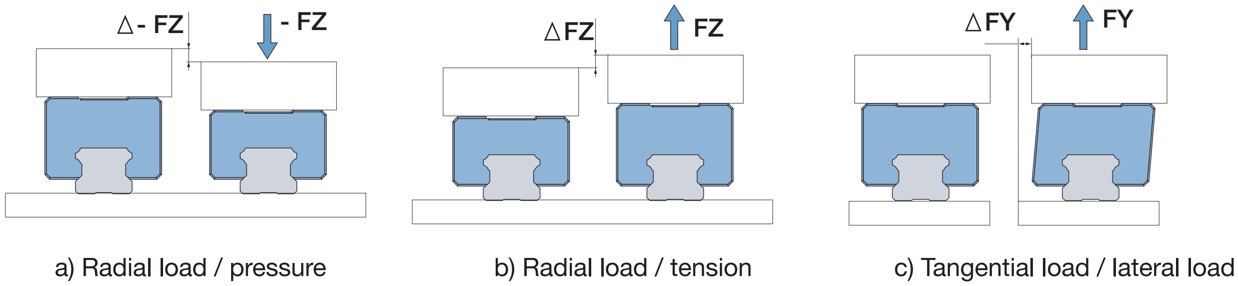
Table 2.8 Radial clearance of profile rail guides [µm]

	Z0	**Z1**	**Z2**	**Z3**
MB...9	-2 to +2	-3 to 0	-	-
MB...12	-3 to +3	-6 to 0	-	-
MB...15	-5 to +5	-10 to 0	-	-
BG...15	-3 to +3	-8 to -4	-13 to -9	-18 to -14
BG...20	-3 to +3	-8 to -4	-14 to -9	-19 to -14
BG...25	-4 to +4	-10 to -5	-17 to -11	-23 to -18
BG...30	-4 to +4	-11 to -5	-18 to -12	-25 to -19
BG...35	-5 to +5	-12 to -6	-20 to -13	-27 to -20
BG...45	-6 to +6	-15 to -7	-23 to -15	-32 to -24
BG...55	-7 to +7	-19 to -8	-29 to -20	-38 to -30

We recommend that you contact our NTN-SNR application engineers to select the optimal preload.

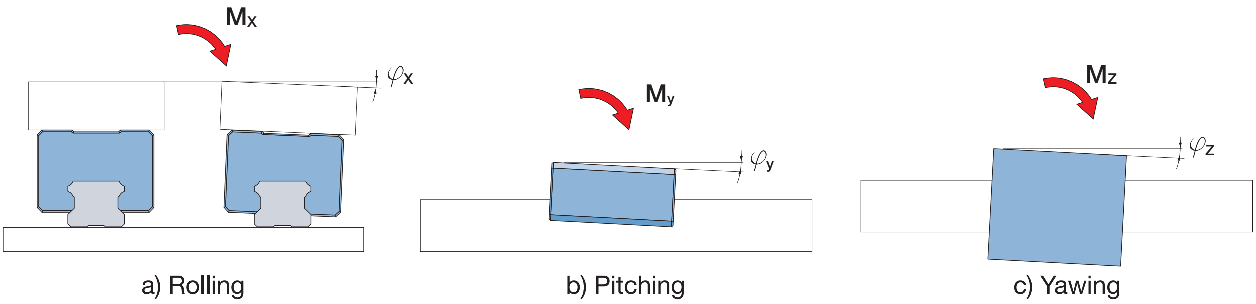
2.6.2 Rigidity

The rigidity of a carriage is defined by the relationship between the external load and the resulting elastic deformation in the load direction. The rigidity is an important parameter for the selection of the system, as the rigidity values vary according to the type and version of the NTN-SNR profile rail guide systems. The rigidity values discriminate between deformation due to load in the main load directions (Figure 2.18) and angular deformation due to torque load (Figure 2.19).



a) Radial load / pressure b) Radial load / tension c) Tangential load / lateral load

Figure 2.18 Deformation due to load in the main load directions



a) Rolling b) Pitching c) Yawing

Figure 2.19 Angular deformation due to torque load

2.7. Precision

2.7.1 Precision grades

NTN-SNR profile rail guides are produced in various precision classes. Each precision class has a maximum deviation for running parallelism and maximum dimensional deviations. (Figure 2.20).

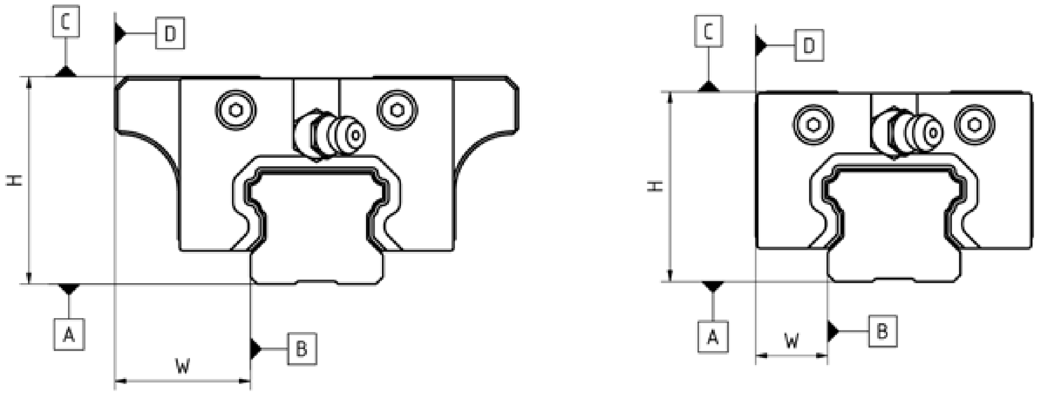


Figure 2.20 Precision classes

The running parallelism ΔC describes the maximum parallelism deviation between the top of the carriage and the bottom of the rail, relative to the length of the rail. ΔD is the the maximum parallelism deviation between the lateral reference surface of the carriage and the rail, relative to the length of the rail. The height tolerance is the maximum dimensional deviation of the height measurement H in the z-direction between the top of the carriage and the bottom of the rail. The maximum dimensional deviation between the lateral reference surface of the carriage and the rail in y-direction is the tolerance of the value W. The values for the individual precision classes are provided in Table 2.9 for the standard profile rail guides and in Table 2.10 for the miniature profile rail guides.

Table 2.9 Precision classes of the standard profile rail guides

	Normal precision class	High precision class (H)	Precision class (P)	Super-precision class (SP)	Ultra-precision class (UP)
Height tolerance (H)	± 0,1	± 0,04	0 -0,04	0 -0,02	0 -0,01
Width tolerance (W)	± 0,1	± 0,04	0 -0,04	0 -0,02	0 -0,01
Height difference (ΔH) *	0,03	0,02	0,01	0,05	0,03
Width difference (ΔW) *	0,03	0,02	0,01	0,05	0,03
Running parallelism between carriage surface C and the rail surface A	Δ C as a function of rail length as shown in Figure 2.21.				
Running parallelism between the carriage reference reference surface D and the rail reference surface B	Δ D as a function of rail length as shown in Figure 2.21.				

** between two carriages*

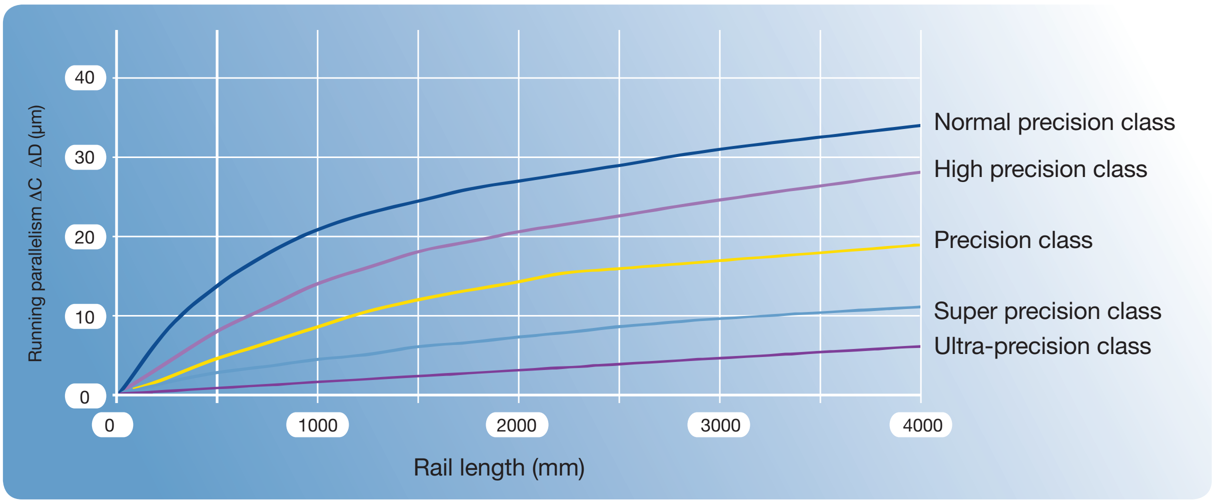


Figure 2.21 Running parallelism of the standard profile rail guides

Table 2.10 Precision classes of the miniature profile rail guides

	Normal precision class	**High precision class (H)**	**Precision class (P)**
Height tolerance (H)	± 0,04	± 0,02	± 0,01
Width tolerance (W)	± 0,04	± 0,025	± 0,015
Height difference (ΔH) *	0,03	0,015	0,007
Width difference (ΔW) *	0,03	0,02	0,01
Running parallelism between carriage surface C and the rail surface A	Δ C as a function of rail length as shown in Figure 2.22.		
Running parallelism between the carriage reference reference surface D and the rail reference surface B	Δ D as a function of rail length as shown in Figure 2.22.		

** between two runner blocks*

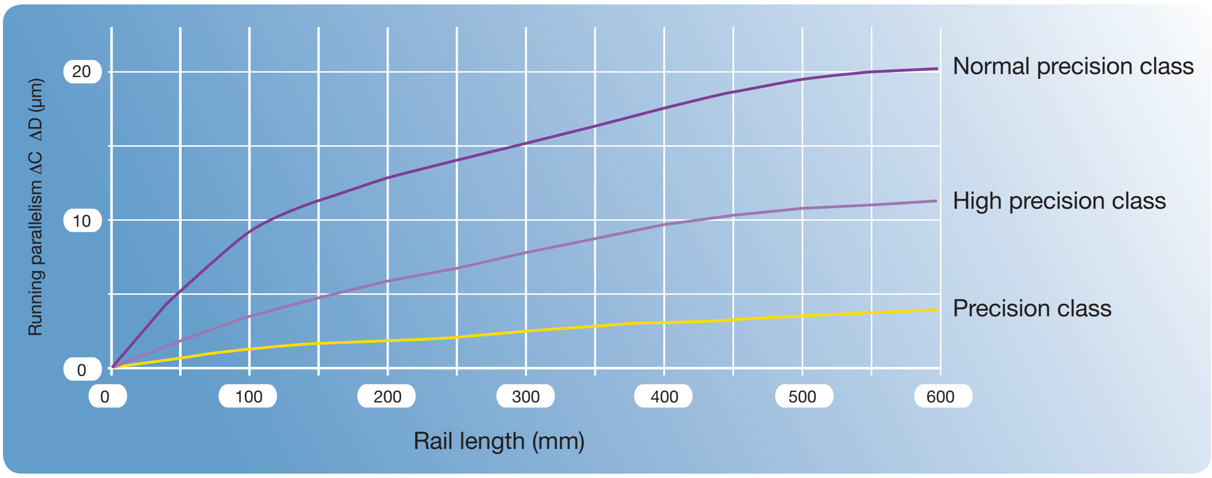


Figure 2.22 Running parallelism of the miniature profile rail guide

2.7.2 Interchangeability

It is not possible to make the NTN-SNR profile rail guides in all precision and preload classes interchangeable, as this would interfere with our goal of ensuring top quality. High precision and preload classes are therefore only available as sets consisting of rails and carriages. Table 2.11 contains an overview of the exchange options.

Table 2.11 Interchangeability of profile rail guides

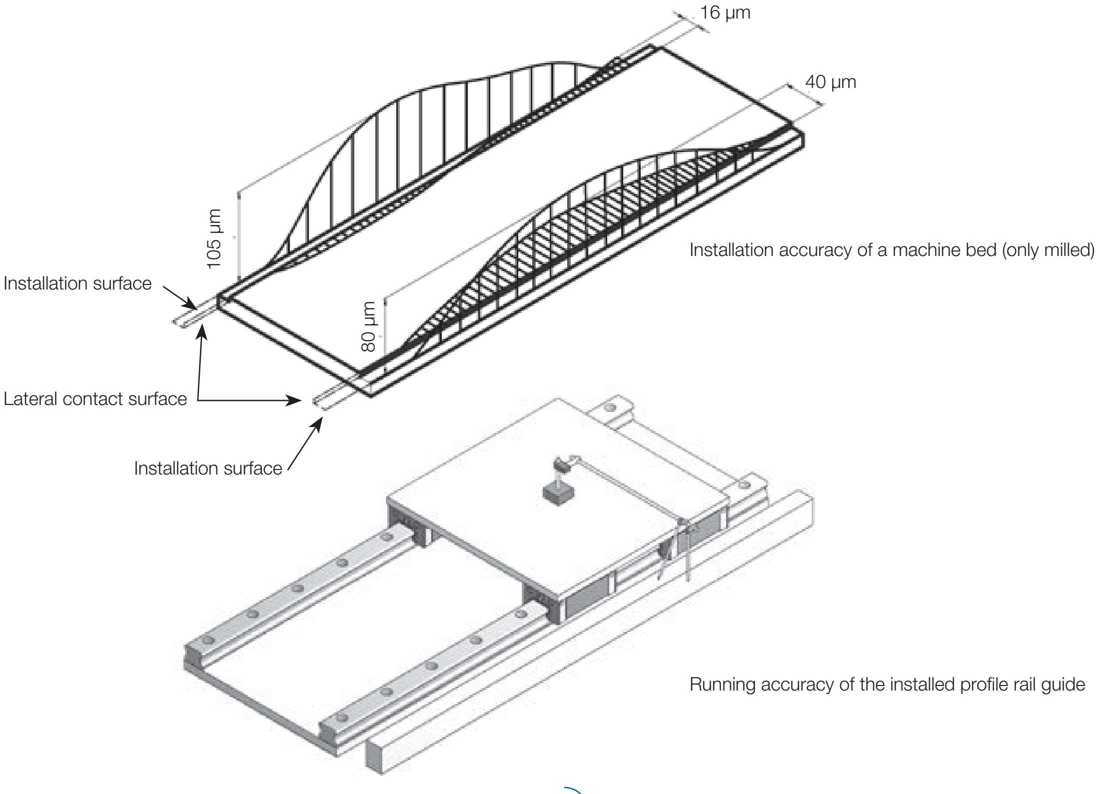
	Interchangeable		**Not interchangeable**				
Precision class	**N**	**H**	**N**	**H**	**P**	**SP**	**UP**
Preload	Z0	Z0	-	-	Z0	-	-
	Z1	Z1	-	-	Z1	Z1	Z1
	Z2	Z2	_	-	Z2	Z2	Z2
	-	-	Z3	Z3	Z3	Z3	Z3

2.7.3 Error compensation

Each component and each support structure on which profile rail guides are to be mounted has straightness, evenness and parallelism variance. Inaccuracies also occur as a result of installation faults. A significant number of these errors can be compensated for by the special track geometry of the NTN-SNR profile rail guides, as long as the supporting structure is sufficiently rigid (Figure 2.23).

The fault compensation effect usually improves the running accuracy of a machine table by more than 80% compared with the initial surfaces.

Figure 2.23 Error compensation



2.8 Drive power

2.8.1 Friction

Profile rail guides basically consist of a carriage a rail and rolling elements that move between the tracks of the carriage and the rail. A friction force F_R occurs, as with any movement (Figure 2.24). The friction coefficient (μ) is mainly affected by the following factors:

> Load (F)
> Preload
> Osculation
> Design principle (circular arc groove or Gothic arc groove)
> Rolling element shape
> Material combinations in the runner block
> Lubricant

The stick-slip effect at start-up, so familiar with sliding guides, hardly occurs.

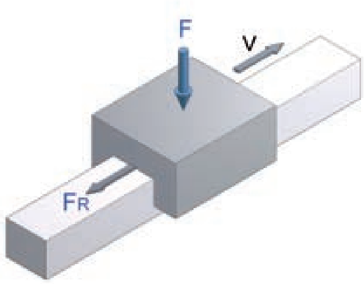
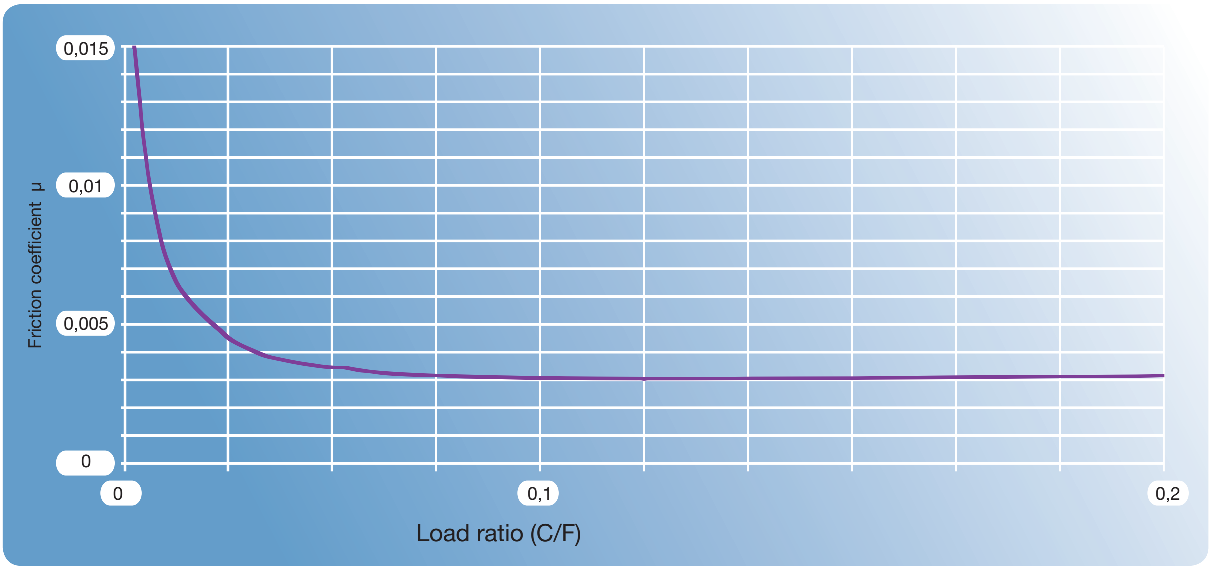


Figure 2.24 Friction force

Figure 2.25 Ratio of load / friction coefficient of profile rail guides with balls



NTN-SNR profile rail guides with balls as rolling elements have a friction coefficient (μ) of approx. 0.003 (Figure 2.25). The forces acting on the system include internal as well as external forces. The external forces may be weight forces, process forces (e.g. milling forces) and dynamic forces (e.g. acceleration forces). Internal forces result from preload, assembly tolerances and installation faults.

The friction caused by the lubricant strongly depends on the properties of the lubricant used. Immediately after relubrication, the friction forces of a profile rail guide increase for a short time. After some rolling movements of the rolling elements, the optimal grease distribution of the system is again reached and the friction force drops to its normal value.

2.8.2 Driving resistance

The driving resistance of a profile rail guide consists of the friction force and the sealing resistance (Figure 2.26).

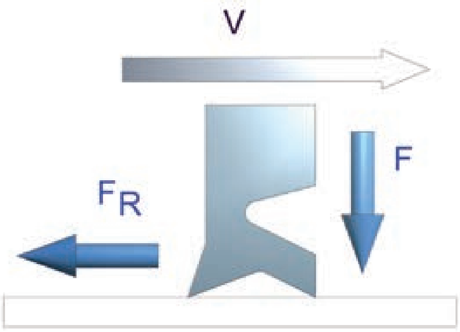


Figure 2.26 Friction force of a two-lip seal

The seal resistance is in turn dependent on the respective combination of seals used. The standard configuration of NTN-SNR profile rail guides includes an inner seal, two lateral seals and two end seals. All seals are implemented as two-lip seals. The maximum sealing resistances are shown in Table 2.12.

Table 2.12 Maximum sealing resistances

Series	Sealing resistance N
BG__15_S	1,7
BG__15_N	2,2
BG__15_L	2,4
BG__15_E	2,8
BG__20_S	2,7
BG__20_N	3,5
BG__20_L	3,9
BG__20_E	4,5
BG__25_S	4,0
BG__25_N	5,2
BG__25_L	5,9
BG__25_E	6,6
BG__30_S	5,4
BG__30_N	7,1
BG__30_L	8,0
BG__30_E	9,0
BG__35_S	6,8
BG__35_N	8,8
BG__35_L	9,9

Series	Sealing resistance N
BG__35_E	11,2
BG__45_N	11,2
BG__45_L	12,2
BG__45_E	14,0
BG__55_N	13,5
BG__55_L	15,8
BG__55_E	16,8
MB_09SN	0,3
MB_09SL	0,4
MB_09WN	0,4
MB_09WL	0,5
MB_12SN	0,7
MB_12SL	0,8
MB_12WN	0,8
MB_12WL	0,9
MB_15SN	0,9
MB_15SL	1,0
MB_15WN	1,1
MB_15WL	1,2

2.8.3 Driving force

The driving force for a profile rail guide system (Figure 2.27) is calculated according to the following formula:

$$F_a = \mu \cdot F + n \cdot f \qquad [2.13]$$

F_a: Driving force [N]
μ: Friction value
F: Load [N]
n: Number of runner blocks
f: Specific movement resistance of a runner block [N]

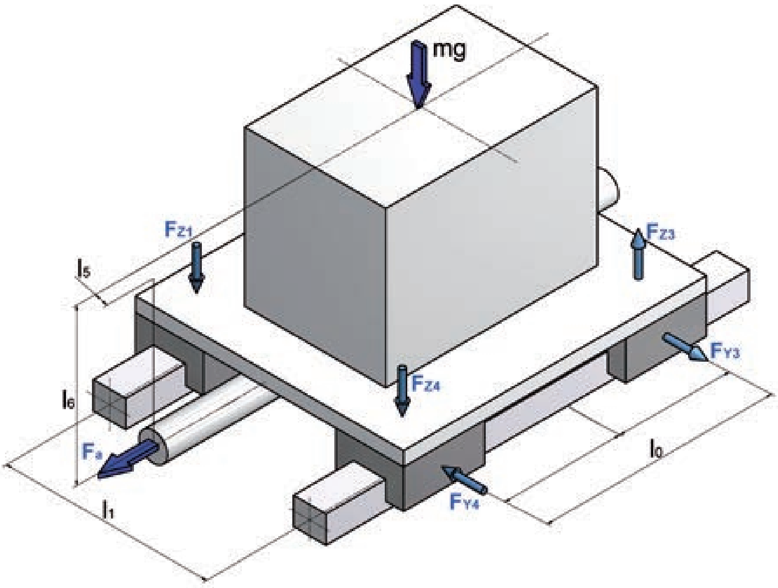


Figure 2.27 Driving force calculation

The maximum driving resistances shown in Table 2.13 result for NTN-SNR profile rail guides with standard sealing and greasing at room temperature and without load. This value may vary considerably when different sealing options or grease types are chosen.

Table 2.13 Driving resistances

Series	Z0 [N]	Z1 [N]	Z2 [N]	Z3 [N]
BGC_15_S	2,9	3,3	3,7	4,1
BGC_15_N	3,7	4,6	5,4	6,3
BGC_15_L	4,2	5,3	6,2	7,3
BGC_15_E	4,9	6,2	7,3	8,6
BGC_20_S	4,4	5,1	5,7	6,4
BGC_20_N	5,8	7,1	8,2	9,6
BGC_20_L	6,6	8,4	9,8	11,6
BGC_20_E	7,6	9,7	11,4	13,5
BGC_25_S	6,3	7,2	8,0	9,0
BGC_25_N	8,3	10,0	11,7	13,5
BGC_25_L	9,6	11,8	13,9	16,3
BGC_25_E	10,7	13,2	15,6	18,3
BGC_30_S	8,3	9,6	10,8	12,2
BGC_30_N	11,1	13,6	16,1	18,9
BGC_30_L	12,8	16,1	19,3	22,9
BGC_30_E	14,3	17,9	21,5	25,5
BGC_35_S	10,6	12,4	14,1	16,1
BGC_35_N	14,3	17,9	21,3	25,2
BGC_35_L	16,3	20,8	25,0	30,0
BGC_35_E	18,4	23,3	28,0	33,4
BGC_45_N	18,5	23,3	27,9	33,3
BGC_45_L	20,7	26,4	31,9	38,3
BGC_45_E	23,7	30,3	36,6	44,0
BGC_55_N	22,6	28,1	33,8	40,3
BGC_55_L	27,2	34,6	42,3	51,0
BGC_55_E	31,0	41,1	51,5	63,3

Series	Z0 [N]	Z1 [N]	Z2 [N]	Z3 [N]
BGX_15_S	2,4	2,9	3,3	3,7
BGX_15_N	3,2	4,1	4,9	5,8
BGX_15_L	3,6	4,7	5,6	6,7
BGX_15_E	4,3	5,6	6,7	8,0
BGX_20_S	3,8	4,5	5,0	5,7
BGX_20_N	5,0	6,4	7,5	8,8
BGX_20_L	5,8	7,5	9,0	10,7
BGX_20_E	6,6	8,7	10,4	12,5
BGX_25_S	5,5	6,4	7,2	8,2
BGX_25_N	7,4	9,1	10,7	12,6
BGX_25_L	8,5	10,7	12,8	15,2
BGX_25_E	9,5	12,0	14,4	17,1
BGX_30_S	7,4	8,6	9,9	11,2
BGX_30_N	10,0	12,6	15,0	17,8
BGX_30_L	11,6	14,9	18,1	21,7
BGX_30_E	12,9	16,6	20,1	24,1
BGX_35_S	9,5	11,3	13,0	15,0
BGX_35_N	13,0	16,6	20,0	24,0
BGX_35_L	14,9	19,4	23,6	28,5
BGX_35_E	16,8	21,7	26,4	31,8
BGX_45_N	16,9	21,6	26,3	31,7
BGX_45_L	18,8	24,5	30,0	36,4
BGX_45_E	21,6	28,2	34,5	41,9
BGX_55_N	20,6	26,1	31,7	38,2
BGX_55_L	24,8	32,2	39,8	48,6
BGX_55_E	28,2	38,3	48,7	60,5

3 Installation

3.1 Arrangement of the installation surface

The installation of profile rail guides usually involves two guide rails arranged in parallel with one or several carriages per rail guide. The example shown is a common application, in which the rail guides are fastened at a specific distance to each other on an even support surface (e.g. a machine bed) and in which a machine table is attached to the carriages (Figure 3.1).

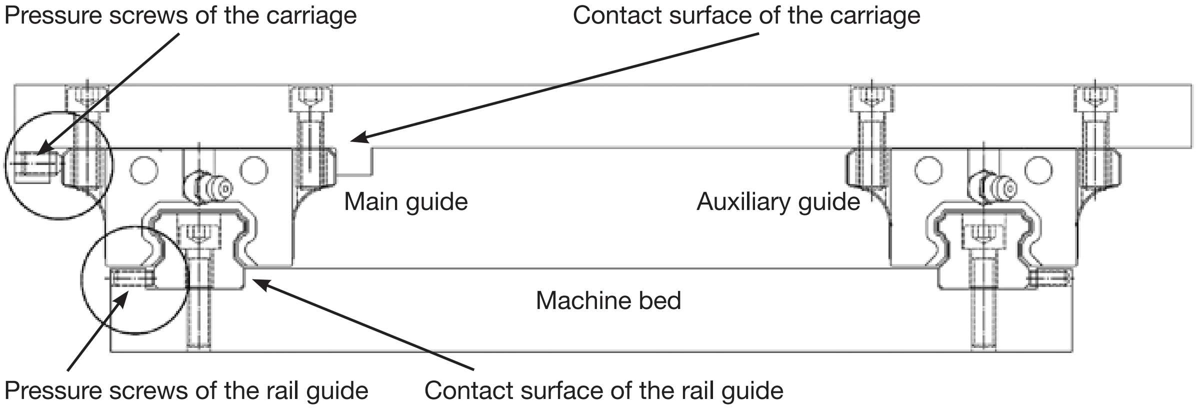


Figure 3.1 Installation for application with two profile rail guides arranged in parallel

The locating edges are used to achieve accurate positioning during installation. The locating edges also make the installation of the whole system easier. The information about the height of the locating edge Hr for the rail guide (Figure 3.2) and the height of the locating edge Hs for the runner block (Figure 3.3) is provided in Table 3.1 and Table 3.2.

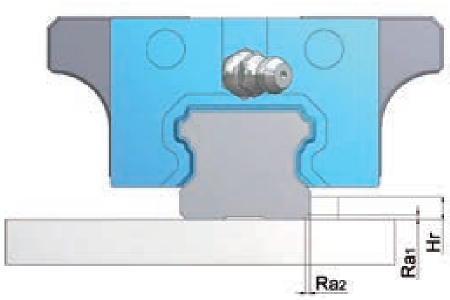


Figure 3.2. Locating edge of the carriages

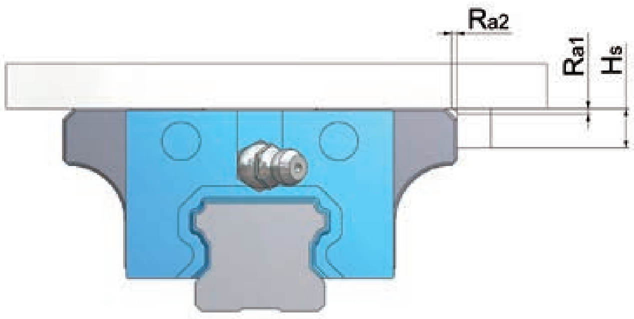


Figure 3.3. Locating edge of the carriages

Table 3.1 Locating edges and edge radius for the BG series.

