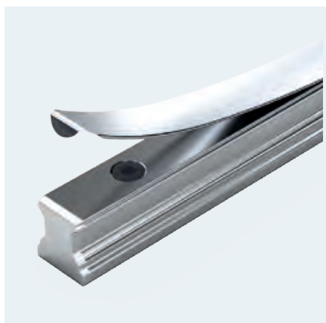
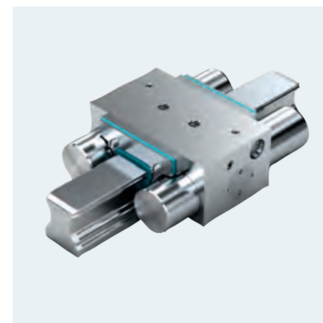
The Drive & Control Company

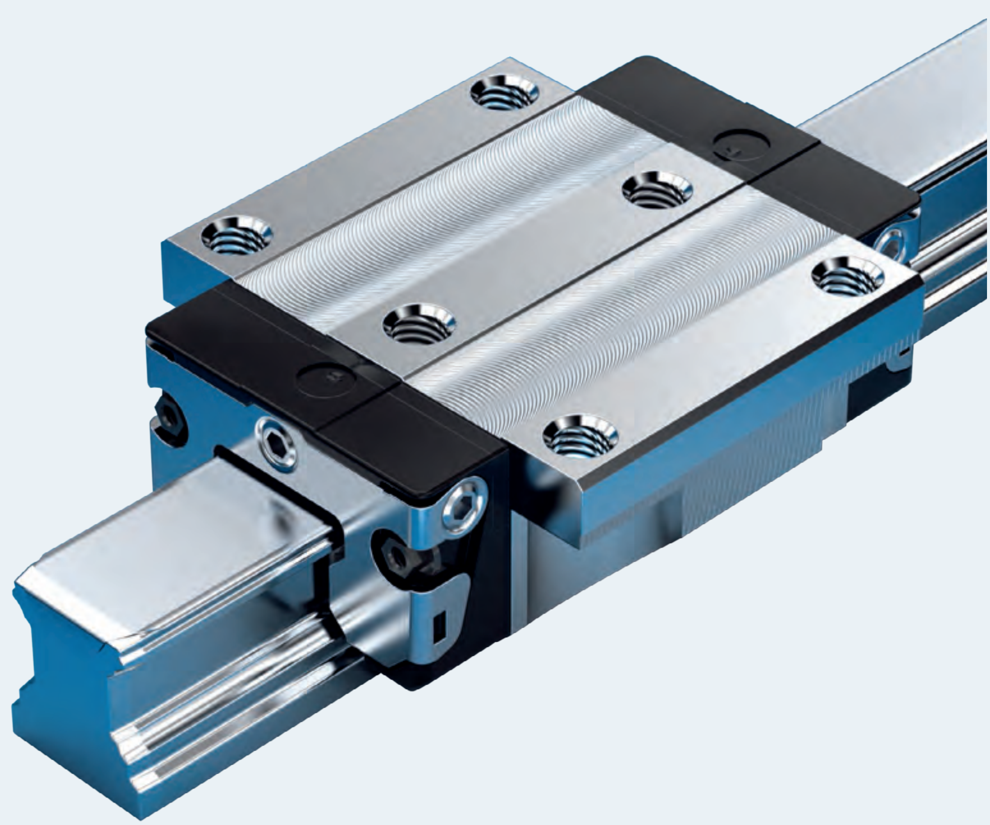
Rexroth
Bosch Group

Ball rail systems

Ball runner blocks, ball rails, accessories





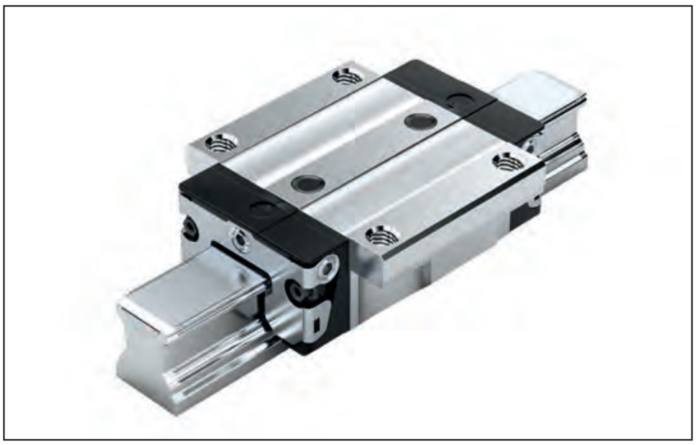


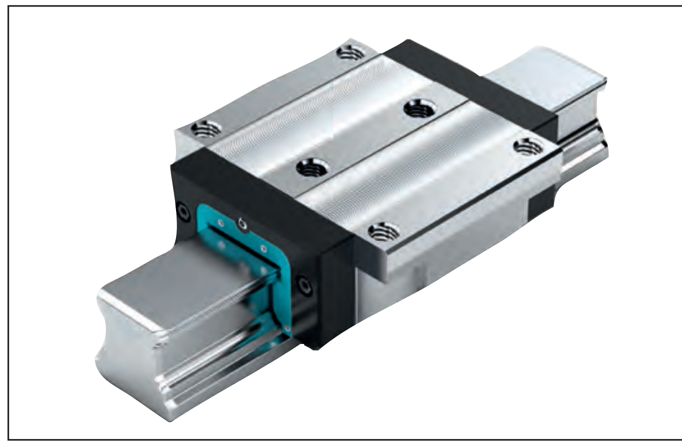
Printed catalogs are available from the end of February 2015

New features at a glance

High-precision steel ball runner blocks BSHP

- High-precision steel ball runner blocks BSHP have been given the patented entry zone that makes it possible to adapt to the current operating load on an individual basis.
- This technology minimizes fluctuations in frictional force and improves travel accuracy compared to conventional ball rail systems.
- Enhanced load capacities and load moments
- BSHP high-precision ball runner blocks are available in all sizes and accuracy classes[1].

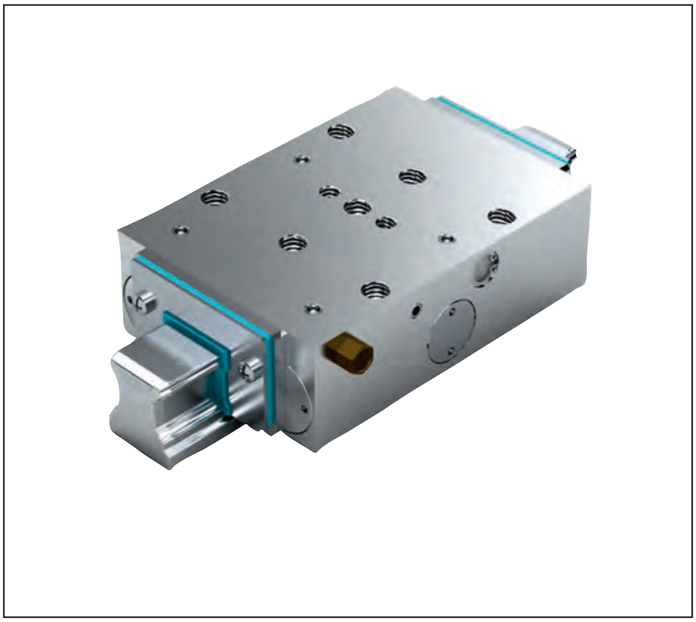




1) Available from June 2, 2014 with date of production of FD 45402. Serial numbers indicate a later date of production.
Example: FD 45514 for a date of production of July 14, 2014. (Can be seen on the packaging and ball runner block)

Pneumatic clamping and braking elements UBPS also in sizes 45 and 55:

- Very high axial holding forces of up to 7,700 N at a release pressure of 5.5 bar with high level of spring energy storage.
- Compact design, compatible with DIN 645



Product description

Characteristic features

With interchangeable elements ex store, you can combine complete guide units yourself ...

At Rexroth, we manufacture ball guide rails and ball runner blocks in ball raceways in particular so precisely that it is possible to interchange each individual element at any time. This means that you can combine them in any way you like within each accuracy class.

As a result, you have top level logistics that are unique. Each element can be individually ordered and separately stocked. Both sides of the guide rail can be used as reference edges.

Highlights

- The same high load capacities in all four main directions of loading
- Very low noise level and best travel performance
- Excellent dynamic characteristics:
  Speed: v_{max} to 10 m/s
  Acceleration: a_{max} = 500 m/s^2
- Long-term lubrication over several years possible
- Minimum quantity lubrication system with integrated reservoir for oil lubrication[1)]
- Lube ports with metal thread on all sides[1)]
- Limitless interchangeability; all guide rail versions can be combined with all runner block versions
- Optimum system rigidity through preloaded O-arrangement
- Optimum installation error compensation with Super ball runner block
- 60 % weight saving with aluminum ball runner block (compared to the steel version)

1) Type-dependent

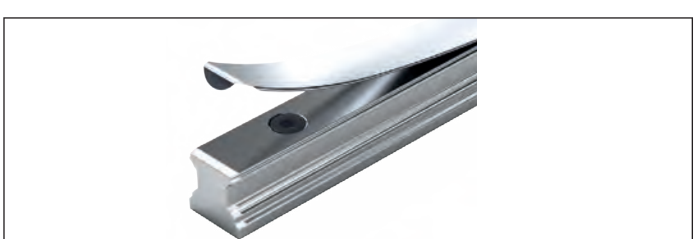
Abbreviation of the formats of all available ball runner blocks and ball guide rails

FNS = Flange, normal, standard height
FLS = Flange long standard height
FKS = Flange, short, standard height
FNN = Flange, normal, low profile
FKN = Flange, short, low profile

SNS = Slimline, normal, standard height
SLS = Slimline, long, standard height
SKS = Slimline, short, standard height
SNH = Slimline, normal, high
SLH = Slimline, long, high
SNN = Slimline, normal, low profile
SKN = Slimline, short, low profile
SNO = Slimline normal no base groove

BNS = Wide, normal, standard height
CNS = Compact, normal, standard height

2) For each ball runner block and ball guide rail type, any design styles that are not available will be indicated in gray lettering.



Definition of ball runner block format

Criterion	Designation	Abbreviation (example)		
		F	**N**	**S**
Width	**F**lange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	**N**ormal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

Definition of ball guide rail format

Criterion	Designation	Code (example)		
		S	**N**	**S**
Width	**S**limline	S		
	Wide	B		
Length	**N**ormal		N	
Height	**S**tandard height			S
	No base groove			O

Proven cover strip for ball guide rail mounting holes

- One cover for all the holes saves time and costs
- Made of corrosion-resistant spring steel per EN 10088
- Easy, secure mounting
- Clip it on and secure it

Further highlights

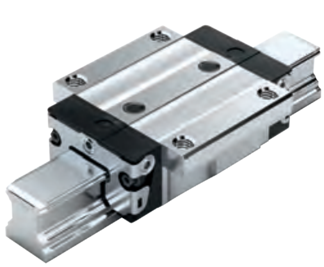
- Interchangeability with the roller rail system
- Integrated, inductive and wear-free measuring system as an option
- Extensive range of accessories
- Attachments on the ball runner block for mounting from above and below[1)]
- Increase in rigidity with lift-off and lateral loading by means of additional screw connections on two drilled holes in the middle of the ball runner block[1)]
- Mounting threads provided on end faces for fixing of all add-on elements
- High rigidity in all load directions – permits applications with just one runner block per rail
- Integrated all-round sealing
- High torque load capacity
- Optimized entry-zone geometry and high number of balls per track minimizes variation in elastic deflection
- Smooth, light running thanks to optimized ball recirculation and ball or ball chain guidance
- Various preload classes

Corrosion protection (optional)[1)]

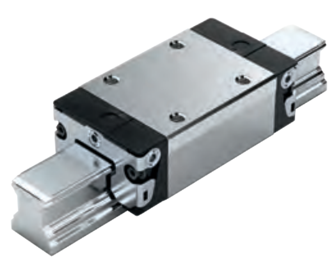
- Resist NR: Ball runner block body made of corrosion-resistant steel according to DIN EN 10088
- Resist NR II: Ball runner block body or ball guide rail and all steel components made of corrosion-resistant steel according to DIN EN 10088
- Resist CR: Ball runner block body or ball guide rail made of steel with corrosion-resistant hard chrome-plated matte silver coating

Design style examples

Standard ball rail system



FNS
Flange, normal, standard height



SNS
Slimline, normal, standard height

Wide ball rail system

BNS
Wide normal standard height

CNS
Compact normal standard height

Ball chain (optional)

- Optimizes noise levels

Notes

General notes

- Combining different accuracy classes When you combine ball guide rails and ball runner blocks of different accuracy classes, the tolerances change for dimensions H and A3. See “Accuracy classes and their tolerances”

Intended use

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

Misuse

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

- the transport of persons

General safety instructions

- The safety rules and regulations of the country in which the product is used must be complied with.
- All current and applicable accident prevention and environmental regulations must be adhered to.
- The product may only be used when it is in technically perfect condition.
- The technical data and environmental conditions stated in the product documentation must be complied with.
- The product must not be put into service until it has been verified that the final product (for example a machine or system) into which the product has been installed complies with the country-specific requirements, safety regulations and standards for the application.
- Rexroth ball rail systems may not be used in zones with potentially explosive atmospheres as defined in ATEX directive 94/9/EC.
- Rexroth ball rail systems must never be altered or modified. The user may only perform the work described in the “Quick User Guide” or the “Mounting Instructions for Ball Rail Systems”.
- The product must never be dismantled.
- At high travel speeds a certain amount of noise is caused by the product. If necessary appropriate measures are to taken to protect the hearing.
- Special safety requirements in specific sectors (e.g. cranes, theaters, foodstuffs) in laws, directives and standards are to be observed.
- Basically, the following standard is to be observed: DIN 637, Safety regulations for dimensioning and operation of profiled rail guides with recirculating rolling elements.

Directives and standards

Rexroth BHSP ball rail systems are suitable for dynamic linear applications requiring reliability and precision. The machine tool industry and other sectors must observe a series of standards and directives. These requirements can vary significantly worldwide. It is therefore essential to understand the legislation and standards that apply in each particular region.

EN ISO 12100

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

Directive 2006/42/EC

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

Directive 2001/95/EC

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

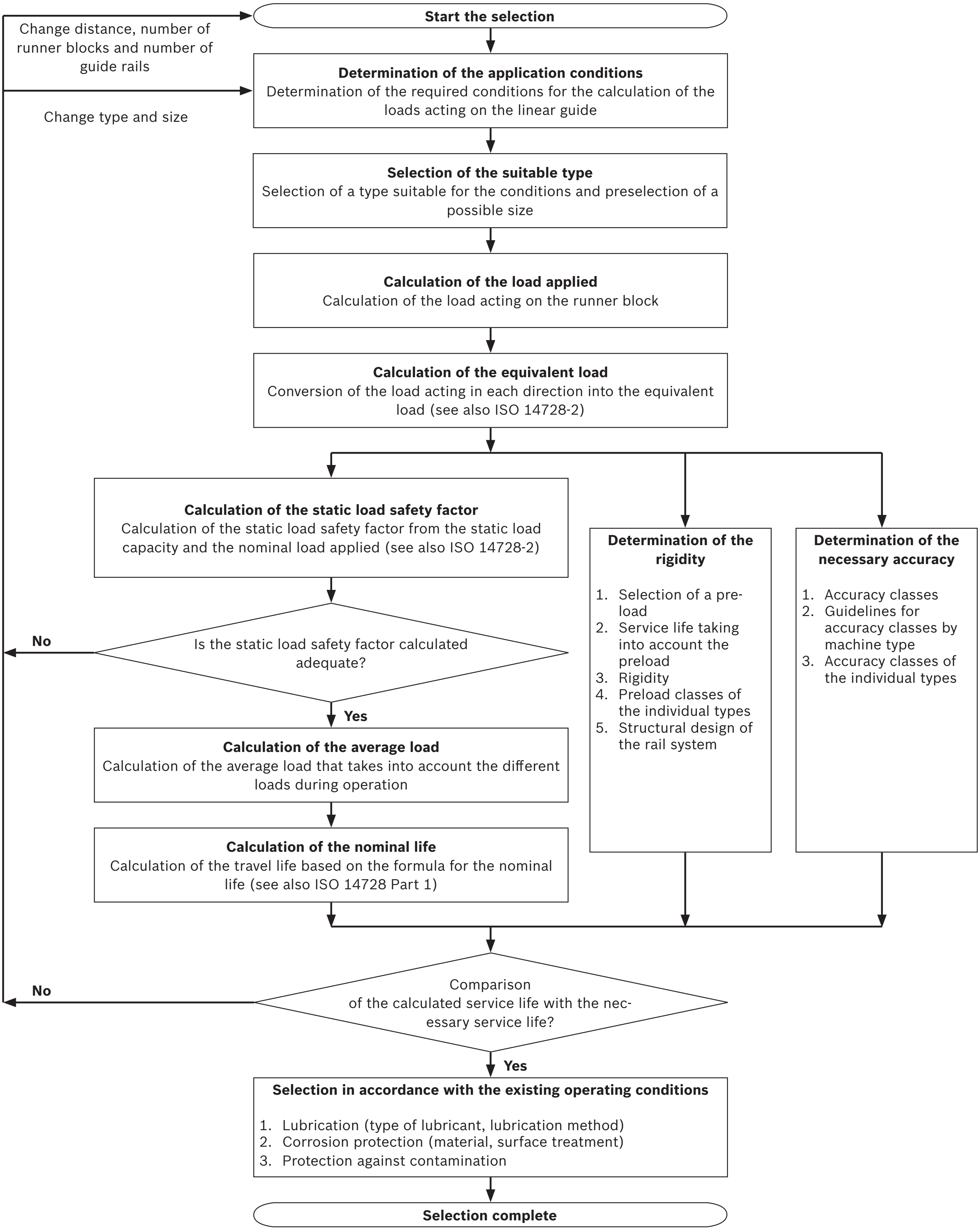
Directive 85/374/EEC

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

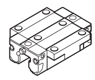
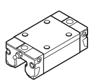
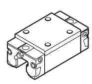
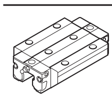
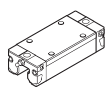
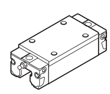
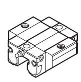
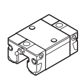
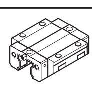
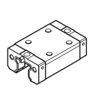
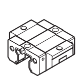
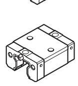
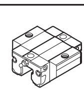
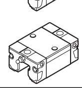
Directive 76/769/EEC

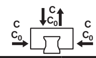
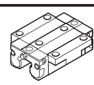
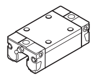
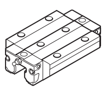
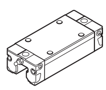
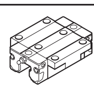
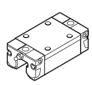
This directive relates to restrictions on the marketing and use of certain dangerous substances and preparations.
“Substances” means chemical elements and their compounds as they occur in the natural state or as produced by industry.
“Preparations” means mixtures or solutions composed of two or more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

Selection of a linear guide acc. to DIN 637



Product overview, ball runner blocks with load capacities and moments

Ball runner block			Page		Size	15	20	25	30	35	45	55	65
						Load capacities (N) and **load moments** (Nm)							
Standard, heavy-duty, ball runner block[7)] made of steel[3)] Resist NR[4)] Resist CR[6)]		**FNS R1651[3)6)] R2001[4)]**	**48[3)] 99[4)]**	**106[6)]**	**C** 1)	**9 860**	**23 400**	**28 600**	**36 500**	**51 800**	**86 400**	**109 000**	**172 000**
					C 2)	8 850	22 200	26 700	34 800	49 400	82 400	–	–
					C_0 1)	**12 700**	**29 800**	**35 900**	**48 100**	**80 900**	**132 000**	**174 000**	**280 000**
					C_0 2)	10 800	27 700	32 300	44 700	75 200	123 000	–	–
		**SNS R1622[3)6)] R2011[4)]**	**54[3)] 99[4)]**	**106[6)]**	**M_t** 1)	**95**	**300**	**410**	**630**	**1 110**	**2 330**	**3 480**	**6 810**
					M_t 2)	85	280	380	600	1 060	2 220	–	–
					M_{t0} 1)	**120**	**380**	**510**	**830**	**1 740**	**3 560**	**5 550**	**11 100**
					M_{t0} 2)	100	350	460	780	1 620	3 320	–	–
		**SNH R1621[3)6)]**	**60[3)]**		**M_L** 1)	**68**	**200**	**290**	**440**	**720**	**1 540**	**2 320**	**4 560**
					M_L 2)	62	190	270	420	700	1 480	–	–
					M_{L0} 1)	**87**	**260**	**360**	**580**	**1 130**	**2 350**	**3 690**	**7 400**
					M_{L0} 2)	76	240	330	540	1 060	2 210	–	–
		**FLS R1653[3)6)] R2002[4)]**	**50[3)] 99[4)]**	**106[6)]**	**C** 1)	**12 800**	**29 600**	**37 300**	**46 000**	**66 700**	**111 000**	**139 000**	**223 000**
					C 2)	11 500	28 200	34 800	43 800	63 600	106 000	–	–
					C_0 1)	**18 400**	**41 800**	**52 500**	**66 900**	**116 000**	**190 000**	**245 000**	**404 000**
					C_0 2)	15 600	38 800	47 300	62 200	108 000	177 000	–	–
		**SLS R1623[3)6)] R2012[4)]**	**56[3)] 99[4)]**	**106[6)]**	**M_t** 1)	**120**	**380**	**530**	**800**	**1 440**	**3 010**	**4 410**	**8 810**
					M_t 2)	110	360	500	760	1 370	2 870	–	–
					M_{t0} 1)	**180**	**540**	**750**	**1 160**	**2 500**	**5 120**	**7 780**	**16 000**
					M_{t0} 2)	150	500	670	1 080	2 320	4 770	–	–
		**SLH R1624[3)6)]**	**62[3)]**	**106[6)]**	**M_L** 1)	**120**	**340**	**530**	**740**	**1 290**	**2 730**	**3 960**	**8 160**
					M_L 2)	110	330	500	710	1 230	2 630	–	–
					M_{L0} 1)	**180**	**490**	**740**	**1 080**	**2 240**	**4 660**	**6 990**	**14 800**
					M_{L0} 2)	150	460	670	1 010	2 090	4 370	–	–
Standard ball runner block[7)] made of steel[3)] Resist NR[4)] Resist CR[6)]		**FKS R1665[3)6)] R2000[4)]**	**52[3)] 99[4)]**	**106[6)]**	**C** 1)	**6 720**	**15 400**	**19 800**	**25 600**	**36 600**	**–**	**–**	**–**
					C 2)	6 030	14 700	18 500	24 400	34 900	–	–	–
					C_0 1)	**7 340**	**16 500**	**21 200**	**28 900**	**49 300**	**–**	**–**	**–**
					C_0 2)	6 230	15 300	19 100	26 900	45 800	–	–	–
		**SKS R1666[3)6)] R2010[4)]**	**58[3)] 99[4)]**	**106[6)]**	**M_t** 1)	**65**	**200**	**280**	**440**	**790**	**–**	**–**	**–**
					M_t 2)	58	190	260	420	750	–	–	–
					M_{t0} 1)	**71**	**210**	**300**	**500**	**1 060**	**–**	**–**	**–**
					M_{t0} 2)	60	200	270	470	980	–	–	–
					M_L 1)	**29**	**83**	**130**	**200**	**340**	**–**	**–**	**–**
					M_L 2)	27	81	120	200	330	–	–	–
					M_{L0} 1)	**32**	**89**	**140**	**230**	**460**	**–**	**–**	**–**
					M_{L0} 2)	28	84	130	220	430	–	–	–
		**FNN R1693[3)6)8)]**	**64[3)]**	**106[6)]**	**C** 1)	**–**	**14 500**	**28 600**	**–**	**–**	**–**	**–**	**–**
					C_0 1)	**–**	**24 400**	**35 900**	**–**	**–**	**–**	**–**	**–**
		**SNN R1694[3)6)8)]**	**68[3)]**	**106[6)]**	**M_t** 1)	**–**	**190**	**410**	**–**	**–**	**–**	**–**	**–**
					M_{t0} 1)	**–**	**310**	**510**	**–**	**–**	**–**	**–**	**–**
					M_L 1)	**–**	**100**	**290**	**–**	**–**	**–**	**–**	**–**
					M_{L0} 1)	**–**	**165**	**360**	**–**	**–**	**–**	**–**	**–**
		**FKN R1663[3)6)8)]**	**66[3)]**	**106[6)]**	**C** 1)	**–**	**9 600**	**19 800**	**–**	**–**	**–**	**–**	**–**
					C_0 1)	**–**	**13 600**	**21 200**	**–**	**–**	**–**	**–**	**–**
		**SKN R1664[3)6)8)]**	**70[3)]**	**106[6)]**	**M_t** 1)	**–**	**120**	**280**	**–**	**–**	**–**	**–**	**–**
					M_{t0} 1)	**–**	**170**	**300**	**–**	**–**	**–**	**–**	**–**
					M_L 1)	**–**	**40**	**130**	**–**	**–**	**–**	**–**	**–**
					M_{L0} 1)	**–**	**58**	**140**	**–**	**–**	**–**	**–**	**–**
Super steel ball runner blocks[3)] Resist CR[6)]		**FKS 1661[3)6)]**	**88[3)]**	**107[6)]**	**C** 1)	**3 900**	**10 100**	**11 400**	**15 800**	**21 100**	**–**	**–**	**–**
					F_{max} 1)	**1 500**	**3 900**	**4 400**	**6 100**	**8 100**	**–**	**–**	**–**
		**SKS 1662[3)6)]**	**90[3)]**	**107[6)]**	**M_t** 1)	**39**	**130**	**170**	**270**	**450**	**–**	**–**	**–**
					M_{tmax} 1)	**15**	**50**	**65**	**105**	**175**	**–**	**–**	**–**

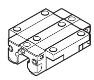
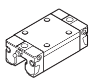
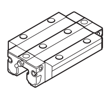
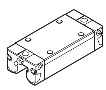
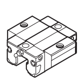
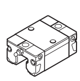
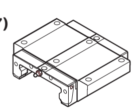
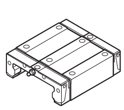
Ball runner block			Page	Size	15	20	25	30	35	45	55	65
					**Load capacities** (N) and **load moments** (Nm)							
High-speed steel ball runner blocks[7]		**FNS R2001 ... 9.**	**85**	**C** 1)	**6 880**	**16 300**	**20 000**	**25 500**	**36 200**	**–**	**–**	**–**
				C_0 1)	**8 860**	**20 800**	**25 100**	**33 500**	**56 500**	**–**	**–**	**–**
		**SNS R2011 ... 9.**	**85**	**M_t** 1)	**66**	**210**	**280**	**440**	**780**	**–**	**–**	**–**
				M_{t0} 1)	**85**	**270**	**360**	**580**	**1 210**	**–**	**–**	**–**
				M_L 1)	**47**	**140**	**200**	**310**	**510**	**–**	**–**	**–**
				M_{L0} 1)	**61**	**180**	**250**	**400**	**790**	**–**	**–**	**–**
		**FLS R2002 ... 9.**	**85**	**C** 1)	**8 930**	**20 700**	**26 000**	**32 100**	**46 600**	**–**	**–**	**–**
				C_0 1)	**12 800**	**29 200**	**36 600**	**46 700**	**81 100**	**–**	**–**	**–**
				M_t 1)	**86**	**260**	**370**	**560**	**1 000**	**–**	**–**	**–**
		**SLS R2012... 9.**	**85**	**M_{t0}** 1)	**120**	**370**	**520**	**810**	**1 740**	**–**	**–**	**–**
				M_L 1)	**85**	**240**	**370**	**520**	**900**	**–**	**–**	**–**
				M_{L0} 1)	**120**	**340**	**520**	**750**	**1 560**	**–**	**–**	**–**
Aluminum ball runner blocks[7]		**FNS R1631**	**94**	**C** 1)	**9 860**	**23 400**	**28 600**	**36 500**	**51 800**	**–**	**–**	**–**
				C 2)	8 850	22 200	26 700	34 800	49 400	–	–	–
				F_{max} 1) 2)	**3 000**	**7 200**	**8 800**	**12 200**	**16 200**	**–**	**–**	**–**
				M_t 1)	**95**	**300**	**410**	**630**	**1 110**	**–**	**–**	**–**
		**SNS R1632**	**96**	M_t 2)	85	280	380	600	1 060	–	–	–
				M_{tmax} 1) 2)	**29**	**92**	**125**	**210**	**345**	**–**	**–**	**–**
				M_L 1)	**68**	**200**	**290**	**440**	**720**	**–**	**–**	**–**
				M_L 2)	62	190	270	420	700	–	–	–
				M_{Lmax} 1) 2)	**16**	**50**	**70**	**110**	**170**	**–**	**–**	**–**

Determination of the dynamic load capacities and moments is based on a travel life of 100,000 m per ISO 14728-1.
Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

1) Ball runner blocks **without** ball chain.
2) Ball runner blocks **with** ball chain.
3) Steel: All steel parts made of carbon steel.
4) Resist NR Size 15 – 35: Ball runner block body made of corrosion-resistant steel per EN 10088.
5) Resist NR II: All steel parts made of corrosion-resistant steel per EN 10088.
6) Resist CR: Ball runner block body made of steel with matte-silver hard-chrome plated corrosion-resistant coating.
7) BSHP ball runner block
8) BSHP ball runner block, size 25 only

Refer to the product description for the abbreviations of the formats

Product overview, ball runner blocks with load capacities and moments

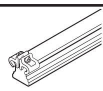
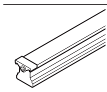
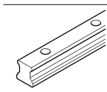
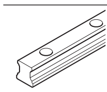
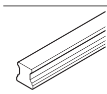
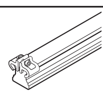
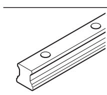
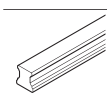
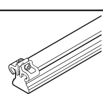
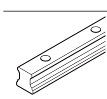
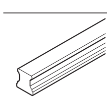
Ball runner block			Page		Size		15	20 20/40	25 25/70	30	35 35/90	45	55	65
							Load capacities (N) and **load moments** (Nm)							
Resist NR II ball		**FNS**			**C**	1)	**5 100**	**12 300**	**15 000**	**20 800**	**27 600**	**–**	**–**	**–**
runner blocks[5)7)]		**R2001 ... 0.**	**102**		C	2)	4 700	11 400	14 000	19 300	27 600	–	–	–
					C_0	1)	**9 300**	**16 900**	**21 000**	**28 700**	**37 500**	**–**	**–**	**–**
					C_0	2)	8 400	15 000	18 900	25 800	37 500	–	–	–
		SNS			**M_t**	1)	**63**	**205**	**270**	**460**	**760**	**–**	**–**	**–**
		**R2011 ... 0.**	**103**		M_t	2)	58	190	250	425	760	–	–	–
					M_{t0}	1)	**90**	**215**	**295**	**500**	**805**	**–**	**–**	**–**
					M_{t0}	2)	81	190	265	450	805	–	–	–
					M_L	1)	**34**	**110**	**150**	**245**	**375**	**–**	**–**	**–**
					M_L	2)	31	100	140	225	375	–	–	–
					M_{L0}	1)	**49**	**115**	**165**	**265**	**390**	**–**	**–**	**–**
					M_{L0}	2)	44	100	150	240	390			
		**FLS**			**C**	1)	**8 500**	**16 000**	**20 000**	**26 300**	**36 500**	**–**	**–**	**–**
		R2002 ... 0.	**102**		C	2)	7 600	15 200	18 100	25 000	34 800	–	–	–
					C_0	1)	**14 000**	**24 400**	**31 600**	**40 100**	**56 200**	**–**	**–**	**–**
					C_0	2)	12 100	22 500	27 400	37 300	52 500	–	–	–
		SLS			**M_t**	1)	**82**	**265**	**365**	**590**	**1025**	**–**	**–**	**–**
		**R2012 ... 0.**	**103**		M_t	2)	73	250	330	560	975	–	–	–
					M_{t0}	1)	**132**	**310**	**450**	**695**	**1 210**	**–**	**–**	**–**
					M_{t0}	2)	118	295	410	660	1 150	–	–	–
					M_L	1)	**64**	**190**	**290**	**420**	**710**	**–**	**–**	**–**
					M_L	2)	58	180	265	400	675	–	–	–
					M_{L0}	1)	**104**	**230**	**350**	**495**	**840**	**–**	**–**	**–**
					M_{L0}	2)	93	215	320	470	805			
		FKS			**C**	1)	**4 500**	**8 200**	**10 500**	**14 500**	**19 300**	**–**	**–**	**–**
		**R2000 ... 0.**	**102**		C	2)	3 900	8 200	9 200	14 500	19 300	–	–	–
					C_0	1)	**5 600**	**9 400**	**12 600**	**17 200**	**22 400**	**–**	**–**	**–**
					C_0	2)	4 600	9 400	10 500	17 200	22 400	–	–	–
		SKS			**M_t**	1)	**44**	**125**	**195**	**320**	**545**	**–**	**–**	**–**
		**R2010 ... 0.**	**103**		M_t	2)	37	125	175	320	545	–	–	–
					M_{t0}	1)	**55**	**115**	**180**	**295**	**485**	**–**	**–**	**–**
					M_{t0}	2)	48	115	160	295	485	–	–	–
					M_L	1)	**16**	**45**	**70**	**110**	**170**	**–**	**–**	**–**
					M_L	2)	13	45	60	110	170	–	–	–
					M_{L0}	1)	**19**	**40**	**65**	**105**	**150**	**–**	**–**	**–**
					M_{L0}	2)	16	40	55	105	150			
Wide steel ball		**BNS**			**C**	1)	**–**	**14 900**	**36 200**	**–**	**70 700**	**–**	**–**	**–**
runner blocks[3)7)]		**R1671[3)6)]**	**126[3)]**	**126[6)]**	C	2)	–	13 700	33 700	–	–	–	–	–
Resist CR[6)7)]					**C_0**	1)	**–**	**20 600**	**50 200**	**–**	**126 000**	**–**	**–**	**–**
					C_0	2)	–	18 200	45 200	–	–	–	–	–
		CNS			**M_t**	1)	**–**	**340**	**1350**	**–**	**3 500**	**–**	**–**	**–**
		R1672[3)6]	**130[3)]**	**130[6)]**	M_t	2)	–	310	1 260	–	–	–	–	–
					**M_{t0}**	1)	**–**	**470**	**1 870**	**–**	**6 240**	**–**	**–**	**–**
					M_{t0}	2)	–	410	1 680	–	–	–	–	–
					M_L	1)	**–**	**140**	**490**	**–**	**1 470**	**–**	**–**	**–**
					M_L	2)	–	130	460	–	–	–	–	–
					M_{L0}	1)	**–**	**190**	**680**	**–**	**2 620**	**–**	**–**	**–**
					M_{L0}	2)	–	170	620	–	–	–	–	–

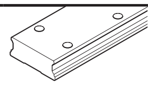
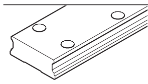
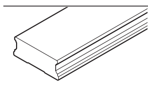
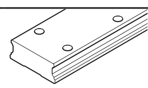
Determination of the dynamic load capacities and moments is based on a travel life of 100,000 m per ISO 14728-1.
Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

1) Ball runner blocks **without** ball chain.
2) Ball runner blocks **with** ball chain.
3) Steel: All steel parts made of carbon steel.
4) Resist NR size 15 – 35: Ball runner block body made of corrosion-resistant steel per EN 10088.
5) Resist NR II: All steel parts made of corrosion-resistant steel per EN 10088.
6) Resist CR: Ball runner block body made of steel with matte-silver hard-chrome plated corrosion-resistant coating.
7) BSHP ball runner block
8) BSHP ball runner block size 25 only

Refer to the product description for the abbreviations of the formats

Product overview, ball guide rails with rail lengths

Ball guide rails			Page	Size 15	 20	 25	 30	 35	 45	 55	 65
				Rail length (mm)							
Standard steel ball guide rails[3)]		**SNS / SNO** **R1605 .3. .. / R1605 .B. ..** For mounting from above, with cover strip and strip clamps	**110**	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
		**SNS / SNO** **R1605 .6. .. / R1605 .D. ..** For mounting from above, with cover strip and screw-down protective caps	**112**	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
		**SNS / SNO** **R1605 .0. .. / R1605 .C. ..** For mounting from above with plastic caps	**114**	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
		**SNS** **R1606 .5. ..** For mounting from above, for steel mounting hole plugs	**116**	–	–	3 836	3 836	3 836	3 776	3 836	3 746
		**SNS** **R1607 .0. ..** Can be screwed on from below	**118**	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
Resist NR II standard ball guide rails[1)]		**SNS** **R2045 .3. ..** For mounting from above, with cover strip and strip clamps	**120**	1 856	3 836	3 836	3 836	3 836	–	–	–
		**SNS** **R2045 .0. ..** For mounting from above with plastic caps	**121**	1 856	3 836	3 836	3 836	3 836	–	–	–
		**SNS** **R2047 .0. ..** Can be screwed on from below	**121**	1 856	3 836	3 836	3 836	3 836	–	–	–
Resist CR standard ball guide rails[2)]		**SNS** **R1645 .3. ..** For mounting from above, with cover strip and strip clamps	**122**	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
		**SNS** **R1645 .0. ..** For mounting from above with plastic caps	**123**	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
		**SNS** **R1647 .0. ..** For mounting from below	**123**	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746

Ball guide rails			Page	Size 20/40	25/70	35/90
				Rail length (mm)		
Wide steel ball guide rails		**BNS R1675 .0. ..** For mounting from above with plastic caps	**134**	3 836	3 836	3 836
		**BNS R1676 .5. ..** For mounting from above, for steel mounting hole plugs	**136**	–	3 836	3 836
		**BNS R1677 .0. ..** For mounting from below	**137**	3 836	3 836	3 836
Wide Resist CR ball guide rails[2)]		**BNS R1673 .0. ..** For mounting from above with plastic caps	**134**	3 836	3 836	3 836

1) Resist NR II: Guide rail made of corrosion-resistant steel per EN 10088
2) Resist CR: Ball guide rail made of steel with matte-silver hard-chrome plated corrosion-resistant coating
3) Sizes 20 and 25: Length up to 5816 mm (one-piece) can be supplied on request
Sizes 30 and 35: Length up to 5836 mm (one-piece) can be supplied on request
Size 45: Length up to 5771 mm (one-piece) can be supplied on request

Refer to the product description for the abbreviations of the formats

General technical data and calculations

General notes

The general technical data and calculations apply to all ball rail systems. This means to all ball runner blocks and ball guide rails.
Specific technical data relating to the individual ball runner blocks and ball guide rails is given separately.

Preload classes

To cover the widest possible range of applications, Rexroth ball runner blocks are available in different preload classes.

The following preload classes are available:

- Ball runner block without preload(preload class C0)
- Ball runner blocks with moderate preload (preload class C1)
- Ball runner blocks with average preload (preload class C2)
- Ball runner blocks with high preload (preload class C3)

So as not to reduce the service life, the preload should not exceed 1/3 of the load on bearing F.

In general, the rigidity of the ball runner block rises with increasing preload. If vibrations occur, choose the correspondingly high preload (≥ preload class C2).

Guide systems with parallel rails

When choosing the preload class, pay attention to the permissible parallelism offset of the rails too (“Accuracy class selection criterion”).
When specifying ball rail systems of accuracy class N, we recommend preload class C0 or C1 to avoid distortive stresses due to the tolerances.

Travel speed

v_{max} : 3 – 10 m/s

For exact values, refer to the individual ball runner blocks.

Acceleration

a_{max} : 250 – 500 m/s²

For exact values, refer to the individual ball runner blocks.
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)
If pre-tensioning force F_{pr} is canceled, a_{max} = 50 m/s² applies

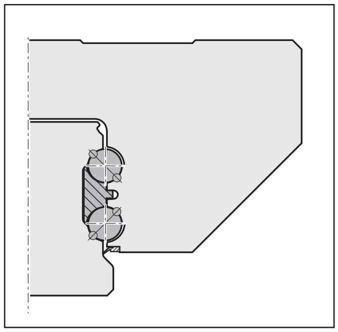
Operating temperature range

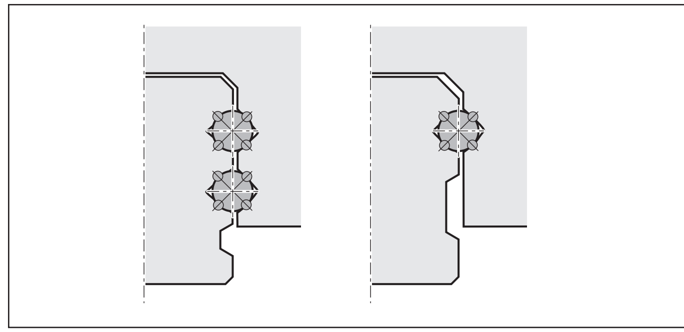
t : 0 – 80 °C

Briefly, up to 100 °C is allowed.
For sub-zero temperatures, please consult us.
For ball runner blocks without ball chain:
lower limit = -10 °C.

Friction

The friction coefficient μ of Rexroth's ball rail system is approximately 0.002 to 0.003 (without the friction of the seal).





Due to the Rexroth design with four rows of balls, there are always **two points of contact** in all the directions of loading. This reduces the friction to a minimum.

Other ball rails with two or four rows of balls with **four points of contact** have multiple friction: due to the differential slip with lateral loading and with a comparable preload without load, the gothic raceway profile causes higher friction (depending on the raceway curvature and the load, up to five times the friction coefficient). This high friction leads to correspondingly greater heat.

Seals

The purpose of seals is to prevent dirt, chips, metalworking fluids, etc. from entering the ball runner block and thus shortening its service life. For more information, refer to selection criteria/seals.

Standard seal (SS)

Universal seals are incorporated as standard in Rexroth ball runner blocks. They provide equal sealing performance on ball guide rails with and without cover strip. Low friction combined with a good sealing effect was an important factor during design. Suitable for applications requiring good sealing.

Low-friction (LS)

For particular ease of movement.

Double-lipped seal (DS)

For frequent exposure to fluids.

Front seal

For use in environmental conditions with many fine dirt or metal particles as well as coolants or cutting fluids.
Can be replaced during servicing.
End seals can be ordered separately as accessories for mounting by the customer.

FKM seal

For use in extreme environmental conditions with coarse dirt or metal particles as well as massive use of coolants or cutting fluids.
Can be replace during servicing.
FKM end seals can be ordered separately as accessories for mounting by the customer.

Cover plate wiper

For use in environments subject to coarse dirt or chips.
Scraper plates can be ordered separately as accessories for mounting by the customer.

General technical data and calculations

Forces and moments

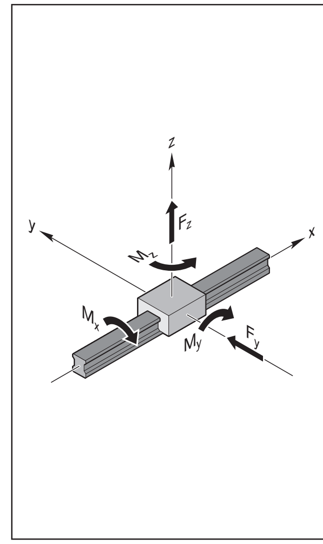
In Rexroth ball rail systems the raceways are arranged at a contact angle of 45°.
This results in the same load-bearing capacity of the entire system in all four major planes of load application.
The ball runner blocks may be subjected to both forces and load moments.

Forces in the four major planes of load application

- Tension F_z (positive Z-direction)
- Pressure $-F_z$ (negative Z-direction)
- Side load F_y (positive Y-direction)
- Side load $-F_y$ (negative Y-direction)

Moments

- Torsional moment M_x (around the X-axis)
- Longitudinal moment M_y (around the Y-axis)
- Longitudinal moment M_z (around the Z-axis)



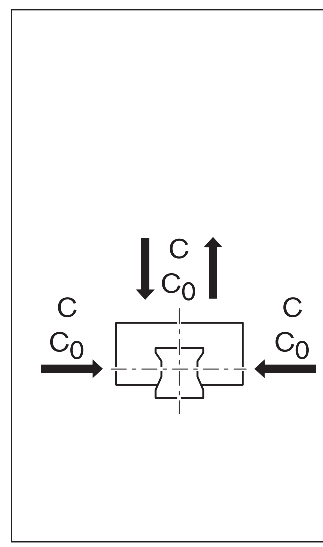
Definition of load capacities

Dynamic load capacity C

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

Static load capacity C_0

Static load in the load direction that corresponds to a calculated load in the center of the contact point with the greatest load between the rolling element (ball) and track zone (guide rail) of 4200 MPa.
Note: With this stress at the contact point, permanent overall deformation of the ball occurs that corresponds to about 0.0001 times the ball diameter. (according to DIN ISO 14728-1)



Definition of moment load capacities

Dynamic torsional moment load capacity M_t

Comparative dynamic moment about the X-axis which causes a load equivalent to the dynamic load capacity C.

Static torsional moment load capacity M_{t0}

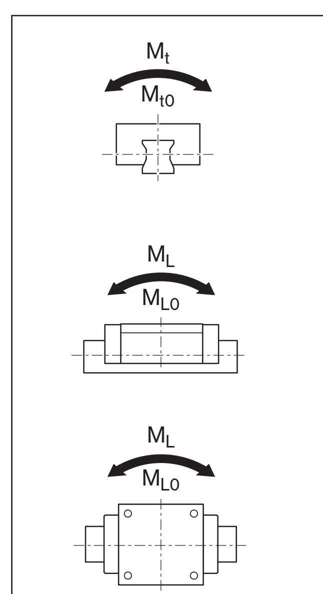
The comparable static moment around the X-axis that induces a load corresponding to the static load capacity C_0.

Dynamic longitudinal moment load M_L

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

Static longitudinal moment load M_{L0}

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



Definition and calculation of the nominal life

The calculated service life which an individual linear rolling bearing, or a group of apparently identical rolling element bearings operating under the same conditions, can attain with a 90 % probability, with contemporary, commonly used materials and manufacturing quality under conventional operating conditions (as per ISO 14728-1).

Nominal life in meters

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

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

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

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

Nominal life at variable speed

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

As an alternative, it is possible to use formula (3) to calculate the service life in operating hours using the average speed $v_{m.}$
This average speed v_m is calculated with speeds that can be changed on a stepwise basis using discrete time steps q_{tn} of the individual load stages (4).

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

Modified service life

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

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

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

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

Notes

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

General technical data and calculations

Load on bearing for calculating the service life

Note

In general, the minimum value of 4.0 should not be fallen short of for both the static and dynamic load ratios. In the case of applications that place high demands on rigidity and/or the service life, a higher load ratio is necessary. With tensile loads, check the screw stability. See the chapter entitled “Installation Information”.

Dynamic load ratio $\frac{C}{F_{m,\ max}}$

Static load ratio $\frac{C_0}{F_{eff,\ max}}$

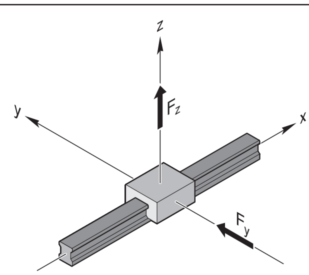
Combined equivalent load

In the case of a combined vertical and horizontal external load, calculate the dynamic equivalent load F_{comb} according to formula (5).

Note

The structure of the ball rail system permits this simplified calculation.

$$F_{comb} = |F_y| + |F_z| \quad (5)$$



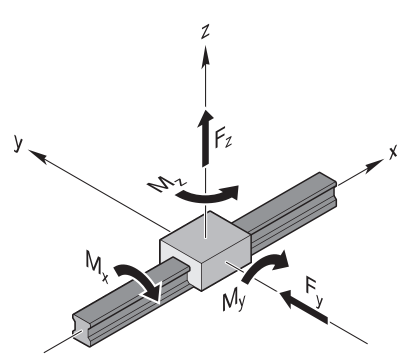
Note

Reduce an external load that affects the ball runner block at any angle with the correct sign to F_y and F_z and insert the amounts into formula (5) or (6).

Combined equivalent load in conjunction with moments

Using formula (6), you can combine all the partial loads that occur in a load case into one single comparison load. i.e. the combined equivalent load.

$$F_{comb} = |F_y| + |F_z| + C \cdot \frac{|M_x|}{M_t} + C \cdot \frac{|M_y|}{M_L} + C \cdot \frac{|M_z|}{M_L} \quad (6)$$



Notes

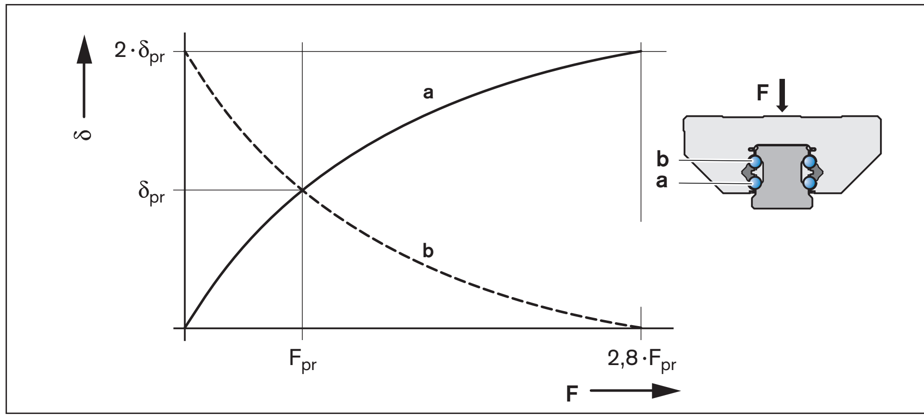
Including moments as stated in formula (6) only applies to an individual ball guide rail with just one ball runner block. The formula is simpler for other combinations.

The forces and moments plotted in the coordinate system can also have an effect in the opposite direction. Reduce an external load that affects the ball runner block at any angle to F_y and F_z and insert the amounts into formula (6).
The structural design of the ball runner blocks allows this simplified calculation.

Considering the internal preloading force F_{pr}

To increase the rigidity and precision of the guide system, it is advisable to use preloaded ball runner blocks (c.f. “System Preloading Selection Criterion”).

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



a	=	loaded (lower) row of balls	
b	=	non-loaded (upper) row of balls	
δ	=	Deformation of the rolling contact at F	(–)
δ_{pr}	=	Deformation of the rolling contact at F_{pr}	(–)
F	=	load on the ball runner block	(N)
F_{pr}	=	Internal pre-tensioning force	(N)

Effective equivalent load on bearing

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

Note

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

$$(7) \quad F_{eff} = F_{comb}$$

Case 1

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

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

$$(8) \quad F_{eff} = \left(\frac{F_{comb}}{2.8 \cdot F_{pr}} + 1\right)^{3/2} \cdot F_{pr}$$

Case 2

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

The pre-tensioning force F_{pr} is included in the calculation of the effective equivalent load.

General technical data and calculations

Dynamic equivalent load

With different load stages, calculate the dynamic equivalent load according to formula (9).

$$(9) \quad F_m = \sqrt[3]{(F_{eff\,1})^3 \cdot \frac{q_{s1}}{100\,\%} + (F_{eff\,2})^3 \cdot \frac{q_{s2}}{100\,\%} + \ldots + (F_{eff\,n})^3 \cdot \frac{q_{sn}}{100\,\%}}$$

Equivalent static load on bearing

With a combined vertical and horizontal external static load in conjunction with a static torsional or longitudinal moment, calculate the static equivalent load $F_{0\,comb}$ according to formula (10).

$$(10) \quad F_{0\,comb} = |F_{0y}| + |F_{0z}| + C_0 \cdot \frac{|M_{0x}|}{M_{t0}} + C_0 \cdot \frac{|M_{0y}|}{M_{L0}} + C_0 \cdot \frac{|M_{0z}|}{M_{L0}}$$

Notes

The static equivalent load $F_{0\,comb}$ must not exceed the static load capacity C_0. Formula (10) only applies when using a single ball guide rail.

Reduce an external load that affects the ball runner block at any angle to F_{0y} and F_{0z} and insert the amounts into formula (10).

Definitions and calculation for dynamic and static load ratios

Using the ratio of load capacity to loading of the ball runner blocks, you can make a preselection of the guide. You should choose the dynamic loading ratio C/F_{max} and the static loading ratio $C_0/F_{0\,max}$ to match the application. The necessary load capacities are calculated from this. The load capacity overview yields the corresponding dimensions and format.

Recommended values for load ratios

The table below contains guideline values for the loading ratios.

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

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

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

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

Case 1: $$\text{Static ratio} = \frac{C_0}{F_{0\,max}}$$

Case 2: $$\text{Static ratio} = \frac{C_0}{F_{max}}$$

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

Static load safety factor S_0

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

$$S_0 = \frac{C_0}{F_{0\,max}}$$

In this connection, $F_{0\,max}$ represents the maximum load amplitude that can occur, which can affect the linear guide. It does not matter whether this load only has an effect for a short time. It may represent a peak amplitude of a dynamic load spectrum. The data in the table applies to size selection.

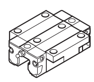
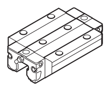
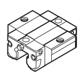
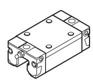
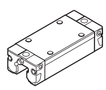
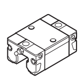
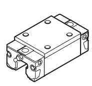
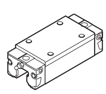
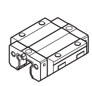
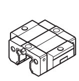
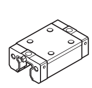
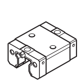
Static load safety factor S_0	Conditions of use
Overhead hanging arrangements or applications with serious potential risks	≥ 20
High dynamic stress at a standstill, contamination.	8 – 12
Normal design of machines and systems unless all the load parameters or connection accuracies are known.	5 – 8
All the loading data is known. Running free of shocks can be guaranteed.	3 – 5

Legend of formulas

Formula	Unit	Designation
a_1	–	Service life factor
C	N	Dynamic load capacity
C_0	N	Static load capacity
F_{max}	N	Maximum dynamic load
$F_{0\,max}$	N	Maximum static load
F_{comb}	N	Combined equivalent load
$F_{0\,comb}$	N	Equivalent static load on bearing
F_{eff}	N	Effective equivalent load on bearing
$F_{eff\,1-n}$	N	Uniform effective individual loads
F_m	N	Dynamic equivalent load
F_{pr}	N	Pre-tensioning force
F_y	N	External load due to a resulting force in the Y-direction
F_{0y}	N	External load due to a static force in the Y-direction
F_z	N	External load due to a resulting force in the Z-direction
F_{0z}	N	External load due to a static force in the Z-direction
M_t	Nm	Dynamic torsional moment load capacity[1)]
M_{t0}	Nm	Static torsional moment load capacity[1)]
M_L	Nm	Dynamic longitudinal moment load[1)]
M_{L0}	Nm	Static longitudinal moment load[1)]
M_x	Nm	Load due to the resulting moment around the X-axis
M_{0x}	Nm	Load due to the static moment around the X-axis

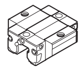
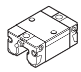
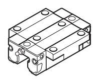
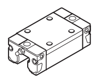
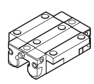
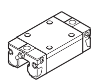
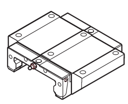
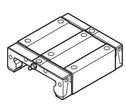
Formula	Unit	Designation
M_y	Nm	Load due to the resulting moment around the Y-axis
M_{0y}	Nm	Load due to the static moment around the Y-axis
M_z	Nm	Load due to the resulting moment around the Z-axis
M_{0z}	Nm	Load due to the static moment around the Z-axis
L_{10}	m	Nominal life (travel range)
$L_{h\,10}$	h	Nominal life (time)
L_{na}	m	Modified nominal life (travel range)
L_{ha}	h	Modified nominal life (time)
n	RPM	Stroke repetition rate (double strokes)
s	m	Stroke length
S_0	–	Static load safety factor
v_m	m/min	Average linear speed
$v_1 \dots v_n$	m/min	Travel speeds of phases 1 ... n
$q_{t1} \dots q_{tn}$	%	Discrete time steps for $v_1 \dots v_n$ of phases 1 ... n
Refer to the table for the values		

Design styles and versions

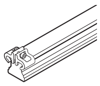
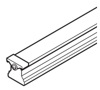
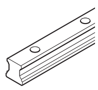
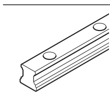
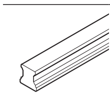
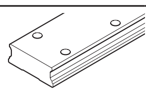
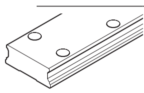
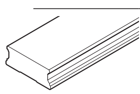
Ball runner block			Application area	Load-bearing capacity	Special feature
Standard ball runner blocks made of steel		**FNS** **R1651**[1,2,5] **R2001**[3,4]	For high rigidity requirements	High	For mounting from above and below
		**FLS** **R1653**[1,2,5] **R2002**[3]	For very high rigidity requirements	Very high	For mounting from above and below
		**FKS** **R1665** **R2000**[3]	For restricted space in the longitudinal direction	Medium	For mounting from above and below Supplementary to DIN 645-1
		**SNS** **R1622**[1,2,5] **R2011**[3,4]	For restricted space in the transverse direction	High	For mounting from above
		**SLS** **R1623**[1,2,5] **R2012**[3]	For restricted space in the transverse direction	Very high	For mounting from above
		**SKS** **R1666** **R2010**[3]	For restricted space in the longitudinal and transverse direction	Medium	For mounting from above
		**SNH** **R1621**[1,2,5]	For restricted space in the transverse direction and high rigidity requirements	High	Higher rigidity than SNS
		**SLH** **R1624**[1,2,5]	For restricted space in the transverse direction and high rigidity requirements	Very high	Higher rigidity than SLS
Standard ball runner blocks made of steel with Resist CR		**FNN** **R1693**[2]	For restricted space in the vertical direction	High	Lower rigidity than FNS Not defined in DIN 645-1
		**FKN** **R1663**[2]	For restricted space in the vertical and longitudinal direction	Medium	Lower rigidity than FKS Not defined in DIN 645-1
		**SNN** **R1694**[2]	For restricted space in the vertical and transverse direction	High	Lower rigidity than SNS Not defined in DIN 645-1
		**SKN** **R1664**[2]	For restricted space in the vertical, longitudinal and transverse direction	Medium	Lower rigidity than SKS Not defined in DIN 645-1

1) Heavy-duty ball runner blocks
2) BSHP ball runner block
3) Resist NR
4) Resist NR II
5) Resist CR

Refer to the product description for the abbreviations of the formats

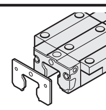
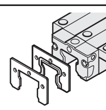
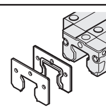
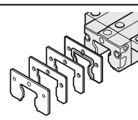
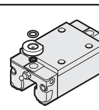
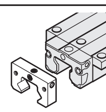
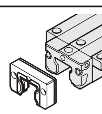
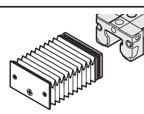
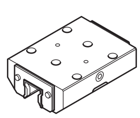
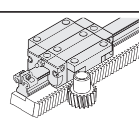
Ball runner block			Application area	Load-bearing capacity	Special feature
Super ball runner blocks made of steel with Resist CR		**FKS R1661**	For compensating large tolerances in the adjoining structure	Medium	At least 2 ball runner blocks per rail required
		**SKS R1662**	For compensating large tolerances in the adjoining structure	Medium	At least 2 ball runner blocks per rail required
Aluminum ball runner blocks		**FNS R1631[2)]**	For lightweight construction to compensate higher tolerances of the adjacent construction	High	For mounting from above and below
		**SNS R1632[2)]**	For lightweight construction to compensate higher tolerances of the adjacent construction	High	For mounting from above
High-speed steel ball runner blocks		**FNS R2001 ... 9.[2)]**	For very high travel speeds (up to 10 m/s)	High	For mounting from above and below
		**SNS R2011 ... 9.[2)]**	For very high travel speeds (up to 10 m/s)	High	For mounting from above
Wide ball runner blocks made of steel with Resist CR		**BNS R1671[2)]**	For high torsional moments in one-rail applications	Very high	For mounting from above and below
		**CNS R1672[2)]**	For high torsional moments on one rail with laterally limited installation space	Very high	For mounting from above

Design styles and versions

Ball guide rails			**Application area**	**Mounting method**	**Special feature**
Standard ball guide rails made of steel		**SNS / SNO** **R1605 .3. ..** **R1605 .B. ..** **R1645 .3. ..**[2] **R2045 .3. ..**[1]	Standard version, very harsh environmental conditions, robust strip clamp	For mounting from above	With cover strip and strip clamp Only one cover for all the holes. No holes required in end face for fastening of cover strip.
		**SNS / SNO** **R1605 .6. ..** **R1605 .D. ..**	Harsh environmental conditions, space-saving strip clamp	For mounting from above	With cover strip and protective cap Only one cover for all the holes.
		**SNS / SNO** **R1605 .0. ..** **R1605 .C. ..** **R1645 .0. ..**[2] **R2045 .0. ..**[1]	Economical	For mounting from above	With plastic caps No installation space needed on the end face.
		**SNS** **R1606 .5. ..**	More resistant to mechanical influencing factors (e.g. jolts) Very harsh environments	For mounting from above	With steel caps No installation space needed on the end face.
		**SNS** **R1607 .0. ..** **R1647 .0. ..**[2] **R2047 .0. ..**[1]	Mounting base easily accessible, best sealing effect for the end seals	For mounting from below	Use of larger screws than with bolting from above Higher lateral forces are permissible. No installation space needed on the end face.
Wide steel ball guide rails		**BNS** **R1675 .0. ..** **R1673 .0. ..**[2]	High moment load capacity	For mounting from above	With plastic caps No installation space needed on the end face.
		**BNS** **R1676 .5. ..**	High moment rigidity, more resistant to mechanical influencing factors (e.g. jolts) Very harsh environments	For mounting from above	With steel caps No installation space needed on the end face.
		**BNS** **R1677 .0. ..**	High moment rigidity, best sealing effect for the end seals	For mounting from below	Use of larger screws than with bolting from above Higher lateral forces are permissible than with the single-row series No installation space needed on the end face.

1) Resist NR II
2) Resist CR

Refer to the product description for the abbreviations of the formats

Accessories **Add-on elements are available as options for the ball runner blocks.**	**Application area**
Cover plate wiper 	The cover plate wiper is an additional element for wiping off coarse particles or dealing with contamination that has been deposited on the ball guide rail. When making your selection, pay attention to whether you will be using a ball guide rail with or without a cover strip.
Front seal Two-piece 	External end seals provide effective protection for the ball runner block, preventing dirt, small particles and liquids from working their way in. This further improves the sealing performance. This means that the sealing effect is improved even more. It is also possible to retrofit the two-piece front seal via the ball guide rail.
FKM seal One-piece and two-piece 	Better sealing performance than the end seal, but with higher friction. For use in environments with high contamination levels, metalworking fluids or aggressive media. Resistant to chemicals and high temperatures.
Seal Kit 	The seal kit is recommended in cases where both a scraper plate and end seal are required.
Lubrication adapter 	For oil and grease lubrication from above for SNH and SLH ball runner blocks (high versions).
Lube plate 	Makes possible other variants for lubricating ball runner blocks. Can be chosen for lube ports with a metric thread and pipe thread.
Front lube unit 	For applications requiring very long relubrication intervals. Under normal loads, they allow travel distances of up to 10,000 km without relubrication. The function is only assured where there is no exposure to liquids and little contamination. The maximum operating temperature is 60 °C.
Bellows 	Bellows can be covered in different variants such as with or without a lubrication plate. Heat-resistant bellows are metalized on one side which makes them non-flammable, and non-combustible, resistant to sparks, weld spatter or hot swarf. Short-term temperature stability is possible at up to 200 °C and an operating temperature of 80 °C.
Clamping and **Braking elements** 	The clamping units serve to prevent the ball rail system from moving when they are at rest. The braking units can be used to bring moving ball rail systems to a standstill and keep them stationary during rest phases. The following versions are available: Hydraulic, pneumatic and manual clamping elements.
Rack 	Gear racks and pinions are space-saving solutions for driving linear motion guides. For transmission of high forces within a small space and with low noise generation. All attachments such as gear reducers, motors and controllers are also available.

System preload

Definition of preload

Ball runner blocks can be preloaded to increase rigidity. The internal pre-tensioning forces that occur in this connection must be considered in the life expectancy calculation. You can choose the preload class to match the area of application. Refer to the table for pre-tensioning force F_{pr} .

Example

- Area of application: Precise guide systems with low external load and high overall rigidity requirements. This results in preload class C1.
- Selected ball runner block FNS R1651 314 20
- The selected ball runner block yields a pre-tensioning force F_{pr} according to the table.
- It is installed at 840 N internal pre-tensioning force F_{pr} .

Code	Preload	Application area
C0[1)]	**Without preload (clearance)**	For particularly smooth-running guide systems with the lowest possible friction for applications with large installation tolerances. Clearance versions are available only in accuracy classes N and H.
C1	**Moderate preload**	For precise guide systems with low external loads and high demands on overall rigidity.
C2	**Average preload**	For precise guide systems with both high external loading and high demands on overall rigidity; also recommended for single-rail systems. Above average moment loads can be absorbed without significant elastic deflection. Further improved overall rigidity with only medium moment loads.
C3	**High preload**	For high-rigidity guide systems like precision machine tools, etc. Above average loads and moments can be absorbed with the least possible elastic deflection. Ball runner blocks with preload C3 available only in accuracy classes UP, SP and XP; heavy duty ball runner blocks only in UP, SP and P.

1) In the case of ball runner blocks without preload (preload class C0), there is a clearance between the ball runner block and the rail of 1 to 10 µm. When using two rails and more than one ball runner block per guide rail, this clearance is usually equalized by parallelism tolerances.

Pre-tensioning force F_{pr}

Ball runner block	Part number	Design style	Preload class	Size 15	20	25	30	35	45	55	65
				Pre-tensioning force F_{pr} (N)							
Standard ball runner block Heavy-duty ball runner block - Steel[3)] - Resist NR[4)] - Resist CR[6)]	R1651[3)6)] R2001[4)]	FNS	C1[1)]	160	380	460	630	840	1 360	1 960	2 460
	R1622[3)6)] R2011[4)]	SNS	C1[2)]	150	350	430	590	840	1 270		
	R1621[3)6)]	SNH	C2[1)]	620	1 500	1 820	2 540	3 350	5 450	7 860	9 840
			C2[2)]	580	1390	1700	2 340	3 350	5 060		
			C3[1)]	1 010	2 440	2 960	4 120	5 450	8 850	12 800	16 000
			C3[2)]	950	2 260	2 770	3 810	5 450	8 230		
	R1653[3)6)] R2002[4)]	FLS	C1[1)]	200	490	610	800	1 110	1 810	2 480	3 260
	R1623[3)6)] R2012[4)]	SLS	C1[2)]	180	460	550	760	1 060	1 640		
	R1624[3)6)]	SLH	C2[1)]	800	1 950	2 430	3 200	4 450	7 230	9940	13000
			C2[2)]	720	1 850	2 200	3 040	4 240	6 550		
			C3[1)]	1 300	3 170	3 950	5 200	7 230	11 800	16 100	21 200
			C3[2)]	1 170	3 000	3 580	4 940	6 890	10 600		
Standard ball runner block - Steel[3)] - Resist NR[4)] - Resist CR[6)]	R1665[3)6)] R2000[4)]	FKS	C1[1)]	110	250	320	440	590			
	R1666[3)6)] R2010[4)]	SKS	C1[2)]	90	250	280	440	590			
	R1693[3)6)]	FNN	C1[1)]		290	460					
	R1694[3)6)]	SNN									
	R1663[3)6)]	FKN	C1[1)]		190	320					
	R1664[3)6)]	SKN									
Super ball runner blocks - Steel[3)] - Resist CR[6)]	R1661[3)6)]	FKS	C1[1)]	80	200	230	320	420			
	R1662[3)6)])	SKS									
Standard high-speed ball runner blocks - Steel	R2001...9.	FNS	C2[1)]	420	1 020	1 240	1 720	2 280			
	R2011...9.	SNS									
	R2002...9.	FLS	C2[1)]	700	1 330	1 660	2 180	3 020			
	R2012...9.	SLS									
Standard ball runner block - Aluminum	R1631	FNS	C1[1)]	160	380	460	630	840			
	R1632	SNS	C1[2)]	150	350	430	590	840			
Standard ball runner block - Resist NR II[5)]	R2001...0.	FNS	C1[1)]	100	250	300	420	550			
	R2011...0.	SNS	C1[2)]	90	230	280	390	550			
			C2[1)]	410	980	1 200	1 660	2 210			
			C2[2)]	380	910	1 120	1 540	2 210			
	R2002...0.	FLS	C1[1)]	170	320	400	530	730			
	R2012...0.	SLS	C1[2)]	150	300	360	500	700			
			C2[1)]	680	1 280	1 600	2 100	2 920			
			C2[2)]	610	1 220	1 450	2 000	2 780			
	R2000...0.	FKS	C1[1)]	90	160	210	290	390			
	R2010...0.	SKS	C1[2)]	80	160	180	290	390			
Wide steel ball runner blocks - Steel[3)] - Resist CR[6)]	R1671[3)6)]	CNS	C1[1)]		270	580		1160			
			C1[2)]		260	550					
	R1672[3)6)])	BNS	C1[1)]		270	580					
			C1[2)]		260	550					

1) Ball runner blocks **without** ball chain.
2) Ball runner blocks **with** ball chain.
3) Steel: All steel parts made of carbon steel.
4) Resist NR size 15 – 35: Ball runner block body made of corrosion-resistant steel per EN 10088.
5) Resist NR II: All steel parts made of corrosion-resistant steel per EN 10088.
6) Resist CR: Ball runner block body made of steel with matte-silver hard-chrome plated corrosion-resistant coating.

Rigidity of ball runner block

Rigidity of ball rail system with preloading

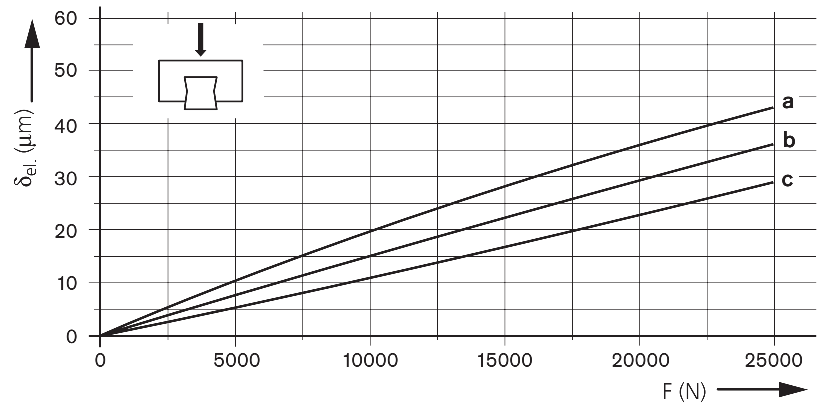
Example: ball runner block FNS Flange normal standard height

Size 35:

a) Ball runner block R1651 31. 20 with preload C1

b) Ball runner block R1651 32. 20 with preload C2

c) Ball runner block R1651 33. 20 with preload C3



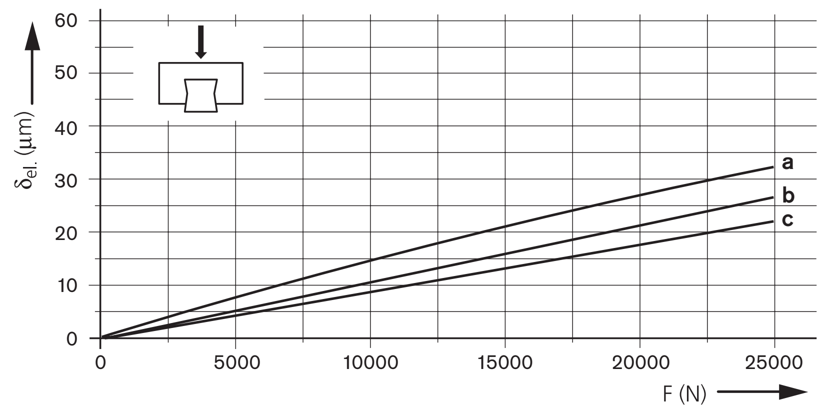
Example: ball runner block FLS Flange long standard height

Size 35:

a) Ball runner block R1653 31. 20 with preload C1

b) Ball runner block R1653 32. 20 with preload C2

c) Ball runner block R1653 33. 20 with preload C3



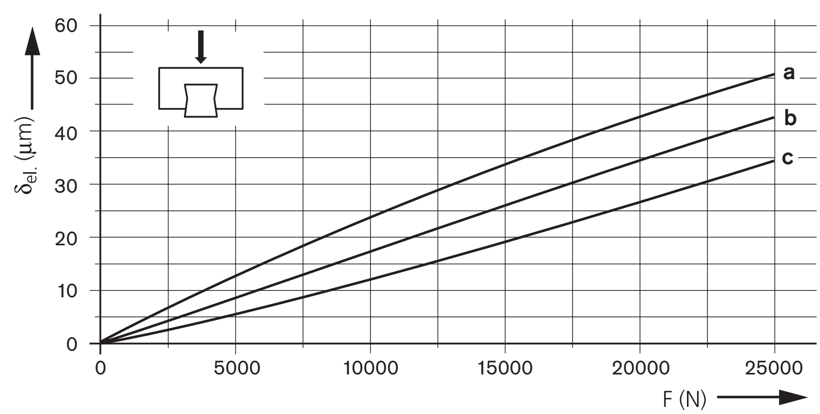
Example: ball runner block SNS Flange slimline standard height

Size 35:

a) Ball runner block R1622 31. 20 with preload C1

b) Ball runner block R1622 32. 20 with preload C2

c) Ball runner block R1622 33. 20 with preload C3



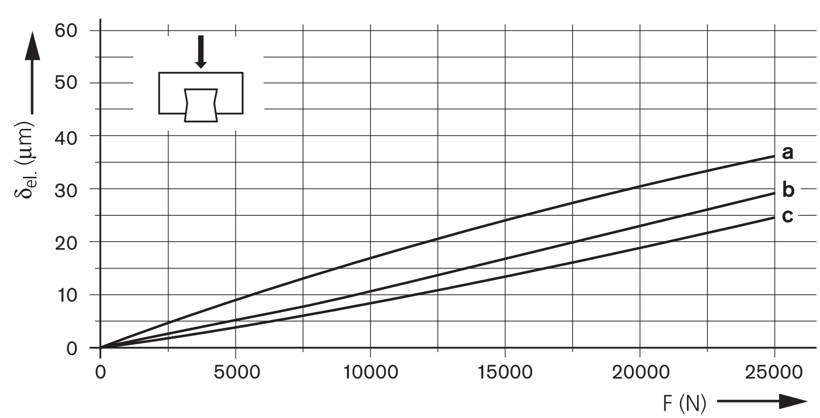
Example: ball runner block SLS slimline long standard height

Size 35:

a) Ball runner block R1623 31. 20 with preload C1

b) Ball runner block R1623 32. 20 with preload C2

c) Ball runner block R1623 33. 20 with preload C3



Preload

C1/C2/C3 = According to pre-tensioning force F_{pr} table

Key

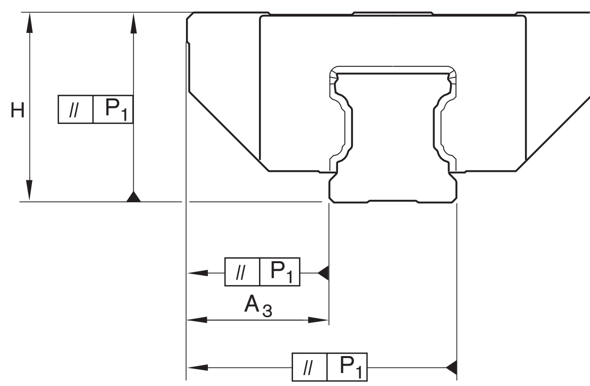
δ_{el} = Elastic deformation (µm)

F = load (N)

Accuracy classes

Accuracy classes and their tolerances

In ball rail systems, the ball runner blocks are available in six accuracy classes and the guide rails in five accuracy classes. For details of the available ball runner blocks and guide rails, see the “Part numbers” tables.

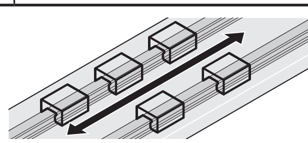
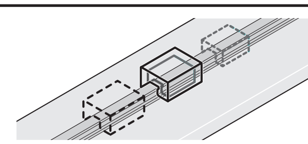


Key to illustration

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

Precision manufacturing process makes interchangeability easy

Rexroth manufactures its ball guide rails and ball runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time. For example, a ball runner block can be used without problems on various guide rails of the same size. Similarly, different ball runner blocks can also be used on one and the same ball guide rail.