	Edge radius Ra1=Ra2 [mm]	Alignment edge Hr [mm]	Alignment edge Hs [mm]	Fastening screws*
BG…15	0,6	3,1	5	M4x16
BG…20	0,9	4,3	6	M5x20
BG…25	1,1	5,6	7	M6x25
BG…30	1,4	6.8	8	M8x30
BG…35	1,4	7,3	9	M8x30
BG…45	1,6	8,7	12	M12x35
BG...55	1,6	11,8	14	M14x35

** Minimum screw length*

Table 3.2 Locating edges and edge radius for the MB series.

	Edge radius Ra1 [mm]	Edge radius Ra2 [mm]	Alignment edge Hr [mm]	Alignment edge Hs [mm]	Fastening screws*
MB…9S	0,1	0,3	0,5	4,9	M3x6
MB…9W	0,1	0,5	2,5	4,9	M3x6
MB…12S	0,3	0,2	1,5	5,7	M3x6
MB…12W	0,3	0,3	2,5	5,7	M3x8
MB…15S	0,3	0,4	2,2	6,5	M3x8
MB…15W	0,3	0,3	2,2	6,5	M3x8

** Minimum screw length*

3.2 Identification of profile rail guides

In the use of profile rail guides with precision classes P and higher, that are installed in one plane (main guide and auxiliary guide) all carriages are marked with the same production code (Figure 3.4).

Figure 3.4 Marking the main and auxiliary guide

The reference surfaces of the carriage are located on the side that is opposite the SNR logo and the production code. The same side has the marker lines (if there are two lines, the marker line is the smaller one) that mark the reference surface of the rail guides (Figure 3.5).

We recommend that you contact our NTN-SNR application engineers when a different arrangement of the reference surfaces is required.

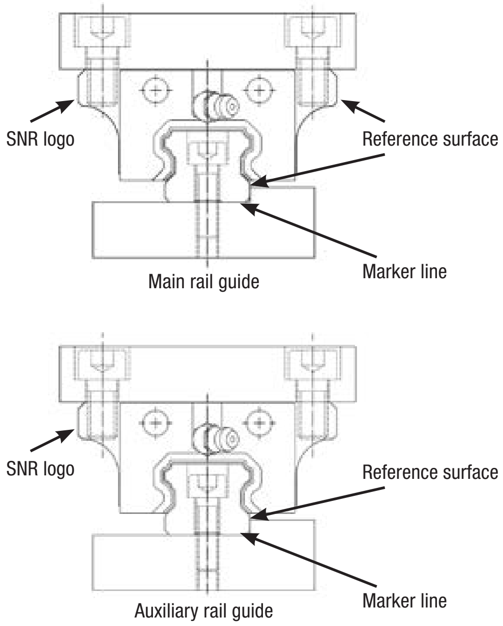


Figure 3.5 Marking the reference surfaces

The rail guides are delivered in one piece up to a standard length of approximately 4000 mm. Longer rail guides are provided in several sections with joints. The joints are marked (Figure 3.6) and the profile rail guides must be mounted accordingly.

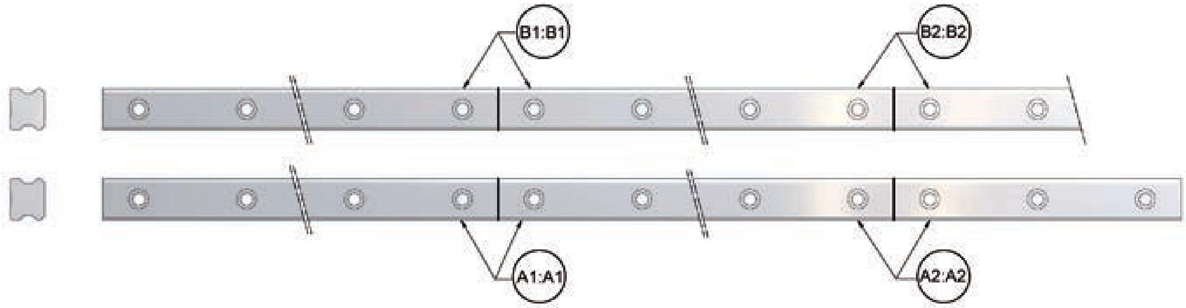
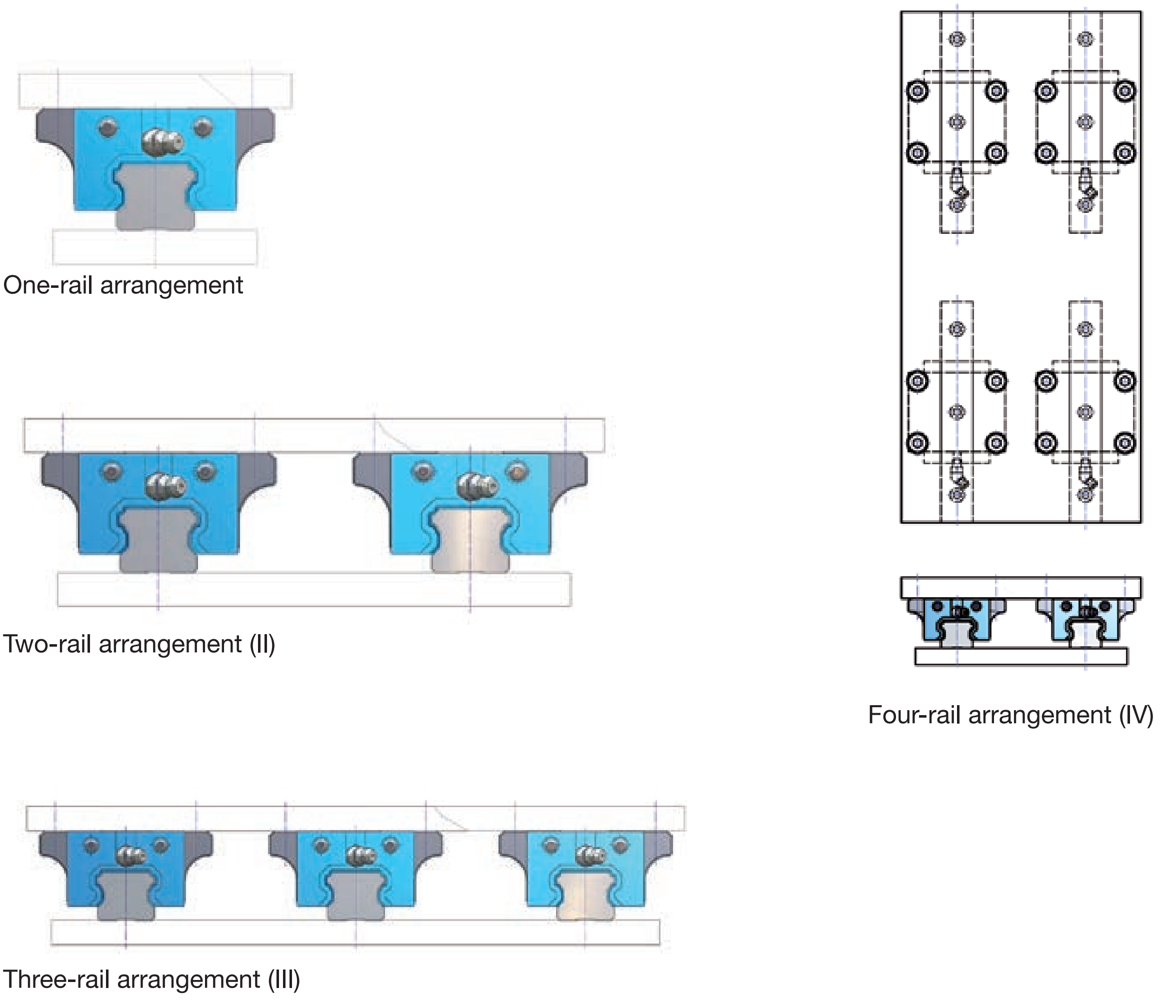


Figure 3.6 Identification of profile rail guides

3.3 Arrangement of profile rail guides

The following examples show some basic arrangements of profile rail guides that are most commonly used in practical applications (Figure 3.7).


One-rail arrangement

Two-rail arrangement (II)

Three-rail arrangement (III)

Four-rail arrangement (IV)

Figure 3.7 Examples for the arrangement of profile rail guides

The number of profile rail guides and the carriages in a total system has an impact on the rigidity, load-rating capacity and dimensions of the device. The arrangement of the profile rail guides also determines the requirements for the accuracy of the installation surfaces. The actual arrangement of profile rail guides strongly depends on the application and may therefore vary accordingly.

3.4 Installation position of a profile rail guide

The installation position of the profile rail guide system (carriage and rail guide) is defined by the basic concept of the machine/device (Figure 3.8). The lubrication process (lubricants, lubrication intervals, supply with lubricant) must be adapted to the installation position selected.

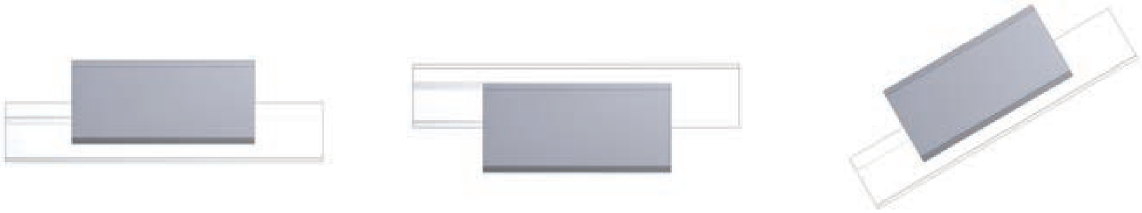
Rotation around the X-axis

Horizontal installation without rotation

Overhead installation, rotation by 180°

Tilted installation, rotation by 0 to 180°

Rotation around the Y-axis



Horizontal installation without rotation

Overhead installation, rotation by 180°

Tilted installation, rotation by 0 to 180°

Figure 3.8 Installation positions of a profile rail guide

3.5 Installation instructions

The conditions specified below must be fulfilled during the installation of NTN-SNR profile rail guides to ensure that the components can be installed and combined with other parts without affecting the health and safety of personnel.

> The work steps may only be performed in the sequence specified.
> The installation may only be performed with suitable tools and support equipment.
> The installation may only be performed by trained personnel.
> The installation of profile rail guides must be performed with cotton gloves, when the parts are dry-preserved. This prevents corrosion caused by sweaty hands
> The installation of carriages on the guide rails should not be performed with a pre-installed machine table.

Step 1. Cleaning the installation surface

Unevenness, burrs and dirt can be removed from the installation surface with an oilstone. In addition, all the NTN-SNR profile rails must be cleaned. All profile rail guides receive a standard treatment with corrosion protection oil when no customer-specific or special requirements are specified. This corrosion protection oil must be removed, e.g. with a cotton cloth.

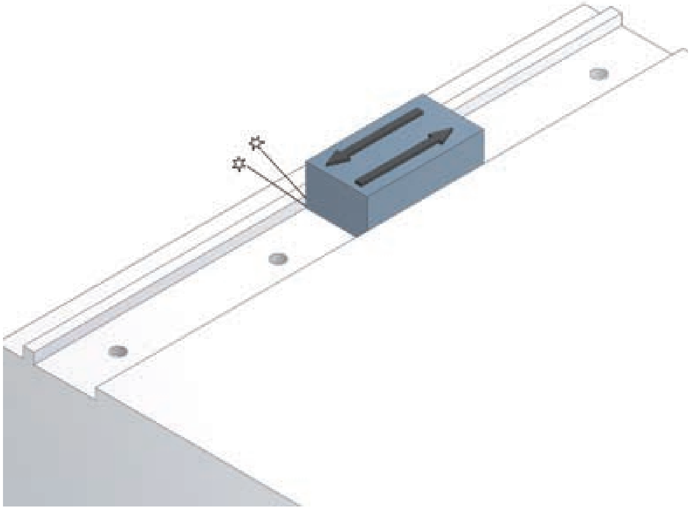


Figure 3.9 Preparation of the installation surface

Step 2. Alignment of the rail guide on the installation surface

Carefully place the rail guide onto the installation surface and fasten it gently with the appropriate screws, so that the rail guide touches the installation surface. The side of the rail guide that is marked with a line (reference surface) must be aligned towards the shoulder edge of the installation surface.

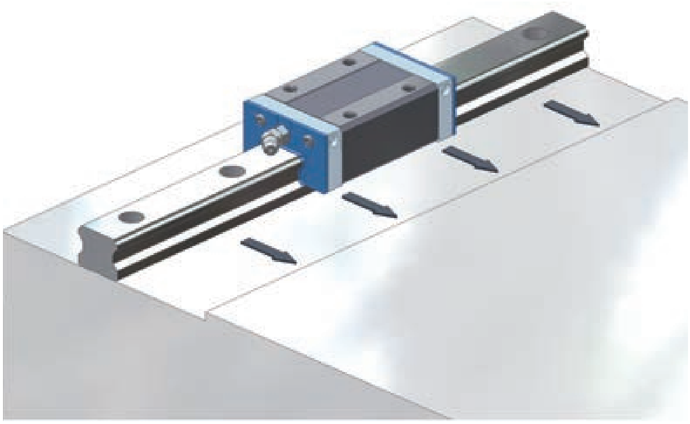


Figure 3.10 Aligning the rail guide

Step 3. Pre-installing the rail guide

The screws are gently and temporarily fastened. The fastening holes in the rail guide must be aligned with the holes in the installation surface).

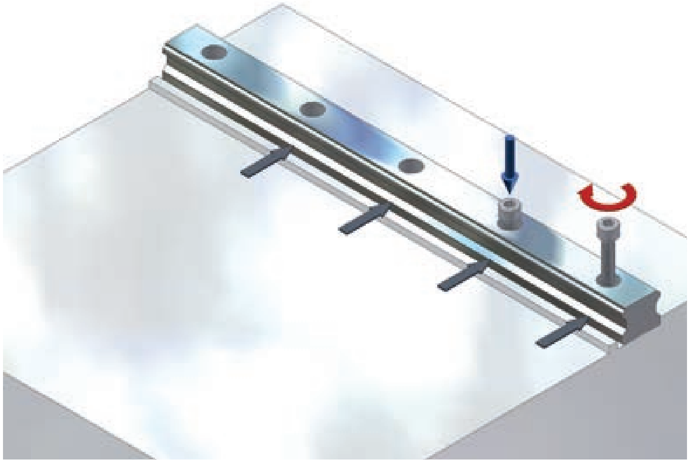


Figure 3.11 Pre-installing the rail guide

Step 4. Fastening the pressure screws

The pressure screws at the rail guide must be fastened to achieve tight contact with the lateral contact surface.

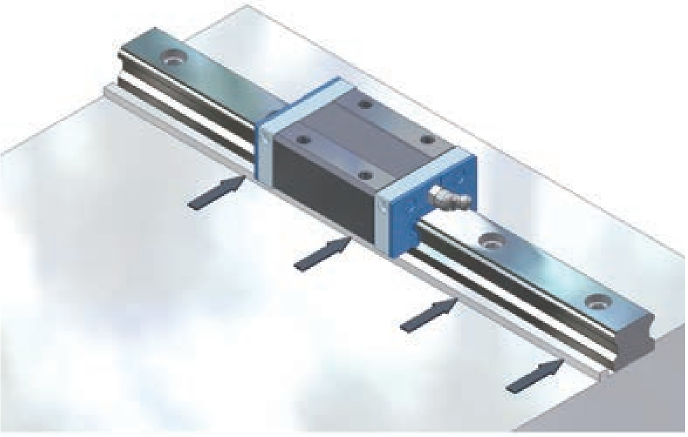


Figure 3.12 Positioning the rail

Step 5. Fastening the fastening screws with a torque spanner

The fastening screws should be fastened with a torque spanner by applying the appropriate torque (Chapter 3.7). The fastening screws should be fastened in sequence, starting at the centre and proceeding towards the ends of the rail guides.

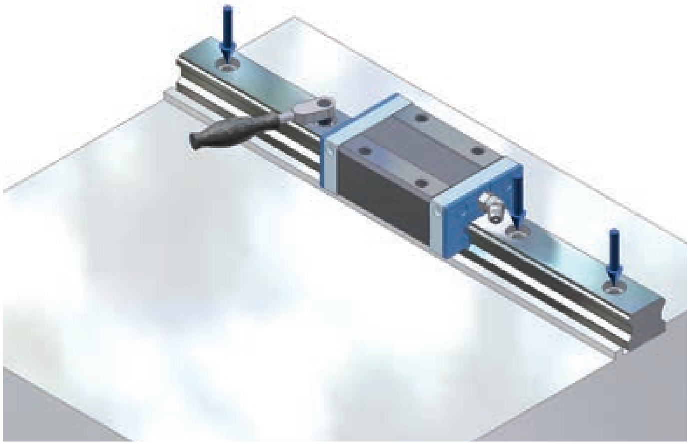


Figure 3.13 Final installation of the rail guide

Step 6. Installation of additional rail guides

Additional rail guides must be installed in the same order (Steps 1 to 5).

Step 7. Installation of the machine table

The table is carefully placed onto the carriage and gently and temporarily fastened with the fastening screws. The pressure screws at the carriage (Figure 3.14) position the table by pressing against the shoulder edge of the table. The fastening screws of the machine table are to be fastened in the order specified (crosswise), starting at the main rail guide side. After installation, low-viscosity oil should be used to treat and protect the system.

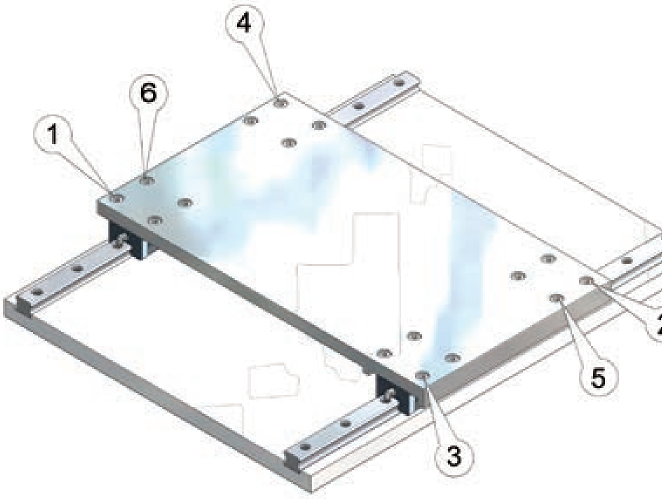


Figure 3.14 Fastening sequence for machine table installation

3.6 Permitted installation tolerances

The service life of the profile rail guide system under normal operating conditions is not affected when the installation tolerances specified are not exceeded..

Parallelism tolerance between two rail guides

The parallelism tolerance between two rail guides (Figure 3.15) depends on the profile rail guide series used and the accuracy of the machine required. The maximum parallelism tolerances are provided in Table 3.3 and Table 3.4.

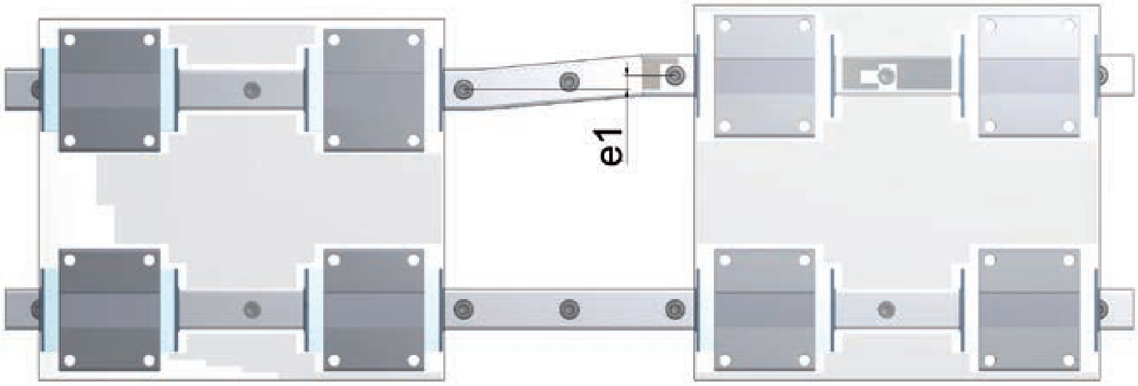


Figure 3.15 Parallelism tolerance between two rail guides e_1

Table 3.3 Parallelism tolerance e1 for the BG series …,[µm]

	e_1			
	Z0	Z1	Z2	Z3
BG…15	25	18	-	-
BG…20	25	20	18	15
BG…25	30	22	20	15
BG…30	40	30	27	20
BG…35	50	35	30	22
BG…45	60	40	35	25
BG…55	70	50	45	30

Table 3.4 Parallelism tolerance e1 for the MB …,[µm]

	e_1	
	Z0	Z1
MB…9	4	3
MB…12	9	5
MB…15	10	6

Height tolerance between two rail guides

The values for the height tolerances (Figure 3.16) depend on the distance between the rail guides and are calculated using the conversion factor x (Table 3.5 and Table 3.6) and Formula [3.1].

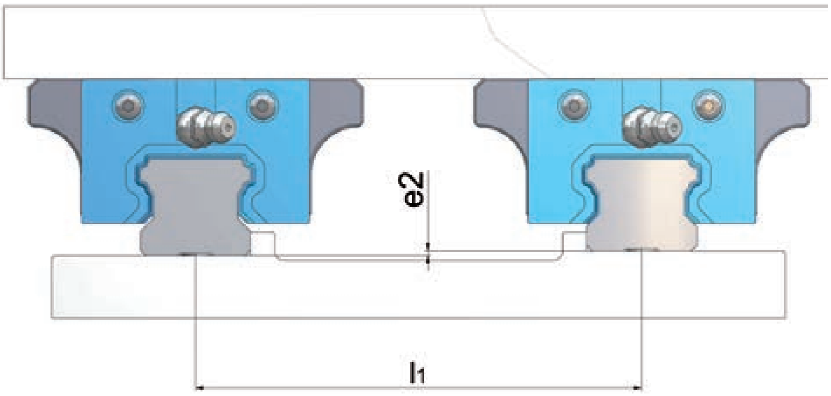


Figure 3.16 Height tolerance between two rail guides e_2

$$e_2 = l_1 * x \qquad [3.1]$$

e_2 Height tolerance between two rails [µm]
l_1 Distance between the rails [mm]
x Calculation factors

Table 3.5 Calculation factors x for the BG series …,[µm]

	Z0	Z1	Z2	Z3
BG…15	0,26	0,17	0,10	-
BG…20	0,26	0,17	0,10	0,08
BG…25	0,26	0,17	0,14	0,12
BG…30	0,34	0,22	0,18	0,16
BG…35	0,42	0,30	0,24	0,20
BG…45	0,50	0,34	0,28	0,20
BG…55	0,60	0,42	0,34	0,25

Table 3.6 Calculation factors x for the MB series …,[µm]

	e_1	
	Z0	Z1
MB…9	0,18	0,03
MB…12	0,25	0,06
MB…15	0,30	0,10

Height tolerance in a longitudinal direction between two carriages

The values for the height tolerances in a longitudinal direction (Figure 3.17) of the carriages are calculated using the conversion factor y (Tables 3.7 and 3.8) and Formula [3.2].

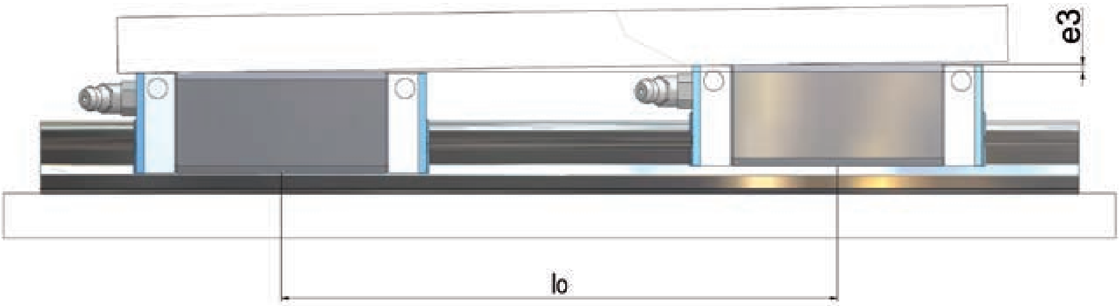


Figure 3.17 Height tolerance in longitudinal e_3

$$e_3 = l_0 * y \qquad [3.2]$$

e_3	Height tolerance between two carriages [µm]
l_0	Distance between the carriages [mm]
y	Calculation factors

Table 3.7 Calculation factors y for the BG series …,[µm]

	Z0	Z1	Z2	Z3
	BG_…15			
…BS / FS	0,14	0,11	0,09	0,07
…BN / FN	0,12	0,10	0,08	0,06
…BL / FL	0,11	0,09	0,07	0,06
…BE / FE	0,10	0,08	0,07	0,05
	BG_…20			
…BS / FS	0,15	0,12	0,10	0,08
…BN / FN	0,13	0,11	0,09	0,07
…BL / FL	0,12	0,10	0,08	0,06
…BE / FE	0,10	0,09	0,07	0,06
	BG_…25			
…BS / FS	0,17	0,14	0,12	0,09
…BN / FN	0,15	0,12	0,10	0,08
…BL / FL	0,14	0,11	0,09	0,07
…BE / FE	0,12	0,10	0,08	0,06
	BG_…30			
…BS / FS	0,21	0,17	0,14	0,11
…BN / FN	0,18	0,15	0,12	0,10
…BL / FL	0,16	0,13	0,11	0,09
…BE / FE	0,14	0,12	0,10	0,08
	BG_…35			
…BS / FS	0,29	0,24	0,20	0,15
…BN / FN	0,25	0,21	0,17	0,13
…BL / FL	0,23	0,19	0,15	0,12
…BE / FE	0,20	0,17	0,14	0,11
	BG_…45			
…BN / FN	0,30	0,25	0,20	0,16
…BL / FL	0,27	0,22	0,18	0,14
…BE / FE	0,24	0,20	0,16	0,13
	BG_…55			
…BN / FN	0,35	0,29	0,24	0,19
…BL / FL	0,32	0,26	0,21	0,17
…BE / FE	0,28	0,23	0,19	0,15

Table 3.8 Calculation factors y for the MB …,[µm]

	Z0	1
	MB_09	
…SN / WN	0,10	0,08
…SL / WL	0,09	0,07
	MB_12	
…SN / WN	0,13	0,11
…SL / WL	0,12	0,10
	MB_15	
…SN / WN	0,17	0,14
…SL / WL	0,15	0,13

3.7 Fastening torques

The specific fastening torque strongly depends on the friction values. Different surfaces and lubrication conditions create a wide range of friction values. The mean friction value for black-finished, non-lubricated screws is 0.14. The recommended fastening torques for fastening screws (Figure 3.18) of the Strength Classes 10.9 and 12.9 are provided in Table 3.9.

Table 3.9 Fastening torques for fastening screws (for μ=0,14)

	Fastening torque [Nm]	
	Strength class 10.9	Strength class 12.9
M2	0,5	0,6
M2,5	1,0	1,2
M3	1,8	2,2
M4	4,4	5,1
M5	8,7	10
M6	15	18
M8	36	43
M10	72	84
M12	125	145
M14	200	235
M16	310	365

Screws of Strength class 12.9 should always be used for high dynamics, overhead installations or installations without a locating edge.

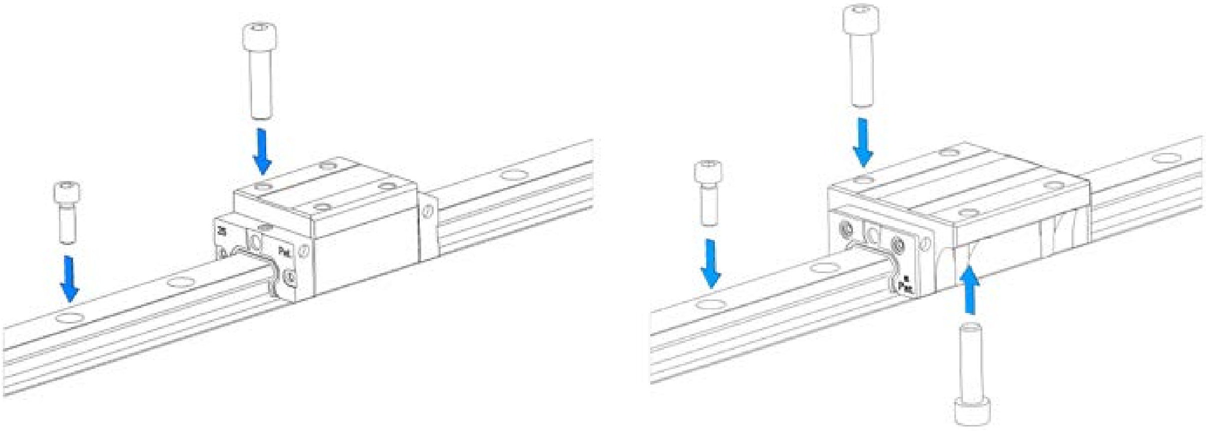


Figure 3.18 Fastening screws

4 Lubrication

4.1. General information

Sufficient lubrication is essential for reliable function of the linear guide system. The rolling elements and tracks are separated by the formation of an even grease film on the race ways. This reduces the stress and increases the service life time. In addition, the metallic surfaces are protected from corrosion. The lubricant film further facilitates jerk-free gliding of the seals over the surfaces and also reduces wear in these areas.

Insufficient lubrication not only increases wear but also significantly shortens the service life time.
The selection of the optimal lubricant has a significant effect on the function and service life time of the profile rail guide system. Appropriate lubrication for the environmental temperature and the specific requirements must be determined to ensure that the function of the system is not restricted and remains available for a prolonged period

Examples of such environmental conditions and influencing factors are:

> High and low temperatures
> Condensed and splash water effects
> Radiation stress
> High vibration stress
> Use in vacuum and/or clean rooms
> Exposure to special media (e.g. fumes, acids, etc.)
> High accelerations and velocity
> Continuous, small stroke movements (< 2 x carriage length)
> Dirt and dust effects

4.2 Lubricants

Lubrication oil, low-viscosity or other greases can be selected for the lubrication of profile rail guide systems.

The optimal lubricant must have the following properties:

> Reduce the friction of the profile rail guides
> Ensure minimum start-up momentum
> Protect the profile rail guide from wear and tear
> Protect the profile rail guides from corrosion
> Noise reduction

Lubricants with solid additives such as graphite PTFE or MoS2 are not suitable for the lubrication of profile rail guide systems. NTN-SNR provides a range of high-performance lubricants for different environmental conditions and influencing factors.

4.2.1 Anti-corrosion oils

Anti-corrosion oils are used to protect the profile rail guides against corrosion during storage and transport. Anti-corrosion oils are not suitable for lubricating profile rail guides during operation. Compatibility with the planned lubricant must always be checked before relubrication and initial operation.

NTN-SNR profile rail guides are delivered with the anti-corrosion oil “Contrakor Fluid H1”. “Contrakor Fluid H1” is compatible with the NTN-SNR standard lubricant. Preservation may be omitted by agreement for special applications with special lubricants.

4.2.2 Lubrication oils

Oil lubrication is usually applied in connection with central lubrication systems. The advantage of an automated, central oil lubrication is that of operator-independent, continuous lubricant supply to all lubrication points. Lubrication oils also conduct friction heat very well. This is balanced against a very high construction and installation effort for lubrication lines. Lubrication oil also leaks more often from the carriage and is thus lost to the system. Oil lubrication requires that the lubrication channels in the end caps are adapted to the installation position to ensure safe supply of all race ways of the profile rail guides. The installation positions are to be defined according to the information in Chapter 3.4. Appropriate lubrication oils for use in NTN-SNR profile rail guides are summarised in Table 4.1.

Table 4.1 Lubrication oils

Description	Oil type	Kinematic viscosity according to DIN 51562 at 40°C [mm²/s]	Density [mg/cm³]	Temp. range [°C]	Properties	Application area
Klüberoil GEM 1-100N	Mineral oil	100	880	-5…+100°C	Good corrosion and wear protection	General machine building
Klüberoil 4 UH1-68N	Poly-alpha olefin	680	860	-25…+120°C	Good ageing and wear protection, NDF H1Good corrosion and wear protection registered*	• Foodprocessing industry • Pharmaceuti-cal industry

** This lubricant has been registered as an H1 product, i.e. it was developed for occasional, technically unavoidable contact with food. Experience has shown that the lubricant can also be used for appropriate applications in the pharmaceutical and cosmetic industry when the conditions in the product information are adhered to. However, no specific test results that might be required for applications in the pharmaceutical industry, e.g. bio-compatibility, are available. The systems manufacturer and operator should therefore perform appropriate risk analyses before applications in this area. Measures to exclude health risks and injuries have to be taken, where required. (Source: Klüber Lubrication)*

4.2.3 Low-viscosity greases

The conditions that apply to the use of lubrication oils also apply to the use of low-viscosity greases. However, it is not necessary to define the installation position, as low-viscosity greases do not run off easily, due to their viscosity. Appropriate low-viscosity greases for use in NTN-SNR profile rail guides are summarised in Table 4.2

Table 4.2 Low-viscosity greases

Des-crip-tion	Base oit / Type of soap	NL-GI-class DIN51818	Worked penetra-tion DIN ISO 2137 at 25°C [0,1mm]	Basic oil viscosity DIN51562 at 40°C [mm²/s]	Density [mg/cm³]	Temp. range [°C]	Properties	Application area
Isoflex Topas NCA 5051	Synthetic hydrocarbon oil, special calcium soap	0/00	385...415	30	800	-50...+140°C	Low friction Easy running	General machine building
Microlub GB 0	Mineral oil	0	355...385	400	900	-20...+90°C	Good wearing protection Particularly pressure-resistant	General machine construction High load Short-stroke applications Vibrations
Klübersynth UH1 14-1600	Synthetic hydrocarbon oil, special calcium soap Aluminium-complex soap	0/00	370...430	ca. 160	850	-45...+120°C	Good ageing and wear protection approval according to USDA H11*	• Food-processing industry • Pharmaceutical industry

** This lubricant has been registered as an H1 product, i.e. it was developed for occasional, technically unavoidable contact with food. Experience has shown that the lubricant can also be used for appropriate applications in the pharmaceutical and cosmetic industry when the conditions in the product information are adhered to. However, no specific test results that might be required for applications in the pharmaceutical industry, e.g. bio-compatibility, are available. The systems manufacturer and operator should therefore perform appropriate risk analyses before applications in this area. Measures to exclude health risks and injuries have to be taken, where required. (Source: Klüber Lubrication)*

4.2.4 Lubrication greases

Most applications are based on profile rail guides with grease lubrication. The use of greases provides better noise reduction and also better emergency running properties and requires less constructive effort than lubrication oils and low-viscosity greases. Lithium soap greases with the Classification KP2-K according to DIN 51825 and NLGI Class 2 according to DIN 51818 with EP additives are to be used for applications under normal conditions. Suitable lubricants must be selected for specific applications under special environmental conditions. It must always be checked whether the different lubricants used are compatible with each other or with the preservation agent.

Table 4.3 contains an overview of the lubricants used in NTR-SNR profile rail guides.

Table 4.3 Greases

Description	Base oit / Type of soap	NLGI-Class DIN 51818	Worked penetration DIN ISO 2137 at 25°C [0,1mm]	Basic oil viscosity DIN ISO 51562 at 40°C [mm^2/s]	Density [mg/cm^3]	Temp. range [°C]	Properties	Application area
SNR LUB HEAVY DUTY	Mineral oil / Lithium with EP additives	2	295	ca. 115	890	-25...+140°C	high loads, very high protection against wear and corrosione	General machine building
SNR LUB HIGH SPEED+	Ester, SHC / Lithium, Calcium	2	-	25	900	-45...+120°C	Very good adhesion properties Very good water resistance	High speeds
SNR LUB HIGH TEMP	semi-synthetic / Polyurea	2	265...295	160	900	-40...+160°C	High temperature resistance Good corrosion protection High oxidation resistance	High temperature range
SNR LUB FOOD	Paraffinic mineral, PAO / Aluminium complex	2	265...295	195	920	-30...+120°C	Good corrosion protection Very good adhesion properties High water resistance NSF H1 registered *	Food processing industry
Microlub GL261	Mineral oil / special lithium-calcium soap	1	310...340	280	890	-30...+140°C	Good wearing protection Particularly pressure-resistant Additive against tribo-corrosion	• General machine building • High load • Short-stroke applications • Vibrations
Klübersynth BEM34-32	Synthetic hydrocarbon oil / special calcium soap	2	265...295	ca. 30	890	-30...+140°C	Particularly pressure-resistant Good wearing protection Good ageing resistance Low starting torque	Clean-room applications
Klübersynth UH1 14-151	Synthetic hydrocarbon oil / ester oil Aluminium complex soap	1	310...340	ca.150	920	-45...+120C	Good corrosion protection Good ageing resistance High water resistance NSF H1 registered *	• Pharmaceutical industry • Food- processing industry

** This lubricant has been registered as an H1 product, i.e. it was developed for occasional, technically unavoidable contact with food. Experience has shown that the lubricant can also be used for appropriate applications in the pharmaceutical and cosmetic industry when the conditions in the product information are adhered to. However, no specific test results that might be required for applications in the pharmaceutical industry, e.g. bio-compatibility, are available. The systems manufacturer and operator should therefore perform appropriate risk analyses before applications in this area. Measures to exclude health risks and injuries have to be taken, where required. (Source: Klüber Lubrication)*

4.3. Lubrication methods

NTN-SNR profile rails can be supplied with lubricant by manual grease guns (Figure 4.1), automated lubricant dispensers (Figure 4.2) or central lubrication systems (Figure 4.3). The carriages are relubricated through the installed lubrication guns (Chapter 4.4.1) when manual grease guns (Chapter 4.4.4) are used.

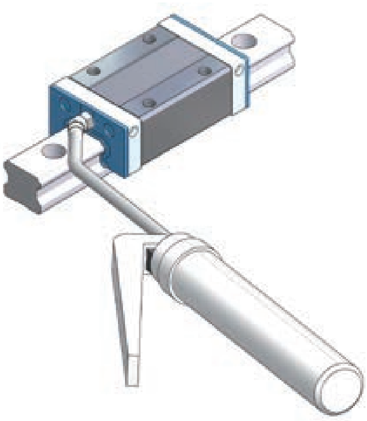


Figure 4.1 Lubrication with manual grease gun

Automated lubricant dispensers (Figure 4.2) ensure the supply of the carriages with lubricant for a definable period. The lubricant dispensers can be connected by a hose to the installed lubrication adaptors (see Chapter 4.4.2), depending on the space available. Care should be taken that each lubrication point has a separate lubrication dispenser and that a maximum pipe length of 500 mm is not exceeded.

Experts & Tools NTN SNR

Figure 4.2 Automated lubricant dispenser

Central lubrication systems can be manually operated or automatically controlled. Manual central lubrication systems have a pump that is operated with a manual lever and supplies all lubrication points with lubricant. Automated central lubrication systems ensure a regular supply of all lubrication points with the amount of lubricant required. These systems can also be implemented as oil-spray lubrication systems under special environmental conditions. Oil is nebulised by compressed air and transported to the lubrication points. Oil mist lubrication systems ensure continuous supply of the lubrication points with the minimum amount of lubricant required and optimal conduction of friction heat. The permanent overpressure in the system also prevents the penetration of foreign particles such as dust or cooling lubricant into the carriages.

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Figure 4.3 Central lubrication systems

4.4 Accessories

4.4.1 Grease nipples

A range of grease nipple is available for lubrication of profile rail guides with manual grease guns. Table 4.4 contains an overview of the grease nipples used by NTN-SNR.

Table 4.4 Grease nipples

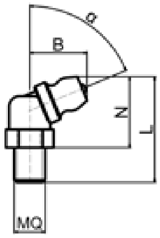
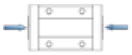
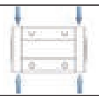
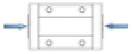
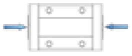
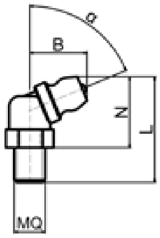
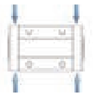
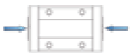
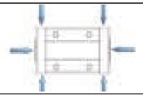
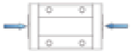
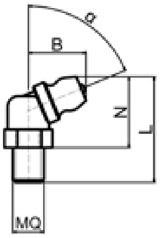
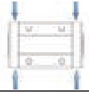
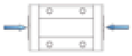
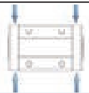
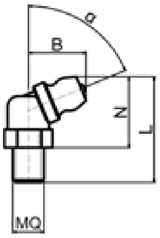
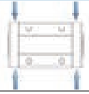
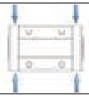
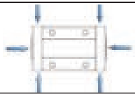
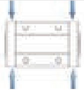
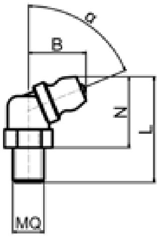
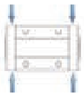
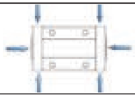
Standard type	**Description**	**MQ**	**α [°]**	**L [mm]**	**N [mm]**	**B [mm]**	**Profile rail guide**	**Installation position**	**Comments**
	Grease nipple ball type GRN-M3-4,7-z-0	M3	0	9,7	4,5	0,0	MB...15SN MB...15WN		
	Grease nipple ball type GRN-M4-3,5-z-0	M4	0	9,5	6	0,0	BG...15		
	Grease nipple ball type GRN-M4-6,0-z-0			13,0	7,0	0,0			
	Grease nipple ball type GRN-M4-8,0-z-0			15,0	7,0	0,0			For double seals for double seals and scraper
Type	**Description**	**MQ**	**α [°]**	**L [mm]**	**N [mm]**	**B [mm]**	**Profile rail guides**	**Installation position**	**Comments**
	Grease nipple hydraulic type GRN-M6-5,0-z-0	M6	0	15,0	9,5	0,0	BG...20,25		
	Grease nipple hydraulic type GRN-M6-8,0-z-0		0	17,3	9,5	0,0	BG...30,35		
							BG…20…35		For BF..20,25 also For double seals
	Grease nipple hydraulic type GRN-M6-12,0-z-0		0	24,0	10,0	0,0	BG...30,35		For double seals For double seals and scraper
							BG…20, 25		For double seals and scraper
	Grease nipple hydraulic type GRN-M6-8,0-z-0	M8	0	18,2	10,2	0,0	BG...45,55		
	Grease nipple hydraulic type GRN-M6-12,0-z-0			22,2					For double seals For double seals and scraper

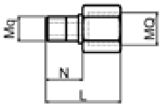
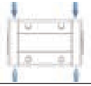
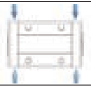
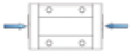
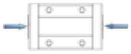
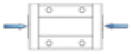
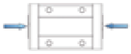
Table 4.4 Grease nipples

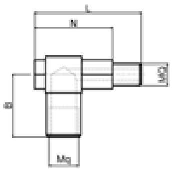
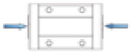
Type	Description	MQ	∝ [°]	L [mm]	N [mm]	B [mm]	Profile rail guide	Installation position	Comments
	Grease nipple hydraulic type GRN-M6-5,5-k-45	M6	45	23,5	18,0	10,5	BG…20…35		
							BG…20…35		For double seals in combination with extention LE-M6-M6 For double seals and scraper in combination with extention LE-M6-M6
							BG…45, 55		
	-	M8	45	23,5	18,0	10,5	BG…45, 55		
Standard type	**Description**	**MQ**	**∝ [°]**	**L [mm]**	**N [mm]**	**B [mm]**	**Profile rail guides**	**Installation position**	**Comments**
	Grease nipple hydraulic type GRN-M6-5,0-z-67	M6	67,5	18,5	13,5	11,4	BG…20, 25		
	Grease nipple hydraulic type GRN-M6-8,0-z-67			21,5			BG…20…35		For BG…20, 25 also For double seals
							BG…30, 35		
	Grease nipple hydraulic type GRN-M6-12,0-z-67			25,5			BG…20…35		For double seals and scraper
							BG…30, 35		For double seals
	Grease nipple hydraulic type GRN-M8-8,0-z-67	M8	67,5	21,3	13,3	12,3	BG…45, 55		
	Grease nipple hydraulic type GRN-M8-12,0-z-67			25,3					For double seals For double seals and scraper
Type	**Description**	**MQ**	**∝ [°]**	**L [mm]**	**N [mm]**	**B [mm]**	**Profile rail guides**	**Installation position**	**Comments**
	Grease nipple hydraulic type GRN-M6-5,5-k-90	M6	90	18,0	12,5	13,0	BG…20, 25		
	Grease nipple hydraulic type GRN-M6-7,5-z-90			20,0			BG…30, 35		
							BG…20…35		For BG…20, 25 also For double seals
	Grease nipple hydraulic type GRN-M6-12,0-z-90			24,5			BG…20…35		For double seals and scraper
							BG…30, 35		For double seals
	Grease nipple hydraulic type GRN-M8-8,0-z-90	M8	90	20,5			BG…45, 55		
	Grease nipple hydraulic type GRN-M8-12,0-z-90			24,5			BG…45, 55		For double seals For double seals and scraper

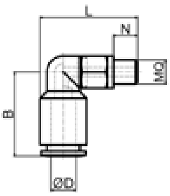
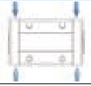
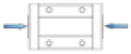
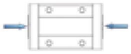
4.4.2 Lubrication adaptors

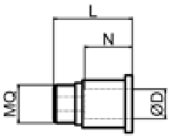
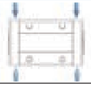
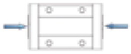
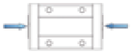
The use of central lubrication systems or the arrangement of grease nipples in more accessible positions require a lubricant supply to the carriages via hoses or pipes. For this purpose, Table 4.5 shows grease adaptors that can be mounted on NTN-SNR profile rail guides.

Table 4.5 Lubrication adaptor

	Description	N [mm]	L [mm]	MQ	Mq	Profile rail guides	Installation position	Comments
	Extention LE-MQ-MqxL	9,4	15,4	M6	M6 M8 or 1/8´´	BG...20,25		
			18,4			BG...30,35		
						BG...20...35		
			22,4			BG...20...35		For double-seal For double-seal + scraper
			18,4	M8		BG...45,55		
			22,4					For double-seal For double-seal + scraper

	Description	N [mm]	L [mm]	B [mm]	MQ	Mq		Installation position	Comments
	Swivel connection LS-MQ-Mq	21,5	29,5	17,0	M6	M6 M8x1	BG...20...35		Can be used for BG...45 and 55 in connection with the LE-M8-M6 extension

	Description	N [mm]	L [mm]	MQ	Ø D [mm]	Profile rail guides	Installation position	Comments
	Tube connection LH-M6S-ØD	12	16	M6	4 or 6	BG...20...35		
						BG...20...35		Can be used in connection with Extension LE-M6-M6
						BG...45,55		Can be used in connection with Extension LE-M8-M6

	Description	N [mm]	L [mm]	MQ	Mq	Ø D [mm]	Profile rail guides	Installation position	Comments
	Tube connection LH-M6A-ØD	14,0	18,0	16,0	M6	4 or 6	BG...20...35		
							BG...20...35		Can be used in connection with Extension LE-M6-M6
							BG...45,55		Can be used in connection with Extension LE-M8-M6

4.4.3 Grease guns

Manual maintenance of profile rail guides can be performed with NTN-SNR grease guns

Technical data:

- Weight: 1.130 g
- Operating pressure: 180 bar
- Maximum pressure: 360 bar
- Transported volume: 0,8 cm^3 / stroke
- Suitable for 400 g cartridges and can also be filled with loose grease
- Various adaptors

Figure 4.4 NTN-SNR grease press

4.4.4 Automated lubricant dispenser

Automated lubricant dispensers supplied by NTN-SNR are available with different oil or grease types. The lubricant is transported with a maximum pressure of 6 bar. Automated lubricant dispensers are intended for operation in a temperature range from -20°C to +60°C in all operating positions. The protection class is IP 65. It is not sensible to use lubricant dispensers for profile rail guides with design sizes below 35. Our NTN-SNR application engineers will gladly provide you with more information.

4.5 Lubricant volumes

Maintenance of profile rail guides may involve:

> Initial lubrication
> Lubrication during initial operation
> Re-lubrication

The respective minimum lubricant amounts are defined as a function of the type and design size of the profile rail guide. NTN-SNR profile rail guides with ball chains are initially lubricated with lithium soap grease KP2-K according to DIN 51825 and NGLI Class 2 at the time of delivery. Double the minimum amount of lubricant for the initial operation is placed into the carriages during initial lubrication. Table 4.6 shows the minimum amounts of lubrication that have to be provided to NTN-SNR profile rail guides for initial operation.

Table 4.6 Minimum amounts of lubricant for initial operation

Size	Carriage type	Grease lubrication [cm³]	Low-viscosity grease lubrication [ml]	Oil lubrication [ml]
BG_15	FS, BS	0,7	0,2	
	BN, FN	0,9	0,2	
	BL, FL	1,0	0,2	
	BE, FE	1,1	0,2	
BG_20	FS, BS	1,1	0,3	
	BN, FN	1,5	0,4	
	BL, FL	1,8	0,4	
	BE, FE	2,0	0,5	
BG_25	FS, BS	1,6	0,4	
	BN, FN	2,3	0,5	
	BL, FL	2,6	0,6	
	BE, FE	3,1	0,7	
BG_30	FS, BS	2,8	0,7	
	BN, FN	3,7	0,9	
	BL, FL	4,0	1,0	
	BE, FE	5,0	1,2	
BG_35	FS, BS	3,9	0,9	
	BN, FN	5,7	1,4	
	BL, FL	6,3	1,5	
	BE, FE	7,5	1,8	
BG_45	BN, FN	7,0	2,0	
	BL, FL	9,0	2,3	
	BE, FE	10,0	2,8	
BG_55	BN, FN	13,0	3,5	
	BL, FL	17,0	4,5	
	BE, FE	19,0	5,5	
MB_09	SN	0,15	--	
	SL	0,20	--	
	WN	0,20	--	
	WL	0,25	--	
MB_12	SN	0,30	--	
	SL	0,35	--	
	WN	0,40	--	
	WL	0,45	--	
MB_15	SN	0,60	--	
	SL	0,70	--	
	WN	0,80	--	
	WL	0,90	--	

While the operation of the profile rail guides the demand of lubricant amount is reduced. In Tab. 4.7 are the mimimal lubricant amount arranged.

Table 4.7 Minimum amounts of lubricant for relubrication

<table>
<tr><th>Size</th><th>Carriage type</th><th>Grease lubrication [cm³]</th><th>Low-viscosity grease lubrication [ml]</th><th>Oil lubrication [ml]</th></tr>
<tr><td rowspan="4">BG_15</td><td>FS, BS</td><td>0,3</td><td colspan="2">0,1</td></tr>
<tr><td>BN, FN</td><td>0,4</td><td colspan="2">0,1</td></tr>
<tr><td>BL, FL</td><td>0,5</td><td colspan="2">0,1</td></tr>
<tr><td>BE, FE</td><td>0,6</td><td colspan="2">0,2</td></tr>
<tr><td rowspan="4">BG_20</td><td>FS, BS</td><td>0,8</td><td colspan="2">0,1</td></tr>
<tr><td>BN, FN</td><td>1,2</td><td colspan="2">0,2</td></tr>
<tr><td>BL, FL</td><td>1,4</td><td colspan="2">0,2</td></tr>
<tr><td>BE, FE</td><td>1,6</td><td colspan="2">0,3</td></tr>
<tr><td rowspan="4">BG_25</td><td>FS, BS</td><td>0,8</td><td colspan="2">0,1</td></tr>
<tr><td>BN, FN</td><td>1,2</td><td colspan="2">0,2</td></tr>
<tr><td>BL, FL</td><td>1,4</td><td colspan="2">0,2</td></tr>
<tr><td>BE, FE</td><td>1,7</td><td colspan="2">0,3</td></tr>
<tr><td rowspan="4">BG_30</td><td>FS, BS</td><td>1,4</td><td colspan="2">0,2</td></tr>
<tr><td>BN, FN</td><td>2,0</td><td colspan="2">0,2</td></tr>
<tr><td>BL, FL</td><td>2,2</td><td colspan="2">0,3</td></tr>
<tr><td>BE, FE</td><td>2,8</td><td colspan="2">0,3</td></tr>
<tr><td rowspan="4">BG_35</td><td>FS, BS</td><td>2,0</td><td colspan="2">0,2</td></tr>
<tr><td>BN, FN</td><td>3,1</td><td colspan="2">0,3</td></tr>
<tr><td>BL, FL</td><td>3,5</td><td colspan="2">0,3</td></tr>
<tr><td>BE, FE</td><td>4,1</td><td colspan="2">0,4</td></tr>
<tr><td rowspan="3">BG_45</td><td>BN, FN</td><td>4,0</td><td colspan="2">0,5</td></tr>
<tr><td>BL, FL</td><td>4,5</td><td colspan="2">0,5</td></tr>
<tr><td>BE, FE</td><td>5,0</td><td colspan="2">0,6</td></tr>
<tr><td rowspan="3">BG_55</td><td>BN, FN</td><td>6,0</td><td colspan="2">0,6</td></tr>
<tr><td>BL, FL</td><td>8,0</td><td colspan="2">0,6</td></tr>
<tr><td>BE, FE</td><td>9,0</td><td colspan="2">0,7</td></tr>
<tr><td rowspan="4">MB_09</td><td>SN</td><td>0,08</td><td colspan="2">--</td></tr>
<tr><td>SL</td><td>0,10</td><td colspan="2">--</td></tr>
<tr><td>WN</td><td>0,10</td><td colspan="2">--</td></tr>
<tr><td>WL</td><td>0,13</td><td colspan="2">--</td></tr>
<tr><td rowspan="4">MB_12</td><td>SN</td><td>0,15</td><td colspan="2">--</td></tr>
<tr><td>SL</td><td>0,20</td><td colspan="2">--</td></tr>
<tr><td>WN</td><td>0,20</td><td colspan="2">--</td></tr>
<tr><td>WL</td><td>0,25</td><td colspan="2">--</td></tr>
<tr><td rowspan="4">MB_15</td><td>SN</td><td>0,30</td><td colspan="2">--</td></tr>
<tr><td>SL</td><td>0,35</td><td colspan="2">--</td></tr>
<tr><td>WN</td><td>0,40</td><td colspan="2">--</td></tr>
<tr><td>WL</td><td>0,45</td><td colspan="2">--</td></tr>
</table>

4.6 Lubrication intervals

NTN-SNR profile rail guides of the BGX and MBX series are packed with anti-corrosion oil at the time of delivery. The carriages of these series require initial lubrication after installation. Double the amount of lubricant specified in Table 4.6 is to be deposited into the carriages. The carriages of the BGC and MBC series are already provided with initial lubrication at the time of delivery. The carriages must be lubricated with the amounts specified in Table 4.6 after the installation. Thereafter, the carriages should be moved several times with long strokes to achieve optimal distribution of the lubricant in the system.

The carriages also require initial lubrication before a prolonged shut-down and before re-operation.

The mixing compatibility of the lubricants must be checked when the lubricant make is to be changed during operation of a system.

The relubrication intervals are affected by several factors (Chapter 4.1). Load and pollution usually have the strongest effect. Accurate relubrication intervals for a specific system can only be determined after the actual operating conditions have been assessed for a sufficiently long period.

The reference value for adjusting central oil lubrication systems is one lubrication pulse per carriage every 20 minutes, using the amount of lubricant specified in Table 4.7. Central lubrication systems with low-viscosity grease should be set to a lubrication interval of 60 minutes.

The reference value for relubrication with grease for conventional guide systems (BGX, MBX series) under normal operating conditions is every six months or after 100 km travel distance. This value can be adjusted upwards or downwards under special environmental conditions. The lubrication interval should not be longer than 2 years or 500 km travel distance, even under optimal environmental conditions, without pollution and low load. The amounts specified in Table 4.7 should be used for relubrication.

These values significantly improve for the same conditions when guiding systems with integrated ball chain (BCG, MBC series) are used. The reference value for NTN-SNR profile rail guides with ball chains under normal operating conditions is lubrication once per year or after 500 km of travel distance. This value may have to be adjusted upwards or downwards under special environmental conditions. A travel performance of several thousand kilometres between maintenance steps is possible when the environmental conditions are good and the load is low. The maximum usage time of the lubricant must be considered when the lubrication cycles are very long. Our NTN-SNR application engineers will gladly help you to determine the maintenance intervals.

5. Accessories

5.1 Sealing Options

5.1.1 Description

Profile rail guides are exposed to a variety of pollution types during operation. Pollution can be caused by solid or liquid foreign particles. The purpose of the sealing system is:

> To prevent penetration of foreign particles of any kind
> To distribute the lubricant evenly over the tracks
> To minimise the loss of lubricant

NTN-SNR profile rail guides can be combined with a multitude of sealing options to provide an optimal sealing system for various applications. The following sealing elements are available for these combinations:

End seal*

- Two lip seal
- Rubber - metal - part
- Front seal of the carriage against contamination from outside
- Minimization of lubricant loss
- Sealing for normal environmental conditions

Inner seal*

- Two lip seal
- Sealing of the carriage's inside against the entry of contamination by deposits in the rail holes
- Reduction of the volume in which the lubricant can be distributed
- Minimization of lubricant loss
- Sealing for all environmental conditions

Side seal*

- Two lip seal
- Sealing of the carriage's inside against the entry of contamination from below
- Minimization of lubricant loss
- Sealing for all environmental conditions, especially in vertical and overhead position

Scraper

- Metal scraper
- Scrapers have no contact with the rail
- Sealing against heavy dirt and chips
- Not suitable as single sealing

Double seal

- Combination from two end seals and spacer element
- Sealing in case of very heavy contamination
- Additional mounting of scrapers possible

Multi - Layer - Seal MLS

- Sealing element of several oil-impregnated laminate layers
- Sealing in case of extreme heavy contamination
- Useful application in combination with double seals or double seals and scraper

Low friction seal LFS

- Sealing element of one oil-impregnated laminate layer
- Reduction of the seal resistance
- Use under conditions with low contamination possible

** Standard sealing*

5.1.2 Combination options

Table 5.1 provides a summary of the various dealing options for NTN-SNR- profile rail guides.

Table 5.1 Sealing options

Description	Sealing structure
SS	End seals on both sides, inner and side seals (standard sealing) (Figure 5.1)
AA	No sealing
UU	End seals on both sides (Figure 5.2)
BB	End seals on both sides and side seals
EE	Double end seals on both sides, inner and side seals (Figure 5.3)
FF	End seals on both sides, inner and side seals, scraper on both sides
GG	Double end seals on both sides, inner and side seals, scraper on both sides (Figure 5.4)
ES	Double end seals on one side, inner and side seals
FS	End seals on both sides, inner and side seals, scraper on one side
GS	Double end seals on one side, inner and side seals, scraper on one side
VV	Double end seals on both sides, inner and side seals, MLS on both sides
WW	Double end seals on both sides, inner and side seals, scraper and MLS on both sides
LL	LFS on both sides
JJ	LFS on both sides and side seals
XX	Special sealing option (description of customer specification required)

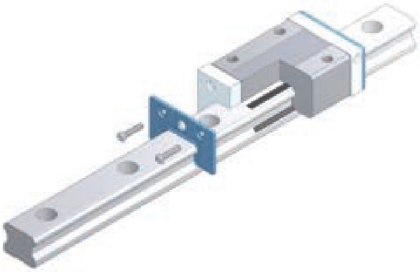


Figure 5.1 Sealing option SS

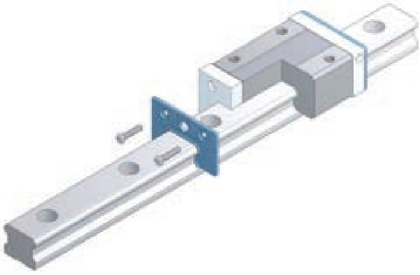


Figure 5.2 Sealing option UU

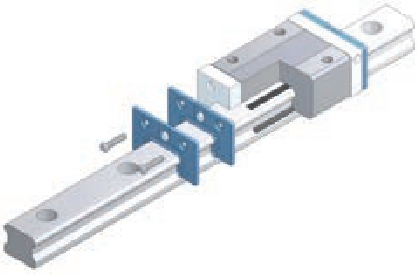


Figure 5.3 Sealing option EE

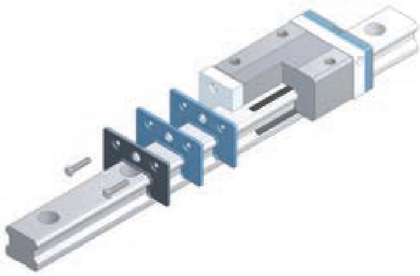


Figure 5.4 Sealing option GG

5.1.3 Dimensions

The length L of the carriage varies according to the sealing option selected. The respective lengths are summarised in Table 5.2.