	H	A_3	$\Delta H, \Delta A_3$
Measured at middle of runner block	 For any ball runner block/rail combination at any position on rail		 For different ball runner blocks at same position on rail

Ball rail system made of steel, aluminum, Resist NR and Resist NRII

Accuracy classes	**Tolerances of the dimensions** (μm) H	A_3	**Max. differences of dimensions H and A_3 on one rail** (μm) $\Delta H, \Delta A_3$
N	±100	±40	30
H	±40	±20	15
P	±20	±10	7
XP[1)]	±11	±8	7
SP	±10	±7	5
UP	±5	±5	3

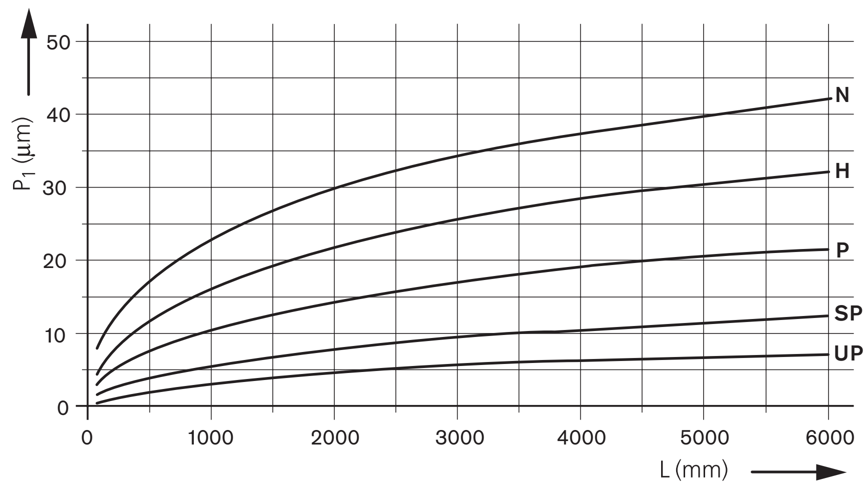
1) Ball runner block in accuracy class XP, ball guide rail with accuracy class SP

Ball rail system, Resist CR, matte-silver hard chrome plated

Accuracy classes	**Tolerances of the dimensions** (μm) H		A_3		**Max. differences of dimensions H and A_3 on one rail** (μm) $\Delta H, \Delta A_3$	
	Ball runner block/ball guide rail	**Ball guide rail**	**Ball runner block/ball guide rail**	**Ball guide rail**	**Ball runner block/ball guide rail**	**Ball guide rail**
H	+47 -38	+44 -39	±23	+19 -24	18	15

Accuracy classes

Parallelism offset P_1 of the ball rail system in operation Values measured in the middle of the runner block with ball rail systems without surface coating.
In the case of Resist CR hard chrome-plated ball guide rails, the values can increase up to 2 μm.



Tolerances for combination of accuracy classes

Ball runner block			Ball guide rails N (μm)	H (μm)	P (μm)	SP (μm)	UP (μm)
N	Tolerance dimension H	(μm)	**±100**	**±48**	±32	±23	±19
	Tolerance dimension A_3	(μm)	**±40**	**±28**	±22	±20	±19
	Max. diff. in dimensions H and A_3 on one rail	(μm)	**30**	**30**	30	30	30
H	Tolerance dimension H	(μm)	**±92**	**±40**	**±24**	±15	±11
	Tolerance dimension A_3	(μm)	**±32**	**±20**	**±14**	±12	±11
	Max. diff. in dimensions H and A_3 on one rail	(μm)	**15**	**15**	**15**	15	15
P	Tolerance dimension H	(μm)	±88	**±36**	**±20**	**±11**	±7
	Tolerance dimension A_3	(μm)	±28	**±16**	**±10**	**±8**	±7
	Max. diff. in dimensions H and A_3 on one rail	(μm)	7	**7**	**7**	**7**	7
XP	Tolerance dimension H	(μm)	±88	**±36**	**±20**	**±11**	±7
	Tolerance dimension A_3	(μm)	±28	**±16**	**±10**	**±8**	±7
	Max. diff. in dimensions H and A_3 on one rail	(μm)	7	**7**	**7**	**7**	7
SP	Tolerance dimension H	(μm)	±87	±35	**±19**	**±10**	**±6**
	Tolerance dimension A_3	(μm)	±27	±15	**±9**	**±7**	**±6**
	Max. diff. in dimensions H and A_3 on one rail	(μm)	5	5	**5**	**5**	**5**
UP	Tolerance dimension H	(μm)	±86	±34	±18	**±9**	**±5**
	Tolerance dimension A_3	(μm)	±26	±14	±8	**±6**	**±5**
	Max. diff. in dimensions H and A_3 on one rail	(μm)	3	3	3	**3**	**3**

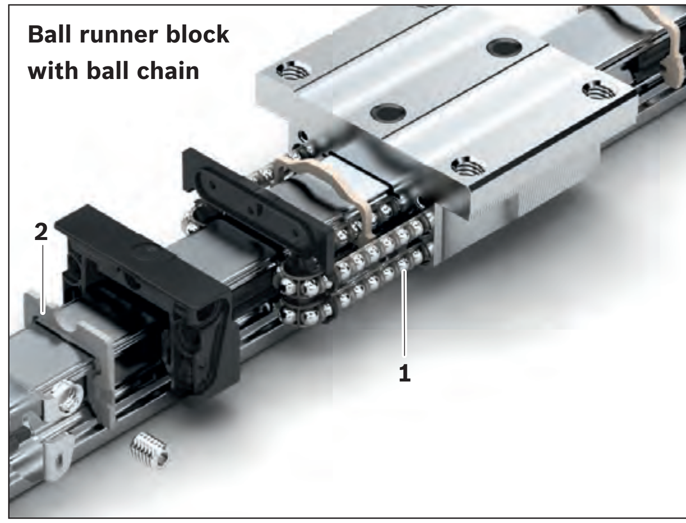
Recommendations for combining accuracy classes
Recommended with **relatively large ball runner block distances** and long strokes:
Ball guide rail in higher accuracy class than ball runner blocks.
Recommended with **small ball runner block distances** and short strokes:
Ball runner blocks in higher accuracy class than ball guide rail.

Selection criterion Travel accuracy
Perfected ball entry and exit zones in the ball runner blocks and optimized spacing of the mounting holes in the guide rails provide very high travel accuracy with very low pulsation. Particularly suitable for high-precision metal-cutting machining, measuring technology, high-precision scanners, eroding technology, etc. (see “Application examples” in the chapter entitled “Product description of high-precision steel ball runner blocks BSHP”.

Ball chain

Rexroth recommends using a ball chain particularly in applications calling for low noise levels.

Ball runner blocks can be equipped with a ball chain (1) as an option. The ball chain prevents the balls from bumping into each other and ensures smoother travel. This reduces the noise level. The lower number of load-bearing balls in ball runner blocks with a ball chain, mean that lower load capacities and load moments can result (“Product overview with load capacities and load moments”).



Seals

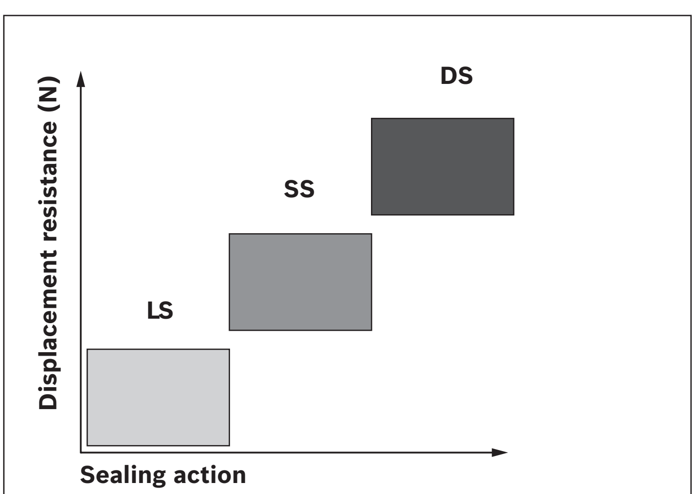
The sealing plate (2) on the end face protects the ball runner block internals from dirt particles, shavings and liquids. It also reduces lubricant drag-out. Optimized sealing lip geometry results in minimal friction. Sealing plates are available with black standard seals (SS), beige low-friction seals (LS), or green double-lipped seals (DS).

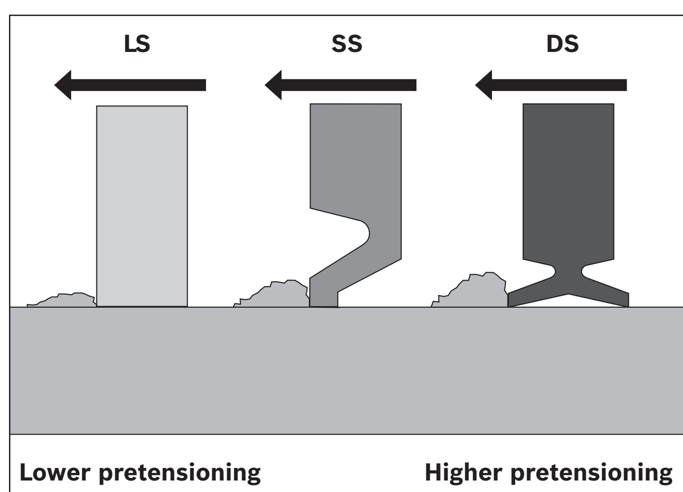
Low-friction seals (LS) (seals with very low friction)
The low-friction seal was developed for applications requiring especially smooth running with minimal lubricant drag-out. It consists of an open-pored polyurethane foam and has only limited wiping action.

Standard seal (SS) (universal seal with good sealing effect)
The standard seal is sufficient for most applications. It offers good wiping action while still permitting long relubrication intervals.

Double-lipped seal (DS) (seal with very good sealing effect)
Rexroth recommends using double-lipped seals in applications in which the ball rail is heavily covered with swarf, wood dust, coolants/lubricants, etc. It has an excellent wiping action with a higher level of frictional drag and lower relubrication intervals.

Sealing action and resistance to movement
The resistance to movement is influenced by the seal’s geometry and the material it is made of. The diagram shows the effect of different seal variants on the sealing effect and the displacement resistance.

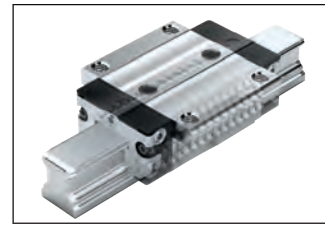




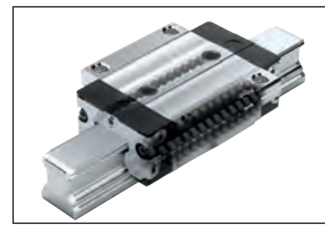
Materials

Rexroth offers ball runner blocks in a variety of materials to meet the requirements of different applications.

A Standard steel ball runner blocks The most widespread version made of carbon steel. An economical solution, but provides no protection against corrosion. It is, however, sufficient for most industrial machinery applications.

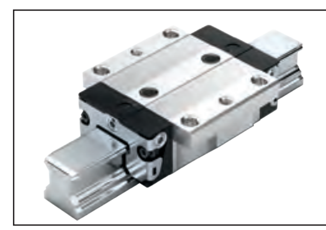


B High-speed steel ball runner blocks With this variant, ceramic balls replace the steel ones in steel ball runner blocks. Since the ceramic material is less dense than steel, the forces in the recirculation zones of the ball circuits remain the same even at the higher permissible travel speed. As a result, there is no reduction in life expectancy, even when the system is operated at speeds of up to 10 m/s. The load capacities and moments are slightly lower than those of the standard version.



Ball runner blocks with limited corrosion resistance

C Aluminum ball runner blocks The ball runner block body consists of a wrought aluminum alloy. The balls, steel inserts, and the mounting screws at the end face are made of carbon steel. The ball runner blocks have the same load capacities as the standard version. Since the yield strength of aluminum is less than that of steel, the maximum load capacity of the ball runner block is limited by $F_{max.}$ and $M_{max.}$
A cost-effective alternative with limited corrosion protection.



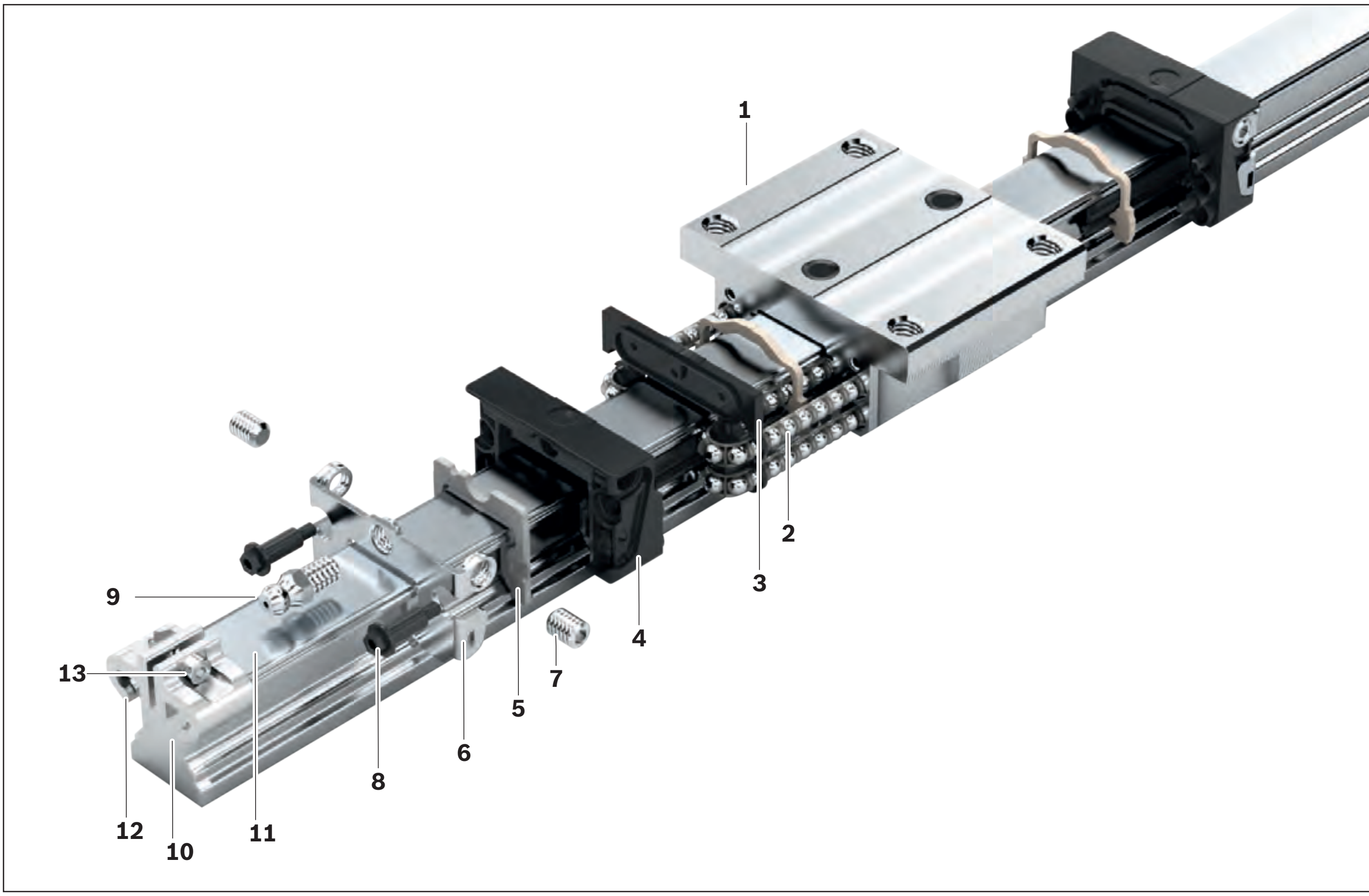
Corrosion-resistant ball runner blocks

D Resist NR
The ball runner block body is made of corrosion-resistant material. Offers limited corrosion protection. The balls, steel inserts, and the mounting screws at the end face are made of carbon steel. The ball runner blocks have the same load capacities and moments as the standard versions.
Rexroth recommends this version for applications requiring corrosion protection.
Fast delivery.

E Resist NR II All the parts of this ball runner block are made of corrosion-resistant material. These ball runner blocks offer the greatest possible protection against corrosion with only a slight reduction in load capacities and moments.

F Resist CR The ball runner block body has a matte silver, hard chrome-plated corrosion-resistant coating. The balls, steel inserts, and the mounting screws at the end face are made of carbon steel. The ball runner blocks have the same load capacities and moments as the standard versions.
As an alternative if the NR version is not available.

Material specifications



Item	Part	Ball runner block A **Steel**	 B **Steel (high-speed)**	 C **Aluminum**	 D **Resist NR**	 E **Resist NR II**	 F **Resist CR**
1	Ball runner block body	Heat-treated steel	Heat-treated steel	Wrought aluminum alloy	Corrosion-resistant steel 1.4122	Corrosion-resistant steel 1.4122	Heat-treated steel, chrome-plated
2	Balls	Anti-friction bearing steel	Si_3N_4	Anti-friction bearing steel	Anti-friction bearing steel	Corrosion-resistant steel 1.4112	Anti-friction bearing steel
3	Recirculation plate	Plastic TEE-E					
4	Ball guide	Plastic POM (PA6.6)					
5	Sealing plate	Plastic TEE-E					
6	Threaded plate	Corrosion-resistant steel 1.4306					
7	Set screw	Corrosion-resistant steel 1.4301					
8	Flanged screws	Carbon steel				Corrosion-resistant steel 1.4303	Carbon steel
9	Lube nipple					Corrosion-resistant steel 1.4305	
Item	Part	Ball guide rail					
10	Ball guide rail	Heat-treated steel				Corrosion-resistant steel 1.4116	Heat-treated steel
11	Cover strip	Corrosion-resistant steel 1.4310					
12	Strip clamp	Anodized aluminum					
13	Clamping screw with nut	Corrosion-resistant steel 1.4301					

Product description

Characteristic features

- The same high load capacities in all four main directions of loading
- Low noise level and outstanding travel performance
- Excellent dynamic characteristics:
  Speed: v_{max} = 5 m/s
  Acceleration: a_{max} = 500 m/s^2
- Long-term lubrication, up to several years
- Minimum quantity lubrication system with integrated reservoir for oil lubrication[1)]
- Lube ports with metal thread on all sides[1)]
- Limitless interchangeability; all ball guide rail versions can be combined at will with all ball runner block versions within each accuracy class
- Optimum system rigidity through preloaded O-arrangement
- Integrated, inductive and wear-free measuring system as an option
- Top logistics that are unique worldwide due to interchangeability of components within each accuracy class
- Attachments on the ball runner block for mounting from above and below[1)]
- Increase in rigidity with lift-off and lateral loading by means of additional screw connections on two holes in the middle of the ball runner block[1)]
- Extensive range of accessories
- Mounting threads provided on end faces for fixing of all add-on elements

Further highlights

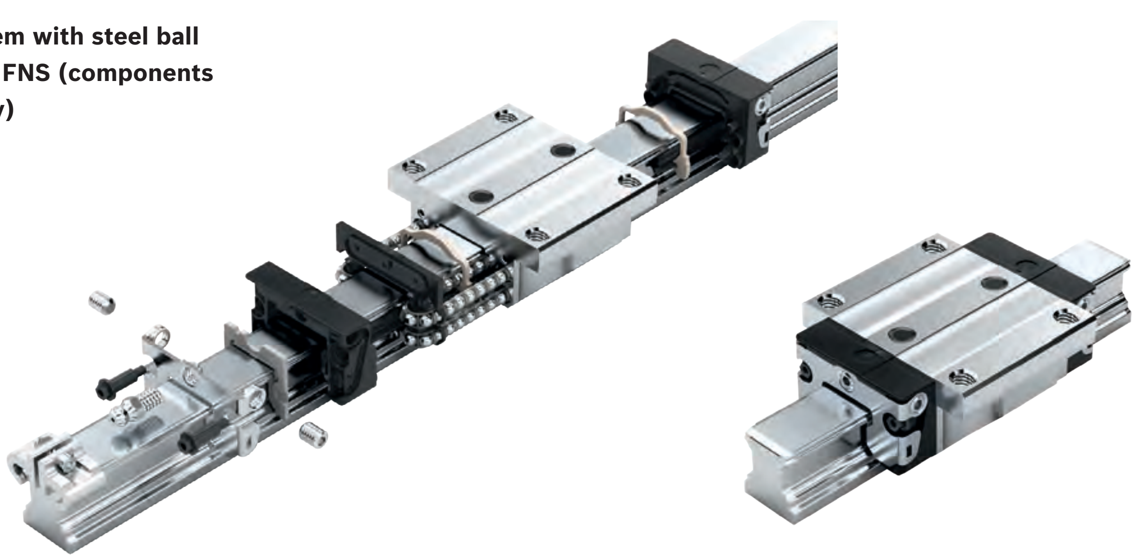
- High rigidity in all load directions – permits applications with just one runner block per rail
- Integrated all-round sealing
- High torque load capacity
- Optimized entry-zone geometry and high number of balls per track minimizes variation in elastic deflection
- Smooth, light running thanks to optimized ball recirculation and ball or ball chain guidance
- Various preload classes
- Ball runner blocks initially greased at the factory[1)]
- Optionally available with ball chain[1)]

Corrosion protection (optional)[1)]

- Resist NR:
  Ball runner block body made of corrosion-resistant steel according to DIN EN 10088
- Resist NR II:
  Ball runner block body or ball guide rail and all steel components made of corrosion-resistant steel according to DIN EN 10088
- Resist CR:
  Ball runner block body or ball guide rail made of steel with corrosion-resistant hard chrome-plated matte silver coating

1) Type-dependent

Ball rail system with steel ball runner block FNS (components and assembly)



Highlights of BSHP ball runner blocks

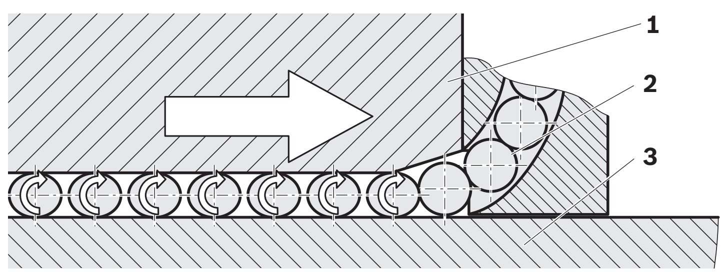
- Travel accuracy again further improved by a factor of up to six
- Significantly reduced frictional drag variations and low frictional drag, especially under an applied external load
- Highest precision
- Superior quality
- Minimum quantity preservation in accuracy classes XP; SP; UP.
  (Reduction in the negative effect on the environment due to anti-corrosion agents)
- Patented entry zone design enhances travel accuracy
- Plus all further advantages of Rexroth precision ball runner blocks

Comparison

Conventional ball runner blocks

If the ball runner block has a conventional entry zone, this can only be designed for a specific load point.

Entry zone geometry for conventional ball runner blocks



1) Ball runner block **2)** Ball **3)** Ball guide rail

Ball entry

- The balls are guided to the beginning of the entry zone by the ball recirculation track.
- When the distance between the ball runner block (1) and the ball guide rail (3) becomes smaller than the ball diameter, the ball (2) is subjected to loading (preload) in a series of pulses.
- The preload increases in the entry zone and reaches a maximum in the load-bearing zone. The ball transmits the force from the ball runner block to the rail.
- The kinematic and geometric conditions cause spaces to develop between the balls.

Entry zone

Conventional ball runner blocks have a fixed entry zone. The depth of the entry zone must be designed to withstand high loading, since smooth ball entry must be assured even under very high loads.

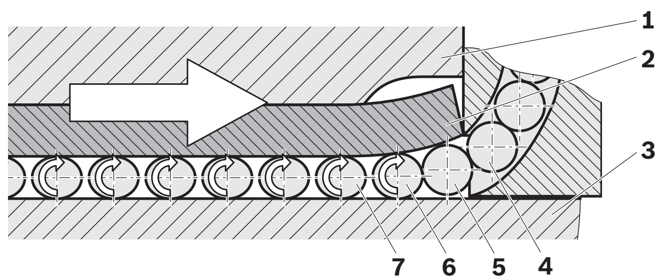
- On the one hand, there should be as many load-bearing balls in the ball runner block to achieve optimum load-bearing capacity.
  ⇒ As short an entry zone as possible
- On the other hand, the increase in loading of the balls upon entry should be as slow and smooth as possible, in order to maximize the geometrical travel accuracy.
  ⇒ As flat (long) an entry zone as possible

These are conflicting aims (short versus long entry zone).

Product description

High-precision steel ball runner blocks BSHP

New entry zone geometry for high precision ball runner blocks
High-precision ball runner blocks have an innovative entry zone. The ends of the steel segments are not supported by the ball runner block body and can therefore deflect elastically. This entry zone adjusts individually to the actual operating load of the ball runner block. The balls enter the load-bearing zone very smoothly, i.e. without any load pulsation.



1) Ball runner block
2) Steel segment
3) Ball guide rail
4) – **7)** Balls

Ball entry

- The balls (4) are guided to the beginning of the entry zone by the ball recirculation track.
- The ball (5) enters the zone load-free.
- The ball (6) deforms the end of the steel bearing plate (2) elastically. This deflection is the sum of the compliance of the ball itself and the compliance of the unsupported end of the steel segment.
- If the distance between the steel bearing plate and the ball guide rail (3) gets less than the ball diameter, the ball comes under load slowly and evenly (preload).
- The preload is thus smoothly increased until the ball (7) has reached its maximum preload.

Innovative solution from Rexroth:

The load-dependent entry zone
The crucial factor is the functionality of the entry zone. The steel segments are manufactured with such precision that they deflect to the right degree in response to the actual load. This results in especially smooth ball entry behavior. A ball deflects the precision-manufactured steel segment only as far as necessary to allow the following ball to enter load-free. The ball is no longer guided into the load-bearing zone in pulses by a rigid entry channel but by a very smooth flexing curve, which ideally transitions tangentially into the load-bearing zone. The extremely smooth ball entry behavior and the continuous adjustment of the entry zone in response to the actual load are the great advantages of these high precision ball runner blocks.

Characteristic features

1 Highest travel accuracy
2 Minimal frictional drag variation
3 The conflicting aims are resolved

Frictional drag variations

Definition

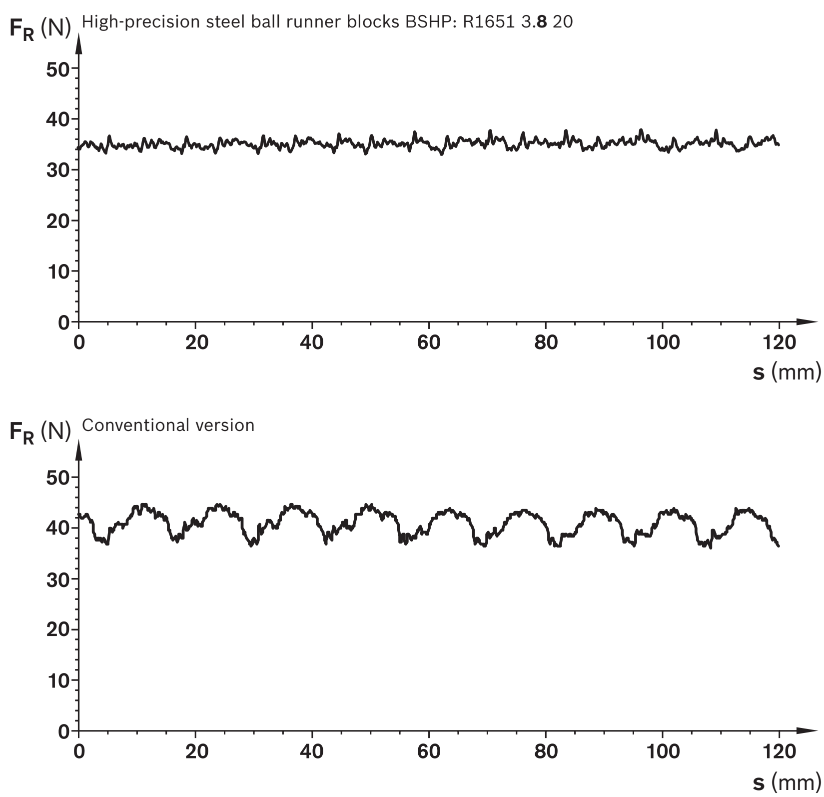
The total frictional drag of a ball runner block is composed of the following components:

1 Ball friction
2 Seal friction
3 Friction in the ball recirculation elements and recirculation tracks

Variations in frictional drag can be especially troublesome in certain operating environments.

These variations are mainly due to the following fact:
The balls have to transition from the load-free zone to the load-bearing zone. Through its innovative design, the smooth ball entry zone minimizes the variations, which also permits better control of the linear drive.

Frictional drag comparison for a size 35 ball runner block with an external load of 10,000 N



⇒ Reduced frictional drag value
⇒ Considerably reduced frictional drag fluctuation

Product description

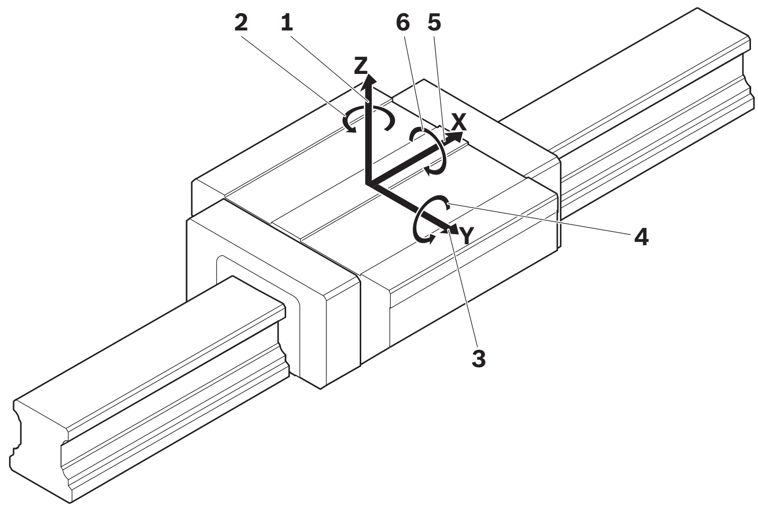
Travel accuracy

Definition

Ideally, the ball runner block should move in a straight line along the guide rail in the direction of the X-axis. In practice, however, deviations occur in all six degrees of freedom. Travel accuracy is the term used to describe the closeness of the movement to the ideal straight line.

The six different degrees of freedom

1 Vertical offset (linear deviation in Z)
2 Yawing (rotation about the Z-axis)
3 Vertical offset (linear deviation in Z)
4 Pitching (rotation about the Y-axis)
5 Translation (linear motion in X)
6 Rolling (rotation about the X-axis)



Causes of travel inaccuracy
Travel accuracy is influenced by the following parameters:
1. The finish of the mounting base to which the rail fastened.
2. Parallelism errors between the contact surfaces of the rail and the ball running tracks.
3. Elastic deformations of the rail under the mounting screws.
4. Variations in accuracy as balls enter and exit the load-bearing zone.

Optimization potential
For 1.: Machine the contact surfaces of the ball guide rail as precisely as possible (cannot be affected by Rexroth).
For 2.: Compensate by choosing the accuracy class of the ball guide rail.
For 3.: Reduce the tightening torque. The tightening torque for the fastening screws has a proportional effect. Reducing the torque will lessen the compression of the rail material.
⇒ Lower geometric travel fluctuations for 4.: The patented, innovative entry zone of Rexroth's high-precision ball runner blocks minimizes accuracy fluctuations.
⚠ This measure makes it possible to reduce the transferable forces and moments.

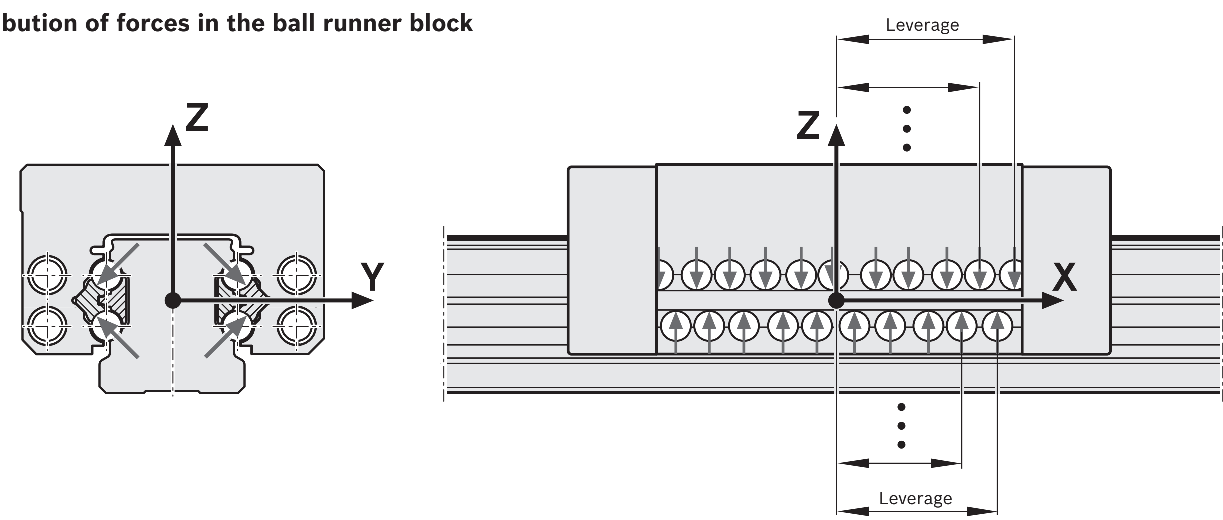
Further potential improvements:
- Use of long runner blocks
- Installation of additional runner blocks per rail

The deviations measured are due to the following phenomenon

A ball circuit contains a number n of load-bearing balls. When the ball runner block is moved in the direction of travel, a new ball engages in the entry zone. Now there are n+1 load-bearing balls. This creates an imbalance between the four rows of load-bearing balls. The ball runner block gets into a rotational movement, since the balls in the load-bearing rows of balls can involuntarily enter. To reestablish the balance, the ball runner block moves to a new balanced position. As the ball runner block moves further on, a ball leaves the load-bearing part of the circuit through the run-out zone. This again creates an imbalance between the four load-bearing ball circuits, which the ball runner block again attempts to correct by rotating.
You can clearly see this effect in the diagram on the next page.

As demonstrated in practical applications, the shortwave inaccuracies have a period equivalent to approximately twice the ball diameter.
The remaining long-wave deviation is the result of the causes 1, 2 and 3 described earlier (mounting base finish, parallelism error, and elastic deformation of the rail under the fastening screws).

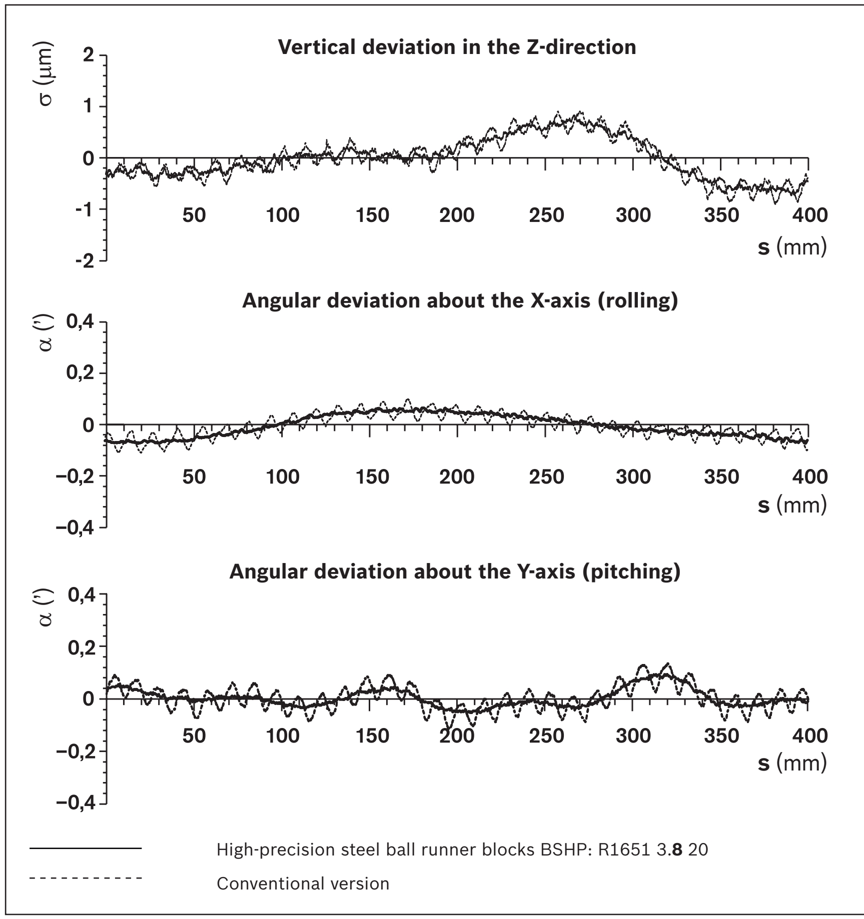
Distribution of forces in the ball runner block



Product description

Direct comparison of the travel accuracy of two ball runner blocks

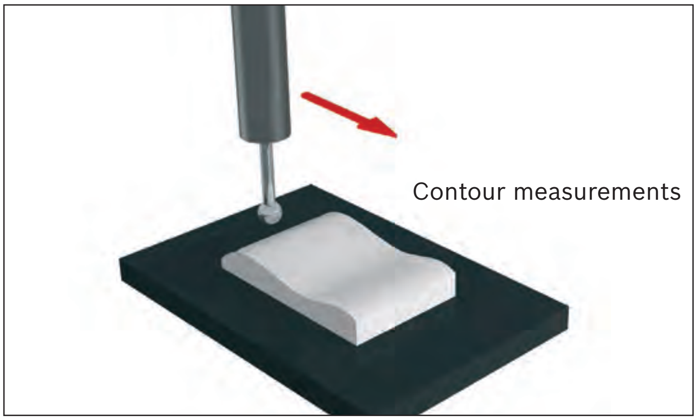
The graph clearly shows that the short-wave inaccuracies (dashed line) can be very significantly reduced by the new, innovative design of the entry zone (continuous line).



Application examples

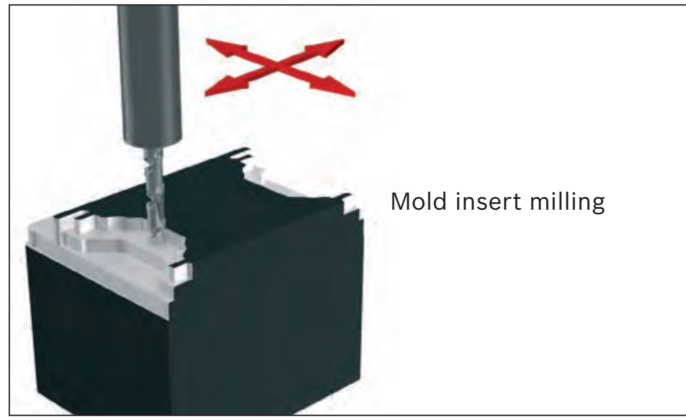
Rexroth high precision ball runner blocks are especially suited for the following applications:

Measuring



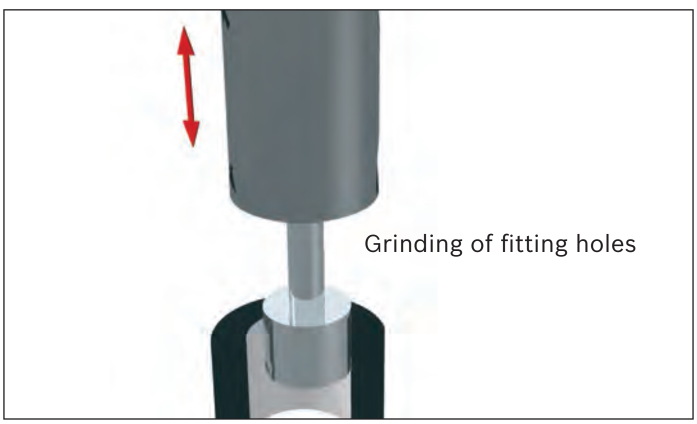
3D coordinate measuring machine

(EDM)



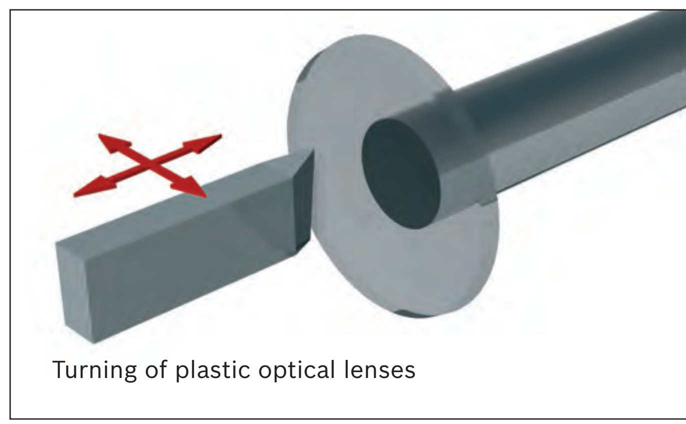
Hard milling

Grinding



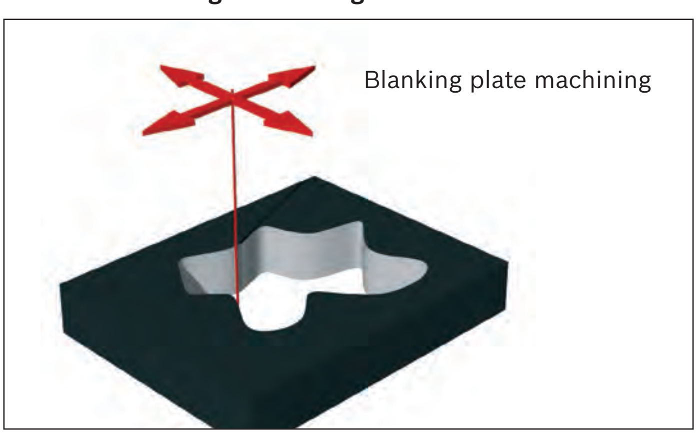
Internal cylindrical grinding

Milling



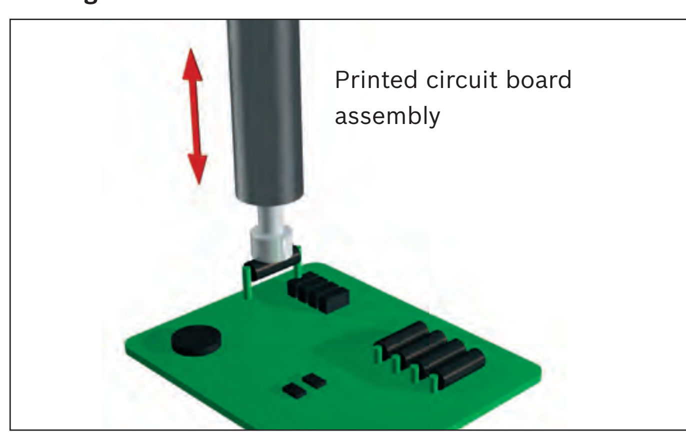
High precision turning

Electrical discharge machining



Wire EDM

Turning Microelectronics



PCB assembly machines

These are just a few examples. It is possible to implement other applications of course. Simply ask us. We'll find the right solution for your needs.

Overview of formats

Standard steel ball runner blocks[1] BSHP up to size 45

FNS

FLS

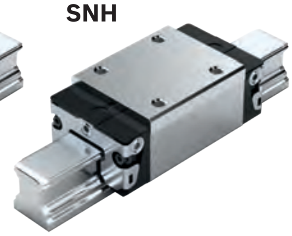
FKS

SNS

SLS

SKS

SNH



SLH

FNN[2]

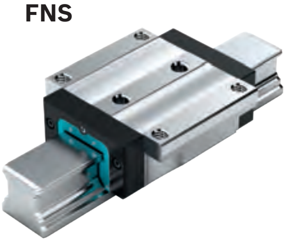
FKN[2]

SNN[2]

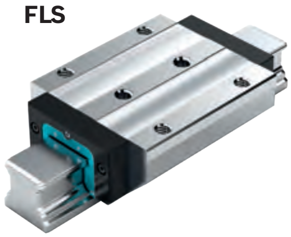
SKN[2]

Heavy-duty ball runner blocks[2] BSHP from size 55 onwards

FNS



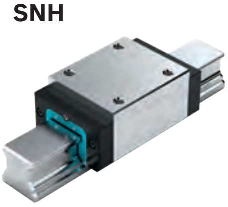
FLS



SNS

SLS

SNH



SLH

Ball chain (optional)

- Optimizes noise levels

1) With ball chain
2) Without ball chain

Order example

Ordering ball runner blocks

The part number is composed of the code numbers for the individual options Each option (gray background) has its own code number (white background).
The following ordering example applies to all ball runner blocks.

Explanation of option "Ball runner block with size"

The design style of the ball runner block – in this example, a standard ball runner block FNS – is specified on the respective product page.
Coding in the part number:

R1651 7

Design style Size

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class						Seal with ball runner blocks					
												without ball chain			with ball chain		
		C0	C1	C2	C3	N	H	P	XP	SP	UP	SS	LS[1)]	DS	SS	LS[1)]	DS
15	R1651 1	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	–	22	23	–
				2		–	3	2	8	1	9	20	21	–	22	23	–
					3	–	–	–	8	1	9	20	21	–	22	23	–
20	R1651 8	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
25	R1651 2	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
30	R1651 7	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
35	R1651 3	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
45	R1651 4	9				4	3	–	–	–	–	20	–	–	22	–	–
			1			4	3	2	8	1	9	20	–	2Z	22	–	2Y
				2		–	3	2	8	1	9	20	–	2Z	22	–	2Y
					3	–	–	–	8	1	9	20	–	2Z	22	–	2Y
e.g.	R1651 7		1				3					20					

Order example

Options:

- FNS ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number: R1651 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

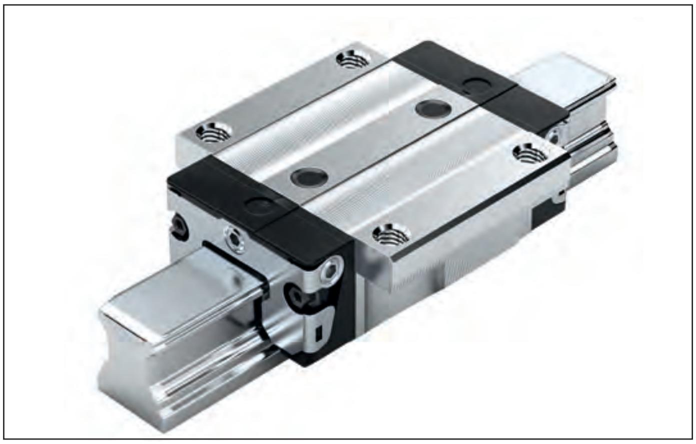
Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/combination
(Some delivery times may be longer)

Definition of ball runner block format

Criterion	Designation	Abbreviation (example)		
		F	N	S
Width	**F**lange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	**N**ormal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

FNS – Flange, normal, standard height R1651 ... 2.



Dynamic characteristics

Travel speed: v_{max} = 5 m/s
Acceleration: a_{max} = 500 m/s^2
(If F_{comb} > 2.8 · F_{pr} : a_{max} = 50 m/s^2)

Note on lubrication

- Pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class						Seal with ball runner blocks					
												without ball chain			with ball chain		
		C0	C1	C2	C3	N	H	P	XP	SP	UP	SS	LS[1)]	DS	SS	LS[1)]	DS
15	R1651 1	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	–	22	23	–
				2		–	3	2	8	1	9	20	21	–	22	23	–
					3	–	–	–	8	1	9	20	21	–	22	23	–
20	R1651 8	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
25	R1651 2	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
30	R1651 7	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
35	R1651 3	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
45	R1651 4	9				4	3	–	–	–	–	20	–	–	22	–	–
			1			4	3	2	8	1	9	20	–	2Z	22	–	2Y
				2		–	3	2	8	1	9	20	–	2Z	22	–	2Y
					3	–	–	–	8	1	9	20	–	2Z	22	–	2Y
e.g.	R1651 7		1				3					20					

1) With accuracy classes N and H and XP in preload class C1 only.

Order example

Options:

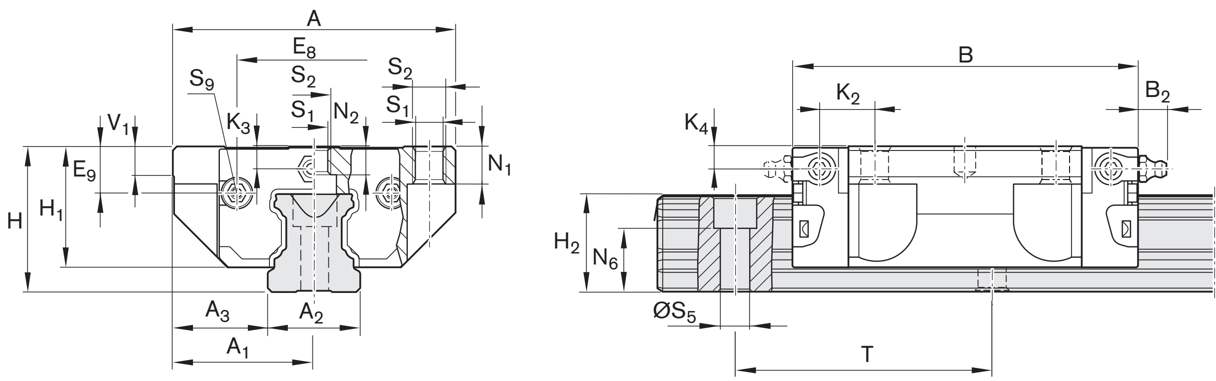
- FNS ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

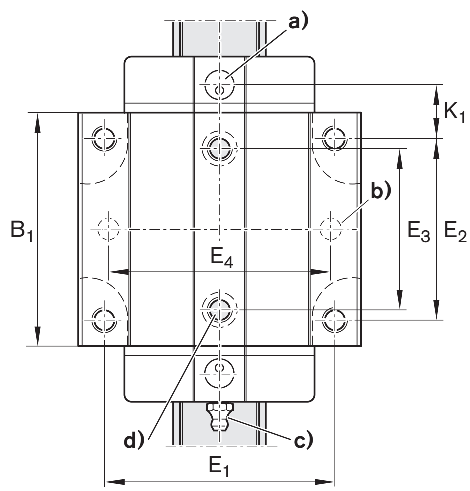
Part number:
R1651 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 45: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

a) Recommended position for pin holes (dimensions E_4 see section Mounting)
Due to production-related issues, pre-drilled holes may be present at this position. They are suitable for drilling out.

b) Lube nipple, size 15 – 20:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

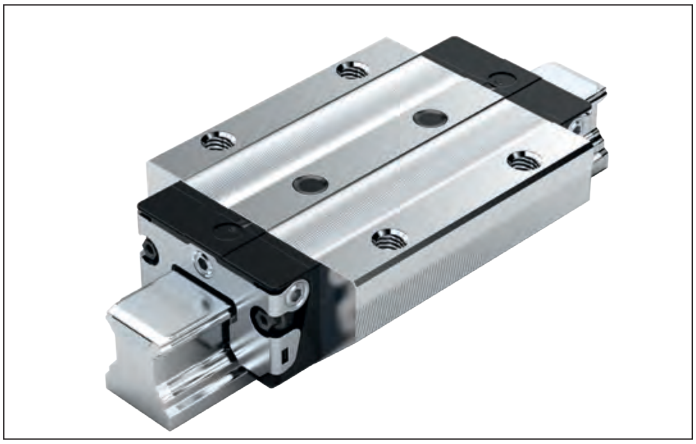
c) For manufacturing reasons, there may be plugs at these positions. These must be removed before mounting.

Size	Dimensions (mm)																	
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_3	E_8	E_9	H	H_1	H_2 1)	H_2 2)	K_1	K_2	K_3	K_4
15	47	23.5	15	16.0	58.2	39.2	38	30	26	24.55	6.70	24	19.90	16.30	16.20	8.00	9.6	3.20	3.20
20	63	31.5	20	21.5	75.0	49.6	53	40	35	32.50	7.30	30	25.35	20.75	20.55	11.80	11.8	3.35	3.35
25	70	35.0	23	23.5	86.2	57.8	57	45	40	38.30	11.50	36	29.90	24.45	24.25	12.45	13.6	5.50	5.50
30	90	45.0	28	31.0	97.7	67.4	72	52	44	48.40	14.60	42	35.35	28.55	28.35	14.00	15.7	6.05	6.05
35	100	50.0	34	33.0	110.5	77.0	82	62	52	58.00	17.35	48	40.40	32.15	31.85	14.50	16.0	6.90	6.90
45	120	60.0	45	37.5	137.6	97.0	100	80	60	69.80	20.90	60	50.30	40.15	39.85	17.30	19.3	8.20	8.20

Size	Dimensions (mm)									Weight (kg)	Load capacities 3) (N)		Load moments 3) (Nm)			
	N_1	N_2	$N_6^{\pm0.5}$	S_1	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
15	5.2	4.40	10.3	4.3	M5	4.5	M2.5x3.5	60	5.0	0.20	9 860	12 700	95	120	68	87
20	7.7	5.20	13.2	5.3	M6	6.0	M3x5	60	6.0	0.45	23 400	29 800	300	380	200	260
25	9.3	7.00	15.2	6.7	M8	7.0	M3x5	60	7.5	0.65	28 600	35 900	410	510	290	360
30	11.0	7.90	17.0	8.5	M10	9.0	M3x5	80	7.0	1.10	36 500	48 100	630	830	440	580
35	12.0	10.15	20.5	8.5	M10	9.0	M3x5	80	8.0	1.60	51 800	80 900	1 110	1 740	720	1 130
45	15.0	12.40	23.5	10.4	M12	14.0	M4x7	105	10.0	3.00	86 400	132 000	2 330	3 560	1 540	2 350

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain ☞ 12
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1.
Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ by 1.26 according to the table.

FLS – Flange, long, standard height R1653 ... 2.



Dynamic characteristics
Travel speed: v_{max} = 5 m/s
Acceleration: a_{max} = 500 m/s^2
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication
- Pre-lubricated

Note
For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class						Seal with ball runner blocks					
												without ball chain			with ball chain		
		C0	C1	C2	C3	N	H	P	XP	SP	UP	SS	LS1)	DS	SS	LS1)	DS
15	R1653 1	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	–	22	23	–
				2		–	3	2	8	1	9	20	21	–	22	23	–
					3	–	–	–	8	1	9	20	21	–	22	23	–
20	R1653 8	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
25	R1653 2	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
30	R1653 7	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
35	R1653 3	9				4	3	–	–	–	–	20	21	–	22	23	–
			1			4	3	2	8	1	9	20	21	2Z	22	23	2Y
				2		–	3	2	8	1	9	20	21	2Z	22	23	2Y
					3	–	–	–	8	1	9	20	21	2Z	22	23	2Y
45	R1653 4	9				4	3	–	–	–	–	20	–	–	22	–	–
			1			4	3	2	8	1	9	20	–	2Z	22	–	2Y
				2		–	3	2	8	1	9	20	–	2Z	22	–	2Y
					3	–	–	–	8	1	9	20	–	2Z	22	–	2Y
e.g.	R1653 7		1				3					20					

1) With accuracy classes N and H and XP in preload class C1 only.

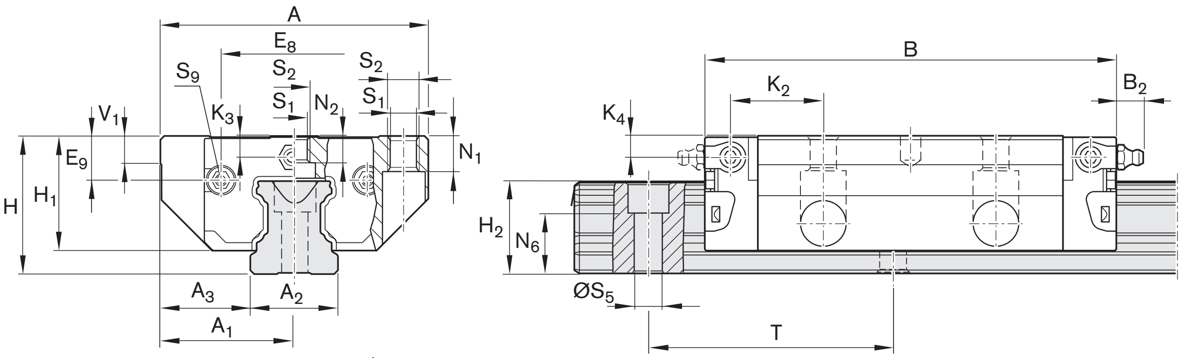
Order example
Options:
- FLS ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

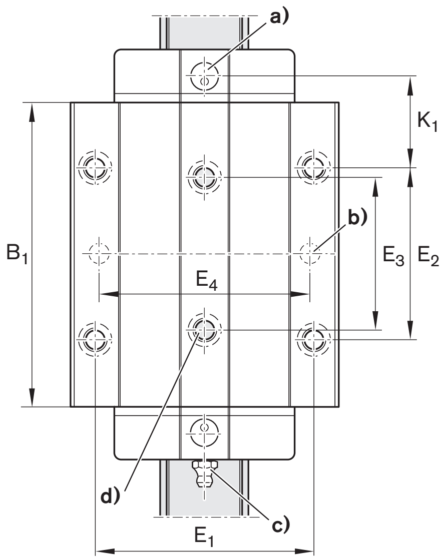
Part number:
R1653 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 45: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

a) Recommended position for pin holes (dimensions E_4 see section Mounting)
Due to production-related issues, pre-drilled holes may be present at this position.
They are suitable for drilling out.

b) Lube nipple, size 15 – 20:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

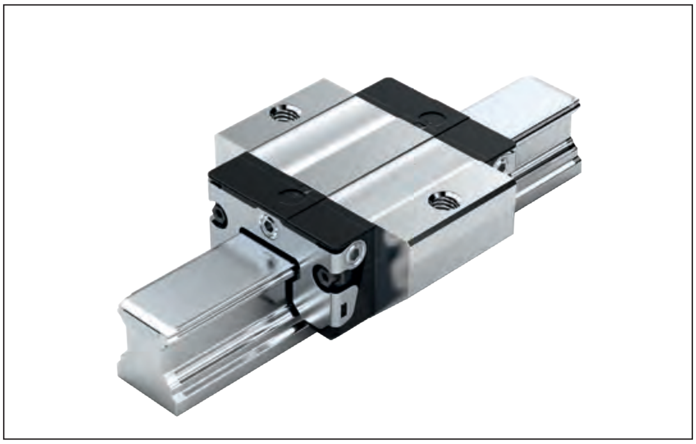
c) Due to production-related issues, blanking plugs may be present at this position.
These must be removed before mounting.

Size	**Dimensions** (mm)																	
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_3	E_8	E_9	H	H_1	H_2 1)	H_2 2)	K_1	K_2	K_3	K_4
15	47	23.5	15	16.0	72.6	53.6	38	30	26	24.55	6.70	24	19.90	16.30	16.20	15.20	16.80	3.20	3.20
20	63	31.5	20	21.5	91.0	65.6	53	40	35	32.50	7.30	30	25.35	20.75	20.55	19.80	19.80	3.35	3.35
25	70	35.0	23	23.5	107.9	79.5	57	45	40	38.30	11.50	36	29.90	24.45	24.25	23.30	24.45	5.50	5.50
30	90	45.0	28	31.0	119.7	89.4	72	52	44	48.40	14.60	42	35.35	28.55	28.35	25.00	26.70	6.05	6.05
35	100	50.0	34	33.0	139.0	105.5	82	62	52	58.00	17.35	48	40.40	32.15	31.85	28.75	30.25	6.90	6.90
45	120	60.0	45	37.5	174.1	133.5	100	80	60	69.80	20.90	60	50.30	40.15	39.85	35.50	37.50	8.20	8.20

Size	**Dimensions** (mm)									**Weight** (kg)	**Load capacities** 3) (N)		**Load moments** 3) (Nm)			
	N_1	N_2	$N_6^{\pm0.5}$	S_1	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
15	5.2	4.40	10.3	4.3	M5	4.5	M2.5x3.5	60	5.0	0.30	12 800	18 400	120	180	120	180
20	7.7	5.20	13.2	5.3	M6	6.0	M3x5	60	6.0	0.55	29 600	41 800	380	540	340	490
25	9.3	7.00	15.2	6.7	M8	7.0	M3x5	60	7.5	0.90	37 300	52 500	530	750	530	740
30	11.0	7.90	17.0	8.5	M10	9.0	M3x5	80	7.0	1.50	46 000	66 900	800	1 160	740	1 080
35	12.0	10.15	20.5	8.5	M10	9.0	M3x5	80	8.0	2.25	66 700	116 000	1 440	2 500	1 290	2 240
45	15.0	12.40	23.5	10.4	M12	14.0	M4x7	105	10.0	4.30	111 000	190 000	3 010	5 120	2 730	4 660

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain ☞🖹 12
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ by 1.26 according to the table.

FKS – Flange, short, standard height R1665 ... 2.



Dynamic characteristics

Travel speed: v_{max} = 5 m/s

Acceleration: a_{max} = 500 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks					
						without ball chain			with ball chain		
		C0	C1	N	H	SS	LS	DS	SS	LS	DS
15	R1665 1	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	–	22	23	–
20	R1665 8	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	2Z	22	23	2Y
25	R1665 2	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	2Z	22	23	2Y
30	R1665 7	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	2Z	22	23	2Y
35	R1665 3	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	2Z	22	23	2Y
e.g.	R1665 7		1		3	20					

Order example

Options:

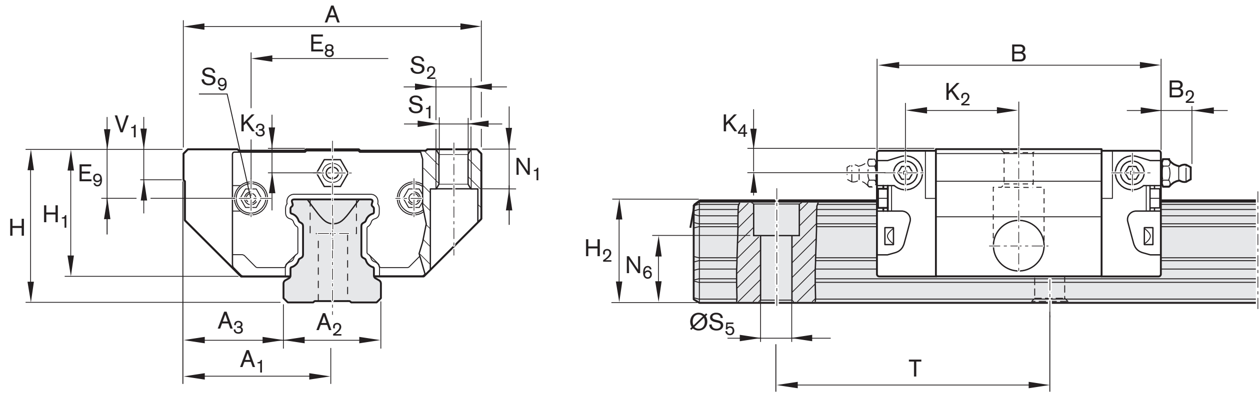
- FKS ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

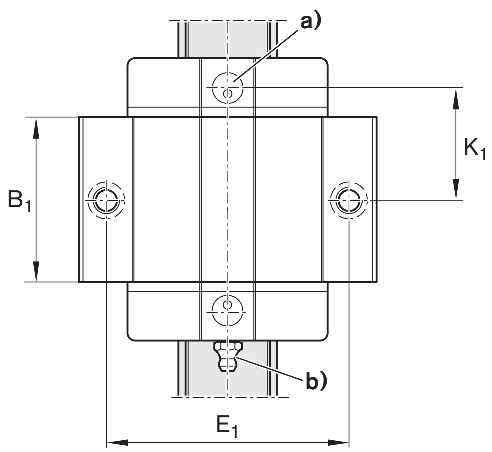
Part number:
R1665 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 35: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

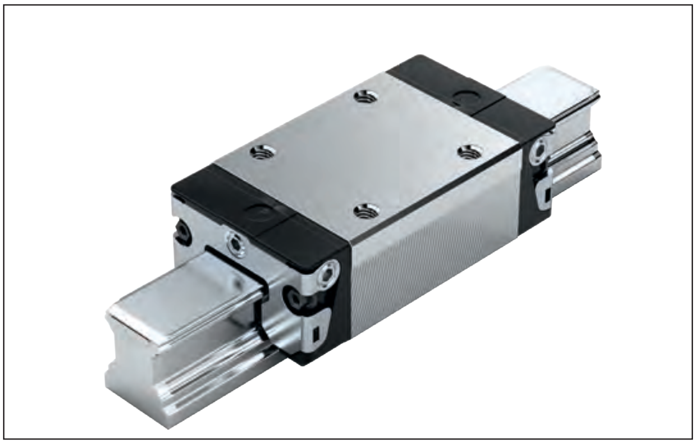
a) Lube nipple, size 15 – 20:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 35:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	**Dimensions** (mm)																
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_8**	**E_9**	**H**	**H_1**	**H_2 1)**	**H_2 2)**	**K_1**	**K_2**	**K_3**	**K_4**
15	47	23.5	15	16.0	44.7	25.7	38	24.55	6.70	24	19.90	16.30	16.20	16.25	17.85	3.20	3.20
20	63	31.5	20	21.5	57.3	31.9	53	32.50	7.30	30	25.35	20.75	20.55	22.95	22.95	3.35	3.35
25	70	35.0	23	23.5	67.0	38.6	57	38.30	11.50	36	29.90	24.45	24.25	25.35	26.50	5.50	5.50
30	90	45.0	28	31.0	75.3	45.0	72	48.40	14.60	42	35.35	28.55	28.35	28.80	30.50	6.05	6.05
35	100	50.0	34	33.0	84.9	51.4	82	58.00	17.35	48	40.40	32.15	31.85	32.70	34.20	6.90	6.90

Size	**Dimensions** (mm)								**Weight** (kg)	**Load capacities 3)** (N)		**Load moments 3)** (Nm)			
	N_1	**$N_6^{\pm 0.5}$**	**S_1**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
15	5.2	10.3	4.3	M5	4.5	M2.5x3.5	60	5.0	0.15	6 720	7 340	65	71	29	32
20	7.7	13.2	5.3	M6	6.0	M3x5	60	6.0	0.30	15 400	16 500	200	210	83	89
25	9.3	15.2	6.7	M8	7.0	M3x5	60	7.5	0.50	19 800	21 200	280	300	130	140
30	11.0	17.0	8.5	M10	9.0	M3x5	80	7.0	0.80	25 600	28 900	440	500	200	230
35	12.0	20.5	8.5	M10	9.0	M3x5	80	8.0	1.20	36 600	49 300	790	1 060	340	460

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain. ☞ 12
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ by 1.26 according to the table.

SNS – slimline, normal, standard height R1622 ... 2.



Dynamic characteristics

Travel speed: v_{max} = 5 m/s

Acceleration: a_{max} = 500 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class				Seal with ball runner blocks					
										without ball chain			with ball chain		
		C0	C1	C2	C3	N	H	P	XP	SS	LS[1]	DS	SS	LS[1]	DS
15	R1622 1	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	–	22	23	–
				2		–	3	2	8	20	21	–	22	23	–
					3	–	–	–	8	20	21	–	22	23	–
20	R1622 8	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
25	R1622 2	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
30	R1622 7	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
35	R1622 3	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
45	R1622 4	9				4	3	–	–	20	–	–	22	–	–
			1			4	3	2	8	20	–	2Z	22	–	2Y
				2		–	3	2	8	20	–	2Z	22	–	2Y
					3	–	–	–	8	20	–	2Z	22	–	2Y
e.g.	R1622 7		1				3			20					

1) With accuracy classes N and H and XP in preload class C1 only.

Order example

Options:

- SNS ball runner blocks
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:

R1622 713 20

Preload classes

C0 = Without preload (clearance)

C1 = Moderate preload

C2 = Average preload

C3 = High preload

Seals

SS = standard seal

LS = low-friction seal

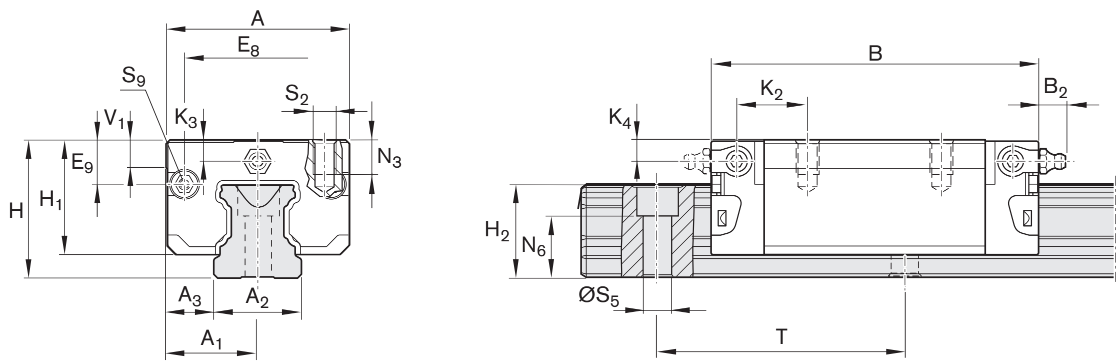
DS = double-lipped seal

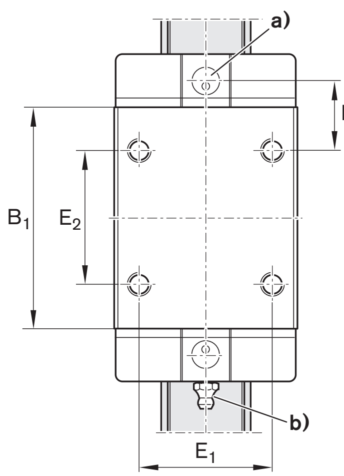
Key

Gray digits

= No preferred variant/ combination

(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 45: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

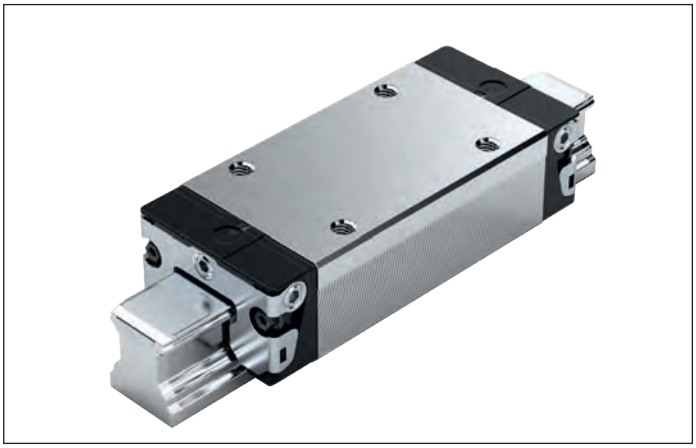
a) Lube nipple, size 15 – 20:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	**Dimensions** (mm)																	
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_2**	**E_8**	**E_9**	**H**	**H_1**	**H_2 1)**	**H_2 2)**	**K_1**	**K_2**	**K_3**	**K_4**
15	34	17	15	9.5	58.2	39.2	26	26	24.55	6.70	24	19.90	16.30	16.20	10.00	11.60	3.20	3.20
20	44	22	20	12.0	75.0	49.6	32	36	32.50	7.30	30	25.35	20.75	20.55	13.80	13.80	3.35	3.35
25	48	24	23	12.5	86.2	57.8	35	35	38.30	11.50	36	29.90	24.45	24.25	17.45	18.60	5.50	5.50
30	60	30	28	16.0	97.7	67.4	40	40	48.40	14.60	42	35.35	28.55	28.35	20.00	21.70	6.05	6.05
35	70	35	34	18.0	110.5	77.0	50	50	58.00	17.35	48	40.40	32.15	31.85	20.50	22.00	6.90	6.90
45	86	43	45	20.5	137.6	97.0	60	60	69.80	20.90	60	50.30	40.15	39.85	27.30	29.30	8.20	8.20

Size	**Dimensions** (mm)							**Weight** (kg)	**Load capacities 3)** (N)		**Load moments 3)** (Nm)			
	N_3	**$N_6^{\pm0.5}$**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
15	6.0	10.3	M4	4.5	M2.5x3.5	60	5.0	0.15	9 860	12 700	95	120	68	87
20	7.5	13.2	M5	6.0	M3x5	60	6.0	0.35	23 400	29 800	300	380	200	260
25	9.0	15.2	M6	7.0	M3x5	60	7.5	0.50	28 600	35 900	410	510	290	360
30	12.0	17.0	M8	9.0	M3x5	80	7.0	0.85	36 500	48 100	630	830	440	580
35	13.0	20.5	M8	9.0	M3x5	80	8.0	1.25	51 800	80 900	1 110	1 740	720	1 130
45	18.0	23.5	M10	14.0	M4x7	105	10.0	2.40	86 400	132 000	2 330	3 560	1 540	2 350

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain. ☞ 12
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

SLS – slimline, long, standard height R1623 ... 2.



Dynamic characteristics

Travel speed: v_{max} = 5 m/s
Acceleration: a_{max} = 500 m/s^2
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class				Seal with ball runner blocks					
										without ball chain			with ball chain		
		C0	C1	C2	C3	N	H	P	XP	SS	LS1)	DS	SS	LS1)	DS
15	R1623 1	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	–	22	23	–
				2		–	3	2	8	20	21	–	22	23	–
					3	–	–	–	8	20	21	–	22	23	–
20	R1623 8	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
25	R1623 2	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
30	R1623 7	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
35	R1623 3	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
45	R1623 4	9				4	3	–	–	20	–	–	22	–	–
			1			4	3	2	8	20	–	2Z	22	–	2Y
				2		–	3	2	8	20	–	2Z	22	–	2Y
					3	–	–	–	8	20	–	2Z	22	–	2Y
e.g.	R1623 7		1				3			20					

1) With accuracy classes N and H and XP in preload class C1 only.

Order example

Options:

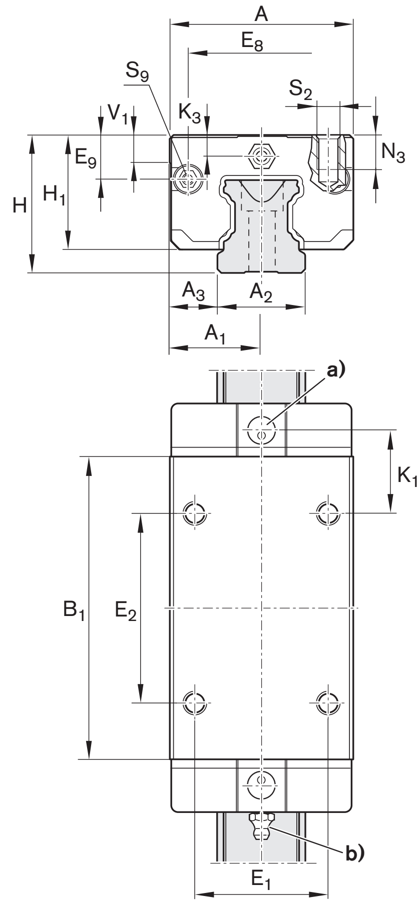
- SLS ball runner blocks
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

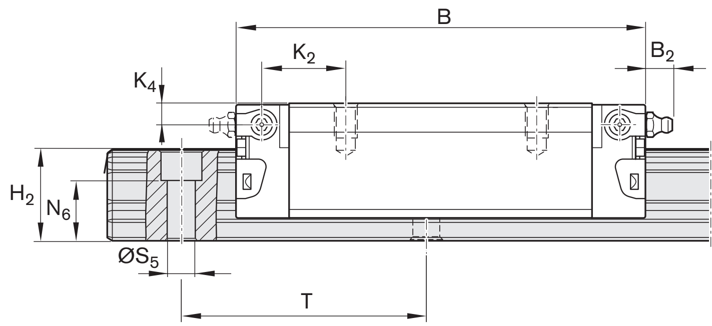
Part number:
R1623 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 45: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

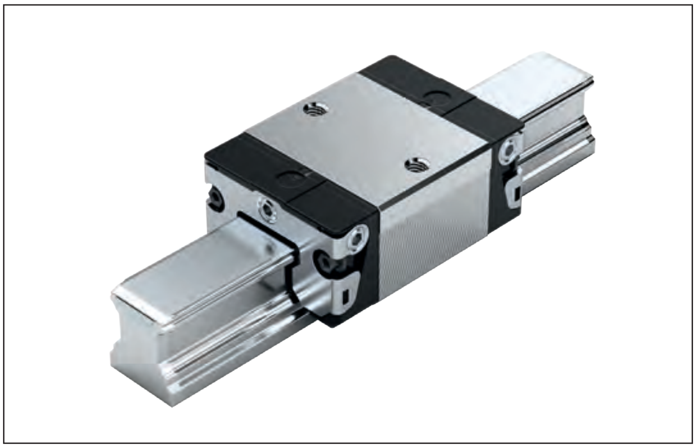
a) Lube nipple, size 15 – 20:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	Dimensions (mm)																
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	E_9	H	H_1	H_2 1)	H_2 2)	K_1	K_2	K_3	K_4
15	34	17	15	9.5	72.6	53.6	26	26	24.55	6.70	24	19.90	16.30	16.20	17.20	18.80	3.20	3.20
20	44	22	20	12.0	91.0	65.6	32	50	32.50	7.30	30	25.35	20.75	20.55	14.80	14.80	3.35	3.35
25	48	24	23	12.5	107.9	79.5	35	50	38.30	11.50	36	29.90	24.45	24.25	20.80	21.95	5.50	5.50
30	60	30	28	16.0	119.7	89.4	40	60	48.40	14.60	42	35.35	28.55	28.35	21.00	22.70	6.05	6.05
35	70	35	34	18.0	139.0	105.5	50	72	58.00	17.35	48	40.40	32.15	31.85	23.75	25.25	6.90	6.90
45	86	43	45	20.5	174.1	133.5	60	80	69.80	20.90	60	50.30	40.15	39.85	35.50	37.50	8.20	8.20

Size	Dimensions (mm)							Weight (kg)	Load capacities 3) (N)		Load moments 3) (Nm)			
	N_3	$N_6^{\pm0.5}$	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
15	6.0	10.3	M4	4.5	M2.5x3.5	60	5.0	0.20	12 800	18 400	120	180	120	180
20	7.5	13.2	M5	6.0	M3x5	60	6.0	0.45	29 600	41 800	380	540	340	490
25	9.0	15.2	M6	7.0	M3x5	60	7.5	0.65	37 300	52 500	530	750	530	740
30	12.0	17.0	M8	9.0	M3x5	80	7.0	1.10	46 000	66 900	800	1 160	740	1 080
35	13.0	20.5	M8	9.0	M3x5	80	8.0	1.70	66 700	116 000	1 440	2 500	1 290	2 240
45	18.0	23.5	M10	14.0	M4x7	105	10.0	3.20	111 000	190 000	3 010	5 120	2 730	4 660

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain. ☞🗎 12
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

SKS – slimline short standard height R1666 ... 2.