Table 5.2 Carriage length with sealing options [mm]

Size	SS	UU	AA	BB	EE	FF	GG	VV	WW	LL	JJ
BG_15_S	40,6	40,6	40,6	40,6	46,6	42,4	48,4	59,6	61,4	44,3	44,3
BG_15_N	58,6	58,6	58,6	58,6	64,6	59,5	66,4	77,6	79,4	62,3	62,3
BG_15_L	66,1	66,1	66,1	66,1	72,1	67,0	73,9	85,1	86,9	69,8	69,8
BG_15_E	81,1	81,1	81,1	81,1	87,1	82,0	88,9	100,1	101,9	84,8	84,8
BG_20_S	48,3	48,3	48,3	48,3	55,3	49,5	57,7	68,3	70,7	51,4	51,4
BG_20_N	69,3	69,3	69,3	69,3	76,3	70,5	78,7	89,3	91,7	72,4	72,4
BG_20_L	82,1	82,1	82,1	82,1	89,1	83,3	91,5	102,1	104,5	85,2	85,2
BG_20_E	97,3	97,3	97,3	97,3	104,3	98,5	106,7	117,3	119,7	100,4	100,4
BG_25_S	54,0	54,0	54,0	54,0	61,0	55,5	63,9	74,0	76,9	57,5	57,5
BG_25_N	79,2	79,2	79,2	79,2	85,7	80,2	88,6	98,7	101,6	82,7	82,7
BG_25_L	93,9	93,9	93,9	93,9	100,4	94,9	103,3	113,4	116,3	97,4	97,4
BG_25_E	108,6	108,6	108,6	108,6	115,1	109,6	118,0	128,1	131,0	112,1	112,1
BG_30_S	64,2	64,2	64,2	64,2	72,2	65,5	74,8	90,2	92,8	68,9	68,9
BG_30_N	94,8	94,8	94,8	94,8	102,8	96,1	105,4	120,8	123,4	99,5	99,5
BG_30_L	105,0	105,0	105,0	105,0	113,0	106,3	115,6	131,0	133,6	109,7	109,7
BG_30_E	130,5	130,5	130,5	130,5	138,5	131,8	141,1	156,5	159,1	135,2	135,2
BG_35_S	75,5	75,5	75,5	75,5	85,5	76,8	88,1	103,5	106,1	80,3	80,3
BG_35_N	111,5	111,5	111,5	111,5	121,5	112,8	124,1	139,5	142,1	116,3	116,3
BG_35_L	123,5	123,5	123,5	123,5	133,5	124,8	136,1	151,5	154,1	128,3	128,3
BG_35_E	153,5	153,5	153,5	153,5	163,5	154,8	166,1	181,5	184,1	158,3	158,3
BG_45_N	129,0	129,0	129,0	129,0	139,0	130,5	142,0	157,0	160,0	132,8	132,8
BG_45_L	145,0	145,0	145,0	145,0	155,0	146,5	158,0	173,0	176,0	148,8	148,8
BG_45_E	174,0	174,0	174,0	174,0	184,0	175,5	187,0	202,0	205,0	177,8	177,8
BG_55_N	155,0	155,0	155,0	155,0	165,0	156,3	167,6	183,0	185,6	158,8	158,8
BG_55_L	193,0	193,0	193,0	193,0	203,0	194,3	205,6	221,0	223,6	196,8	196,8
BG_55_E	210,0	210,0	210,0	210,0	220,0	211,3	222,6	238,0	240,6	213,8	213,8
MB_09SN	30,8	--	30,8	--	--	--	--	--	--	--	--
MB_09SL	40,5	--	40,5	--	--	--	--	--	--	--	--
MB_12SN	34,0	--	34,0	--	--	--	--	--	--	--	--
MB_12SL	47,0	--	47,0	--	--	--	--	--	--	--	--
MB_15SN	42,0	--	42,0	--	--	--	--	--	--	--	--
MB_15SL	59,8	--	59,8	--	--	--	--	--	--	--	--
MB_09WN	39,0	--	39,0	--	--	--	--	--	--	--	--
MB_09WL	51,0	--	51,0	--	--	--	--	--	--	--	--
MB_12WN	44,5	--	44,5	--	--	--	--	--	--	--	--
MB_12WL	59,1	--	59,1	--	--	--	--	--	--	--	--
MB_15WN	55,5	--	55,5	--	--	--	--	--	--	--	--
MB_15WL	74,7	--	74,7	--	--	--	--	--	--	--	--

5.2 Rail caps

Foreign particles may reach the inside of the carriage through the fastening holes in the guide rail and cause damage. We recommend that you close the holes in the rail with rail caps to prevent this. These caps consist of oil-resistant plastic. Rail caps made of brass may be used when the pollution is very strong or when direct mechanical forces act on the guide rails. Table 5.3 contains an overview of the rail caps available.

Table 5.3 Sealing caps

Size	Rail cap	
	Plastic	Brass
MB_09S	CAP1	--
MB_12S	CAP1	--
MB_15S	CAP1	--
MB_09W	CAP1	--
MB_12W	CAP2	--
MB_15W	CAP2	--
BG_15	CAP4	CAP4B
BG_20	CAP5	CAP5B
BG_25	CAP6	CAP6B
BG_30	CAP8	CAP8B
BG_35	CAP8	CAP8B
BG_45	CAP10	CAP10B
BG_55	CAP14	CAP14B

5.3 Bellows

If linear guides exposed to strong contamination by chips, dust or welding spatter, it is recommended to protect the guides by special bellows. For NTN-SNR profile rail guides are the corresponding bellows available.

5.3.1 Dimensions

Table 5.4 Bellows

Size	Height [mm] A	Width [mm] B	Overall heigth [mm] A1	Depth of fold [mm] Ft	Relation of length R	Length per fold [mm] ApF	Stroke per fold [mm] HpF	Thick-ness mountig set [mm]	Recom-mended design typ of carriage	Type bellow
15	26	46	29	15	8	20	17,5	5	BG_H15F	BG15-BEL-H...
20	32,5	61	37	20	10	30	27	5	BG_H20F	BG20-BEL-H...
25	33,5	66	39,5	20	10	30	27	5	BG_H25F	BG25-BEL-H...
30	37	70	44	20	10	30	27	6	BG_H30F	BG30-BEL-H...
35	39,5	78	47	20	10	30	27	6	BG_H35F	BG35-BEL-H...
45	44	85	53	20	10	30	27	8	all	BG45-BEL-H...
55	50	97	62,5	20	10	30	27	8	all	BG55-BEL-H...

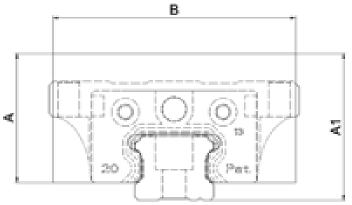


Figure 5.5 Dimensions of the bellows

Calculation of the bellow length:

Necessary quantity = Number of folds = Round up (Stroke / HpF) + 1 or Round off (Lmax / ApF) + 1
Lmin = Number of folds * 3mm (2,5 mm for size 15)

Type code bellow:

BG30-BEL-H 105 / 1050 -35

Size Lmin Lmax Nunber of folds

Type code Mounting set:

BG30-BEL-H-MS

5.3.2 Assembly of bellows

- Move the carriage (pos.2) to the rail end and disassemble the bottom head screws (pos.8) of the end seals.
- Assemble bellow (pos.5) with the spacer (pos.3) and the enclosed bottom head screws (pos.8) on the carriage.
- Assemble bellow on the clamping element (pos.4) with the bottom head screws (pos.7).
- Position of the bellow with the assembled clamping element at the desired location.
- Fix of the clamping element with the set screw (pos.6) on the rail.

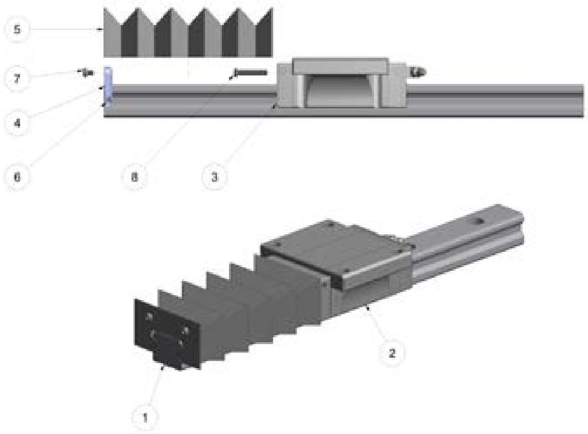


Figure 5.6 Assembly of bellows

5.3.3 Designation

The bellows for NTN-SNR profile rail guides and the related parts have the following designations:

• Bellow	BG[size] - BEL-H Lmin / Lmax - Number of folds
• Mounting set	BG[size] - BEL-H- MS

5.4 Cover strip

To close the rail holes, NTN-SNR profile rail guides can be assembled with a cover strip. In this case, the assembly time which is required to close the holes from long rails with plastic caps should be reduced considerably. The cover strip is a stainless steel strip, which is glued on top of the rails. Even under the most adverse environmental conditions, the adhesive bond is not affected. To secure the cover strip on the rail ends, corresponding securing elements are available. The standard cover strip is available in lengths up to 25 m.

5.4.1 Dimension

Table 5.5 Cover strip

Size	Width [mm]	Thickness [mm]	Length of safety element [mm]
BG15	10	0,3	12,5
BG20	11	0,3	12,5
BG25	13	0,3	12,5
BG30	16	0,3	12,5
BG35	18	0,3	14,2
BG45	27	0,3	17,5
BG55	29	0,3	17,5

5.4.2 Mounting tool

A mounting tool is available for the assembly of the cover strip. The use of the mounting tool ensures a centered mounting on top of rail.

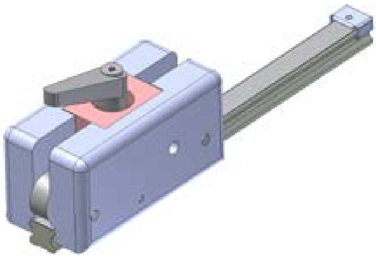


Figure 5.7 Mounting tool

5.4.3 Designation

The cover strip for NTN-SNR profile rail guides and the related parts have the following designations:

• Cover strip	BG[size]-CS[length in mm (five digits)]
• Safety element	BG[size]-SE
• Mounting tool	BG[size]-MT

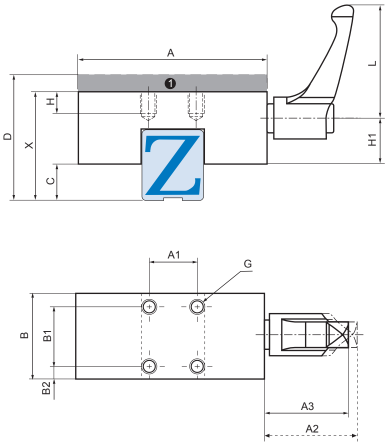
5.5 Clamping- and Braking Elements

Clamping and braking elements for NTN-SNR profile rail guides allow the positioning, holding and braking in different application areas.

5.5.1 Manual clamping element

5.5.1.1 Manual clamping element for standard rail guides

The clamping elements of the HK-series are operating manually. By rotating the freely adjustable clamp lever, the contact sections are pressed synchronously against the free surfaces of the section rail guide. The floating contact sections guarantee symmetric power transmission.



NOTE: Consider measurement C/Interfering contour
❶ Adapting plate (accessories)
X = measure of function to be complied
D = Linear guide installation measurement (if necessary with adapting plate)

Figure 5.8

Table 5.6 Manual clamping elements for standard guides

Size	Design type of carriage	Clamping element	Adapter plate	power [N]	Faste-ning torque [Nm]	Measure [mm]														Weight [kg]
						A	A1	A2	A3	B	B1	B2	C	D	X	G	L	H	H1	
15	BG_S15B	HK1501A	PHK15-2	1 200	5,0	47	17	33,5	30,5	25	17	4	4,5	24	22	M 4	44	5	12,5	0,168
	BG_S15F																			
	BG_H15F																			
	BG_H15B		PHK15-6											28						0,210
20	BG_S20B	HK2001A	--	1 200	7,0	60	15	41,5	38,5	24	15	4,5	8,0	28	28	M 5	63	6	13	0,220
	BG_S20F		PHK20-2																	
	BG_H20F													30						0,240
	BG_H20B																			
25	BG_S25B	HK2501A	--	1 200	7,0	70	20	41,5	38,5	30	20	5	9,0	33	33	M 6	63	8	15	0,360
	BG_S25F		PHK25-3																	
	BG_H25F													36						0,400
	BG_X25B																			
	BG_H25B		PHK25-7											40						0,440
30	BG_S30B	HK3001A	--	2 000	12,0	90	22	50,5	46,5	39	22	8,5	12,0	42	42	M 6	78	8	21,5	0,893
	BG_H30F																			
	BG_H30B		PHK30-3											45						1,000
35	BG_S35B	H3501A	PMK35-4	2 000	15,0	100	24	50,5	46,5	39	24	7,5	12,0	48	44	M 8	78	10	21,5	1,011
	BG_H35F																			
	BG_H35B		PMK35-11											55						1,183
45	BG_S45B	HK4501A	PHK45-6	2 000	15,0	120	26	50,5	46,5	44	26	9	12,0	60	54	M 10	78	14	26,5	1,658
	BG_H45F																			
	BG_H45B		PHK45-16											70						2,038
55	BG_S55B	HK5501A	PHK55-4	2 000	17,0	140	30	61,5	56,5	49	30	9,5	17,0	70	66	M 14	95	16	31	1,630
	BG_H55F																			
	BG_H55B		PHK55-14											80						2,130

5.5.1.2 Manual clamping element for miniature rail guides

The clamping elements of the miniHK-series are operating manually. By tightening the clamping screw, the contact sections are pressed synchronously against the free surfaces of the section rail guide. The floating contact sections guarantee symmetric power transmission.

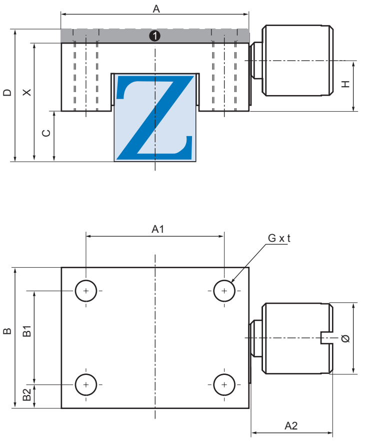


Figure 5.9

NOTE: Consider measurement C/Interfering contour
❶ Adapting plate (accessories)

Table 5.7 Manual clamping elements for miniature guides

Size	Design type of carriage	Clamping element	Adapter plate	Holding power [N]	Fastening torque [Nm]	Measure [mm]												Weight [kg]
						A	A1	A2	B	B1	B2	C	D	X	G x1	Ø	H	
09	MB_09S	HK0900M	--	100	0,17	20	15	9,0	17	11	3,0	2,7	10	10	M 3 x 3	8	5,35	0,016
	MB_09W	HK0900MW	--	100	0,17	30	17	9,0	17	11	3,0	4,2	12	12	M 3 x 3	8	5,85	0,031
12	MB_12S	HK1200M	--	150	0,35	27	20	10,0	19	13	3,0	3,5	13	13	M 3 x 3,6	10	7,15	0,031
	MB_12W	HK1200MW	--	150	0,35	40	30	10,0	19	13	3,0	4,0	14	14	M 3 x 3,6	10	7,65	0,061
15	MB_15S	HK1500M	--	180	0,75	32	25	14,0	20	14	3,0	5,0	16	16	M 3 x 4	12	8,05	0,050
	MB_15W	HK1500MW	--	180	0,75	60	45	14,7	22	15	3,5	4,5	16	16	M 4 x 4,5	12	8,55	0,099

5.5.2 Pneumatic clamping element

5.5.2.1 Pneumatic clamping element for standard rail guides

The clamping elements of the MK-series close by pneumatic pressure. The clamping elements of the MKS-series close by spring-loaded energy storage. The integrated wedge slide gear achieves high supporting forces. The pressure medium moves the wedge slide gear in a longitudinal direction. The resulting transverse movement presses contact sections with high force against the free surfaces of the section rail guide.

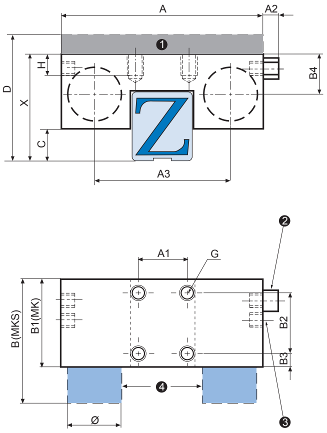


Figure 5.10

Note: Consider measurement C/Interfering contour!

Air connections are located on both sides and can be exchanged according to mounting requirements.

Only one connection is necessary for function.

❶ *Adapting plate PMK (accessory)*

❷ *MK Series: Air filter*
MKS: M5 port (air connection)

❸ *MK Series: M5 port (air connection)*
MKS: Air filter / Plus connection M5.

❹ *The attachment spring unit on the MKS, is not applicable on the MK.*

Table 5.8 Pneumatic clamping elements for standard profile guides

Size	Design type of carriage	Clamping element	Adapter plate	Holding power [N]		Measure [mm]															Weight [kg]	
				MK	MKS	A	A1	A2	A2	A3	B	B1	B3	B4	C	D	X	G	H	→	MK	MKS
15	BG_S15B	MK(S)1501A	--	650	400	55	15	6	34	58	39	15	15,5	12	2,5	24	24	M 4	4,5	16	0,230	0,260
	BG_S15F																					
	BG_H15F																					
	BG_H15B		PMK15-4													28					0,295	0,325
20	BG_S20B	MK(S)2001A	--	1 000	600	66	20	6	43	61	39	20	5	14,4	2,5	28	28	M 5	5	20	0,270	0,310
	BG_S20F																					
	BG_H20F															4,5					0,300	0,300
	BG_H20B																					
25	BG_S25B	MK(S)2501A	--	1 200	750	75	20	5	49	56	35	20	5	15,5	5,0	33	33	M 6	8	22	0,360	0,420
	BG_S25F																					
	BG_H25F		PMK25-2												6,0	36					0,340	0,398
	BG_X25B																					
	BG_H25B		PMK25-6													40					0,476	0,536
30	BG_S30B	MK(S)3001A	--	1 750	1 050	90	22	5	58	68	39	22	8,5	20,5	5,0	42	42	M 8	10	25	0,610	0,680
	BG_H30F																					
	BG_H30B		PMK30-3													45					0,686	0,756
35	BG_S35B	MK(S)3501A	PMK35-4	2 000	1 250	100	24	5	68	67	39	24	7,5	20,5	5,5	48	44	M 8	10	28	0,905	1,015
	BG_H35F																					
	BG_H35B		PMK35-11												6,5	55					1,055	1,165
45	BG_S45B	MK(S)4501A	PMK45-6	2 250	1 450	120	26	5	78,8	82	49	26	11,5	26,8	10,5	60	54	M 10	15	30	1,600	1,750
	BG_H45F																					
	BG_H45B		PMK45-16													70					2,031	2,181
55	BG_S55B	MK(S)5501A	PMK55-7	2 250	1 450	128	30	5	87	82	49	30	9,5	30,5	14	70	63	M 10	18	30	1,956	2,126
	BG_H55F																					
	BG_H55B		PMK55-17													80					2,416	2,586

5.5.2.2 Pneumatic clamping element for miniature rail guides

The clamping elements of the MCP-series close by pneumatic pressure. The clamping elements of the MCPS-series close by spring-loaded energy storage and open by pneumatic pressure. They are asymmetrically arranged with respect to the rail axis, which makes it possible to keep the carriage width on one side. The wrap-around clamp is floating, consequently there are no transverse forces in adjoining structures. This also enables a friction connection for the contact sections between the element and linear guide.

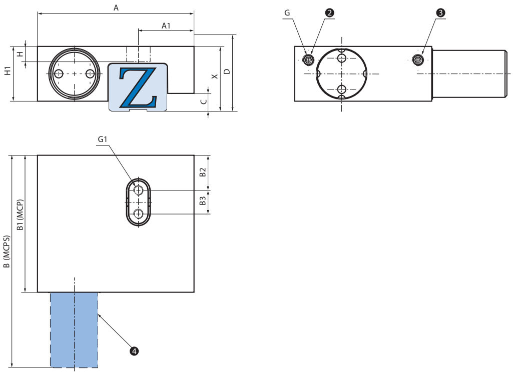


Figure 5.11

Note: Consider measurement C/Interfering contour!

G: Air connection

❶ MCP Series: Air filter
MCPS: M3 port (air connection)

❷ MCP Series: M3 port (air connection)
MCPS: Air filter / Plus connection M3.

❸ The attachment spring unit on the MCPS is not applicable on the MCP.

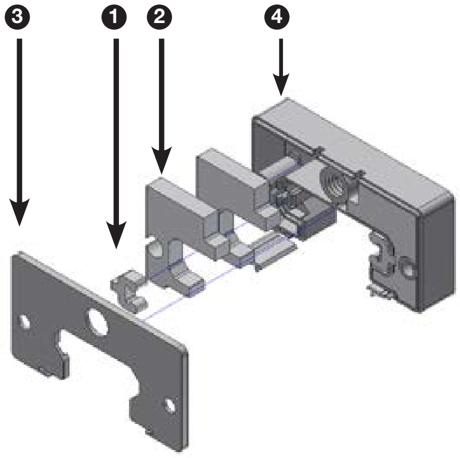
Table 5.9 Pneumatic clamping elements for miniature guides

Size	Design type of carriage	Clamping element	Holding power [N]		Measure [mm]													Weight [kg]	
			MCP	MCPS	A	A1	B	B1	B2	B3	C	D	X	G	G1	H	H1	MCP	MCPS
09	MB_09S	MCP(S)0914L	130	80	32,5	9,7	52,5	34	8,25	5,5	2,15	10	10	M 3	M 2,5	3,3	15	0,070	0,078
12	MB_12S	MCP(S)1214L	280	250	37,5	13,2	52,5	34	8,25	5,5	2,95	13	13	M 3	M 2,5	3,5	16	0,087	0,094
15	MB_15S	MCP(S)1514L	320	280	41,5	15,7	52,5	34	8,00	6,0	3,95	16	16	M 3	M 2,5	3,8	16	0,099	0,105

5.6 Lubrication system LU1

5.6.1 Structure

The lubrication system LU1 is developed for the use in combination with grease lubricated lineare guides. In operation, lubrication oil is given by capillary action to the raceways of the profile rail. The function is given in all mounting positions. With the continuous supply of oil, the operation interval of the lubricant inside of the block increase substantially.



❶ Transfer fabric
❷ Oil-absorbing foam
❸ Frame
❹ Cover

Figure 5.12

The lubrication system LU1 is split into two unconnected chambers. By default, the lubrication system LU1 is filled with the high-performance gear and multi-purpose oil Klübersynth® GEM 4 - 220. The combination from the lubrication system LU1 with all sealing options is possible.

5.6.2 Dimension

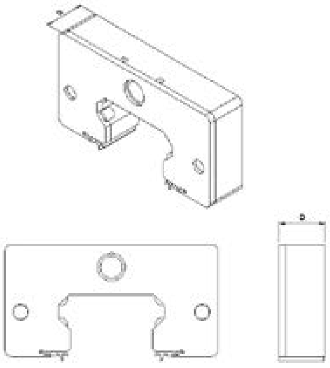


Figure 5.13

Table 5.9

Size	Width D [mm]
BG15-LU1	10,3
BG20-LU1	10,3
BG25-LU1	10,3
BG30-LU1	10,3
BG35-LU1	10,7
BG45-LU1	13,0
BG55-LU1	13,0

5.6.3 Features

The lubrication system LU1 is designed so that the grease nipples and lubrication connections for the re-lubrication of the carriage with grease can be directly mounted.

This lubrication oil is miscible with all of the NTN-SNR standard greases. However, the greases SNR LUB FOOD and Klübersynth UH 14-151 lose their H1 – registration under this configuration. To refill the lubrication system under normal use is not necessary, but from the top of the cover it is possible. A sideways refill is not provided. Furthermore, the necessary holes could be manufactured by our production. Please contact in this case our NTN-SNR application engineers. It is important that the two chambers of the lubrication system will always be refilled with oil. A filling with other lubrication oils according to customer specifications is possible. It is important that dynamic viscosity according DIN 51 562 T01 from approximately 200 mm²/s is given. Lower viscosity leads to more rapid emptying. Oils with higher viscosity could not be transported in extreme cases.

6. Corrosion protection

NTN-SNR liner guides can be provided in the following versions when special requirements for corrosion protection apply:

Black chrome coating

- Oxide ceramic layer
- Thickness 2…10 µm
- No deformation of the parts
- Resistant to acids, alkalis and solvents
- Relatively soft layer (up to 350 HV), which clears away by rolling over in the area of the raceways
- Color: matt black
- Suitable for applications in the optic industry, medical industry,…

Hard chrome coating

- Galvanic process
- Thickness 2…5 µm
- No deformation of the parts
- Very high hardness of the layer (700…800 HV), good corrosion resistant
- Color: metallic blank
- Suitable for applications in clean rooms, food industry,…

DURALLOY TDC® coating

- Specific thin chrome coating
- Thickness 2,5…4 µm
- No deformation of the parts
- Crack free layer with extreme high hardness (800…1300 HV), very good corrosion resistant
- Color: matt grey
- Suitable for applications in wet areas

We recommend contacting our NTN-SNR application engineers to select a suitable corrosion protection.

7. Type code

Order examples for standard systems without options:

Profile rail guide system:

BG	C	H	25	B	N	2	SS	L	01600	N	Z1	II	–	0	-20.0	N
1	2	3	4	5	6	7	8	9	10	11	12	13		14	15	16

Profile rail:

BG	R	25	L	01600	N	II	–	0	-20.0	N
1	2	4	9	10	11	13		14	15	16

Carriage:

BG	C	H	25	B	N	SS	N	Z1	–	N
1	2	3	4	5	6	8	11	12		16

1	BG	Series BG: Standard profile rail guide MB: Miniature profile rail guide	
2	C	Version C: Profile rail guide with ball chain X: Conventional profile rail guide	W: Profile rail, wide R: Profile rail
3	H	Design height* H: normal height S: flat height	X: medium height *does not apply for miniature guides*
4	25	Design size	
5	B	Design type of carriage B: Carriage, block design S: Miniature Carriage, narrow	F: Carriage, flange design W: Miniature carriage, wide
6	N	Length of the carriage S: Carriage, short L: Carriage, long	N: Carriage, normal E: Carriage extra long
7	2	Number of carriages	
8	N	Seals SS: Inner, end and side seals (standard sealing) BB: End and side seals EE: Inner, double-end and side seals GG: Inner, double-end and side seals and metal scrapers Additional sealing options see Chapter 5.1.2	
9	L	Fastening method for the profile rail L: Rail with through-holes C: Rail with tapped, blind holes to screw down the rails from below	
10	01600	Profile rail length 5-digit specification in [mm]	
11	N	Precision class N: Normal precision class P: Precision class UP: Ultra-precision class	H: High-precision class SP: Super-precision class
12	Z1	Perload class Z0: No perload Z2: Medium perload ZX: Special preload	Z1: Low preload Z3: High preload

Order example for standard system with options:

Profile rail guide system:

BG	C	H	25	B	N	2	SS	L	01600	N	Z1	II	–	0	-20.0	S	-03	02	3	1	-	3	1
1	2	3	4	5	6	7	8	9	10	11	12	13		14	15	16	17	18	19	20		21	22

Profile rail:

BG	R	25	L	01600	N	I	–	0	-20.0	S-	3	1
1	2	4	9	10	11	13		14	15	16	21	22

Carriage:

BG	C	H	25	B	N	SS	N	Z1	–	S -	03	02	3	1
1	2	3	4	5	6	8	11	12		16	17	18	19	20

13	II	Profile rail arrangement Without: No information concerning rail arrangement III: Three rails in parallel	II: Two rails in parallel IV: Four connected rails
14	0	Profile rail segmentation 0: One-segment rail 1: Rail with arbitrary segments 2: Rail segmentation according to drawing	
15	20.0	Starting measure G1 of the profile rail Definition see Chapter 8.12	
16	N	Special version of the profile rails N: Standard	S: Special version, index follows
17...22		Index for special versions	
17	03	Greases see Table 7.2 and Chapter 4.3.2	
18	02	Lubrication connections see Table 7.1 and Chapter 4.4.1, 4.4.2	
19	3	Material / coatings of the carriages see Table 7.3 and Chapter 6	
20	1	Special versions of the carriages 0: Standard 1: Carriages with one LU1 _: Index (A...Z) is given in a case of order	2: Carriages with two LU1
21	3	Material / coatings of the profile rails see Table 7.3 and Chapter 6	
22	1	Special version of the profile rails 0: Standard _: Index (A...Z) is given in a case of order	

Table 7.1 Index of lubrication connections

Index	Lubrication connections (see Chapter 4.4
00	End face, grease nipple, 67° / locking screw
01	End face, 2 locking screws
02	End face, grease nipple, 0° / locking screw
03	End face, grease nipple, 45° / locking screw
04	End face, grease nipple, 90° / locking screw
05	End face, lubrication extention / locking screw
06	End face, swivel connection / locking screw
07	End face, tube connection, straight / locking screw
08	End face, tube connection, 90° / locking screw
10	Lateral on reference side, grease nipple, 67° / locking screw
11	Lateral on reference side, 2 locking screws
12	Lateral on reference side, grease nipple, 0°/ locking screw
13	Lateral on reference side, grease nipple, 45° / locking screw
14	Lateral on reference side, grease nipple, 90° / locking screw
15	Lateral on reference side, lubrication tube / locking screw
16	Lateral on reference side, swivel connection / locking screw
17	Lateral on reference side, tube connection, straight / locking screw
18	Lateral on reference side, tube connection, 90° / locking screw
20	Lateral opposite reference side, grease nipple, 67° / locking screw
21	Lateral opposite reference side, 2 locking screws
22	Lateral opposite reference side, grease nipple, 0°/ locking screw
23	Lateral opposite reference side, grease nipple, 45° / locking screw
24	Lateral opposite reference side, grease nipple, 90° / locking screw
25	Lateral opposite reference side, lubrication extention / locking screw
26	Lateral opposite reference side, swivel connection / locking screw
27	Lateral opposite reference side, tube connection, straight / locking screw
28	Lateral opposite reference side, tube connection, 90° / locking screw
99	Lubrication connections according to customer drawing

Table 7.2 Index of lubrication greases

Index	Manufacturer	Grease description (see Chapter 4.2.4)
00	NTN-SNR	SNR LUB Heavy Duty (standard grease)
01	Klüber	Without grease, only with Contrakor Fluid H1 preservation oil
02	NTN-SNR	SNR LUB HIGH SPEED+
03	NTN-SNR	SNR LUB HIGH TEMP
04	NTN-SNR	SNR LUB FOOD
05	Klüber	Microlub GL261
06	Klüber	Klübersynth BEM34-32
07	Klüber	Klübersynth UH1 14-151
99		Special grease according to customer specifications

Table 7.3 Index of materials / coatings

Index	Description (see Chapter 6)
0	Standard material
2	Black chrome coating
4	Hard chrome coating
5	DURALLOY TDC® coating

8. NTN-SNR profile rail guides

8.1 Overview

NTN-SNR profile rail guides are high-quality precision products. They combine customer-orientated product development and high quality requirements. They offer the customer a wide product range for various applications in all areas of industry.

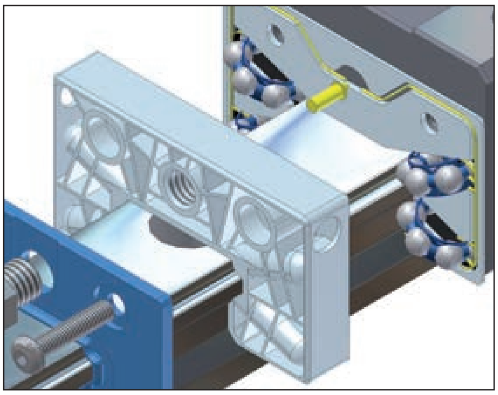
The most important characteristics are:

NTN-SNR standard profile rail guides

- \> Arrangement of the tracks at a 45° angle which results in equal load ratings in all main directions
- \> Low system friction with a maximum friction coefficient, μ of 0.003 due to circular arc grooves
- \> High tolerance compensation and error compensation capability due to DF-arrangement of the race ways
- \> Multitude of lubrication connections can be mounted on all sides of the carriage
- \> Flange carriages allows screw connection from the top and the bottom
- \> All seals in two-lip versions for optimal protection of the carriage against liquid and solid foreign particles
- \> Range of sealing options for special applications
- \> Profile rail guides with ball chain and conventional types on one rail
- \> Dimensions according to DIN 645-1 and DIN 645-2.

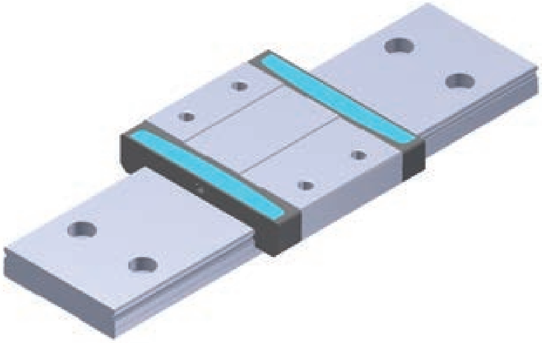
NTN-SNR standard profile rail guides with ball chains

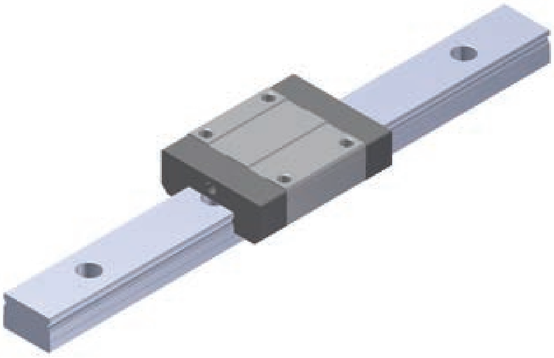
- > Low noise level
- > Very quiet running due to additional spacer ball at the chain ends
- > Low heat generation
- > Velocity of up to 5 m/s
- > Accelerations of up to 50 m/s2
- > Long-term zero maintenance
- > Long service life
- > Patented ball chain with integrated lubrication reservoirs



NTN-SNR miniature profile rail guides

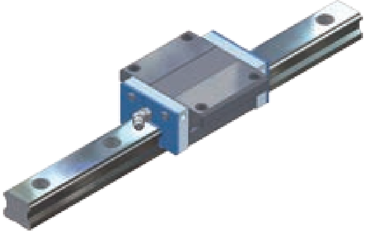
- > Compact design
- > Guide rail and carriage made of corrosion-resistant material
- > Available in narrow and wide rail versions
- > With ball chain and in conventional type available





Profile rail guide with ball chain

Carriages with flange, normal height (p. 90)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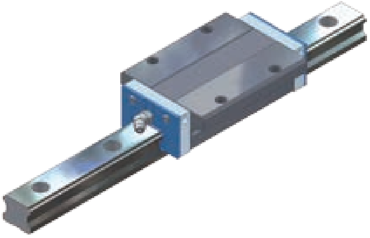
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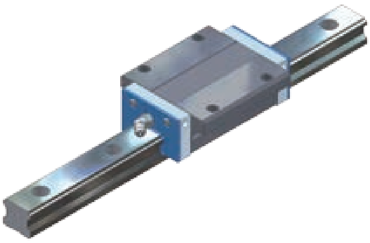
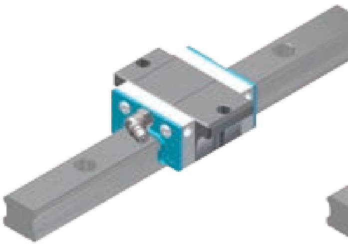

BGCH…FL (long)

Carriages with flange, flat (p. 92)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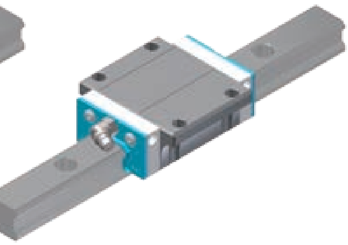
(short)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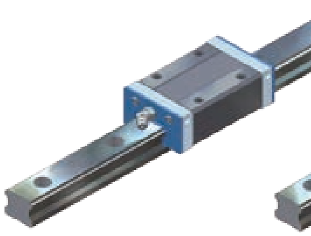
(standard)

Carriages in block design, flat (p. 96)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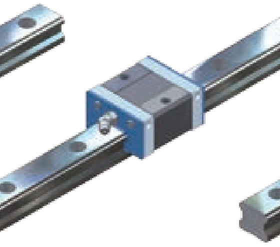
(standard)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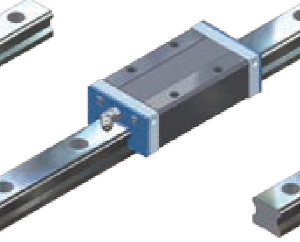
(short)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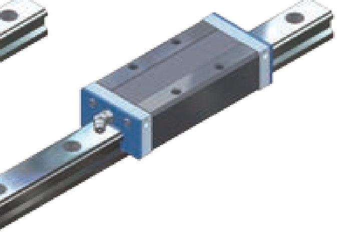
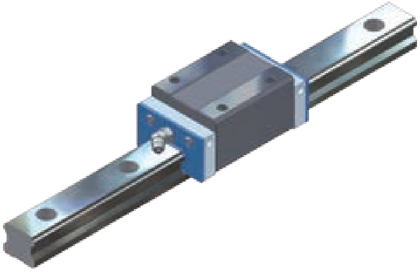

BGXS…BE
(extra long)

Carriages in in block design, normal height (p. 96)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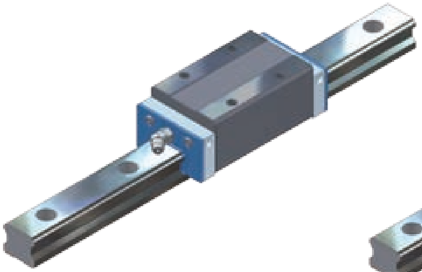
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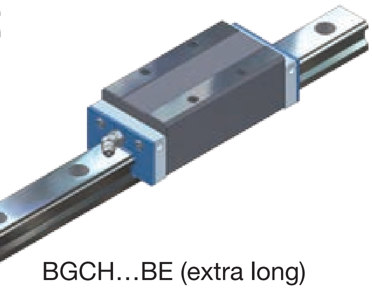
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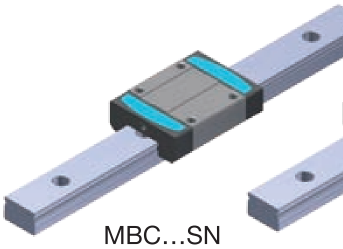
Miniature carriages (p. 106)


MBC…SN
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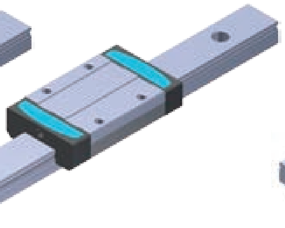
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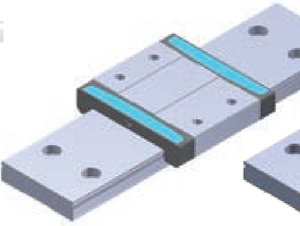
(narrow version, long)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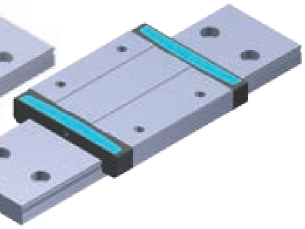
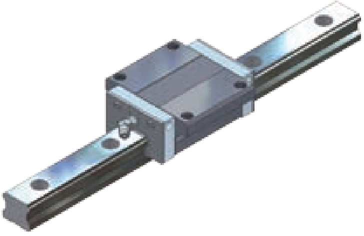
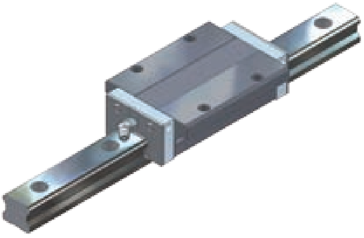
(wide version, standard)

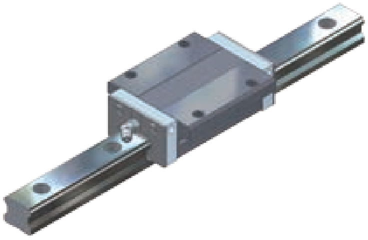

MBC…WL
(wide version, long)

Profile rail guide without ball chain

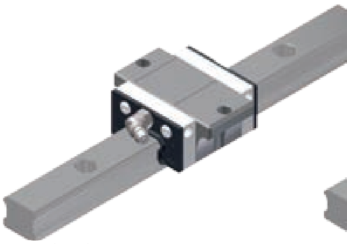
Carriages with flange, normal height (p. 98)

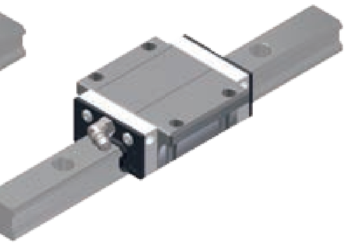

BGXH…FN (standard)


BGXH…FE (extra long)

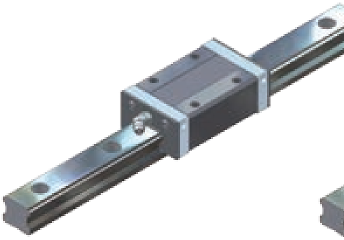

BGXH…FL (long)

Carriages with flange, flat height (p. 100)


BGXS…FN
(Standard)


BGXS…FS
(short)

Carriages in block design, flat (p. 104)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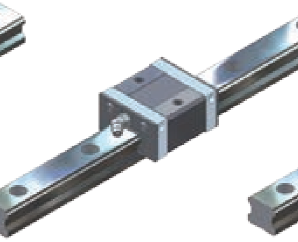
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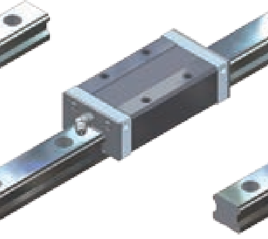
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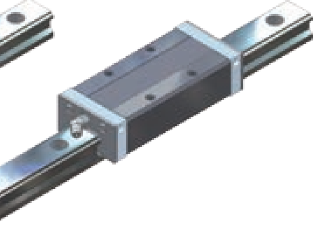
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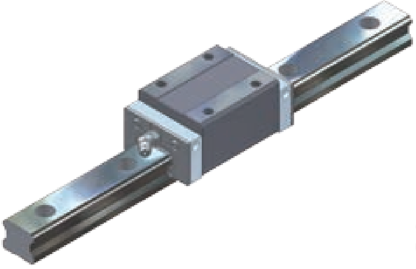
(extra long)

Carriages in in block design, normal height (p. 102)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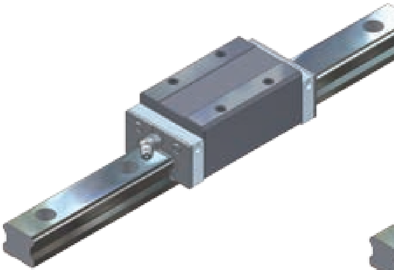
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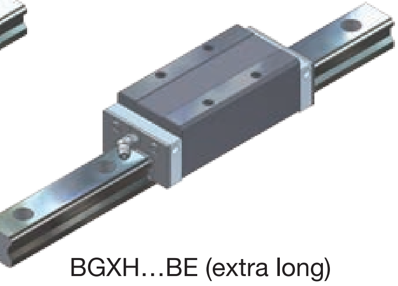
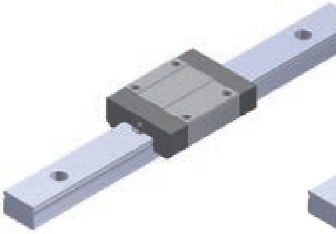

BGXH…BE (extra long)

Miniature carriages (p. 110)


MBX…SN
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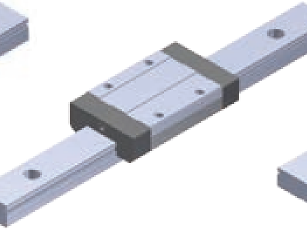
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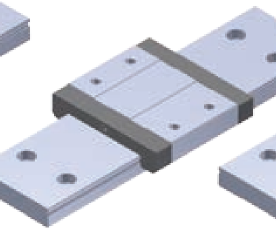
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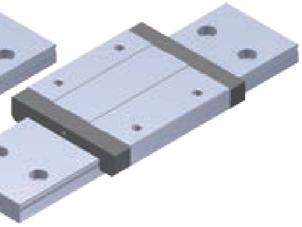
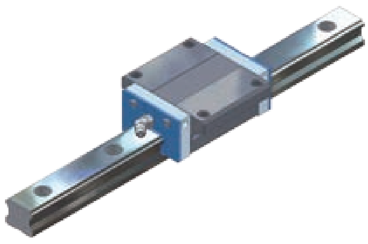
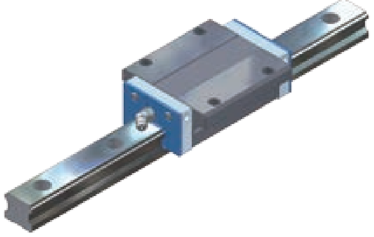

MBX…WL
(wide version, long)

8.2 BGCH…F

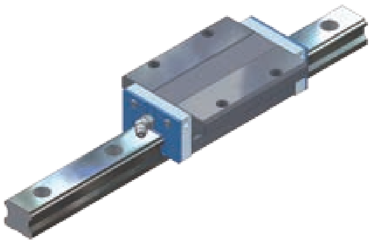
Profile rail guide with ball chain, Carriages with flange, normal height



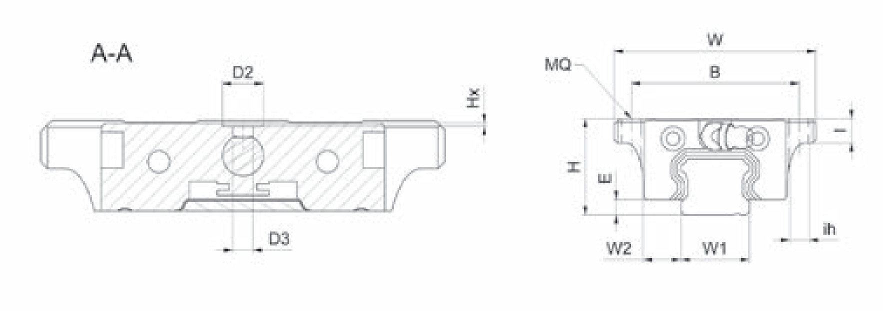
BGCH…FN, standard



BGCH…FL, long



BGCH…FE, extra long

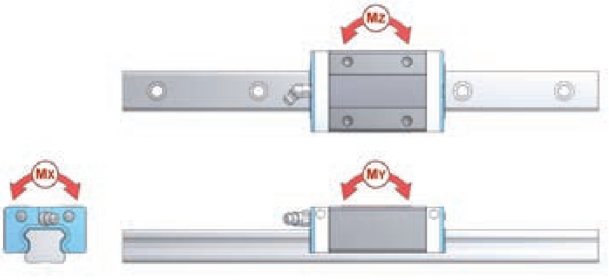


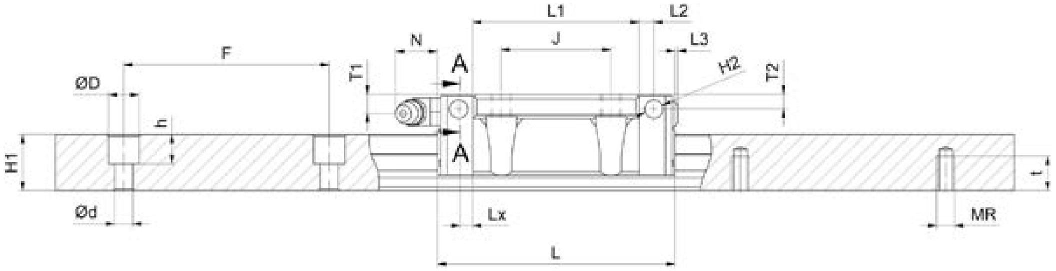
	System mm					Carriage mm															
	H	W	W2	E	L	B	J	MQ	ih	l	L1	Oil H	T1	N	T2	L2	H2	Lx	Hx	D2	D3
BGCH15 FN	24	47	16,0	3,3	58,6	38	30	M 5	4,4	8,0	40,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCH15 FL	24	47	16,0	3,3	66,1	38	30	M 5	4,4	8,0	47,7	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCH15 FE	24	47	16,0	3,3	81,1	38	30	M 5	4,4	8,0	62,7	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCH20 FN	30	63	21,5	4,5	69,3	53	40	M 6	5,4	9,0	48,5	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCH20 FL	30	63	21,5	4,5	82,1	53	40	M 6	5,4	9,0	61,3	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCH20 FE	30	63	21,5	4,5	97,3	53	40	M 6	5,4	9,0	76,5	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCH25 FN	36	70	23,5	5,8	79,2	57	45	M 8	7,0	10,0	57,5	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCH25 FL	36	70	23,5	5,8	93,9	57	45	M 8	7,0	10,0	72,2	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCH25 FE	36	70	23,5	5,8	108,6	57	45	M 8	7,0	10,0	86,9	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCH30 FS	42	90	31,0	7,0	64,2	72	--	M 10	8,6	11,0	37,2	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH30 FN	42	90	31,0	7,0	94,8	72	52	M 10	8,6	11,0	67,8	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH30 FL	42	90	31,0	7,0	105,0	72	52	M 10	8,6	11,0	78,0	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH30 FE	42	90	31,0	7,0	130,5	72	52	M 10	8,6	11,0	103,5	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH35 FS	48	100	33,0	7,5	75,5	82	--	M 10	8,6	12,0	44,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH35 FN	48	100	33,0	7,5	111,5	82	62	M 10	8,6	12,0	80,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH35 FL	48	100	33,0	7,5	123,5	82	62	M 10	8,6	12,0	92,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH35 FE	48	100	33,0	7,5	153,5	82	62	M 10	8,6	12,0	122,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH45 FN	60	120	37,5	8,9	129,0	100	80	M 12	10,6	15,5	94,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCH45 FL	60	120	37,5	8,9	145,0	100	80	M 12	10,6	15,5	110,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCH45 FE	60	120	37,5	8,9	174,0	100	80	M 12	10,6	15,5	139,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCH55 FN	70	140	43,5	12,7	155,0	116	95	M 14	12,6	18,5	116,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH55 FL	70	140	43,5	12,7	193,0	116	95	M 14	12,6	18,5	154,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH55 FE	70	140	43,5	12,7	210,0	116	95	M 14	12,6	18,5	171,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0

Example of order code

BGCH 25 FN 2 SS L 02000 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

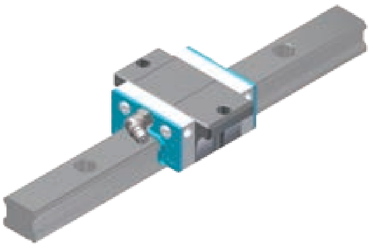




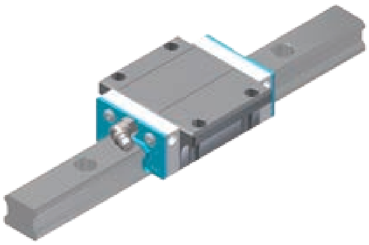
Rail [mm]								Load rating					Mass			
			Version L			Version C		kN		kNm			kg	kg/ m		
W1	H1	F	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail		
15	13	60	4,5	7,5	6,0	M 5	8,0	11,51	19,62	0,135	0,118	0,118	0,21	1,28	BGCH15	FN
15	13	60	4,5	7,5	6,0	M 5	8,0	13,93	23,72	0,164	0,169	0,169	0,23	1,28	BGCH15	FL
15	13	60	4,5	7,5	6,0	M 5	8,0	16,90	31,35	0,217	0,293	0,293	0,29	1,28	BGCH15	FE
20	16,3	60	6,0	9,5	8,5	M 6	10,0	17,71	30,50	0,285	0,221	0,221	0,40	2,15	BGCH20	FN
20	16,3	60	6,0	9,5	8,5	M 6	10,0	22,96	39,52	0,370	0,361	0,361	0,46	2,15	BGCH20	FL
20	16,3	60	6,0	9,5	8,5	M 6	10,0	27,44	48,88	0,457	0,557	0,557	0,61	2,15	BGCH20	FE
23	19,2	60	7,0	11,0	9,0	M 6	12,0	24,85	41,07	0,440	0,352	0,352	0,57	2,88	BGCH25	FN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	31,93	52,79	0,567	0,568	0,568	0,72	2,88	BGCH25	FL
23	19,2	60	7,0	11,0	9,0	M 6	12,0	36,00	63,29	0,680	0,820	0,820	0,89	2,88	BGCH25	FE
28	22,8	80	9,0	14,0	12,0	M 8	15,0	18,19	27,05	0,350	0,150	0,150	0,80	4,45	BGCH30	FS
28	22,8	80	9,0	14,0	12,0	M 8	15,0	36,71	54,57	0,707	0,551	0,551	1,10	4,45	BGCH30	FN
28	22,8	80	9,0	14,0	12,0	M 8	15,0	47,54	70,68	0,915	0,822	0,822	1,34	4,45	BGCH30	FL
28	22,8	80	9,0	14,0	12,0	M 8	15,0	52,93	86,71	1,123	1,338	1,338	1,66	4,45	BGCH30	FE
34	26,0	80	9,0	14,0	12,0	M 8	17,0	26,22	40,66	0,643	0,270	0,270	1,00	6,25	BGCH35	FS
34	26,0	80	9,0	14,0	12,0	M 8	17,0	52,32	81,12	1,283	0,973	0,973	1,50	6,25	BGCH35	FN
34	26,0	80	9,0	14,0	12,0	M 8	17,0	65,37	101,36	1,603	1,397	1,397	1,90	6,25	BGCH35	FL
34	26,0	80	9,0	14,0	12,0	M 8	17,0	71,92	125,30	1,982	2,287	2,287	2,54	6,25	BGCH35	FE
45	31,1	105	14,0	20,0	17,0	M 12	20,0	71,57	108,90	2,302	1,525	1,525	2,27	9,60	BGCH45	FN
45	31,1	105	14,0	20,0	17,0	M 12	20,0	85,12	129,54	2,738	2,123	2,123	2,68	9,60	BGCH45	FL
45	31,1	105	14,0	20,0	17,0	M 12	20,0	98,36	163,28	3,451	3,381	3,381	3,42	9,60	BGCH45	FE
53	38,0	120	16,0	23,0	20,0	M 14	24,0	86,19	133,42	3,306	2,306	2,306	3,44	13,80	BGCH55	FN
53	38,0	120	16,0	23,0	20,0	M 14	24,0	116,31	178,85	4,432	4,104	4,104	4,63	13,80	BGCH55	FL
53	38,0	120	16,0	23,0	20,0	M 14	24,0	157,65	253,62	6,279	6,462	6,462	5,16	13,80	BGCH55	FE

8.3 BGCS...F

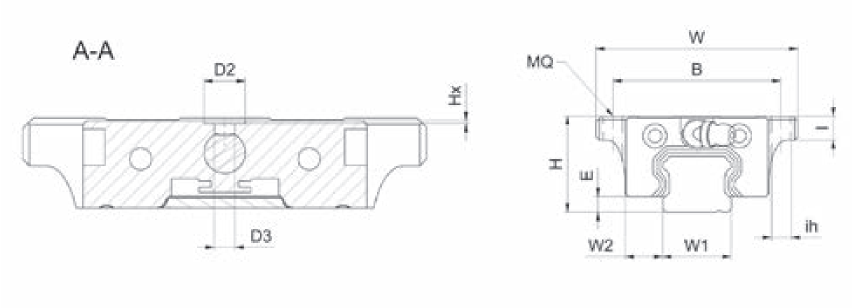
Profile rail guide without ball chain, carriage with flange, flat



BGCS…FN, short



BGCS…FS, standard

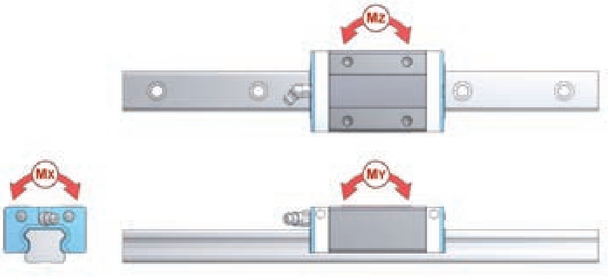


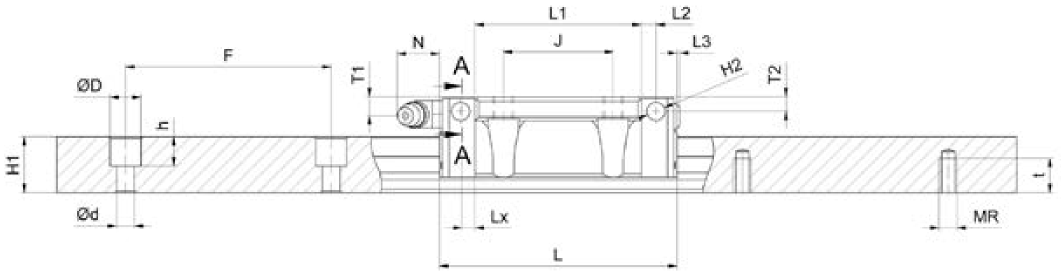
	System mm					Carriage mm															
	H	W	W2	E	L	B	J	MQ	ih	I	L1	Oil H	T1	N	T2	L2	H2	Lx	Hx	D2	D3
BGCS15 FS	24	52	18,5	3,3	40,6	41	--	M 5	4,4	8,0	22,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCS15 FN	24	52	18,5	3,3	58,6	41	26	M 5	4,4	8,0	40,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCS20 FS	28	59	19,5	4,5	48,3	49	--	M 6	5,4	7,0	27,5	M 6 x 1,0	5,1	15,6	4,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCS20 FN	28	59	19,5	4,5	69,3	49	32	M 6	5,4	7,0	48,5	M 6 x 1,0	5,1	15,6	4,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCS25 FS	33	73	25,0	5,8	54,0	60	--	M 8	7,0	7,0	32,3	M 6 x 1,0	7,2	15,6	6,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCS25 FN	33	73	25,0	5,8	79,2	60	35	M 8	7,0	7,0	57,5	M 6 x 1,0	7,2	15,6	6,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0