Dynamic characteristics

Travel speed: v_{max} = 5 m/s

Acceleration: a_{max} = 500 m/s²

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note on lubrication

- Pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks					
						without ball chain			with ball chain		
		C0	C1	N	H	SS	LS	DS	SS	LS	DS
15	R1666 1	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	–	22	23	–
20	R1666 8	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	2Z	22	23	2Y
25	R1666 2	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	2Z	22	23	2Y
30	R1666 7	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	2Z	22	23	2Y
35	R1666 3	9		4	3	20	21	–	22	23	–
			1	4	3	20	21	2Z	22	23	2Y
e.g.	R1666 7		1		3	20					

Order example

Options:

- SKS ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:

R1666 713 20

Preload classes

C0 = Without preload (clearance)

C1 = Moderate preload

Seals

SS = standard seal

LS = low-friction seal

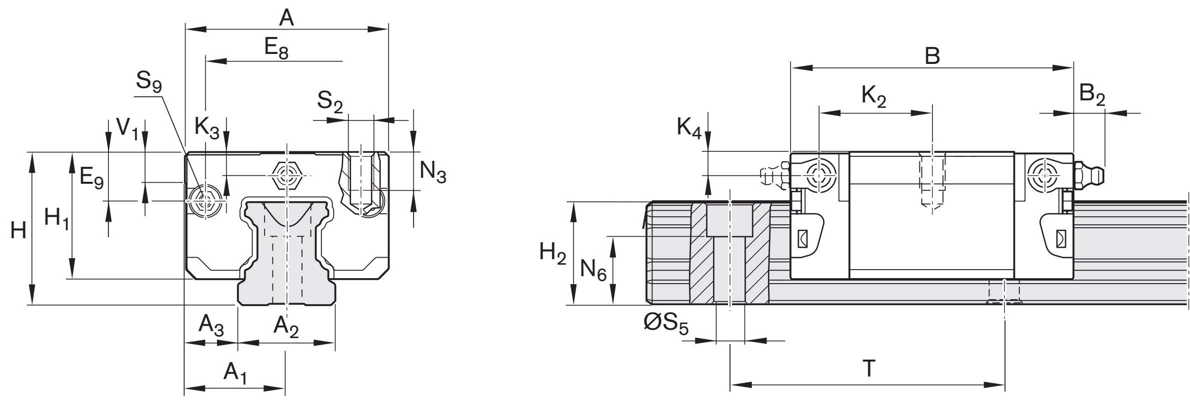
DS = double-lipped seal

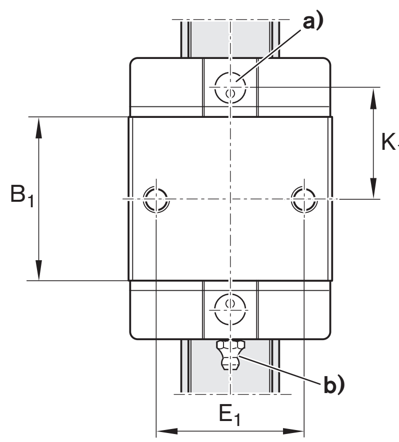
Key

Gray digits

= No preferred variant/ combination

(Some deliver.y times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 35: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

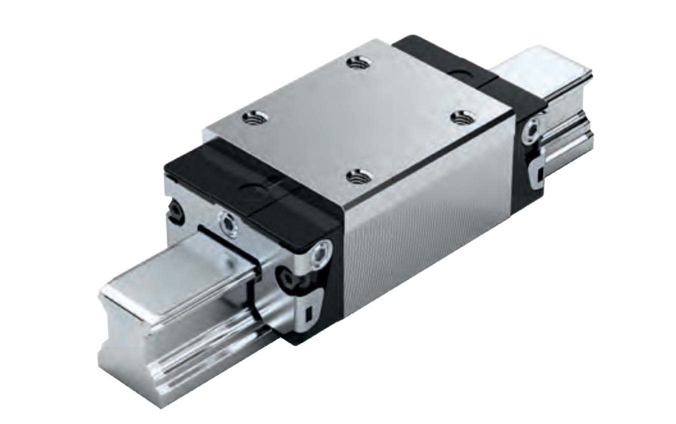
a) Lube nipple, size 15 – 20:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 35:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	Dimensions (mm)															
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_8	E_9	H	H_1	H_2 1)	H_2 2)	K_1	K_2	K_3	K_4
15	34	17	15	9.5	44.7	25.7	26	24.55	6.70	24	19.90	16.30	16.20	16.25	17.85	3.20	3.20
20	44	22	20	12.0	57.3	31.9	32	32.50	7.30	30	25.35	20.75	20.55	22.95	22.95	3.35	3.35
25	48	24	23	12.5	67.0	38.6	35	38.30	11.50	36	29.90	24.45	24.25	25.35	26.50	5.50	5.50
30	60	30	28	16.0	75.3	45.0	40	48.40	14.60	42	35.35	28.55	28.35	28.80	30.50	6.05	6.05
35	70	35	34	18.0	84.9	51.4	50	58.00	17.35	48	40.40	32.15	31.85	32.70	34.20	6.90	6.90

Size	Dimensions (mm)							Weight (kg)	Load capacities 3) (N)		Load moments 3) (Nm)			
	N_3	$N_6^{\pm0.5}$	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
15	6.0	10.3	M4	4.5	M2.5x3.5	60	5.0	0.10	6 720	7 340	65	71	29	32
20	7.5	13.2	M5	6.0	M3x5	60	6.0	0.25	15 400	16 500	200	210	83	89
25	9.0	15.2	M6	7.0	M3x5	60	7.5	0.35	19 800	21 200	280	300	130	140
30	12.0	17.0	M8	9.0	M3x5	80	7.0	0.60	25 600	28 900	440	500	200	230
35	13.0	20.5	M8	9.0	M3x5	80	8.0	0.90	36 600	49 300	790	1 060	340	460

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain. ☞🗎 12
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

SNH – slimline, normal, high R1621 ... 2.



Dynamic characteristics

Travel speed: v_{max} = 5 m/s

Acceleration: a_{max} = 500 m/s²

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note on lubrication

- Pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class				Seal with ball runner blocks					
										without ball chain			with ball chain		
		C0	C1	C2	C3	N	H	P	XP	SS	LS1)	DS	SS	LS1)	DS
15	R1621 1	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	–	22	23	–
				2		–	3	2	8	20	21	–	22	23	–
					3	–	–	–	8	20	21	–	22	23	–
25	R1621 2	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
30	R1621 7	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
35	R1621 3	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
45	R1621 4	9				4	3	–	–	20	–	–	22	–	–
			1			4	3	2	8	20	–	2Z	22	–	2Y
				2		–	3	2	8	20	–	2Z	22	–	2Y
					3	–	–	–	8	20	–	2Z	22	–	2Y
e.g.	R1621 7		1				3			20					

1) With accuracy classes N and H and XP in preload class C1 only.

Order example

Options:

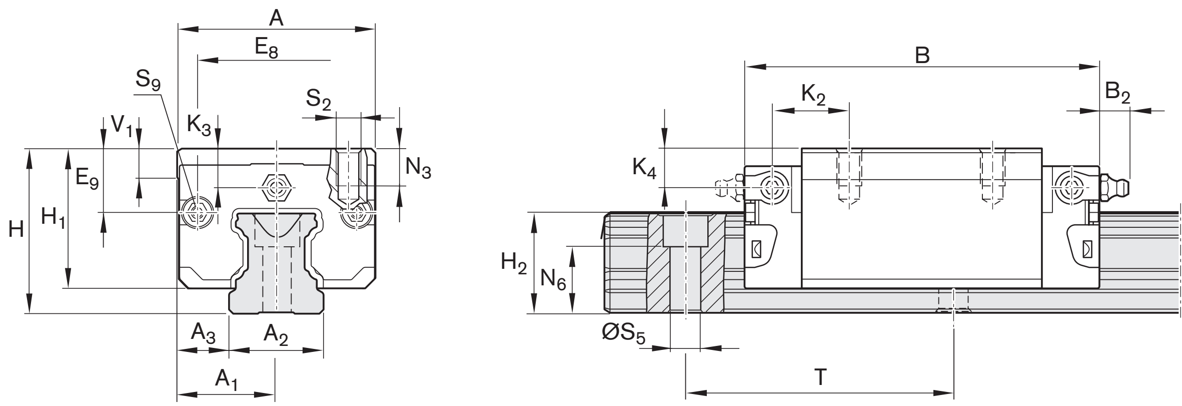
- SNH ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

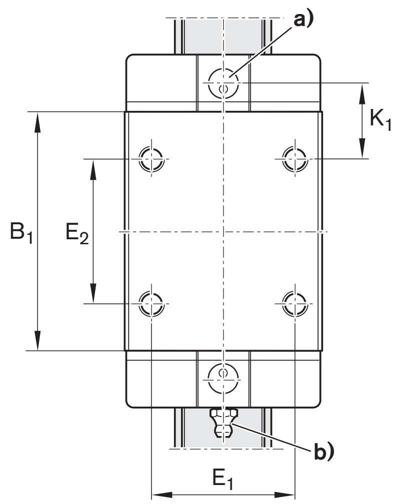
Part number:
R1621 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
Sizes 25 – 45: Ø 5 · 1.0 (mm)
open lube port if necessary and install lubrication adapter if necessary
(see section Lubrication).

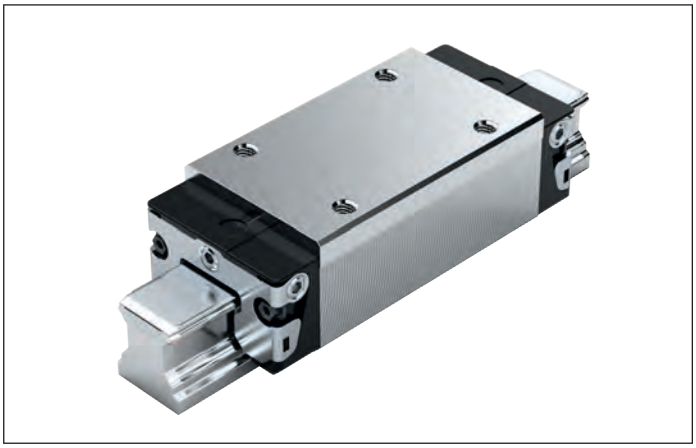
a) Lube nipple, size 15:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	**Dimensions** (mm)																	
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_2**	**E_8**	**E_9**	**H**	**H_1**	**H_2**[1)]	**H_2**[2)]	**K_1**	**K_2**	**K_3**	**K_4**
15	34	17	15	9.5	58.2	39.2	26	26	24.55	10.70	28	23.90	16.30	16.20	10.00	11.60	7.20	7.20
25	48	24	23	12.5	86.2	57.8	35	35	38.30	15.50	40	33.90	24.45	24.25	17.45	18.60	9.50	9.50
30	60	30	28	16.0	97.7	67.4	40	40	48.40	17.60	45	38.35	28.55	28.35	20.00	21.70	9.05	9.05
35	70	35	34	18.0	110.5	77.0	50	50	58.00	24.35	55	47.40	32.15	31.85	20.50	22.00	13.90	13.90
45	86	43	45	20.5	137.6	97.0	60	60	69.80	30.90	70	60.30	40.15	39.85	27.30	29.30	18.20	18.20

Size	**Dimensions** (mm)							**Weight** (kg)	**Load capacities**[3)] (N)		**Load moments**[3)] (Nm)			
	N_3	**$N_6^{\pm0.5}$**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
15	6.0	10.3	M4	4.5	M2.5x3.5	60	5.0	0.20	9 860	12 700	95	120	68	87
25	9.0	15.2	M6	7.0	M3x5	60	7.5	0.60	28 600	35 900	410	510	290	360
30	12.0	17.0	M8	9.0	M3x5	80	7.0	0.95	36 500	48 100	630	830	440	580
35	13.0	20.5	M8	9.0	M3x5	80	8.0	1.55	51 800	80 900	1 110	1 740	720	1 130
45	18.0	23.5	M10	14.0	M4x7	105	10.0	3.00	86 400	132 000	2 330	3 560	1 540	2 350

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain. ☞🗎 12
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

SLH – slimline, long, high R1624 ... 2.



Dynamic characteristics

Travel speed: v_{max} = 5 m/s

Acceleration: a_{max} = 500 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class				Seal with ball runner blocks					
										without ball chain			with ball chain		
		C0	C1	C2	C3	N	H	P	XP	SS	LS1)	DS	SS	LS1)	DS
25	R1624 2	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
30	R1624 7	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
35	R1624 3	9				4	3	–	–	20	21	–	22	23	–
			1			4	3	2	8	20	21	2Z	22	23	2Y
				2		–	3	2	8	20	21	2Z	22	23	2Y
					3	–	–	–	8	20	21	2Z	22	23	2Y
45	R1624 4	9				4	3	–	–	20	–	–	22	–	–
			1			4	3	2	8	20	–	2Z	22	–	2Y
				2		–	3	2	8	20	–	2Z	22	–	2Y
					3	–	–	–	8	20	–	2Z	22	–	2Y
e.g.	R16247		1				3			20					

1) With accuracy classes N and H and XP in preload class C1 only.

Order example

Options:

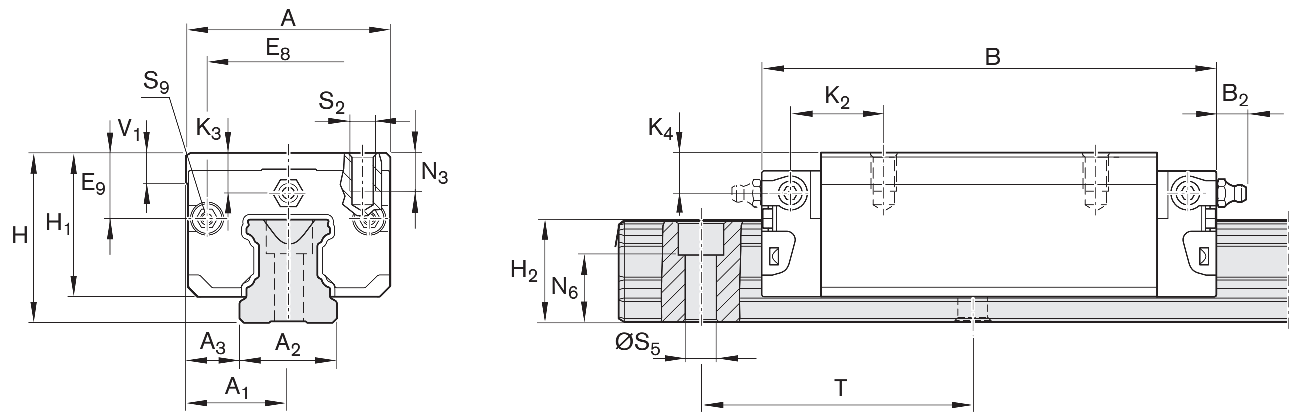
- SLH ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

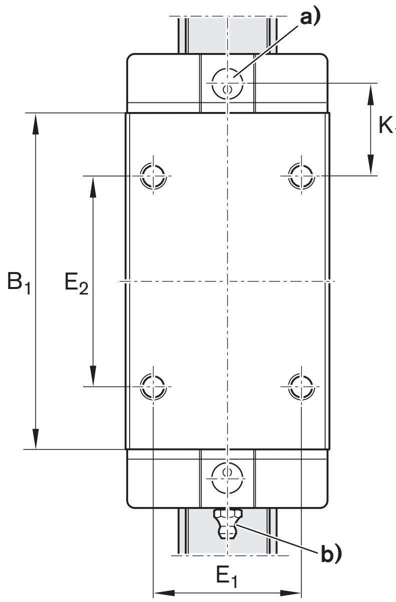
Part number:
R1624 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 25 – 45: Ø 5 · 1.0 (mm)
open lube port if necessary and install lubrication adapter if necessary
(see section Lubrication).

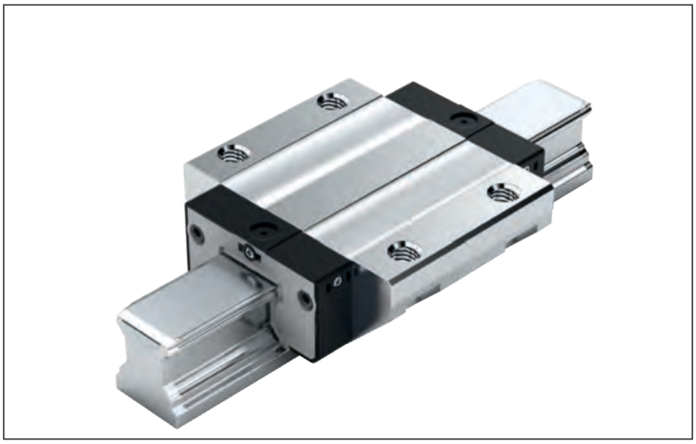
a) Lube nipple, size 25 – 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	**Dimensions** (mm)																	
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	E_9	H	H_1	H_2 1)	H_2 2)	K_1	K_2	K_3	K_4
25	48	24	23	12.5	107.9	79.5	35	50	38.30	15.50	40	33.90	24.45	24.25	20.80	21.95	9.50	9.50
30	60	30	28	16.0	119.7	89.4	40	60	48.40	17.60	45	38.35	28.55	28.35	21.00	22.70	9.05	9.05
35	70	35	34	18.0	139.0	105.5	50	72	58.00	24.35	55	47.40	32.15	31.85	23.75	25.25	13.90	13.90
45	86	43	45	20.5	174.1	133.5	60	80	69.80	30.90	70	60.30	40.15	39.85	35.50	37.50	18.20	18.20

Size	**Dimensions** (mm)							**Weight** (kg)	**Load capacities** 3) (N)		**Load moments** 3) (Nm)			
	N_3	$N_6^{\pm0.5}$	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
25	9.0	15.2	M6	7.0	M3x5	60	7.5	0.80	37 300	52 500	530	750	530	740
30	12.0	17.0	M8	9.0	M3x5	80	7.0	1.20	46 000	66 900	800	1 160	740	1 080
35	13.0	20.5	M8	9.0	M3x5	80	8.0	2.10	66 700	116 000	1 440	2 500	1 290	2 240
45	18.0	23.5	M10	14.0	M4x7	105	10.0	4.10	111 000	190 000	3 010	5 120	2 730	4 660

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain. ☞🗎 12
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

FNN – Flange, normal, low profile R1693 ... 1.



Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Not pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks without ball chain	
		C0	C1	N	H	SS	LS
20	R1693 8	9	1	4	3	10	11
25[1)]	R1693 2	9	1	4	3	10	11
e.g.	R1693 8		1		3	10	

1) BSHP ball runner block

Order example

Options:

- FNN ball runner block
- Size 20
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:

R1693 813 10

Preload classes

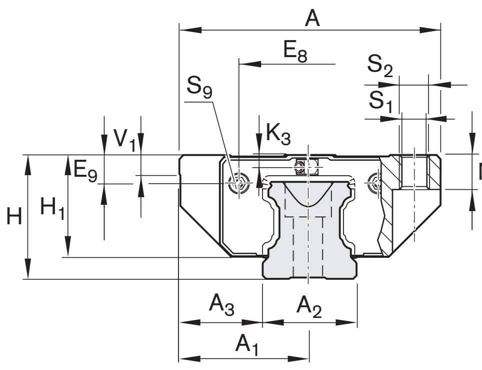
C0 = Without preload (clearance)
C1 = Moderate preload

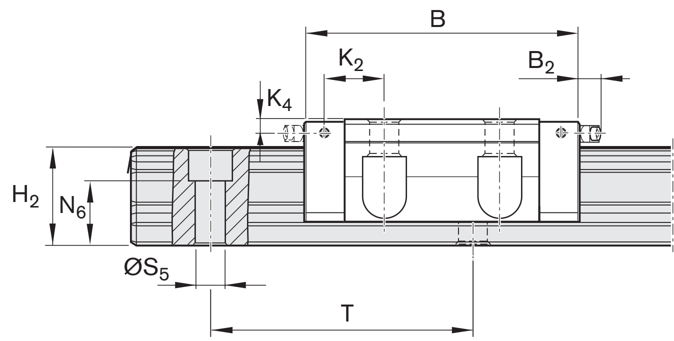
Seals

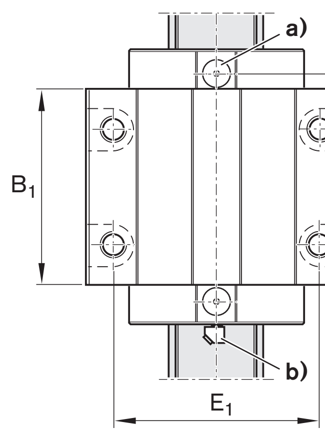
SS = standard seal
LS = low-friction seal

Key

Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)







For O-ring
size 20 – 25: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

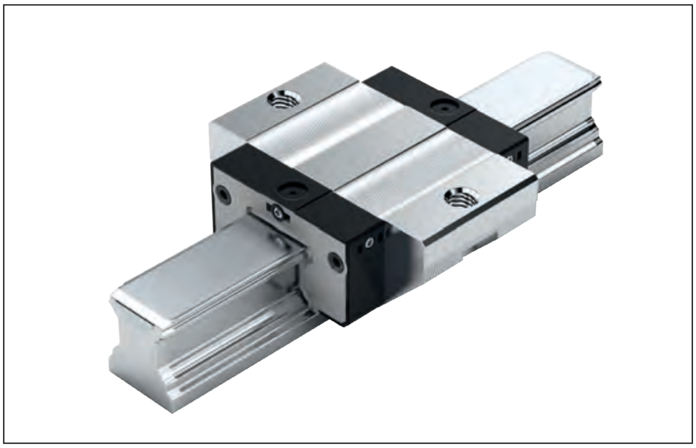
a) Lube nipple, size 20 – 25:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 8 mm
lube port with additional anti-torsion element.
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
The lube nipple is included in the scope of delivery (not installed).
Size 20: Connection possible on end face.
Size 25: Connection possible at all sides.

Size	**Dimensions** (mm)																	
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_2**	**E_8**	**E_9**	**H**	**H_1**	**H_2 1)**	**H_2 2)**	**K_1**	**K_2**	**K_3**	**K_4**
20	59	29.5	20	19.5	72.5	49.6	49	32	30.5	5.6	28	23.0	20.75	20.55	13.0	–	3.6	–
25	73	36.5	23	25.0	81.0	57.8	60	35	38.3	8.5	33	26.5	24.45	24.25	16.6	17.0	4.1	4.1

Size	**Dimensions** (mm)								**Weight** (kg)	**Load capacities 3)** (N)		**Load moments 3)** (Nm)			
	N_1	**$N_6^{\pm0.5}$**	**S_1**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
20	7.7	13.2	5.3	M6	6.0	M3x5	60	6.0	0.40	14 500	24 400	190	310	100	165
25	9.3	15.2	6.7	M8	7.0	M3x5	60	7.5	0.60	28 600	35 900	410	510	290	360

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

FKN – Flange, short, low profile R1663 ... 1.



Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Not pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks without ball chain	
		C0	C1	N	H	SS	LS
20	R1663 8	9	1	4	3	10	11
251)	R1663 2	9	1	4	3	10	11
e.g.	R1663 8		1		3	10	

1) BSHP ball runner block

Order example

Options:

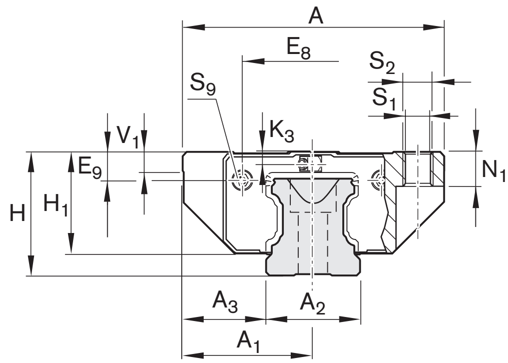
- FKN ball runner block
- Size 20
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

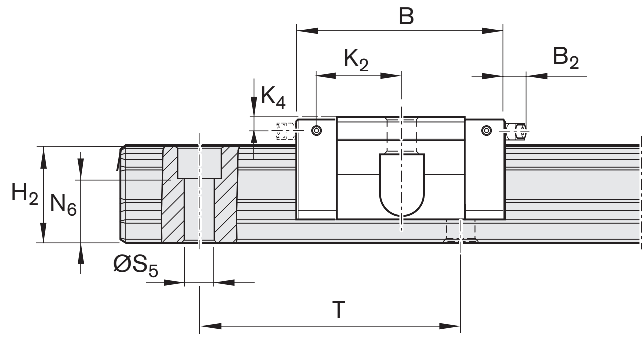
Part number:
R1663 813 10

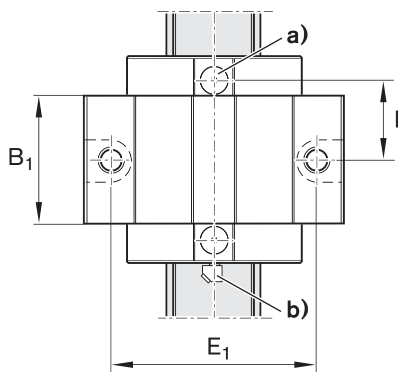
Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
LS = low-friction seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)







For O-ring
size 20 – 25: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

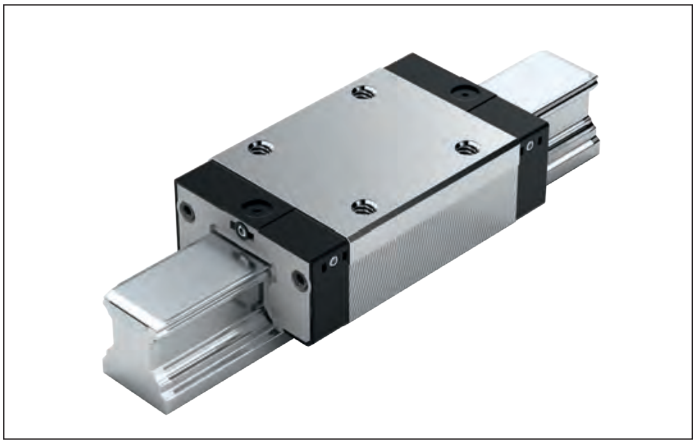
a) Lube nipple, size 20 – 25:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 8 mm
lube port with additional anti-torsion element.
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
The lube nipple is included in the scope of delivery (not installed).
Size 20: Connection possible on end face.
Size 25: Connection possible at all sides.

Size	**Dimensions** (mm)																
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_8**	**E_9**	**H**	**H_1**	**H_2 1)**	**H_2 2)**	**K_1**	**K_2**	**K_3**	**K_4**
20	59	29.5	20	19.5	55	31.9	49	30.5	5.6	28	23.0	20.75	20.55	20.1	–	3.6	–
25	73	36.5	23	25.0	62	38.6	60	38.3	8.5	33	26.5	24.45	24.25	24.5	25.0	4.1	4.1

Size	**Dimensions** (mm)								**Weight** (kg)	**Load capacities 3)** (N)		**Load moments 3)** (Nm)			
	N_1	**$N_6^{\pm0.5}$**	**S_1**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
20	7.7	13.2	5.3	M6	6.0	M3x5	60	6.0	0.25	9 600	13 600	120	170	40	58
25	9.3	15.2	6.7	M8	7.0	M3x5	60	7.5	0.45	19 800	21 200	280	300	130	140

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

SNN – slimline, normal, low profile R1694 ... 1.



Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s²

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note on lubrication

- Not pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks without ball chain	
		C0	C1	N	H	SS	LS
20	R1694 8	9	1	4	3	10	11
25[1)]	R1694 2	9	1	4	3	10	11
e.g.	R1694 8		1		3	10	

1) BSHP ball runner block

Order example

Options:

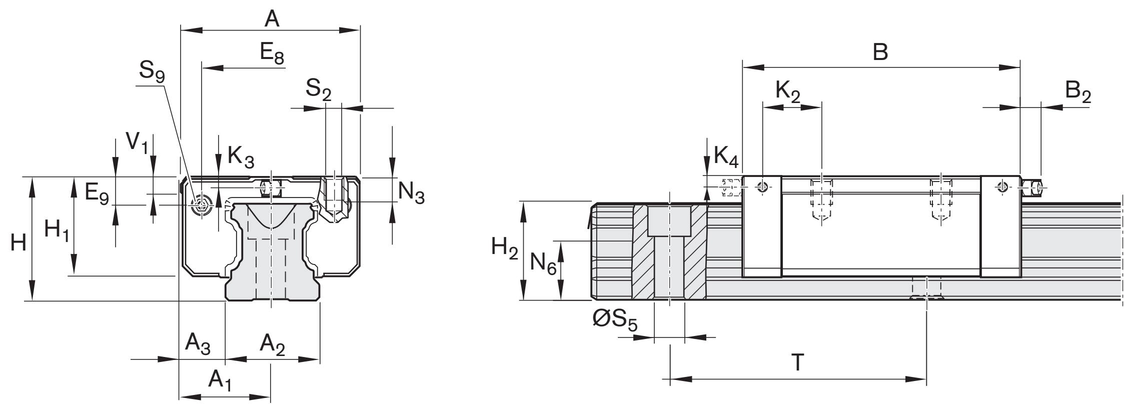
- SNN ball runner block
- Size 20
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

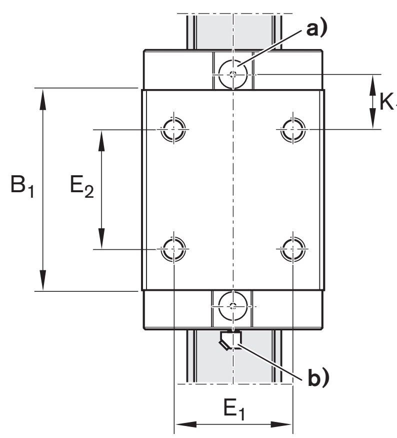
Part number:
R1694 813 10

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
LS = low-friction seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 20 – 25: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

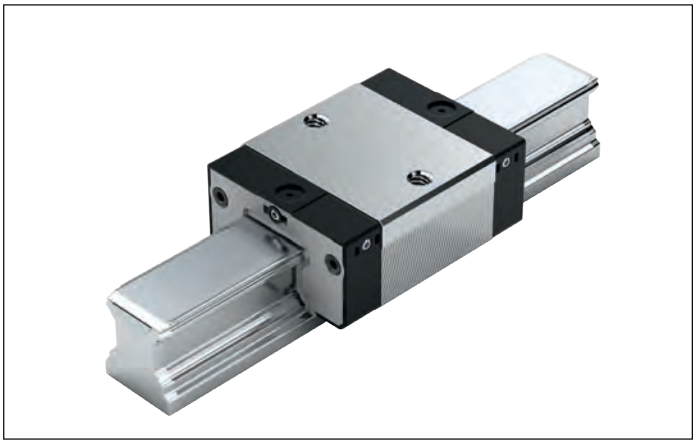
a) Lube nipple, size 20 – 25:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 8 mm
lube port with additional anti-torsion element.
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
The lube nipple is included in the scope of delivery (not installed).
Size 20: Connection possible on end face.
Size 25: Connection possible at all sides.

Size	Dimensions (mm)																
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	E_9	H	H_1	H_2 1)	H_2 2)	K_1	K_2	K_3	K_4
20	42	21	20	11.0	72.5	49.6	32	32	30.5	5.6	28	23.0	20.75	20.55	13.0	–	3.6	–
25	48	24	23	12.5	81.0	57.8	35	35	38.3	8.5	33	26.5	24.45	24.25	16.6	17.0	4.1	4.1

Size	Dimensions (mm)							Weight (kg)	Load capacities 3) (N)		Load moments 3) (Nm)			
	N_3	$N_6^{\pm0.5}$	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
20	6.3	13.2	M5	6.0	M3x5	60	6.0	0.30	14 500	24 400	190	310	100	165
25	7.0	15.2	M6	7.0	M3x5	60	7.5	0.45	28 600	35 900	410	510	290	360

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M}_t$ and $\mathbf{M}_L$ by 1.26 according to the table.

SKN – slimline, short, low profile R1664 ... 1.



Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Not pre-lubricated

Note

For all SNS/SNO ball guide rails.

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks without ball chain	
		C0	C1	N	H	SS	LS
20	R1664 8	9	1	4	3	10	11
25[1)]	R1664 2	9	1	4	3	10	11
e.g.	R1664 8		1		3	10	

1) BSHP ball runner block

Order example

Options:

- SKN ball runner block
- Size 20
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:

R1664 813 10

Preload classes

C0 = Without preload (clearance)

C1 = Moderate preload

Seals

SS = standard seal

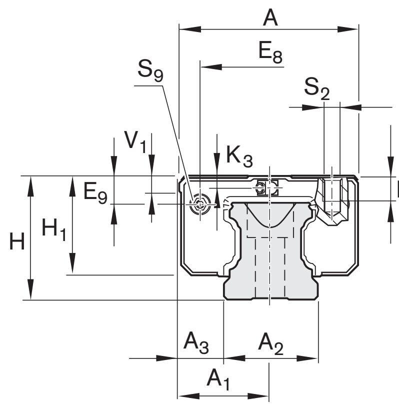
LS = low-friction seal

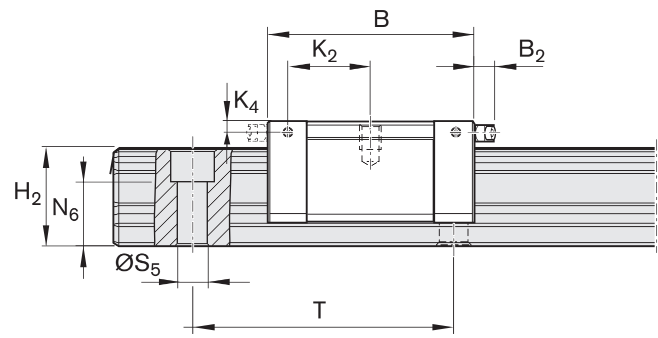
Key

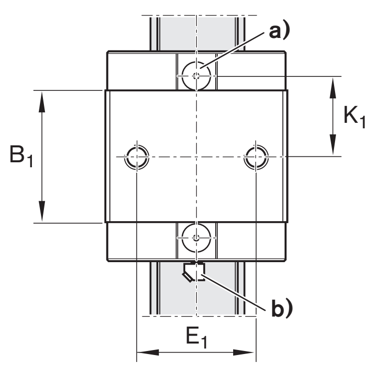
Gray digits

= No preferred variant/ combination

(Some delivery times may be longer)







For O-ring
size 20 – 25: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

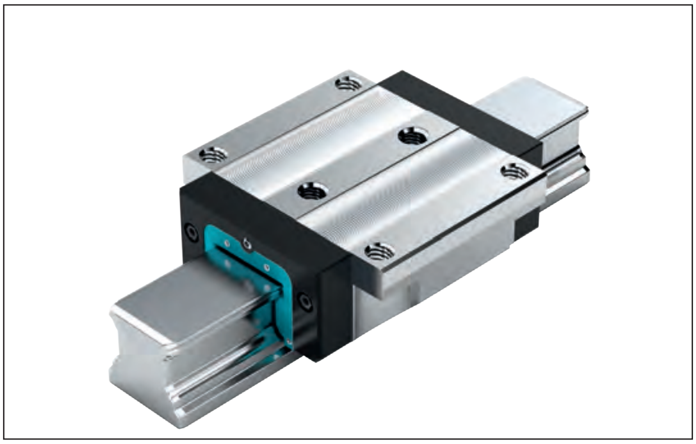
a) Lube nipple, size 20 – 25:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 8 mm
lube port with additional anti-torsion element.
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
The lube nipple is included in the scope of delivery (not installed).
Size 20: Connection possible on end face.
Size 25: Connection possible at all sides.

Size	Dimensions (mm)																
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_8**	**E_9**	**H**	**H_1**	**H_2[1)]**	**H_2[2)]**	**K_1**	**K_2**	**K_3**	**K_4**
20	42	21	20	11.0	55	31.9	32	30.5	5.6	28	23.0	20.75	20.55	20.1	–	3.6	–
25	48	24	23	12.5	62	38.6	35	38.3	8.5	33	26.5	24.45	24.25	24.5	25.0	4.1	4.1

Size	Dimensions (mm)							Weight (kg)	Load capacities[3)] (N)		Load moments[3)] (Nm)			
	N_3	**$N_6^{\pm 0.5}$**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
20	6.3	13.2	M5	6.0	M3x5	60	6.0	0.20	9 600	13 600	120	170	40	58
25	7.0	15.2	M6	7.0	M3x5	60	7.5	0.30	19 800	21 200	280	300	130	140

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

FNS – Flange normal standard height, R1651 … 1.



Dynamic characteristics

Speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s²

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note on lubrication

- Not pre-lubricated

Note

Can be used on all ball guide rails SNS.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class					Seal with ball runner blocks without ball chain
		C0	C1	C2	C3	N	H	P	SP	UP	SS
55	R1651 5	9				4	3	–	–	–	10
			1			4	3	2	1	9	10
				2		–	3	2	1	9	10
					3	–	–	2	1	9	10
65	R1651 6	9				4	3	–	–	–	10
			1			4	3	2	1	9	10
				2		–	3	2	1	9	10
					3	–	–	2	1	9	10
e.g.	R1651 5		1				3				10

Order example

Options:

- FNS ball runner block
- Size 55
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:

R1651 513 10

Preload classes

C0 = Without preload (clearance)

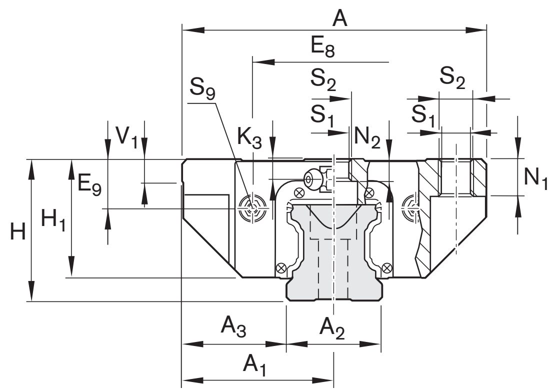
C1 = Moderate preload

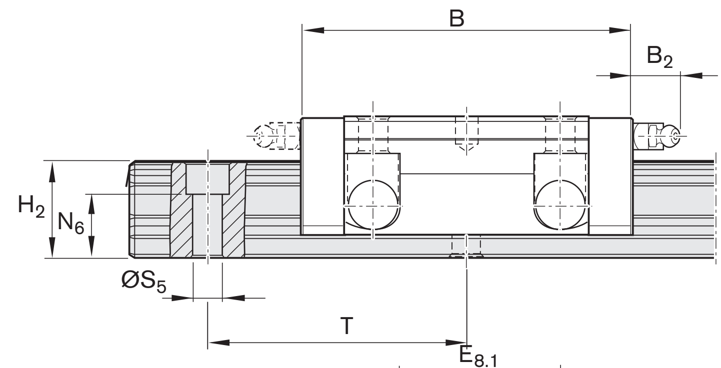
C2 = Average preload

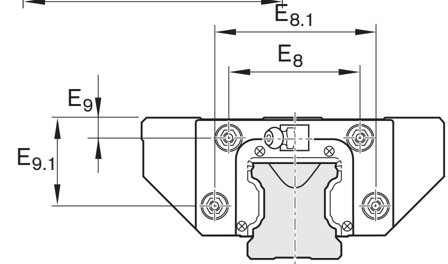
C3 = High preload

Seals

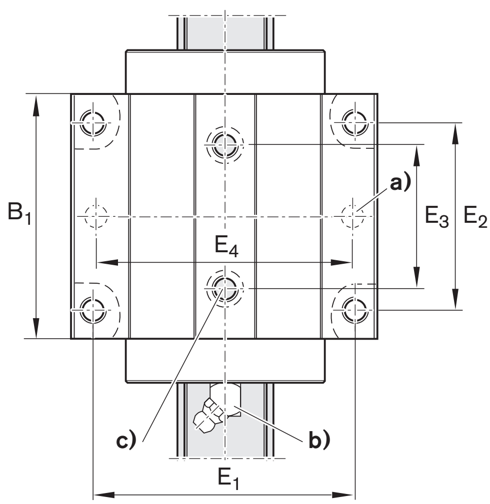
SS = standard seal







Size 65



a) Recommended position for pin holes (dimensions E_4 see section Mounting). Due to production-related issues, pre-drilled holes may be present at this position. They are suitable for drilling out.

b) Lube nipple, size 55:
Hydraulic-type lube nipple DIN 71412-B M6x8, B_2 = 16 mm
Lube nipple size 65:
Hydraulic-type lube nipple DIN 71412-B M8x1x8, B_2 = 16 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible on end face.

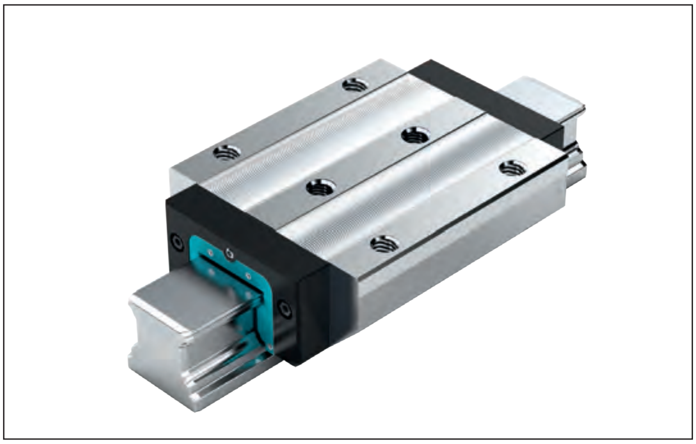
c) For manufacturing reasons, there may be plugs at these positions. These must be removed before mounting.

Size	**Dimensions** (mm)																
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_2**	**E_3**	**E_8**	**$E_{8.1}$**	**E_9**	**$E_{9.1}$**	**H**	**H_1**	**H_2 1)**	**H_2 2)**
55	140	70	53	43.5	159	115.5	116	95	70	80	–	22.3	–	70	57	48.15	47.85
65	170	85	63	53.5	188	139.6	142	110	82	76	100	11.0	53.5	90	76	60.15	59.85

Size	**Dimensions** (mm)										**Weight** (kg)	**Load capacities 3)** (N)		**Load moments 3)** (Nm)			
	K_3	**N_1**	**N_2**	**$N_6^{\pm 0.5}$**	**S_1**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
55	9	18	13.5	29.0	12.4	M14	16	M5x8	120	12	5.20	109 000	174 000	3 480	5 550	2 320	3 690
65	16	23	14.0	38.5	14.6	M16	18	M4x7	150	15	10.25	172 000	280 000	6 810	11 100	4 560	7 400

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

FLS – Flange long standard height, R1653 … 1.



Dynamic characteristics
Travel speed: v_{max} = 3 m/s
Acceleration: a_{max} = 250 m/s^2
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication
- Not pre-lubricated

Note
Can be used on all ball guide rails SNS.

Options and part numbers

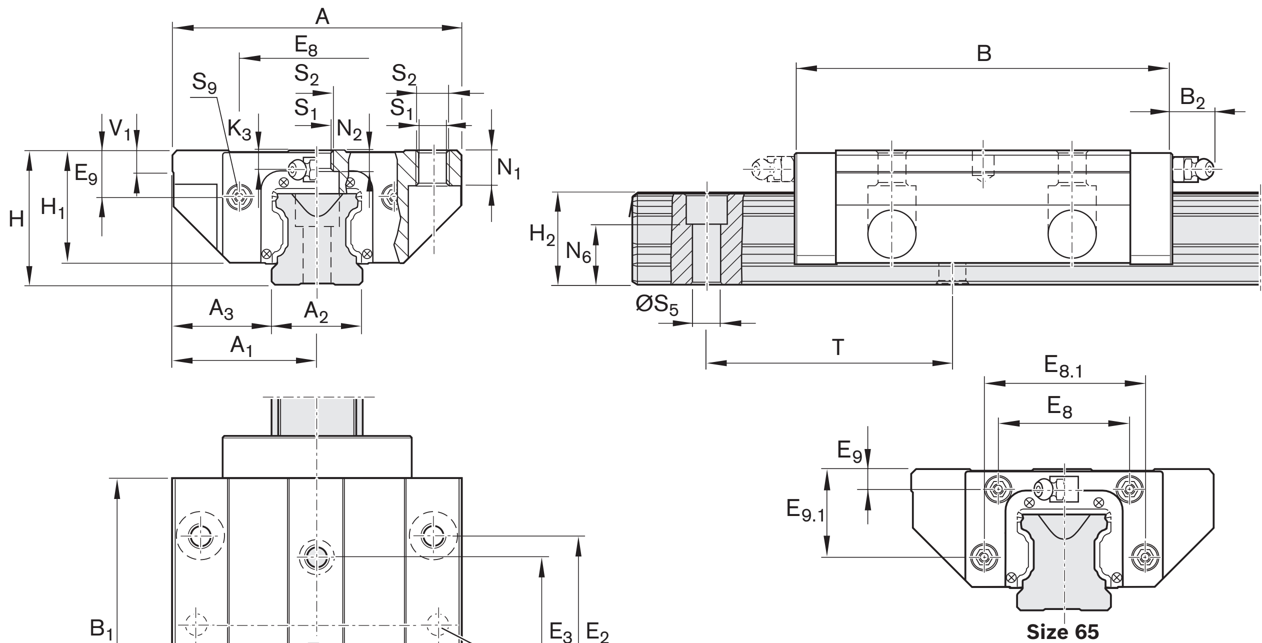
Size	Ball runner block with size	Preload class				Accuracy class					Seal with ball runner blocks without ball chain
		C0	C1	C2	C3	N	H	P	SP	UP	SS
55	R1653 5	9				4	3	–	–	–	10
			1			4	3	2	1	9	10
				2		–	3	2	1	9	10
					3	–	–	2	1	9	10
65	R1653 6	9				4	3	–	–	–	10
			1			4	3	2	1	9	10
				2		–	3	2	1	9	10
					3	–	–	2	1	9	10
e.g.	R1653 5		1				3				10

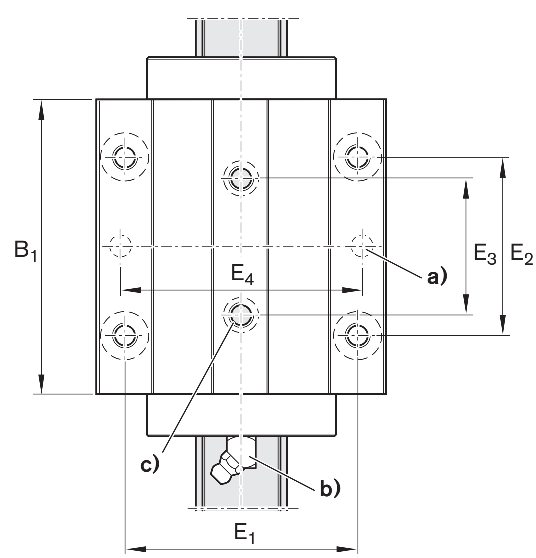
Order example
Options:
- FLS ball runner block
- Size 55
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1653 513 10

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal





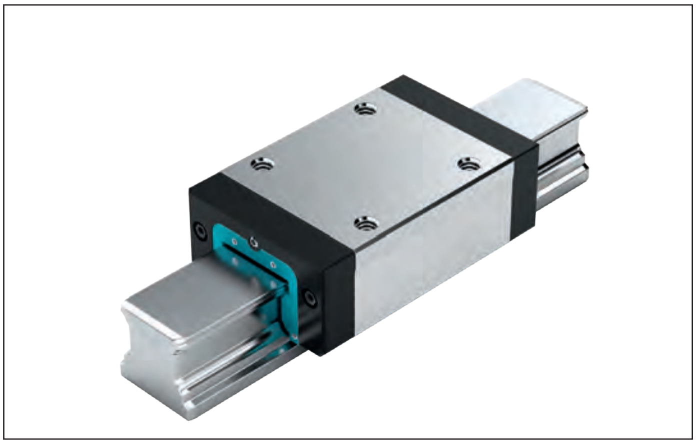
a) Recommended position for pin holes (dimensions E_4 see section Mounting). Due to production-related issues, pre-drilled holes may be present at this position. They are suitable for drilling out.
b) Lube nipple, size 55:
Hydraulic-type lube nipple DIN 71412-B M6x8, B_2 = 16 mm
Lube nipple size 65:
Hydraulic-type lube nipple DIN 71412-B M8x1x8, B_2 = 16 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible on end face.
c) For manufacturing reasons, there may be plugs at these positions. These must be removed before mounting.

Size	Dimensions (mm)																
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_3	E_8	$E_{8.1}$	E_9	$E_{9.1}$	H	H_1	H_2 1)	H_2 2)
55	140	70	53	43.5	199	155.5	116	95	70	80	–	22.3	–	70	57	48.15	47.85
65	170	85	63	53.5	243	194.6	142	110	82	76	100	11.0	53.5	90	76	60.15	59.85

Size	Dimensions (mm)										Weight (kg)	Load capacities 3) (N)		Load moments 3) (Nm)			
	K_3	N_1	N_2	$N_6^{\pm0.5}$	S_1	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
55	9	18	13.5	29.0	12.4	M14	16	M5x8	120	12	7.50	139 000	245 000	4 410	7 780	3 960	6 990
65	16	23	14.0	38.5	14.6	M16	18	M4x7	150	15	14.15	223 000	404 000	8 810	16 000	8 160	14 800

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ by 1.26 according to the table.

SNS – slimline normal standard height, R1622 ...1.



Dynamic characteristics

Travel speed: v_{max} = 3 m/s
Acceleration: a_{max} = 250 m/s²
(If F_{comb} > 2.8 · F_{pr} : a_{max} = 50 m/s²)

Note on lubrication

- Not pre-lubricated

Note

Can be used on all ball guide rails SNS.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class			Seal with ball runner blocks without ball chain
		C0	C1	C2	C3	N	H	P	SS
55	R1622 5	9				4	3	–	10
			1			4	3	2	10
				2		–	3	2	10
					3	–	–	2	10
65	R1622 6	9				4	3	–	10
			1			4	3	2	10
				2		–	3	2	10
					3	–	–	2	10
e.g.	R1622 5	1				3			10

Order example

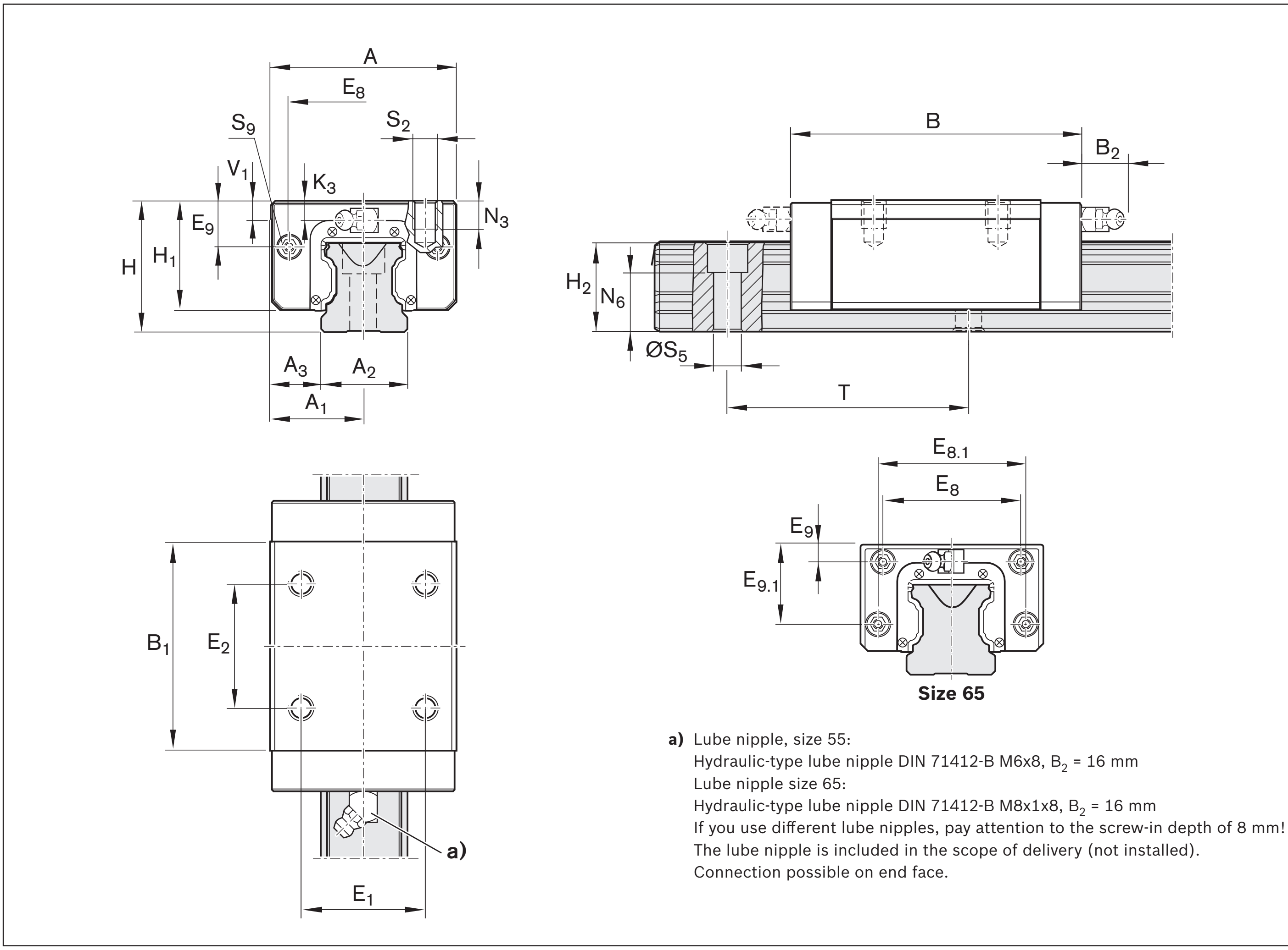
Options:

- SNS ball runner blocks
- Size 55
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1622 513 10

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal



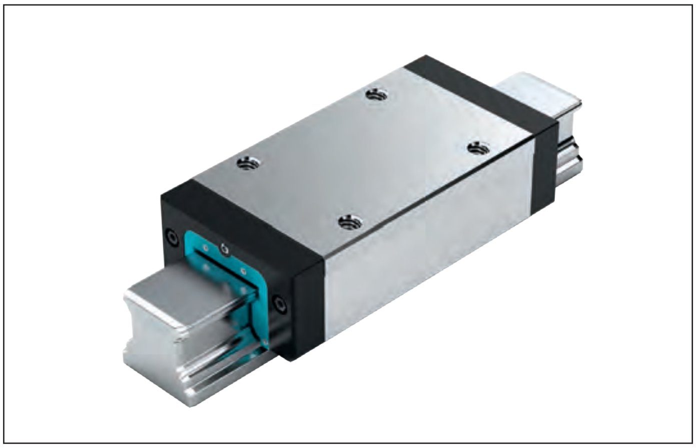
a) Lube nipple, size 55:
Hydraulic-type lube nipple DIN 71412-B M6x8, B_2 = 16 mm
Lube nipple size 65:
Hydraulic-type lube nipple DIN 71412-B M8x1x8, B_2 = 16 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible on end face.

Size	**Dimensions** (mm)														
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	$E_{8.1}$	E_9	$E_{9.1}$	H	H_1	H_2 1)	H_2 2)
55	100	50	53	23.5	159	115.5	75	75	80	–	22.3	–	70	57	48.15	47.85
65	126	63	63	31.5	188	139.6	76	70	76	100	11.0	53.5	90	76	60.15	59.85

Size	**Dimensions** (mm)								**Weight** (kg)	**Load capacities 3)** (N)		**Load moments 3)** (Nm)			
	K_3	N_3	$N_6^{\pm 0.5}$	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
55	9	19	29.0	M12	16	M5x8	120	12	3.80	109 000	174 000	3 480	5 550	2 320	3 690
65	16	21	38.5	M16	18	M4x7	150	15	6.90	172 000	280 000	6 810	11 100	4 560	7 400

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M}_t$ and $\mathbf{M}_L$ by 1.26 according to the table.

SLS – slimline long standard height, R1623 ...1.



Dynamic characteristics
Travel speed: v_{max} = 3 m/s
Acceleration: a_{max} = 250 m/s^2
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication
- Not pre-lubricated

Note
Can be used on all ball guide rails SNS.

Options and part numbers

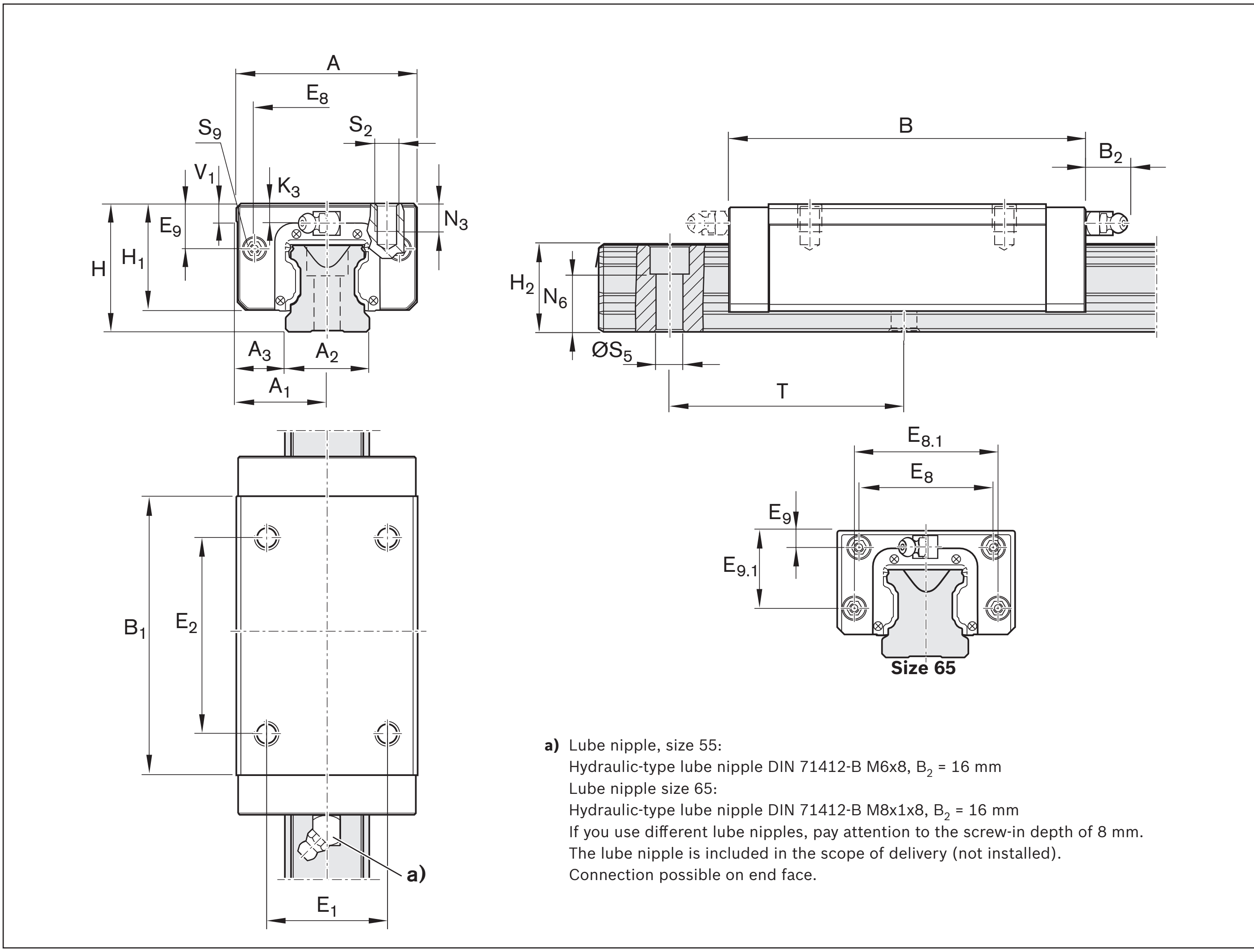
Size	Ball runner block with size	Preload class				Accuracy class			Seal with ball runner blocks without ball chain
		C0	C1	C2	C3	N	H	P	SS
55	R1623 5	9				4	3	–	10
			1			4	3	2	10
				2		–	3	2	10
					3	–	–	2	10
65	R1623 6	9				4	3	–	10
			1			4	3	2	10
				2		–	3	2	10
					3	–	–	2	10
e.g.	R1623 5		1				3		10

Order example
Options:
- SLS ball runner blocks
- Size 55
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1623 513 10

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal



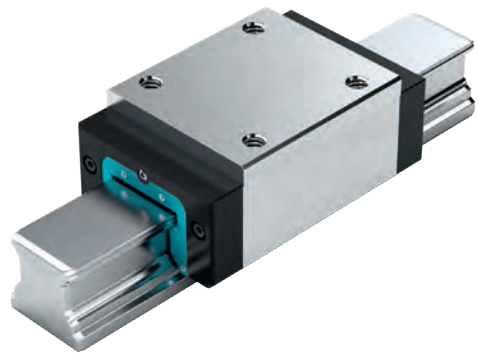
a) Lube nipple, size 55:
Hydraulic-type lube nipple DIN 71412-B M6x8, B_2 = 16 mm
Lube nipple size 65:
Hydraulic-type lube nipple DIN 71412-B M8x1x8, B_2 = 16 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm.
The lube nipple is included in the scope of delivery (not installed).
Connection possible on end face.

Size	Dimensions (mm)														
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	$E_{8.1}$	E_9	$E_{9.1}$	H	H_1	H_2 1)	H_2 2)
55	100	50	53	23.5	199	155.5	75	95	80	–	22.3	–	70	57	48.15	47.85
65	126	63	63	31.5	243	194.6	76	120	76	100	11.0	53.5	90	76	60.15	59.85

Size	Dimensions (mm)								Weight (kg)	Load capacities 3) (N)		Load moments 3) (Nm)			
	K_3	N_3	$N_6^{\pm 0.5}$	S_2	S_5	S_9	T	V_1	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
55	9	19	29.0	M12	16	M5x8	120	12	4.8	139 000	245 000	4 410	7 780	3 960	6 990
65	16	21	38.5	M16	18	M4x7	150	15	9.8	223 000	404 000	8 810	16 000	8 160	14 800

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

SNH – slimline normal high, R1621 ... 1.



Dynamic characteristics

Travel speed: v_{max} = 3 m/s
Acceleration: a_{max} = 250 m/s^2
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Not pre-lubricated

Note

Can be used on all ball guide rails SNS.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class			Seal with ball runner blocks without ball chain
		C0	C1	C2	C3	N	H	P	SS
55	R1621 5	9				4	3	–	10
			1			4	3	2	10
				2		–	3	2	10
					3	–	–	2	10
e.g.	R1621 5		1				3		10

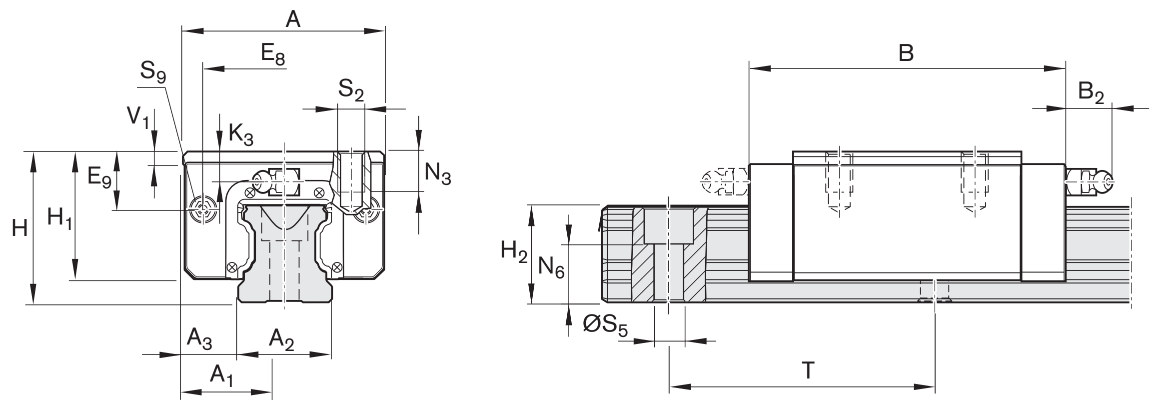
Order example

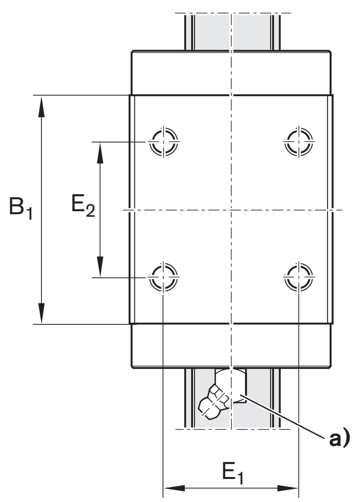
Options:
- SNH ball runner block
- Size 55
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1621 513 10

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal





a) Lube nipple, size 55:
Hydraulic-type lube nipple DIN 71412-B M6x8, B_2 = 16 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm.
The lube nipple is included in the scope of delivery (not installed).
Connection possible on end face.

Size	Dimensions (mm)												
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_2**	**E_8**	**E_9**	**H**	**H_1**	**H_2 1)**	**H_2 2)**
55	100	50	53	23.5	159	115.5	75	75	80	32.3	80	67	48.15	47.85

Size	Dimensions (mm)								Weight (kg)	Load capacities 3) (N)		Load moments 3) (Nm)			
	K_3	**N_3**	**$N_6^{\pm0.5}$**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
55	19	19	29	M12	16	M5x8	120	12	4.70	109 000	174 000	3 480	5 550	2 320	3 690

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

SLH – slimline long high, R1624 ... 1.

Dynamic characteristics

Travel speed: v_{max} = 3 m/s
Acceleration: a_{max} = 250 m/s²
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note on lubrication

- Not pre-lubricated

Note

Can be used on all ball guide rails SNS.

Options and part numbers

Size	Ball runner block with size	Preload class				Accuracy class			Seal with ball runner blocks without ball chain
		C0	C1	C2	C3	N	H	P	SS
55	R1624 5	9				4	3	–	10
			1			4	3	2	10
				2		–	3	2	10
					3	–	–	2	10
e.g.	R1624 5		1				3		10

Order example

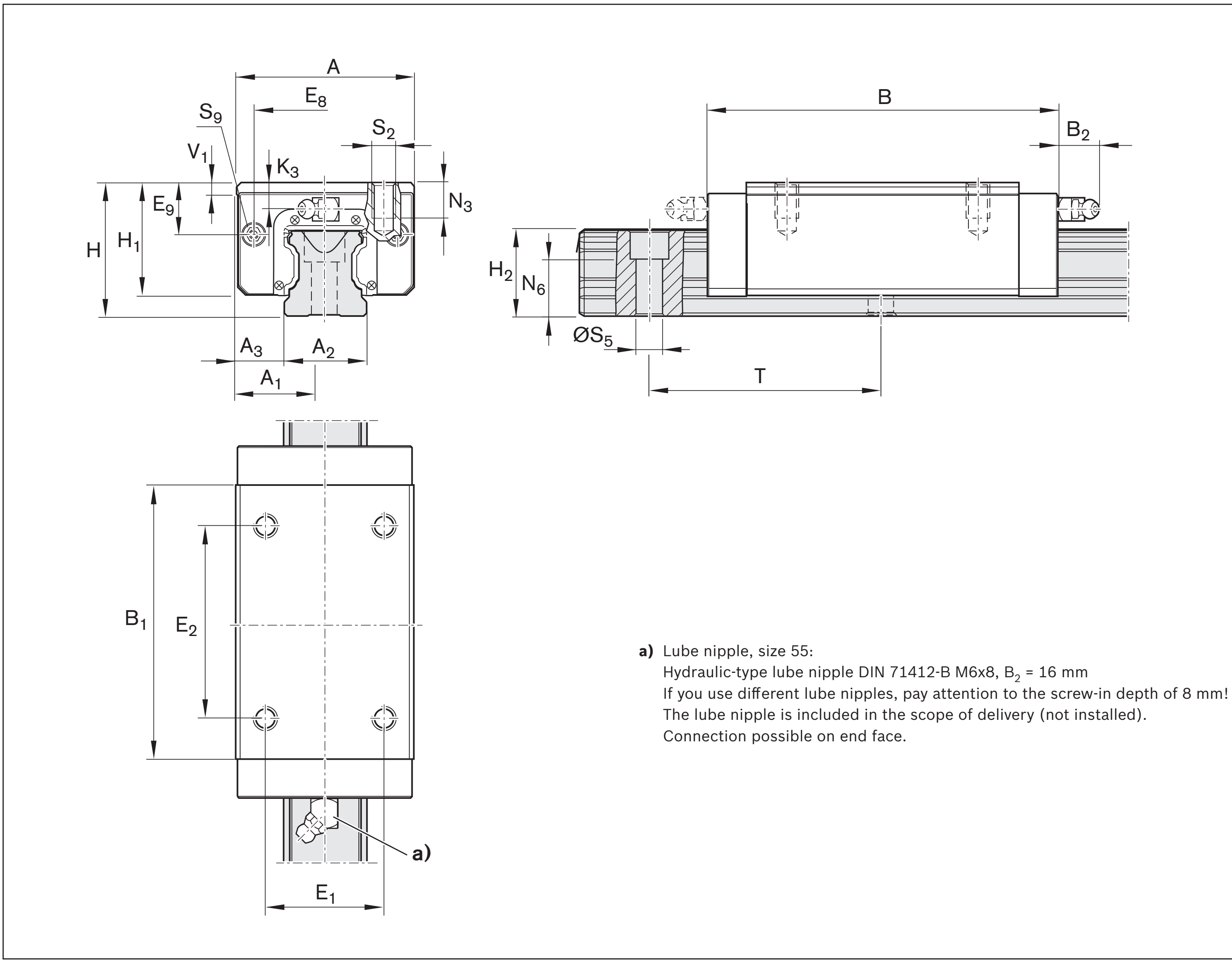
Options:

- SLH ball runner block
- Size 55
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1624 513 10

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Seals
SS = standard seal



a) Lube nipple, size 55:
Hydraulic-type lube nipple DIN 71412-B M6x8, B_2 = 16 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible on end face.

Size	Dimensions (mm)													
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_2**	**E_8**	**E_9**	**H**	**H_1**	**H_2 1)**	**H_2 2)**
55	100	50	53	23.5	199	155.5	75	95	80	32.3	80	67	48.15	47.85

Size	Dimensions (mm)								Weight (kg)	Load capacities 3) (N)		Load moments 3) (Nm)			
	K_3	**N_3**	**$N_6^{\pm0.5}$**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**	**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
55	19	19	29	M12	16	M5x8	120	12	6.00	139 000	245 000	4 410	7 780	3 960	6 990

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

Product description

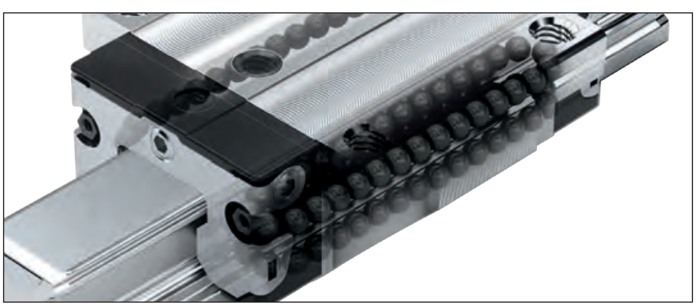
Characteristic features

- Excellent dynamic characteristics:
  Speed: v_{max} = 10 m/s
  Acceleration: a_{max} = 500 m/s^2
- The same high load capacities in all four main directions of loading
- Long-term lubrication, up to several years
- Minimum quantity lubrication system with integrated reservoir for oil lubrication
- Lube ports with metal threads on all sides
- Limitless interchangeability; all ball guide rail versions can be combined at will with all ball runner block versions within each accuracy class
- Optimum system rigidity through preloaded O-arrangement
- Electrically insulating due to the use of ceramic balls
- Existing range of accessories fully utilizable
- Top logistics that are unique worldwide

Further highlights:

- High travel speed thanks to low mass of ceramic balls
- Attachments on the ball runner block for mounting from above and below[1)]
- Improved rigidity under lift-off and side loading conditions when additional mounting screws are used in the two holes provided at the center of the ball runner block
- Mounting threads provided on end faces for fixing of all add-on elements
- High rigidity in all load directions – permits applications with just one runner block per rail
- Integrated all-round sealing
- High torque load capacity
- Optimized entry-zone geometry and high number of balls per track minimizes variation in elastic deflection
- Smooth running thanks to optimized ball recirculation and guidance
- Available in five common sizes
- Ball runner blocks pre-lubricated in factory

1) Type-dependent



Ceramic balls

- Permit very high speeds

Definition of ball runner block format

Criterion	Designation	Abbreviation (example)		
		F	N	S
Width	**F**lange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	**N**ormal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

Note

For all SNS/SNO ball guide rails.

Overview of formats

FNS R2001 ... 9.

FLS R2002 ... 9.

SNS R2011 ... 9.

SLS R2012 ... 9.

FNS, FLS, SNS, SLS

Design style	Size	Ball runner block with size	Preload class	Accuracy class		Seal with ball runner blocks without ball chain	Load capacities[1] (N)		Load moments[1] (Nm)				Weight (kg)
			C2	H	P	SS	C	C_0	M_t	M_{t0}	M_L	M_{L0}	m
FNS	**15**	R2001 1	2	3	2	90	6 880	8 860	66	85	47	61	0.20
	20	R2001 8	2	3	2	90	16 300	20 800	210	270	140	180	0.45
	25	R2001 2	2	3	2	90	20 000	25 100	280	360	200	250	0.60
	30	R2001 7	2	3	2	90	25 500	33 500	440	580	310	400	1.05
	35	R2001 3	2	3	2	90	36 200	56 500	780	1 210	510	790	1.50
	e.g.	R2001 7	2	3		90							
FLS	**15**	R2002 1	2	3	2	90	8 930	12 800	86	120	85	120	0.30
	20	R2002 8	2	3	2	90	20 700	29 200	260	370	240	340	0.55
	25	R2002 2	2	3	2	90	26 000	36 600	370	520	370	520	0.80
	30	R2002 7	2	3	2	90	32 100	46 700	560	810	520	750	1.45
	35	R2002 3	2	3	2	90	46 600	81 100	1 000	1 740	900	1 560	2.15
SNS	**15**	R2011 1	2	3	2	90	6 880	8 860	66	85	47	61	0.15
	20	R2011 8	2	3	2	90	16 300	20 800	210	270	140	180	0.35
	25	R2011 2	2	3	2	90	20 000	25 100	280	360	200	250	0.45
	30	R2011 7	2	3	2	90	25 500	33 500	440	580	310	400	0.80
	35	R2011 3	2	3	2	90	36 200	56 500	780	1 210	510	790	1.15
SLS	**15**	R2012 1	2	3	2	90	8 930	12 800	86	120	85	120	0.20
	20	R2012 8	2	3	2	90	20 700	29 200	260	370	240	340	0.45
	25	R2012 2	2	3	2	90	26 000	36 600	370	520	370	520	0.60
	30	R2012 7	2	3	2	90	32 100	46 700	560	810	520	750	1.05
	35	R2012 3	2	3	2	90	46 600	81 100	1 000	1 740	900	1 560	1.60

1) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M}_t$ and $\mathbf{M}_L$ by 1.26 according to the table.