Example of order code

BGXH 25 FN 2 SS L 02000 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

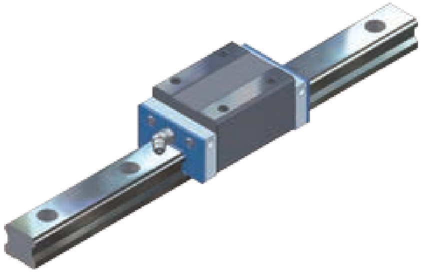




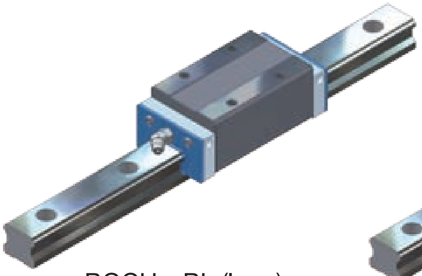
Rail [mm]								Load rating					Mass			
								kN		kNm			kg	kg/ m		
			Version L			Version C										
W1	H1	F	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail		
15	13	60	4,5	7,5	6,0	M 5	8,0	5,727	9,77	0,068	0,032	0,032	0,12	1,28	BGCS15	FS
15	13	60	4,5	7,5	6,0	M 5	8,0	11,51	19,62	0,135	0,118	0,118	0,19	1,28	BGCS15	FN
20	16,3	60	6,0	9,5	8,5	M 6	10,0	9,11	15,69	0,146	0,065	0,065	0,18	2,15	BGCS20	FS
20	16,3	60	6,0	9,5	8,5	M 6	10,0	17,71	30,50	0,285	0,221	0,221	0,31	2,15	BGCS20	FN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	12,67	21,00	0,226	0,101	0,101	0,33	2,88	BGCS25	FS
23	19,2	60	7,0	11,0	9,0	M 6	12,0	24,85	41,07	0,440	0,352	0,352	0,50	2,88	BGCS25	FN

8.4 BGCH...B

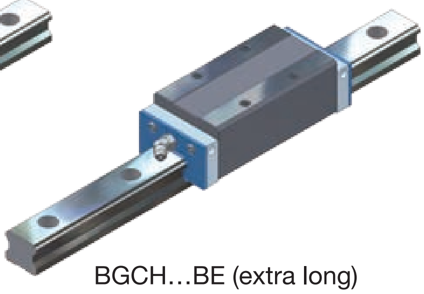
Profile rail guide with ball chain, carriages in block design, normal height



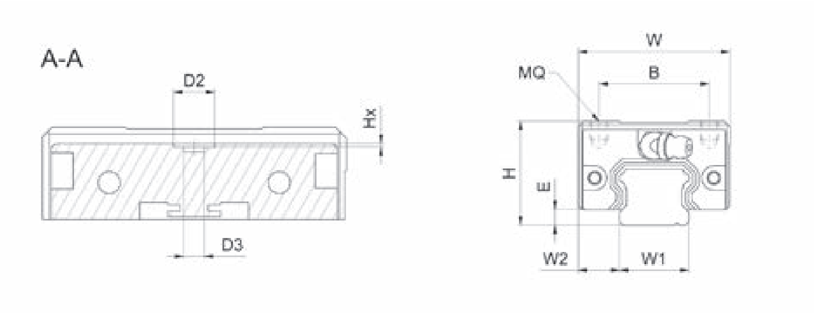
BGCH…BN (standard)



BGCH…BL (long)



BGCH…BE (extra long)

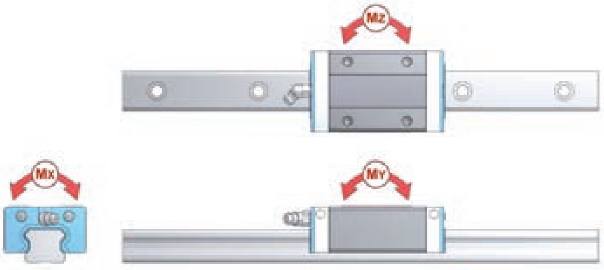


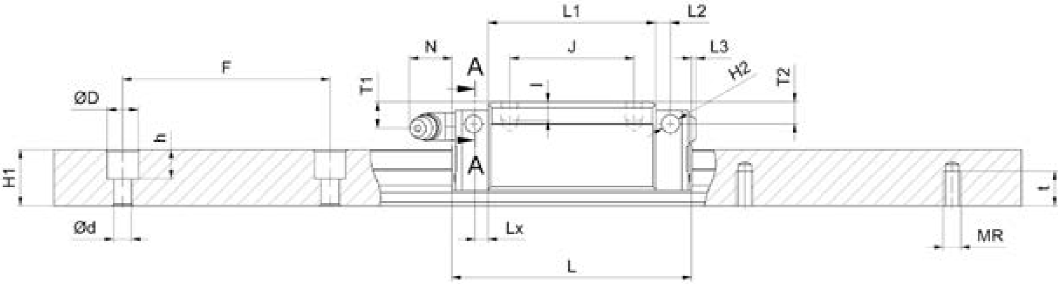
	System mm					Carriage mm															
	H	W	W2	E	L	B	J	MQ	I	L1	Oil H	T1	N	T2	L2	L3	D1	Lx	Hx	D2	D3
BGCH15 BN	28	34	9,5	3,3	58,6	26	26	M 4	6,0	40,2	M 4 x 0,7	9,5	5,0	8,5	4,2	1,5	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCH15 BL	28	34	9,5	3,3	66,1	26	26	M 4	6,0	47,7	M 4 x 0,7	9,5	5,0	8,5	4,2	1,5	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCH15 BE	28	34	9,5	3,3	81,1	26	34	M 4	6,0	62,7	M 4 x 0,7	9,5	5,0	8,5	4,2	1,5	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCH20 BN	30	44	12,0	4,5	69,3	32	36	M 5	6,5	48,5	M 6 x 1,0	7,1	15,6	6,3	4,25	2,1	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCH20 BL	30	44	12,0	4,5	82,1	32	36	M 5	6,5	61,3	M 6 x 1,0	7,1	15,6	6,3	4,25	2,1	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCH20 BE	30	44	12,0	4,5	97,3	32	50	M 5	6,5	76,5	M 6 x 1,0	7,1	15,6	6,3	4,25	2,1	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCH25 BN	40	48	12,5	5,8	79,2	35	35	M 6	9,0	57,5	M 6 x 1,0	14,2	15,6	13,4	4,65	2,3	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCH25 BL	40	48	12,5	5,8	93,9	35	35	M 6	9,0	72,2	M 6 x 1,0	14,2	15,6	13,4	4,65	2,3	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCH25 BE	40	48	12,5	5,8	108,6	35	50	M 6	9,0	86,9	M 6 x 1,0	14,2	15,6	13,4	4,65	2,3	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCH30 BN	45	60	16,0	7,0	94,8	40	40	M 8	12,0	67,8	M 6 x 1,0	13,0	15,6	8,5	6,0	2,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH30 BL	45	60	16,0	7,0	105,0	40	40	M 8	12,0	78,0	M 6 x 1,0	13,0	15,6	8,5	6,0	2,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH30 BE	45	60	16,0	7,0	130,5	40	60	M 8	12,0	103,5	M 6 x 1,0	13,0	15,6	8,5	6,0	2,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH35 BN	55	70	18,0	7,5	111,5	50	50	M 8	12,0	80,5	M 6 x 1,0	18,5	15,6	13,5	7,25	2,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH35 BL	55	70	18,0	7,5	123,5	50	50	M 8	12,0	92,5	M 6 x 1,0	18,5	15,6	13,5	7,25	2,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH35 BE	55	70	18,0	7,5	153,5	50	72	M 8	12,0	122,5	M 6 x 1,0	18,5	15,6	13,5	7,25	2,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH45 BN	70	86	20,5	8,9	129,0	60	60	M 10	18,0	94,0	M 8 x 1,25	24,5	16,0	24,5	8,0	2,9	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCH45 BL	70	86	20,5	8,9	145,0	60	60	M 10	18,0	110,0	M 8 x 1,25	24,5	16,0	24,5	8,0	2,9	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCH45 BE	70	86	20,5	8,9	174,0	60	80	M 10	18,0	139,0	M 8 x 1,25	24,5	16,0	24,5	8,0	2,9	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCH55 BN	80	100	23,5	12,7	155,0	75	75	M 12	22,0	116,0	M 8 x 1,25	24,0	16,0	24,5	10,0	2,9	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH55 BL	80	100	23,5	12,7	193,0	75	75	M 12	22,0	154,0	M 8 x 1,25	24,0	16,0	24,5	10,0	2,9	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCH55 BE	80	100	23,5	12,7	210,0	75	95	M 12	22,0	171,0	M 8 x 1,25	24,0	16,0	24,5	10,0	2,9	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0

Example of order code

BGCH 25 BN 2 SS L 02000 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

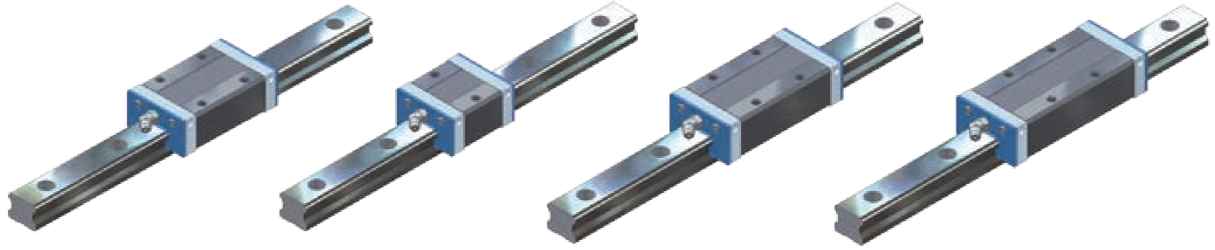




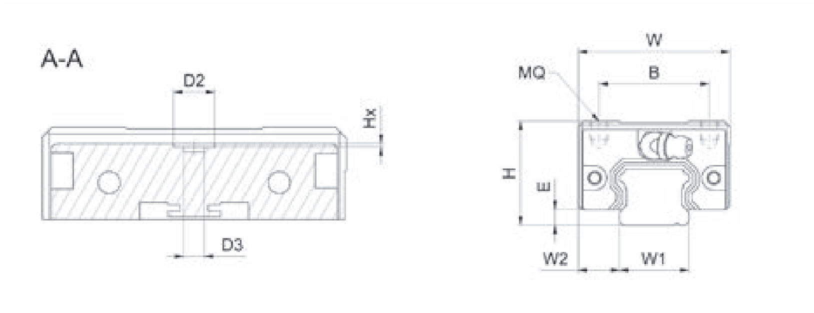
Rail [mm]								Load rating					Mass			
								kN		kNm			kg	kg/ m		
			Version L			Version C										
W1	H1	F	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail		
15	13,0	60	4,5	7,5	6,0	M 5	8,0	11,51	19,62	0,135	0,118	0,118	0,19	1,28	BGCH15	BN
15	13,0	60	4,5	7,5	6,0	M 5	8,0	13,93	23,72	0,164	0,169	0,169	0,23	1,28	BGCH15	BL
15	13,0	60	4,5	7,5	6,0	M 5	8,0	16,90	31,35	0,217	0,293	0,293	0,29	1,28	BGCH15	BE
20	16,3	60	6,0	9,5	8,5	M 6	10,0	17,71	30,50	0,285	0,221	0,221	0,31	2,15	BGCH20	BN
20	16,3	60	6,0	9,5	8,5	M 6	10,0	22,96	39,52	0,370	0,361	0,361	0,36	2,15	BGCH20	BL
20	16,3	60	6,0	9,5	8,5	M 6	10,0	27,44	48,88	0,457	0,557	0,557	0,47	2,15	BGCH20	BE
23	19,2	60	7,0	11,0	9,0	M 6	12,0	24,85	41,07	0,440	0,352	0,352	0,45	2,88	BGCH25	BN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	31,93	52,79	0,567	0,568	0,568	0,66	2,88	BGCH25	BL
23	19,2	60	7,0	11,0	9,0	M 6	12,0	36,00	63,29	0,680	0,820	0,820	0,80	2,88	BGCH25	BE
28	22,8	80	9,0	14,0	12,0	M 8	15,0	36,71	54,57	0,707	0,551	0,551	0,91	4,45	BGCH30	BN
28	22,8	80	9,0	14,0	12,0	M 8	15,0	47,54	70,68	0,915	0,822	0,822	1,04	4,45	BGCH30	BL
28	22,8	80	9,0	14,0	12,0	M 8	15,0	52,93	86,71	1,123	1,338	1,338	1,36	4,45	BGCH30	BE
34	26,0	80	9,0	14,0	12,0	M 8	17,0	52,32	81,12	1,283	0,973	0,973	1,50	6,25	BGCH35	BN
34	26,0	80	9,0	14,0	12,0	M 8	17,0	65,37	101,36	1,603	1,397	1,397	1,80	6,25	BGCH35	BL
34	26,0	80	9,0	14,0	12,0	M 8	17,0	71,92	125,30	1,982	2,287	2,287	2,34	6,25	BGCH35	BE
45	31,1	105	14,0	20,0	17,0	M 12	20,0	71,57	108,90	2,302	1,525	1,525	2,28	9,60	BGCH45	BN
45	31,1	105	14,0	20,0	17,0	M 12	20,0	85,12	129,54	2,738	2,123	2,123	2,67	9,60	BGCH45	BL
45	31,1	105	14,0	20,0	17,0	M 12	20,0	98,36	163,28	3,451	3,381	3,381	3,35	9,60	BGCH45	BE
53	38,0	120	16,0	23,0	20,0	M 14	24,0	86,19	133,42	3,306	2,306	2,306	3,42	13,80	BGCH55	BN
53	38,0	120	16,0	23,0	20,0	M 14	24,0	116,31	178,85	4,432	4,104	4,104	4,57	13,80	BGCH55	BL
53	38,0	120	16,0	23,0	20,0	M 14	24,0	157,65	253,62	6,279	6,462	6,462	5,08	13,80	BGCH55	BE

8.5 BGCS...B

Profile rail guide with ball chain, carriages in block design, flat / medium height



BGCS…BN (standard) BGCS…BS (short) BGXS…BL (long) BGXS…BE (extra long)

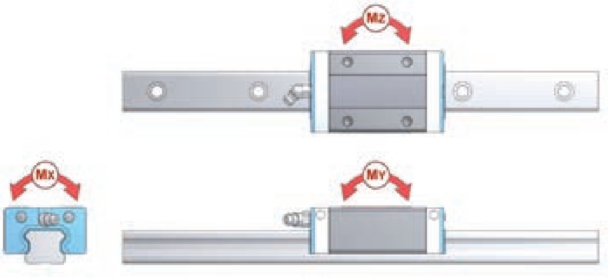


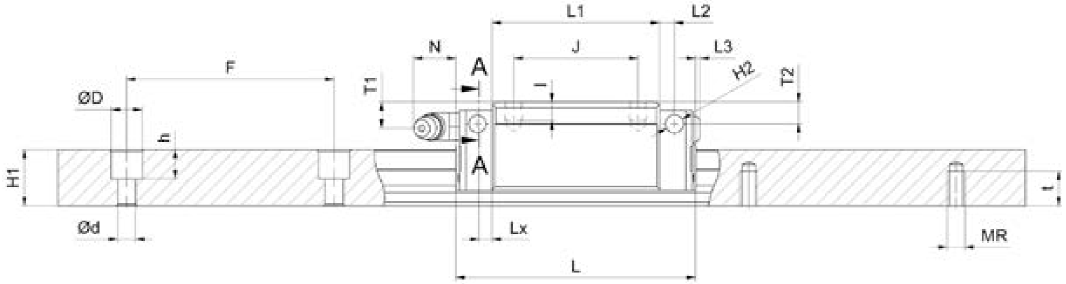
		System mm					Carriage mm													
		H	W	W2	E	L	B	J	MQ	I	L1	Oil H	T1	N	T2	L2	H2	Lx	Hx	D2	D3
BGCS15	BS	24	34	9,5	3,3	40,6	26	--	M 4	4,8	22,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCS15	BN	24	34	9,5	3,3	58,6	26	26	M 4	4,8	40,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCS15	BL	24	34	9,5	3,3	66,1	26	26	M 4	4,8	47,7	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCS15	BE	24	34	9,5	3,3	81,1	26	34	M 4	4,8	62,7	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGCS20	BS	28	42	11,0	4,5	48,3	32	--	M 5	5,5	27,5	M 6 x 1,0	5,1	15,2	4,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCS20	BN	28	42	11,0	4,5	69,3	32	32	M 5	6,5	48,5	M 6 x 1,0	7,1	15,2	4,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGCS25	BS	33	48	12,5	5,8	54,0	35	--	M 6	6,8	32,3	M 6 x 1,0	7,2	15,6	6,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	v 3,0
BGCS25	BN	33	48	12,5	5,8	79,2	35	35	M 6	6,8	57,5	M 6 x 1,0	7,2	15,6	6,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	v 3,0
BGCX25	BN	36	48	12,5	5,8	79,2	35	35	M 6	9,0	57,5	M 6 x 1,0	10,2	12,5	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCX25	BL	36	48	12,5	5,8	93,9	35	35	M 6	9,0	72,2	M 6 x 1,0	10,2	12,5	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCX25	BE	36	48	12,5	5,8	108,6	35	50	M 6	9,0	86,9	M 6 x 1,0	10,2	12,5	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGCS30	BS	42	60	16,0	7,0	64,2	40	--	M 8	10,0	37,2	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS30	BN	42	60	16,0	7,0	94,8	40	40	M 8	10,0	67,8	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS30	BL	42	60	16,0	7,0	105,0	40	40	M 8	10,0	78,0	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS30	BE	42	60	16,0	7,0	130,5	40	60	M 8	10,0	103,5	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS35	BS	48	70	18,0	7,5	75,5	50	--	M 8	10,0	44,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS35	BN	48	70	18,0	7,5	111,5	50	50	M 8	10,0	80,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS35	BL	48	70	18,0	7,5	123,5	50	50	M 8	10,0	92,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS35	BE	48	70	18,0	7,5	153,5	50	72	M 8	10,0	122,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS45	BN	60	86	20,5	8,9	129,0	60	60	M 10	15,5	94,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCS45	BL	60	86	20,5	8,9	145,0	60	60	M 10	15,5	110,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCS45	BE	60	86	20,5	8,9	174,0	60	80	M 10	15,5	139,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGCS55	BN	70	100	23,5	12,7	155,0	75	75	M 12	18,0	116,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS55	BL	70	100	23,5	12,7	193,0	75	75	M 12	18,0	154,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGCS55	BE	70	100	23,5	12,7	210,0	75	95	M 12	18,0	171,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0

Example of order code

BGCS 25 BN 2 SS L 02000 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

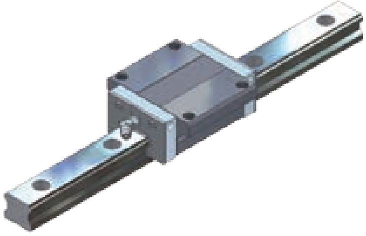




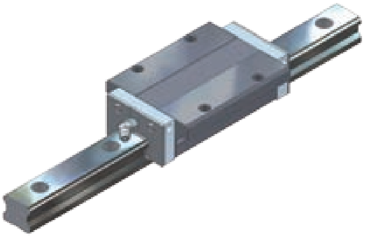
Rail [mm]								Load rating					Mass			
								kN		kNm			kg	kg/ m		
			Version L			Version C										
W1	H1	F	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail		
15	13,0	60	4,5	7,5	6,0	M 5	8,0	5,73	9,77	0,068	0,032	0,032	0,10	1,28	BGCS15	BS
15	13,0	60	4,5	7,5	6,0	M 5	8,0	11,51	19,62	0,135	0,118	0,118	0,17	1,28	BGCS15	BN
15	13,0	60	4,5	7,5	6,0	M 5	8,0	13,93	23,72	0,164	0,169	0,169	0,18	1,28	BGCS15	BL
15	13,0	60	4,5	7,5	6,0	M 5	8,0	16,90	31,35	0,217	0,293	0,293	0,29	1,28	BGCS15	BE
20	16,3	60	6,0	9,5	8,5	M 6	10,0	9,11	15,69	0,146	0,065	0,065	0,17	2,15	BGCS20	BS
20	16,3	60	6,0	9,5	8,5	M 6	10,0	17,71	30,50	0,285	0,221	0,221	0,26	2,15	BGCS20	BN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	12,67	21,00	0,226	0,101	0,101	0,21	2,88	BGCS25	BS
23	19,2	60	7,0	11,0	9,0	M 6	12,0	24,85	41,07	0,440	0,352	0,352	0,38	2,88	BGCS25	BN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	24,85	41,07	0,440	0,352	0,352	0,40	2,88	BGCX25	BN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	31,93	52,79	0,567	0,568	0,568	0,54	2,88	BGCX25	BL
23	19,2	60	7,0	11,0	9,0	M 6	12,0	36,00	63,29	0,680	0,820	0,820	0,67	2,88	BGCX25	BE
28	22,8	80	9,0	14,0	12,0	M 8	15,0	18,19	27,05	0,350	0,150	0,150	0,50	4,45	BGCS30	BS
28	22,8	80	9,0	14,0	12,0	M 8	15,0	36,71	54,57	0,707	0,551	0,551	0,80	4,45	BGCS30	BN
28	22,8	80	9,0	14,0	12,0	M 8	15,0	47,54	70,68	0,915	0,822	0,822	0,94	4,45	BGCS30	BL
28	22,8	80	9,0	14,0	12,0	M 8	15,0	52,93	86,71	1,123	1,338	1,338	1,16	4,45	BGCS30	BE
34	26,0	80	9,0	14,0	12,0	M 8	17,0	26,22	40,66	0,643	0,270	0,270	0,80	6,25	BGCS35	BS
34	26,0	80	9,0	14,0	12,0	M 8	17,0	52,32	81,12	1,283	0,973	0,973	1,20	6,25	BGCS35	BN
34	26,0	80	9,0	14,0	12,0	M 8	17,0	65,37	101,36	1,603	1,397	1,397	1,40	6,25	BGCS35	BL
34	26,0	80	9,0	14,0	12,0	M 8	17,0	71,92	125,30	1,982	2,287	2,287	1,84	6,25	BGCS35	BE
45	31,1	105	14,0	20,0	17,0	M 12	20,0	71,57	108,90	2,302	1,525	1,525	1,64	9,60	BGCS45	BN
45	31,1	105	14,0	20,0	17,0	M 12	20,0	85,12	129,54	2,738	2,123	2,123	1,93	9,60	BGCS45	BL
45	31,1	105	14,0	20,0	17,0	M 12	20,0	98,36	163,28	3,451	3,381	3,381	2,42	9,60	BGCS45	BE
53	38,0	120	16,0	23,0	20,0	M 14	24,0	86,19	133,42	3,306	2,306	2,306	2,67	13,80	BGCS55	BN
53	38,0	120	16,0	23,0	20,0	M 14	24,0	116,31	178,85	4,432	4,104	4,104	3,57	13,80	BGCS55	BL
53	38,0	120	16,0	23,0	20,0	M 14	24,0	157,65	253,62	6,279	6,462	6,462	3,97	13,80	BGCS55	BE

8.6 BGXH…F

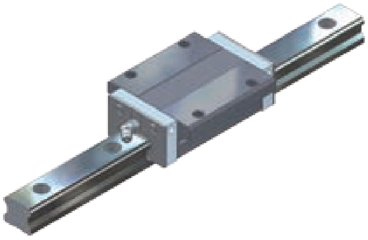
Profile rail guide without ball chain, carriages with flange, normal height



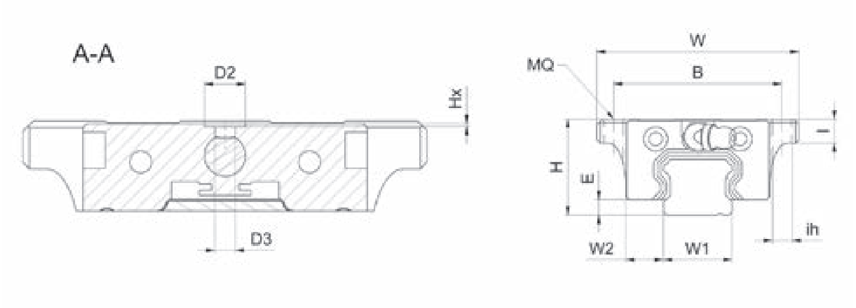
BGXH…FN, standard



BGXH…FE, extra long



BGXH…FL, long

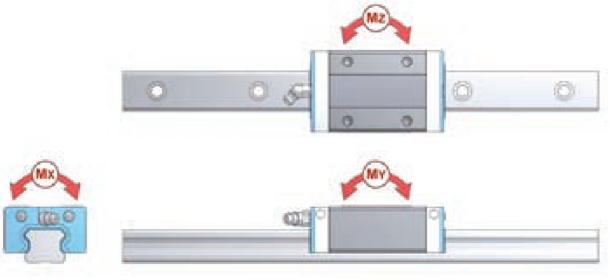


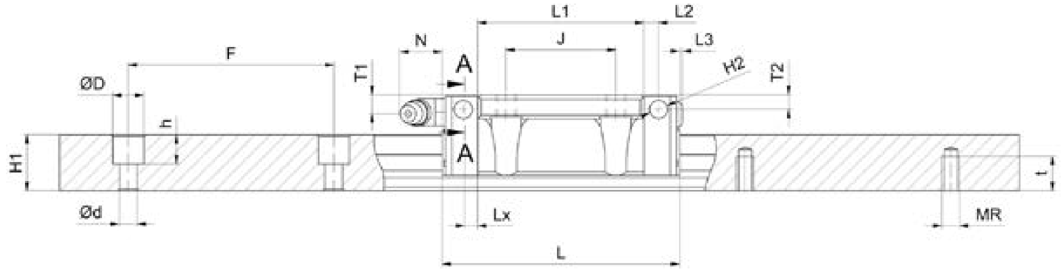
	System mm					Carriage mm															
	H	W	W2	E	L	B	J	MQ	ih	I	L1	Oil H	T1	N	T2	L2	H2	Lx	Hx	D2	D3
BGXH15 FN	24	47	16,0	3,3	58,6	38	30	M 5	4,4	8,0	40,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXH15 FL	24	47	16,0	3,3	66,1	38	30	M 5	4,4	8,0	47,7	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXH15 FE	24	47	16,0	3,3	81,1	38	30	M 5	4,4	8,0	62,7	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXH20 FN	30	63	21,5	4,5	69,3	53	40	M 6	5,4	9,0	48,5	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXH20 FL	30	63	21,5	4,5	82,1	53	40	M 6	5,4	9,0	61,3	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXH20 FE	30	63	21,5	4,5	97,3	53	40	M 6	5,4	9,0	76,5	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXH25 FN	36	70	23,5	5,8	79,2	57	45	M 8	7,0	10,0	57,5	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXH25 FL	36	70	23,5	5,8	93,9	57	45	M 8	7,0	10,0	72,2	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXH25 FE	36	70	23,5	5,8	108,6	57	45	M 8	7,0	10,0	86,9	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXH30 FS	42	90	31,0	7,0	64,2	72	--	M 10	8,6	11,0	37,2	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH30 FN	42	90	31,0	7,0	94,8	72	52	M 10	8,6	11,0	67,8	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH30 FL	42	90	31,0	7,0	105,0	72	52	M 10	8,6	11,0	78,0	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH30 FE	42	90	31,0	7,0	130,5	72	52	M 10	8,6	11,0	103,5	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH35 FS	48	100	33,0	7,5	75,5	82	--	M 10	8,6	12,0	44,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH35 FN	48	100	33,0	7,5	111,5	82	62	M 10	8,6	12,0	80,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH35 FL	48	100	33,0	7,5	123,5	82	62	M 10	8,6	12,0	92,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH35 FE	48	100	33,0	7,5	153,5	82	62	M 10	8,6	12,0	122,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH45 FN	60	120	37,5	8,9	129,0	100	80	M 12	10,6	15,5	94,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXH45 FL	60	120	37,5	8,9	145,0	100	80	M 12	10,6	15,5	110,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXH45 FE	60	120	37,5	8,9	174,0	100	80	M 12	10,6	15,5	139,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXH55 FN	70	140	43,5	12,7	155,0	116	95	M 14	12,6	18,5	116,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH55 FL	70	140	43,5	12,7	193,0	116	95	M 14	12,6	18,5	154,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH55 FE	70	140	43,5	12,7	210,0	116	95	M 14	12,6	18,5	171,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0

Example of order code

BGXH 25 FN 2 SS L 02000 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

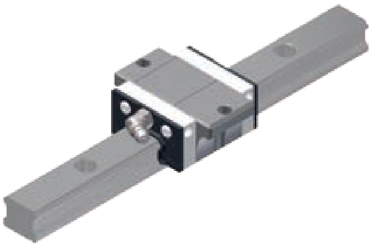




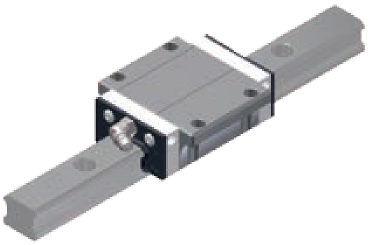
Rail [mm]								Load rating					Mass			
								kN		kNm			kg	kg/ m		
			Version L			Version C										
W1	H1	F	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail		
15	13	60	4,5	7,5	6,0	M 5	8,0	9,33	19,62	0,135	0,118	0,118	0,21	1,28	BGXH15	FN
15	13	60	4,5	7,5	6,0	M 5	8,0	11,30	23,72	0,164	0,169	0,169	0,23	1,28	BGXH15	FL
15	13	60	4,5	7,5	6,0	M 5	8,0	13,69	31,35	0,217	0,293	0,293	0,29	1,28	BGXH15	FE
20	16,3	60	6,0	9,5	8,5	M 6	10,0	14,35	30,50	0,285	0,221	0,221	0,40	2,15	BGXH20	FN
20	16,3	60	6,0	9,5	8,5	M 6	10,0	18,93	39,52	0,370	0,361	0,361	0,46	2,15	BGXH20	FL
20	16,3	60	6,0	9,5	8,5	M 6	10,0	22,11	48,88	0,457	0,557	0,557	0,61	2,15	BGXH20	FE
23	19,2	60	7,0	11,0	9,0	M 6	12,0	20,12	41,07	0,440	0,352	0,352	0,57	2,88	BGXH25	FN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	25,87	52,79	0,567	0,568	0,568	0,72	2,88	BGXH25	FL
23	19,2	60	7,0	11,0	9,0	M 6	12,0	29,16	63,29	0,680	0,820	0,820	0,89	2,88	BGXH25	FE
28	22,8	80	9,0	14,0	12,0	M 8	15,0	14,74	27,05	0,350	0,150	0,150	0,80	4,45	BGXH30	FS
28	22,8	80	9,0	14,0	12,0	M 8	15,0	29,73	54,57	0,707	0,551	0,551	1,10	4,45	BGXH30	FN
28	22,8	80	9,0	14,0	12,0	M 8	15,0	38,51	70,68	0,915	0,822	0,822	1,34	4,45	BGXH30	FL
28	22,8	80	9,0	14,0	12,0	M 8	15,0	42,87	86,71	1,123	1,338	1,338	1,66	4,45	BGXH30	FE
34	26,0	80	9,0	14,0	12,0	M 8	17,0	21,24	40,66	0,643	0,270	0,270	1,00	6,25	BGXH35	FS
34	26,0	80	9,0	14,0	12,0	M 8	17,0	43,37	81,12	1,283	0,973	0,973	1,50	6,25	BGXH35	FN
34	26,0	80	9,0	14,0	12,0	M 8	17,0	52,95	101,36	1,603	1,397	1,397	1,90	6,25	BGXH35	FL
34	26,0	80	9,0	14,0	12,0	M 8	17,0	58,26	125,30	1,982	2,287	2,287	2,54	6,25	BGXH35	FE
45	31,1	105	14,0	20,0	17,0	M 12	20,0	57,97	108,90	2,302	1,525	1,525	2,27	9,60	BGXH45	FN
45	31,1	105	14,0	20,0	17,0	M 12	20,0	68,95	129,54	2,738	2,123	2,123	2,68	9,60	BGXH45	FL
45	31,1	105	14,0	20,0	17,0	M 12	20,0	79,67	163,28	3,451	3,381	3,381	3,42	9,60	BGXH45	FE
53	38,0	120	16,0	23,0	20,0	M 14	24,0	69,81	133,42	3,306	2,306	2,306	3,44	13,80	BGXH55	FN
53	38,0	120	16,0	23,0	20,0	M 14	24,0	94,20	178,85	4,432	4,104	4,104	4,63	13,80	BGXH55	FL
53	38,0	120	16,0	23,0	20,0	M 14	24,0	127,70	253,62	6,279	6,462	6,462	5,16	13,80	BGXH55	FE