Note

For dimensions, dimension drawing, load capacities, rigidities and moments, see “Standard ball runner block BSHP”

FNS order example

Options:

- FNS ball runner block
- Size 30
- Preload class C2
- Accuracy class H
- With standard seal, without ball chain

Part number:
R2001 723 90

Preload classes
C2 = Average preload

Seals
SS = standard seal

Product description

Characteristic features

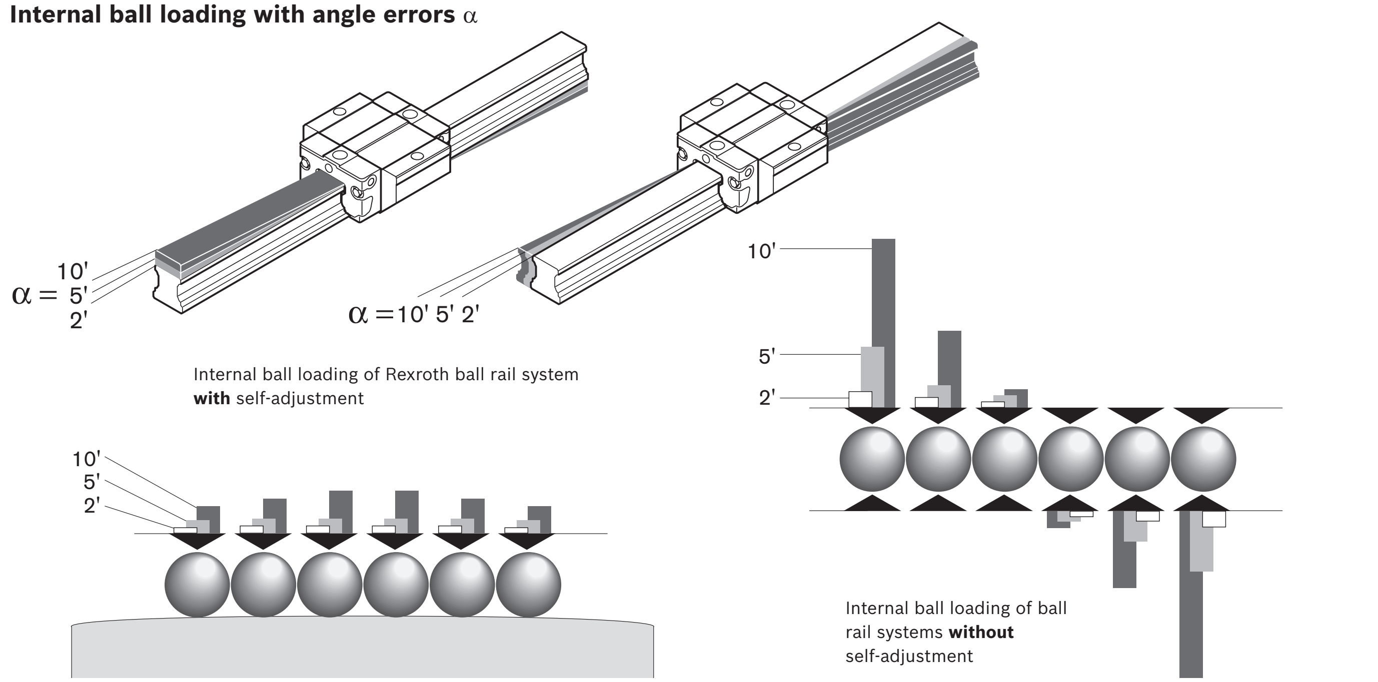
- Automatically compensates for errors in alignment (of up to 10' arc about two axes)
- Extra-compact design
- The same high load capacities in all four main directions of loading
- Wider permissible tolerances for parallelism and height offsets of the mounting surfaces
- Accuracy classes H and N
- Preload classes:
  C0 (without preload, clearance)
  C1 (moderate preload)
- Quiet running due to the optimum design of the return unit and entry
- Low noise level and outstanding travel performance
- Excellent dynamic characteristics:
  Speed: v_{max} = 5 m/s
  Acceleration: a_{max} = 500 m/s^2
- Minimum quantity lubrication system with integrated reservoir for oil lubrication
- Lube ports with metal thread on all sides
- Ball runner blocks pre-lubricated in factory
- Limitless interchangeability; all ball guide rail versions can be combined at will with all ball runner block versions within each accuracy class

Self-alignment

Rexroth's Super ball runner blocks with self-aligning feature automatically compensate for errors in alignment to 10' of arc.
There is no load capacity reduction through compression across the edges.
The centers of the mating surfaces supporting the steel load bearing plates serve as a rocking fulcrum.
Therefore slight errors in alignment between runner block and guide rail do not cause problems. Also, inaccuracies in machining, mounting errors or guide rail flex will automatically be corrected.
The self-aligning feature assures that the balls enter the load-bearing zone smoothly and that the load is distributed evenly across the entire row of balls.
Result:
Considerably quieter running and much longer service life.

With two Super runner blocks on one guide rail, it is also possible to produce tilt-free ball rail systems with a high load capacity, particularly for handling applications.

Internal ball loading with angle errors α



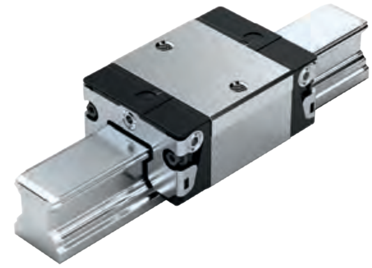
Internal ball loading of Rexroth ball rail system **with** self-adjustment

Internal ball loading of ball rail systems **without** self-adjustment

Overview of formats

FKS

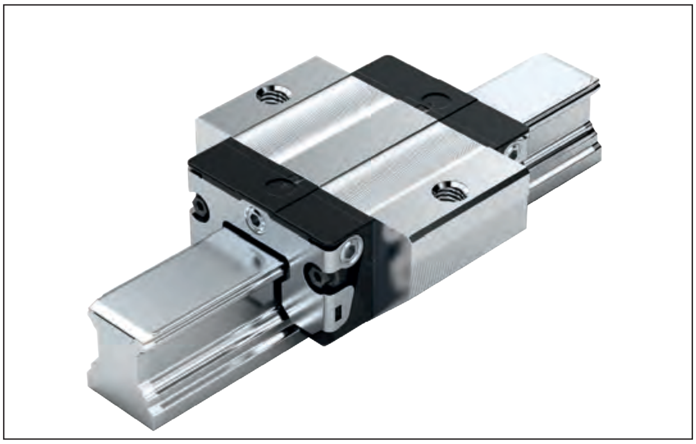
SKS



Definition of ball runner block format

Criterion	Designation	Abbreviation (example) F	K	S
Width	**F**lange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	Normal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

FKS – Flange, short, standard height



R1661 ... 2.

Dynamic characteristics

Travel speed: v_{max} = 5 m/s

Acceleration: a_{max} = 500 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Pre-lubricated

Note

Can be used on all ball guide rails SNS.

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks without ball chain	
		C0	C1	N	H	SS	LS
15	R1661 1	9	1	4	3	20	21
20	R1661 8	9	1	4	3	20	21
25	R1661 2	9	1	4	3	20	21
30	R1661 7	9	1	4	3	20	21
35	R1661 3	9	1	4	3	20	21
e.g.	R1661 7		1		3	20	

Order example

Options:

- FKS ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:

R1661 713 20

Preload classes

C0 = Without preload (clearance)

C1 = Moderate preload

Seals

SS = standard seal

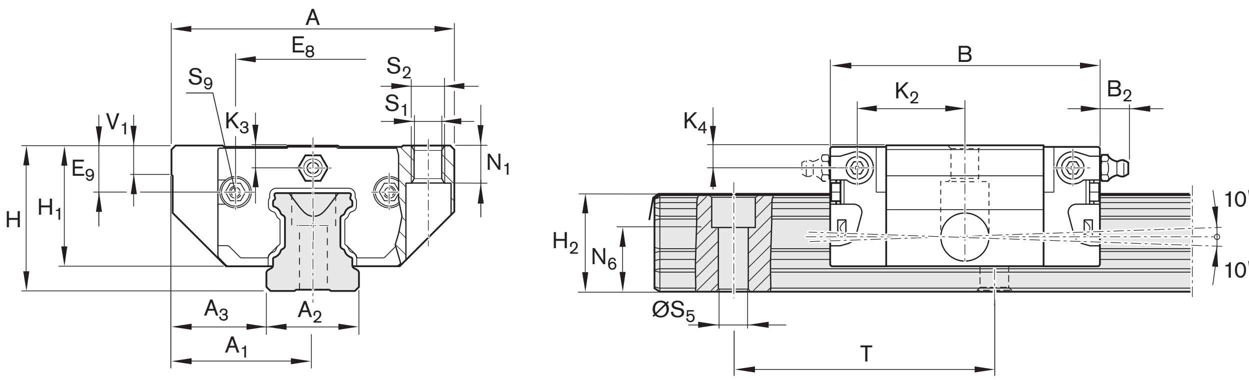
LS = low-friction seal

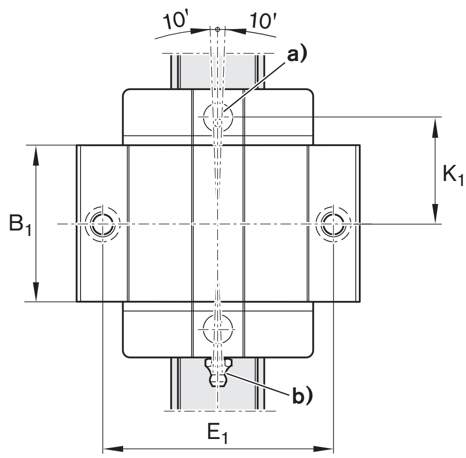
Key

Gray digits

= No preferred variant/ combination

(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 35: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

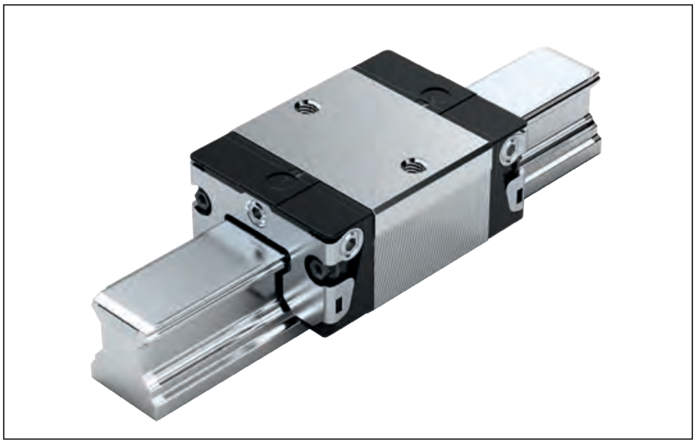
a) Lube nipple, size 15 – 20:
Funnel-type lube nipple DIN 3405 – A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 35:
Hydraulic-type lube nipple DIN 71412 – A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	**Dimensions** (mm)																
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_8**	**E_9**	**H**	**H_1**	**H_2 1)**	**H_2 2)**	**K_1**	**K_2**	**K_3**	**K_4**
15	47	23.5	15	16.0	44.7	25.7	38	24.55	6.70	24	19.90	16.30	16.20	16.25	17.85	3.20	3.20
20	63	31.5	20	21.5	57.3	31.9	53	32.50	7.30	30	25.35	20.75	20.55	22.95	22.95	3.35	3.35
25	70	35.0	23	23.5	67.0	38.6	57	38.30	11.50	36	29.90	24.45	24.25	25.35	26.50	5.50	5.50
30	90	45.0	28	31.0	75.3	45.0	72	48.40	14.60	42	35.35	28.55	28.35	28.80	30.50	6.05	6.05
35	100	50.0	34	33.0	84.9	51.4	82	58.00	17.35	48	40.40	32.15	31.85	32.70	34.20	6.90	6.90

Size	**Dimensions** (mm)								**Weight** (kg)	**Load capacities 3)** (N)	**Permissible load** (N)	**Load moments 3)** (Nm)	
	N_1	**$N_6^{\pm0.5}$**	**S_1**	**S_2**	**S_5**	**S_9**	**T**	**V_1**		**C**	**F_{max}**	**M_t**	**$M_{t\,max}$**
15	5.2	10.3	4.3	M5	4.5	M2.5x3.5	60	5.0	0.15	3 900	1 500	39	15
20	7.7	13.2	5.3	M6	6.0	M3x5	60	6.0	0.30	10 100	3 900	130	50
25	9.3	15.2	6.7	M8	7.0	M3x5	60	7.5	0.50	11 400	4 400	170	65
30	11.0	17.0	8.5	M10	9.0	M3x5	80	7.0	0.80	15 800	6 100	270	105
35	12.0	20.5	8.5	M10	9.0	M3x5	80	8.0	1.20	21 100	8 100	450	175

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C** and **M_t** by 1.26 according to the table.

SKS – slimline short standard height



R1662 ... 2.

Dynamic characteristics

Travel speed: v_{max} = 5 m/s
Acceleration: a_{max} = 500 m/s^2
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication

- Pre-lubricated

Note

Can be used on all ball guide rails SNS.

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks without ball chain	
		C0	C1	N	H	SS	LS
15	R1662 1	9	1	4	3	20	21
20	R1662 8	9	1	4	3	20	21
25	R1662 2	9	1	4	3	20	21
30	R1662 7	9	1	4	3	20	21
35	R1662 3	9	1	4	3	20	21
e.g.	R1662 7		1		3	20	

Order example

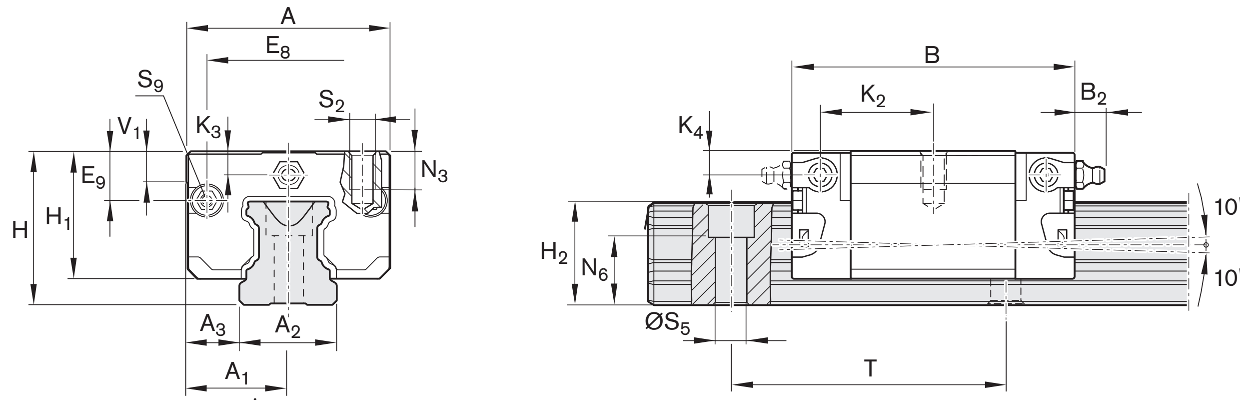
Options:
- SKS ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

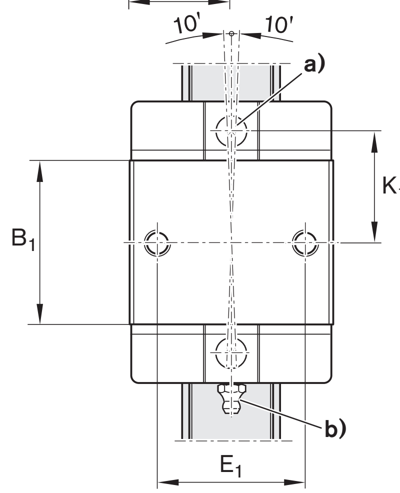
Part number:
R1662 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
LS = low-friction seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 35: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

a) Lube nipple, size 15 – 20:
Funnel-type lube nipple DIN 3405 – A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 35:
Hydraulic-type lube nipple DIN 71412 – A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	**Dimensions** (mm)																
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_8**	**E_9**	**H**	**H_1**	**H_2 1)**	**H_2 2)**	**K_1**	**K_2**	**K_3**	**K_4**
15	34	17	15	9.5	44.7	25.7	26	24.55	6.70	24	19.90	16.30	16.20	16.25	17.85	3.20	3.20
20	44	22	20	12.0	57.3	31.9	32	32.50	7.30	30	25.35	20.75	20.55	22.95	22.95	3.35	3.35
25	48	24	23	12.5	67.0	38.6	35	38.30	11.50	36	29.90	24.45	24.25	25.35	26.50	5.50	5.50
30	60	30	28	16.0	75.3	45.0	40	48.40	14.60	42	35.35	28.55	28.35	28.80	30.50	6.05	6.05
35	70	35	34	18.0	84.9	51.4	50	58.00	17.35	48	40.40	32.15	31.85	32.70	34.20	6.90	6.90

Size	**Dimensions** (mm)							**Weight** (kg)	**Load capacities 3)** (N)	**Permissible load** (N)	**Load moments 3)** (Nm)	
	N_3	**$N_6^{\pm0.5}$**	**S_2**	**S_5**	**S_9**	**T**	**V_1**		**C**	**F_{max}**	**M_t**	**$M_{t\,max}$**
15	6.0	10.3	M4	4.5	M2.5x3.5	60	5.0	0.10	3 900	1 500	39	15
20	7.5	13.2	M5	6.0	M3x5	60	6.0	0.25	10 100	3 900	130	50
25	9.0	15.2	M6	7.0	M3x5	60	7.5	0.35	11 400	4 400	170	65
30	12.0	17.0	M8	9.0	M3x5	80	7.0	0.60	15 800	6 100	270	105
35	13.0	20.5	M8	9.0	M3x5	80	8.0	0.90	21 100	8 100	450	175

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip
3) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C** and **M_t** by 1.26 according to the table.

Product description

Characteristic features

Rexroth ball rail systems with aluminum runner blocks were specifically developed for use in industrial robots and general purpose machines calling for compact, lightweight rolling-element linear motion guideways. They are available in various accuracy classes, each with high load-bearing capacity. These highly compact and weight-saving assemblies are available in five common sizes and offer the same load capacities in all four main load directions.

Highlights

- High torque load capacity
- Optimized entry-zone geometry and high number of balls per track minimizes variation in elastic deflection
- Very low weight: 60 % weight reduction compared to steel ball runner blocks
- Limitless interchangeability; all ball guide rail versions can be combined at will with all ball runner block versions within each accuracy class

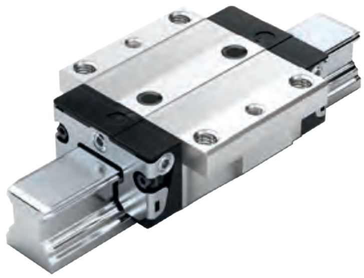
Further highlights

- Low noise level and outstanding travel performance
- Excellent dynamic characteristics:
  Speed: v_{max} = 5 m/s
  Acceleration: a_{max} = 500 m/s^2
- Long-term lubrication, up to several years
- Minimum quantity lubrication system with integrated reservoir for oil lubrication
- Wider permissible tolerances for parallelism and height offsets of the mounting surfaces
- Accuracy classes H and N can be combined with any of the rails in each accuracy class
- Lube ports with metal threads on all sides
- Mounting threads provided on end faces for fixing of all add-on elements
- Ball guide rails in accuracy class H also available with surface protection Resist CR (matte-silver hard chrome plated)
- Smooth, light running thanks to optimized ball recirculation and ball or ball chain guidance
- Increase in rigidity with lift-off and lateral loading by means of additional screw connections on two holes in the middle of the ball runner block[1)]
- Attachments on the ball runner block for mounting from above and below[1)]
- Predrilled locating pin holes in the ball runner blocks
- Available with ball chain as an option
- Ball runner blocks pre-lubricated in factory

1) Type-dependent

Overview

FNS



SNS

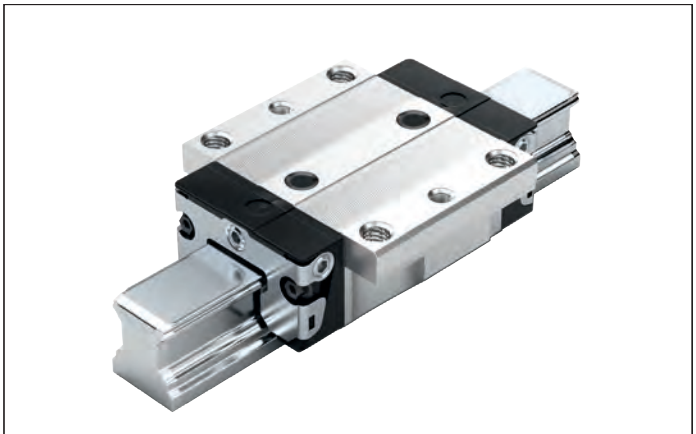
Definition of ball runner block format

Criterion	Designation	Abbreviation (example)		
		F	N	S
Width	**F**lange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	**N**ormal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

Ball chain (optional)

- Optimizes noise levels

FNS – Flange normal standard height, R1631 … 2.



R1631 … 2.

Dynamic characteristics

Travel speed: v_{max} = 5 m/s
Acceleration: a_{max} = 500 m/s²
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note on lubrication

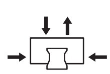
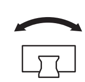
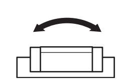
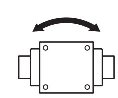
- Pre-lubricated

Note

Can be used on all ball guide rails SNS.

Options/material numbers/technical data

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks			
						without ball chain		with ball chain	
		C0	C1	N	H	SS	LS	SS	LS
15	R1631 1	9	1	4	3	20	21	22	23
20	R1631 8	9	1	4	3	20	21	22	23
25	R1631 2	9	1	4	3	20	21	22	23
30	R1631 7	9	1	4	3	20	21	22	23
35	R1631 3	9	1	4	3	20	21	22	23
e.g.	R1631 7		1		3	20			

Size	Load capacities 1) (N)	Permissible load (N)	Load moments 1) (Nm)			
						
	C	F_{max}	M_t	$M_{t\,max}$	M_L	$M_{L\,max}$
15	9 860	3 000	95	29	68	16
20	23 400	7 200	300	92	200	50
25	28 600	8 800	410	125	290	70
30	36 500	12 200	630	210	440	110
35	51 800	16 200	1 110	345	720	170

1) Load capacities and load moments for ball runner blocks **without** ball chain.
Load capacities and load moments for ball runner blocks **with** ball chain ☞ 13
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

Order example

Options:

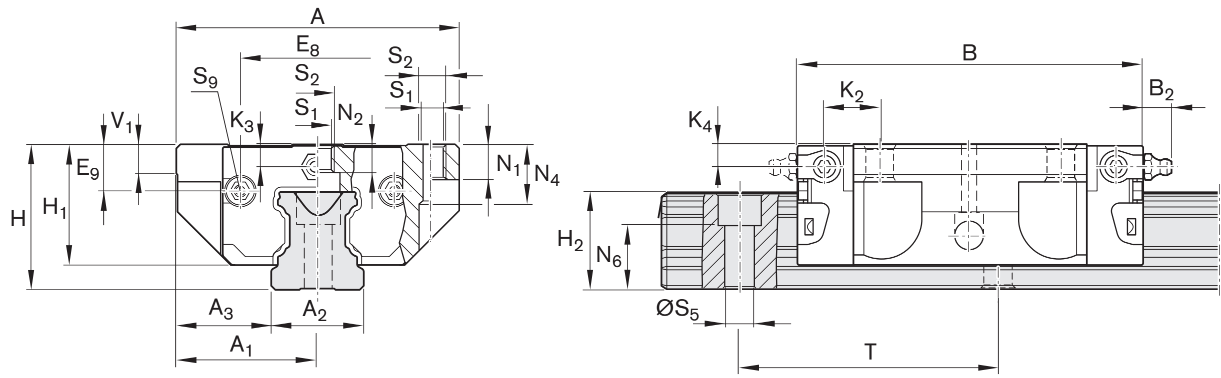
- FNS ball runner block
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

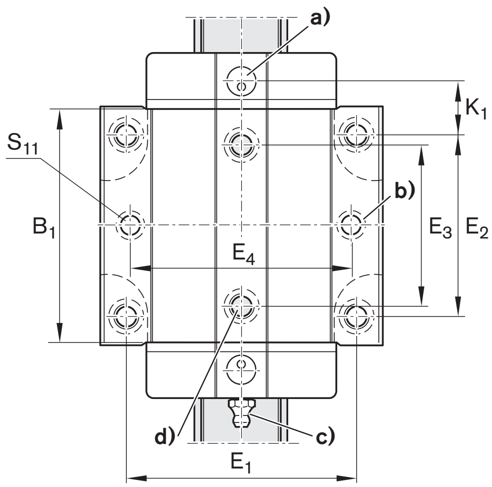
Part number:
R1631 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
LS = low-friction seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 35: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

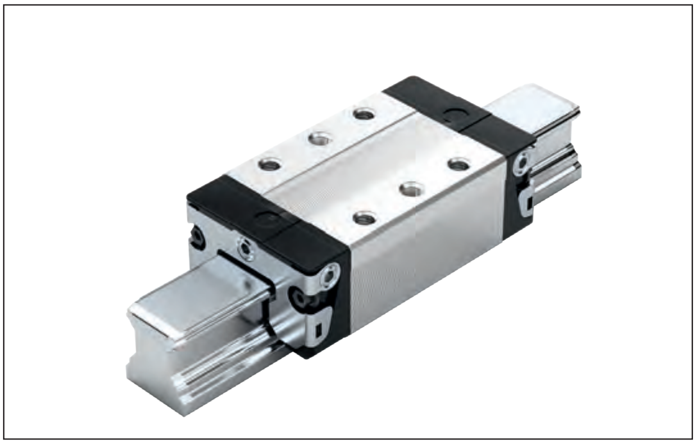
- **a)** Pre-drilled pin holes are already present as shown (dimensions E_4 see section Mounting).
- **b)** Lube nipple, size 15 – 20:
  Hydraulic-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
  If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
  Lube nipple, size 25 – 35:
  Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
  If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
  The lube nipple is included in the scope of delivery (not installed).
  Connection possible at all sides.
- **c)** For manufacturing reasons, there may be plugs at these positions. These must be removed before mounting.

Size	**Dimensions** (mm)																		
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_3	E_8	E_9	**H**	H_1	H_2 1)	H_2 2)	K_1	K_2	K_3	K_4
15	47	23.5	15	16.0	58.2	39.2	38	30	26	24.55	6.70	24	19.90	16.30	16.20	8.00	9.6	3.20	3.20
20	63	31.5	20	21.5	75.0	49.6	53	40	35	32.50	7.30	30	25.35	20.75	20.55	11.80	11.8	3.35	3.35
25	70	35.0	23	23.5	86.2	57.8	57	45	40	38.30	11.50	36	29.90	24.45	24.25	12.45	13.6	5.50	5.50
30	90	45.0	28	31.0	97.7	67.4	72	52	44	48.40	14.60	42	35.35	28.55	28.35	14.00	15.7	6.05	6.05
35	100	50.0	34	33.0	110.5	77.0	82	62	52	58.00	17.35	48	40.40	32.15	31.85	14.50	16.0	6.90	6.90

Size	**Dimensions** (mm)											**Weight**
	N_1	N_2	N_4	$N_6^{\pm0.5}$	S_1	S_2	S_5	S_9	S_{11}	**T**	V_1	(kg)
15	5.2	4.40	10.3	10.3	4.3	M5	4.5	M2.5x3.5	3.7	60	5.0	0.10
20	7.7	5.20	13.5	13.2	5.3	M6	6.0	M3x5	4.7	60	6.0	0.24
25	9.3	7.00	17.8	15.2	6.7	M8	7.0	M3x5	5.7	60	7.5	0.30
30	11.0	7.90	20.5	17.0	8.5	M10	9.0	M3x5	7.7	80	7.0	0.55
35	12.0	10.15	24.0	20.5	8.5	M10	9.0	M3x5	7.7	80	8.0	0.75

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip

SNS – slimline normal standard height, R1632 ... 2.



R1632 ... 2.

Dynamic characteristics

Travel speed: v_{max} = 5 m/s
Acceleration: a_{max} = 500 m/s²
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note on lubrication

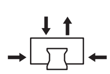
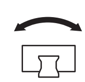
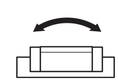
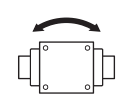
- Pre-lubricated

Note

Can be used on all ball guide rails SNS.

Options/material numbers/technical data

Size	Ball runner block with size	Preload class		Accuracy class		Seal with ball runner blocks			
						without ball chain		with ball chain	
		C0	C1	N	H	SS	LS	SS	LS
15	R1632 1	9	1	4	3	20	21	22	23
20	R1632 8	9	1	4	3	20	21	22	23
25	R1632 2	9	1	4	3	20	21	22	23
30	R1632 7	9	1	4	3	20	21	22	23
35	R1632 3	9	1	4	3	20	21	22	23
e.g.	R1632 7		1		3	20			

Size	Load capacities[1)] (N)	Permissible load (N)	Load moments[1)] (Nm)			
						
	C	F_{max}	M_t	$M_{t\ max}$	M_L	$M_{L\ max}$
15	9 860	3 000	95	29	68	16
20	23 400	7 200	300	92	200	50
25	28 600	8 800	410	125	290	70
30	36 500	12 200	630	210	440	110
35	51 800	16 200	1 110	345	720	170

1) Load capacities and load moments for ball runner blocks **without** ball chain.
Load capacities and load moments for ball runner blocks **with** ball chain. ☞ 13
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

Order example

Options:

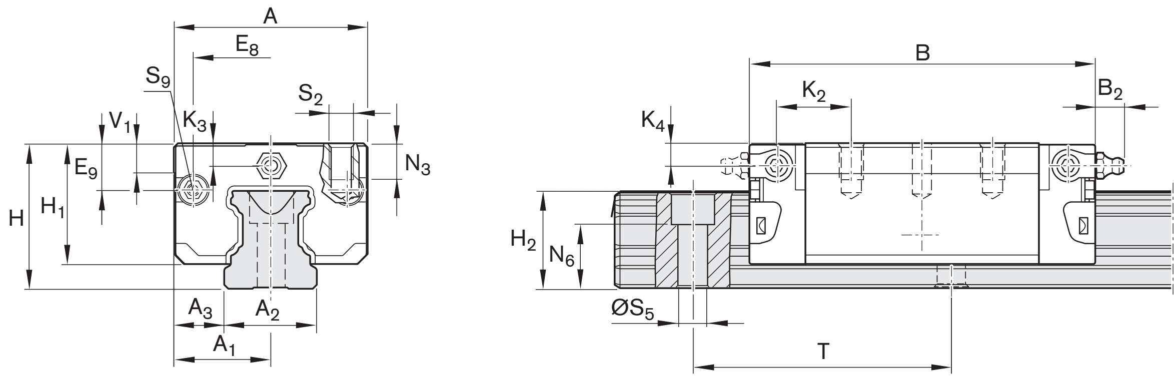
- SNS ball runner blocks
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

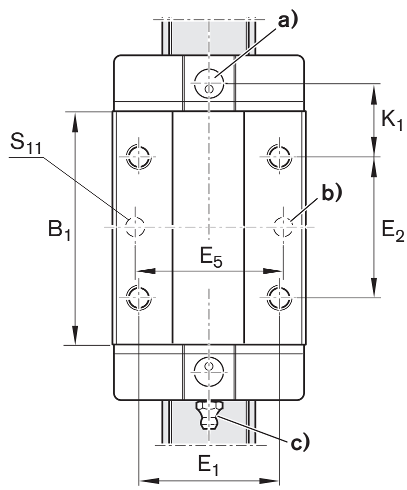
Part number:
R1632 713 20

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
LS = low-friction seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)





For O-ring
size 15: Ø 4 · 1.0 (mm)
size 20 – 35: Ø 5 · 1.0 (mm)
open lube port if necessary (see section Lubrication).

a) Pre-drilled pin holes are already present as shown (dimensions E_5 see section Mounting).

b) Lube nipple, size 15 – 20:
Hydraulic-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 – 35:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed).
Connection possible at all sides.

Size	**Dimensions** (mm)																	
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	E_9	**H**	H_1	H_2 1)	H_2 2)	K_1	K_2	K_3	K_4
15	34	17	15	9.5	58.2	39.2	26	26	24.55	6.70	24	19.90	16.30	16.20	10.00	11.60	3.20	3.20
20	44	22	20	12.0	75.0	49.6	32	36	32.50	7.30	30	25.35	20.75	20.55	13.80	13.80	3.35	3.35
25	48	24	23	12.5	86.2	57.8	35	35	38.30	11.50	36	29.90	24.45	24.25	17.45	18.60	5.50	5.50
30	60	30	28	16.0	97.7	67.4	40	40	48.40	14.60	42	35.35	28.55	28.35	20.00	21.70	6.05	6.05
35	70	35	34	18.0	110.5	77.0	50	50	58.00	17.35	48	40.40	32.15	31.85	20.50	22.00	6.90	6.90

Size	**Dimensions** (mm)								**Weight**
	N_3	$N_6^{\pm0.5}$	S_2	S_5	S_9	S_{11}	**T**	V_1	(kg)
15	6.0	10.3	M4	4.5	M2.5x3.5	3.7	60	5.0	0.10
20	7.5	13.2	M5	6.0	M3x5	4.7	60	6.0	0.20
25	9.0	15.2	M6	7.0	M3x5	5.7	60	7.5	0.35
30	12.0	17.0	M8	9.0	M3x5	7.7	80	7.0	0.45
35	13.0	20.5	M8	9.0	M3x5	7.7	80	8.0	0.65

1) Dimension H_2 with cover strip
2) Dimension H_2 without cover strip

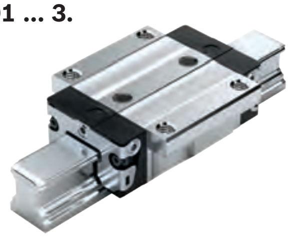
Product description

General information about corrosion-resistant Resist NR ball runner blocks

- Since Resist NR is not a coating, all of the dimensions and tolerances, dynamic characteristic, load capacities, rigidities and moments are identical with the standard steel version.
  Refer to the next page for the material numbers.
- For all SNS/SNO ball guide rails.
- Ball runner block body made of corrosion-resistant steel according to DIN EN 10088. Rexroth recommends this version for applications requiring corrosion protection. Fast delivery.
- Pre-lubricated

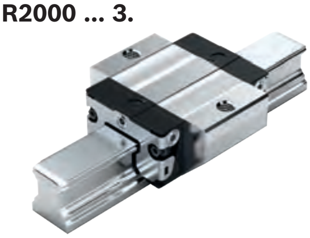
Overview of formats

FNS
R2001 ... 3.

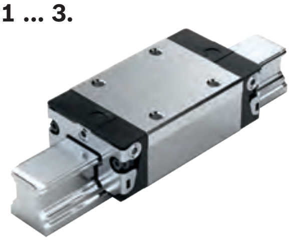


FLS
R2002 ... 3.

FKS
R2000 ... 3.



SNS
R2011 ... 3.



SLS
R2012 ... 3.

SKS
R2010 ... 3.

Definition of ball runner block format

Criterion	Designation	Abbreviation (example)		
		F	**N**	**S**
Width	**F**lange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	**N**ormal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

Ball chain (optional)

- Optimizes noise levels

FNS, FLS, FKS, SNS, SLS, SKS

Design style	Size	Ball runner block with size	Preload class		Accuracy class	Seal with ball runner blocks without ball chain			with ball chain		
			C0	C1	H	SS	LS	DS	SS	LS	DS
FNS	**15**	R2001 1	9	–	3	30	31	–	32	33	–
	20	R2001 8	9	–	3	30	31	–	32	33	–
	25	R2001 2	9	–	3	30	31	–	32	33	–
	30	R2001 7	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
	35	R2001 3	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
	e.g.	R2001 7		1	3	30					
FLS	**15**	R2002 1	9	–	3	30	31	–	32	33	–
	20	R2002 8	9	–	3	30	31	–	32	33	–
	25	R2002 2	9	–	3	30	31	–	32	33	–
	30	R2002 7	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
	35	R2002 3	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
FKS	**15**	R2000 1	9	–	3	30	31	–	32	33	–
	20	R2000 8	9	–	3	30	31	–	32	33	–
	25	R2000 2	9	–	3	30	31	–	32	33	–
	30	R2000 7	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
	35	R2000 3	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
SNS	**15**	R2011 1	9	–	3	30	31	–	32	33	–
	20	R2011 8	9	–	3	30	31	–	32	33	–
	25	R2011 2	9	–	3	30	31	–	32	33	–
	30	R2011 7	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
	35	R2011 3	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
SLS	**15**	R2012 1	9		3	30	31	–	32	33	–
	20	R2012 8	9		3	30	31	–	32	33	–
	25	R2012 2	9		3	30	31	–	32	33	–
	30	R2012 7	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
	35	R2012 3	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
SKS	**15**	R2010 1	9	–	3	30	31	–	32	33	–
	20	R2010 8	9	–	3	30	31	–	32	33	–
	25	R2010 2	9	–	3	30	31	–	32	33	–
	30	R2010 7	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y
	35	R2010 3	9		3	30	31	–	32	33	–
				1	3	30	31	3Z	32	33	3Y

FNS order example

Options:

- Resist NR FNS ball runner blocks BSHP
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number: R2001 713 30

Note

For dimensions, dimension drawing, load capacities, rigidities and moments, see “Standard ball runner block BSHP”

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/combination
(Some delivery times may be longer)

Product description

Characteristic features

Resist NR II ball rail systems made of corrosion-resistant steel[1)] have been used in particular in conjunction with water-based media, highly dilute acids, alkali or salt solutions. These guides are particularly suitable for use in relative humidities above 70 % and temperatures above 30 °C.
Conditions like these are found above all in cleaning systems, galvanization and pickling lines, steam degreasing systems, and also cooling equipment.
Since no additional corrosion protection is needed, Resist NR II ball rail systems are particularly suitable for use in clean rooms, general PCB production. There are other potential uses in the general packaging industry.

General information about Resist NR II ball runner blocks
- For all SNS ball guide rails that are not initially greased and not preserved
- Refer to the appropriate steel ball runner block for the dimensions

Highlights

- All metal parts made of corrosion-resistant steel
- Available in five common sizes
- Excellent dynamic characteristics:
  Speed: v_{max} = 5 m/s
  Acceleration: a_{max} = 500 m/s^2
- The same high load capacities in all four main directions of loading
- Available in accuracy classes N, H and P, up to preload class C2
- Long-term lubrication, up to several years
- Minimum quantity lubrication system with integrated reservoir for oil lubrication
- Lube ports with metal threads on all sides
- Available with ball chain as an option

1) Resist NR II:
Ball runner block body or ball guide rail and all steel components made of corrosion-resistant steel according to DIN EN 10088

General notes
- Refer to the ball rail system catalog NRFG R310DE2226 (2011.04) for ball rail systems for uses in areas of the food industry
- Combining different accuracy classes When you combine ball guide rails and ball runner blocks of different accuracy classes, the tolerances change for dimensions H and A3. See “Accuracy classes and their tolerances”
- Combining different materials
  When you combine ball guide rails and ball runner blocks of different materials, the load capacities, permissible loads and load moments change. You must use the lower value in each case.

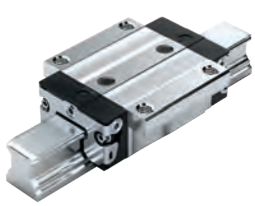
Further highlights

- Limitless interchangeability; all ball guide rail versions can be combined at will with all ball runner block versions within each accuracy class (including those made of steel, aluminum, Resist NR and Resist CR)
- Optimum system rigidity through preloaded O-arrangement
- Existing range of accessories fully utilizable
- Attachments on the ball runner block for mounting from above and below[2)]
- Increase in rigidity with lift-off and lateral loading by means of additional screw connections on two holes in the middle of the ball runner block[2)]
- Mounting threads provided on end faces for fixing of all add-on elements
- High rigidity in all load directions – permits applications with just one runner block per rail
- Integrated all-round sealing
- Optimized entry-zone geometry and high number of balls per track minimizes variation in elastic deflection
- Smooth, light running thanks to optimized ball recirculation and ball or ball chain guidance
- Ball guide rails Resist NR II are available with or without cover strip and for mounting from above or below
- Ball runner blocks also available with chrome-plated guide rails

2) Type-dependent

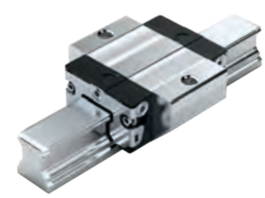
Overview of formats

FNS R2001 ... 0.

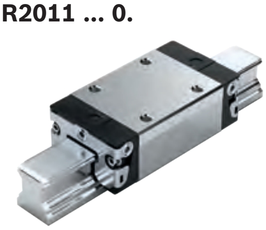


FLS R2002 ... 0.

FKS R2000 ... 0.



SNS R2011 ... 0.



SLS R2012 ... 0.

SKS R2010 ... 0.

Definition of ball runner block format

Criterion	Designation	Abbreviation (example)		
		F	N	S
Width	**F**lange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	**N**ormal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

Ball chain (optional)

- Optimizes noise levels

FNS, FLS, FKS, SNS, SLS, SKS

Size	Ball runner block with size	Preload class			Accuracy class			Seal with ball runner blocks						Weight (kg)	Load capacities[2)] (N)		Load moments[2)] (Nm)			
								without ball chain			with ball chain									
		C0	C1	C2	N	H	P	SS	LS[1)]	DS	SS	LS[1)]	DS	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
FNS																				
15	R2001 1	9			4	3	–	04	05	–	06	07	–	0.20	5 100	9 300	63	90	34	49
			1		4	3	2	04	05	–	06	07	–							
				2	–	3	2	04	–	–	06	–	–							
20	R2001 8	9			4	3	–	04	05	–	06	07	–	0.45	12 300	16 900	205	215	110	115
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
25	R2001 2	9			4	3	–	04	05	–	06	07	–	0.65	15 000	21 000	270	295	150	165
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
30	R2001 7	9			4	3	–	04	05	–	06	07	–	1.10	20 800	28 700	460	500	245	265
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
35	R2001 3	9			4	3	–	04	05	–	06	07	–	1.60	27 600	37 500	760	805	375	390
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
FLS																				
15	R2002 1	9			4	3	–	04	05	–	06	07	–	0.30	8 500	14 000	82	132	64	104
			1		4	3	2	04	05	–	06	07	–							
				2	–	3	2	04	–	–	06	–	–							
20	R2002 8	9			4	3	–	04	05	–	06	07	–	0.55	16 000	24 400	265	310	190	230
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
25	R2002 2	9			4	3	–	04	05	–	06	07	–	0.90	20 000	31 600	365	450	290	350
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
30	R2002 7	9			4	3	–	04	05	–	06	07	–	1.50	26 300	40 100	590	695	420	495
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
35	R2002 3	9			4	3	–	04	05	–	06	07	–	2.25	36 500	56 200	1 025	1 210	710	840
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
FKS																				
15	R2000 1	9			4	3	–	04	05	–	06	07	–	0.15	4 500	5 600	44	55	16	19
			1		4	3	–	04	05	–	06	07	–							
				–	–	–	–	–	–	–	–	–	–							
20	R2000 8	9			4	3	–	04	05	–	06	07	–	0.30	8 200	9 400	125	115	45	40
			1		4	3	–	04	05	0X	06	07	0W							
				–	–	–	–	–	–	–	–	–	–							
25	R2000 2	9			4	3	–	04	05	–	06	07	–	0.50	10 500	12 600	195	180	70	65
			1		4	3	–	04	05	0X	06	07	0W							
				–	–	–	–	–	–	–	–	–	–							
30	R2000 7	9			4	3	–	04	05	–	06	07	–	0.80	14500	17 200	320	295	110	105
			1		4	3	–	04	05	0X	06	07	0W							
				–	–	–	–	–	–	–	–	–	–							
35	R2000 3	9			4	3	–	04	05	–	06	07	–	1.20	19 300	22 400	545	485	170	150
			1		4	3	–	04	05	0X	06	07	0W							
				–	–	–	–	–	–	–	–	–	–							

Order example
Options:

- Resist NR II SKS ball runner blocks BSHP
- Size 30
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Material number: R2010 713 04

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)

Size	Ball runner block with size	Preload class			Accuracy class			Seal with ball runner blocks						Weight (kg)	Load capacities2) (N)		Load moments2) (Nm)			
								without ball chain			with ball chain									
		C0	C1	C2	N	H	P	SS	LS1)	DS	SS	LS1)	DS	m	C	C_0	M_t	M_{t0}	M_L	M_{L0}
SNS																				
15	R2011 1	9			4	3	–	04	05	–	06	07	–	0.15	5 100	9 300	63	90	34	49
			1		4	3	2	04	05	–	06	07	–							
				2	–	3	2	04	–	–	06	–	–							
20	R2011 8	9			4	3	–	04	05	–	06	07	–	0.35	12 300	16 900	205	215	110	115
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
25	R2011 2	9			4	3	–	04	05	–	06	07	–	0.50	15 000	21 000	270	295	150	165
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
30	R2011 7	9			4	3	–	04	05	–	06	07	–	0.85	20 800	28 700	460	500	245	265
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
35	R2011 3	9			4	3	–	04	05	–	06	07	–	1.25	27 600	37 500	760	805	375	390
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
SLS																				
15	R2012 1	9			4	3	–	04	05	–	06	07	–	0.20	8 500	14 000	82	132	64	104
			1		4	3	2	04	05	–	06	07	–							
				2	–	3	2	04	–	–	06	–	–							
20	R2012 8	9			4	3	–	04	05	–	06	07	–	0.45	16 000	24 400	265	310	190	230
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
25	R2012 2	9			4	3	–	04	05	–	06	07	–	0.65	20 000	31 600	365	450	290	350
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
30	R2012 7	9			4	3	–	04	05	–	06	07	–	1.10	26 300	40 100	590	695	420	495
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
35	R2012 3	9			4	3	–	04	05	–	06	07	–	1.70	36 500	56 200	1 025	1 210	710	840
			1		4	3	2	04	05	0X	06	07	0W							
				2	–	3	2	04	–	0X	06	–	0W							
SKS																				
15	R2010 1	9			4	3	–	04	05	–	06	07	–	0.10	4 500	5 600	44	55	16	19
			1		4	3	–	04	05	–	06	07	–							
				–	–	–	–	–	–	–	–	–	–							
20	R2010 8	9			4	3	–	04	05	–	06	07	–	0.25	8 200	9 400	125	115	45	40
			1		4	3	–	04	05	0X	06	07	0W							
				–	–	–	–	–	–	–	–	–	–							
25	R2010 2	9			4	3	–	04	05	–	06	07	–	0.35	10 500	12 600	195	180	70	65
			1		4	3	–	04	05	0X	06	07	0W							
				–	–	–	–	–	–	–	–	–	–							
30	R2010 7	9			4	3	–	04	05	–	06	07	–	0.60	14500	17 200	320	295	110	105
			1		4	3	–	04	05	0X	06	07	0W							
				–	–	–	–	–	–	–	–	–	–							
35	R2010 3	9			4	3	–	04	05	–	06	07	–	0.90	19 300	22 400	545	485	170	150
			1		4	3	–	04	05	0X	06	07	0W							
				–	–	–	–	–	–	–	–	–	–							
e.g.	R2010 7		1			3		04												

1) Only with accuracy classes N and H

2) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain. ☞ 14
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

Note

See standard ball runner blocks BSHP for the dimensions and dimension drawing

Product description

General information about Resist CR ball runner blocks

- Refer to the next few pages for the material numbers.
- For dimensions, dimension drawing, dynamic characteristics, load capacities, rigidities and moments, see the corresponding steel ball runner blocks
- Ball runner block body made of steel with matte-silver hard-chrome plated corrosion-resistant coating.
- Pre-lubricated

In the case of hard chrome-plated matte silver Resist CR ball runner blocks and ball guide rails, pay attention to the different tolerances of dimensions H and A_3 (see “Accuracy classes and their tolerances”)

Recommended ball runner blocks for Resist CR ball guide rails of accuracy class H and preload classes C0 and C1

Recommended ball runner block size 15 – 65

- Accuracy class H
- Preload class C0

Recommended ball runner block size 30 – 65

- Accuracy class H
- Preload class C1

Definition of ball runner block format

Criterion	Designation	Abbreviation (example) F	N	S
Width	**F**lange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	**N**ormal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

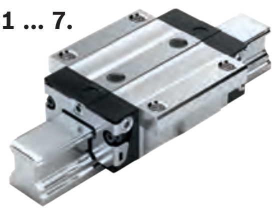
Ball chain (optional)

- Optimizes noise levels

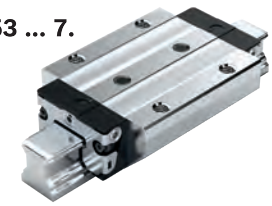
Overview of formats

Standard steel ball runner blocks[1] BSHP up to size 45

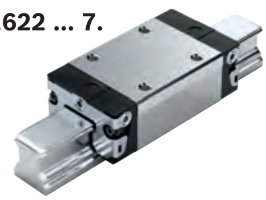
FNS
R1651 ... 7.



FLS
R1653 ... 7.

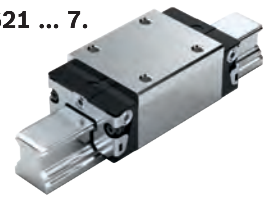


SNS
R1622 ... 7.



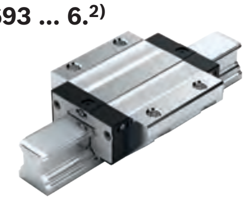
SLS
R1623 ... 7.

SNH
R1621 ... 7.



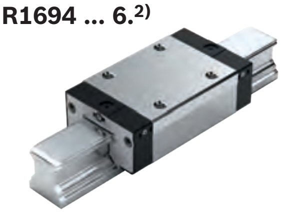
SLH
R1624 ... 7.

FNN
R1693 ... 6.[2]



FKN
R1663 ... 6.[2]

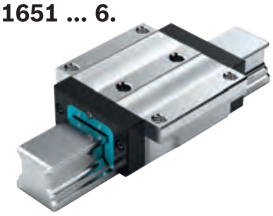
SNN
R1694 ... 6.[2]



SKN
R1664 ... 6.[2]

Heavy-duty ball runner blocks[2] BSHP from size 55 onwards

FNS
R1651 ... 6.

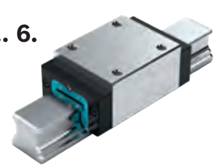


FLS
R1653 ... 6.

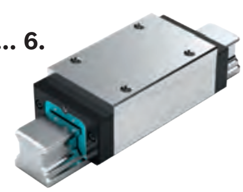
SNS
R1622 ... 6.

SLS
R1623 ... 6.

SNH
R1621 ... 6.



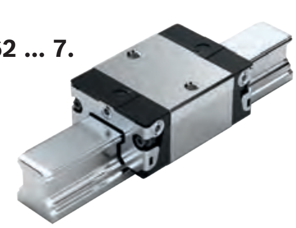
SLH
R1624 ... 6.



Super ball runner blocks[2]

FKS
R1661 ... 7.

SKS
R1662 ... 7.



1) With ball chain
2) Without ball chain

FNS, FLS, SNS, SLS, SNH, SLH, FNN, FKN, SNN, SKN, FKS, SKS

Standard BSHP ball runner blocks

Design style	Size	Ball runner block with size	Preload class		Accuracy class	Seal with ball runner blocks					
						without ball chain			with ball chain		
			C0	C1	H	SS	LS	DS	SS	LS	DS
FNS	**45**	R1651 4	9		3	70	–	–	72	–	–
				1	3	70	–	7Z	72	–	7Y
	e.g.	R1651 4		1	3	70					
FLS	**45**	R1653 4	9		3	70	–	–	72	–	–
				1	3	70	–	7Z	72	–	7Y
SNS	**45**	R1622 4	9		3	70	–	–	72	–	–
				1	3	70	–	7Z	72	–	7Y
SLS	**45**	R1623 4	9		3	70	–	–	72	–	–
				1	3	70	–	7Z	72	–	7Y
SNH	**15**	R1621 1	9	–	3	70	71	–	72	73	–
	25	R1621 2	9	–	3	70	71	–	72	73	–
	30	R1621 7	9		3	70	71	–	72	73	–
				1		70	71	7Z	72	73	7Y
	35	R1621 3	9		3	70	71	–	72	73	–
				1		70	71	7Z	72	73	7Y
	45	R1621 4	9		3	70	–	–	72	–	–
				1		70	–	7Z	72	–	7Z
SLH	**25**	R1624 2	9	–	3	70	71	–	72	73	–
	30	R1624 7	9		3	70	71	–	72	73	–
				1		70	71	7Z	72	73	7Y
	35	R1624 3	9		3	70	71	–	72	73	–
				1		70	71	7Z	72	73	7Y
	45	R1624 4	9		3	70	–	–	72	–	–
				1		70	–	7Z	72	–	7Z
FNN	**20**	R1693 8	9	–	3	60	–	–	–	–	–
	25	R1693 2	9	–	3	60	–	–	–	–	–
FKN	**20**	R1663 8	9	–	3	60	–	–	–	–	–
	25	R1663 2	9	–	3	60	–	–	–	–	–
SNN	**20**	R1694 8	9	–	3	60	–	–	–	–	–
	25	R1694 2	9	–	3	60	–	–	–	–	–
SKN	**20**	R1664 8	9	–	3	60	–	–	–	–	–
	25	R1664 2	9	–	3	60	–	–	–	–	–

Order example

Options:

- Resist CR FNS ball runner blocks BSHP
- Size 45
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number: R1651 413 70

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
LS = low-friction seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)

Heavy-duty BSHP ball runner blocks

Design style	Size	Ball runner block with size	Preload class		Accuracy class	Seal with ball runner blocks without ball chain
			C0	C1	H	SS
FNS	**55**	R1651 5	9	1	3	60
	65	R1651 6	9	1	3	60
FLS	**55**	R1653 5	9	1	3	60
	65	R1653 6	9	1	3	60
SNS	**55**	R1622 5	9	1	3	60
	65	R1622 6	9	1	3	60
SLS	**55**	R1623 5	9	1	3	60
	65	R1623 6	9	1	3	60
SNH	**55**	R1621 5	9	1	3	60
SLH	**55**	R1624 5	9	1	3	60

Super ball runner blocks

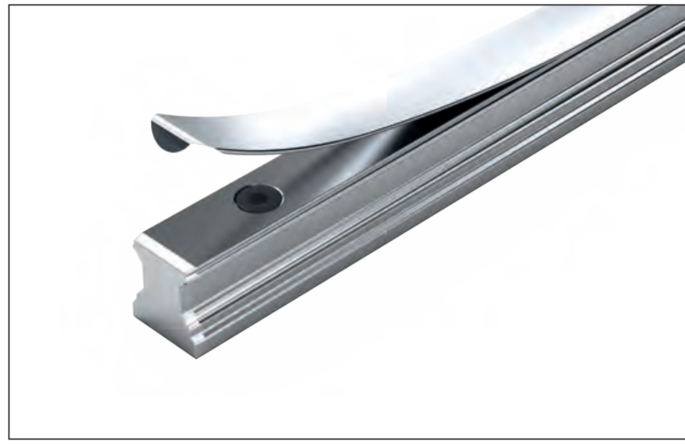
Design style	Size	Ball runner block with size	Preload class		Accuracy class	Seal with ball runner blocks without ball chain		
			C0	C1	H	SS	LS	DS
FKS	**15**	R1661 1	9	–	3	70	71	–
	20	R1661 8	9	–	3	70	71	–
	25	R1661 2	9	–	3	70	71	–
	30	R1661 7	9		3	70	71	–
				1	3	70	71	7Z
	35	R1661 3	9		3	70	71	–
				1	3	70	71	7Z
SKS	**15**	R1662 1	9	–	3	70	71	–
	20	R1662 8	9	–	3	70	71	–
	25	R1662 2	9	–	3	70	71	–
	30	R1662 7	9		3	70	71	–
				1	3	70	71	7Z
	35	R1662 3	9		3	70	71	–
				1	3	70	71	7Z

Note

For dimensions, dimension drawing, load capacities, rigidities and moments, see “Standard-/Heavy-duty ball runner blocks BSHP and Super ball runner blocks”.

Product description

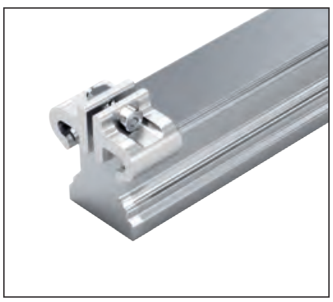
Characteristic features



- Top rigidity in all load directions
- High torque load capacity

Proven cover strip for ball guide rail mounting holes

- **One** cover for all the holes saves time and costs
- Made of corrosion-resistant spring steel per EN 10088
- Easy, secure mounting
- Clip on and fasten



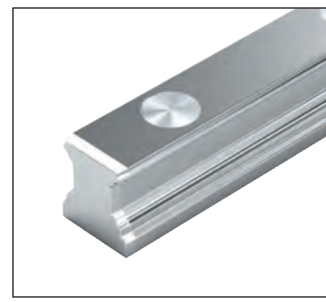
Ball guide rails with aluminum cover strip and strip clamps

- Without threaded holes at the end faces (not required)

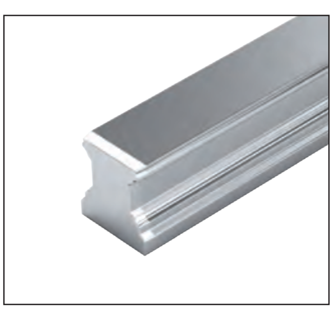
Ball guide rails with cover strip and screwed down plastic protective caps

- With threaded holes at the end faces

Ball guide rails with plastic mounting hole plugs



Ball guide rails with steel mounting hole plugs



Ball guide rails for mounting from below

Definition of ball guide rail format

Criterion	Designation	Code (example)		
		S	**N**	**S**
Width	**S**limline	S		
	Wide	B		
Length	**N**ormal		N	
Height	**S**tandard height			S
	No base groove			O

Ordering guide rails with the recommended lengths

Ordering ball guide rails in recommended lengths

The procedure shown in the following ordering examples applies to all ball guide rails. Recommended rail lengths are more cost effective.

Options and part numbers

Size	Ball guide rail with size	Accuracy class					Number of sections, rail length L (mm), ...		Pitch T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ mm
		N	H	P	SP	UP	One-piece	Composite		Maximum number of holes n_B
15	R1605 13	4	3	2	1	9	31, ...	3., ...	60	64
20	R1605 83	4	3	2	1	9	31, ...	3., ...	60	64
25	R1605 23	4	3	2	1	9	31, ...	3., ...	60	64
30	R1605 73	4	3	2	1	9	31, ...	3., ...	80	48
35	R1605 33	4	3	2	1	9	61, ...	6., ...	80	48
45	R1605 43	4	3	2	1	9	61, ...	6., ...	105	36
55	R1605 53	4	3	2	1	9	61, ...	6., ...	120	32
65	R1605 63	4	3	2	1	9	61, ...	6., ...	150	25
e.g.	R1605 73		3				31, 1676			

Excerpt from table with part numbers and recommended rail lengths for ordering example

From the desired length to the recommended length

$$L = \left(\frac{L_W}{T}\right)^{*} \cdot T - 4$$

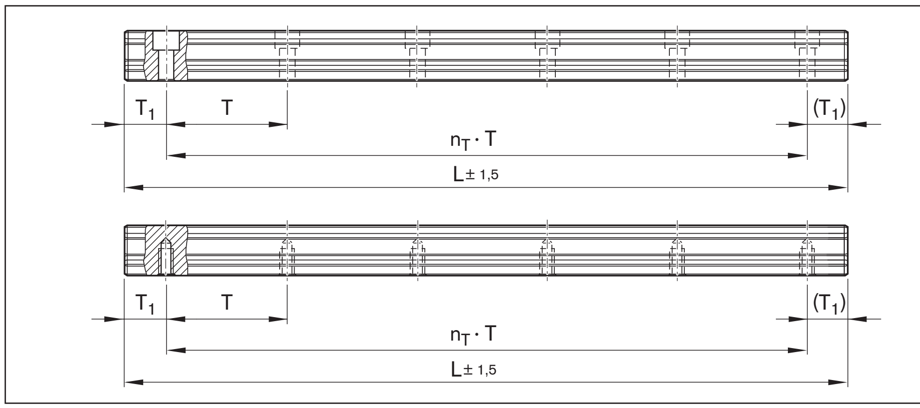
* Round up quotient L_W/T to the nearest whole number!

Calculation example

$$L = \left(\frac{1660}{80 \text{ mm}}\right) \cdot 80 \text{ mm} - 4 \text{ mm}$$

$$L = 21 \cdot 80 \text{ mm} - 4 \text{ mm}$$

$$L = 1676 \text{ mm}$$



Basis: Number of holes

$$L = n_B \cdot T - 4 \text{ mm}$$

Basis: Number of pitches

$$L = n_T \cdot T + 2 \cdot T_{1S}$$

L	=	Recommended rail length	(mm)
L_W	=	Desired length of rail	(mm)
T	=	Pitch	(mm)
T_{1S}	=	Preferred dimension	(mm)
n_B	=	Number of holes	(–)
n_B	=	Number of pitches	(–)

Notes on ordering examples

If preferred dimension T_{1S} is not used, it is possible to choose between:

- End space T_1 between T_{1S} and $T_{1\ min.}$
- As an alternative, it is possible to choose end spaces T_1 to $T_{1\ max.}$

Ordering example 1 (to L_{max})

- Ball guide rail SNS size 30 with cover strip and strip clamps
- Accuracy class H
- Calculated rail length 1676 mm, (20 · T, preferred dimension T_{1S} = 38 mm; number of holes n_B = 21)

Ordering data

Material number, rail length (mm)
T_1 / $n_T \cdot T$ / T_1 (mm)

R1605 733 31, 1676 mm
38 / 20 · 80 / 38 mm

Ordering example 2 (above L_{max})

- Ball guide rail SNS size 30 with cover strip and strip clamps
- Accuracy class H
- Calculated rail length 5116 mm, 2 sections (63 · T, preferred dimension T_{1S} = 38 mm; number of holes n_B = 64)

Ordering data

Material number with number of sections, rail length (mm)
T_1 / $n_T \cdot T$ / T_1 (mm)

R1605 733 32, 5116 mm
38 / 63 · 80 / 38 mm

In the case of rail lengths above L_{max}, sections approved by Rexroth are joined together.

SNS/SNO with cover strip and strip clamps

R1605 .3. ../ R1605 .B. ..

For mounting from above, with cover strip made of corrosion-resistant spring steel per EN 10088 and strip clamps made of aluminum (without threaded mounting holes on end face)

Notes

- Secure the cover strip!
- Strip clamps are supplied.
- Follow the mounting instructions!
  Send for the publications “Mounting Instructions for Ball Rail Systems” and “Mounting Instructions for the Cover Strip.”
- Composite guide rails also available.

Further SNS/SNO ball guide rails and accessories are available.

- Cover strip, protective caps (see accessories for ball guide rails)

SNO R1605 .B. ball guide rails .. with flat underside for mounting on components made of cast mineral materials

- In size 25 – 45 and accuracy class P and SP available on request.

Options and part numbers

Size	Ball guide rail with size	Accuracy class					Number of sections, rail length L (mm), ...		Pitch T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ mm
		N	H	P	SP	UP	One-piece	Composite		Maximum number of holes n_B
15	R1605 13	4	3	2	1	9	31, ...	3., ...	60	64
20	R1605 83	4	3	2	1	9	31, ...	3., ...	60	64
25	R1605 23	4	3	2	1	9	31, ...	3., ...	60	64
30	R1605 73	4	3	2	1	9	31, ...	3., ...	80	48
35	R1605 33	4	3	2	1	9	61, ...	6., ...	80	48
45	R1605 43	4	3	2	1	9	61, ...	6., ...	105	36
55	R1605 53	4	3	2	1	9	61, ...	6., ...	120	32
65	R1605 63	4	3	2	1	9	61, ...	6., ...	150	25
e.g.	R1605 73		3				31, 1676			

Ordering example 1
(to L_{max})
Options:

- Ball guide rail SNS
- Size 30
- Accuracy class H
- One-piece
- Rail length
  L = 1676 mm

Part number:
R1605 733 31, 1676 mm

Ordering example 2
(above L_{max})
Options:

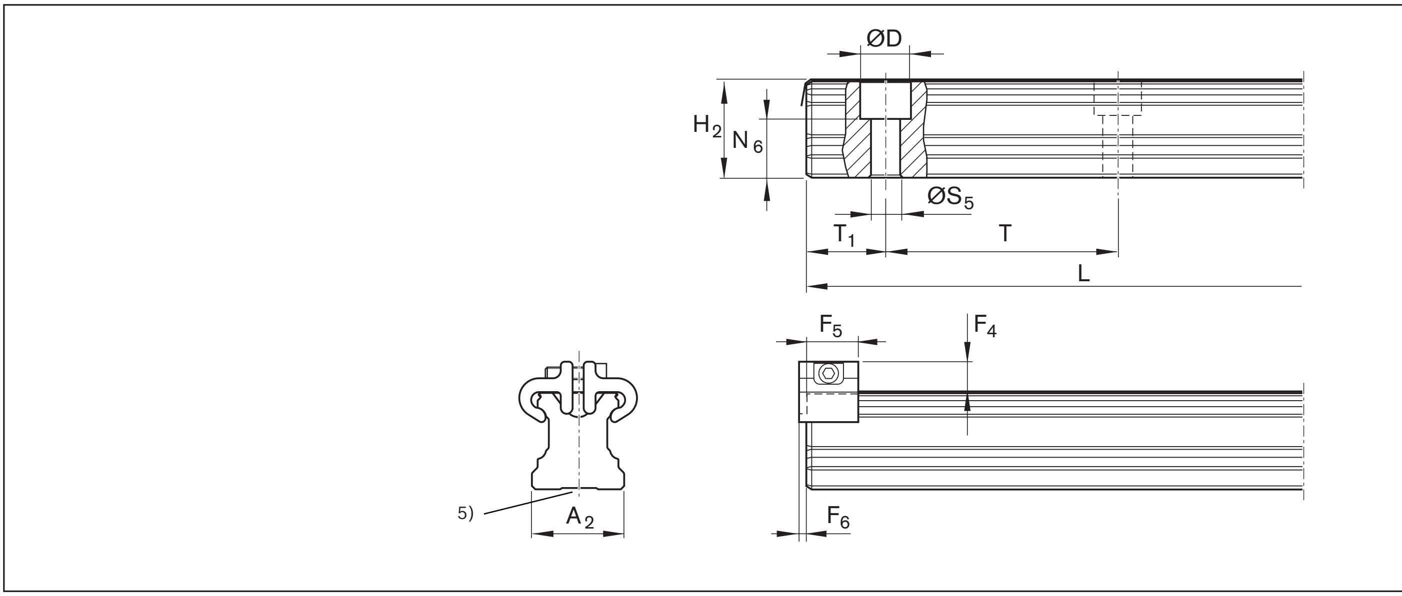
- Ball guide rail SNS
- Size 30
- Accuracy class H
- **2 sections**
- Rail length
  L = 5116 mm

Part number:
R1605 733 3**2**, 5116 mm

Ordering example 3
(to L_{max}, with smooth base surface)
Options:

- SNO ball guide rail
- Size 30
- Accuracy class H
- One-piece
- Rail length
  L = 1676 mm

Part number:
R1605 7**B**3 31, 1676 mm



Size	Dimensions (mm)													Weight m
	A_2	D	F_4 3)	F_5	F_6	H_2 1)	L_{max} 2)	$N_6^{\pm 0.5}$	S_5	T	$T_{1\ min}$	T_{1S} 4)	$T_{1\ max}$	(kg/m)
15	15	7.4	7.3	12	2.0	16.30	3 836	10.3	4.5	60	12	28.0	50	1.4
20	20	9.4	7.1	12	2.0	20.75	3 836	13.2	6.0	60	13	28.0	50	2.4
25	23	11.0	8.2	13	2.0	24.45	3 836	15.2	7.0	60	13	28.0	50	3.2
30	28	15.0	8.7	13	2.0	28.55	3 836	17.0	9.0	80	16	38.0	68	5.0
35	34	15.0	11.7	16	2.2	32.15	3 836	20.5	9.0	80	16	38.0	68	6.8
45	45	20.0	12.5	18	2.2	40.15	3 776	23.5	14.0	105	18	50.5	89	10.5
55	53	24.0	14.0	17	3.2	48.15	3 836	29.0	16.0	120	20	58.0	102	16.2
65	63	26.0	15.0	17	3.2	60.15	3 746	38.5	18.0	150	21	73.0	130	22.4

1) Dimension H_2 with cover strip
Size 15 with 0.1 mm cover strip
Size 20 – 30 with 0.2 mm cover strip
Size 35 – 65 with 0.3 mm cover strip

2) One-piece ball guide rails are available for size 20 – 45 in accuracy classes N, H and P with
size 20 – 25 up to 5816 mm being available on request.
Size 30 – 35 up to 5836 mm available on request.
Size 45 up to 5771 mm available on request.

3) Dimension F_4 with cover strip

4) Preferred dimension T_{1S} with tolerances ± 0.75 is recommended.

5) SNO ball guide rails with smooth base surface (without base groove).

SNS/SNO with cover strip and protective caps

R1605 .6. ../ R1605 .D. ..

For mounting from above, with cover strip made of corrosion-resistant spring steel per EN 10088 and screw-down plastic protective end caps (with threaded mounting holes on end face)

Notes

- Secure the cover strip!
- Protective caps with screws and washers included in scope of supply.
- Follow the mounting instructions!
  Send for the publications “Mounting Instructions for Ball Rail Systems” and “Mounting Instructions for the Cover Strip.”
- Composite guide rails also available.

Further SNS/SNO ball guide rails and accessories

- Cover strip, protective caps (see accessories for ball guide rails)

SNO R1605 .D. ball guide rails .. with flat underside for mounting on components made of cast mineral materials

- In size 25 – 45 and accuracy class P and SP available on request.

Options and part numbers

Size	Ball guide rail with size	Accuracy class					Number of sections, rail length L (mm), ...		Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ mm
		N	H	P	SP	UP	One-piece	Composite		Maximum number of holes n_B
15	R1605 16	4	3	2	1	9	31, ...	3., ...	60	64
20	R1605 86	4	3	2	1	9	31, ...	3., ...	60	64
25	R1605 26	4	3	2	1	9	31, ...	3., ...	60	64
30	R1605 76	4	3	2	1	9	31, ...	3., ...	80	48
35	R1605 36	4	3	2	1	9	61, ...	6., ...	80	48
45	R1605 46	4	3	2	1	9	61, ...	6., ...	105	36
55	R1605 56	4	3	2	1	9	61, ...	6., ...	120	32
65	R1605 66	4	3	2	1	9	61, ...	6., ...	150	25
e.g.	R1605 76		3				31, 1676			

Ordering example 1
(to L_{max})
Options:
- Ball guide rail SNS
- Size 30
- Accuracy class H
- One-piece
- Rail length
  L = 1676 mm

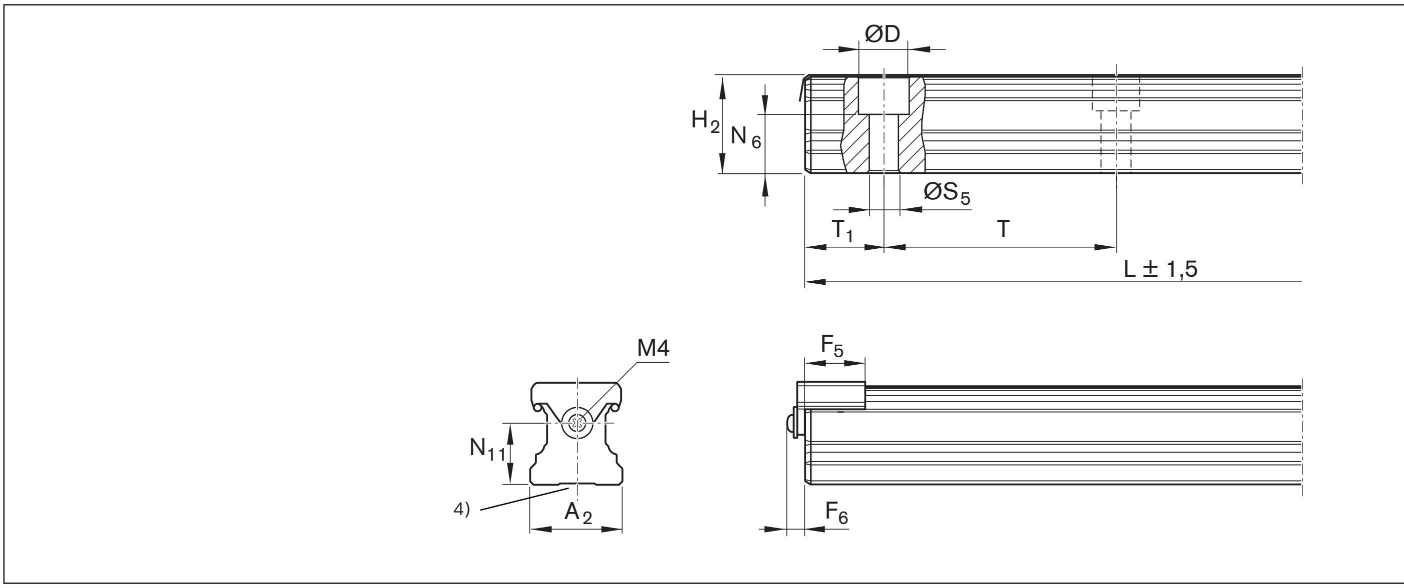
Part number:
R1605 763 31, 1676 mm

Ordering example 2
(above L_{max})
Options:
- Ball guide rail SNS
- Size 30
- Accuracy class H
- **2 sections**
- Rail length
  L = 5116 mm

Part number:
R1605 763 3**2**, 5116 mm

Ordering example 3
(to L_{max} , with smooth base surface)
Options:
- SNO ball guide rail
- Size 30
- Accuracy class H
- One-piece
- Rail length
  L = 1676 mm

Part number:
R1605 7**D**3 31, 1676 mm



Size	Dimensions (mm)													Weight m
	A_2	D	F_5	F_6	H_2 1)	L_{max} 2)	$N_6^{\pm0.5}$	N_{11}	S_5	T	$T_{1\ min}$ 3)	T_{1S}	$T_{1\ max}$	(kg/m)
15	15	7.4	14.0	6.5	16.30	3 836	10.3	9.8	4.5	60	12	28.0	50	1.4
20	20	9.4	14.0	6.5	20.75	3 836	13.2	13.0	6.0	60	13	28.0	50	2.4
25	23	11.0	15.2	6.5	24.45	3 836	15.2	15.0	7.0	60	13	28.0	50	3.2
30	28	15.0	15.2	7.0	28.55	3 836	17.0	18.0	9.0	80	16	38.0	68	5.0
35	34	15.0	18.0	7.0	32.15	3 836	20.5	22.0	9.0	80	16	38.0	68	6.8
45	45	20.0	20.0	7.0	40.15	3 776	23.5	30.0	14.0	105	18	50.5	89	10.5
55	53	24.0	20.0	7.0	48.15	3 836	29.0	30.0	16.0	120	20	58.0	102	16.2
65	63	26.0	20.0	7.0	60.15	3 746	38.5	40.0	18.0	150	21	73.0	130	22.4

1) Dimension H_2 with cover strip
Size 15 with 0.1 mm cover strip
Size 20 – 30 with 0.2 mm cover strip
Size 35 – 65 with 0.3 mm cover strip
2) One-piece ball guide rails are available for size 20 – 45 in accuracy classes N, H and P with size 20 – 25 up to 5816 mm being available on request.
Size 30 – 35 up to 5836 mm available on request.
Size 45 up to 5771 mm available on request.
3) If T_{1min} is fallen short of, no thread is possible on the end face. Secure the cover strip.
4) SNO ball guide rails with smooth base surface (without base groove).