8.7 BGXS...F

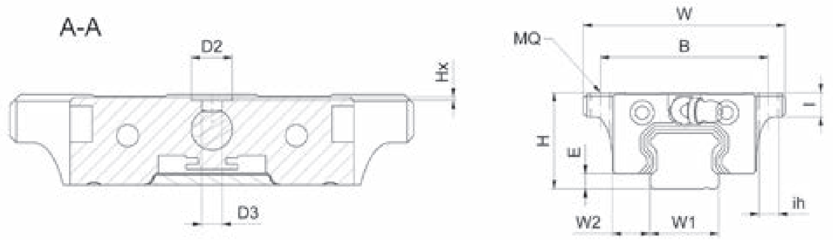
Profile rail guide without ball chain, carriage with flange, flat



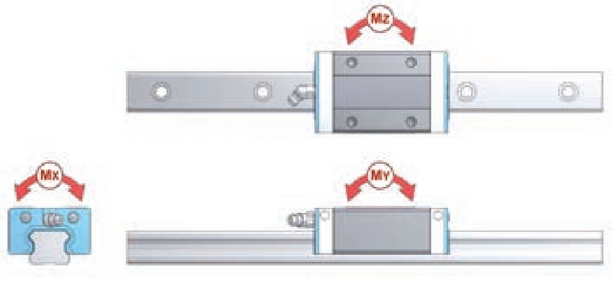
BGXS...FS (short)

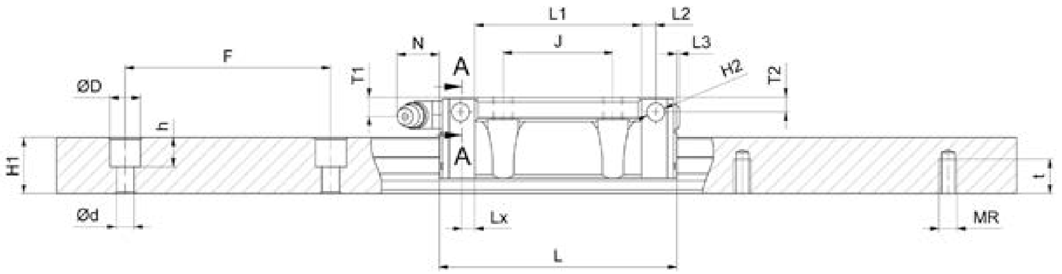


BGSX...FN, (standard)



	System mm					Carriage mm															
	H	W	W2	E	L	B	J	MQ	ih	I	L1	Oil H	T1	N	T2	L2	H2	Lx	Hx	D2	D3
BGXS15 FS	24	52	18,5	3,3	40,6	41	--	M 5	4,4	8,0	22,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXS15 FN	24	52	18,5	3,3	58,6	41	26	M 5	4,4	8,0	40,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXS20 FS	28	59	19,5	4,5	48,3	49	--	M 6	5,4	7,0	27,5	M 6 x 1,0	5,1	15,6	4,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXS20 FN	28	59	19,5	4,5	69,3	49	32	M 6	5,4	7,0	48,5	M 6 x 1,0	5,1	15,6	4,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXS25 FS	33	73	25,0	5,8	54,5	60	--	M 8	7,0	7,0	32,3	M 6 x 1,0	7,2	15,6	6,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXS25 FN	33	73	25,0	5,8	79,7	60	35	M 8	7,0	7,0	57,5	M 6 x 1,0	7,2	15,6	6,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0

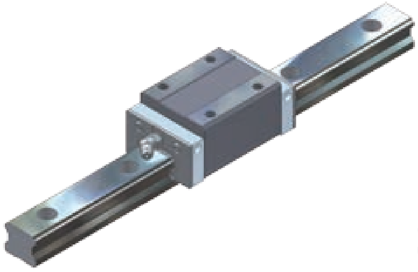




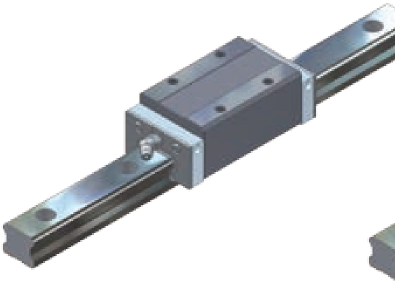
Rail [mm]								Load rating					Mass			
								kN		kNm			kg	kg/ m		
			Version L			Version C										
W1	H1	F	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail		
15	13	60	4,5	7,5	6,0	M 5	8,0	4,64	9,77	0,068	0,032	0,032	0,12	1,28	BGXS15	FS
15	13	60	4,5	7,5	6,0	M 5	8,0	9,33	19,62	0,135	0,118	0,118	0,19	1,28	BGXS15	FN
20	16,3	60	6,0	9,5	8,5	M 6	10,0	7,38	15,69	0,146	0,065	0,065	0,18	2,15	BGXS20	FS
20	16,3	60	6,0	9,5	8,5	M 6	10,0	14,35	30,50	0,285	0,221	0,221	0,31	2,15	BGXS20	FN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	10,29	21,00	0,226	0,101	0,101	0,33	2,88	BGXS25	FS
23	19,2	60	7,0	11,0	9,0	M 6	12,0	20,12	41,07	0,440	0,352	0,352	0,57	2,88	BGXS25	FN

8.8 BGXH…B

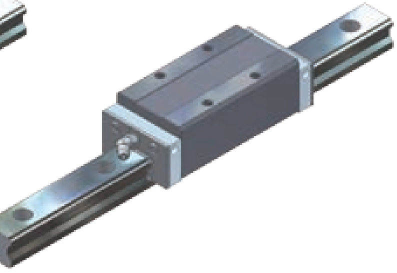
Profile rail guide without ball chain, carriages in block design, normal height



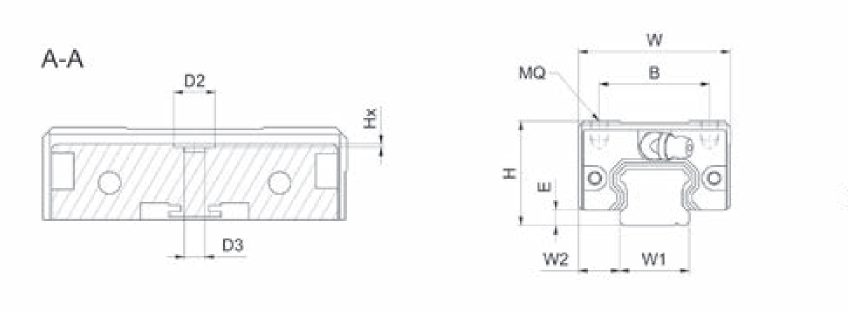
BGXH…BN, standard



BGXH…BL, long



BGXH…BE, extra long

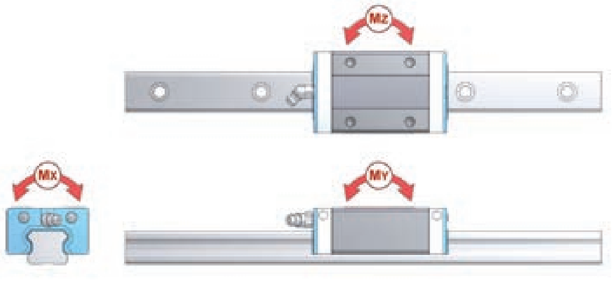


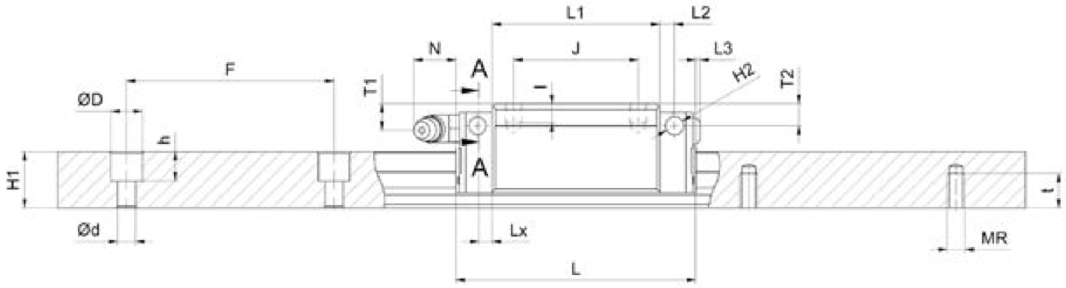
		System mm					Carriage mm														
		H	W	W2	E	L	B	J	MQ	I	L1	Oil H	T1	N	T2	L2	H2	Lx	Hx	D2	D3
BGXH15	BN	28	34	9,5	3,3	58,6	26	26	M 4	6,0	40,2	M 4 x 0,7	9,5	5,0	8,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXH15	BL	28	34	9,5	3,3	66,1	26	26	M 4	6,0	47,7	M 4 x 0,7	9,5	5,0	8,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXH15	BE	28	34	9,5	3,3	81,1	26	34	M 4	6,0	62,7	M 4 x 0,7	9,5	5,0	8,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXH20	BN	30	44	12,0	4,5	69,3	32	36	M 5	6,5	48,5	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXH20	BL	30	44	12,0	4,5	82,1	32	36	M 5	6,5	61,3	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXH20	BE	30	44	12,0	4,5	97,3	32	50	M 5	6,5	76,5	M 6 x 1,0	7,1	15,6	6,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXH25	BN	40	48	12,5	5,8	79,2	35	35	M 6	9,0	57,5	M 6 x 1,0	14,2	15,6	13,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXH25	BL	40	48	12,5	5,8	93,9	35	35	M 6	9,0	72,2	M 6 x 1,0	14,2	15,6	13,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXH25	BE	40	48	12,5	5,8	108,6	35	50	M 6	9,0	86,9	M 6 x 1,0	14,2	15,6	13,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXH30	BN	45	60	16,0	7,0	94,8	40	40	M 8	12,0	67,8	M 6 x 1,0	13,0	15,6	8,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH30	BL	45	60	16,0	7,0	105,0	40	40	M 8	12,0	78,0	M 6 x 1,0	13,0	15,6	8,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH30	BE	45	60	16,0	7,0	130,5	40	60	M 8	12,0	103,5	M 6 x 1,0	13,0	15,6	8,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH35	BN	55	70	18,0	7,5	111,5	50	50	M 8	12,0	80,5	M 6 x 1,0	18,5	15,6	13,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH35	BL	55	70	18,0	7,5	123,5	50	50	M 8	12,0	92,5	M 6 x 1,0	18,5	15,6	13,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH35	BE	55	70	18,0	7,5	153,5	50	72	M 8	12,0	122,5	M 6 x 1,0	18,5	15,6	13,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH45	BN	70	86	20,5	8,9	129,0	60	60	M 10	18,0	94,0	M 8 x 1,25	24,5	16,0	24,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXH45	BL	70	86	20,5	8,9	145,0	60	60	M 10	18,0	110,0	M 8 x 1,25	24,5	16,0	24,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXH45	BE	70	86	20,5	8,9	174,0	60	80	M 10	18,0	139,0	M 8 x 1,25	24,5	16,0	24,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXH55	BN	80	100	23,5	12,7	155,0	75	75	M 12	22,0	116,0	M 8 x 1,25	24,0	16,0	24,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH55	BL	80	100	23,5	12,7	193,0	75	75	M 12	22,0	154,0	M 8 x 1,25	24,0	16,0	24,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXH55	BE	80	100	23,5	12,7	210,0	75	95	M 12	22,0	171,0	M 8 x 1,25	24,0	16,0	24,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0

Example of order code

BGXH 25 BN 2 SS L 02000 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

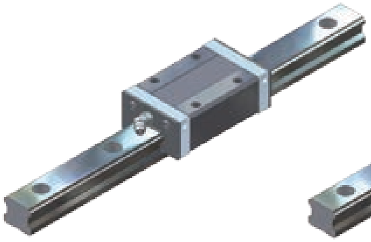


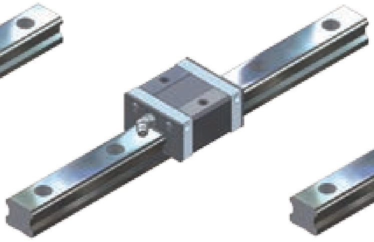


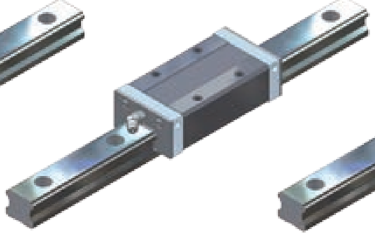
Rail [mm]								Load rating					Mass			
								kN		kNm			kg	kg/ m		
			Version L			Version C										
W1	H1	F	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail		
15	13,0	60	4,5	7,5	6,0	M 5	8,0	9,33	19,62	0,135	0,118	0,118	0,19	1,28	BGXH15	BN
15	13,0	60	4,5	7,5	6,0	M 5	8,0	11,23	23,72	0,164	0,169	0,169	0,23	1,28	BGXH15	BL
15	13,0	60	4,5	7,5	6,0	M 5	8,0	13,69	31,35	0,217	0,225	0,225	0,29	1,28	BGXH15	BE
20	16,3	60	6,0	9,5	8,5	M 6	10,0	14,35	30,50	0,285	0,221	0,221	0,31	2,15	BGXH20	BN
20	16,3	60	6,0	9,5	8,5	M 6	10,0	18,60	39,52	0,370	0,361	0,361	0,36	2,15	BGXH20	BL
20	16,3	60	6,0	9,5	8,5	M 6	10,0	22,11	48,88	0,457	0,557	0,557	0,47	2,15	BGXH20	BE
23	19,2	60	7,0	11,0	9,0	M 6	12,0	20,12	41,07	0,440	0,352	0,352	0,45	2,88	BGXH25	BN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	25,87	52,79	0,567	0,568	0,568	0,66	2,88	BGXH25	BL
23	19,2	60	7,0	11,0	9,0	M 6	12,0	29,16	63,29	0,680	0,820	0,820	0,80	2,88	BGXH25	BE
28	22,8	80	9,0	14,0	12,0	M 8	15,0	29,73	54,57	0,707	0,551	0,551	0,91	4,45	BGXH30	BN
28	22,8	80	9,0	14,0	12,0	M 8	15,0	38,51	70,68	0,915	0,822	0,822	1,04	4,45	BGXH30	BL
28	22,8	80	9,0	14,0	12,0	M 8	15,0	42,87	86,71	1,123	1,338	1,338	1,36	4,45	BGXH30	BE
34	26,0	80	9,0	14,0	12,0	M 8	17,0	42,40	81,12	1,283	0,973	0,973	1,50	6,25	BGXH35	BN
34	26,0	80	9,0	14,0	12,0	M 8	17,0	52,95	101,36	1,603	1,397	1,397	1,80	6,25	BGXH35	BL
34	26,0	80	9,0	14,0	12,0	M 8	17,0	58,26	125,30	1,982	2,287	2,287	2,34	6,25	BGXH35	BE
45	31,1	105	14,0	20,0	17,0	M 12	20,0	57,97	108,90	2,302	1,525	1,525	2,28	9,60	BGXH45	BN
45	31,1	105	14,0	20,0	17,0	M 12	20,0	68,95	129,54	2,738	2,123	2,123	2,67	9,60	BGXH45	BL
45	31,1	105	14,0	20,0	17,0	M 12	20,0	79,67	163,28	3,451	3,381	3,381	3,35	9,60	BGXH45	BE
53	38,0	120	16,0	23,0	20,0	M 14	24,0	69,81	133,42	3,306	2,306	2,306	3,42	13,80	BGXH55	BN
53	38,0	120	16,0	23,0	20,0	M 14	24,0	94,20	178,85	4,432	4,104	4,104	4,57	13,80	BGXH55	BL
53	38,0	120	16,0	23,0	20,0	M 14	24,0	127,70	253,62	6,284	6,462	6,462	5,08	13,80	BGXH55	BE

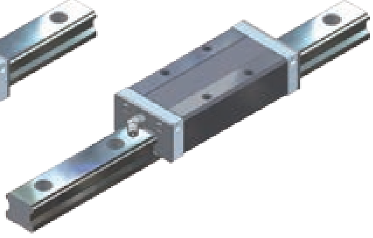
8.9 BGXS...B

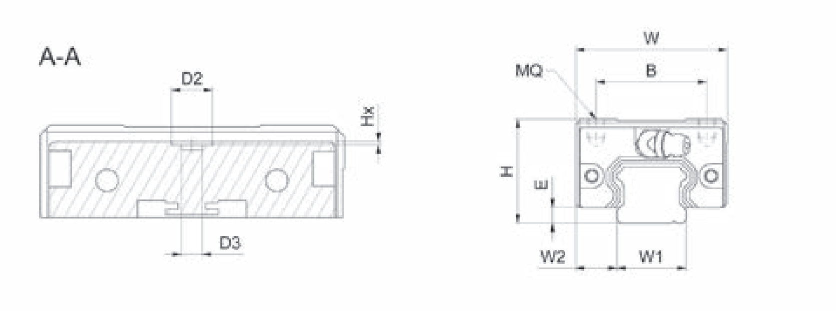
Profile rail guide without ball chain, carriages in block design, flat / medium height


BGXS…BN, standard


BGXS…BS, short


BGXS…BL, long


BGXS…BE, extra long

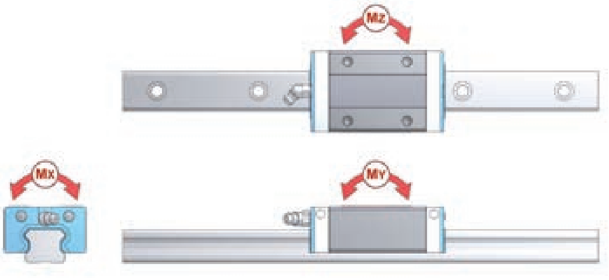


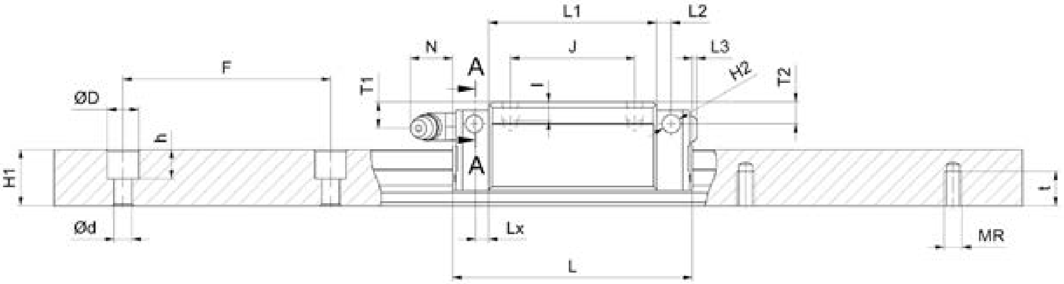
		System mm					Carriage mm														
		H	W	W2	E	L	B	J	MQ	I	L1	Oil H	T1	N	T2	L2	H2	Lx	Hx	D2	D3
BGXS15	BS	24	34	9,5	3,3	40,6	26	--	M 4	4,8	22,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXS15	BN	24	34	9,5	3,3	58,6	26	26	M 4	4,8	40,2	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXS15	BL	24	34	9,5	3,3	66,1	26	26	M 4	4,8	47,7	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXS15	BE	24	34	9,5	3,3	81,1	26	34	M 4	4,8	62,7	M 4 x 0,7	5,5	5,0	4,5	4,2	Ø 3,0	3,35	0,5	Ø 5,0	Ø 3,0
BGXS20	BS	28	42	11,0	4,5	48,3	32	--	M 5	5,5	27,5	M 6 x 1,0	5,1	15,6	4,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXS20	BN	28	42	11,0	4,5	69,3	32	32	M 5	6,5	48,5	M 6 x 1,0	7,1	15,6	4,3	4,25	Ø 5,3	3,80	0,5	Ø 6,0	Ø 3,0
BGXS25	BS	33	48	12,5	5,8	54,0	35	--	M 6	6,8	32,3	M 6 x 1,0	7,2	15,6	6,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXS25	BN	33	48	12,5	5,8	79,2	35	35	M 6	6,8	57,5	M 6 x 1,0	7,2	15,6	6,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXX25	BN	36	48	12,5	5,8	79,2	35	35	M 6	9,0	57,5	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXX25	BL	36	48	12,5	5,8	93,9	35	35	M 6	9,0	72,2	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXX25	BE	36	48	12,5	5,8	108,6	35	50	M 6	9,0	86,9	M 6 x 1,0	10,2	15,6	9,4	4,65	Ø 5,3	4,00	0,5	Ø 6,0	Ø 3,0
BGXS30	BS	42	60	16,0	7,0	64,2	40	--	M 8	10,0	37,2	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS30	BN	42	60	16,0	7,0	94,8	40	40	M 8	10,0	67,8	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS30	BL	42	60	16,0	7,0	105,0	40	40	M 8	10,0	78,0	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	v 3,0
BGXS30	BE	42	60	16,0	7,0	130,5	40	60	M 8	10,0	103,5	M 6 x 1,0	10,0	15,6	5,5	6,0	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS35	BS	48	70	18,0	7,5	75,5	50	--	M 8	10,0	44,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS35	BN	48	70	18,0	7,5	111,5	50	50	M 8	10,0	80,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS35	BL	48	70	18,0	7,5	123,5	50	50	M 8	10,0	92,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS35	BE	48	70	18,0	7,5	153,5	50	72	M 8	10,0	122,5	M 6 x 1,0	11,5	16,0	10,5	7,25	Ø 5,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS45	BN	60	86	20,5	8,9	129,0	60	60	M 10	15,5	94,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXS45	BL	60	86	20,5	8,9	145,0	60	60	M 10	15,5	110,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXS45	BE	60	86	20,5	8,9	174,0	60	80	M 10	15,5	139,0	M 8 x 1,25	14,4	16,0	14,5	8,0	Ø 6,8	4,00	0,5	Ø 6,0	Ø 3,0
BGXS55	BN	70	100	23,5	12,7	155,0	75	75	M 12	22,0	116,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS55	BL	70	100	23,5	12,7	193,0	75	75	M 12	22,0	154,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0
BGXS55	BE	70	100	23,5	12,7	210,0	75	95	M 12	22,0	171,0	M 8 x 1,25	14,0	16,0	14,5	10,0	Ø 7,0	4,00	0,5	Ø 6,0	Ø 3,0

Example of order code

BGXS 25 BN 2 SS L 02000 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

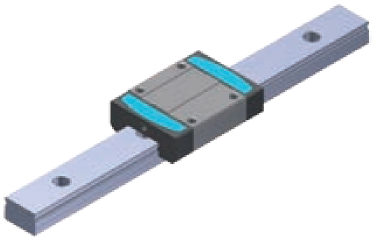




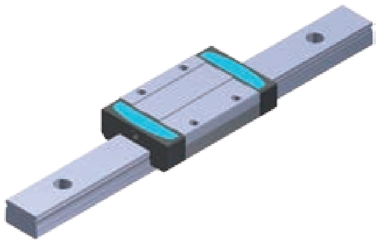
Rail [mm]								Load rating					Mass			
								kN		kNm			kg	kg/ m		
			Version L			Version C										
W1	H1	F	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail		
15	13,0	60	4,5	7,5	6,0	M 5	8,0	4,64	9,77	0,068	0,032	0,032	0,10	1,28	BGXS15	BS
15	13,0	60	4,5	7,5	6,0	M 5	8,0	9,33	19,62	0,135	0,118	0,118	0,17	1,28	BGXS15	BN
15	13,0	60	4,5	7,5	6,0	M 5	8,0	11,23	23,72	0,164	0,169	0,169	0,18	1,28	BGXS15	BL
15	13,0	60	4,5	7,5	6,0	M 5	8,0	13,69	31,35	0,217	0,293	0,293	0,22	1,28	BGXS15	BE
20	16,3	60	6,0	9,5	8,5	M 6	10,0	7,38	15,69	0,146	0,065	0,065	0,17	2,15	BGXS20	BS
20	16,3	60	6,0	9,5	8,5	M 6	10,0	14,35	30,50	0,285	0,221	0,221	0,26	2,15	BGXS20	BN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	10,29	21,00	0,226	0,101	0,101	0,21	2,88	BGXS25	BS
23	19,2	60	7,0	11,0	9,0	M 6	12,0	20,12	41,07	0,440	0,352	0,352	0,38	2,88	BGXS25	BN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	20,12	41,07	0,440	0,352	0,352	0,40	2,88	BGXX25	BN
23	19,2	60	7,0	11,0	9,0	M 6	12,0	25,87	52,79	0,567	0,568	0,568	0,54	2,88	BGXX25	BL
23	19,2	60	7,0	11,0	9,0	M 6	12,0	29,16	63,29	0,680	0,820	0,820	0,67	2,88	BGXX25	BE
28	22,8	80	9,0	14,0	12,0	M 8	15,0	14,74	27,05	0,350	0,150	0,150	0,50	4,45	BGXS30	BS
28	22,8	80	9,0	14,0	12,0	M 8	15,0	29,73	54,57	0,707	0,551	0,551	0,80	4,45	BGXS30	BN
28	22,8	80	9,0	14,0	12,0	M 8	15,0	38,51	70,68	0,915	0,822	0,822	0,94	4,45	BGXS30	BL
28	22,8	80	9,0	14,0	12,0	M 8	15,0	42,87	86,71	1,123	1,338	1,338	1,16	4,45	BGXS30	BE
34	26,0	80	9,0	14,0	12,0	M 8	17,0	21,24	40,66	0,643	0,270	0,270	0,80	6,25	BGXS35	BS
34	26,0	80	9,0	14,0	12,0	M 8	17,0	43,37	81,12	1,283	0,973	0,973	1,20	6,25	BGXS35	BN
34	26,0	80	9,0	14,0	12,0	M 8	17,0	52,95	101,36	1,603	1,397	1,397	1,40	6,25	BGXS35	BL
34	26,0	80	9,0	14,0	12,0	M 8	17,0	58,26	125,30	1,982	2,287	2,287	1,84	6,25	BGXS35	BE
45	31,1	105	14,0	20,0	17,0	M 12	20,0	57,97	108,90	2,302	1,525	1,525	1,64	9,60	BGXS45	BN
45	31,1	105	14,0	20,0	17,0	M 12	20,0	68,95	129,54	2,738	2,123	2,123	1,93	9,60	BGXS45	BL
45	31,1	105	14,0	20,0	17,0	M 12	20,0	79,67	163,28	3,451	3,381	3,381	2,42	9,60	BGXS45	BE
53	38,0	120	16,0	23,0	20,0	M 14	24,0	69,81	133,42	3,306	2,306	2,306	3,67	13,80	BGXS55	BN
53	38,0	120	16,0	23,0	20,0	M 14	24,0	94,20	178,85	4,432	4,104	4,104	3,57	13,80	BGXS55	BL
53	38,0	120	16,0	23,0	20,0	M 14	24,0	127,70	253,62	6,279	6,462	6,462	3,97	13,80	BGXS55	BE

8.10 MBC…S

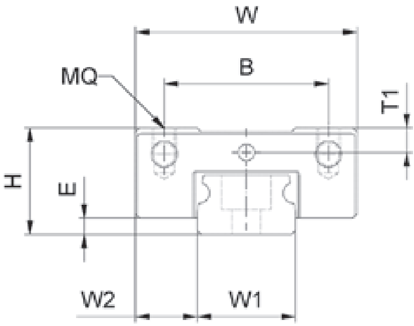
Miniature profile rail guide with ball chain narrow version