SNS/SNO with plastic protective caps

R1605 .0. ../ R1605 .C. ..

For mounting from above with plastic caps

Notes

- Plastic mounting hole plugs included in scope of supply.
- Follow the mounting instructions!
  Please ask for the “Mounting Instructions for Ball Rail Systems”.
- Composite guide rails also available.

Further ball guide rails SNS and accessories

- Corrosion-resistant Resist NR and Resist CR ball guide rails
- For plastic caps, refer to the accessories for ball guide rails

SNO R1605 .C. ball guide rails .. with flat underside for mounting on components made of cast mineral materials

- In size 25 – 45 and accuracy class P and SP available on request.

Options and part numbers

Size	Ball guide rail with size	Accuracy class					Number of sections, rail length L (mm), ...		Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ mm
		N	H	P	SP	UP	One-piece	Composite		Maximum number of holes n_B
15	R1605 10	4	3	2	1	9	31, ...	3., ...	60	64
20	R1605 80	4	3	2	1	9	31, ...	3., ...	60	64
25	R1605 20	4	3	2	1	9	31, ...	3., ...	60	64
30	R1605 70	4	3	2	1	9	31, ...	3., ...	80	48
35	R1605 30	4	3	2	1	9	31, ...	3., ...	80	48
45	R1605 40	4	3	2	1	9	31, ...	3., ...	105	36
55	R1605 50	4	3	2	1	9	31, ...	3., ...	120	32
65	R1605 60	4	3	2	1	9	31, ...	3., ...	150	25
e.g.	R1605 70		3				31, 1676			

Ordering example 1 (to L_{max})

Options:

- Ball guide rail SNS
- Size 30
- Accuracy class H
- One-piece
- Rail length
  L = 1676 mm

Part number:
R1605 703 31, 1676 mm

Ordering example 2 (above L_{max})

Options:

- Ball guide rail SNS
- Size 30
- Accuracy class H
- **2 sections**
- Rail length
  L = 5116 mm

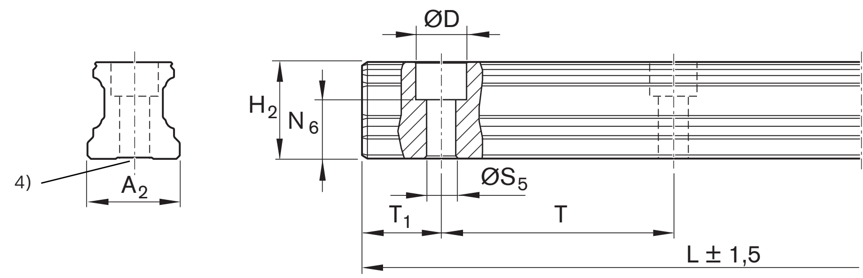
Part number:
R1605 703 3**2**, 5116 mm

Ordering example 3 (to L_{max}, with smooth base surface)

Options:

- SNO ball guide rail
- Size 30
- Accuracy class H
- One-piece
- Rail length
  L = 1676 mm

Part number:
R1605 7**C**3 31, 1676 mm



Size	Dimensions (mm)										Weight m
	A_2	D	H_2 1)	L_{max} 2)	$N_6^{\pm0.5}$	S_5	T	$T_{1\ min}$	T_{1S} 3)	$T_{1\ max}$	(kg/m)
15	15	7.4	16.20	3 836	10.3	4.5	60	10	28.0	50	1.4
20	20	9.4	20.55	3 836	13.2	6.0	60	10	28.0	50	2.4
25	23	11.0	24.25	3 836	15.2	7.0	60	10	28.0	50	3.2
30	28	15.0	28.35	3 836	17.0	9.0	80	12	38.0	68	5.0
35	34	15.0	31.85	3 836	20.5	9.0	80	12	38.0	68	6.8
45	45	20.0	39.85	3 776	23.5	14.0	105	16	50.5	89	10.5
55	53	24.0	47.85	3 836	29.0	16.0	120	18	58.0	102	16.2
65	63	26.0	59.85	3 746	38.5	18.0	150	20	73.0	130	22.4

1) Dimension H_2 without cover strip
2) One-piece ball guide rails are available for
size 20 – 45 in accuracy classes N, H and P with
size 20 – 25 up to 5816 mm being available on request.
Size 30 – 35 up to 5836 mm available on request.
Size 45 up to 5771 mm available on request.
3) Preferred dimension T_{1S} with tolerances ± 0.75 is recommended.
4) SNO ball guide rails with smooth base surface (without base groove).

SNS with steel mounting hole plugs

R1606 .5. ..

For mounting from above for steel caps

Notes
- Steel mounting hole plugs not included in scope of supply.
- Follow the mounting instructions!
  Please ask for the “Mounting Instructions for Ball Rail Systems”.
- Composite guide rails also available.

Further ball guide rails SNS and accessories
- For steel caps and mounting device for steel caps, see accessories for ball guide rails

Options and part numbers

Size	Ball guide rail with size	Accuracy class				Number of sections, rail length L (mm), ...		Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ mm
		N	H	P	SP	One-piece	Composite		Maximum number of holes n_B
25	R1606 25	4	3	2	1	31, ...	3., ...	60	64
30	R1606 75	4	3	2	1	31, ...	3., ...	80	48
35	R1606 35	4	3	2	1	31, ...	3., ...	80	48
45	R1606 45	4	3	2	1	31, ...	3., ...	105	36
55	R1606 55	4	3	2	1	31, ...	3., ...	120	32
65	R1606 65	4	3	2	1	31, ...	3., ...	150	25
e.g.	R1606 75		3			31, 1676			

Ordering example 1 (to L_{max})

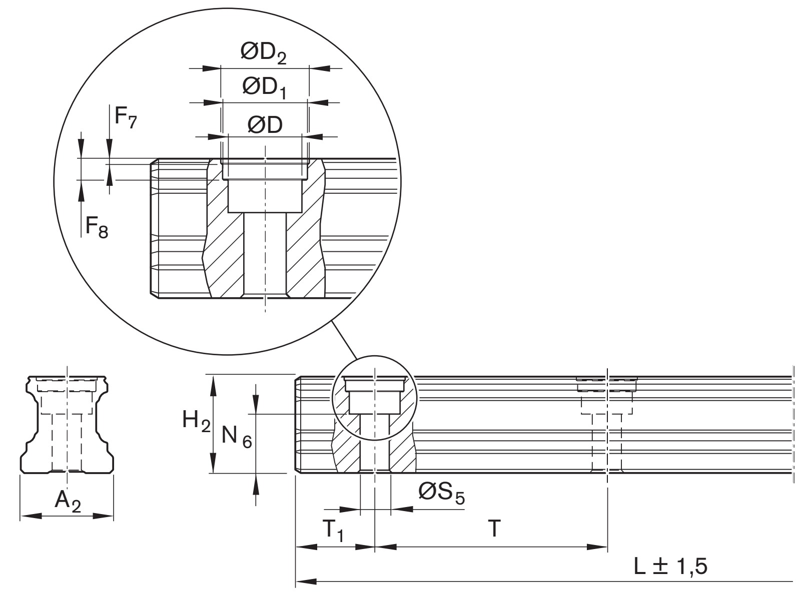
Options:
- Ball guide rail SNS
- Size 30
- Accuracy class H
- One-piece
- Rail length
  L = 1676 mm

Part number:
R1606 753 31, 1676 mm

Ordering example 2 (above L_{max})

Options:
- Ball guide rail SNS
- Size 30
- Accuracy class H
- **2 sections**
- Rail length
  L = 5116 mm

Part number:
R1606 753 3**2**, 5116 mm



Size	Dimensions (mm)														Weight m
	A_2	D	D_1	D_2	F_7	F_8	H_2 1)	L_{max} 2)	$N_6^{\pm0.5}$	S_5	T	$T_{1\ min}$	T_{1S} 3)	$T_{1\ max}$	(kg/m)
25	23	11.0	12.55	13.0	0.90	3.7	24.25	3 836	15.2	7.0	60	13	28.0	50	3.2
30	28	15.0	17.55	18.0	0.90	3.6	28.35	3 836	17.0	9.0	80	16	38.0	68	5.0
35	34	15.0	17.55	18.0	0.90	3.6	31.85	3 836	20.5	9.0	80	16	38.0	68	6.8
45	45	20.0	22.55	23.0	1.45	8.0	39.85	3 776	23.5	14.0	105	18	50.5	89	10.5
55	53	24.0	27.55	28.0	1.45	8.0	47.85	3 836	29.0	16.0	120	20	58.0	102	16.2
65	63	26.0	29.55	30.0	1.45	8.0	59.85	3 746	38.5	18.0	150	21	73.0	130	22.4

1) Dimension H_2 without cover strip
2) One-piece ball guide rails are available for size 25 – 45 in accuracy classes N, H and P with size 25 up to 5816 mm being available on request.
Size 30 – 35 up to 5836 mm available on request.
Size 45 up to 5771 mm available on request.
3) Preferred dimension T_{1S} with tolerances ± 0.75 is recommended.

SNS for mounting from below

R1607 .0. ..

For mounting from below

Notes

- Follow the mounting instructions!
  Please ask for the "Mounting Instructions for Ball Rail Systems".
- Composite guide rails also available.

Further ball guide rails SNS and accessories

- Corrosion-resistant Resist NR and Resist CR ball guide rails

Options and part numbers

Size	Ball guide rail with size	Accuracy class					Number of sections, rail length L (mm), ...		Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ mm
		N	H	P	SP	UP	One-piece	Composite		Maximum number of holes n_B
15	R1607 10	4	3	2	1	9	31, ...	3., ...	60	64
20	R1607 80	4	3	2	1	9	31, ...	3., ...	60	64
25	R1607 20	4	3	2	1	9	31, ...	3., ...	60	64
30	R1607 70	4	3	2	1	9	31, ...	3., ...	80	48
35	R1607 30	4	3	2	1	9	31, ...	3., ...	80	48
45	R1607 40	4	3	2	1	9	31, ...	3., ...	105	36
55	R1607 50	4	3	2	1	9	31, ...	3., ...	120	32
65	R1607 60	4	3	2	1	9	31, ...	3., ...	150	25
e.g.	R1607 70		3				31, 1676			

Ordering example 1 (to L_{max})

Options:

- Ball guide rail SNS
- Size 30
- Accuracy class H
- One-piece
- Rail length
  L = 1676 mm

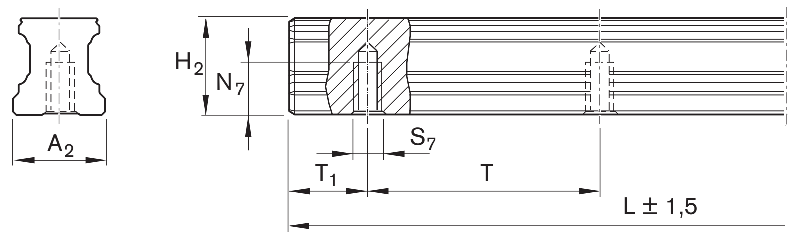
Part number:
R1607 703 31, 1676 mm

Ordering example 2 (above L_{max})

Options:

- Ball guide rail SNS
- Size 30
- Accuracy class H
- **2 sections**
- Rail length
  L = 5116 mm

Part number:
R1607 703 3**2**, 5116 mm



Size	Dimensions (mm)									Weight
	A_2	H_2 1)	L_{max} 2)	N_7	S_7	T	T_{1min}	T_{1S} 3)	$T_{1\ max}$	m (kg/m)
15	15	16.20	3 836	7.5	M5	60	10	28.0	50	1.4
20	20	20.55	3 836	9.0	M6	60	10	28.0	50	2.4
25	23	24.25	3 836	12.0	M6	60	10	28.0	50	3.2
30	28	28.35	3 836	15.0	M8	80	12	38.0	68	5.0
35	34	31.85	3 836	15.0	M8	80	12	38.0	68	6.8
45	45	39.85	3 776	19.0	M12	105	16	50.5	89	10.5
55	53	47.85	3 836	22.0	M14	120	18	58.0	102	16.2
65	63	59.85	3 746	25.0	M16	150	20	73.0	130	22.4

1) Dimension H_2 without cover strip
2) One-piece ball guide rails are available for size 20 – 45 in accuracy classes N, H and P with size 20 – 25 up to 5816 mm being available on request.
Size 30 – 35 up to 5836 mm available on request.
Size 45 up to 5771 mm available on request.
3) Preferred dimension T_{1S} with tolerances ± 0.75 is recommended.

Product description

General information about Resist NR II ball guide rails
Refer to the next few pages for the material numbers. For the recommended rail lengths, dimensions and weights, refer to the corresponding standard steel ball guide rails. Observe the chapter entitled "Mounting Information"!
Send for the publications "Mounting Instructions for Ball Rail Systems" and "Mounting Instructions for the Cover Strip."
Accessories: For cover strips, strip clamps and caps ... for ball guide rails, see the "Accessories for ball guide rails" chapter.
Corrosion resistance and conditions of use
Ball guide rails Resist NR II and all steel parts are made of corrosion-resistant steel per EN 10088, with aluminum strip clamps. They are specifically intended for use in applications involving aqueous media, very dilute acids, alkalis or salt solutions. These guides are particularly suitable for use in relative humidities above 70 % and temperatures above 30 °C. These conditions can be found in particular in cleaning systems, electroplating and pickling plants, steam degreasing plants and in refrigerating machines. Since they have built-in corrosion protection, ball rail systems Resist NR II are also ideal for use in clean rooms and for general printed circuit board assembly. Other application areas include the pharmaceuticals and food industries.
For the recommended ball runner blocks for Resist NR II ball guide rails, see the "Resist NR II ball runner blocks" **chapter**
Combining different accuracy classes
When you combine ball guide rails and ball runner blocks of different accuracy classes, the tolerances change for dimensions H and A3 (see "Accuracy classes and their tolerances.")

Ball guide rails, Resist NR II

R2045 .3. .., SNS for mounting from above with cover strip and strip clamps

Options and part numbers

Size	Ball guide rail with size	Accuracy class			Number of sections, rail length L (mm), ...	
		N	H	P	One-piece	Composite
15[1)]	R2045 13	4	3	2	31, ...	3., ...
20	R2045 83	4	3	2	31, ...	3., ...
25	R2045 23	4	3	2	31, ...	3., ...
30	R2045 73	4	3	2	31, ...	3., ...
35	R2045 33	4	3	2	61, ...	6., ...
e.g.	R2045 73		3		31, 1676	

1) Maximum rail length 1856 mm, maximum number of holes n_B 30

Installation information
- Secure the cover strip!
- Strip clamps are supplied.
- Composite guide rails also available.

Ordering example 1 (to L_{max})
Options:
- NR II, SNS ball guide rail
- Size 30
- Accuracy class H
- One-piece
- Rail length L = 1676 mm

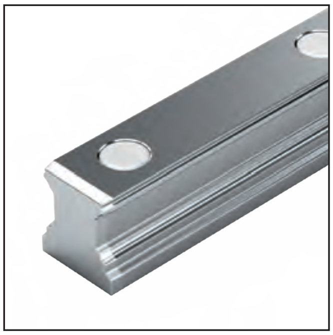
Part number:
R2045 733 31, 1676 mm

Ordering example 2 (above L_{max})
Options:
- NR II, SNS ball guide rail
- Size 30
- Accuracy class H
- **2 sections**
- Rail length L = 5116 mm

Part number:
R2045 733 3**2**, 5116 mm

Ball guide rails, Resist NR II

R2045 .0. .., SNS for mounting from above with plastic caps



Options and part numbers

Size	Ball guide rail with size	Accuracy class			Number of sections, rail length L (mm), ...	
		N	H	P	One-piece	Composite
15[1)]	R2045 10	4	3	2	31, ...	3., ...
20	R2045 80	4	3	2	31, ...	3., ...
25	R2045 20	4	3	2	31, ...	3., ...
30	R2045 70	4	3	2	31, ...	3., ...
35	R2045 30	4	3	2	31, ...	3., ...
e.g.	R2045 70		3		31, 1676	

1) Maximum rail length 1856 mm, maximum number of holes n_B 30

Installation information

- Plastic mounting hole plugs included in scope of supply.
- Composite guide rails also available.

Ordering example 1 (to L_{max})

Options:

- NR II, SNS ball guide rail
- Size 30
- Accuracy class H
- One-piece
- Rail length L = 1676 mm

Part number:

R2045 703 31, 1676 mm

Ordering example 2 (above L_{max})

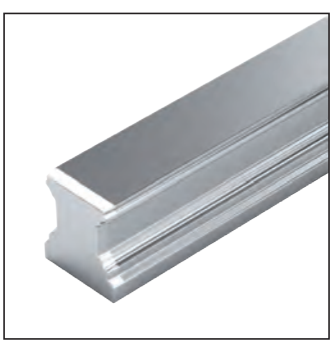
Options:

- NR II, SNS ball guide rail
- Size 30
- Accuracy class H
- **2 sections**
- Rail length L = 5116 mm

Part number:

R2045 703 3**2**, 5116 mm

R2047 .0. .., SNS for mounting from below



Options and part numbers

Size	Ball guide rail with size	Accuracy class			Number of sections, rail length L (mm), ...	
		N	H	P	One-piece	Composite
15[1)]	R2047 10	4	3	2	31, ...	3., ...
20	R2047 80	4	3	2	31, ...	3., ...
25	R2047 20	4	3	2	31, ...	3., ...
30	R2047 70	4	3	2	31, ...	3., ...
35	R2047 30	4	3	2	31, ...	3., ...
e.g.	R2047 70		3			32, 5116

1) Maximum rail length 1856 mm, maximum number of holes n_B 30

Installation information

- Composite guide rails also available.

Ordering example 1 (to L_{max})

Options:

- NR II, SNS ball guide rail
- Size 30
- Accuracy class H
- One-piece
- Rail length L = 1676 mm

Part number:

R2047 703 31, 1676 mm

Ordering example 2 (above L_{max})

Options:

- NR II, SNS ball guide rail
- Size 30
- Accuracy class H
- **2 sections**
- Rail length L = 5116 mm

Part number:

R2047 703 3**2**, 5116 mm

Product description

General notes on ball guide rails in Resist CR

Refer to the next few pages for the material numbers. For the recommended rail lengths, dimensions and weights, refer to the corresponding standard steel ball guide rails. Observe the chapter entitled “Mounting Information”!

Send for the publications “Mounting Instructions for Ball Rail Systems” and “Mounting Instructions for the Cover Strip.”

Accessories: For cover strips, strip clamps and caps ... for ball guide rails, see the “Accessories for ball guide rails” chapter

Corrosion-resistant coating Resist CR

Ball guide rail made of steel with matte-silver hard-chrome plated corrosion-resistant coating.

Ball guide rails with coated end faces

- End faces, chamfers and thread on the end face coated; material numbers: – R16.. ... 41 or R16.. ... 71
- Composite ball guide rails are chamfered on both sides at the joints.

Recommended ball runner blocks for Resist CR ball guide rails of accuracy class H and preload classes C0 and C1

Size 15 – 65: Accuracy class H, preload class C0

Size 30 – 65: Accuracy class H, preload class C1

Combining different accuracy classes

When you combine ball guide rails and ball runner blocks of different accuracy classes, the tolerances change for dimensions H and A3 (see the chapter entitled “Accuracy classes and their tolerances.”)

Ball guide rails, Resist CR

R1645 .3. .., SNS for mounting from above with cover strip and strip clamps

Options and part numbers

Size	Ball guide rail with size	Accuracy class	Number of sections, rail length L (mm), ...	
			One-piece	Composite
		H	Coated end faces	Coated end faces
15	R1645 13	3	41, ...	4., ...
20	R1645 83	3	41, ...	4., ...
25	R1645 23	3	41, ...	4., ...
30	R1645 73	3	41, ...	4., ...
35	R1645 33	3	71, ...	7., ...
45	R1645 43	3	71, ...	7., ...
55	R1645 53	3	71, ...	7., ...
65	R1645 63	3	71, ...	7., ...
e.g.	R1645 73	3	31, 1676	

Installation information

- Secure the cover strip!
- Strip clamps are supplied.
- Composite guide rails also available.

Ordering example 1 (to L_{max})

Options:

- Ball guide rail CR, SNS
- Size 30
- Accuracy class H
- One-piece
- Coated end faces
- Rail length L = 1676 mm

Part number:

R1645 733 41, 1676 mm

Ordering example 2 (above L_{max})

Options:

- Ball guide rail CR, SNS
- Size 30
- Accuracy class H
- **2 sections**
- Coated end faces
- Rail length L = 5116 mm

Part number:

R1645 733 4**2**, 5116 mm

Ball guide rails, Resist CR

R1645 .0. .., SNS for mounting from above with plastic caps

Options and part numbers

Size	Ball guide rail with size	Accuracy class	Number of sections, rail length L (mm), ...	
			One-piece	Composite
		H	Coated end faces	Coated end faces
15	R1645 10	3	41, ...	4., ...
20	R1645 80	3	41, ...	4., ...
25	R1645 20	3	41, ...	4., ...
30	R1645 70	3	41, ...	4., ...
35	R1645 30	3	41, ...	4., ...
45	R1645 40	3	41, ...	4., ...
55	R1645 50	3	41, ...	4., ...
65	R1645 60	3	41, ...	4., ...
e.g.	R1645 70	3	31, 1676	

Installation information
- Plastic mounting hole plugs included in scope of supply.
- Composite guide rails also available.

Ordering example 1 (to L_{max})

Options:
- Ball guide rail CR, SNS
- Size 30
- Accuracy class H
- One-piece
- Coated end faces
- Rail length L = 1676 mm

Part number:
R1645 703 41, 1676 mm

Ordering example 2 (above L_{max})

Options:
- Ball guide rail CR, SNS
- Size 30
- Accuracy class H
- **2 sections**
- Coated end faces
- Rail length L = 5116 mm

Part number:
R1645 703 4**2**, 5116 mm

R1647 .0. .., SNS for mounting from below

Options and part numbers

Size	Ball guide rail with size	Accuracy class	Number of sections, rail length L (mm), ...	
			One-piece	Composite
		H	Coated end faces	Coated end faces
15	R1647 10	3	41, ...	4., ...
20	R1647 80	3	41, ...	4., ...
25	R1647 20	3	41, ...	4., ...
30	R1647 70	3	41, ...	4., ...
35	R1647 30	3	41, ...	4., ...
45	R1647 40	3	41, ...	4., ...
55	R1647 50	3	41, ...	4., ...
65	R1647 60	3	41, ...	4., ...
e.g.	R1647 70	3		42, 5116

Installation information
- Composite guide rails also available.

Ordering example 1 (to L_{max})

Options:
- Ball guide rail CR, SNS
- Size 30
- Accuracy class H
- One-piece
- Coated end faces
- Rail length L = 1676 mm

Part number:
R1647 703 41, 1676 mm

Ordering example 2 (above L_{max})

Options:
- Ball guide rail CR, SNS
- Size 30
- Accuracy class H
- **2 sections**
- Coated end faces
- Rail length L = 5116 mm

Part number:
R1647 703 4**2**, 5116 mm

Product description

Characteristic features

- Limitless interchangeability; all ball guide rail versions can be combined at will with all ball runner block versions within each accuracy class
- Due to very high torsional moment load capacity and torsional rigidity, particularly suitable for single rail applications
- High torque load capacity
- The same high load capacities in all four main directions of loading
- Integrated all-round sealing
- Low noise level and best travel performance
- Excellent dynamic characteristics:
  Speed: v_{max} to 5 m/s [1)]
  Acceleration: a_{max} to 500 m/s^2 [1)]
- Long-term lubrication, up to several years
- Minimum quantity lubrication system with integrated reservoir for oil lubrication[1)]
- Lube ports with metal thread on all sides[1)]
- Optimum system rigidity through preloaded O-arrangement
- Extensive range of accessories

Further highlights

- Optimized entry-zone geometry and high number of balls per track minimizes variation in elastic deflection
- Mounting threads provided on end faces for fixing of all add-on elements
- Guide with low clearance or slight preload
- Quiet, smooth running due to the optimum design of the return unit and routing of the balls and ball chain[1)]
- Attachments on the ball runner block for mounting from above and below[1)]
- Improved rigidity under lift-off and side loading conditions when additional mounting screws are used in the two holes provided at the center of the ball runner block
- Ball runner blocks initially greased at the factory[1)]
- Optionally available with ball chain[1)]
- Can be used on all ball guide rails BNS.

Corrosion protection (optional)

- Resist CR:
  Ball runner block body or ball guide rail made of steel with corrosion-resistant hard chrome-plated matte silver coating

1) Type-dependent

⚠ Size 20/40:
New ball rail system with other ball diameters Not interchangeable with previous size 20/40 versions!

Overview of formats

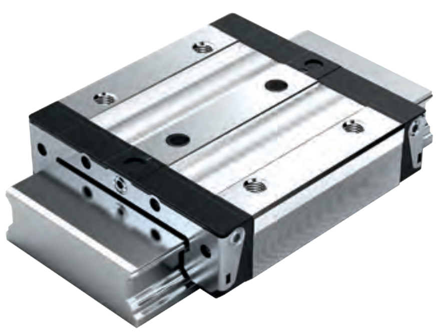
BNS[1)]

Size 20/40 and 25/70
- With ball chain
- Pre-lubricated

BNS

Size 35/90

CNS[1)]



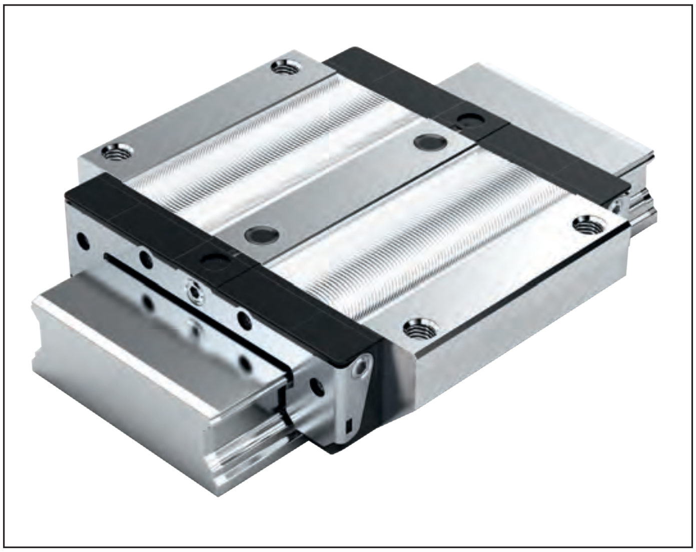
Size 20/40 and 25/70
- With ball chain
- Pre-lubricated

Definition of ball runner block format

Criterion	Designation	Abbreviation (example)		
		B	N	S
Width	Flange	F		
	Slimline	S		
	Wide	B		
	Compact	C		
Length	**N**ormal		N	
	Long		L	
	Short		K	
Height	**S**tandard height			S
	High			H
	Low			N

Ball chain (optional)
- Optimizes noise levels

BNS – Wide, normal, standard height



Steel ball runner blocks
R1671 ... 2.

Dynamic characteristics

Speed: v_{max} = 5 m/s
Acceleration: a_{max} = 500 m/s^2
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication:

- Pre-lubricated

Further ball runner blocks BNS

- See below for corrosion-resistant ball runner blocks

Order example

Options:

- BNS ball runner block
- Size 25/70
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1671 213 20

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class			Seal with ball runner blocks			
							without ball chain		with ball chain	
		C0	C1	N	H	P	SS	DS	SS	DS
20/40[1]	R1671 5	9		4	3	–	20	–	22	–
			1	4	3	2	20	2Z	22	2Y
25/70	R1671 2	9		4	3	–	20	–	22	–
			1	4	3	2	20	2Z	22	2Y
e.g.	R1671 2		1		3		20			

Resist CR ball runner block
R1671 ... 7.

Note on lubrication:

- Pre-lubricated

Order example

Options:

- BNS ball runner block
- Size 25/70
- Preload class C0
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1671 293 70

Options and part numbers

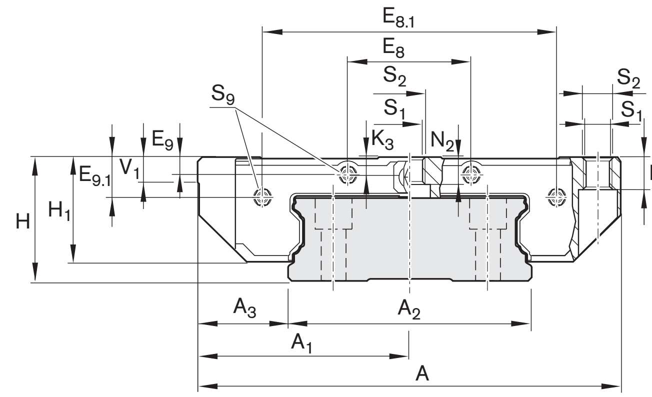
Size	Ball runner block with size	Preload class	Accuracy class	Seal with ball runner blocks			
				without ball chain		with ball chain	
		C0	H	SS	DS	SS	DS
20/40[1]	R1671 5	9	3	70	7Z	72	7Y
25/70	R1671 2	9	3	70	7Z	72	7Y
e.g.	R1671 2	9	3	70			

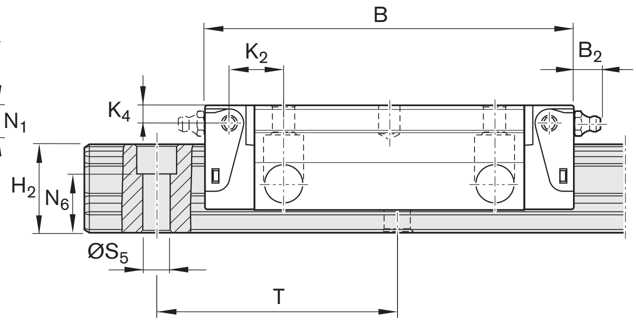
1) Note: Ball runner block cannot be combined with ball guide rail R167 8.. ..

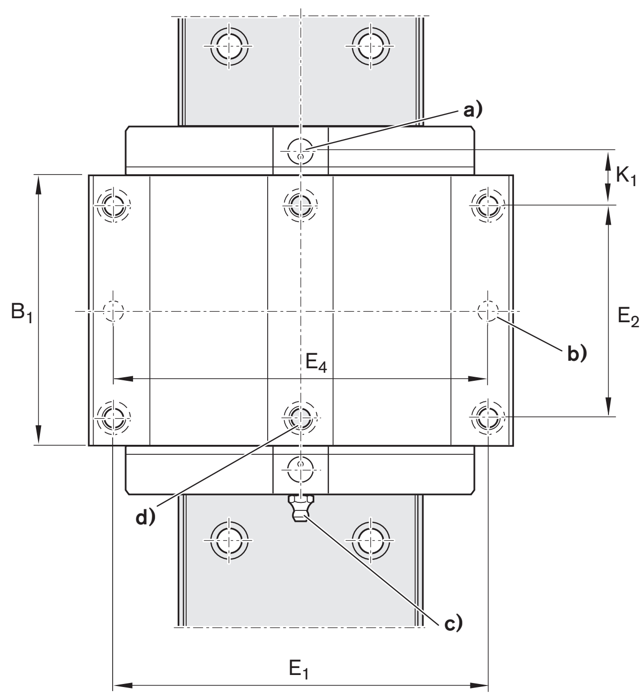
Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)







For O-ring
size 20/40: Ø 5 · 1.0 (mm)
size 25/70: Ø 5 · 1.0 (mm)
open lube port if necessary
(see section Lubrication).

a) Recommended position for pin holes (dimensions E_4 see section Mounting).
Due to production-related issues, pre-drilled holes may be present at this position.
They are suitable for drilling out.

b) Lube nipple, size 20/40:
Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25/70:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed). Connection possible at all sides.

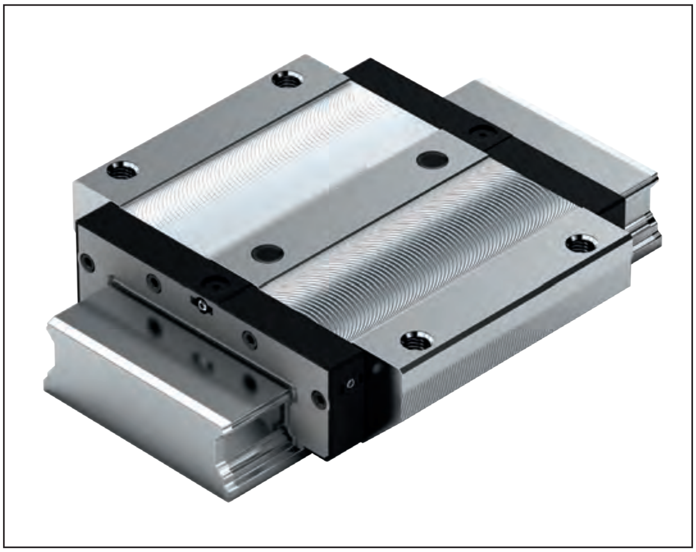
c) Due to production-related issues, blanking plugs may be present at this position.
These must be removed before mounting.

Size	**Dimensions** (mm)																	
	A	A_1	A_2	A_3	B	B_1	E_1	E_2	E_8	$E_{8.1}$	E_9	$E_{9.1}$	H	H_1	H_2	K_1	K_2	K_3	K_4
20/40	80	40	42	19.0	73	51.3	70	40	18	53.4	3.4	8.1	27	22.50	18.30	10.6	11.0	3.5	3.5
25/70	120	60	69	25.5	105	76.5	107	60	35	83.5	4.9	11.3	35	29.75	23.55	15.4	15.5	5.2	5.2

Size	**Dimensions** (mm)									**Weight** (kg)	**Load capacities**1) (N)		**Load moments**1) (Nm)			
	N_1	N_2	$N_6^{\pm 0.5}$	S_1	S_2	S_5	S_9	T	V_1		C	C_0	M_t	M_{t0}	M_L	M_{L0}
20/40	7.70	3.70	12.5	5.3	M6	4.4	M2.5x1.5^{+3}	60	6.0	0.4	14 900	20 600	340	470	140	190
25/70	9.35	7.05	14.4	6.7	M8	7.0	M3x2$^{+4.5}$	80	7.5	1.2	36 200	50 200	1 350	1 870	490	680

1) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain ☞🗎 14
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ by 1.26 according to the table.

BNS – Wide, normal, standard height



Steel ball runner blocks
R1671 ... 1.

Dynamic characteristics

Speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note on lubrication:

- Not pre-lubricated

Further ball runner blocks BNS

- See below for corrosion-resistant ball runner blocks

Order example

Options:

- BNS ball runner block
- Size 35/90
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1671 313 10

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class			Seal with ball runner blocks without ball chain
		C0	C1	N	H	P	SS
35/90	R1671 3	9		4	3	–	10
			1	4	3	2	10
e.g.	R1671 3		1		3		10

Resist CR ball runner block
R1671 ... 6.

Order example

Options:

- BNS ball runner block
- Size 35/90
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

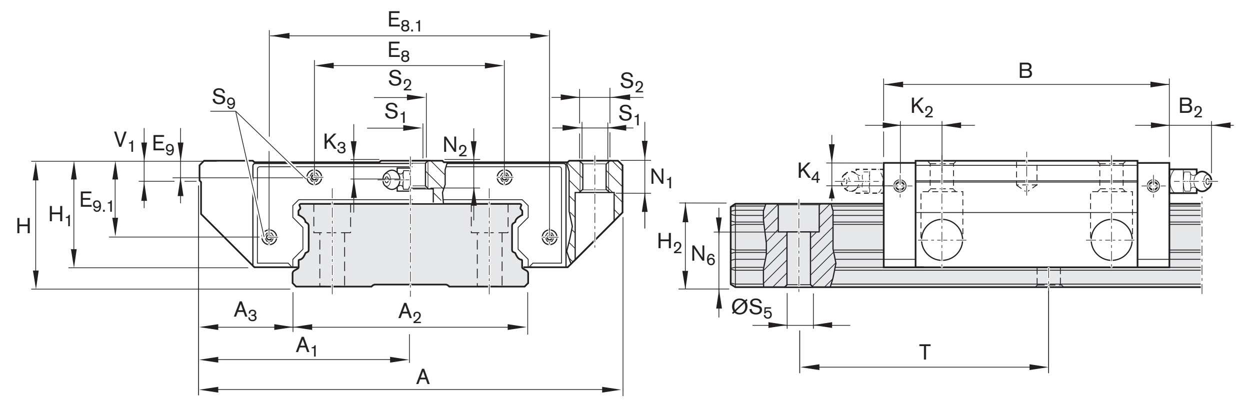
Part number:
R1671 313 60

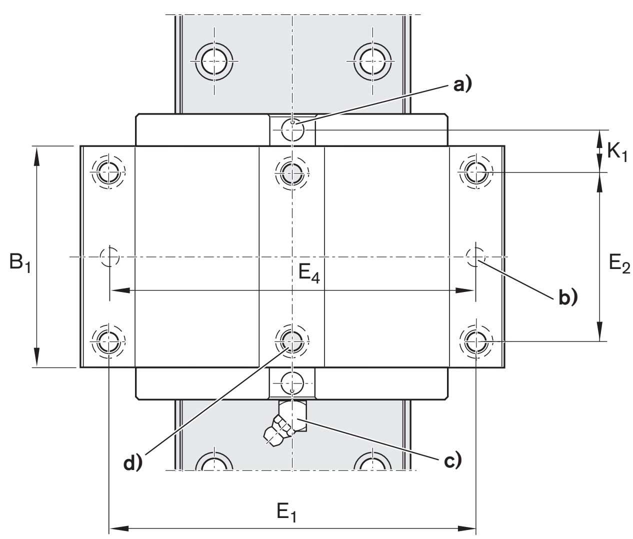
Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class	Seal with ball runner blocks without ball chain
		C0	C1	H	SS
35/90	R1671 3	9	1	3	60
e.g.	R1671 3		1	3	60

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal





For O-ring
size 35/90: Ø 6 · 1.5 (mm)
open lube port if necessary
(see section Lubrication).

a) Recommended position for pin holes (dimensions E_4 see section Mounting).
Due to production-related issues, pre-drilled holes may be present at this position.
They are suitable for drilling out.

b) Lube nipple, size 35/90:
Hydraulic-type lube nipple DIN 71412-B M6x8, B_2 = 16 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed). Connection possible at all sides.

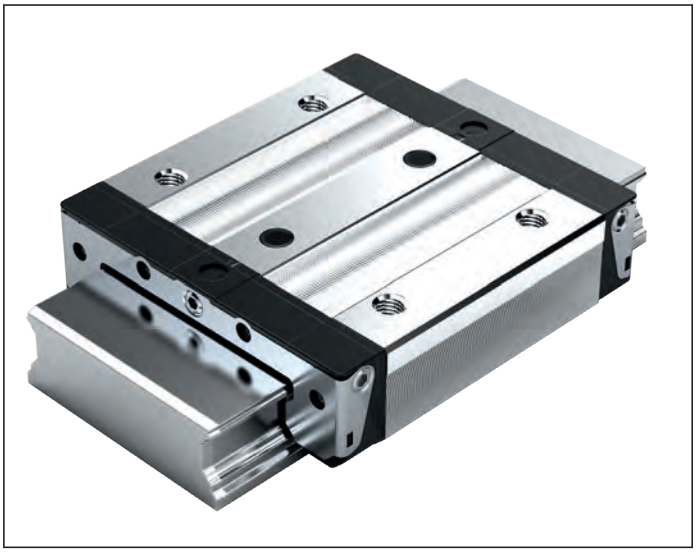
c) Due to production-related issues, blanking plugs may be present at this position.
These must be removed before mounting.

Size	**Dimensions** (mm)																
	A	**A_1**	**A_2**	**A_3**	**B**	**B_1**	**E_1**	**E_2**	**E_8**	**$E_{8.1}$**	**E_9**	**$E_{9.1}$**	**H**	**H_1**	**H_2**	**K_1**	**K_2**
35/90	162	81	90	36	142	113.6	144	80	79	116	6.8	29.9	50	42.5	31.85	22.8	24.8

Size	**Dimensions** (mm)											**Weight** (kg)	**Load capacities**[1)] (N)		**Load moments**[1)] (Nm)			
	K_3	**K_4**	**N_1**	**N_2**	**$N_6^{\pm 0.5}$**	**S_1**	**S_2**	**S_5**	**S_9**	**T**	**V_1**		**C**	**C_0**	**M_t**	**M_{t0}**	**M_L**	**M_{L0}**
35/90	9	9	14	12	20.5	8.4	M10	9	M3x5	80	8.0	3.70	70 700	126 000	3 500	6 240	1 470	2 620

1) Load capacities and load moments for ball runner blocks **without** ball chain.
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, **M_t** and **M_L** by 1.26 according to the table.

CNS – Compact, normal, standard height



Steel ball runner blocks
R1672 ... 2.

Dynamic characteristics
Speed: v_{max} = 5 m/s
Acceleration: a_{max} = 500 m/s²
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)
Note on lubrication:
- Pre-lubricated

Further ball runner blocks CNS
- See below for corrosion-resistant ball runner blocks

Order example
Options:
- CNS ball runner block
- Size 25/70
- Preload class C1
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1672 213 20

Options and part numbers

Size	Ball runner block with size	Preload class		Accuracy class			Seal with ball runner blocks			
							without ball chain		with ball chain	
		C0	C1	N	H	P	SS	DS	SS	DS
20/401)	R1672 5	9		4	3	–	20	–	22	–
			1	4	3	–	20	2Z	22	2Y
25/70	R1672 2	9		4	3	–	20	–	22	–
			1	4	3	–	20	2Z	22	2Y
e.g.	R1672 2		1		3		20			

Resist CR ball runner block2)
R1672 ... 7.

Order example
Options:
- CNS ball runner block
- Size 25/70
- Preload class C0
- Accuracy class H
- With standard seal, without ball chain

Part number:
R1672 293 70

Options and part numbers

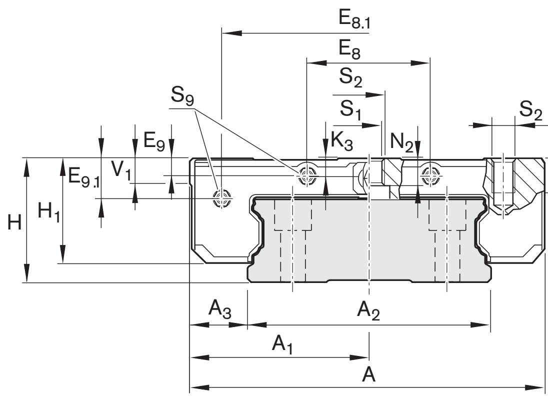
Size	Ball runner block with size	Preload class	Accuracy class	Seal with ball runner blocks			
				without ball chain		with ball chain	
		C0	H	SS	DS	SS	DS
20/401)	R1672 5	9	3	70	7Z	72	7Y
25/70	R1672 2	9	3	70	7Z	72	7Y
e.g.	R1672 2	9	3	70			

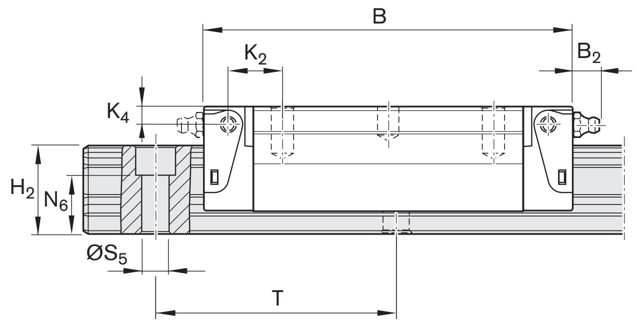
1) Note: Ball runner block cannot be combined with ball guide rail R167 8.. ..

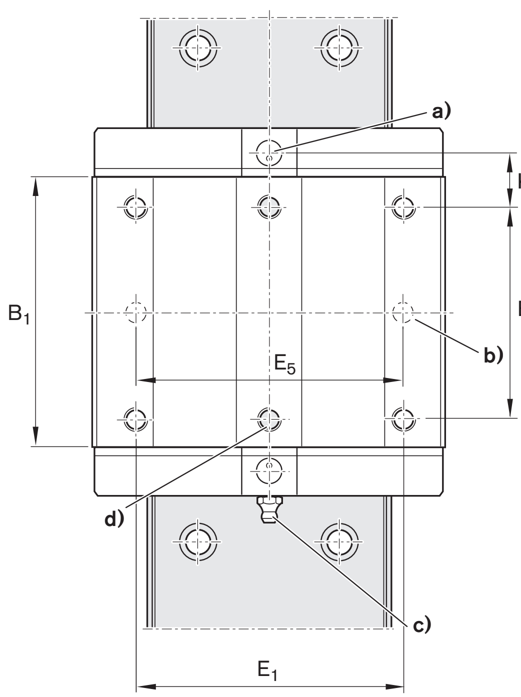
Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload

Seals
SS = standard seal
DS = double-lipped seal

Key
Gray digits
= No preferred variant/ combination
(Some delivery times may be longer)







For O-ring
size 20/40: Ø 5 · 1.0 (mm)
size 25/70: Ø 5 · 1.0 (mm)
open lube port if necessary
(see section Lubrication).

a) Recommended position for pin holes (dimensions E_5 see section Mounting). Due to production-related issues, pre-drilled holes may be present at this position. They are suitable for drilling out.

b) Lube nipple, size 20/40: Funnel-type lube nipple DIN 3405-A M3x5, B_2 = 1.6 mm. If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25/70: Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm. If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
The lube nipple is included in the scope of delivery (not installed). Connection possible at all sides.

c) Due to production-related issues, blanking plugs may be present at this position. These must be removed before mounting.

Size	**Dimensions** (mm)																	
	A	A_1	A_2	A_3	B	B_1	E_1	E_2	E_8	$E_{8.1}$	E_9	$E_{9.1}$	H	H_1	H_2	K_1	K_2	K_3	K_4
20/40	62	31	42	10.0	73.0	51.3	46	32	18	53.4	3.4	8.1	27	22.50	18.30	14.6	15.00	3.5	3.5
25/70	100	50	69	15.5	104.7	76.5	76	50	35	83.5	4.9	11.3	35	29.75	23.55	19.4	20.45	5.2	5.2

Size	**Dimensions** (mm)									**Weight** (kg)	**Load capacities**1) (N)		**Load moments**1) (Nm)			
	N_2	N_3	$N_6^{\pm 0.5}$	S_1	S_2	S_5	S_9	T	V_1		C	C_0	M_t	M_{t0}	M_L	M_{L0}
20/40	3.70	6	12.5	5.3	M6	4.4	M2.5x1.5^{+3}	60	6.0	0.3	14 900	20 600	340	470	140	190
25/70	7.05	8	14.4	6.7	M8	7.0	M3x2$^{+4.5}$	80	7.5	1.0	36 200	50 200	1 350	1 870	490	680

1) Load capacities and load moments for ball runner blocks **without** ball chain. Load capacities and load moments for ball runner blocks **with** ball chain ☞🗎 14
Determination of the dynamic load capacities and load moments is based on a 100,000 m travel life according to DIN ISO14728-1. Often only 50,000 m are actually stipulated. For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ by 1.26 according to the table.

Product description

Characteristic features

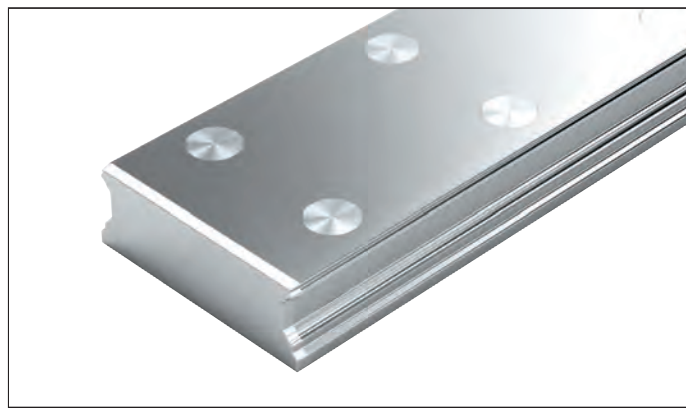
- Top rigidity in all load directions
- Top torque load capacity

Corrosion protection (optional)

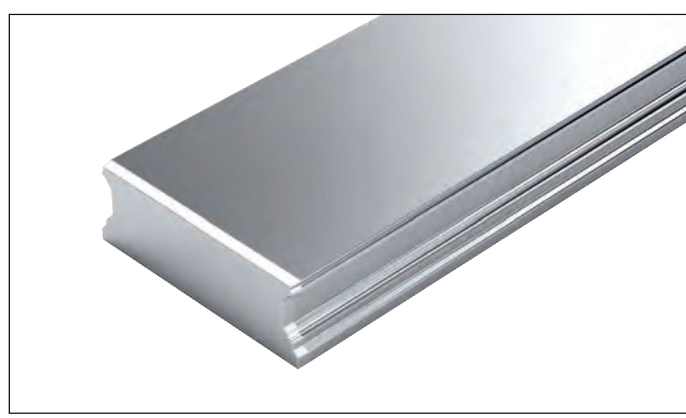
- Resist CR:
  Ball guide rail made of steel with corrosion-resistant hard chrome-plated matte silver coating in accuracy class H

⚠ Size 20/40:
Ball rail system with other ball diameters Not interchange-able with previous size 20/40 versions!

Ball guide rails with plastic mounting hole plugs



Ball guide rails with steel mounting hole plugs



Ball guide rails for mounting from below

Definition of ball guide rail format

Criterion	Designation	Code (example)		
		B	N	S
Width	Slimline	S		
	Wide	B		
Length	**N**ormal		N	
Height	**S**tandard height			S

Ordering guide rails with the recommended lengths

Ordering ball guide rails in recommended lengths

The procedure shown in the following ordering examples applies to all ball guide rails. Recommended rail lengths are more cost effective.

Options and part numbers

Size	Ball guide rail with size	Accuracy class			Number of sections, rail length L (mm), ...		Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$
					One-piece	Composite		Maximum number of holes per row of holes n_B
		N	H	P				
20/40[1)]	R1675 50	4	3	2	31, ...	3., ...	60	64
25/70	R1675 20	4	3	2	31, ...	3., ...	80	48
35/90	R1675 30	4	3	2	31, ...	3., ...	80	48
e.g.	R1675 30		3		31, 1676			

Excerpt from table with part numbers and recommended rail lengths for ordering example

From the desired length to the recommended length

$$L = \left(\frac{L_W}{T}\right)^* \cdot T - 4$$

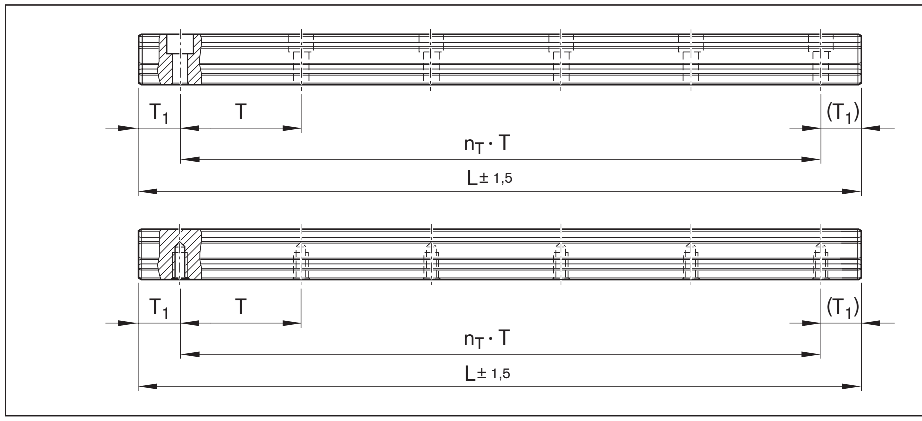
* Round up quotient L_W/T to the nearest whole number!

Calculation example

$$L = \left(\frac{1660\ \text{mm}}{80\ \text{mm}}\right) \cdot 80\ \text{mm} - 4\ \text{mm}$$

$$L = 21 \cdot 80\ \text{mm} - 4\ \text{mm}$$

$$L = 1676\ \text{mm}$$



Basis: Number of holes per row of holes

$$L = n_B \cdot T - 4$$

Basis: Number of pitches

$$L = n_T \cdot T + 2 \cdot T_{1S}$$

L	=	Recommended rail length	(mm)
L_W	=	Desired length of rail	(mm)
T	=	Pitch	(mm)
T_{1S}	=	Preferred dimension	(mm)
n_B	=	Number of holes per row of holes	(–)
n_B	=	Number of pitches	(–)

Notes on ordering examples

If preferred dimension T_{1S} is not used, it is possible to choose between:

- End space T_1 between T_{1S} and $T_{1\ min.}$
- As an alternative, it is possible to choose end spaces T_1 to $T_{1\ max.}$

Ordering example 1 (to L_{max})

- Ball guide rail BNS size 35/90 with plastic mounting hole plugs
- Accuracy class H
- Calculated rail length 1676 mm, (20 · T, preferred dimension T_{1S} = 38 mm; number of holes per row of holes n_B = 21)

Ordering data

Material number, rail length (mm)
T_1 / $n_T \cdot T$ / T_1 (mm)

R1675 303 31, 1676 mm
38 / 20 · 80 / 38 mm

Ordering example 2 (above L_{max})

- Ball guide rail BNS size 35/90 with plastic mounting hole plugs
- Accuracy class H
- Calculated rail length 5116 mm, 2 sections (63 · T, preferred dimension T_{1S} = 38 mm; number of holes per row of holes n_B = 64)

Ordering data

Material number with number of sections, rail length (mm)
T_1 / $n_T \cdot T$ / T_1 (mm)

R1675 303 32, 5116 mm
38 / 63 · 80 / 38 mm

In the case of rail lengths above L_{max}, sections approved by the factory are joined together.

BNS with plastic mounting hole plugs

Steel ball guide rails
R1675 .0. ..
With two-row mounting hole pattern, for mounting from above, with plastic mounting hole plugs
Notes
- Plastic mounting hole plugs included in scope of supply.
- Follow the mounting instructions!
  Please ask for the "Mounting Instructions for Ball Rail Systems".
- Composite guide rails also available.

Further ball guide rails BNS and accessories
- See below for corrosion-resistant ball guide rails
- For caps, see the "Accessories for ball guide rails" chapter

Options and part numbers

Size	Ball guide rail with size	Accuracy class			Number of sections, rail length L (mm), ...		Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ Maximum number of holes per row of holes n_B
		N	H	P	One-piece	Composite		
20/40[1)]	R1675 50	4	3	2	31, ...	3., ...	60	64
25/70	R1675 20	4	3	2	31, ...	3., ...	80	48
35/90	R1675 30	4	3	2	31, ...	3., ...	80	48
e.g.	R1675 30		3		31, 1676			

Resist NR II ball guide rails
R1673 .0. ..

Options and part numbers

Size	Ball guide rail with size	Accuracy class	Number of sections, rail length L (mm), ...			Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ Maximum number of holes per row of holes n_B
			One-piece		Composite		
		H	Uncoated end faces	Coated end faces	Coated end faces		
20/40[1)]	R1673 50	3	31, ...	41, ...	4., ...	60	64
25/70	R1673 20	3	31, ...	41, ...	4., ...	80	48
35/90	R1673 30	3	31, ...	41, ...	4., ...	80	48
e.g.	R1673 30	3			42, 5116		

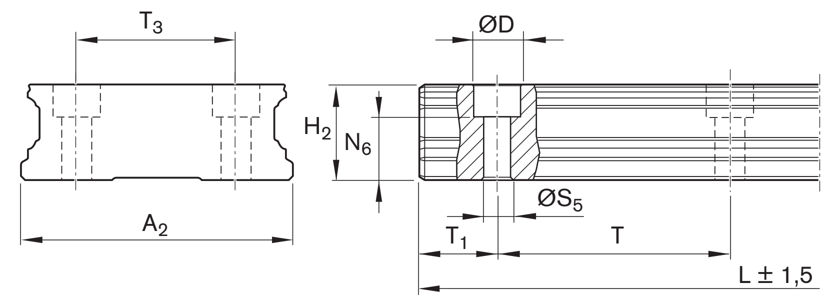
1) Note: Ball guide rail cannot be combined with ball runner block R1671 8.. ..

Ordering example 1 (to L_{max})
Options:
- Ball guide rail BNS
- Size 35/90
- Accuracy class H
- One-piece
- Uncoated end faces
- Rail length L = 1676 mm

Part number: R1675 303 31, 1676 mm

Ordering example 2 (above L_{max})
Options:
- Ball guide rail CR, BNS
- Size 35/90
- Accuracy class H
- **2 sections**
- Coated end faces
- Rail length L = 5116 mm

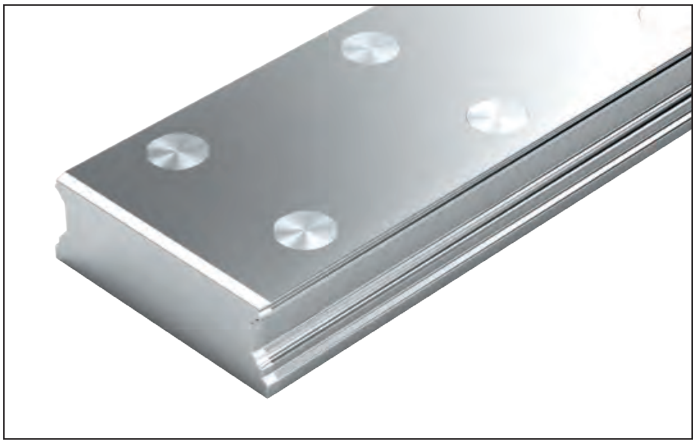
Part number: R1673 303 4**2**, 5116 mm



Size	Dimensions (mm)											Weight
	A_2	D	H_2[1)]	L_{max}	$N_6^{\pm 0.5}$	S_5	T	$T_{1\ min}$	T_{1S}[2)]	$T_{1\ max}$	T_3	(kg/m)
20/40	42	7.4	18.30	3 836	12.45	4.4	60	10	28	50	24	5.3
25/70	69	11.0	23.55	3 836	14.50	7.0	80	10	38	70	40	11.6
35/90	90	15.0	31.85	3 836	20.50	9.0	80	12	38	68	60	21.0

1) Dimension H_2 without cover strip
2) Preferred dimension T_{1S} with tolerances ±0.75 is recommended.

BNS with steel mounting hole plugs



Steel ball guide rails R1676 .5. ..
With two-row mounting hole pattern, for mounting from above, with steel mounting hole plugs

Notes

- Steel mounting hole plugs not included in scope of supply.
- Follow the mounting instructions!
  Please ask for the “Mounting Instructions for Ball Rail Systems”.
- Composite guide rails also available.

Accessories

- For caps and mounting device for steel caps, see the “Accessories for ball guide rails” chapter.

Options and part numbers

Size	Ball guide rail with size	Accuracy class			Number of sections, rail length L (mm), ...		Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ Maximum number of holes per row of holes n_B
		N	H	P	One-piece	Composite		
25/70	R1676 25	4	3	2	31, ...	3., ...	80	48
35/90	R1676 35	4	3	2	31, ...	3., ...	80	48
e.g.	R1676 35		3		31, 1676			

Ordering example 1 (to L_{max})

Options:

- Ball guide rail BNS
- Size 35/90
- Accuracy class H
- One-piece
- Rail length L = 1676 mm

Part number: R1676 353 31, 1676 mm

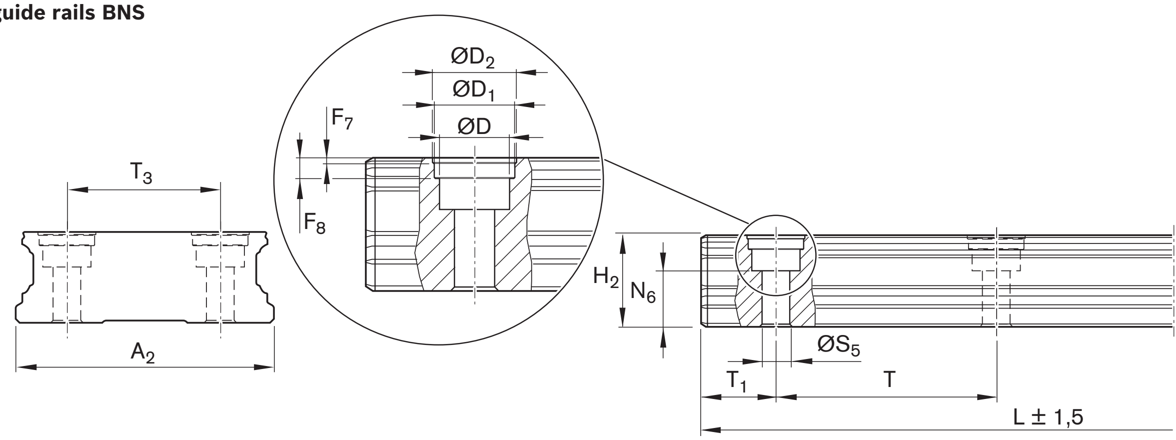
Ordering example 2 (above L_{max})

Options:

- Ball guide rail BNS
- Size 35/90
- Accuracy class H
- **2 sections**
- Rail length L = 5116 mm

Part number: R1676 353 3**2**, 5116 mm

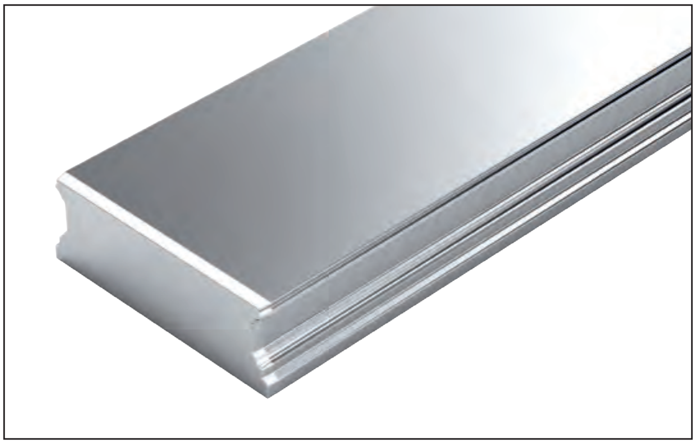
Ball guide rails BNS



Size	Dimensions (mm)														Weight
	A_2	D	D_1	D_2	F_7	F_8	H_2 1)	L_{max}	$N_6^{\pm 0.5}$	S_5	T	$T_{1\,min}$	T_{1S} 2)	$T_{1\,max}$	T_3	(kg/m)
25/70	69	11.0	12.55	13	0.9	3.7	23.55	3 836	14.5	7.0	80	10	38	70	40	11.6
35/90	90	15.0	17.55	18	0.9	3.6	31.85	3 836	20.5	9.0	80	12	38	68	60	21.0

1) Dimension H_2 without cover strip
2) Preferred dimension T_{1S} with tolerances ±0.75 is recommended.

BNS for mounting from below



Steel ball guide rails R1677 .0. ..
With two-row mounting hole pattern, for mounting from below

Notes
- Follow the mounting instructions!
  Please ask for the "Mounting Instructions for Ball Rail Systems".
- Composite guide rails also available.

Options and part numbers

Size	Ball guide rail with size	Accuracy class N	H	P	Number of sections, rail length L (mm), ... One-piece	Composite	Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ / Maximum number of holes per row of holes n_B
20/40 1)	R1677 50	4	3	2	31, ...	3., ...	60	64
25/70	R1677 20	4	3	2	31, ...	3., ...	80	48
35/90	R1677 30	4	3	2	31, ...	3., ...	80	48
e.g.	R1677 30		3		31, 1676			

1) Note: Ball guide rail cannot be combined with ball runner block R1671 8.. ..

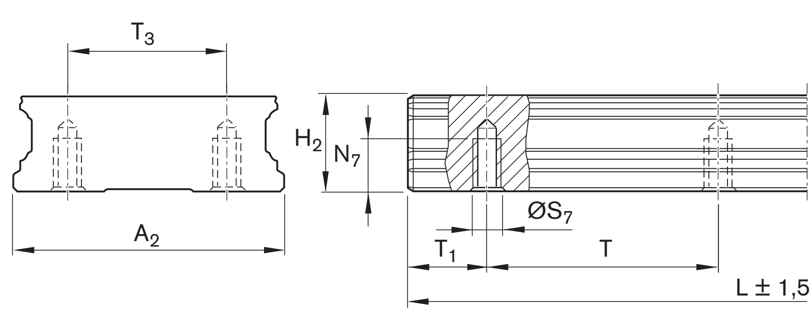
Ordering example 1 (to L_{max})
Options:
- Ball guide rail BNS
- Size 35/90
- Accuracy class H
- One-piece
- Rail length L = 1676 mm

Part number: R1677 303 31, 1676 mm

Ordering example 2 (above L_{max})
Options:
- Ball guide rail BNS
- Size 35/90
- Accuracy class H
- **2 sections**
- Rail length L = 5116 mm

Part number: R1677 303 3**2**, 5116 mm

Ball guide rails BNS



Size	Dimensions (mm) A_2	H_2 1)	L_{max}	N_7	S_7	T	$T_{1\,min}$	T_{1S} 2)	$T_{1\,max}$	T_3	Weight (kg/m)
20/40	42	18.30	3 836	7.5	M5	60	10	28	50	24	5.3
25/70	69	23.55	3 836	12.0	M6	80	10	38	70	40	11.6
35/90	90	31.85	3 836	15.0	M8	80	12	38	68	60	21.0

1) Dimension H_2 without cover strip
2) Preferred dimension T_{1S} with tolerances ±0.75 is recommended.

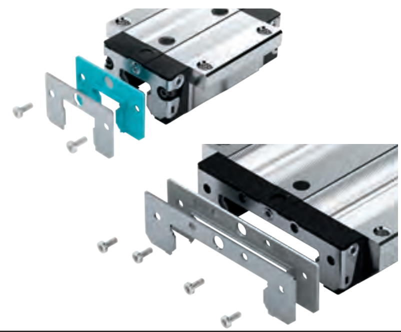
Product description

Rexroth offers limitless interchangeability as all ball runner block versions can be combined at will with all accessories within each size. The entire range is perfectly geared to provide top performance and to meet all special requirements. On request, we can also supply accessories already installed.

Overview of ball runner block accessories

Cover plate wiper

Two-piece front seal[1)]

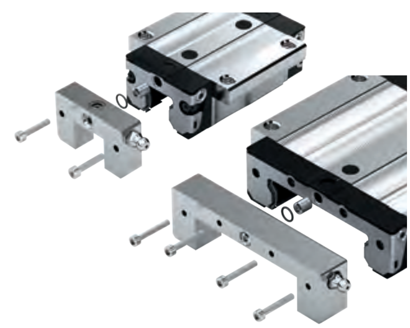


One and two-piece FKM seal[1)]

Seal kit[1)]

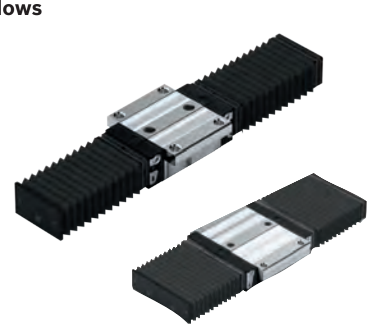
Lubrication adapter for existing systems with high SNH or SLH ball runner blocks only[1)]

Lubrication plate[1)]

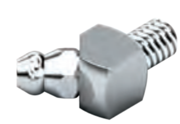


Front lube unit

Bellows



Lube nipple



Plastic hose for lube fittings

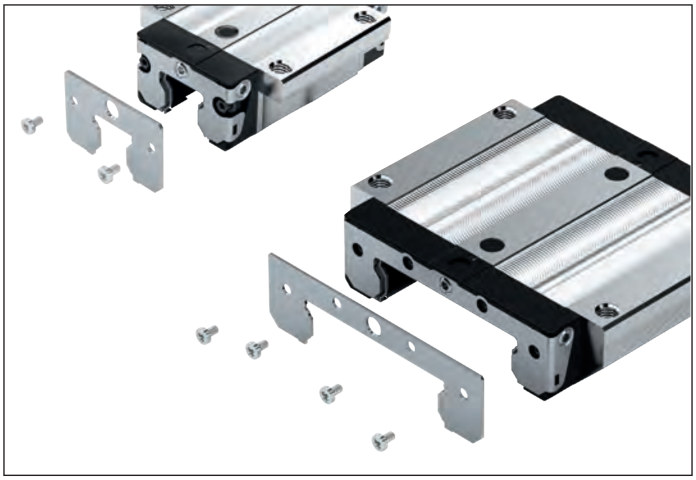
O-rings

Lube Fittings

- Reducers
- Extension pieces
- Connectors
- Swivel fittings
- Swivel screw joints for plastic tubes

1) For ball runner blocks F.N (flange ... low) and S.N (Slimline ... low) not available

Cover plate wiper

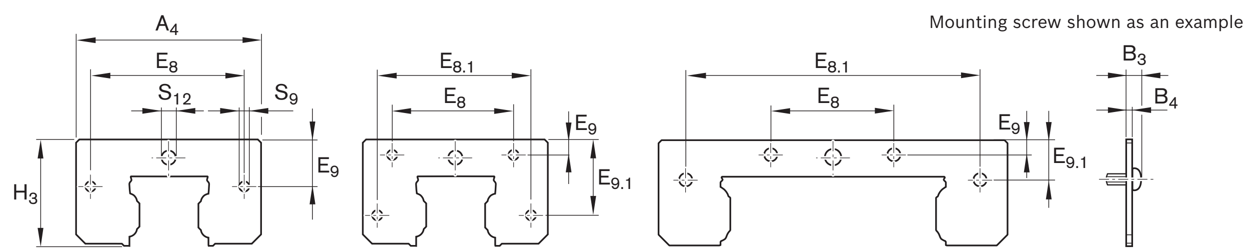


Scraper plates R16.0 .10 ..

- Material: Corrosion-resistant steel according to DIN EN 10088
- Specification: bright
- Precision design with maximum gap dimension of 0.1 to 0.3 mm

Installation information

- When combining with two-piece end seals, use seal kit: For material numbers, see seal kit
- The fastening screws are included.
- When mounting, make sure there is a uniform gap between the guide rail and the scraper.
- For end-face lubrication, consider minimum screw-in depth.
- Follow the mounting instructions.



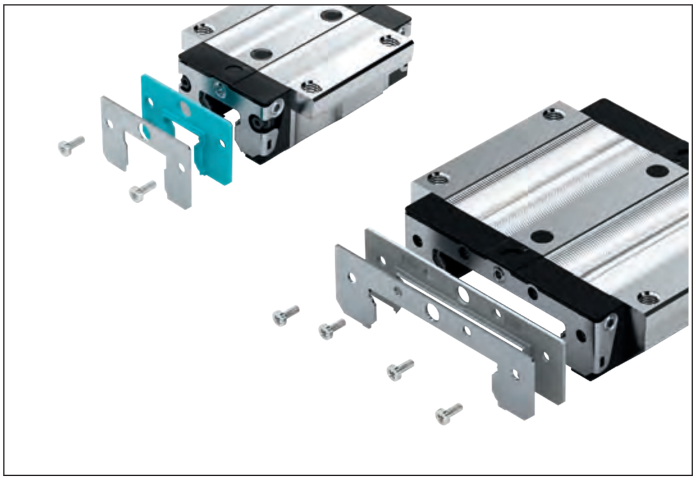
Cover plate wiper size 65

Wide cover plate wiper

Size	Part number for ball guide rail with cover strip	Dimensions (mm) A_4	B_3	B_4	E_8	$E_{8.1}$	E_9	$E_{9.1}$	H_3	S_9	S_{12}	Weight (g)
15	R1620 110 30	33.0	3.1	1.0	24.55	–	6.30	–	19.2	3.5	4.6	5
20	R1620 810 30	42.0	3.4	1.0	32.40	–	6.80	–	24.8	4.0	5.1	6
	R1620 810 35[3)]	41.0	3.4	1.0	30.50	–	5.10	–	22.8	4.0	4.0	5
25	R1620 210 30	47.0	3.4	1.0	38.30	–	11.00	–	29.5	4.0	7.0	8
	R1620 210 35[3)]	47.0	3.4	1.0	38.30	–	8.00	–	26.5	4.0	4.0	7
30	R1620 710 30	59.0	3.4	1.0	48.40	–	14.10	–	34.7	4.0	7.0	12
35	R1620 310 40[1)]	69.0	3.4	1.0	58.00	–	17.00	–	40.1	4.0	7.0	16
45	R1620 410 40[1)]	85.0	5.1	2.0	69.80	–	20.50	–	50.0	5.0	7.0	50
55	R1620 510 40[1)]	98.0	5.7	2.0	80.00	–	21.80	–	56.4	6.0	7.0	65
65	R1620 610 40[1)]	124.0	5.6	2.5	76.00	100.0	10.00	52.50	74.7	5.0	9.0	140
20/40[4)5)]	R1670 510 00[2)]	60.0	3.1	1.0	18.00	53.4	2.65	7.35	21.7	3.5	4.0	7
25/70[4)]	R1670 210 10[2)]	101.0	3.4	1.0	35.00	83.5	4.35	10.75	29.1	4.0	7.0	14
35/90[4)]	R1670 310 10[2)]	129.0	3.4	1.0	79.00	116.0	5.60	28.70	40.8	4.0	7.0	25

1) Material number for ball guide rail **without** cover strip: R1620 .10 30
2) Ball guide rail **without** cover strip
3) For ball runner blocks F.N (flange ... low) and S.N (Slimline ... low)
4) Wide ball rail system
5) Note: Cover plate wiper cannot be combined with ball guide rail R167 8.. ..

Front seal

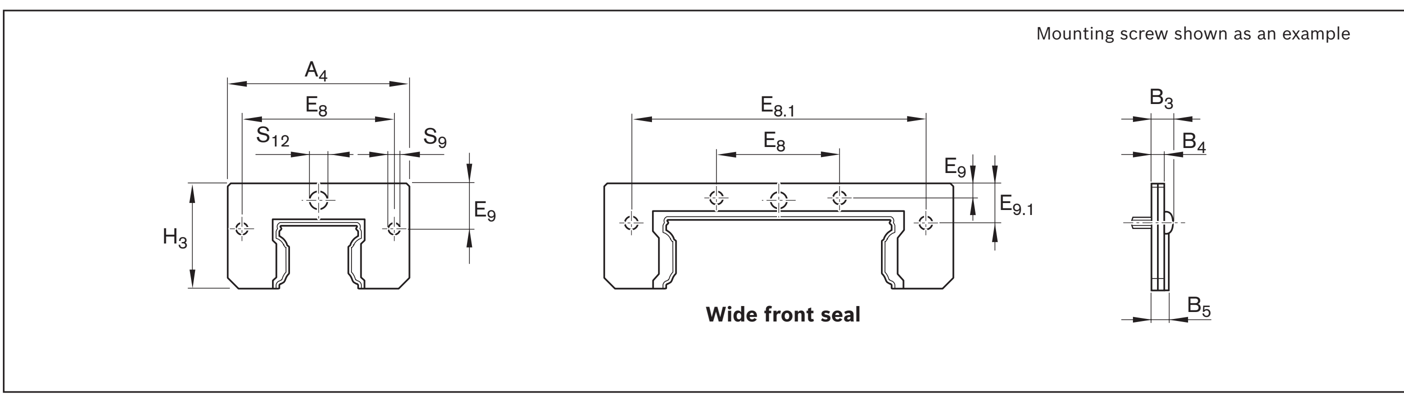


Two-piece

- Material: Material: corrosion-resistant steel per DIN EN 10088 with polymer seal
- Specification: bright

Installation information

- The fastening screws are included.
- For end-face lubrication, consider minimum screw-in depth.
- Follow the mounting instructions.



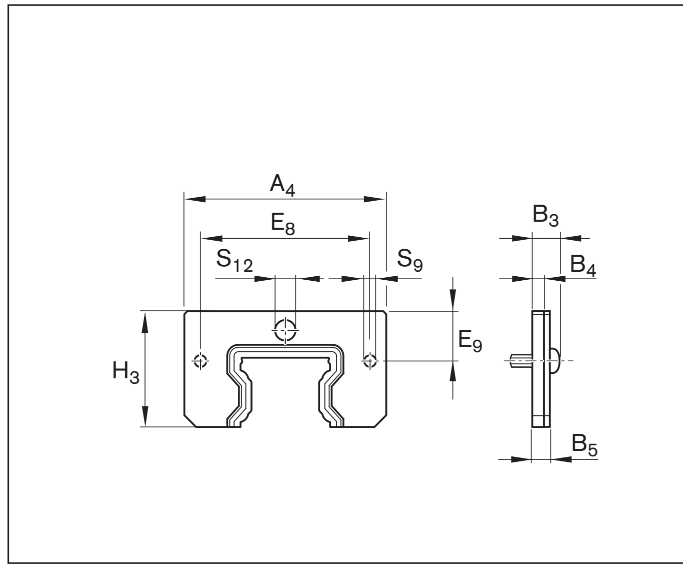
Size	Material number	Dimensions (mm)											Weight
		A_4	B_3	B_4	B_5	E_8	$E_{8.1}$	E_9	$E_{9.1}$	H_3	S_9	S_{12}	(g)
15	R1619 121 20	32.0	4.3	2.2	3.0	24.55	–	6.30	–	19.0	3.5	4.3	6.0
20[1)]	R1619 821 20	42.0	4.9	2.5	3.3	32.40	–	6.80	–	24.3	4.0	5.1	8.0
25[1)]	R1619 221 30	47.0	4.9	2.5	3.3	38.30	–	11.00	–	29.0	4.0	7.0	10.0
30	R1619 721 30	59.0	5.7	3.3	4.5	48.40	–	14.10	–	34.5	4.0	7.0	18.0
35	R1619 321 30	69.0	5.7	3.3	4.5	58.00	–	17.00	–	39.5	4.0	7.0	25.0
45	R1619 421 30	85.0	7.1	4.0	5.5	69.80	–	20.50	–	49.5	5.0	7.0	55.0
55	R1619 521 30	98.0	7.7	4.0	5.5	80.00	–	21.50	–	56.0	6.0	7.0	65.0
20/40[2)3)]	R1619 522 20	60.0	4.6	2.5	3.3	18.00	53.4	2.65	7.35	21.7	3.5	4.0	7.5
25/70[2)]	R1619 222 20	99.0	4.9	2.5	3.3	35.00	83.5	4.30	10.70	28.6	4.0	7.3	14.5
35/90[2)]	R1619 322 20	128.6	5.7	3.3	4.5	79.00	116.0	5.80	28.90	41.0	4.0	7.0	40.0

1) Not for ball runner blocks F.N (flange ... low) and S.N (Slimline ... low)
2) Wide ball rail system
3) Note: New front seal cannot be combined with previous ball guide rail R167 8.. ..

FKM seal

Two-piece

- Material: Corrosion-resistant steel according to DIN EN 10088 with FKM seal
- For areas of application and resistance, refer to selection criteria/seals



Special feature

Easy mounting and removal even when guide rail is screwed down.

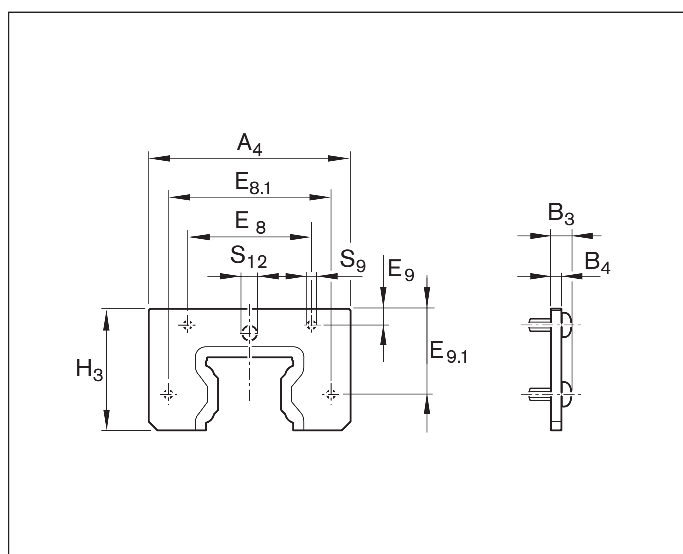
Installation information

- The fastening screws are included.
- For end-face lubrication, consider minimum screw-in depth.
- Follow the mounting instructions.

Size	Material number	Dimensions (mm)									Weight
		A_4	B_3	B_4	B_5	E_8	E_9	H_3	S_9	S_{12}	(g)
35	R1619 320 30	69	8.4	4	6	58.0	17.0	39.5	4	7	39.0
45	R1619 420 30	85	9.1	4	6	69.8	20.5	49.5	5	7	61.0
55	R1619 520 30	98	9.7	4	6	80.0	21.8	56.4	6	7	80.5

One-piece

- Material: Corrosion-resistant steel according to DIN EN 10088 with FKM seal

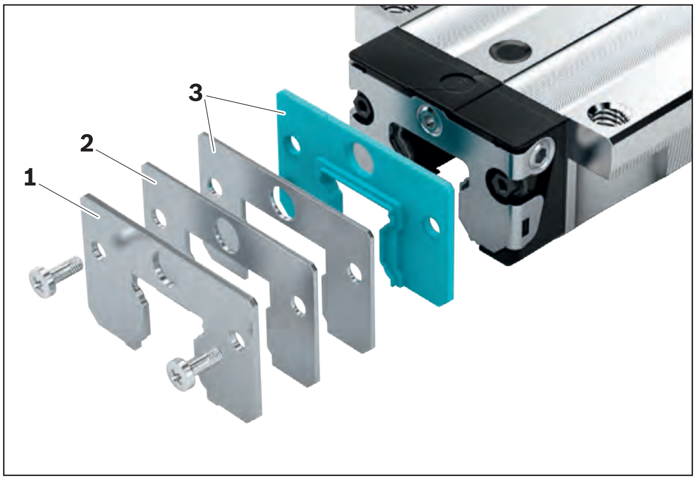


Installation information

- The fastening screws are included.
- For end-face lubrication, consider minimum screw-in depth.
- Follow the mounting instructions.

Size	Material number	Dimensions (mm)										Weight
		A_4	B_3	B_4	E_8	$E_{8.1}$	E_9	$E_{9.1}$	H_3	S_9	S_{12}	(g)
65	R1619 620 30	124	9.6	6.5	76	100	10	52.5	74.7	5	9	146

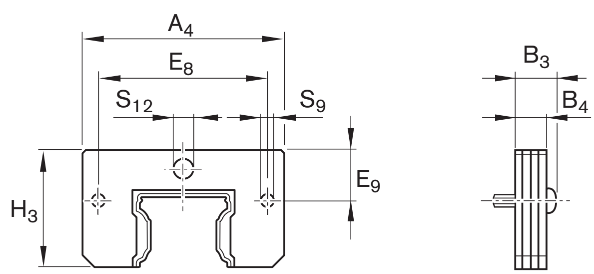
Seal Kit



1 Cover plate wiper
2 Support plate
3 Two-piece front seal

Installation information

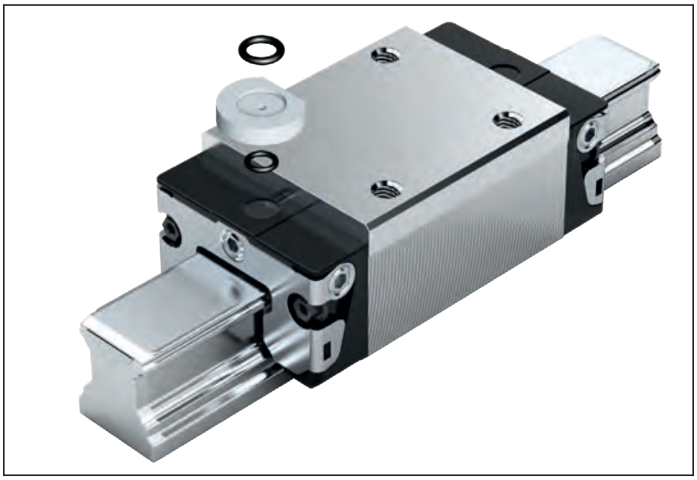
- We recommend the use of the seal kit when combining a cover plate wiper with a two-piece front seal.
- The fastening screws are included.
- For end-face lubrication, consider minimum screw-in depth.
- Follow the mounting instructions.



Size	Part number for ball guide rail		Dimensions (mm)								Weight
	without cover strip	with cover strip	A_4	B_3	B_4	E_8	E_9	H_3	S_9	S_{12}	(g)
15	R1619 120 50	R1619 120 50	32.0	6.3	4.2	24.55	6.30	19.0	3.5	4.3	16
201)	R1619 820 50	R1619 820 50	42.0	6.9	4.5	32.40	6.80	24.3	4.0	5.1	20
251)	R1619 220 50	R1619 220 50	47.0	6.9	4.5	38.30	11.00	29.0	4.0	7.0	26
30	R1619 720 50	R1619 720 50	59.0	8.2	5.8	48.40	14.10	34.5	4.0	7.0	42
35	R1619 320 40	R1619 320 50	69.0	8.2	5.8	58.00	17.00	39.5	4.0	7.0	57
45	R1619 420 40	R1619 420 50	85.0	11.1	8.0	69.80	20.50	49.5	5.0	7.0	155
55	R1619 520 40	R1619 520 50	98.0	11.7	8.0	80.00	21.50	56.0	6.0	7.0	195

1) **Not** for ball runner blocks F.N (flange ... low) and S.N (Slimline ... low)

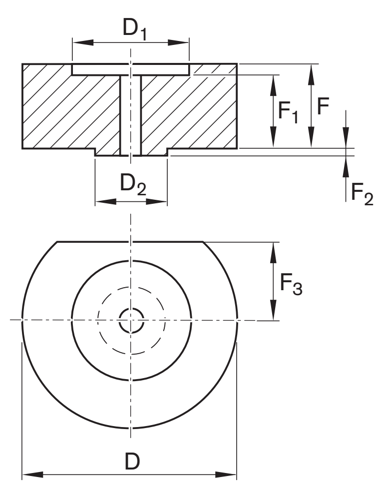
Lubrication adapter



For oil and grease lubrication from above with high ball runner blocks SNH R1621 or SLH R1624

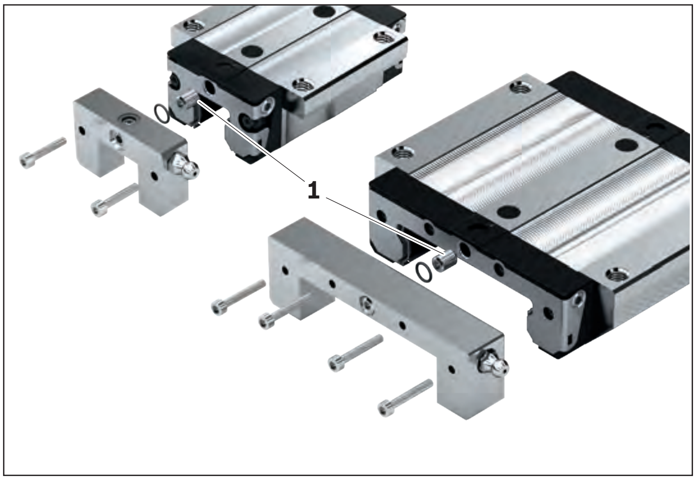
- Material: Plastic
- Quantity per pack: 1 piece

Installation information
- O-rings are provided.
- Before mounting, use a heated pointed metal tool to open the lube hole on the ball runner block (do not use a drill).
- For more details, see the “Lubrication and maintenance” chapter.



Size	Material number	Dimensions (mm)							Weight
		D	D_1	D_2	F	F_1	F_2	F_3	(g)
15	R1621 100 05	12	6.2	3.4	3.7	3.1	0.5	3.20	0.5
25	R1621 200 05	15	7.2	4.4	3.8	3.2	0.5	5.85	0.9
30	R1621 700 05	16	7.2	4.4	2.8	2.2	0.5	6.10	0.7
35	R1621 300 05	18	7.2	4.4	6.8	6.2	0.5	6.80	2.2
45	R1621 400 05	20	7.2	4.4	9.8	9.2	0.5	8.30	4.1

Lube plate



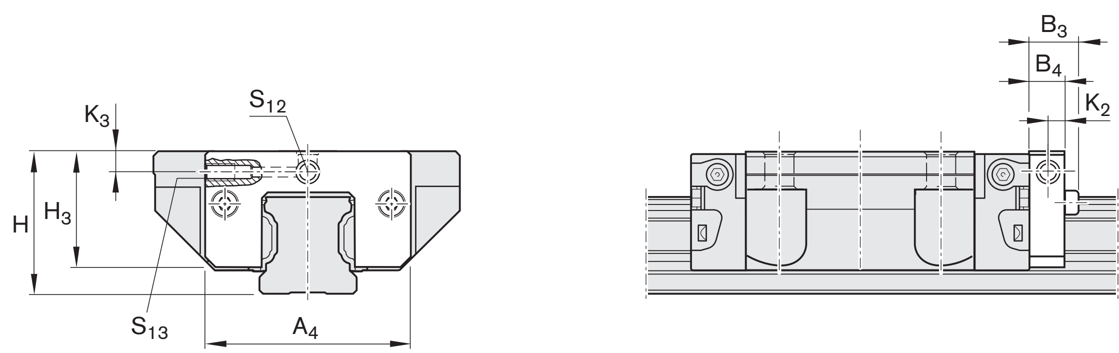
For standard lube nipples

- Material: Aluminum

Installation information

- The necessary parts for attachment are included.
- Size 15 – 20:
  Funnel-type lube nipple with drive-in peg is included.
- Size 25 – 65:
  The ball runner block's lube nipple can be used.
- Follow the mounting instructions.

⚠ The included lubricant pin (1) must be mounted between the lubrication plate and the ball runner block! (The pin contains a lube hole.)



Size	Material number	Dimensions (mm)									Weight
		A_4	B_3	B_4	H	H_3 [2]	K_2	K_3 [2]	S_{12}	S_{13}	(g)
15	R1620 111 20	32	13.1	11	24 28 [3]	19.0	5.5	3.4 7.4 [3]	M3	Ø3	15
20 [1]	R1620 811 20	42	15.0	12	30	24.8	6.0	3.5	M3	Ø3	25
25 [1]	R1620 211 20	47	15.0	12	36 40 [3]	28.3	6.0	6.0 10.0 [3]	M6	M6	30
30	R1620 711 20	59	15.0	12	42 45 [3]	33.8	6.0	8.0 11.0 [3]	M6	M6	45
35	R1620 311 20	69	15.0	12	48 55 [3]	39.1	6.0	8.0 15.0 [3]	M6	M6	60
45	R1620 411 20	85	16.0	12	60 70 [3]	48.5	6.0	8.0 18.0 [3]	M6	M6	85
55	R1620 511 20	98	17.0	12	70 80 [3]	56.0	6.0	9.0 19.0 [3]	M6	M6	115
65	R1620 611 20	124	18.0	14	90	75.7	7.0	18.0	M8x1	M8x1	250

1) N**ot** for ball runner blocks F.N (flange ... low) and S.N (Slimline ... low)
2) Referred to the ball runner block mounting face
3) For ball runner blocks S.H (Slimline ... high)

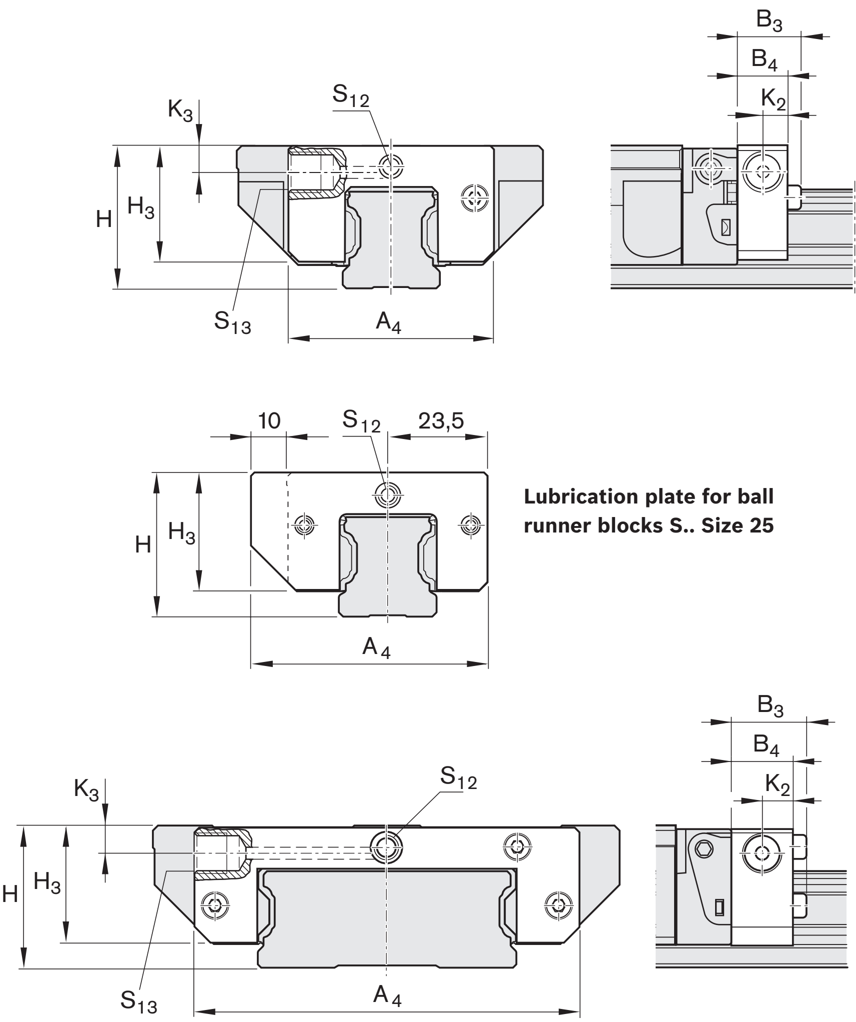
Lubrication plate G 1/8

For lube nipple G 1/8

- Material: Aluminum

Installation information

- The necessary parts for attachment are included.
- Ball runner block S.. (slimline ... ...) Size 25: Pay attention to the lateral protrusion of the lubrication plate!
- Follow the mounting instructions.



Lubrication plate for ball runner blocks S.. Size 25

Wide lubrication plate

Size	Material number	Dimensions (mm)									Weight
		A_4	B_3	B_4	H	H_3[2)]	K_2	K_3[2)]	S_{12}	S_{13}	(g)
25[1)]	R1620 211 30	57	19.0	16	36 40[3)]	28.3	8	7.0 11.0[3)]	M6	G 1/8x8	40
30	R1620 711 30	59	19.0	16	42 45[3)]	33.8	8	7.0 10.0[3)]	M6	G 1/8x8	59
35	R1620 311 30	69	19.0	16	48 55[3)]	39.1	8	8.0 15.0[3)]	M6	G 1/8x8	79
45	R1620 411 30	85	20.0	16	60 70[3)]	48.5	8	8.0 18.0[3)]	M6	G 1/8x8	112
55	R1620 511 30	98	21.0	16	70 80[3)]	56.0	8	9.0 19.0[3)]	M6	G 1/8x8	152
65	R1620 611 30	124	20.0	16	90	75.7	8	18.0	M6	G 1/8x8	285
25/70[4)]	R1670 211 40	99	19.0	16	35	29.6	8	8.4	M6	G 1/8x8	65
35/90[4)]	R1670 311 30	129	19.0	16	50	42.0	8	9.5	M6	G 1/8x8	120

1) N**ot** for ball runner blocks F.N (flange ... low) and S.N (Slimline ... low)
2) Referred to the ball runner block mounting face
3) For ball runner blocks S.H (Slimline ... high)
4) Wide ball rail system

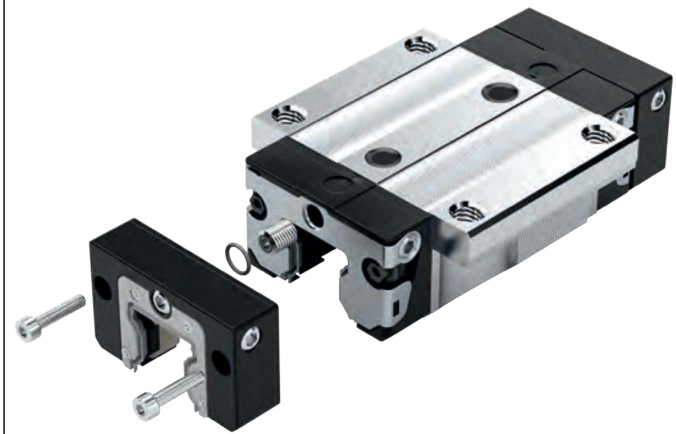
Front lube units

For running distances up to 10,000 km without relubrication

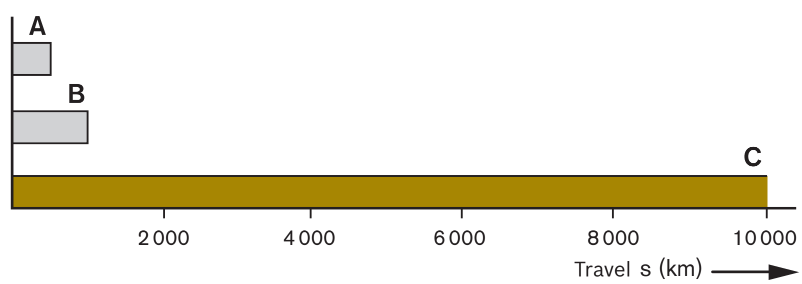
Advantages during mounting and service

- Running distances of up to 10,000 km without relubrication
- Only initial lubrication (with grease) of the ball runner block necessary
- Front lube units at both runner block ends
- Minimal lubricant loss
- Reduced oil consumption
- No lube lines
- Max. operating temperature 60 °C
- In-service refilling possible using lube nipple on end face or at side
- Lube port on end face of the front lube unit suitable for lubricating runner block with grease

Standard ball runner block with two front lube units



Size	Possible running distance s with front lube units (km)
15	10 000
20	10 000
25	10 000
30	10 000
35	10 000
45	10 000
55	1 500
65	1 000



Previous travel s
A With oil lubrication up to 500 km
B With grease lubrication up to 1000 km

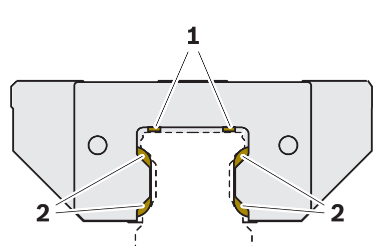
Possible travel s
C With front lube units up to 10,000 km

For part numbers, dimension drawing, dimensions and technical data, see next page.

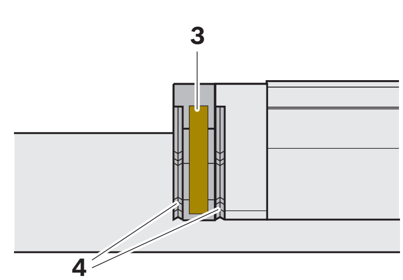
Oil consumption comparison for size 25

Front lube units	Lubricant quantity per lubrication cycle (cm³)	Travel s (km)	Lubricant consumption absolute (cm³/km)	comparative (%)
without	1.2	20	0.06	100.00
with	**5.2**	**5 000**	**0.00104**	**1.73**

Lubricant distribution
Specially designed lube distribution ducts ensure that the lubricant is applied only where needed: directly to the raceways and to the guide rail top surface.



1 Top of the ball guide rail
2 Raceways of the ball bearing guide



3 Oil tank
4 Seals

Front lube unit R1619 .2. 00
Material: Special plastic

Front lube units R1619 .2. 00 are filled with (Mobil SHC 639) oil ready-to-install and can be mounted after basic lubrication of the ball runner blocks.

Front lube unit R1619 .2. 10
Material: Special plastic

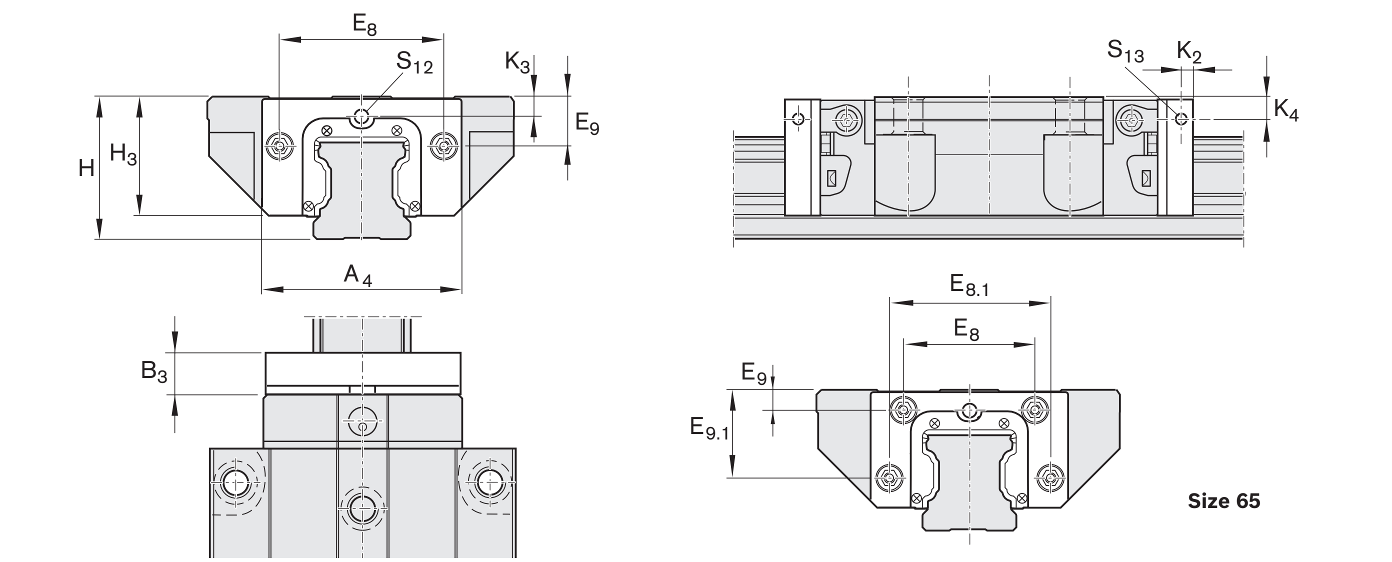
Front lube units R1619 .2. 10 are unfilled at the factory.

Recommended oil lubricant for initial filling:

- ▶ Mobil SHC 639 (Viscosity 1000 mm²/s at 40 °C)

Before mounting the front lube unit, it is necessary to carry out initial lubrication of the ball runner blocks **with grease lubricant! See the chapter entitled "Lubrication".**

If you use a different lubricant oil than the one stated, check the compatibility of the lubricants and the running distance!



Size 65

Size	Material number	Dimensions (mm) A_4	B_3	E_8	$E_{8.1}$	E_9[2]	$E_{9.1}$[2]	H	H_3[2]	K_2	K_3[2]/K_4[2]	S_{12}	S_{13}	Oil (cm³)	Weight (g)
15	R1619 125 00	31.8	11.5	24.55	–	6.70 10.70[3]	–	24 28[3]	19.40 23.40[3]	5	3.35 7.35[3]	M3	M3	1.00	15
20	R1619 825 00	43.0	12.5	32.50	–	7.30	–	30	24.90	5	3.70	M3	M3	2.20	20
	R1619 826 00[1]	41.0	12.5	30.50	–	5.60	–	28	22.90	–	3.10	–	M3	1.80	20
25	R1619 225 00	47.0	13.0	38.30	–	11.50 15.50[3]	–	36 40[3]	29.30 33.30[3]	5	5.50 9.50[3]	M6	M6	2.60	25
	R1619 226 00[1]	47.0	13.0	38.30	–	8.50	–	33	26.30	5	4.10	M3	M3	2.50	25
30	R1619 725 00	58.8	14.5	48.40	–	14.60 17.60[3]	–	42 45[3]	35.05 38.05[3]	6	6.05 9.05[3]	M6	M6	3.85	35
35	R1619 325 00	69.0	16.0	58.00	–	17.35 24.35[3]	–	48 55[3]	39.85 46.85[3]	6	6.90 13.90[3]	M6	M6	5.70	50
45	R1619 425 00	84.0	17.0	69.80	–	20.90 30.90[3]	–	60 70[3]	49.80 59.80[3]	7	8.20 18.20[3]	M6	M6	9.60	70
55	R1619 525 00	99.0	18.0	80.00	–	22.30 32.30[3]	–	70 80[3]	57.05 67.05[3]	8	8.90 18.90[3]	M6	M6	14.50	90
65	R1619 625 00	124.2	19.0	76.00	100	11.00	53.5	90	75.70	8	16.00	M8	M8	30.00	130

1) For ball runner blocks F.N (flange ... low) and S.N (Slimline ... low)
2) Referred to the ball runner block mounting face
3) For ball runner blocks S.H (Slimline ... high)

Front lube units

Initial filling of a front lube unit shipped without oil

- Remove the set screw from the lube hole (Fig. 1, item 1) and keep it ready for later use.
- Screw in the lube nipple (**2**).
- Lay the front lube unit (**3**) down flat and fill with the amount of oil according to table 1; leave for about 36 hours.
- Check whether the lube insert is completely soaked with oil. If necessary, add oil.
- Remove lube nipple.
- Screw in the set screw.

- For size 20 low profile: Place the front lube unit in 10 mm of oil for about 36 hours (see figure 2).

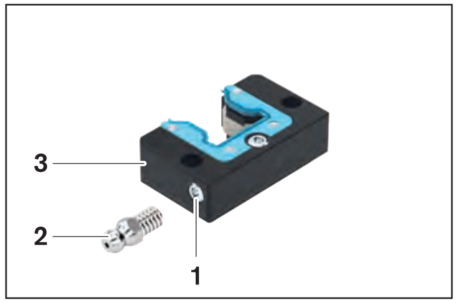


Fig. 1

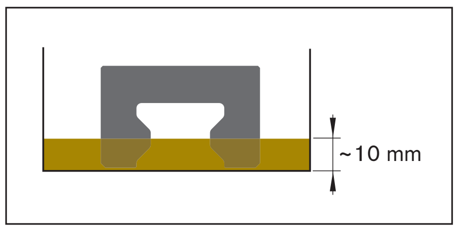


Fig. 2

Size	Amount of oil for initial filling of a front lube unit without oil (cm³)
15	0.90
20	2.00
25	2.40
30	3.85
35	5.70
45	9.60
55	14.50
65	30.00

Table 1

Relubrication of front lube units

When the relubrication interval according to Graph 1 has been reached, add the relubrication quantity according to table 1.

- The units can be relubricated through the lube port at the side.
- It is **not** possible to top up the size 20 front lube unit via the lube port (see figure 2).

Note

Rexroth recommends that you replace the front lube units after three years at the latest and regrease the ball runner block before installing the new ones.

Relubrication of runner blocks

In clean operating environments, the ball runner blocks can be relubricated with grease (Dynalub 510) from the end face.
For information on relubricating ball runner blocks **using grease lubricant,** see the “Lubrication” chapter

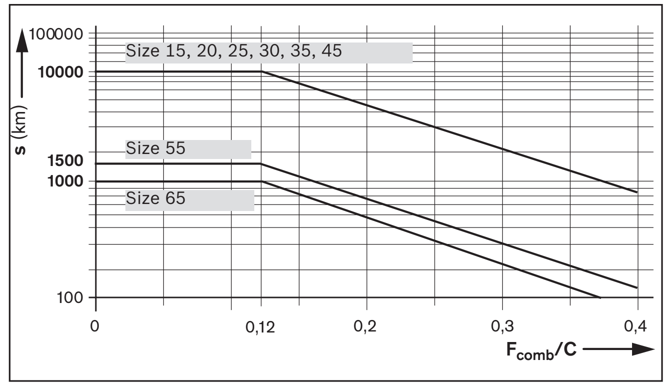
⚠ If you use different lubricants than the ones stated, you may find that relubrication intervals are shorter and that performance decreases with regard to short stroke and loading capacity; in addition, chemical interactions can take place between the plastics, lubricants and the preservative agents.
The recommended in-service lubrication intervals depend on environmental factors, load and type of loading.
Environmental influences include, for example, swarf, mineral and similar abrasion, solvents and temperature.
The loading and the load type are, for example, vibrations, jolts and tilting.
⚠ The manufacturer is not familiar with local operating conditions. Users can only determine the in-service lubrication intervals with certainty by conducting their own in-house tests or by close observation.
⚠ Do not use water-based coolant/lubricant on ball guide rails and ball runner blocks!

Load-dependent relubrication intervals for ball runner blocks with front lube units Applicable under the following conditions:

- Lubricants of ball runner block: Dynalub 510 (NLGI 2 grease) or alternatively Castrol Longtime PD 2 (NLGI 2 grease)
- Lubricant of front lube units: Mobil SHC 639 (synthetic oil)
- Maximum speed: v_{max} = 2 m/s
- No exposure to metalworking fluids
- Standard seals (SS)
- Ambient temperature: T = 20 – 30 °C

Key

C = Dynamic load capacity (N)
F_{comb} = Dynamically combined equivalent load (N)
F_{comb}/C = load ratio (–)
s = Relubrication interval as running distance (km)



Graph 1

Definition of F_{comb}/C

The load ratio F_{comb}/C describes the ratio of the dynamic equivalent load with combined load on the bearing F_{comb} (taking into account the internal pre-tensioning force F_{pr}) and the dynamic load capacity C.

Mounting of front lube units

Installation information

All required mounting accessories (coated screws, seals and lube nipples) are supplied along with the units.
Mount a front lube unit (Figure 3, item 3) on both sides of the ball runner block!
Do not remove the ball runner block from the rail!

Ball runner blocks up to size 45 (Fig. 3a):

The included lubricant pin (2) must be mounted between the lubrication plate and the ball runner block!
(The pin contains a lube hole.)

- Remove set screw (1).
- Screw in lube pin (2).
- Push on front lube unit (3).
- Insert O-ring (5) between runner block and front lube unit.
- Tighten the screws (4) to tightening torque M_A (see table 2).

Ball runner blocks from size 55 (Fig. 3b):

- Push on front lube unit (3).
- Remove set screw (1) and insert O-ring (5) between runner block and front lube unit.
- Tighten the screws (4) to tightening torque M_A (see table 2).

Size	Item 4	Tightening torque M_A (Nm)
15	M2.5 x 12	0.3
20	M3 x 14	0.6
25	M3 x 14	0.6
30	M3 x 14	1.2
35	M3 x 16	1.2
45	M4 x 18	1.6
55	M5 x 18	2.0
65	M4 x 20	1.6

Table 2

Figure 3a (up to size 45)

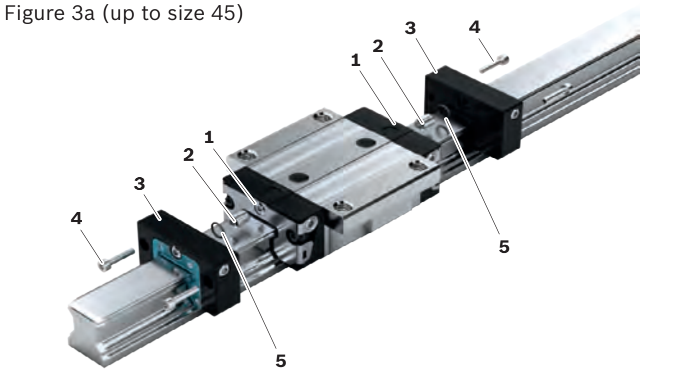
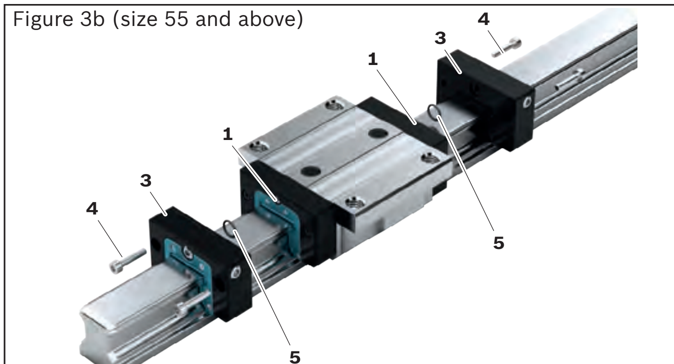
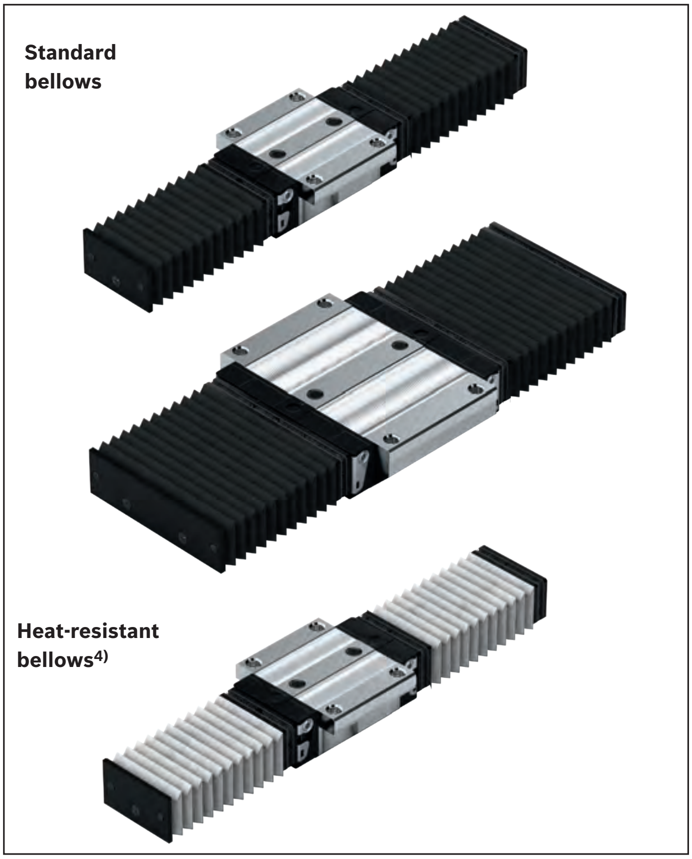


Figure 3b (size 55 and above)



Bellows



Standard bellows
R1620 .0. 00

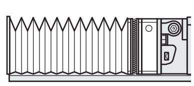
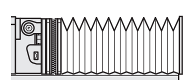
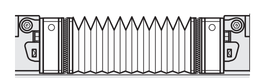
- Material: Polyurethane-coated polyester fabric
- Aluminum lube plate

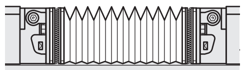
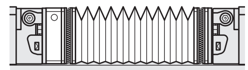
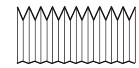
Heat-resistant bellows[4)]
R1620 .5. 00

- Material: Nomex fabric, metalized on both sides

Temperature resistance

- Non combustible, non flammable
- Resistant to sparks, welding spatter and hot chips.
- Up to 200 °C peat temperature before the protective jacket
- Max. operating temperature of 80 °C for the entire bellows

Size	Part number, no. of folds		
	 **Type 1: with lubrication plate[1)] and end plate** **Type 6: with front lube unit[2)] and end plate**	 **Type 2: with mounting frame and end plate**	 **Type 3: with 2 lubrication plates[1)]** **Type 7: with 2 front lube units[2)]**
	Standard bellows		
15	R1620 10. 00, ...	R1620 102 00, ...	R1620 10. 00, ...
20	R1620 80. 00, ...	R1620 802 00, ...	R1620 80. 00, ...
25	R1620 20. 00, ...	R1620 202 00, ...	R1620 20. 00, ...
30	R1620 70. 00, ...	R1620 702 00, ...	R1620 70. 00, ...
35	R1620 30. 00, ...	R1620 302 00, ...	R1620 30. 00, ...
45	R1620 40. 00, ...	R1620 402 00, ...	R1620 40. 00, ...
55	R1620 50. 00, ...	R1620 502 00, ...	R1620 50. 00, ...
65	R1620 60. 00, ...	R1620 602 00, ...	R1620 60. 00, ...
20/40[3)]	–	R1670 502 00, ...	–
25/70[3)]	–	R1670 202 00, ...	–
35/90[3)]	–	R1670 302 00, ...	–
	Heat-resistant bellows[4)]		
25	R1620 25. 00, ...	R1620 252 00, ...	R1620 25. 00, ...
30	R1620 75. 00, ...	R1620 752 00, ...	R1620 75. 00, ...
35	R1620 35. 00, ...	R1620 352 00, ...	R1620 35. 00, ...
45	R1620 45. 00, ...	R1620 452 00, ...	R1620 45. 00, ...
55	R1620 55. 00, ...	R1620 552 00, ...	R1620 55. 00, ...
65	R1620 65. 00, ...	R1620 652 00, ...	R1620 65. 00, ...

Size	Part number, no. of folds		
	 Type 4: with 2 mounting frames	 Type 5: with lubrication plate[1] and mounting frame Type 8: with front lube unit[2] and mounting frame	 Type 9: Bellows loose (spare part)
	Standard bellows		
15	R1620 104 00, ...	R1620 10. 00, ...	R1600 109 00, ...
20	R1620 804 00, ...	R1620 80. 00, ...	R1600 809 00, ...
25	R1620 204 00, ...	R1620 20. 00, ...	R1600 209 00, ...
30	R1620 704 00, ...	R1620 70. 00, ...	R1600 709 00, ...
35	R1620 304 00, ...	R1620 30. 00, ...	R1600 309 00, ...
45	R1620 404 00, ...	R1620 40. 00, ...	R1600 409 00, ...
55	R1620 504 00, ...	R1620 50. 00, ...	R1600 509 00, ...
65	R1620 604 00, ...	R1620 60. 00, ...	R1600 609 00, ...
20/40[3]	R1670 504 00, ...	–	R1670 509 00, ...
25/70[3]	R1670 204 00, ...	–	R1670 209 00, ...
35/90[3]	R1670 304 00, ...	–	R1670 309 00, ...
	Heat-resistant bellows[4]		
25	R1620 254 00, ...	R1620 25. 00, ...	R1600 259 00, ...
30	R1620 754 00, ...	R1620 75. 00, ...	R1600 759 00, ...
35	R1620 354 00, ...	R1620 35. 00, ...	R1600 359 00, ...
45	R1620 454 00, ...	R1620 45. 00, ...	R1600 459 00, ...
55	R1620 554 00, ...	R1620 55. 00, ...	R1600 559 00, ...
65	R1620 654 00, ...	R1620 65. 00, ...	R1600 659 00, ...

Weights on request

1) No lubrication plate necessary with ball runner blocks with side lube ports
2) VSE = front lube unit
3) Wide ball rail system
4) Pay attention to the overall height (see the dimension drawing/dimensions for heat-resistant bellows)

Ordering example:

- Bellows
- Size 35
- Standard
- Type 6: with FLU and end plate
- number of folds: 36

Example: **R1620 3 0 6 00, 36 folds**

Standard = 0
Heat resistant = 5

Type 1 – 9

Bellows

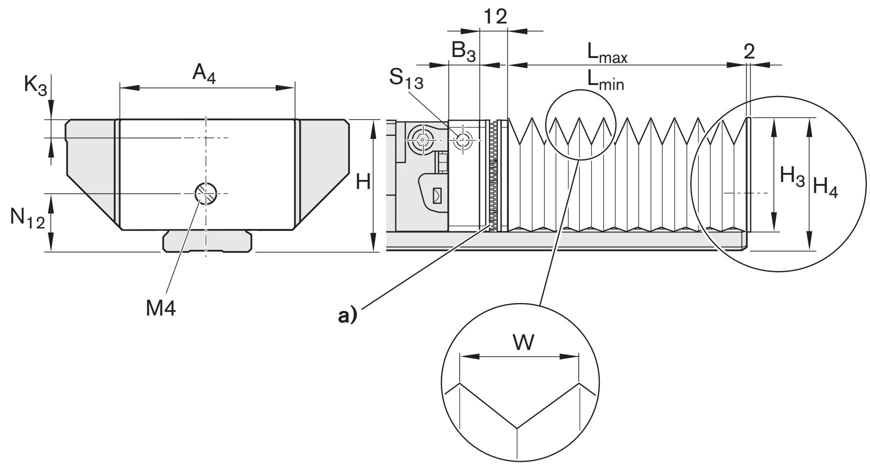
Installation information

- The bellows are delivered pre-assembled.
- The fastening screws are included.

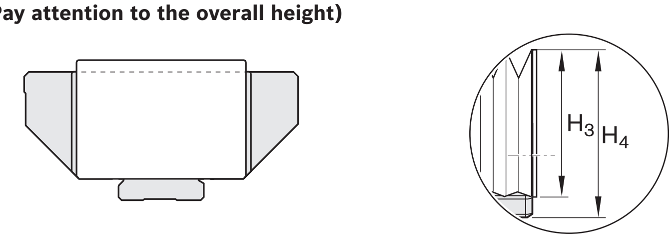
- Bellows with lubrication plate (Type 1, 3 – 5) **size 15 – 20:** Funnel-type lube nipple with drive-in peg is included. **Size 25 – 65 and wide:** The ball runner block's lube nipple can be used.

- With type 1 and type 2, you must tap one M4 x 10 thread with 2 x 45° recesses each into the end face of the SNS ball guide rail. With BNS ball guide rails: Tap two threads each.

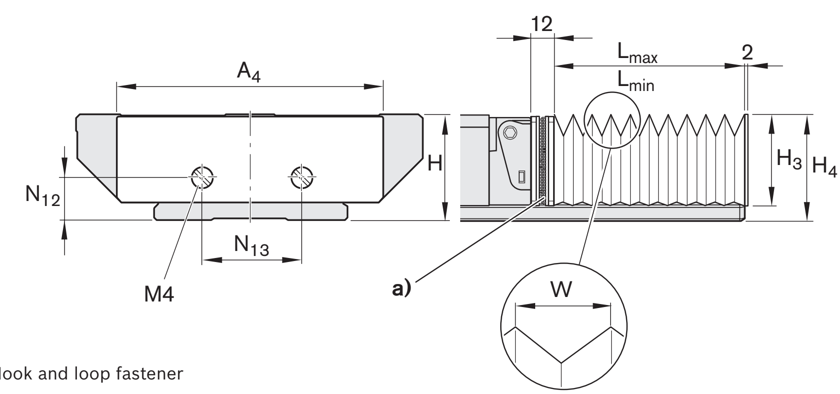
- Follow the mounting instructions.



Heat-resistant bellows[2)]
(Pay attention to the overall height)



Wide bellows



a) Hook and loop fastener

Representation not to scale

Standard bellows

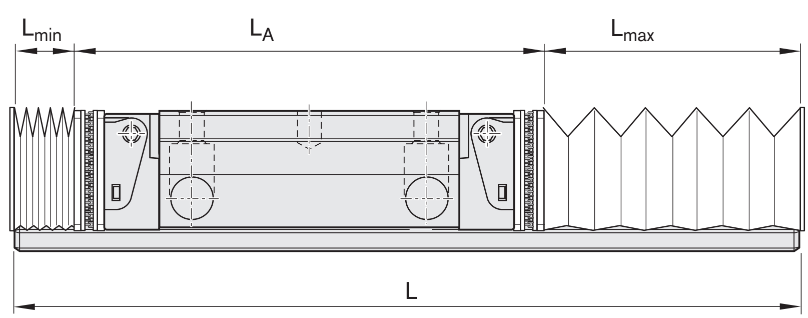
Size	Dimensions (mm)										Factor
	A_4	B_3	H	H_3	H_4	K_3	N_{12}	N_{13}	S_{13}	W	U
15	45	11	24	26.5	31.5	3.4	11.0	–	M3	19.9	1.18
20	42	12	30	24.0	29.2	3.5	13.0	–	M3	10.3	1.33
25	45	12	36	28.5	35.0	6.0	15.0	–	M3	12.9	1.32
30	55	12	42	34.0	41.0	8.0	18.0	–	M6	15.4	1.25
35	64	12	48	39.0	47.0	8.0	22.0	–	M6	19.9	1.18
45	83	12	60	49.0	59.0	8.0	30.0	–	M6	26.9	1.13
55	96	12	70	56.0	69.0	9.0	30.0	–	M6	29.9	1.12
65	120	14	90	75.0	89.0	18.0	40.0	–	M8x1	40.4	1.08
20/401)	73	–	27	31.0	35.0	–	11.5	–	–	19.9	1.12
25/701)	101	–	35	29.0	35.0	–	14.0	26	–	12.9	1.25
35/901)	128	–	50	42.0	49.0	–	21.5	40	–	19.9	1.18

Heat-resistant bellows2)

Size	Dimensions (mm)										Factor
	A_4	B_3	H	H_3	H_4	K_3	N_{12}	N_{13}	S_{13}	W	U
25	62	12	36	39.0	44.5	6.0	15	–	M6	25.9	1.25
30	67	12	42	42.0	47.5	8.0	18	–	M6	25.9	1.25
35	74	12	48	47.0	54.0	8.0	22	–	M6	29.9	1.21
45	88	12	60	55.0	64.0	8.0	30	–	M6	32.9	1.18
55	102	12	70	63.0	75.0	9.0	30	–	M6	37.9	1.16
65	134	14	90	86.0	99.0	18.0	40	–	M8x1	52.4	1.11

1) Wide ball rail system
2) Pay attention to the overall height (dimension H_4 compared to dimension H)

Calculations



Bellows

$$L_{max} = (\text{stroke} + 30) \cdot U$$

$$L_{min} = L_{max} - \text{stroke}$$

$$\text{Number of pleats} = \frac{L_{max}}{W} + 2$$

Ball guide rail length

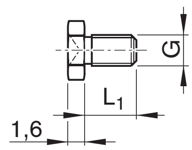
$$L = L_{min} + L_{max} + L_A$$

L_{max}	=	bellows expanded	(mm)
L_{min}	=	bellows contracted	(mm)
Stroke	=	stroke	(mm)
U	=	calculation factor	(–)
W	=	maximum extension	(mm)
L	=	rail length	(mm)
L_A	=	long ball runner block with mounting frame	(mm)

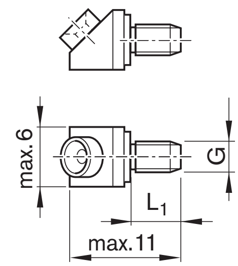
Lube nipple, lube ports, extensions

Funnel-type lube nipple per DIN 3405

Form A



Form B

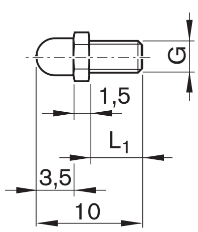


Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 029 09	M3	5	0.3
R3417 032 09[1)]			

1) Resist NR II lube nipple made of corrosion-resistant steel according to DIN EN 10088

Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 004 09	M3	5	1.5

Ball-type lube nipple

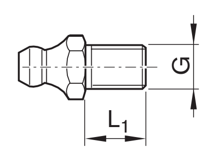


Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 005 01[1)]	M3	5	0.5

1) Material: Brass

Hydraulic-type lube nipple per DIN 71412

Form A

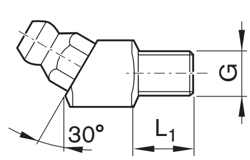


Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 008 02	M6	8	2.6
R3417 016 02[1)]			

1) Resist NR II lube nipple made of corrosion-resistant steel according to DIN EN 10088

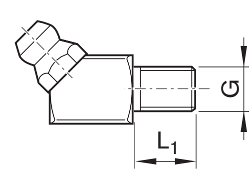
Hydraulic-type lube nipple per DIN 71412

30°



Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 023 02	M6	8	7.4

Form B

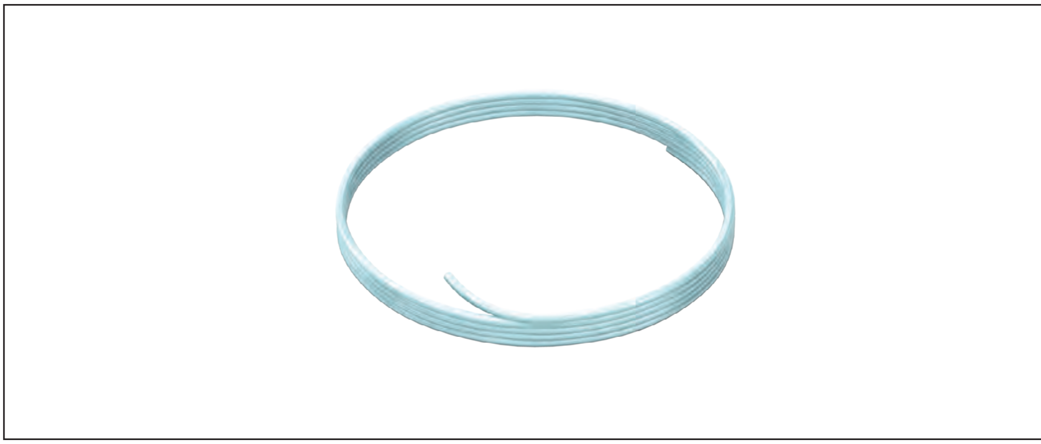


Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 007 02	M6	8	7.4
R3417 006 02	M8x1	8	8.0

Lube Fittings

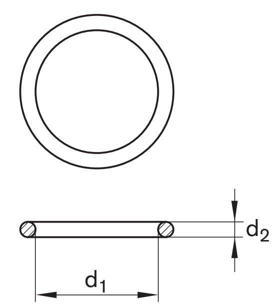
Plastic hose for lube fittings

Plastic hose Ø 3 mm



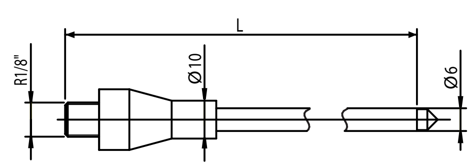
Material number	Dimensions external Ø (mm)	internal Ø (mm)	Length (m)	Weight (kg)
R3499 287 00	3	1.7	50	0.4

O-rings



Material number	d_1 x d_2 (mm)	Weight
R3411 130 01	4 x 1.0	
R3411 131 01	5 x 1.0	
R3411 003 01	6 x 1.5	0.03

Nozzle pipe

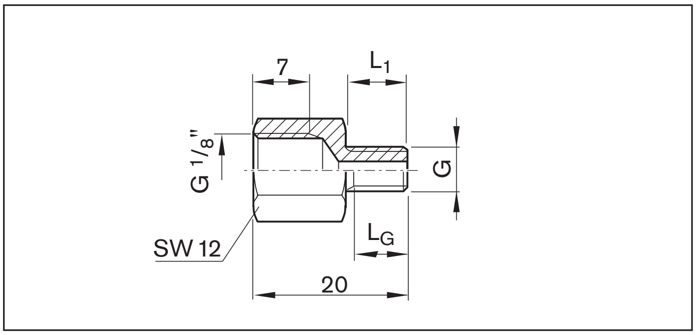


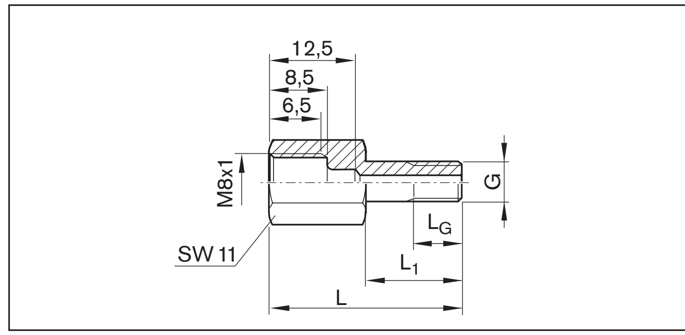
Material number	Dimensions (mm) L	Weight (g)
R3455 030 44	200	158

Lube nipple, lube ports, extensions

Lube Fittings

Reducers

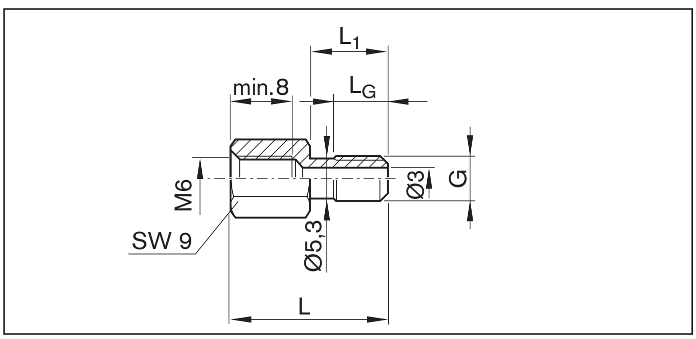


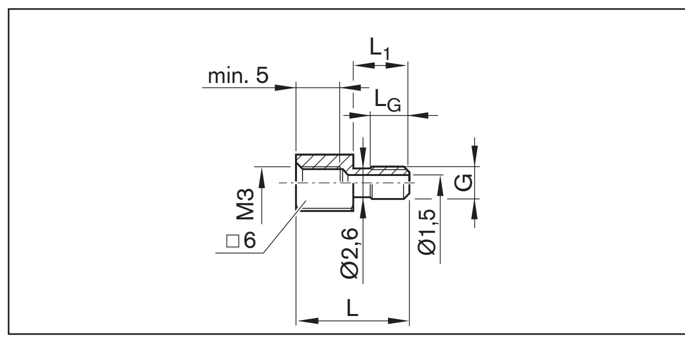


Material number	Dimensions (mm) G	L1	LG	Weight (g)
R3455 030 34	M6	8	6.5	7.5

Material number	Dimensions (mm) G	L	L1	LG	Weight (g)
R3455 030 53	M8x1	28.5	14.5	8	10

Extension pieces



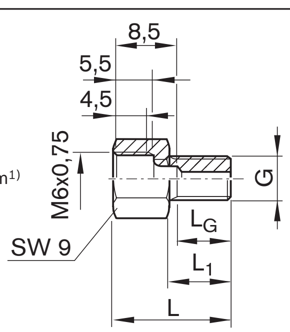


Material number	Dimensions (mm) G	L	L1	LG	Weight (g)
R3455 030 69	M6	21.0	10.5	7	5.0
R3455 030 87	M6	25.0	14.5	8	5.5
R3455 030 85	M6	26.5	16.0	7	5.0

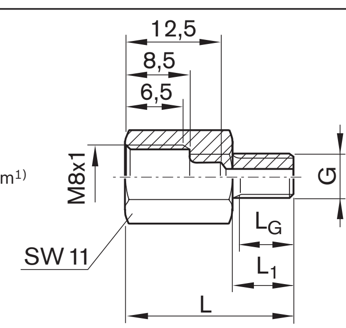
Material number	Dimensions (mm) G	L	L1	LG	Weight (g)
R3455 030 78	M3	16.5	8.5	6	2.5

Connectors

For tube Ø 2.5 mm[1)]



For tube Ø 4 mm[1)]

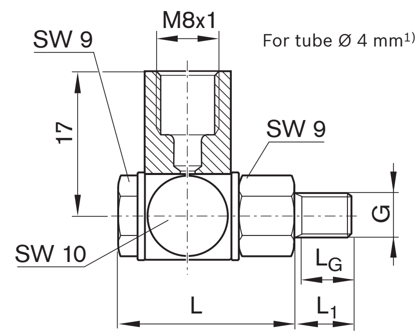


Material number	Dimensions (mm) G	L	L1	LG	Weight (g)
R3455 030 38	M6	15.5	8	6.5	4.1

Material number	Dimensions (mm) G	L	L1	LG	Weight (g)
R3455 030 37	M6	22	8	6.5	8.8

1) For connections as per DIN 2353 (solderless tube fittings)

Swivel fittings

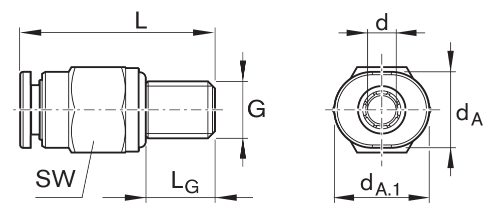


Material number	Dimensions (mm)				Weight
	G	L	L_1	L_G	(g)
R3417 018 09	M6	21.5	8	6.5	18.6

1) For connections as per DIN 2353 (solderless tube fittings)

Straight connectors
Push-in fittings for plastic and metal tubes

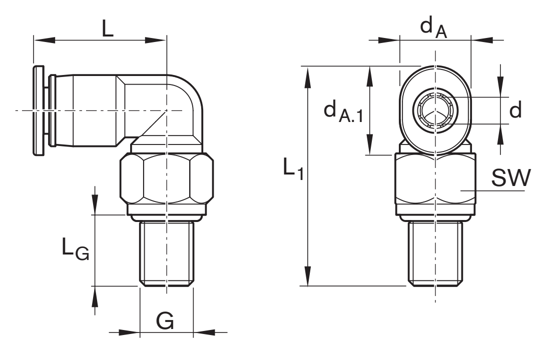
⚠ Not allowed with ball runner blocks with accessories on the end face



Material number	Dimensions (mm)							Weight
	d_A	$d_{A.1}$	d±0.1	G	L	L_G	SW	(g)
R3417 033 09	6.0	7	3	M3	15.5	5	6[1]	1.4
R3417 034 09	8.0	9	3	M5	18.0	5	8	3.5
R3417 035 09	8.5	10	4	M6	20.5	8	9	4.6
R3417 036 09	10.0	12	6	M6	21.5	8	10	4.8

1) Maximum tightening torque: M_A = 0.5 Nm

Elbow plug-in connections rotatable[1]



Material number	Dimensions (mm)								Weight
	d_A	$d_{A.1}$	d±0.1	G	L	L_1	L_G	SW	(g)
R3417 037 09	6.0	7	3	M3	13.7	18.0	5	6[2]	1.7
R3417 038 09	8.0	10	4	M6	19.5	24.7	8	9	5.1
R3417 039 09	10.5	12	6	M6	20.0	25.0	8	9	6.1

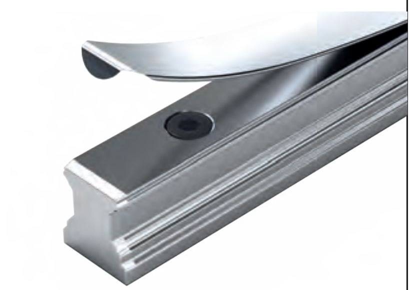
1) Maximum lubricant pressure: 30 bar (exerting slow pressure with manual grease gun)
2) Maximum tightening torque: M_A = 0.5 Nm

Product description

Rexroth offers limitless interchangeability as all ball guide rail versions can be combined at will with all accessories within each size.
The entire range is perfectly geared to provide top performance and to meet all special requirements.

Overview of accessories for ball guide rails

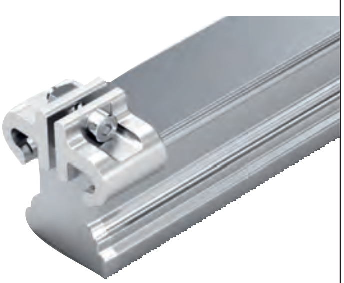
Cover strip, separate



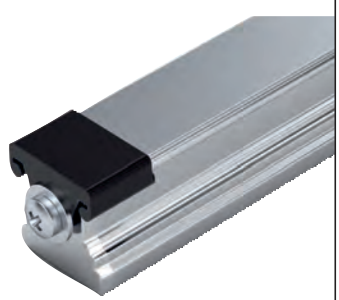
Expanding tool

Installation set for cover strip with arbor and lifting plate

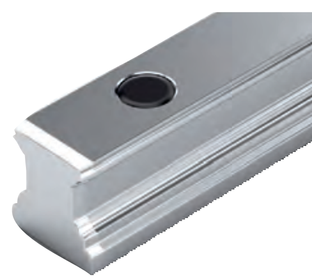
Aluminum strip clamp



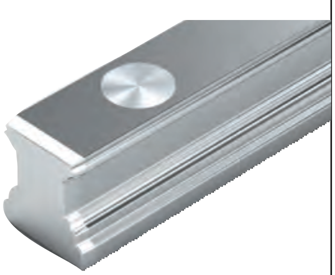
Plastic protective cap



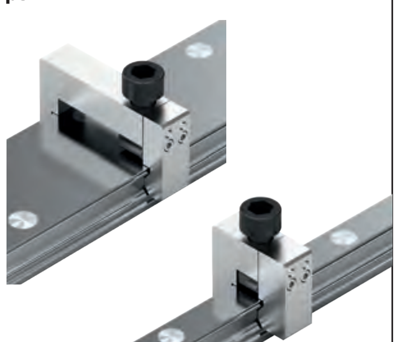
Plastic mounting hole plug



Steel cap



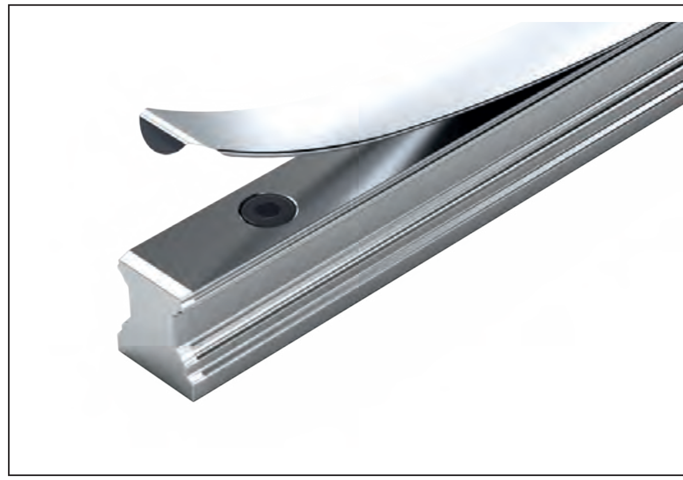
Two-piece mounting device for steel caps



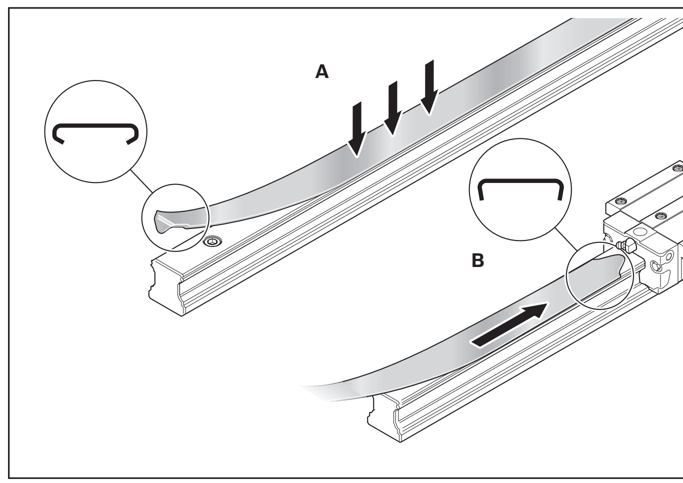
V-guide (except BNS)

Cover strip

Mounting instructions for rail cover strip
Secure the cover strip!
- Follow the mounting instructions!
  Please ask for the “Mounting Instructions for the Cover Strip”.

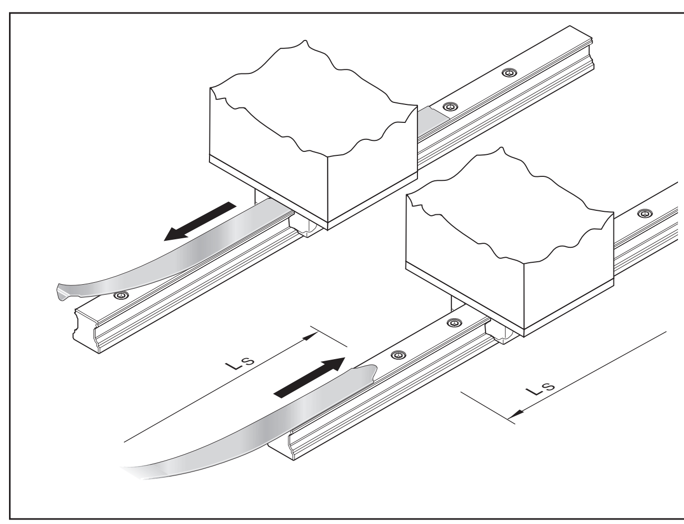


Advantages
The cover strip is easy to clip on and remove.
- This considerably facilitates and speeds up the mounting process:
  - no need to plug each single hole.
  - no time delay while waiting for adhesive to harden when using adhesive tape.
- The cover strip and be mounted and removed (up to 4 times).



Versions and functions
A Cover strip with fixed seat (standard)
- The cover strip is clipped on before the ball runner blocks are mounted and fits tightly.

B Cover strip with sliding area
- For mounting or replacing a cover strip when the ball runner blocks or adjoining structure cannot be removed.
- A section of the snap-fit cover strip is very slightly widened and can then be easily slid under the ball runner blocks.



A special expanding tool can be used to create the sliding fit after a cover strip has been installed.
Above all, you can adapt the slide length L_S appropriately to the installation location.

⚠ The cover strip is a precision part that you must handle carefully. Above all, you must not bend it.
There is a risk of injury on the edges and ends of the cover strip!
Wear gloves.

Refer to the following pages for the material numbers, dimension drawing, dimensions and weights.

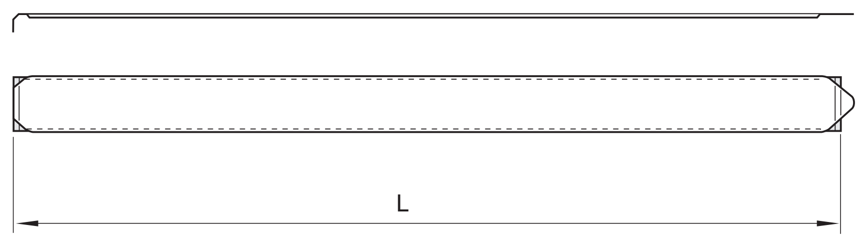
Cover strip

Cover strip, separate

For initial mounting, as spare part or as replacement part

Note
A matching cover strip (sliding or snap fit) can be supplied for each ball guide rail SNS.

Standard snap-fit cover strip



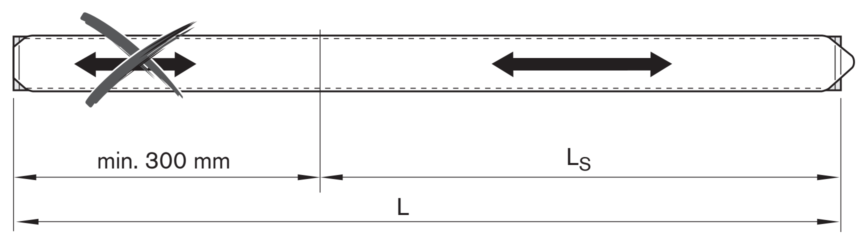
Ordering example 1 (Standard snap-fit cover strip)

- Ball guide rail SNS
- Size 35
- Rail length
  L = 2696 mm

Part number:
R1619 330 20, 2696 mm

Size	Standard snap-fit cover strip Material number, rail length L (mm)	Weight (g/m)
15	R1619 130 00, ...	10
20	R1619 830 00, ...	29
25	R1619 230 00, ...	32
30	R1619 730 00, ...	40
35	R1619 330 20, ...	80
45	R1619 430 20, ...	100
55	R1619 530 20, ...	120
65	R1619 630 20, ...	148

Sliding-fit cover strip



L_S = length of sliding area (mm)
L = rail length (mm)

Ordering example 2 (Sliding-fit cover strip)

- Ball guide rail SNS
- Size 35
- Rail length
  L = 2696 mm
- Length of sliding area
  L_S = 1200 mm

Part number:
R1619 330 30, 2696, 1200 mm

Size	Sliding-fit cover strip Material number, rail length L (mm), length of sliding area L_S (mm)	Weight (g/m)
15	R1619 130 10, ...	10
20	R1619 830 10, ...	29
25	R1619 230 10, ...	32
30	R1619 730 10, ...	40
35	R1619 330 30, ...	80
45	R1619 430 30, ...	100
55	R1619 530 30, ...	120
65	R1619 630 30, ...	148

- Follow the mounting instructions!
  Please ask for the "Mounting Instructions for the Cover Strip".

Expanding Tool

For creating a sliding fit in the cover strip

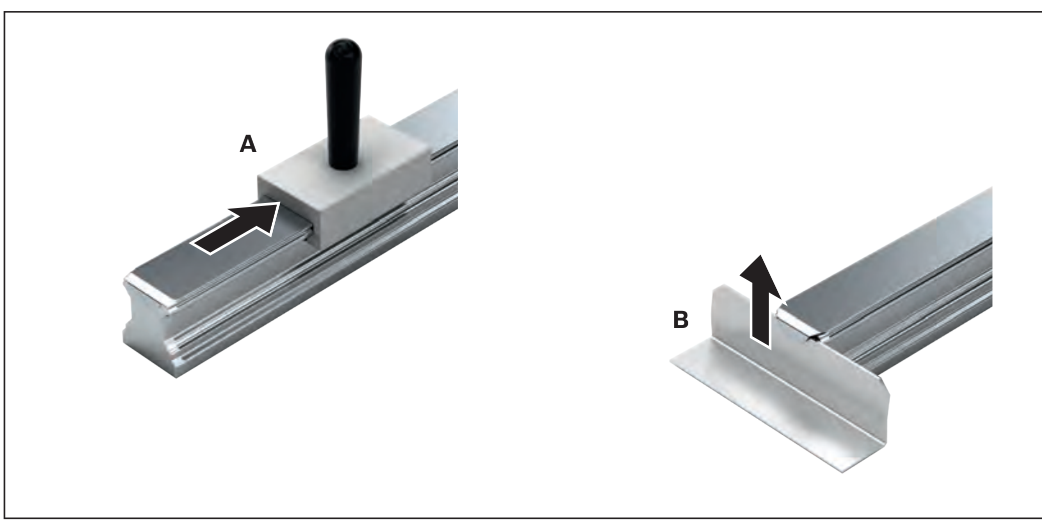
Size	Material number	Weight (g)
15	R1619 115 10	40
20	R1619 815 10	50
25	R1619 215 10	80
30	R1619 715 10	100
35	R1619 315 30	100
45	R1619 415 30	130
55	R1619 515 30	210
65	R1619 615 30	270

Cover strip mounting kit

Mounting tool and lifting plate

Installation information

- The kit comprises a mounting tool (A) for clipping on the cover strip and a lifting plate (B) for removing the cover strip.



Size	Material number	Weight (g)
25	R1619 210 80	170
30	R1619 710 80	200
35	R1619 310 60	200
45	R1619 410 60	210
55	R1619 510 60	210
65	R1619 610 60	280

Follow the mounting instructions!

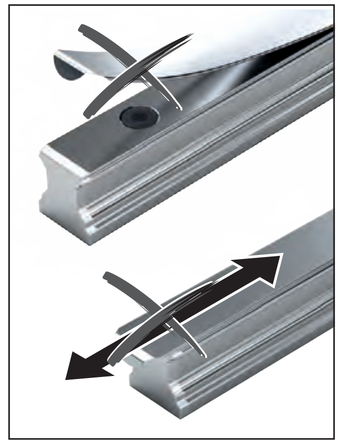
- Please ask for the “Mounting Instructions for the Cover Strip”.

Cover strip

Parts for securing the cover strip

Installation information

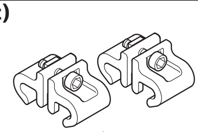
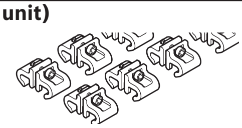
- Rexroth recommends the use of strip clamps to:
- prevent unintentional lifting of the strip and penetration of dirt,
- fix the cover strip in place.



Strip clamps
for ball guide rails without tapped holes on the end face

Material:

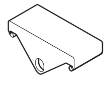
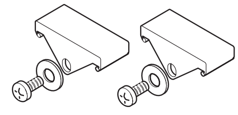
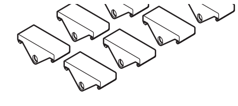
- Strip clamp made of anodized aluminum
- Clamping screw and nut made of corrosion-resistant steel according to DIN EN 10088

Size	Set (2 pieces per unit) 		Bulk pack (100 per unit) 	
	Material number (unit)	Weight (g)	Material number (unit)	Weight (kg)
15	R1619 139 50	11	R1619 139 60	0.55
20	R1619 839 50	13	R1619 839 60	0.65
25	R1619 239 50	14	R1619 239 60	0.70
30	R1619 739 50	22	R1619 739 60	1.10
35	R1619 339 50	30	R1619 339 60	1.50
45	R1619 439 50	56	R1619 439 60	2.80
55	R1619 539 50	62	R1619 539 60	3.10
65	R1619 639 50	84	R1619 639 60	4.20

Protective end caps
For ball guide rails with threaded holes at the end faces

Material:

- Plastic protective cap, color black
- Screw made of corrosion-resistant steel according to DIN EN 10088
- Washer made of galvanized steel

Size	Single cap 		Set (2 pieces per unit with screws) 		Bulk pack 	
	Material number (without screw)	Weight (g)	Material number (unit)	Weight (g)	Part number/qty (without screws)	Weight (kg)
15	R1619 139 00	0.8	R1619 139 20	5.5	R1619 139 01 / 1000	0.8
20	R1619 839 00	0.9	R1619 839 20	6.0	R1619 839 01 / 1000	0.9
25	R1619 239 00	1.0	R1619 239 20	7.0	R1619 239 01 / 1000	1.3
30	R1619 739 00	1.7	R1619 739 20	9.0	R1619 739 01 / 1000	1.7
35	R1619 339 00	2.0	R1619 339 20	10.0	R1619 339 01 / 1000	2.5
45	R1619 439 00	4.0	R1619 439 20	13.0	R1619 439 01 / 700	2.6
55	R1619 539 00	4.0	R1619 539 20	20.0	R1619 539 01 / 500	2.1
65	R1619 639 00	6.0	R1619 639 20	20.0	R1619 639 01 / 300	1.7

Caps

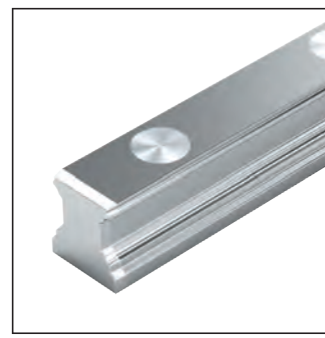
Plastic mounting hole plugs

Size	Single cap Part number	Weight (g)
15	R1605 100 80	0.05
20	R1605 800 80	0.10
25	R1605 200 80	0.30
30	R1605 300 80	0.60
35	R1605 300 80	0.60
45	R1605 400 80	1.00
55	R1605 500 80	1.70
65	R1605 600 90	2.10
20/40	R1605 100 80	0.05
25/70	R1605 200 80	0.30
35/90	R1605 300 80	0.60

Note

- Follow the mounting instructions!
  Please ask for the “Mounting Instructions for Ball Rail Systems”.