MBC…SN, narrow version, standard



MBC…SL, narrow version, long

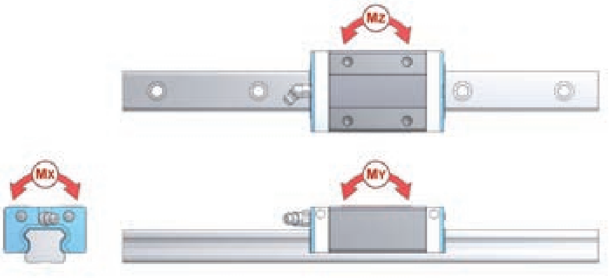


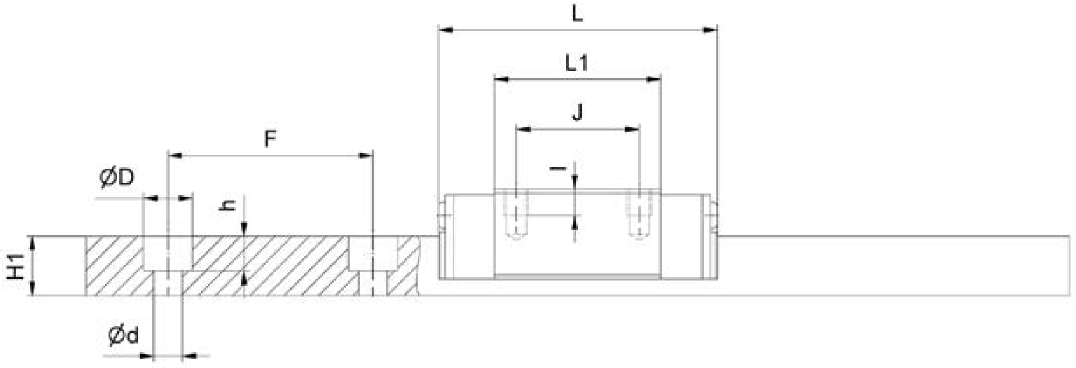
		System mm					Carriage mm							
		H	W	W2	E	L	B	J	MQ	I	L1	Oil H	T1	N
MBC09	SN	10	20	5,5	2,2	30,8	15	10	M 3	2,8	19,5	Ø 1,5	2,4	--
MBC09	SL	10	20	5,5	2,2	40,5	15	16	M 3	2,8	29,2	Ø 1,5	2,4	--
MBC12	SN	13	27	7,5	2,0	34,0	20	15	M 3	3,2	20,3	Ø 2,0	3,0	--
MBC12	SL	13	27	7,5	2,0	47,0	20	20	M 3	3,2	33,3	Ø 2,0	3,0	--
MBC15	SN	16	32	8,5	4,0	42,0	25	20	M 3	3,5	25,3	M 3	3,5	5
MBC15	SL	16	32	8,5	4,0	59,8	25	25	M 3	3,5	43,1	M 3	3,5	5

Example of order code

MBC 12 SN 2 UU L 00195 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

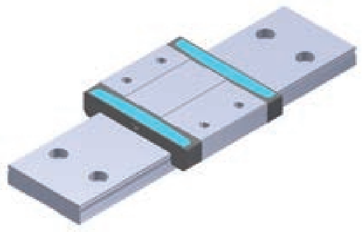




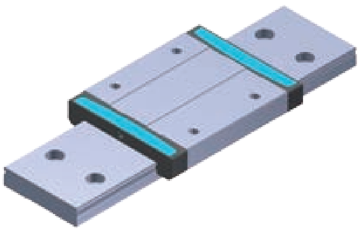
Rail [mm]									Load rating					Mass		
									kN		kNm			kg	kg/ m	
				Version L			Version C									
W1	H1	F	WH	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail	
9	6,05	20	--	3,5	6,0	3,30	--	--	2,65	2,26	0,0104	0,0083	0,0083	0,014	0,39	MBC09 SN
9	6,05	20	--	3,5	6,0	3,30	--	--	3,43	3,24	0,0147	0,0167	0,0167	0,020	0,39	MBC09 SL
12	7,25	25	--	3,5	6,0	4,30	--	--	3,92	3,42	0,0225	0,0117	0,0117	0,029	0,63	MBC12 SN
12	7,25	25	--	3,5	6,0	4,30	--	--	5,59	5,15	0,0333	0,0275	0,0275	0,047	0,63	MBC12 SL
15	9,50	40	--	3,5	6,0	4,50	--	--	6,52	5,59	0,0392	0,0255	0,0255	0,047	1,05	MBC15 SN
15	9,50	40	--	3,5	6,0	4,50	--	--	8,83	7,85	0,0549	0,0539	0,0539	0,078	1,05	MBC15 SL

8.11 MBC…W

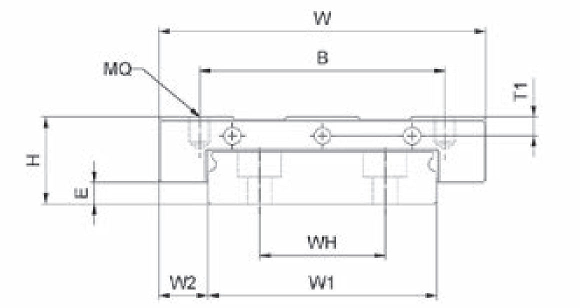
Miniature profile rail guide with ball chain wide version



MBC…WN, wide version, standard



MBC…WL, wide version, long

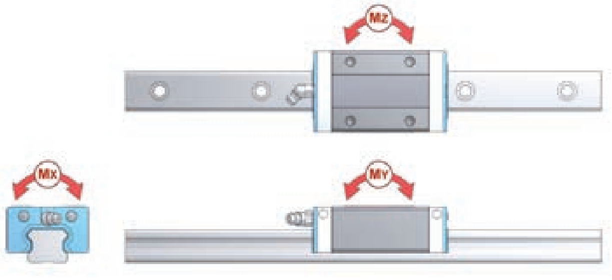


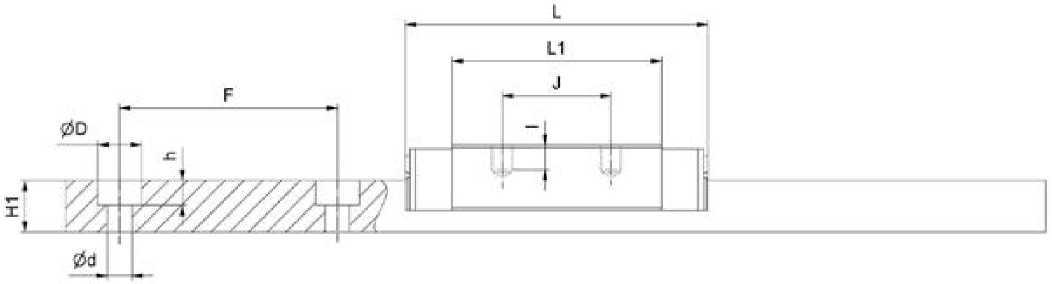
	System mm					Carriage mm							
	H	W	W2	E	L	B	J	MQ	I	L1	Oil H	T1	N
MBC09 WN	12	30	6,0	3,4	39,0	21	12	M 3	2,8	26,7	Ø 1,5	2,3	--
MBC09 WL	12	30	6,0	3,4	51,0	23	24	M 3	2,8	38,7	Ø 1,5	2,3	--
MBC12 WN	14	40	8,0	3,8	44,5	28	15	M 3	3,5	30,5	Ø 2,0	3,0	--
MBC12 WL	14	40	8,0	3,8	59,1	28	28	M 3	3,5	45,1	Ø 2,0	3,0	--
MBC15 WN	16	60	9,0	4,0	55,5	45	20	M 4	4,5	38,1	M 3	3,5	5
MBC15 WL	16	60	9,0	4,0	74,7	45	35	M 4	4,5	57,3	M 3	3,5	5

Example of order code

MBC 12 WN 2 UU L 00195 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

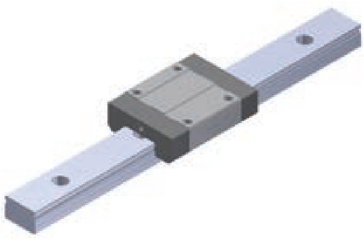




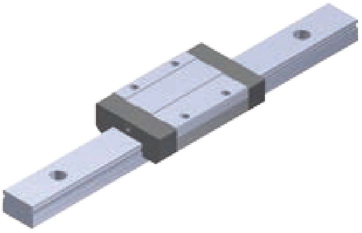
Rail [mm]									Load rating					Mass		
									kN		kNm			kg	kg/ m	
				Version L			Version C									
W1	H1	F	WH	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail	
18	7,50	30	--	3,5	6,0	4,50	--	--	3,19	3,24	0,0306	0,0147	0,0147	0,030	0,98	MBC09 WN
18	7,50	30	--	3,5	6,0	4,50	--	--	4,27	4,22	0,0402	0,0270	0,0270	0,042	0,98	MBC09 WL
24	8,70	40	--	4,5	8,0	4,50	--	--	5,34	5,20	0,0647	0,0257	0,0257	0,029	1,53	MBC12 WN
24	8,70	40	--	4,5	8,0	4,50	--	--	7,01	6,91	0,0863	0,0476	0,0476	0,076	1,53	MBC12 WL
42	9,50	40	23	4,5	8,0	4,50	--	--	8,92	8,38	0,1716	0,0500	0,0500	0,111	2,97	MBC15 WN
42	9,50	40	23	4,5	8,0	4,50	--	--	11,18	10,79	0,2207	0,0956	0,0956	0,165	2,97	MBC15 WL

8.12 MBX…S

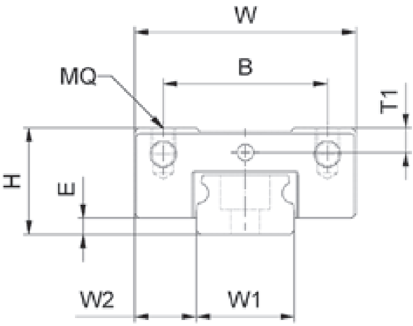
Miniature profile rail guide without ball chain narrow version



MBX…SN, narrow version, standard



MBX…SL, narrow version, long

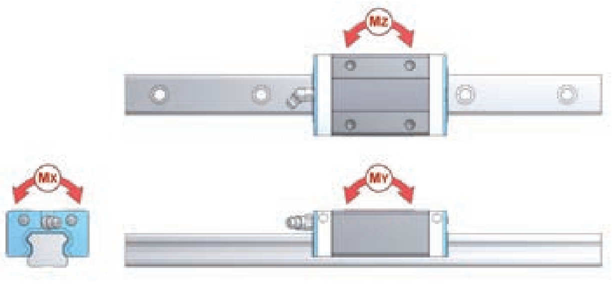


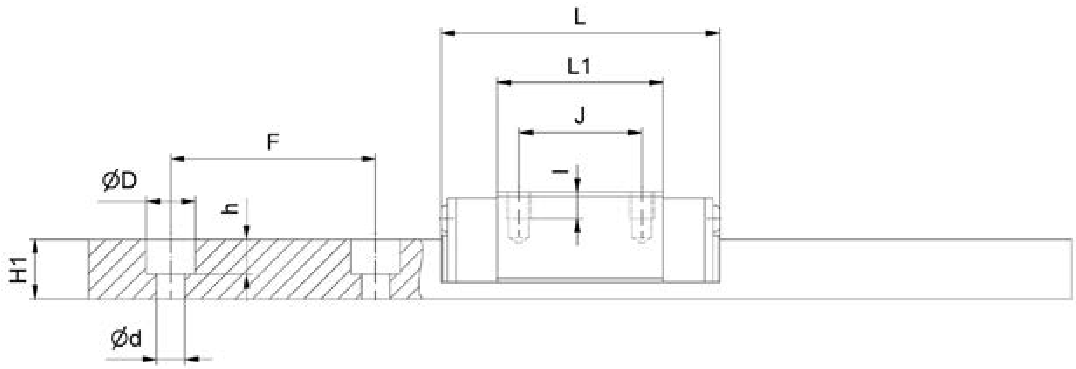
		System mm					Carriage mm							
		H	W	W2	E	L	B	J	MQ	I	L1	Oil H	T1	N
MBX09	SN	10	20	5,5	2,2	30,8	15	10	M 3	2,8	19,5	Ø 1,5	2,4	--
MBX09	SL	10	20	5,5	2,2	40,5	15	16	M 3	2,8	29,2	Ø 1,5	2,4	--
MBX12	SN	13	27	7,5	2,0	34,0	20	15	M 3	3,2	20,3	Ø 2,0	3,0	--
MBX12	SL	13	27	7,5	2,0	47,0	20	20	M 3	3,2	33,3	Ø 2,0	3,0	--
MBX15	SN	16	32	8,5	4,0	42,0	25	20	M 3	3,5	25,3	M 3	3,5	5
MBX15	SL	16	32	8,5	4,0	59,8	25	25	M 3	3,5	43,1	M 3	3,5	5

Example of order code

MBX 12 SN 2 UU L 00195 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*

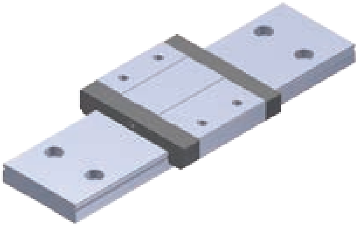




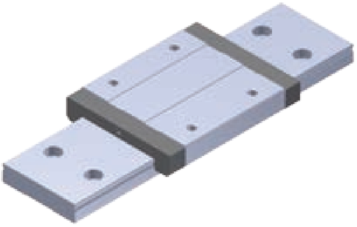
Rail									Load rating					Mass		
[mm]									kN		kNm			kg	kg/ m	
				Version L			Version C									
W1	H1	F	WH	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail	
9	6,05	20	--	3,5	6,0	3,30	--	--	2,01	2,26	0,0104	0,0083	0,0083	0,014	0,39	MBX09 SN
9	6,05	20	--	3,5	6,0	3,30	--	--	2,75	3,24	0,0147	0,0167	0,0167	0,020	0,39	MBX09 SL
12	7,25	25	--	3,5	6,0	4,30	--	--	3,29	3,42	0,0225	0,0117	0,0117	0,029	0,63	MBX12 SN
12	7,25	25	--	3,5	6,0	4,30	--	--	4,41	5,15	0,0333	0,0275	0,0275	0,047	0,63	MBX12 SL
15	9,50	40	--	3,5	6,0	4,50	--	--	5,44	5,59	0,0392	0,0255	0,0255	0,047	1,05	MBX15 SN
15	9,50	40	--	3,5	6,0	4,50	--	--	7,16	7,85	0,0549	0,0539	0,0539	0,078	1,05	MBX15 SL

8.13 MBX…W

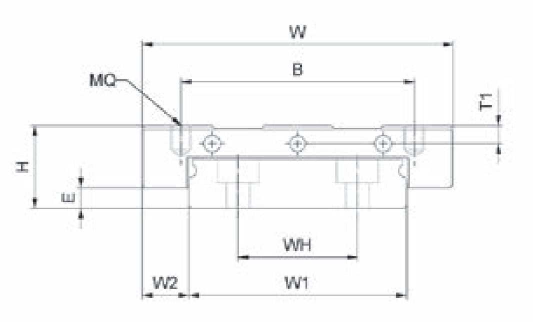
Miniature profile rail guide without ball chain, broad version



MBX…WN, wide version, standard



MBX…WL, wide version, long

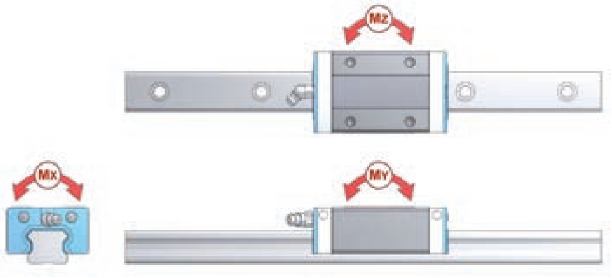


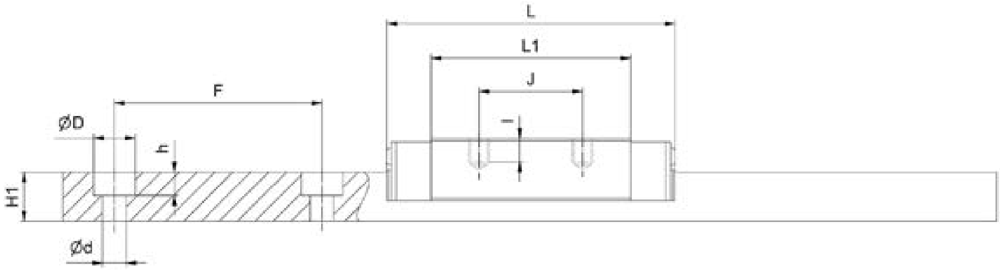
		System mm					Carriage mm							
		H	W	W2	E	L	B	J	MQ	I	L1	Oil H	T1	N
MBX09	WN	12	30	6,0	3,4	39,0	21	12	M 3	2,8	26,7	Ø 1,5	2,3	--
MBX09	WL	12	30	6,0	3,4	51,0	23	24	M 3	2,8	38,7	Ø 1,5	2,3	--
MBX12	WN	14	40	8,0	3,8	44,5	28	15	M 3	3,5	30,5	Ø 2,0	3,0	--
MBX12	WL	14	40	8,0	3,8	59,1	28	28	M 3	3,5	45,1	Ø 2,0	3,0	--
MBX15	WN	16	60	9,0	4,0	55,5	45	20	M 4	4,5	38,1	M 3	3,5	5
MBX15	WL	16	60	9,0	4,0	74,7	45	35	M 4	4,5	57,3	M 3	3,5	5

Example of order code

MBX 12 WN 2 UU L 00195 N Z1 II -0 0 -00000 -00*

**Explanation to type code in Chapter 7*





Rail [mm]									Load rating					Mass		
									kN		kNm			kg	kg/ m	
				Version L			Version C									
W1	H1	F	WH	d	D	h	MR	t	C	C0	MX	MY	MZ	Carriage	Rail	
18	7,50	30	--	3,5	6,0	4,50	--	--	2,60	3,24	0,0306	0,0147	0,0147	0,030	0,98	MBX09 WN
18	7,50	30	--	3,5	6,0	4,50	--	--	3,33	4,22	0,0402	0,0270	0,0270	0,042	0,98	MBX09 WL
24	8,70	40	--	4,5	8,0	4,50	--	--	4,31	5,20	0,0647	0,0257	0,0257	0,052	1,53	MBX12 WN
24	8,70	40	--	4,5	8,0	4,50	--	--	5,59	6,91	0,0863	0,0476	0,0476	0,076	1,53	MBX12 WL
42	9,50	40	23	4,5	8,0	4,50	--	--	7,40	8,38	0,1716	0,0500	0,0500	0,111	2,97	MBX15 WN
42	9,50	40	23	4,5	8,0	4,50	--	--	8,92	10,79	0,2207	0,0956	0,0956	0,165	2,97	MBX15 WL

8.14 Standard lengths of NTN-SNR profile rail guides

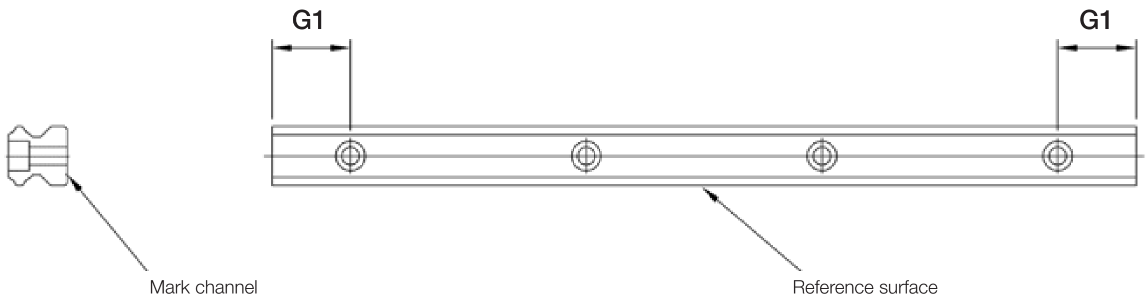
NTN-SNR profile rail guides are produced in standard lengths. Table 8.1 shows the standard length as a function of the design size.

Table 8.1 Standard length of NTN-SNR profile rails

Design size	BGC… / BGX…							MBC…S / MBX…S			MBC…W / MBX…W		
	15	20	25	30	35	45	55	09	12	15	09	12	15
Standard lengths	160	160	160	280	280	360	420	55	70	70	50	70	70
	220	220	220	360	360	465	540	75	95	110	80	110	110
	280	280	280	440	440	570	660	95	120	150	110	150	150
	340	340	340	520	520	675	780	115	145	190	140	190	190
	400	400	400	600	600	780	900	135	170	230	170	230	230
	460	460	460	680	680	885	1020	155	195	270	200	270	270
	520	520	520	760	760	990	1140	175	220	310	230	310	310
	580	580	580	840	840	1095	1260	195	245	350	260	350	350
	640	640	640	920	920	1200	1380	235	270	390	290	390	390
	700	700	700	1000	1000	1305	1500	275	295	430	320	430	430
	760	760	760	1080	1080	1410	1620	315	345	470	380	470	470
	820	820	820	1160	1160	1515	1740	355	395	510	440	550	550
	880	880	880	1240	1240	1620	1860	395	445	550	500	630	630
	940	940	940	1320	1320	1725	1980	435	495	590	560	710	710
	1000	1000	1000	1400	1400	1830	2100	475	545	630	620	790	790
	1060	1060	1060	1480	1480	1935	2220	555	595	670	680	870	870
	1120	1120	1120	1560	1560	2040	2340	635	645	750	740	950	950
	1180	1180	1180	1640	1640	2145	2460	715	695	830	800	1030	1030
	1240	1240	1240	1720	1720	2250	2580	795	745	910	860	1110	1110
	1300	1300	1300	1800	1800	2355	2700	875	795	990	920	1190	1190
	1360	1360	1360	1880	1880	2460	2820	955	845	1070		1270	1270
	1420	1420	1420	1960	1960	2565	2940		945	1150		1350	1350
	1480	1480	1480	2040	2040	2670	3060		995	1230		1430	1430
	1540	1540	1540	2200	2200	2775	3180		1095	1310			
	1600	1600	1600	2360	2360	2880	3300		1195	1390			
	1720	1720	1720	2520	2520	2985	3420		1295				
	1840	1840	1840	2680	2680	3090	3540		1395				
	1960	1960	1960	2840	2840	3195	3660						
	2080	2080	2080	3000	3000	3300	3780						
	2200	2200	2200	3160	3160	3405							
	2320	2320	2320	3320	3320	3510							
	2440	2440	2440	3480	3480	3615							
	2560	2560	2560	3640	3640	3720							
	2680	2680	2680	3800	3800	3825							
	2800	2800	2800										
	2920	2920	2920										
	3040	3040	3040										
	3280	3280	3280										
	3520	3520	3520										
	3760	3760	3760										
Max. length	4000							2000			2000		
F	60	60	60	80	80	105	120	20	25	40	30	40	40
G1 = G2	20	20	20	20	20	22,5	30	7,5	10	15	10	15	15

Specification of dimensions G1 and G2 is required to determine the position of the first and the last hole in the rail when no standard lengths are used or rails with asymmetrical hole pattern are used. Figure 8.1 shows the definition of the position of dimensions G1 and G2.

Suffixes: without / -III



Suffixes: -II / -IV

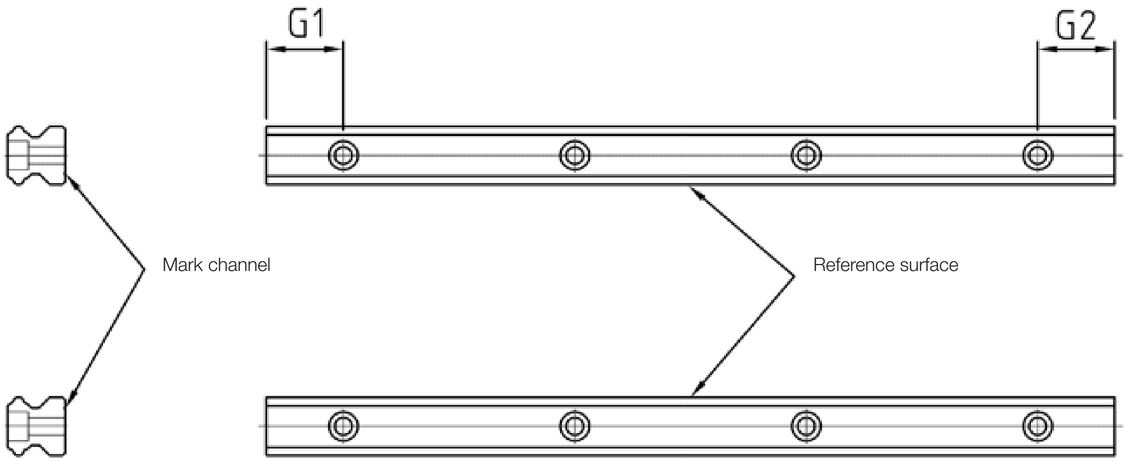


Figure 8.1 Position of dimensions G1, G2 and F

The following versions of profile rail guide systems can be ordered:

- Single-segment guide rail in standard length
- Single-segment guide rail in special length, symmetrical (G1=G2)
- Single-segment guide rail in special length, asymmetrical (G1≠G2: G1=…, G2=….)
- Arbitrarily segmented guide rail (G1=G2). Guide rails with a length that exceeds the specified maximum standard length for guide rails delivered in several sections with joints (see Chapter 3.2). The number of sections is defined by NTN-SNR.
- Segmented guide rail according to customer specifications. The number of sections is determined by customer specifications. The total length of the guide rail must be specified when two or several guide rail segments with joints are ordered.

9. Guide to queries

Date ______________________________
Offer valid until _______________________

Company ___________________________________
City ______________________________________ Address ____________________________
Contact person _______________________________
Phone ____________________________________ Fax _______________________________
Mail ______________________________________

Project description

☐ Once-off requirement Number of items ____ Preferred date _______________________
☐ Series requirement Items/year ________ Preferred date for number of items ______CW

☐ New design ☐ Technical upgrade ☐ Cost reduction

System description

Number of parallel guide rails ____________________
Distance of the (outer) rails: ______________________ from 4 rails onwards,
distance of the inner rails: ________________

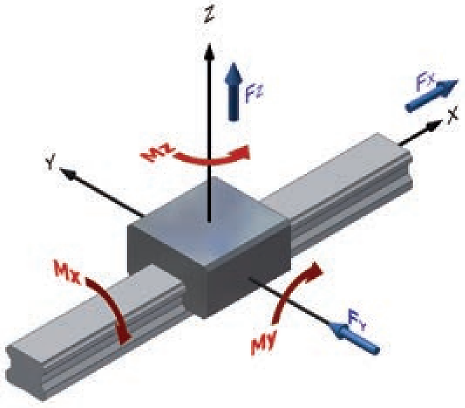
Number of carriages: ___________________________
Distance of the (outer) carriages: __________________ from 4 carriages: onwards,
distance of the inner carriages: ____________

Position of the drive: _______________across (y) [mm] vertical (z) [mm] ______________________
Installation position: _________ Longitudinal incline g [°] Cross incline [°]_____________________
Installation surface: __________ machined: _________ unmachined: _________________________
For permanent temperature ____________________ °C
Stroke [mm]: ___________________________________
Cycle time [s]: _________________________________

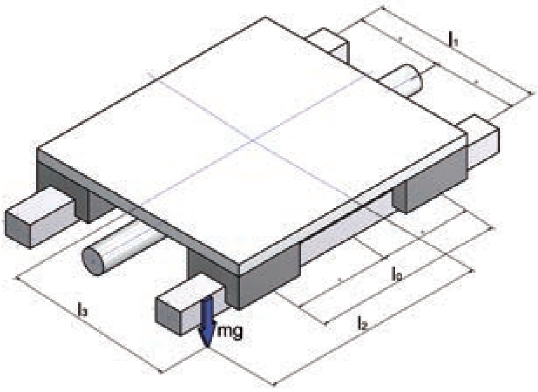
Movement velocity [m/min]: ______________________ Optional movement time [s]:
Acceleration [m/s]: ____________________________ Acceleration at emergency stop [m/s^2]

Desired service life time: _________________________ Cycles or ________ km or _________hours

Coordinate system



Position of the loads



Loads

Axis description ________________________________

Load		longitudinal [mm]		horizontal [mm]	vertical [mm]	Travel percentage	Comments
Centre of gravity	[kg]	xmax	xmin	y	z	[%]	
m1							
m2							
m3							
m4							
m5							
External force		longitudinal [mm]		horizontal [mm]	vertical [mm]	Travel percentage	Comments
Point of action	[N]	xmax	xmin	y	z	[%]	
Fx		omitted					
Fy				omitted			
Fz					omitted		

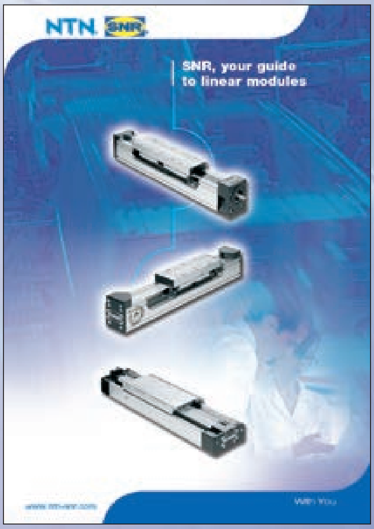
Drawing:

10. Index

Notes

Additional catalogue documentation

More information concerning our NTN-SNR products for linear motion is provided in our catalogues.



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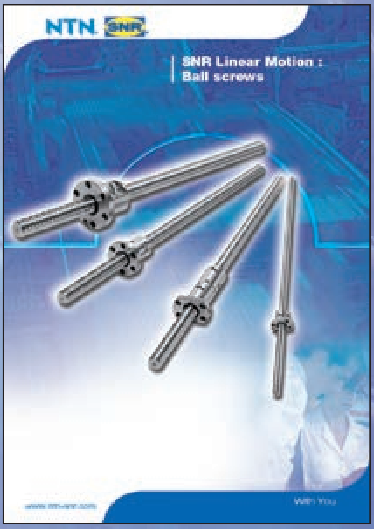

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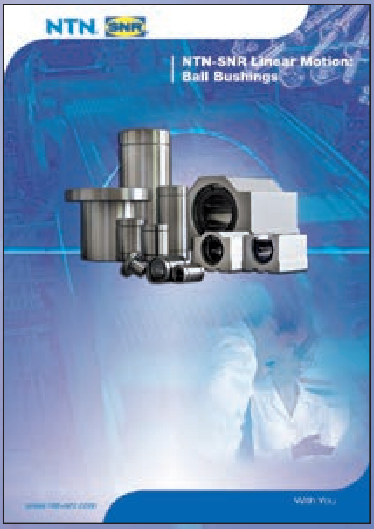

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