Steel mounting hole plugs



Size	Single plug made of machining steel Part number	Weight (g)
25	R1606 200 75	2
30	R1606 300 75	3
35	R1606 300 75	3
45	R1606 400 75	6
55	R1606 500 75	8
65	R1606 600 75	9
25/70	R1606 200 75	2
35/90	R1606 300 75	3

Notes

- Steel mounting hole plugs are not supplied with the guide rails.
  Order the mounting tool along with the plugs!
- Follow the mounting instructions!
  Please ask for the “Mounting Instructions for Ball Rail Systems”.

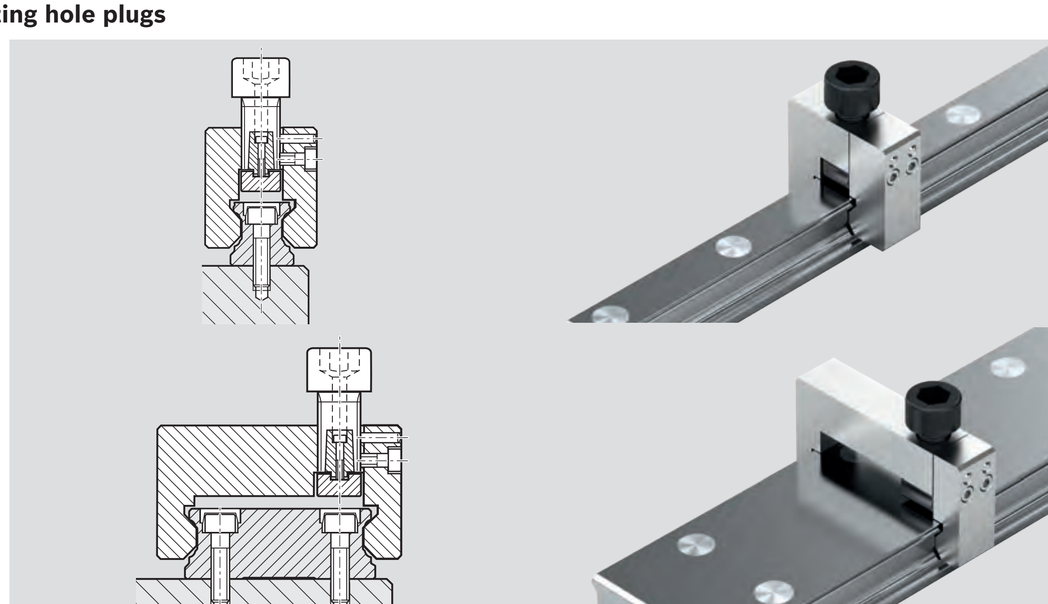
Mounting tool for steel mounting hole plugs

Two-piece, with instruction leaflet

The two-piece mounting tool is suitable for mounting plugs to a screwed down guide rail.

Size	Part number	Weight (kg)
25	R1619 210 00[1)]	0.37
30	R1619 710 00[1)]	0.37
35	R1619 310 10	0.57
45	R1619 410 10	0.85
55	R1619 510 10	1.50
65	R1619 610 00[1)]	1.85
25/70	R1619 210 40	0.75
35/90	R1619 310 40	1.05

1) Only available as a one-piece unit



V-guide

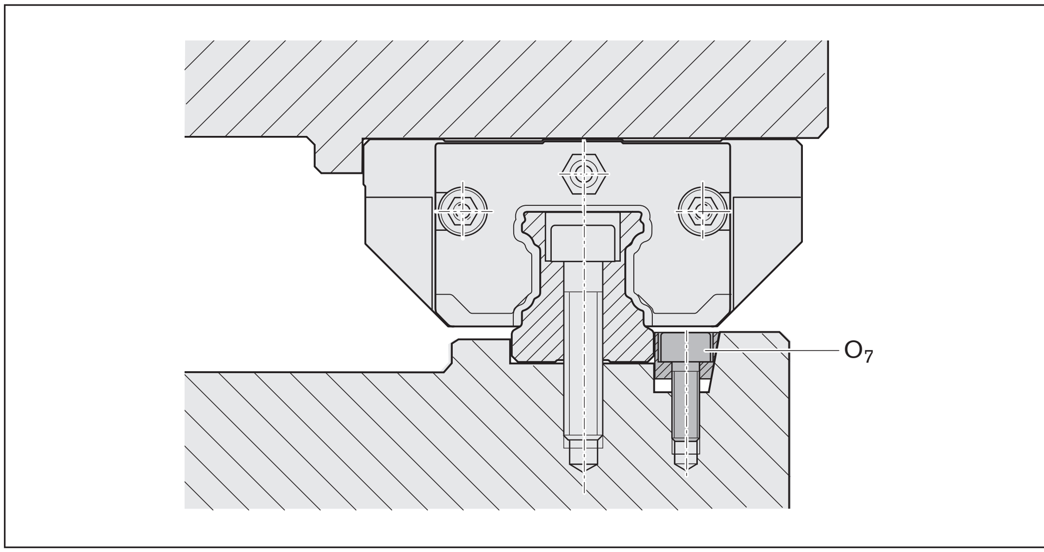
V-guide

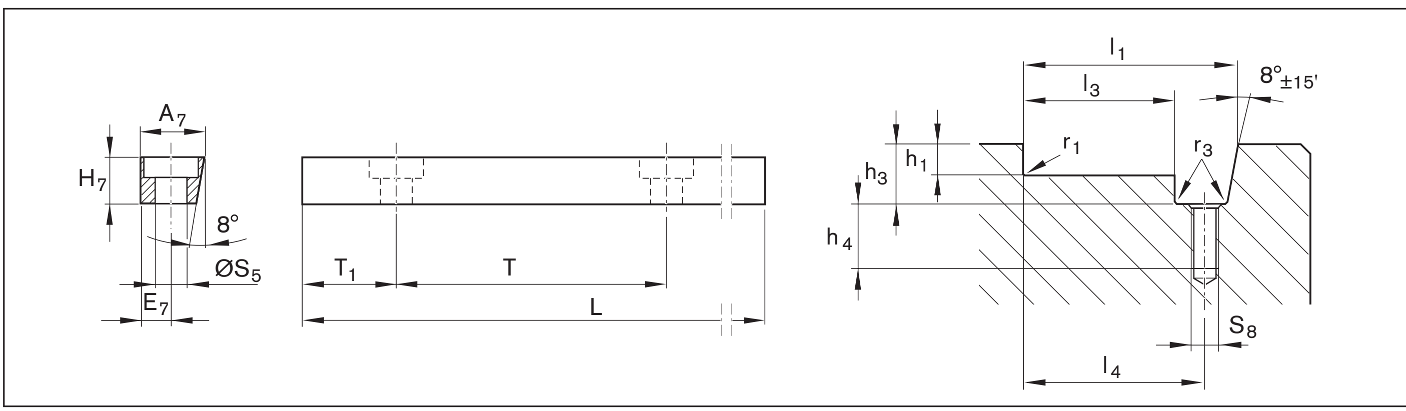
Lateral retention for ball guide rails

- Material: Steel
- Specification: black finished

Note

- Follow the mounting instructions!
  Please ask for the "Mounting Instructions for Ball Rail Systems".





V-guide

Size	Material number	Dimensions (mm)								Weight
		A_7	E_7	H_7	L	O_7[1)]	S_5	T	T_1	(kg)
15	R1619 200 01	12.0	6	10	957	M5x20	6.0	60	28.5	0.8
20										
25										
30										
35										
45	R1619 400 01	19.0	9	16	942	M8x25	9.0	105	51.0	2.0
55										
65										

1) Screw O_7 according to DIN 6912

Wedge profile groove

Size	Dimensions (mm)								
	$h_{1\ -0.2}$	h_3^{+1}	h_4^{+2}	$l_1^{\pm0.05}$	$l_3^{-0.1}$	$l_4^{\pm0.1}$	$r_{1\ max}$	$r_{3\ max}$	S_8
15	3.5	12.5	15	27	14.9	21	0.4	0.5	M5
20	4.0	12.5	15	32	19.9	26	0.5	0.5	M5
25	4.0	12.5	15	35	22.9	29	0.8	0.5	M5
30	5.0	12.5	15	40	27.9	34	0.8	0.5	M5
35	6.0	12.5	15	46	33.9	40	0.8	0.5	M5
45	8.0	19.0	16	64	44.9	54	0.8	0.5	M8
55	10.0	19.0	16	72	52.9	62	1.2	0.5	M8
65	10.0	19.0	16	82	62.9	72	1.2	0.5	M8

Product description of hydraulic clamping and braking elements

Application areas

Clamping
- With installation work and machine at a standstill **with** power with KBH
- Of heavy handling systems
- Clamping of machine tables in heavy duty machining centers

Braking
- Auxiliary brake for linear motors
- Of heavy handling systems

Characteristic features

- Very high axial holding forces
- Dynamic and static stabilization in the axis travel direction
- Heavy-duty brake

Further highlights

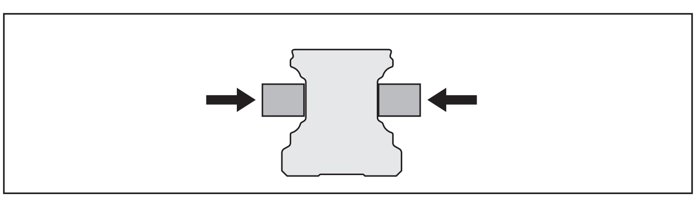
- Up to 1 million clamping cycles
- Up to 2,000 emergency braking operations
- Threaded ports on both sides for connection of hydraulic circuit
- Solid, rigid steel housing, catalytically nickel-plated
- High positioning accuracy
- Cracking pressure 150 bar
- Integrated all-round sealing
- Special pressure diaphragm for high functional reliability without pressure losses or leakage
- Brake shoes with integrated contour-locking, large-surface contact profiles for maximum axial stiffness
- Super heavy duty model

Special features of KBH:
- Low oil displacement volume
- Compact design, compatible with DIN 645
- 10 million clamping cycles (B10d value)

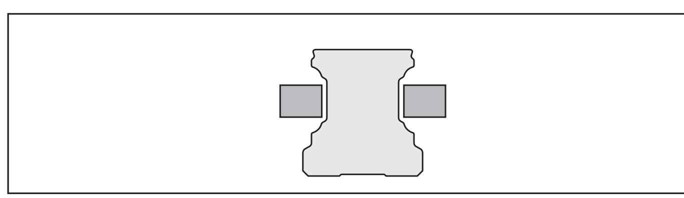
⚠ Pay attention to the safety information about clamping and braking elements. ☞🗎 170

Functional principle

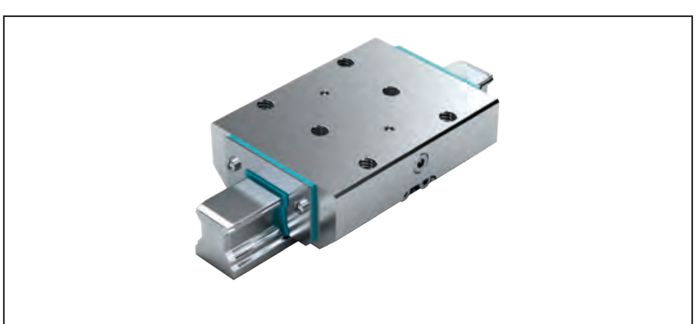
Hydraulic pressure: 50 – 150 bar
Clamping and braking by pressure application
The large-surface clamping profiles are pressed directly against the free surfaces of the ball guide rail by the piston-type action of a hydraulic oil circuit.



Hydraulic pressure: 0 bar
Release by spring action
A preloaded return spring provides quick release.



KBH, FLS



KBH, SLS

Additional information

Hydraulic ports
The hydraulic clamping elements are pre-filled with HLP 46 at the factory. The hydraulic port is attached on both sides. Only one port is needed for pressure loading. Take particular care when venting the fixed and flexible hydraulic inlet pipes, since air pockets can lead to damage to the sealing elements.

Adjoining structure, installation of the clamping elements
To avoid adverse effects like permanent rubbing on the linear guide, the adjoining structure must be designed such that its rigidity matches the loading and demands placed upon it. If the clamping elements tilt, the linear guide can be touched and worn, which leads to it being damaged.

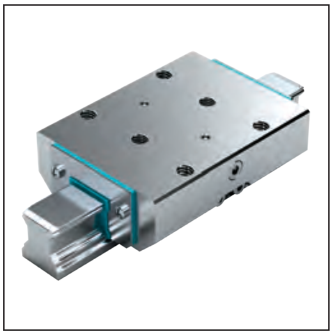
The presetting at the factory matches the linear guide and you must not change it at installation. When doing this, follow the installation instructions for the clamping and braking elements and the linear guides to the letter.
Many spring-loaded cylinders have a transport lock fitted between the contact profiles.
This lock must be removed by applying pressure to the element. When you release the pressure, the transport lock or the associated linear guide must always be in contact between the contact profiles!
The clamping elements have no guide function at all. This means that it is not possible to replace a runner block with a clamping element. The ideal position for the clamping element is between two runner blocks.
If you use several clamping elements, you should distribute them evenly on both guide rails to achieve maximum rigidity of the overall structure.

Lubrication
When using the specified hydraulic medium, lubrication is not necessary.

Surface protection
All the housings of the clamping elements are chemically nickel-plated and therefore have limited corrosion protection. Aluminum areas are chemically nickel-plated or hard-coated depending on the requirements.

B10d value
The B10d value indicates the number of switching cycles by which 10 % of the components have failed dangerously.

Hydraulic clamping and braking elements, KBH, FLS



FLS

Flange long standard height

R1619 .40 21

Note

Can be used on all ball guide rails SNS.

Clamping and braking by pressure application

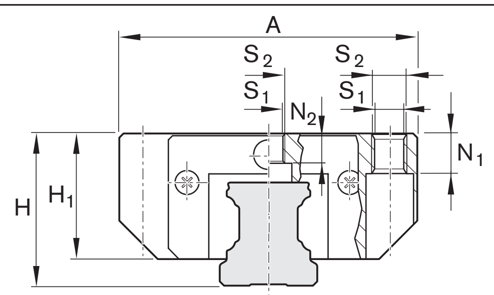
- Max. hydraulic operating pressure:
  - Size 25: 100 bar
  - Size 35 – 65: 150 bar
- Operating temperature range t: 0-70 °C

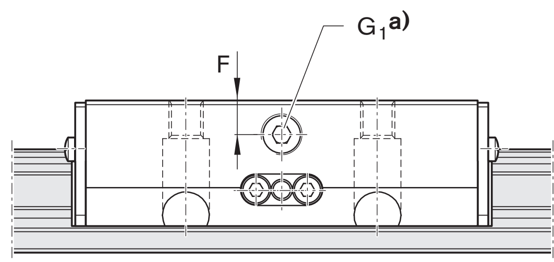
Lubrication notes

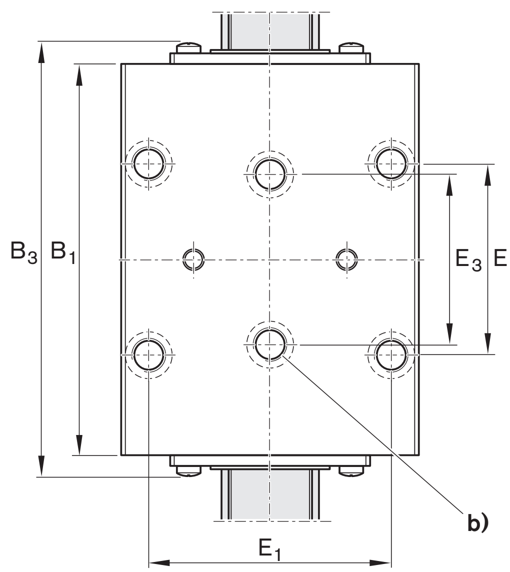
- First filling with hydraulic oil HLP46.
- If other oils are used, check the compatibility.

⚠ Pay attention to the safety information about clamping and braking elements.

☞🗎 170







Installation information

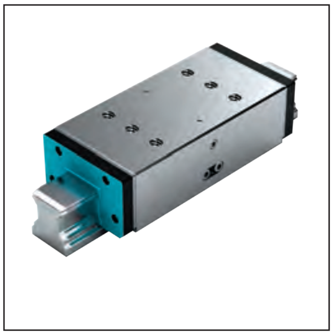
- Both sides may be used as reference surfaces.
- Make sure the adjoining structure is sufficiently rigid.
- Read the mounting instructions before start-up.
- Check that the sealing lips of the end seals sit evenly all around the guide rail. Re-align if necessary.

a) Hydraulic port*) G_1 on both sides
b) The two mounting holes at the center must be used in addition!
*) Only one port is necessary.
All ports are plugged for shipment.

Size	Material number	Holding force 1) (N)	Dimensions (mm) A	B_1	$B_{3\,max}$	H	H_1	E_1	E_2	E_3	F	G_1	N_1 4)	N_2 5)	S_1	S_2	Displacement 6) (cm³)	Weight (kg)
25	R1619 240 21	2 200 2)	70	92.0	102.3	36	29.5	57	45	40	8	1/8"	9	7.0	6.8	M8	0.6	1.10
35	R1619 340 21	5 700 3)	100	120.5	141.0	48	40.0	82	62	52	12	1/8"	12	10.2	8.6	M10	1.1	2.69
45	R1619 440 21	9 900 3)	120	155.0	178.0	60	50.0	100	80	60	15	1/8"	15	12.4	10.5	M12	1.8	5.20
55	R1619 540 21	13 700 3)	140	184.0	209.0	70	57.0	116	95	70	16	1/8"	18	13.5	12.5	M14	2.4	8.40
65	R1619 640 21	22 700 3)	170	227.0	264.0	90	76.0	142	110	82	20	1/4"	23	14.0	14.5	M16	3.8	17.30

1) Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).
2) At 100 bar
3) At 150 bar
4) For mounting from below with ISO 4762
5) For mounting from below with DIN 7984
6) Per clamping cycle

Hydraulic clamping and braking elements, KBH, SLS



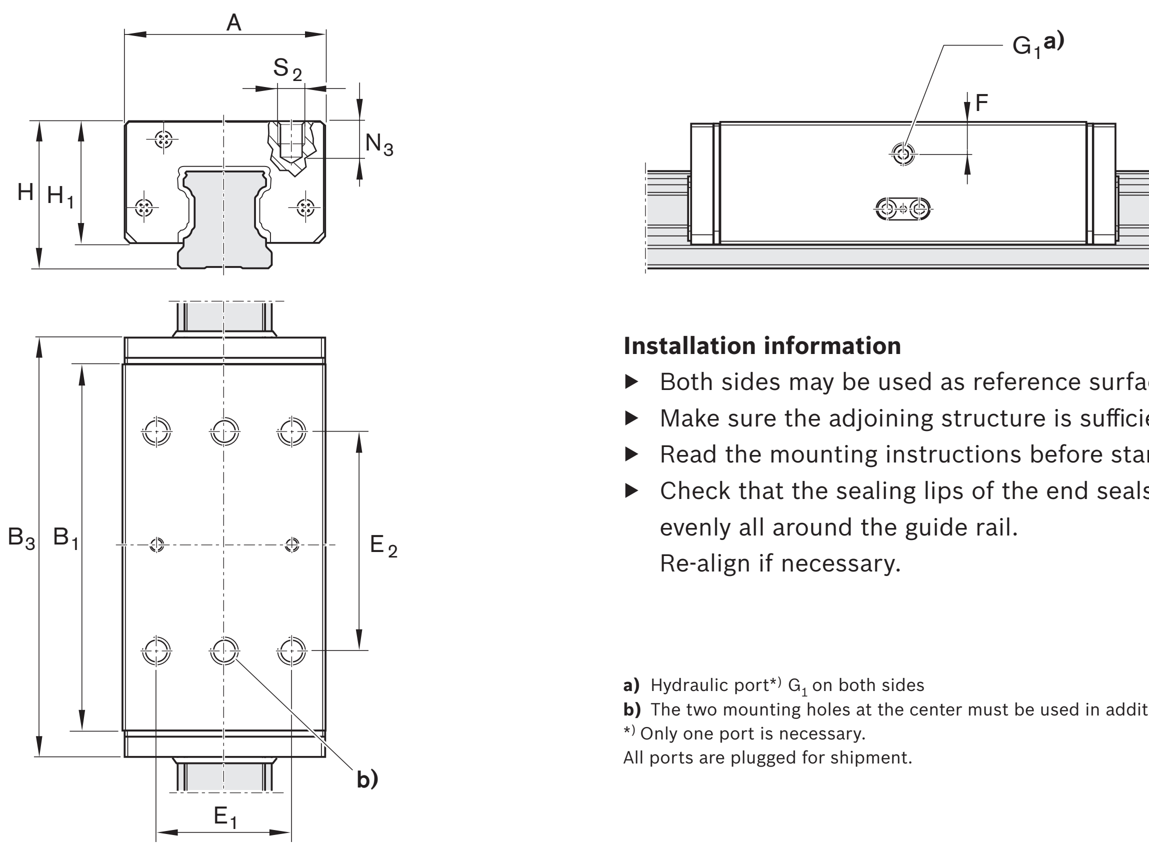
SLS
Slimline long standard height
R1619 .40 20

Note
Can be used on all ball guide rails SNS.

Clamping and braking by pressure application
- Max. hydraulic operating pressure:
- Size 65: 150 bar
- Operating temperature range t: 0-70 °C

Lubrication notes
- First filling with hydraulic oil HLP46.
- If other oils are used, check the compatibility.

⚠ Pay attention to the safety information about clamping and braking elements.
☞ 170



Installation information
- Both sides may be used as reference surfaces.
- Make sure the adjoining structure is sufficiently rigid.
- Read the mounting instructions before start-up.
- Check that the sealing lips of the end seals sit evenly all around the guide rail.
  Re-align if necessary.

a) Hydraulic port*) G_1 on both sides
b) The two mounting holes at the center must be used in addition!
*) Only one port is necessary.
All ports are plugged for shipment.

Size	Material number	Holding force [1] (N)	Dimensions (mm) A	B_1	$B_{3\,max}$	H	H_1	E_1	E_2	F	G_1	N_3	S_2	Displace-ment[3] (cm^3)	Weight (kg)
65	R1619 640 20	22 700[2]	126	227	264	90	76	76	120	20	1/4"	21	M16	3.8	14.40

1) Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).
2) At 100 bar
3) Per clamping cycle

Safety information for clamping and braking elements

General safety notes

⚠ When carrying out any work on the clamping elements, you must comply with respective accident prevention regulations and VDE safety and installation information!

⚠ The clamping elements have no guide function at all. This means that it is not possible to replace a runner block with a clamping element. The ideal position for the clamping element is between two runner blocks. If you use several clamping elements, you should distribute them evenly on both guide rails to achieve maximum rigidity of the overall structure.

⚠ With hydraulic clamping and braking elements, the return pressure of the tank line must be less than 1.5 bar!

⚠ You must take into account the response/reaction time of the clamping and braking elements!

⚠ The clamping element is not intended for securing suspended loads!

⚠ You must not remove the cover of the safety clamp; it is spring-loaded!

⚠ You are only allowed to remove the transport lock if:
- The hydraulic port has been pressurized with the operating pressure according to instructions.
- The air port has had applied a pneumatic pressure of at least 4.5 bar (MBPS) or 5.5 bar (UBPS, MKS) as-specified.

⚠ The clamping element may only be depressurized if the ball guide rail or transport lock is between the contact profiles!

⚠ Using clamping and braking elements combined with integrated measuring systems is not allowed on ball guide rails!

Additional notes for clamping and braking units

⚠ The clamping and braking elements are suitable for use in safety-relevant applications for braking and clamping . Safe functioning of the overall facility in which the clamping and braking elements are deployed is mainly determined by the control of this facility. The manufacturer of the higher-level facilities, assembly, system or machine must carry out technical design of this facility. When doing this, the safety requirements for functional safety must be taken into account.

Additional notes for clamping units

⚠ The element must not be used as a braking element! For use only when the axis is at a standstill.

⚠ Apply pressure only when mounted on the ball guide rail!

Hydraulic clamping elements product description

Application areas

- Clamping of heavy handling systems
- Clamping of machine tables in heavy duty machining centers

Characteristic features

- Very high axial holding forces
- Compact design, compatible with DIN 645
- Dynamic and static stabilization in the axis travel direction

Further highlights

- Threaded ports on both sides for connection of hydraulic circuit
- Solid, rigid steel housing, catalytically nickel-plated
- High positioning accuracy
- Steplessly adjustable pressure from 50 – 150 bar
- Integrated all-round sealing
- Special pressure diaphragm for high functional reliability without pressure losses or leakage
- Integrated contour-locking, large-surface contact profiles for maximum axial stiffness

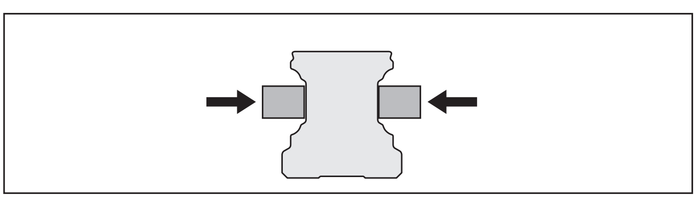
Special features of KWH:

- 10 million clamping cycles (B10d value)

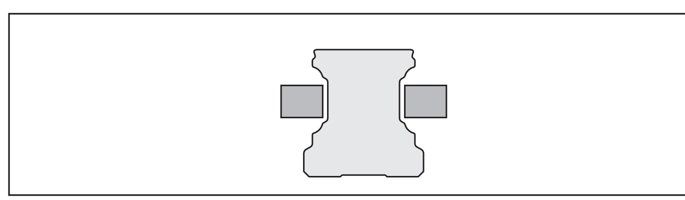
⚠ Pay attention to the safety information about clamping and braking elements. ☞🗎 170

Functional principle

Hydraulic pressure: 50 – 150 bar
Clamping by pressure application
The large-surface clamping profiles are pressed directly against the free surfaces of the ball guide rail by the piston-type action of a hydraulic oil circuit.

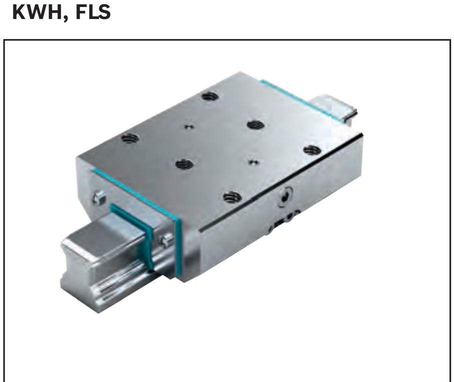


Hydraulic pressure: 0 bar
Release by spring action
A preloaded return spring provides quick release.

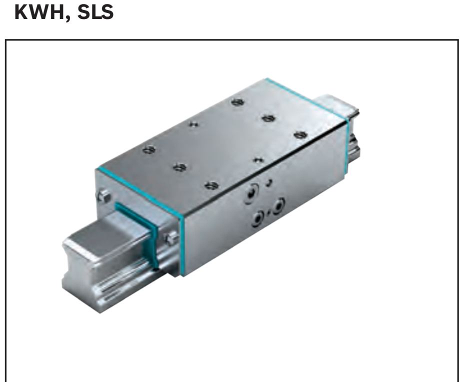


Model overview, accessories, hydraulic clamping units

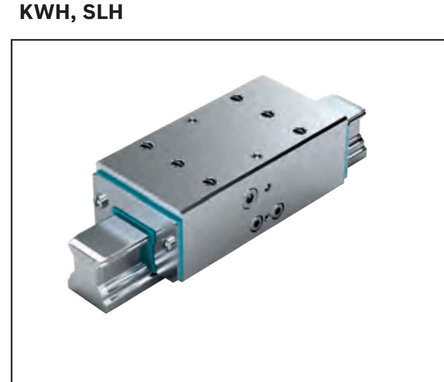
KWH, FLS



KWH, SLS



KWH, SLH



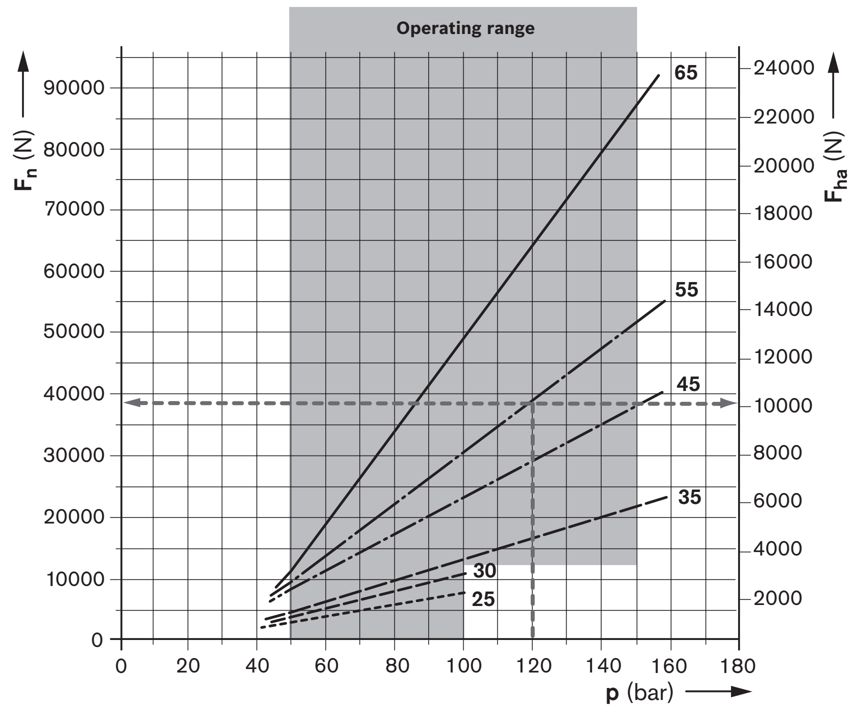
Technical data and calculations

Normal forces and holding forces

Measured values with hydraulic clamping element KWH, FLS Flange long standard height, size 25 – 65

Max. hydraulic operating pressure:
- Size 25 – 30: 100 bar
- Size 35 – 65: 150 bar

Normal and holding forces for hydraulic clamping units



Calculation of holding force

$$F_{ha} = F_n \cdot 2 \cdot \mu_0$$

Holding force for hydraulic clamping elements

Normal force (measured): F_n see diagram
static friction coefficient: μ_0 = 0.13 (approx.) with steel/steel, oiled, relative to the ball guide rail

Calculation example: Clamping unit KWH size 55

Pressure:	p	= 120 bar
Normal force:	F_n	= 38,500 N (see diagram)
Holding force:	F_{ha}	= 38,500 N · 2 · 0.13
		= 10,010 N

Permissible holding force for hydraulic clamping units

$$F_{ha,\,perm} = F_{ha} / f_S$$

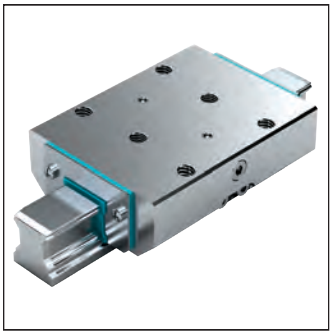
The safety factor f_S depends on:
- vibrations
- force surges
- application-specific requirements, etc.

Example: Clamping unit KWH size 55

Holding force:	F_{ha}	= 10,010 N (see calculation example)
Safety factor:	f_S	= 1.25 (assumed)
Permissible holding force:	$F_{ha,\,perm}$	= 10,010 N / 1.25
		≈ 8,000 N

f_S	=	Safety factor	(–)
F_{ha}	=	Holding force (at μ_0 = 0.13)	(N)
$F_{ha,\,perm}$	=	Permissible holding force	(N)
F_n	=	Normal force	(N)
μ_0	=	Static friction coefficient	(–)
p	=	pressure	(bar)

Hydraulic clamping elements KWH, FLS



FLS Flange long standard height

R1619 .42 11

Note

Can be used on all ball guide rails SNS.

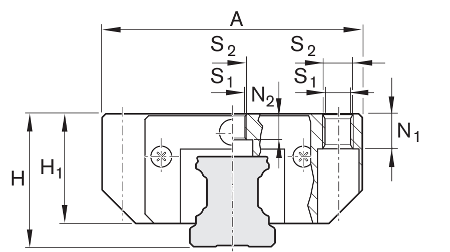
Clamping by pressure application

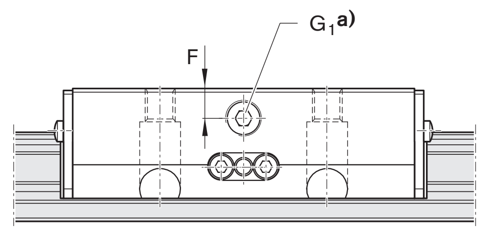
- Max. hydraulic operating pressure:
  - Size 25 – 30: 100 bar
  - Size 35 – 65: 150 bar
- Operating temperature range t: 0 – 70 °C

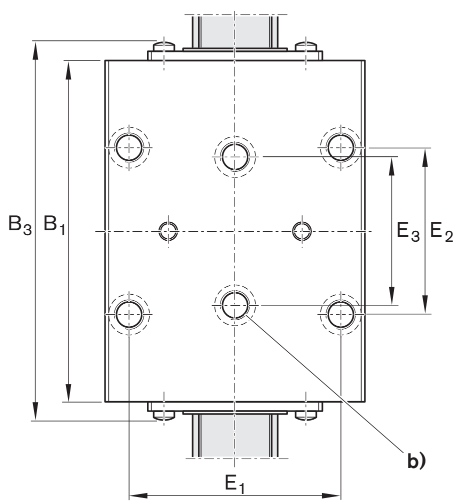
Lubrication notes

- First filling with hydraulic oil HLP46.
- If other oils are used, check the compatibility.

⚠ Pay attention to the safety information about clamping and braking elements. ☞🗎 170







Installation information

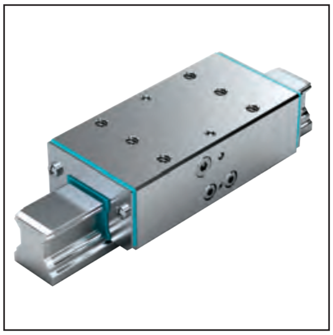
- Both sides may be used as reference surfaces.
- Make sure the adjoining structure is sufficiently rigid.
- Read the mounting instructions before start-up.
- Check that the sealing lips of the end seals sit evenly all around the guide rail.
  Re-align if necessary.

a) Hydraulic port*) G_1 on both sides
b) The two mounting holes at the center must be used in addition!
*) Only one port is necessary.
All ports are plugged for shipment.

Size	Material number	Holding force[1] (N)	Dimensions (mm) A	B_1	$B_{3\,max}$	H	H_1	E_1	E_2	E_3	F	G_1	N_1[4]	N_2[5]	S_1	S_2	Displacement[6] (cm³)	Weight (kg)
25	R1619 242 11	2 200[2]	70	92.0	102.3	36	29.5	57	45	40	8.0	1/8"	9	7.0	6.8	M8	0.6	1.22
30	R1619 742 11	3 000[2]	90	103.5	115.4	42	35.0	72	52	44	10.5	1/8"	11	8.0	8.6	M10	0.7	2.09
35	R1619 342 11	5 700[3]	100	120.5	133.0	48	40.0	82	62	52	12.0	1/8"	12	10.2	8.6	M10	1.1	2.69
45	R1619 442 11	9 900[3]	120	155.0	170.0	60	50.0	100	80	60	15.0	1/8"	15	12.4	10.5	M12	1.8	5.32
55	R1619 542 11	13 700[3]	140	184.0	201.0	70	57.0	116	95	70	16.0	1/8"	18	13.5	12.5	M14	2.4	8.40
65	R1619 642 11	22 700[3]	170	227.0	256.0	90	76.0	142	110	82	20.0	1/4"	23	14.0	14.5	M16	3.8	17.30

1) Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68). Permissible holding force ☞🗎 173
2) At 100 bar
3) At 150 bar
4) For mounting from below with ISO 4762
5) For mounting from below with DIN 7984
6) Per clamping cycle

Hydraulic clamping elements KWH, SLS



SLS slimline long standard height
R1619 .42 51

Note

Can be used on all ball guide rails SNS.

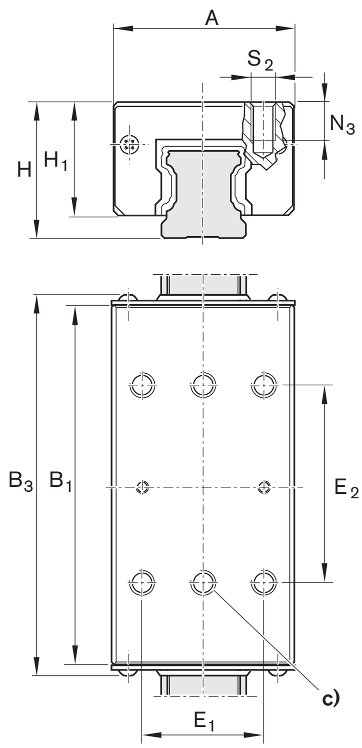
Clamping by pressure application

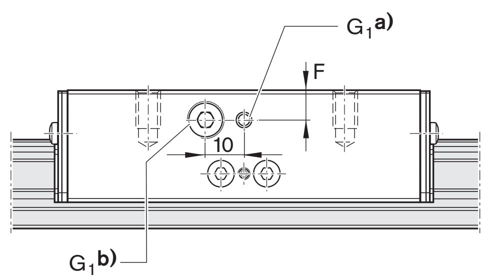
- Max. hydraulic operating pressure:
  - Size 25 – 30: 100 bar
  - Size 35, 55, 65: 150 bar
  - Size 45: 110 bar
- Operating temperature range t: 0-70 °C

Lubrication notes

- First filling with hydraulic oil HLP46.
- If other oils are used, check the compatibility.

⚠ Pay attention to the safety information about clamping and braking elements.
☞🗎 170





Installation information

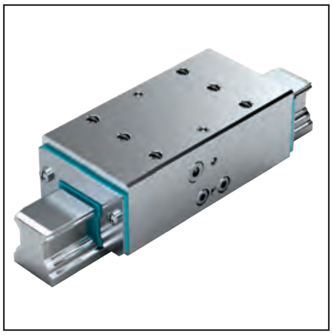
- Both sides may be used as reference surfaces.
- Make sure the adjoining structure is sufficiently rigid.
- Read the mounting instructions before start-up.
- Check that the sealing lips of the end seals sit evenly all around the guide rail.
  Re-align if necessary.

a) Hydraulic port*) G_1 on both sides
b) Hydraulic port*) G_1 on both sides with size 25 – 30
c) The two mounting holes at the center must be used in addition!
*) Only one port is necessary.
All ports are plugged for shipment.

Size	Material number	Holding force[1] (N)	**Dimensions** (mm) A	B_1	$B_{3\,max}$	H	H_1	E_1	E_2	F	G_1	N_3	S_2	Displacement[4] (cm³)	Weight (kg)
25	R1619 242 51	1 600[2]	48	92.0	102.3	36	29.5	35	50	8	1/8"	8	M6	0.6	1.22
30	R1619 742 51	3 000[2]	60	103.5	115.4	42	35.0	40	60	9	1/8"	8	M8	0.7	2.09
35	R1619 342 51	3 500[2]	70	120.5	134.0	48	40.0	50	72	12	1/8"	13	M8	1.1	2.02
45	R1619 442 51	7 400[2]	86	155.0	170.0	60	50.0	60	80	15	1/8"	15	M10	1.8	4.00
55	R1619 542-51	13 700[3]	100	184.0	201.0	70	57.0	75	95	16	1/8"	18	M12	2.4	6.10
65	R1619 642 51	22 700[3]	126	227.0	256.0	90	76.0	76	120	20	1/4"	21	M16	3.8	14.40

1) Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68). Permissible holding force ☞🗎 173
2) At 100 bar
3) At 150 bar
4) Per clamping cycle

Hydraulic clamping units KWH

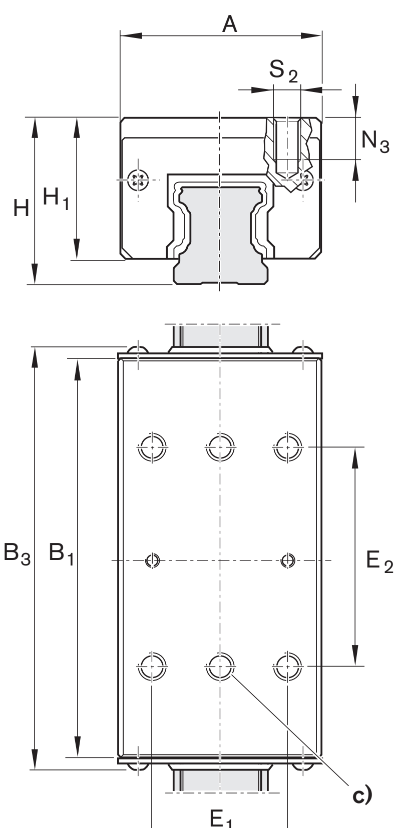


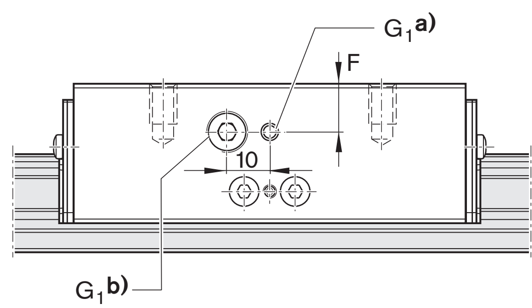
SLH slimline long high
R1619 .42 31
Note
Can be used on all ball guide rails SNS.

Clamping by pressure application
- Max. hydraulic operating pressure:
  - Size 25 – 30: 100 bar
  - Size 35, 55, 65: 150 bar
  - Size 45: 110 bar
- Operating temperature range t: 0 - 70 °C

Lubrication notes
- First filling with hydraulic oil HLP46.
- If other oils are used, check the compatibility.

⚠ Pay attention to the safety information about clamping and braking elements.
☞🗎 170





Installation information
- Both sides may be used as reference surfaces.
- Make sure the adjoining structure is sufficiently rigid.
- Read the mounting instructions before start-up.
- Check that the sealing lips of the end seals sit evenly all around the guide rail.
  Re-align if necessary.

a) Hydraulic port*) G_1 on both sides
b) Hydraulic port*) G_1 on both sides with size 25 – 30
c) The two mounting holes at the center must be used in addition!
*) Only one port is necessary.
All ports are plugged for shipment.

Size	Material number	Holding force[1)] (N)	Dimensions (mm) A	B_1	$B_{3\,max}$	H	H_1	E_1	E_2	F	G_1	N_3	S_2	Displace-ment[4)] (cm³)	Weight (kg)
25	R1619 242 31	1 600[2)]	48	92.0	102.3	40	33.5	35	50	12	1/8"	12	M6	0.6	1.10
30	R1619 742 31	3 000[2)]	60	103.5	115.4	45	38.0	40	60	12	1/8"	11	M8	0.7	1.90
35	R1619 342 31	3 500[2)]	70	120.5	134.0	55	47.0	50	72	18	1/8"	13	M8	1.1	2.46
45	R1619 442 31	7 400[2)]	86	155.0	170.0	70	60.0	60	80	24	1/8"	18	M10	1.8	4.95
55	R1619 542 31	13 700[3)]	100	184.0	201.0	80	67.0	75	95	26	1/8"	19	M12	2.4	7.90

1) Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68). Permissible holding force ☞🗎 173
2) At 100 bar
3) At 150 bar
4) Per clamping cycle

Pneumatic clamping and braking elements product description

Application areas

Clamping
- In the event of a pressure drop
- During installation work and while machine is stopped, without power
- Clamping of axes in machining centers
- Clamping of Z-axes in rest positions

Braking
- In the event of a power failure
- In the event of a pressure drop
- Reinforcing the E-stop function
- Auxiliary brake for linear motors

Characteristic features

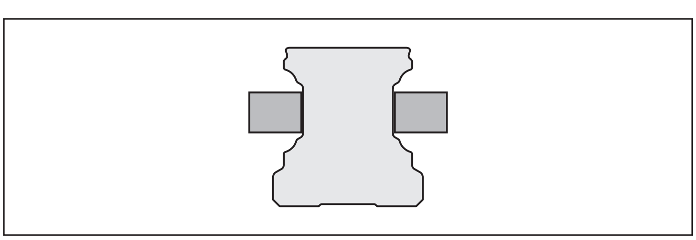
- Clamping and braking by spring energy accumulator
- Integrated contour-locking contact profiles for maximum axial and horizontal stiffness, providing excellent braking action
- Dynamic and static stabilization in the axis travel direction

Special features of MBPS/UBPS:
- 5 million clamping cycles (B10d value)

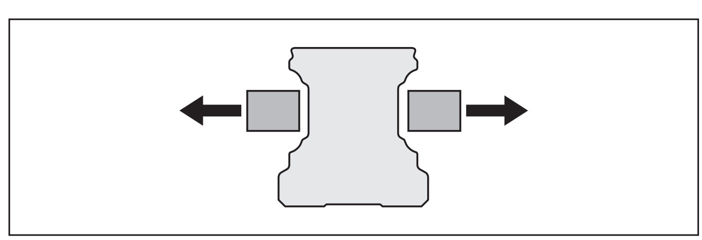
⚠ Pay attention to the safety information about clamping and braking elements. ☞🗎 170

Functional principle

Air pressure: 0 bar
Clamping and braking by spring action
In the event of a pressure drop, braking or clamping is achieved by a dual-action tapered slide valve mechanism with two spring assemblies (spring energy accumulators). An integrated quick venting valve ensures fast response.



Air pressure: 4.5 – 8 bar (MBPS)
5.5 – 8 bar (UBPS)
Release by air pressure
The clamping profiles are held apart by compressed air.
- Allows free movement



Further highlights

- Up to 1 million clamping cycles
- Up to 2,000 emergency braking operations
- Integrated all-round sealing
- High continuous performance
- High positioning accuracy
- Tapered valve mechanism
- Solid, rigid steel housing, catalytically nickel-plated
- Low air consumption
- Zero maintenance

Special features of MBPS:

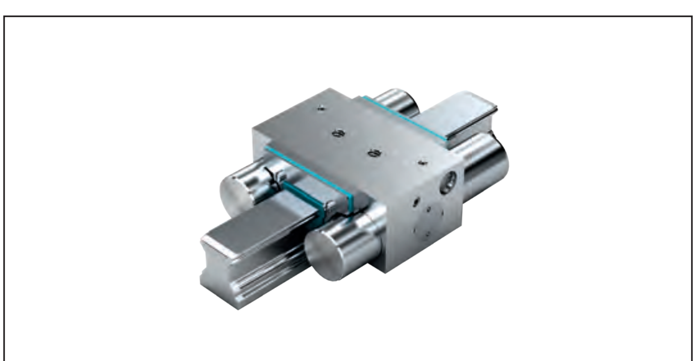
- Clamping and braking unit in compact, short design
- Attachments with three pistons each that are series-connected in conjunction with strong springs generate holding forces of up to 3,800 N at an opening pressure of only 4.5 bar.
- 5 million clamping cycles (B10d value)[1)]

Special features of UBPS:

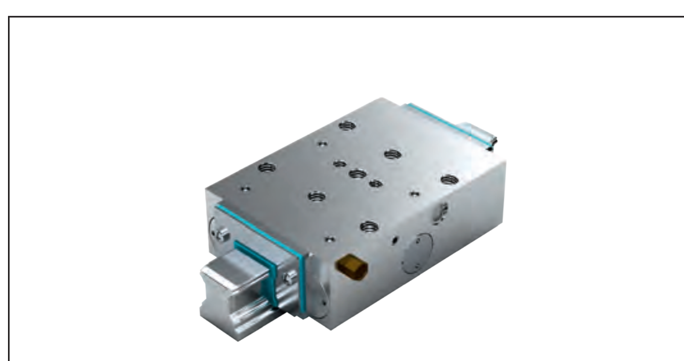
- Very high axial holding forces of up to 7,700 N at a release pressure of 5.5 bar with high level of spring energy storage.
- Increase in holding force to 9,200 N by additional application of air at the air-plus port
- Extremely low air consumption
- Compact design, compatible with DIN 645
- 5 million clamping cycles (B10d value)[1)]

1) With a PLUS port, the B10d value is not achieved

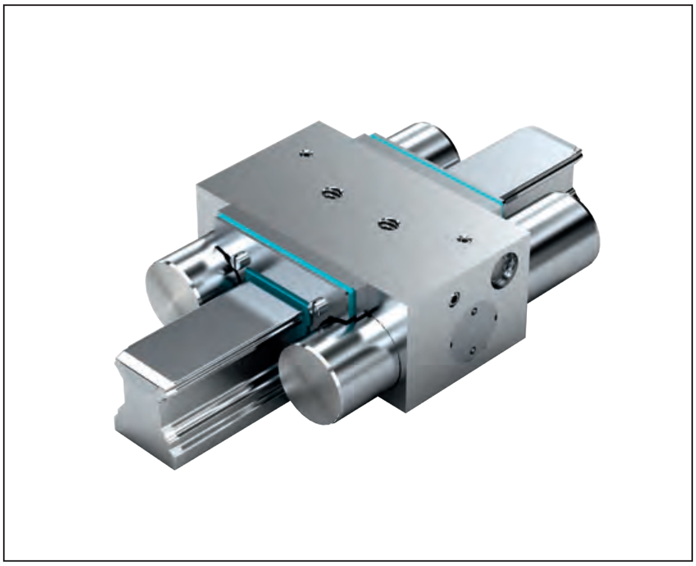
MBPS



UBPS



Pneumatic clamping and braking units MBPS



R1619 .40 31

Note
Can be used on all ball guide rails SNS.

Clamps and brakes without pressurization (spring energy)

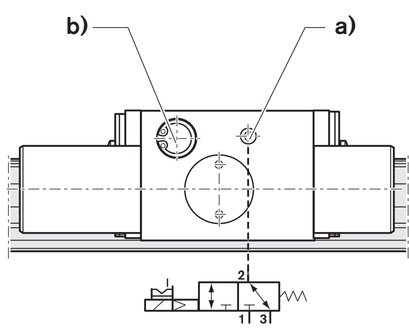
- Release pressure min. 4.5 bar
- Max. pneumatic operating pressure: 8 bar
- Operating temperature range t: 0 – 70 °C

Installation information

- Make sure the adjoining structure is sufficiently rigid.
- Use only filtered and lubricated air. The specified filter mesh size is 25 µm.
- Read the mounting instructions before start-up.
- Check that the sealing lips of the end seals sit evenly all around the guide rail. Re-align if necessary.

⚠ Pay attention to the safety information about clamping and braking elements. ☞🗎 170

Switching[1] with standard air port

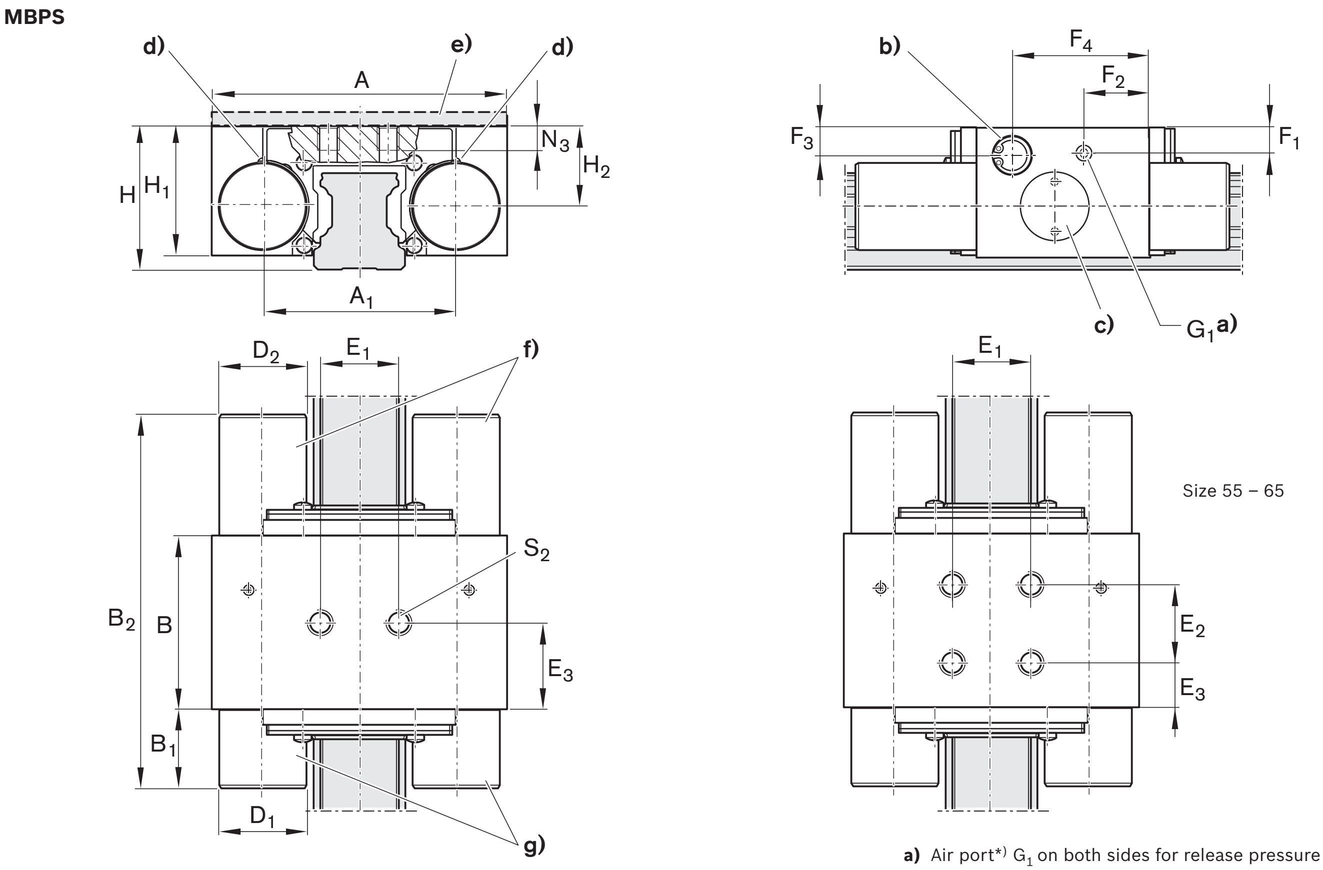


a) Air port
b) Quick venting valve
Nominal diameter: min. 6 mm

Size	Material number	Holding force Spring energy[1] (N)	Air consumption (normalized) Air port (dm³/stroke)
20	R1619 840 31	750	0.034
25	R1619 240 31	1 300	0.048
30	R1619 740 31	2 000	0.065
35	R1619 340 31	2 600	0.093
45	R1619 440 31	3 800	0.099
55	R1619 540 31	4 700	0.244
65	R1619 640 31	4 700	0.244

1) Holding force achieved by spring energy at 6 bar. Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).

MBPS

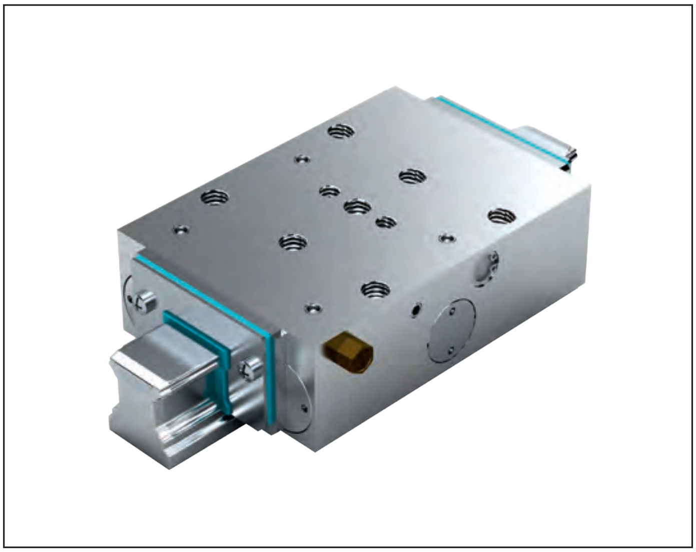


a) Air port*) G_1 on both sides for release pressure
b) Quick venting valve on both sides
c) Only on add-on module.
d) Exhaust on both sides
e) Spacer plate (accessory)
f) Piston
g) Spring accumulator
*) Only one port is necessary.
All ports are plugged for shipment.

Size	Dimensions (mm)																			Weight
	A	A_1	B	B_1	$B_{2\,max}$	D_1	D_2	E_1	E_2	E_3	F_1	F_2	F_3	F_4	G_1	H	H_1 1)	H_2	N_3	S_2	(kg)
20	66	45.7	44	19.0	94.5	16	18	20	-	22.0	5.5	15.5	6.0	35.5	M5	30	25.8	16.2	8.6	M6	0.7
25	75	49.0	44	20.2	95.5	22	22	20	-	22.0	6.5	16.5	7.0	34.7	M5	36	32.5	20.0	8.0	M6	1.0
30	90	58.0	47	29.0	107.5	25	25	22	-	23.0	7.2	30.5	7.2	40.0	M5	42	38.5	24.0	9.0	M8	1.8
35	100	68.0	46	27.7	106.2	28	28	24	-	24.5	9.0	19.0	9.5	38.0	G1/8"	48	42.0	26.5	10.0	M8	1.9
45	120	78.8	49	32.2	113.7	30	30	26	-	24.5	15.0	31.1	12.2	41.6	G1/8"	60	52.0	35.5	15.0	M10	2.3
55	140	97.0	62	41.0	145.0	39	39	38	38	12.0	11.0	23.0	11.0	40.0	M5	70	59.0	38.0	18.0	M10	3.7
65	150	106.0	62	41.0	145.0	39	38	38	38	12.0	16.0	23.0	16.0	40.0	M5	90	75.5	53.5	18.0	M10	4.2

1) For ball runner block .H. (...High...) Spacer plate necessary.

Pneumatic clamping and braking units UBPS



R1619 .40 51

Very high axial holding forces due to three pistons connected in series combined with strong spring energy accumulator; increased holding force thanks to additional pressure through the air-plus port

Note

Can be used on all ball guide rails SNS.

Pressureless clamping and braking (spring energy)

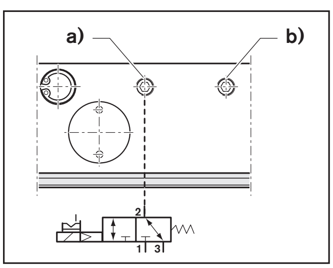
- Release pressure min. 5.5 bar
- Max. pneumatic operating pressure: 8 bar
- Temperature range t: 0 – 70 °C

Installation information

- Both sides may be used as reference surfaces.
- Make sure the adjoining structure is sufficiently rigid.
- Use only filtered and lubricated air. The specified filter mesh size is 25 µm.
- Read the mounting instructions before start-up.
- Check that the sealing lips of the end seals sit evenly all around the guide rail. Re-align if necessary.

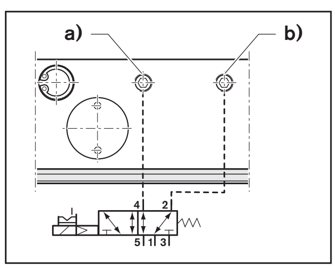
⚠ Pay attention to the safety information about clamping and braking elements. ☞ 170

Switching[1)]
with standard air port



a) Air port
b) Air filter
Nominal diameter: min. 6 mm

Switching[2)]
with air-plus port



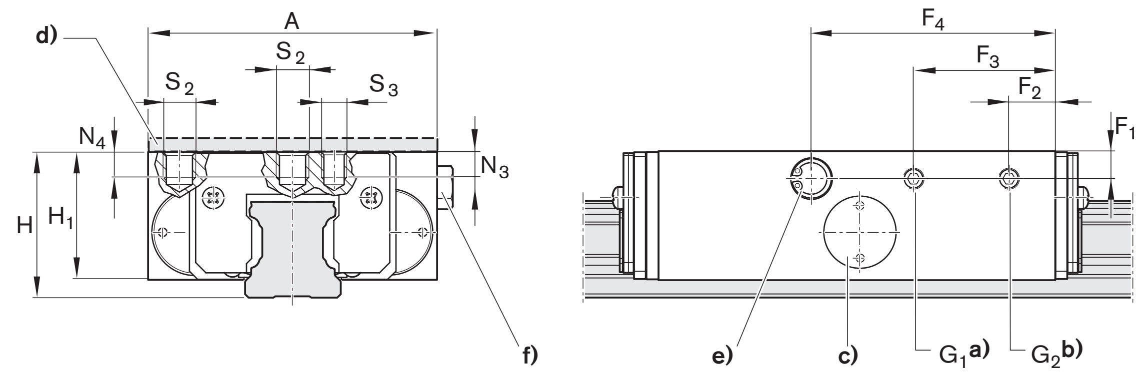
a) Air port
b) Air-plus port
Nominal diameter: min. 6 mm

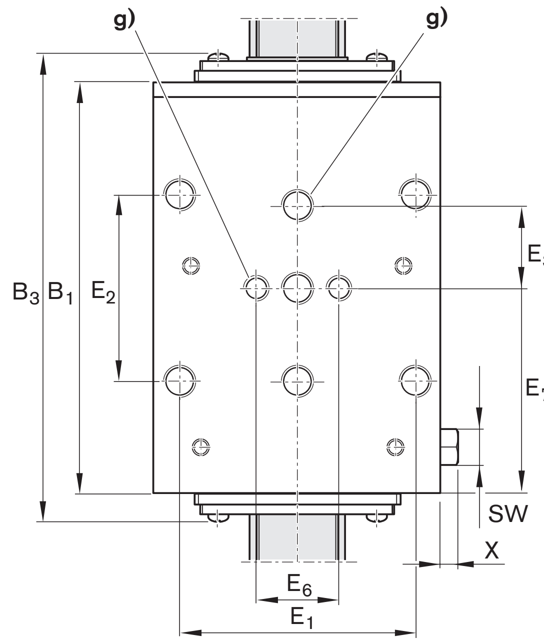
Size	Material number	Holding force		Air consumption (normalized)	
		Spring energy[1)] (N)	With air-plus port[2)] (N)	Air port (dm³/stroke)	Air-plus port (dm³/stroke)
25	R1619 240 51	1 850	2 650	0.080	0.165
30	R1619 740 51	2 500	3 300	0.111	0.274
35[3)]	R1619 340 51	2 800	3 800	0.139	0.303
45	R1619 440 51	5 200	7 600	0.153	0.483
55	R1619 540 51	7 700	9 200	0.554	0.952

1) Holding force achieved by spring energy. Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).
2) Increased holding force by additional application of air at the air-plus port at 6.0 bar. Switching via 5/2 or 5/3-way directional control valve.
3) Type tested according to the EU Machinery Directive 98/37/EC (in force until Dec. 28, 2009) and 2006/42/EC (effective beginning Dec. 29, 2009).

Product description

UBPS





a) Air port*) G_1 on both sides for release pressure
b) Port*) G_2 on both sides for air-plus port or air filter
c) Only on add-on module.
d) Spacer plate (accessory)
e) Exhaust on both sides
f) Air filter: Port G_2 (possible on both sides)
g) At least two mounting holes at the center must be used in addition!
*) Only one port is necessary.
All ports are plugged for shipment.

Size	**Dimensions** (mm)											
	A	**B_1**	**$B_{3\,max}$**	**E_1**	**E_2**	**E_3**	**E_6**	**E_7**	**F_1**	**F_2**	**F_3**	**F_4**
25	70	99	115.1	57	45	20	20	49.5	6.5	11	34.3	59.0
30	90	109	128.7	72	52	22	22	54.5	6.5	11	40.8	66.5
35	100	109	131.0	82	62	26	24	54.5	8.0	11	40.8	66.5
45	120	197	220.1	100	80	30	-	98.5	12	32	167	106.5
55	140	197	221.6	116	95	35	-	98.5	13	32	165	103.5

Size	**Dimensions** (mm)										**Weight**
	G_1	**G_2**	**H**	**H_1 1)**	**N_3**	**N_4**	**S_2**	**S_3**	**X**	**SW**	(kg)
25	M5	M5	36	31	7	7	M8	M6	5.5	Ø8, SW7	1.20
30	M5	M5	42	37	8	8	M10	M8	5.5	Ø8, SW7	1.80
35	G1/8"	G1/8"	48	42	10	10	M10	M8	6.5	Ø15, SW13	2.25
45	G1/8"	G1/8"	60	52	-	12	M12	-	6.5	Ø15, SW13	6.20
55	G1/8"	G1/8"	70	60	-	14	M14	-	6.5	Ø15, SW13	9.40

1) For ball runner block .H. (...High...) Spacer plate necessary. Available on request.

Pneumatic clamping elements product description

Application areas

- Pneumatic clamping of machine axes
- Table crossbars in the woodworking industry
- Positioning of hoists

Characteristic features

- High axial holding forces within a very short span
- Dynamic and static stabilization in the axis travel direction
- Simple mechanical gripping principle in LCP and LCPS with good price/performance ratio

Further highlights

- Easy to mount
- Steel housing, catalytically nickel-plated
- High axial and horizontal stiffness
- Precise positioning

Special features of MK:
- Clamps with pressure (pneumatic) Compressed air via a dual-action conical slide-valve gear presses the clamping profiles onto the web surfaces of the ball guide rail.
- Steplessly adjustable pressure from 4 – 8 bar
- Releasing with spring force. A preloaded return spring provides quick release.

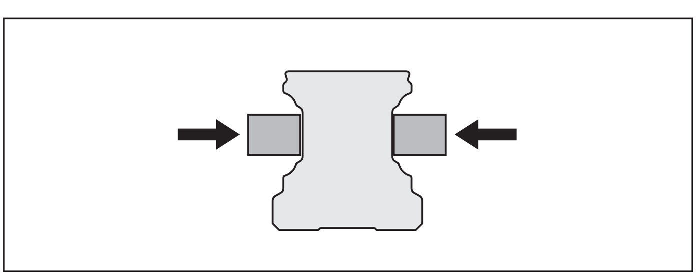
Special features of MKS:
- Clamps without pressurization (with spring energy) in the case of a pressure drop via the dual-action conical slide-valve gear with two spring assemblies
- An integrated quick-exhaust valve ensures rapid response times
- Increased holding force through air-plus port
- Releasing pneumatically. Cracking pressure 5.5 – 8 bar

Special features of LCP:
- Clamps with pressure (pneumatic) via mechanical wraparound clamping
- Steplessly adjustable pressure from 5.5 – 8 bar
- Quick release
- Releasing with spring force. A preloaded return spring provides quick release.

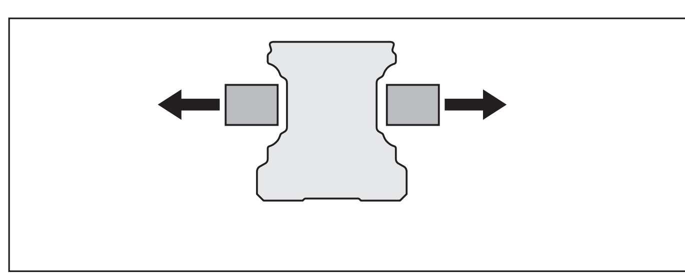
Special features of LCPS:
- Clamps without pressurization (with spring energy) due to mechanical wraparound clamping with one spring assembly
  (spring energy storage)
- Release pressure 5.5 – 8 bar (pneumatic)
- Increased holding force through air-plus port
- Releasing with air pressure.

⚠ Pay attention to the safety information about clamping and braking elements. ☞ 170

Functional principle



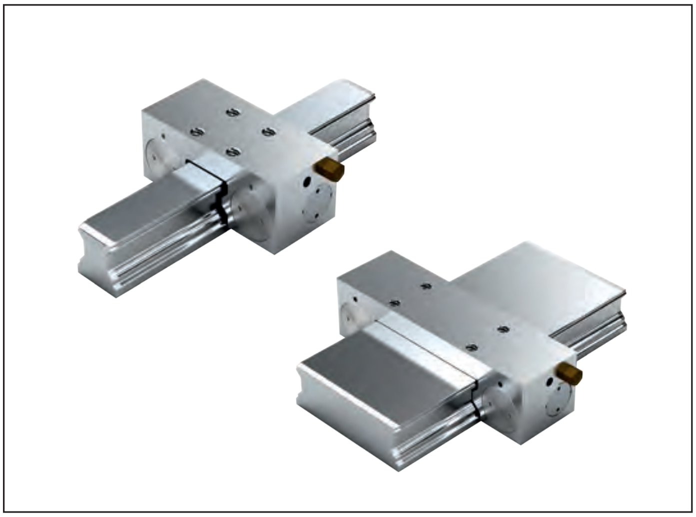
Clamping with air pressure or spring force
- Clamping profiles are pressed onto the web surfaces of the ball guide rail.



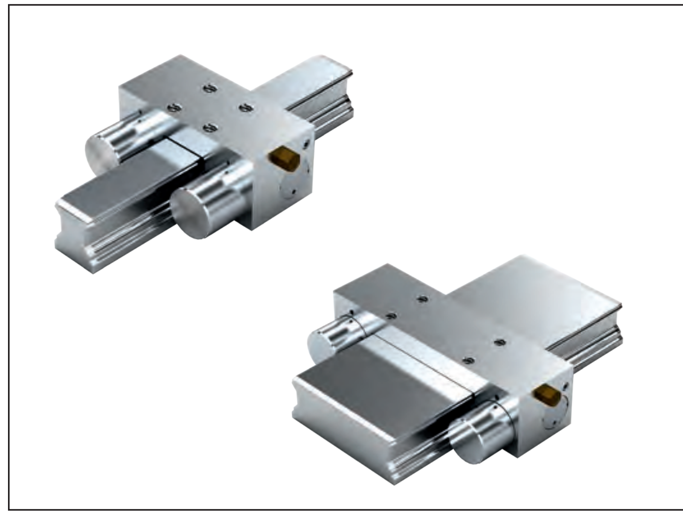
Releasing with air pressure or spring force
- The clamping profiles are held apart.
- Allows free movement

Model overview, accessories, pneumatic clamping units

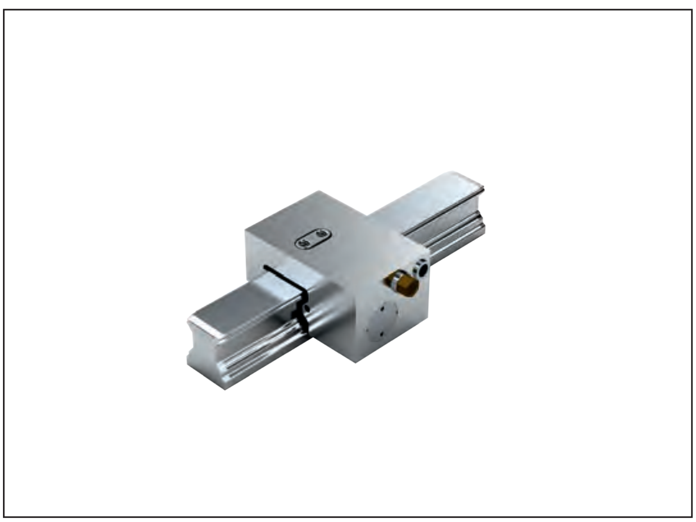
MK



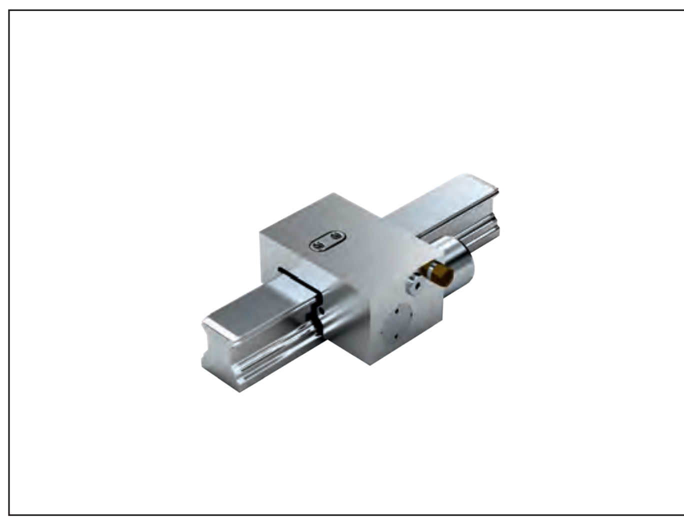
MKS



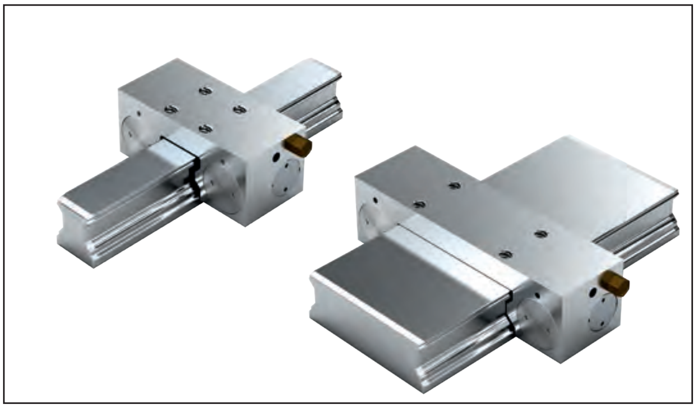
LCP



LCPS



Pneumatic clamping units MK



R1619 .42 60

Note
Can be used on all ball guide rails SNS.

R1619 .42 62

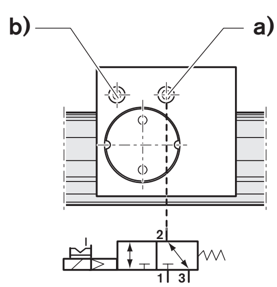
Note
Can be used on all ball guide rails BNS.

Clamping by pressure application
- Max. pneumatic operating pressure: 8 bar
- Operating temperature range t: 0 – 70 °C

Installation information
- Make sure the adjoining structure is sufficiently rigid.
- Use only filtered and lubricated air. The specified filter mesh size is 25 µm.
- Read the mounting instructions before start-up.

⚠ Pay attention to the safety information about clamping and braking elements. ☞🗎 170

Switching[1)]
for standard air port

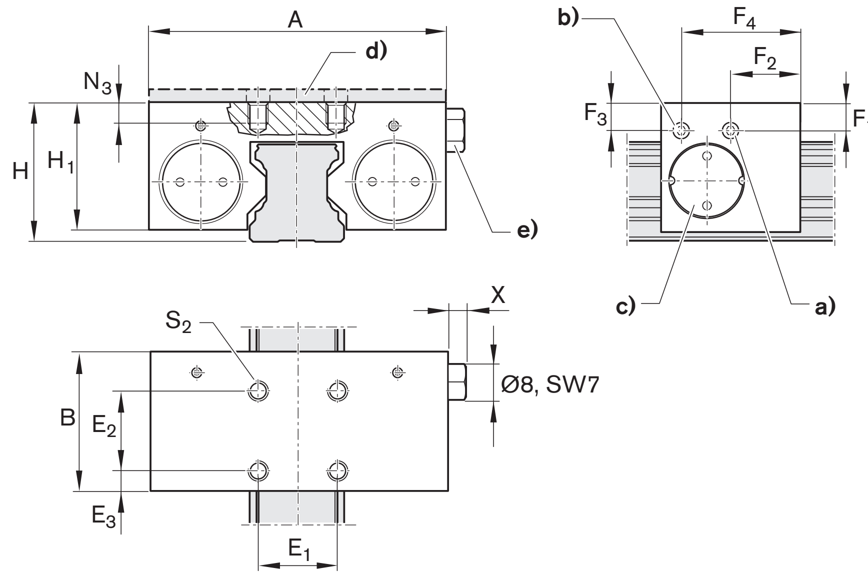


a) Air port
b) Air filter
Nominal width:
Sizes 15 – 20: min. 4 mm
Sizes 25 – 65: min. 6 mm

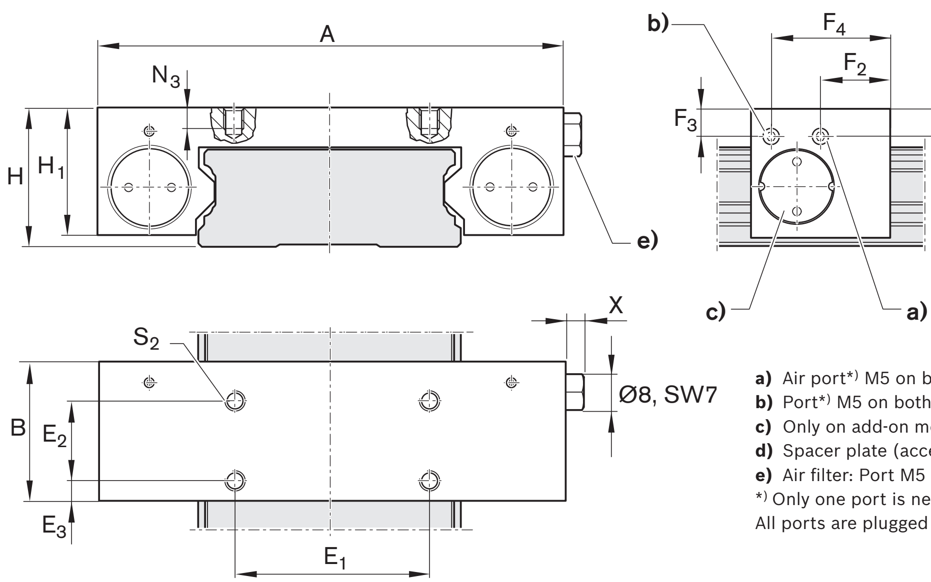
Size	Material number	Holding force Pneumatic[1)] (N)	Air consumption (normalized) Air port (dm³/stroke)
15	R1619 142 60	650	0.011
20	R1619 842 60	1 000	0.019
25	R1619 242 60	1 200	0.021
30	R1619 742 60	1 750	0.031
35	R1619 342 60	2 000	0.031
45	R1619 442 60	2 250	0.041
55	R1619 542 60	2 250	0.041
65	R1619 642 60	2 250	0.041
20/40	R1619 842 62	650	0.019
25/70	R1619 242 62	1 200	0.021
35/90	R1619 342 62	2 000	0.031

1) Holding force at 6 bar. Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).

MK



MK wide

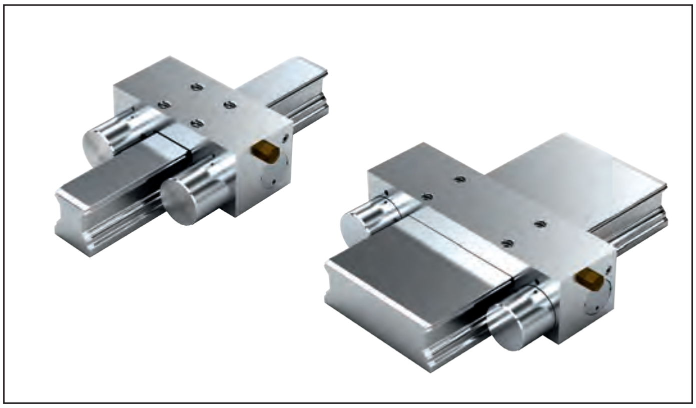


a) Air port*) M5 on both sides for release pressure
b) Port*) M5 on both sides for air filter
c) Only on add-on module.
d) Spacer plate (accessory) for MK
e) Air filter: Port M5 (both sides possible)
*) Only one port is necessary.
All ports are plugged for shipment.

Size	Dimensions (mm)														Weight
	A	B	E_1	E_2	E_3	F_1	F_2	F_3	F_4	H	H_1 1)	N_3	S_2	X	(kg)
15	55	39	15	15	15.5	5.6	34.0	16.1	34.0	24	20.8	4.5	M4	6.5	0.25
20	66	39	20	20	9.0	4.5	17.3	6.0	34.5	30	27.0	6.0	M6	5.5	0.36
25	75	35	20	20	5.0	7.0	17.5	7.0	30.0	36	32.5	8.0	M6	5.5	0.45
30	90	39	22	22	8.5	8.5	15.0	10.3	24.5	42	38.5	9.0	M8	5.5	0.72
35	100	39	24	24	7.5	11.0	14.5	12.0	24.5	48	44.0	10.0	M8	5.5	0.88
45	120	49	26	26	11.5	14.5	19.5	14.5	29.5	60	52.0	15.0	M10	5.5	1.70
55	128	49	30	30	9.5	17.0	19.5	17.0	29.5	70	57.0	15.0	M10	5.5	1.95
65	138	49	30	30	9.5	14.5	19.5	14.5	29.5	90	73.5	20.0	M10	5.5	2.68
20/40	80	39	20	20	15.5	5.0	4.5	5.0	31.0	27	23.5	4.5	M4	5.5	0.37
25/70	120	35	50	20	5.0	7.0	17.5	9.0	30.0	35	32.5	8.0	M6	5.5	0.62
35/90	156	42	60	20	9.5	11.5	18.0	14.0	36.5	50	45.5	10.0	M10	5.5	0.88

1) For ball runner block .H. (...High...) Spacer plate necessary

Pneumatic clamping units MKS



R1619 .40 60

Note
Can be used on all ball guide rails SNS.

R1619 .40 62

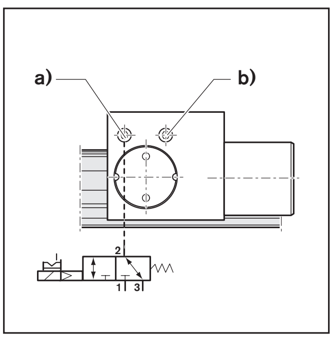
Note
Can be used on all ball guide rails BNS.

Clamps without pressurization (spring energy)
- Release pressure min. 5.5 bar
- Max. pneumatic operating pressure: 8 bar
- Operating temperature range t: 0 – 70 °C

Installation information
- Make sure the adjoining structure is sufficiently rigid.
- Use only filtered and lubricated air. The specified filter mesh size is 25 μm.
- Read the mounting instructions before start-up.

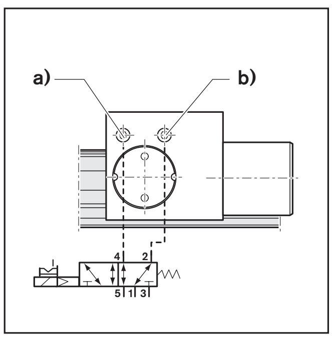
⚠ Pay attention to the safety information about clamping and braking elements. ☞ 170

Switching1)
for standard air port



a) Air port
b) Air filter
Nominal width:
Sizes 15 – 20: min. 4 mm
Sizes 25 – 65: min. 6 mm

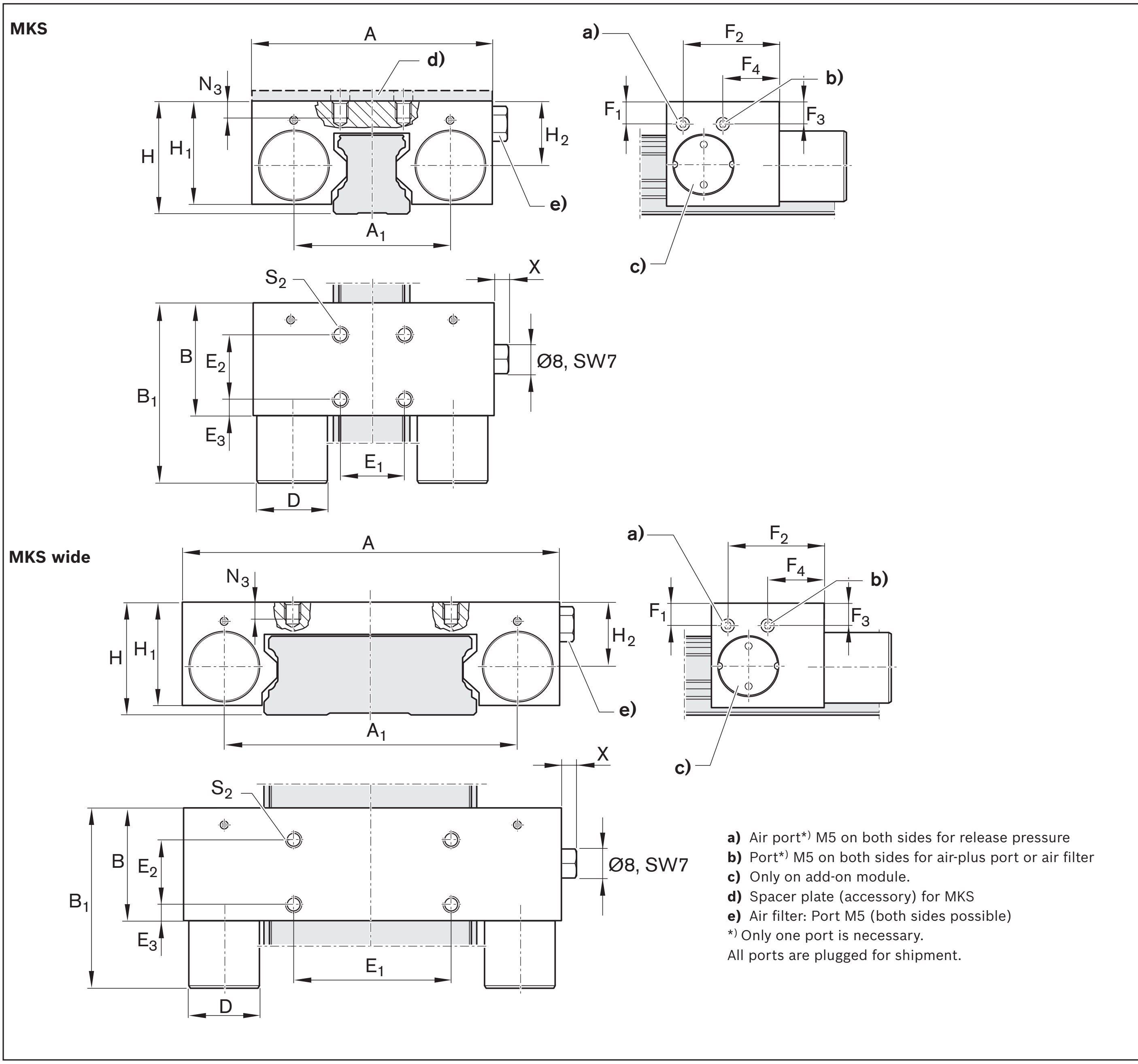
Switching2)
for air-plus port



a) Air port
b) Air-plus port
Nominal width:
Sizes 15 – 20: min. 4 mm
Sizes 25 – 65: min. 6 mm

Size	Material number	Holding force		Air consumption (normalized)	
		Spring energy1)	With air-plus port2)	Air port	Air-plus port
		(N)	(N)	(dm³/stroke)	(dm³/stroke)
15	R1619 140 60	400	1 050	0.011	0.035
20	R1619 840 60	600	1 300	0.019	0.063
25	R1619 240 60	750	1 500	0.021	0.068
30	R1619 740 60	1 050	2 600	0.031	0.121
35	R1619 340 60	1 250	3 250	0.031	0.129
45	R1619 440 60	1 450	3 300	0.041	0.175
55	R1619 540 60	1 450	3 300	0.041	0.175
65	R1619 640 60	1 450	3 300	0.041	0.175
20/40	R1619 840 62	400	1 050	0.019	0.063
25/70	R1619 240 62	750	1 950	0.021	0.068
35/90	R1619 340 62	1 250	3 250	0.031	0.129

1) Holding force achieved by spring energy. Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).
2) Increased holding force by additional application of air at the air-plus port at 6.0 bar. Switching via 5/2 or 5/3-way directional control valve.



a) Air port*) M5 on both sides for release pressure
b) Port*) M5 on both sides for air-plus port or air filter
c) Only on add-on module.
d) Spacer plate (accessory) for MKS
e) Air filter: Port M5 (both sides possible)
*) Only one port is necessary.
All ports are plugged for shipment.

Size	Dimensions (mm)																		Weight
	A	A_1	B	$B_{1\,max}$	D	E_1	E_2	E_3	F_1	F_2	F_3	F_4	H	H_1 1)	H_2	N_3	S_2	X	(kg)
15	55	34.0	39	58.5	16	15	15	15.5	16.1	34.0	5.6	34.0	24	20.8	11.6	4.5	M4	6.5	0.29
20	66	43.0	39	61.5	20	20	20	9.0	6.0	34.5	4.5	17.3	30	27.0	15.5	6.0	M6	5.5	0.41
25	75	49.0	35	56.5	22	20	20	5.0	7.0	30.0	7.0	17.5	36	32.5	20.0	8.0	M6	5.5	0.50
30	90	58.0	39	68.5	25	22	22	8.5	10.3	24.5	8.5	15.0	42	38.5	24.0	9.0	M8	5.5	0.81
35	100	68.0	39	67.5	28	24	24	7.5	12.0	24.5	11.0	14.5	48	44.0	28.0	10.0	M8	5.5	1.00
45	120	78.8	49	82.5	30	26	26	11.5	14.5	29.5	14.5	19.5	60	52.0	35.5	15.0	M10	5.5	1.84
55	128	86.8	49	82.5	30	30	30	9.5	17.0	29.5	17.0	19.5	70	57.0	40.0	15.0	M10	5.5	2.08
65	138	96.8	49	82.5	30	30	30	9.5	14.5	29.5	14.5	19.5	90	73.5	55.0	20.0	M10	5.5	2.86
20/40	80	59.0	39	58.5	16	20	20	15.5	5.0	31.0	5.0	4.5	27	23.5	14.0	4.5	M4	5.5	0.39
25/70	120	94.0	35	56.5	22	50	20	5.0	9.0	30.0	7.0	17.5	35	32.5	20.0	8.0	M6	5.5	0.68
35/90	156	124.0	42	70.5	28	60	20	9.5	14.0	36.5	11.5	18.0	50	45.5	30.0	10.0	M10	5.5	0.89

1) For ball runner block .H. (...High...) Spacer plate necessary

Pneumatic clamping units LCP

R1619 .42 74

Note

Can be used on all ball guide rails SNS.

Clamping by pressure application

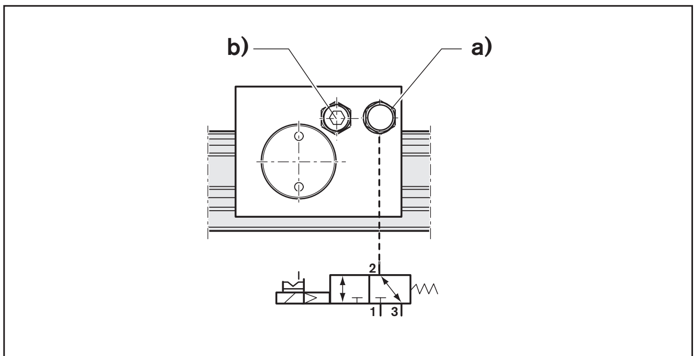
- Max. pneumatic operating pressure: 8 bar
- Operating temperature range t: 0 – 60 °C

Installation information

- Make sure the adjoining structure is sufficiently rigid.
- Use only filtered and lubricated air. The specified filter mesh size is 25 µm.
- Read the mounting instructions before start-up.

⚠ Pay attention to the safety information about clamping and braking elements. ☞🗎 170

Switching[1] with standard air port

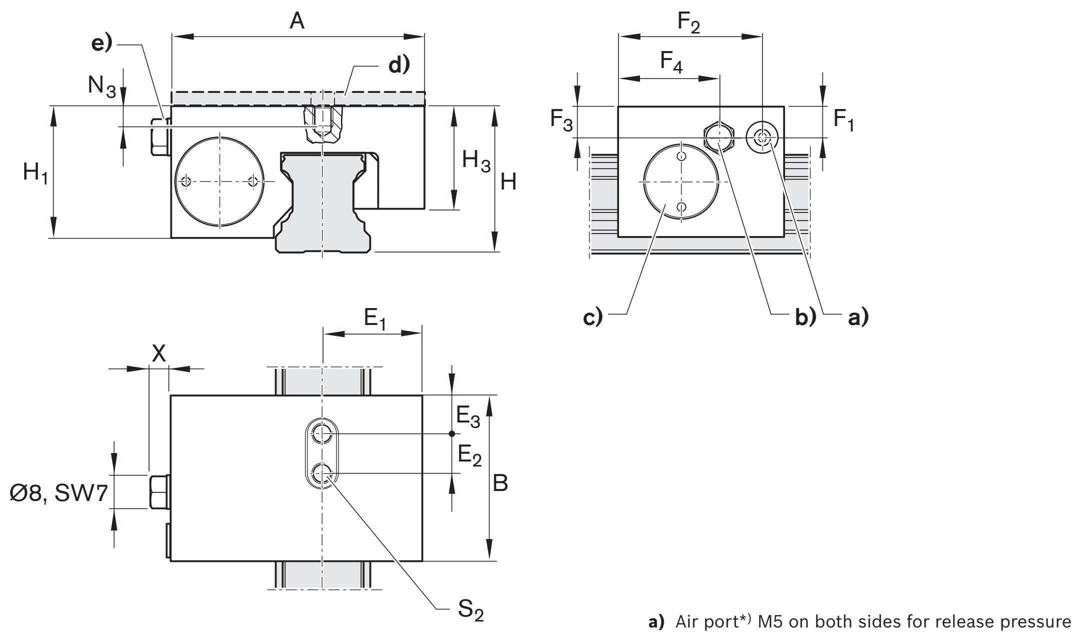


a) Air port
b) Air filter
Nominal width:
Sizes 15 – 20: min. 4 mm
Sizes 25 – 65: min. 6 mm

Size	Material number	Holding force Pneumatic[1] (N)	Air consumption (normalized) Air port (dm³/stroke)
25	R1619 242 74	850	0.015

1) Holding force at 6 bar. Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).

LCP

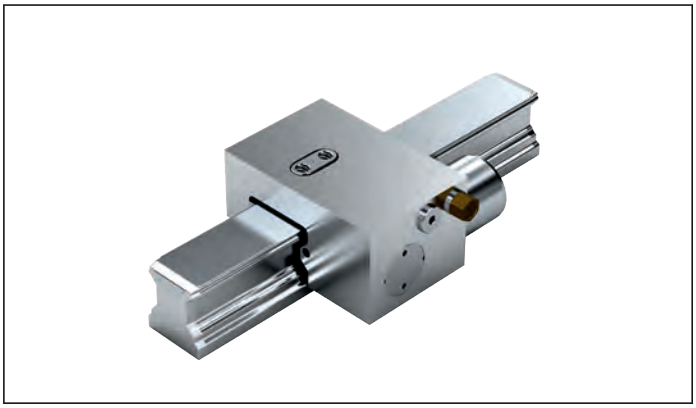


a) Air port*) M5 on both sides for release pressure
b) Air port*) M5 on both sides for air filter
c) Only on add-on module.
d) Spacer plate (accessory)
e) Air filter: Port M5 (both sides possible)
*) Only one port is necessary.
All ports are plugged for shipment.

Size	**Dimensions** (mm)															**Weight**
	A	**B**	**E_1**	**E_2**	**E_3**	**F_1**	**F_2**	**F_3**	**F_4**	**H**	**H_1[1)]**	**H_3**	**N_3**	**S_2**	**X**	(kg)
25	61.4	41	23.9	9.5	9.75	6.5	36.0	6.5	24.5	36.0	32.5	24.55	7.7	M5	6.5	0.27

1) For ball runner block .H. (...High...) Spacer plate necessary.

Pneumatic clamping units LCPS



R1619 .40 70

Note

Can be used on all ball guide rails SNS.

Clamps without pressurization (spring energy)

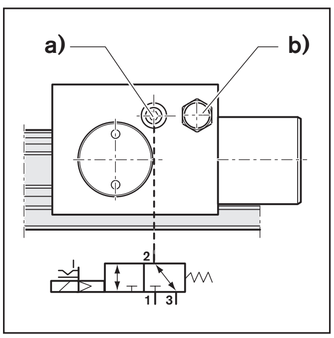
- Release pressure min.: 5.5 bar
- Max. pneumatic operating pressure 8 bar
- Operating temperature range t: 0 – 60 °C

Installation information

- Make sure the adjoining structure is sufficiently rigid.
- Use only filtered and lubricated air. The specified filter mesh size is 25 µm.
- Pay attention to the installation instructions before starting commissioning.

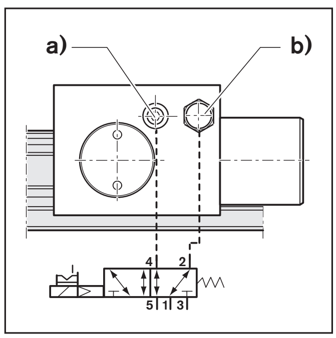
⚠ Pay attention to the safety information about clamping and braking elements. ☞🗎 170

Switching1)
for standard air port



a) Air port
b) Air filter
Nominal width:
Size 15 – 20: min. 4 mm
Size 25 – 65: min. 6 mm

Switching2)
for air-plus port

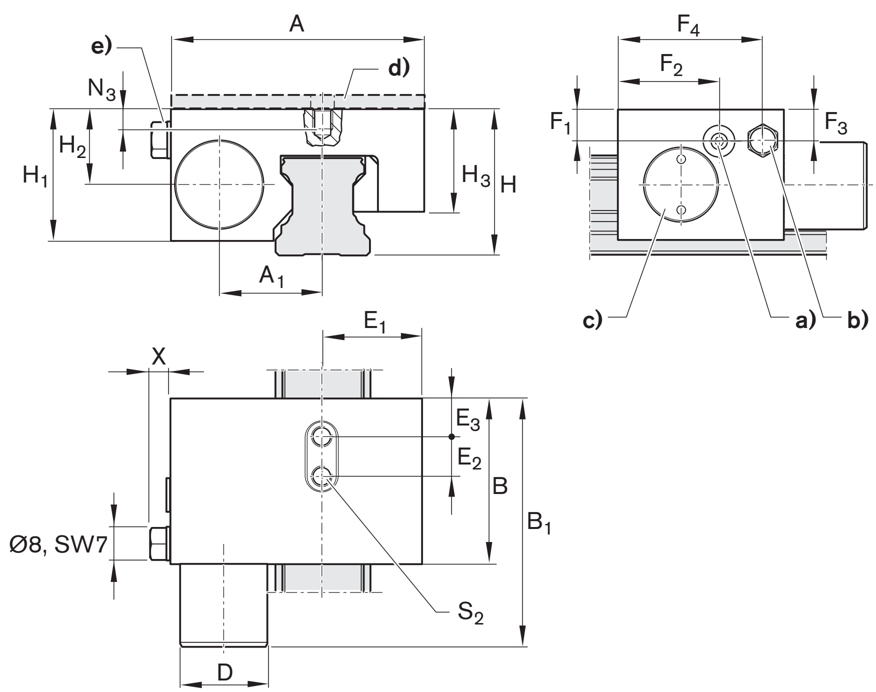


a) Air port
b) Air-plus port
Nominal width:
Size 15 – 20: min. 4 mm
Size 25 – 65: min. 6 mm

Size	Material number	Holding force		Air consumption (normalized)	
		Spring energy1)	With air-plus port2)	Air port	Air-plus port
		(N)	(N)	(dm^3/stroke)	(dm^3/stroke)
25	R1619 240 70	650	1 050	0.015	0.082

1) Holding force achieved by spring energy. Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).
2) Increased holding force by additional application of air at the air-plus port at 6.0 bar. Switching via 5/2 or 5/3-way directional control valve.

LCPS



a) Air port*) M5 on both sides for release pressure
b) Port*) M5 on both sides for air-plus port or air filter
c) Only on add-on module.
d) Spacer plate (accessory)
e) Air filter: Port M5 (both sides possible)
*) Only one port is necessary.
All ports are plugged for shipment.

Size	**Dimensions** (mm)																			**Weight**
	A	**A_1**	**B**	**B_{1max}**	**D**	**E_1**	**E_2**	**E_3**	**F_1**	**F_2**	**F_3**	**F_4**	**H**	**H_1 1)**	**H_2**	**H_3**	**N_3**	**S_2**	**X**	(kg)
25	61.4	24.5	41	62.5	22	23.9	9.5	9.75	6.5	24.5	6.5	36.0	36	32.5	20.0	24.55	7.7	M5	6.5	0.35

1) For ball runner block .H. (...High...) Spacer plate necessary.

Manual clamping elements product description

Application areas
- Table crossbars and slides
- Width adjustment
- Mechanical stops
- Positioning on optical instruments and measuring tables

Characteristic features

- Simple, reliable construction in compact design
- Manually operated clamping element without auxiliary power

Further highlights
- Freely adjustable hand lever
- Symmetrical force application to ball guide rail via floating contact profile
- Precise positioning
- Holding forces up to 2,000 N

Spacer plate

For assembly with ball runner blocks, high version, SNH R1621 or SLH R1624.

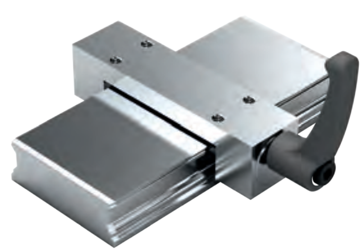
Special features of HK:
- 500,000 clamping cycles (B10d value)

⚠ Pay attention to the safety information about clamping and braking elements. ☞ 170

Model overview, accessories, manual clamping units, spacer plate

HK

HK

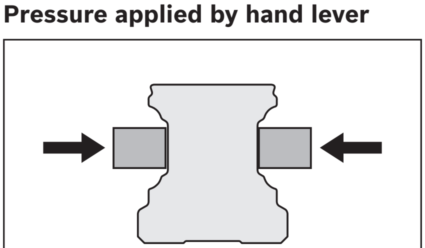


Spacer plate

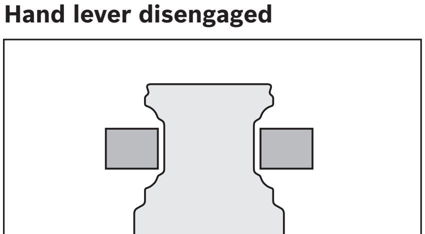
For clamping units MK, MKS and HK

Clamping by manual pressure
The clamping profiles are pressed against the web surfaces of the guide rail by the action of the hand lever.

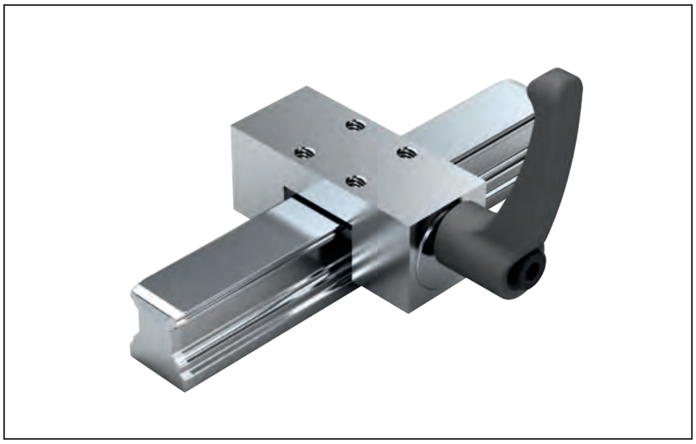
Pressure applied by hand lever



Hand lever disengaged



Manual clamping units HK



R1619 .42 82

Note
Can be used on all ball guide rails SNS.

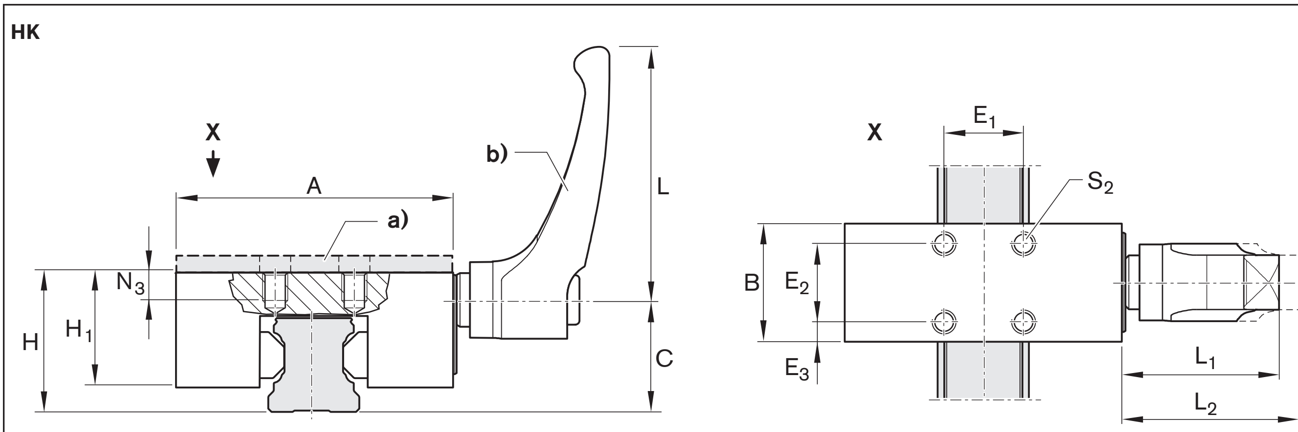
Manual clamping
- Operating temperature range t: 0 – 70 °C

Installation information
- Make sure the adjoining structure is sufficiently rigid.
- Read the mounting instructions before start-up.

Size	Material number	Holding force[1] (N)	Tightening torque (Nm)
15	R1619 142 82	1 200	4
20	R1619 842 82	1 200	5
25	R1619 242 82	1 200	7
30	R1619 742 82	2 000	15
35	R1619 342 82	2 000	15
45	R1619 442 82	2 000	15
55	R1619 542 82	2 000	22
65	R1619 642 82	2 000	22

⚠ Pay attention to the safety information about clamping and braking elements. ☞ 170

HK

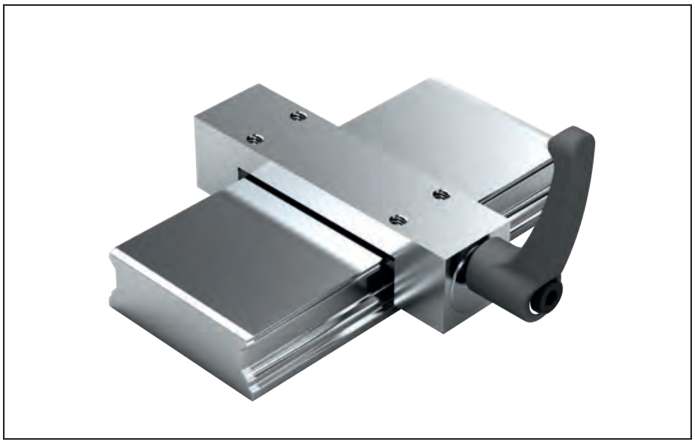


a) Spacer plate (accessory)
b) Position of hand lever adjustable

Size	Dimensions (mm)													Weight
	A	B	C	E_1	E_2	E_3	H	H_1[3]	L	L_1	L_2[2]	N_3	S_2	(kg)
15	47	25	19.0	17	17	4.0	24	19	44	30.0	33.0	5	M4	0.16
20	60	24	24.5	15	15	4.5	30	23	44	30.0	33.0	6	M5	0.23
25	70	30	29.3	20	20	5.0	36	29	64	38.5	41.5	7	M6	0.43
30	90	39	34.0	22	22	8.5	42	33	78	46.5	50.5	8	M6	0.82
35	100	39	38.0	24	24	7.5	48	41	78	46.5	50.5	10	M8	1.08
45	120	44	47.0	26	26	9.0	60	48	78	46.5	50.5	14	M10	1.64
55	140	49	56.5	30	30	9.5	70	51	95	56.5	61.5	14	M14	1.71
65	160	64	69.5	35	35	14.5	90	66	95	56.5	61.5	20	M16	2.84

1) Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).
2) Hand lever disengaged
3) For ball runner block .H. (...High...) Spacer plate necessary

Manual clamping units HK



R1619 .42 83

Note
Can be used on all ball guide rails BNS.

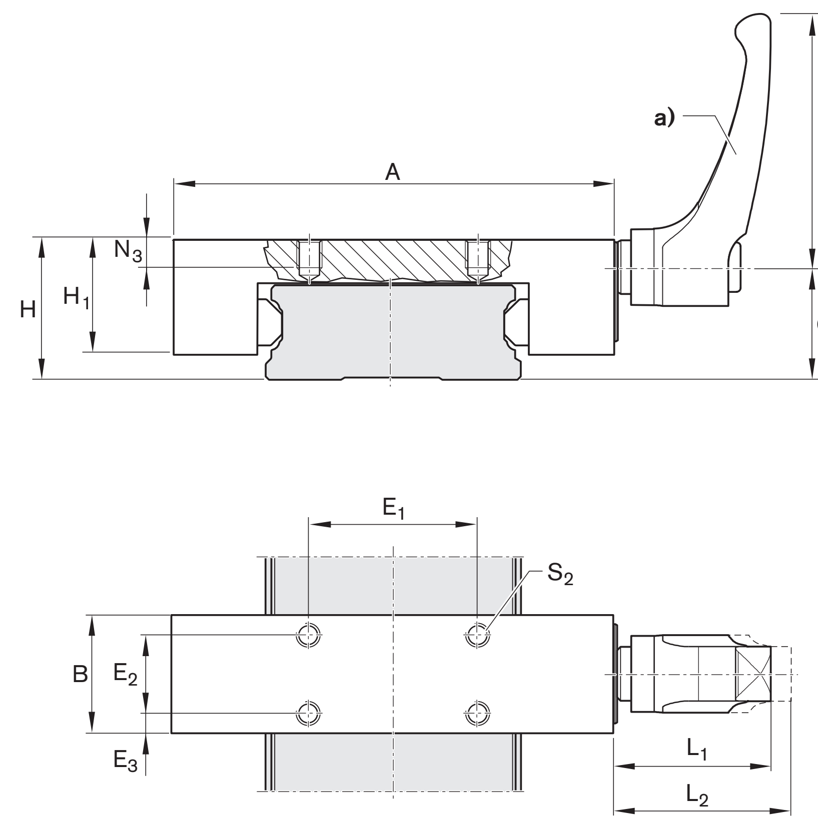
Manual clamping
- Operating temperature range t: 0 – 70 °C

Installation information
- Make sure the adjoining structure is sufficiently rigid.
- Read the mounting instructions before start-up.

Size	Material number	Holding force[1] (N)	Tightening torque (Nm)
25/70	R1619 242 83	1 200	7
35/90	R1619 342 83	2 000	15

⚠ Pay attention to the safety information about clamping and braking elements. ☞ 170

HK wide



a) Position of hand lever adjustable

Size	Dimensions (mm)													Weight
	A	B	C	E_1	E_2	E_3	H	H_1	L	L_1	L_2[2]	N_3	S_2	(kg)
25/70	120	39	28.2	50	25	7.0	35	30	64	38.5	41.5	11	M6	0.77
35/90	145	39	38.0	60	20	9.5	50	39	78	46.5	50.5	11	M8	1.38

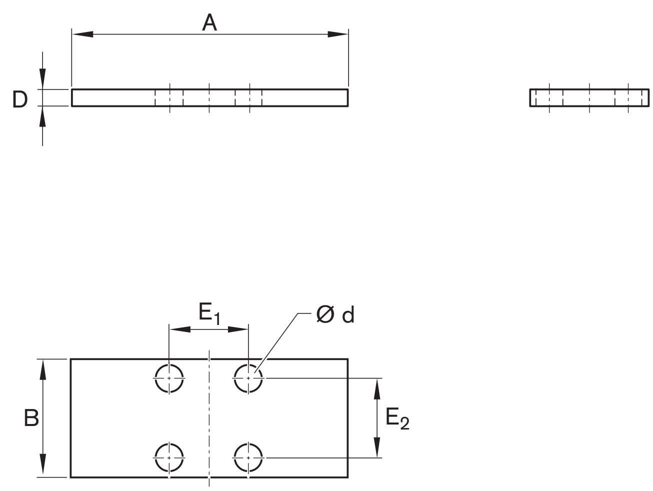
1) Testing is performed in the installed condition with a film of lubricating oil (ISO VG 68).
2) Hand lever disengaged

Spacer plate

For clamping units MK, MKS and HK

Note
For assembly with ball runner blocks, high version, SNH R1621 or SLH R1624.

Spacer plate



R1619 .40 65

Suitable for clamping units:
- R1619 .42 60 (MK)
- R1619 .40 60 (MKS)

Size	Material number	Dimensions (mm)						Weight
		A	B	D	d	E_1	E_2	(kg)
15	R1619 140 65	55	39	4	4.5	15	15	0.065
25	R1619 240 65	75	35	4	6.5	20	20	0.078
30	R1619 740 65	90	39	3	8.5	22	22	0.077
35	R1619 340 65	100	39	7	8.5	24	24	0.202
45	R1619 440 65	120	49	10	10.5	26	26	0.434
55	R1619 540 65	128	49	10	10.5	30	30	0.465

R1619 .42 .5

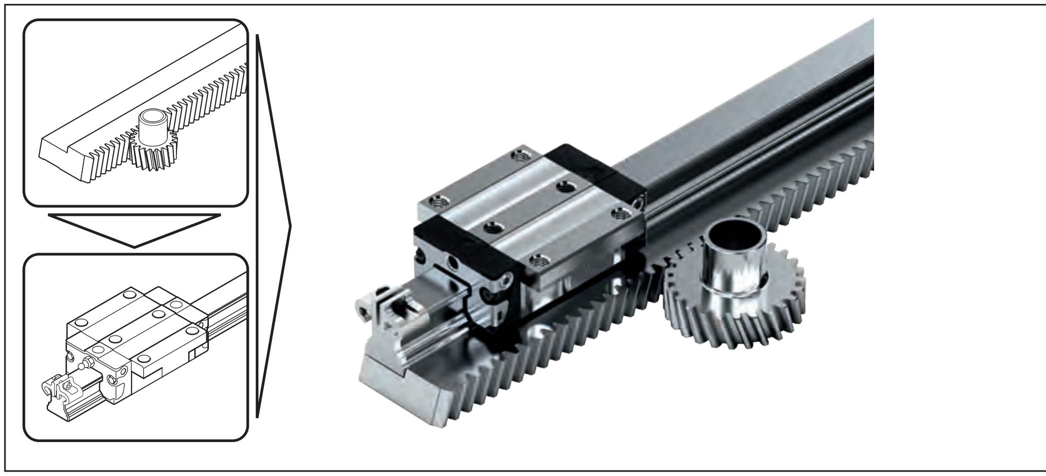
Suitable for clamping units:
- R1619 .42 82 (HK)

Size	Material number	Dimensions (mm)						Weight
		A	B	D	d	E_1	E_2	(kg)
15	R1619 142 85	47	25	4	4.5	17	17	0.035
25	R1619 242 85	70	30	4	6.5	20	20	0.062
30	R1619 742 85	90	39	3	6.5	22	22	0.080
35	R1619 340 65	100	39	7	8.5	24	24	0.202
45	R1619 442 85	120	44	10	10.5	26	26	0.387
55	R1619 542 85	140	49	10	14.5	30	30	0.511

Product description

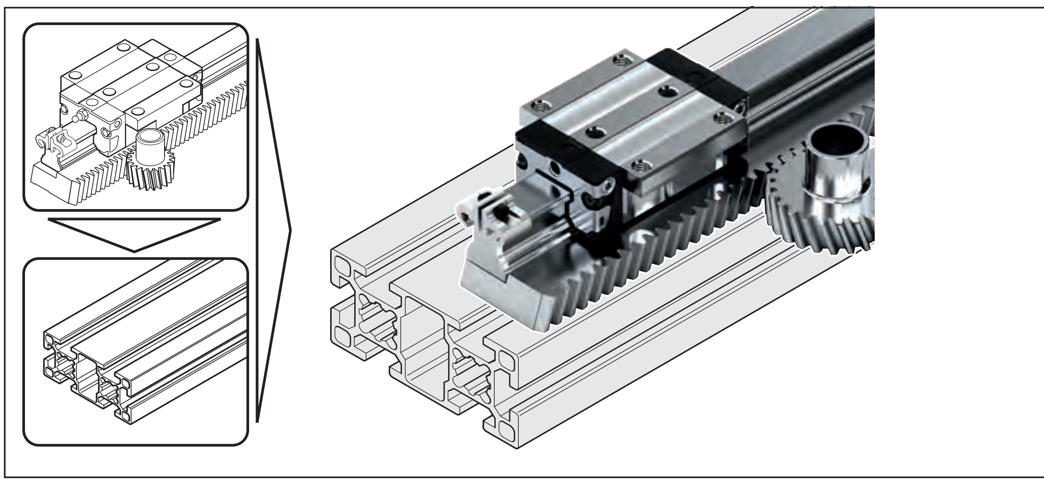
Gear racks with helical teeth for all ball guide rails SNS, for mounting from above, in sizes 25, 30 and 35.

Combination of gear rack with pinion drive and ball rail systems (see application examples).

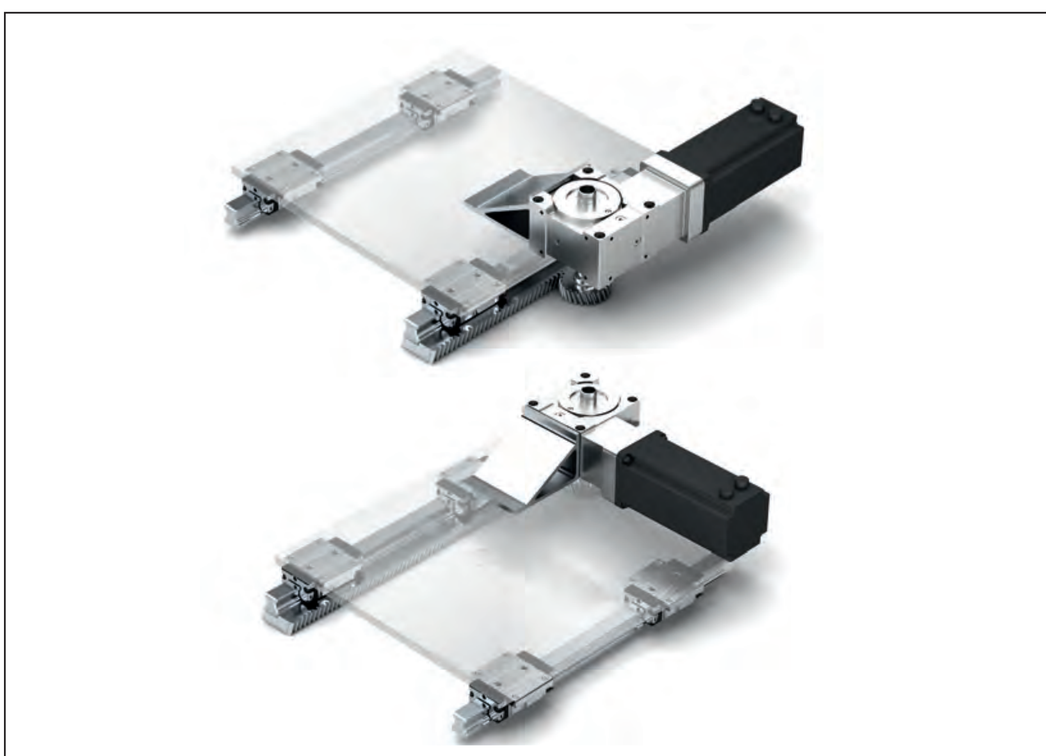


The ball rail system and gear rack can be mounted on profile framing system elements.

Only gear racks and ball rail systems of the same size can be combined.



For information about the rack and pinion, refer to the catalog entitled “Ball Rail Systems with a Rack”.



General mounting instructions

The following notes relating to mounting apply to all ball rail systems. However, different specifications exist with regard to the parallelism of the guide rails and to mounting the ball runner blocks with screws and locating pins. This information is provided separately alongside the descriptions of the individual types of ball rail systems.

⚠ In the case of overhead installation (hanging installation) or vertical installation, the ball runner block can release from the ball guide rail due to the balls being lost or broken. Secure the ball runner block from falling! Danger of death! We recommend the use of protection against falling loads!

⚠ Rexroth ball rail systems are high-quality products. Particular care must be taken during transportation and subsequent mounting. The same care must be taken with cover strips. All steel parts are protected with anti-corrosion oil. It is not necessary to remove this oil provided the recommended lubricants are used.

Mounting examples

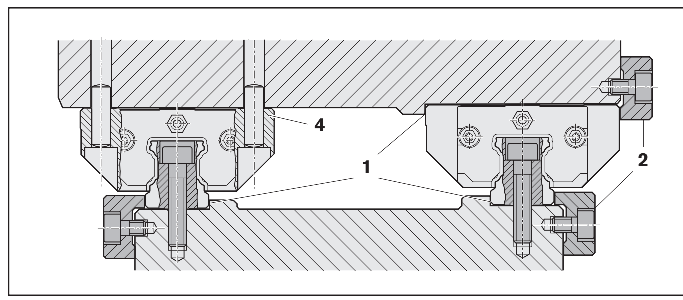
Ball guide rails
Each guide rail has ground reference surfaces on both sides.

Possibilities for side fixing:
1 Reference edges
2 Clamping strips
3 V-guides
Note
- Guide rails without side fixing have to be aligned straight and parallel when mounting, preferably using a straightedge.
- Recommended limits for side load if no additional lateral retention is provided, see the individual ball runner blocks.

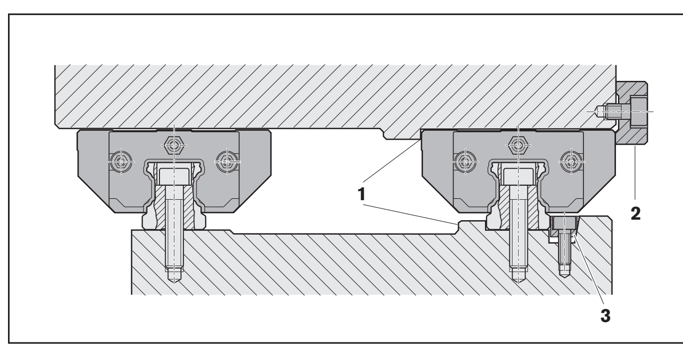
Ball runner block
Each ball runner block has a ground reference edge on one side (see dimension V_1 in the dimension drawings).

Possibilities for additional fixing:
1 Reference edges
2 Clamping strips
4 Pinning

Installation with fixing of both ball guide rails and both ball runner blocks



Installation with fixing of one ball guide rail and one ball runner block



Notes
- Before installing the components, clean and degrease all mounting surfaces.
- Please ask for the “Mounting Instructions for Ball Rail Systems”.
- After mounting, it should be possible to move the ball runner block easily.

General mounting instructions

Maximum forces and moments of profiled guide rails according to ISO 12090-1 (DIN 637)

The maximum load on a profiled guide rail is defined not only by the static load-bearing capacity C_0 in accordance with ISO 14728 Part 2 and the static moments M_{t0} from the rolling contact, but also by the screw connections. As a rule, runner blocks are fastened using 4 or 6 screws. Guide rails have a regularly spaced single-row threaded connection.
If the runner block is positioned exactly over a rail screw, this screw will absorb the largest portion of the load. For this reason, the load-bearing capacity is primarily dependent on the length of the runner block, the rail hole spacing, the screw size and the width of the rail contact surface. Slipping or mismatches on exceeding a maximum load limit is primarily defined by the screw fastening of the rail.
The table shows the permissible static tensile forces and moments around the guide axis for profiled rail systems in various versions for screw tightening torques with strength class 8.8.

Illustration of static pull forces and moments

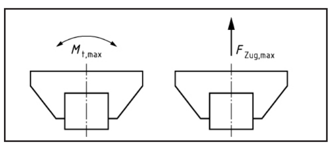


Fig. 1

Standard ball rail systems

Ball runner block

Size	Short		Standard length		Long	
	F_{max} (N)	$M_{t\ max}$ (Nm)	F_{max} (N)	$M_{t\ max}$ (Nm)	F_{max} (N)	$M_{t\ max}$ (Nm)
15	3200	22	3700	26	4200	30
20	5500	51	6400	60	7300	68
25	8100	87	9400	100	10800	120
30	15900	210	18500	240	21100	280
35	15800	250	18500	300	21100	340
45	39300	830	45900	970	52400	1100
55	54600	1400	63700	1600	72800	1800
65	75600	2200	88200	2600	100800	3000

Wide ball rail systems

Ball runner block

Size	Standard length	
	F_{max} (N)	$M_{t\ max}$ (Nm)
20/40	8460	140
25/70	26100	530
35/90	38900	1430

⚠ With dynamic stress, the forces and moments according to the table should be devaluated by at least 35 % as a guideline value. If necessary, you must consider the forces and moments (in derogation from Figure 1).

Maximum static side load without stop strips for strength class 8.8 (as per DIN 637)

For safe structural design the application includes the usage of stop strips on runner block and rail. If stop strips are not used on the runner block or the rail, then if a load is applied in the transverse direction the guide may slip as soon as the side loads in the table are exceeded. The stated maximum side loads apply for screw strength class 8.8 and an adjoining structure made of steel or cast iron.

Standard ball rail systems			
Ball runner block			
Size	**Short**	**Standard length**	**Long**
	F_{max} (N)	**F_{max} (N)**	**F_{max} (N)**
15	240	280	320
20	410	480	550
25	610	710	810
30	1200	1400	1600
35	1200	1400	1600
45	3000	3400	3900
55	4100	4800	5500
65	5700	6600	7600

Bolted connections tightening torques for profiled guide rails with strength class 8.8 (according to DIN 637)

Size	**FNS R1651, FLS R1653, FKS R1665, FKN R1663**				**SNS R1622, SLS R1623, SNH R1621, SLH R1624, SKS R1666, SKN R1664**		**Rail**	
	mounted from above		**mounted from below**		**mounted from above**			
		M_A (Nm)		**M_A (Nm)**		**M_A (Nm)**		**M_A (Nm)**
15	M5	6	M4	3	M4	3	M4	3
20	M6	10	M5	6	M5	6	M5	6
25	M8	25	M6	10	M6	10	M6	10
30	M10	49	M8	24	M8	25	M8	24
35	M10	49	M8	24	M8	25	M8	24
45	M12	83	M10	48	M10	49	M12	83
55	M14	130	M12	81	M12	83	M14	130
65	M16	200	M14	130	M16	200	M16	200

Mounting

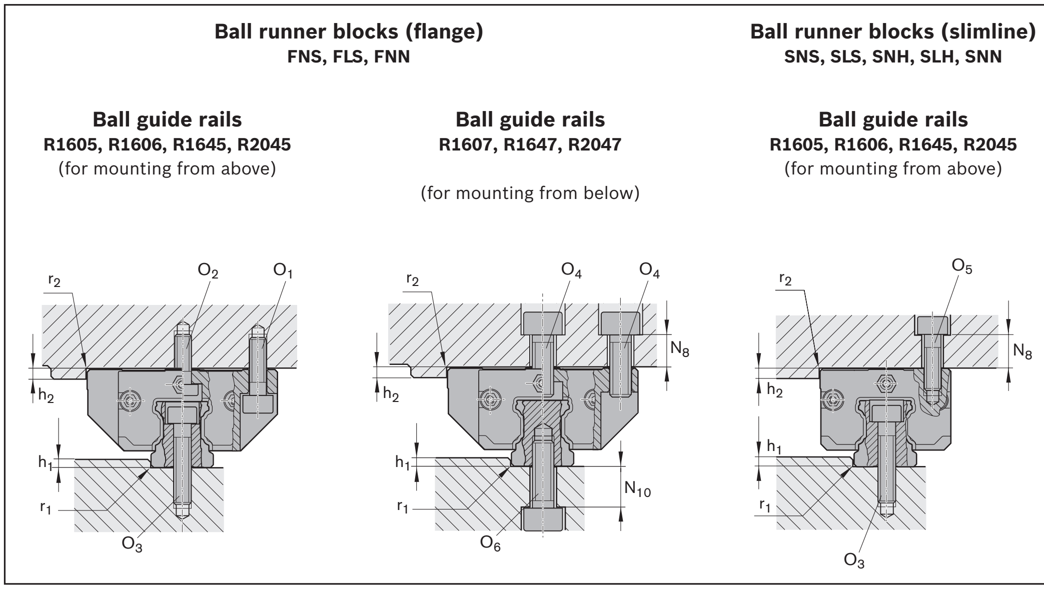
Reference edges, corner radii

Examples of combinations
The combinations shown here are examples. Basically, any ball runner block may be combined with any of the ball guide rail types offered.

Fastening screws
⚠ In the case of high screw stress, always check the safety of the screws.

For more information on this topic, see the "General mounting instructions" section.

Guide rail with normal and long runner blocks



Size	Dimensions (mm)						
	$h_{1\,min}$	$h_{1\,max}$[1)]	h_2	N_8	N_{10}	$r_{1\,max}$	$r_{2\,max}$
15	2.5	3.5	4	6	7.0	0.4	0.6
20	2.5	4.0	5	9 10[3)]	9.5 –	0.6	0.6
25	3.0	5.0	5	10 11[3)]	12.0 –	0.8	0.8
30	3.0	5.0	6	10	9.0	0.8	0.8
35	3.5	6.0	6	13	13	0.8	0.8
45	4.5	8.0	8	14	13	0.8	0.8
55	7.0	10.0	10	20	23	1.2	1.0
65	7.0	10.0	14	22	26	1.2	1.0

1) If using clamping and braking elements, pay attention to H1 values.

Size	Screw sizes					
	Ball runner block				Ball guide rail	
	O_1 ISO 4762 4 pieces	O_2[2)] DIN 6912 2 pieces	O_4[1) 2)] ISO 4762 6 pieces	O_5 ISO 4762 4 pieces	O_3 ISO 4762	O_6 ISO 4762
15	M4x12	M4x10	M5x12	M4x12	M4x20	M5x12
20	M5x16	M5x12	M6x16	M5x16	M5x25	M6x16
25	M6x20	M6x16	M8x20	M6x18	M6x30	M6x20
30	M8x25	M8x16	M10x20	M8x20	M8x30	M8x20
35	M8x25	M8x20	M10x25	M8x25	M8x35	M8x25
45	M10x30	M10x25	M12x30	M10x30	M12x45	M12x30
55	M12x40	M12x30	M14x40	M12x35	M14x50	M14x40
65	M14x45	M14x35	M16x45	M16x40	M16x60	M16x45

1) When fastening the ball runner block from above with only four screws O_4:
Permissible lateral force 1/3 lower and rigidity less
2) When fastening the ball runner block with six screws:
Tighten the center screws to tightening torque M_A of strength class 8.8
3) SNN ball runner block

Locating pins

⚠ If the guideline values for the permissible lateral force are exceeded (see the corresponding ball runner blocks), you must fix them additionally by pinning.

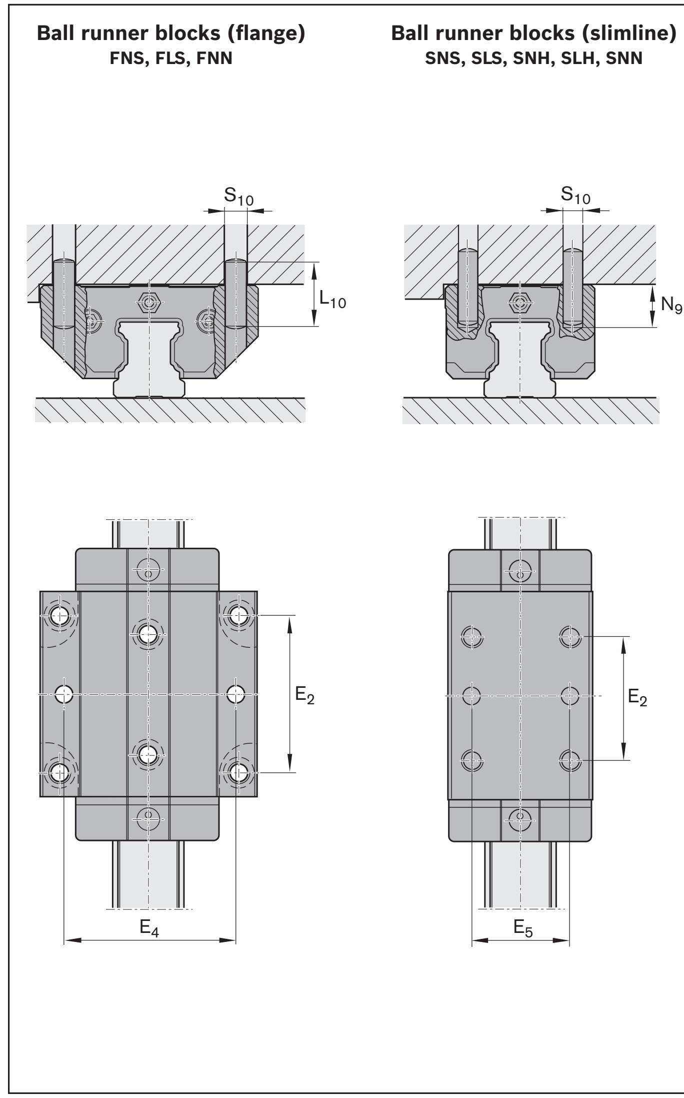
For the recommended dimensions for pin holes, refer to the dimension drawing and the dimensions.

Possible pin types

- Taper pin (hardened) or
- Straight pin ISO 8734

Note

- At the recommended positions for pin holes, there may be pre-drilled holes in the middle of the ball runner block due to production-related issues (Ø < S_{10}). They are suitable for drilling out.
- If is necessary to carry out pinning at a different position (e.g. the middle lube port), dimension E_2 must not be exceeded in the longitudinal direction (for dimension E_2, refer to the dimension tables of the corresponding ball runner blocks). Comply with dimensions E_1 and E_4!
- Do not finish the pin holes until after installation.
- Please ask for the “Mounting Instructions for Ball Rail Systems”.



Size	Dimensions (mm)				
	E_4	E_5	L_{10} 1)	$N_{9\,max}$	S_{10} 1)
15	38	26	18	6.0	4
20	53 49 2)	32	24	7.5 6.5 2)	5
25	55 60 2)	35	32	9.0 7.0 2)	6
30	70	40	36	12.0	8
35	80	50	40	13.0	8
45	98	60	50	18.0	10
55	114	75	60	19.0	12
65	140	76	60	22.0	14

1) Taper pin (hardened) or straight pin (ISO 8734)
2) Ball runner block FNN and SNN

Mounting

Reference edges, corner radii

Examples of combinations

The combinations shown here are examples. Basically, any ball runner block may be combined with any of the ball guide rail types offered.

Bolting the ball runner blocks with two screws is completely adequate up to the maximum load.
(Refer to the corresponding ball runner blocks for the maximum load capacity and load moments).

Fastening screws

⚠ In the case of high screw stress, always check the safety of the screws.

For more information on this topic, see the “General mounting instructions” section.

Guide rail with short and super runner blocks

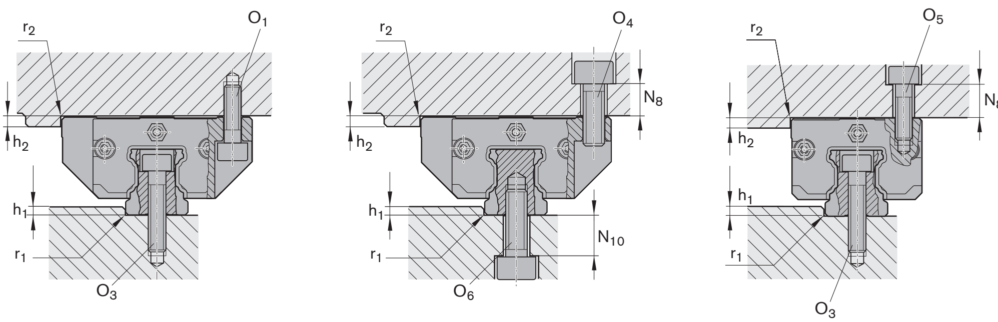
Ball runner blocks (flange)
FKS, FKN

Ball runner blocks (slimline)
SKS, SKN

Ball guide rails
R1605, R1606, R1645
(for mounting from above)

Ball guide rails
R1607, R1647
(for mounting from below)

Ball guide rails
R1605, R1606, R1645
(for mounting from above)



Size	Dimensions (mm)						
	$h_{1\,min}$	$h_{1\,max}$ 1)	h_2	N_8	N_{10}	$r_{1\,max}$	$r_{2\,max}$
15	2.5	3.5	4	6	7.0	0.4	0.6
20	2.5	4.0	5	9	9.5	0.6	0.6
				10 2)	–		
25	3.0	5.0	5	10	12.0	0.8	0.8
				11 2)	–		
30	3.0	5.0	6	10	9.0	0.8	0.8
35	3.5	6.0	6	13	13.0	0.8	0.8

1) If using clamping and braking elements, pay attention to H1 values.
2) SKN ball runner block

Size	Screw sizes				
	Ball runner block			Ball guide rail	
	O_1 ISO 4762 2 pieces	O_4 ISO 4762 2 pieces	O_5 ISO 4762 2 pieces	O_3 ISO 4762	O_6 ISO 4762
15	M4x12	M5x12	M4x12	M4x20	M5x12
20	M5x16	M6x16	M5x16	M5x25	M6x16
25	M6x20	M8x20	M6x18	M6x30	M6x20
30	M8x25	M10x20	M8x20	M8x30	M8x20
35	M8x25	M10x25	M8x25	M8x35	M8x25

Locating pins

⚠ If the guideline values for the permissible lateral force are exceeded (see the corresponding ball runner blocks), you must fix them additionally by pinning.

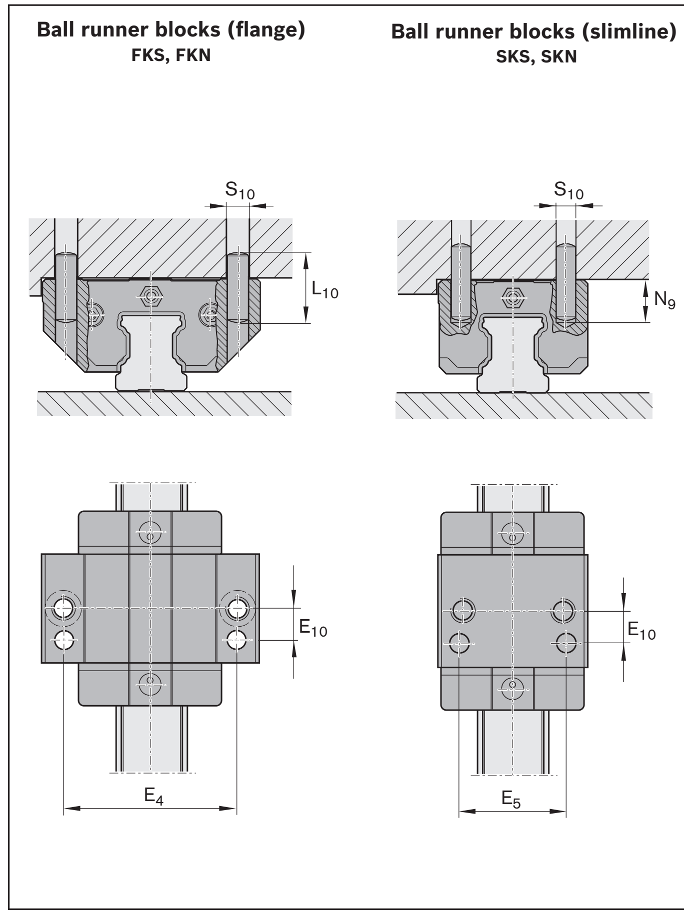
For the recommended dimensions for pin holes, refer to the dimension drawing and the dimensions.

Possible pin types

- Taper pin (hardened) or
- Straight pin ISO 8734

Note

- At the recommended positions for pin holes, there may be pre-drilled holes in the middle of the ball runner block due to production-related issues (Ø < S_{10}).
  They are suitable for drilling out.
  Comply with dimensions E_4 and E_5!
- Only prepare the pin holes after the installation is complete.
  Please ask for the “Mounting Instructions for Ball Rail Systems”.

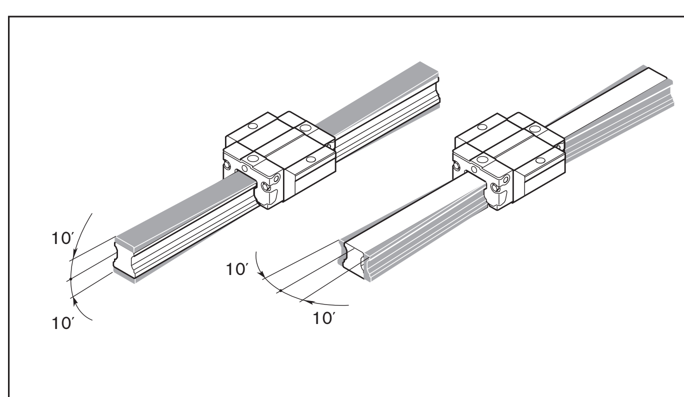


Size	Dimensions (mm)					
	E_4	E_5	E_{10}	L_{10} 1)	$N_{9\,max}$	S_{10} 1)
15	38	26	9	18	3.0	4
20	53 49 2)	32	10	24	3.5 2.0 2)	5
25	55 60 2)	35	11	32	7.0 5.0 2)	6
30	70	40	14	36	10.0	8
35	80	50	15	40	12.0	8

1) Taper pin (hardened) or straight pin (ISO 8734)
2) Ball runner block FKN and SKN

Permitted alignment error for Super ball runner blocks

at the guide rail and at the ball runner block



Mounting

Reference edges, corner radii, screw sizes

Examples of combinations
The combinations shown here are examples. Basically, any ball runner block may be combined with any of the ball guide rail types offered.

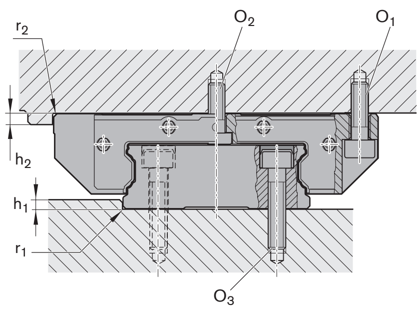
Fastening screws
⚠ In the case of high screw stress, always check the safety of the screws.

For more information on this topic, see the "General mounting instructions" section.

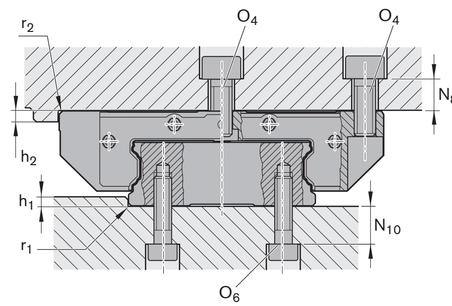
Guide rail with wide runner block

Ball runner blocks (flange) BNS

Ball guide rails
R1673, R1675, R1676
(for mounting from above)

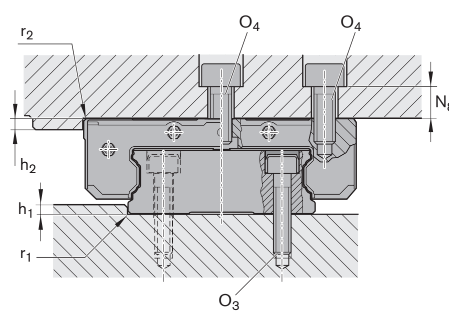


Ball guide rails
R1677
(for mounting from below)



Ball runner blocks (compact) CNS

Ball guide rails
R1673, R1675, R1676
(for mounting from above)



Size	Dimensions (mm)							
	$h_{1\,min}$	$h_{1\,max}$ 1)	h_2	N_8	N_8 2)	N_{10}	$r_{1\,max}$	$r_{2\,max}$
20/40	2.0	2.5	4	9.5	11	5.5	0.5	0.5
25/70	3.0	4.5	5	10.0	13	9.0	0.8	0.8
35/90	3.5	6.0	6	13.0	–	11.0	0.8	0.8

Size	Screw sizes				
	Ball runner block			Ball guide rail	
	O_1 ISO 4762 4 pieces	O_2 3) DIN 6912 2 pieces	O_4 3) ISO 4762 6 pieces	O_3 ISO 4762	O_6 ISO 4762
20/40	M5x16	M5x12	M6x16	M4x20	M5x12
25/70	M6x20	M6x16	M8x20	M6x30	M6x20
35/90	M8x25	M8x20	M10x25	M8x35	M8x25

1) If using clamping and braking elements, pay attention to H1 values.
2) CNS ball runner block
3) When fastening the ball runner block with six screws:
Tighten the center screws to tightening torque M_A of strength class 8.8.
Always use middle fastening screws; otherwise there is a risk.

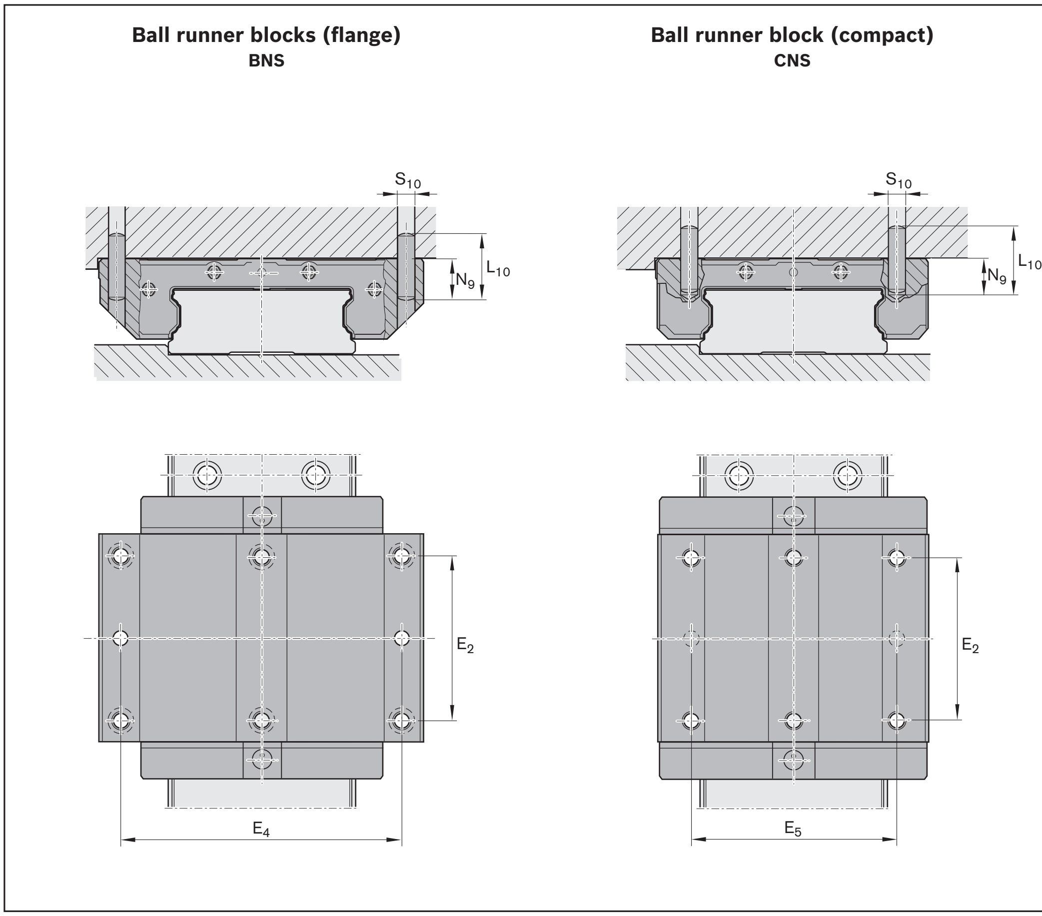
Locating pins

⚠ If the guideline values for the permissible lateral force are exceeded (see the corresponding ball runner blocks), you must fix them additionally by pinning.

For the recommended dimensions for pin holes, refer to the dimension drawing and the dimensions.

Possible pin types

- Taper pin (hardened) or
- DIN ISO 8734 straight pin



Size	Dimensions (mm)				
	E_4	E_5	L_{10} 1)	$N_{9\ max}$	S_{10} 1)
20/40	70	46	24	7	5
25/70	107	76	32	8	6
35/90	144	–	32	8	8

1) Taper pin (hardened) or straight pin (ISO 8734)

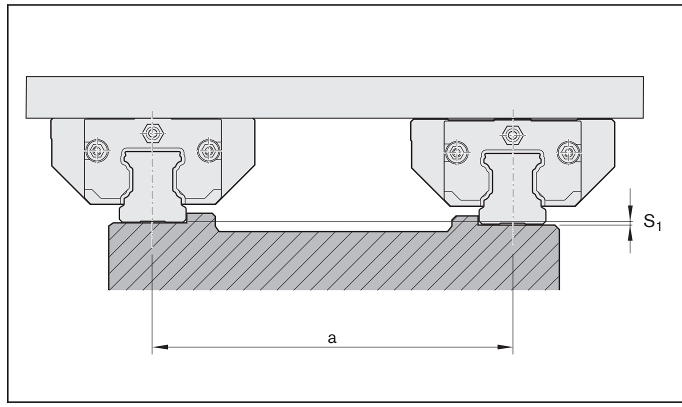
Note

- At the recommended positions for pin holes, there may be pre-drilled holes in the middle of the ball runner block due to production-related issues (Ø < S_{10}). They are suitable for drilling out.
- If is necessary to carry out pinning at a different position (e.g. the middle lube port), dimension E_2 must not be exceeded in the longitudinal direction (for dimension E_2, refer to the dimension tables of the corresponding ball runner blocks). Comply with dimensions E_4 and E_5!
- Only prepare the pin holes after the installation is complete.
- Please ask for the “Mounting Instructions for Ball Rail Systems”.

Installation tolerances

Vertical offset

If you comply with the permissible vertical offset S_1 and S_2, the effect on the service life is, in general, negligible.



Permissible vertical offset in the transverse direction S_1
You must deduct from the permissible vertical offset S_1 of the ball guide rails the tolerance for dimension H according to the table containing the accuracy classes in the “General product description” chapter.

Ball runner block	Calculation factor Y for preload class			
	C0	C1	C2	C3
Steel	$4.3 \cdot 10^{-4}$	$2.8 \cdot 10^{-4}$	$1.7 \cdot 10^{-4}$	$1.2 \cdot 10^{-4}$
Short made of steel	$5.2 \cdot 10^{-4}$	$3.4 \cdot 10^{-4}$	–	–
Super ball runner blocks	$8.0 \cdot 10^{-4}$	$6.0 \cdot 10^{-4}$	–	–
Aluminum	$7.0 \cdot 10^{-4}$	$5.0 \cdot 10^{-4}$	–	–

$$S_1 = a \cdot Y$$

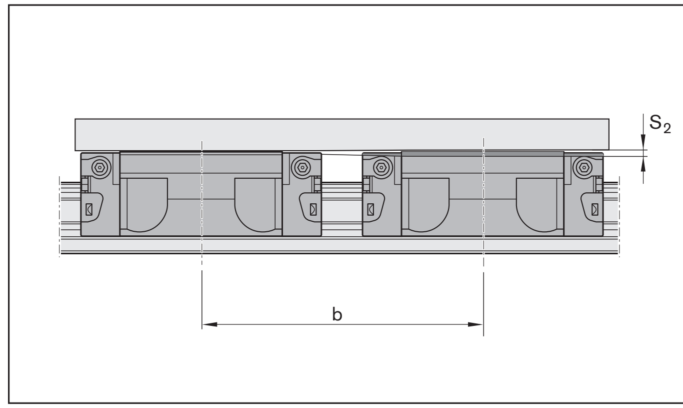
Key

S_1	= Permissible vertical offset of the ball guide rails	(mm)
a	= distance between guide rails	(mm)
Y	= calculation factor, transverse direction	(–)

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

Permissible vertical offset in the longitudinal direction S_2

You must deduct from the permissible vertical offset S_2 of the ball runner blocks the “Max. difference of dimension H on one rail” tolerance according to the table containing the accuracy classes in the “General product description” chapter. You must deduct from the permissible vertical offset S_2 of the ball runner blocks the “Max. difference of dimension H on one rail” tolerance according to the table containing the accuracy classes in the “General product description” chapter.



Ball runner block	Calculation factor X for preload class		
	Short	Normal	Long
Steel	$6.0 \cdot 10^{-5}$	$4.3 \cdot 10^{-5}$	$3.0 \cdot 10^{-5}$
Aluminum	–	$6.0 \cdot 10^{-5}$	–

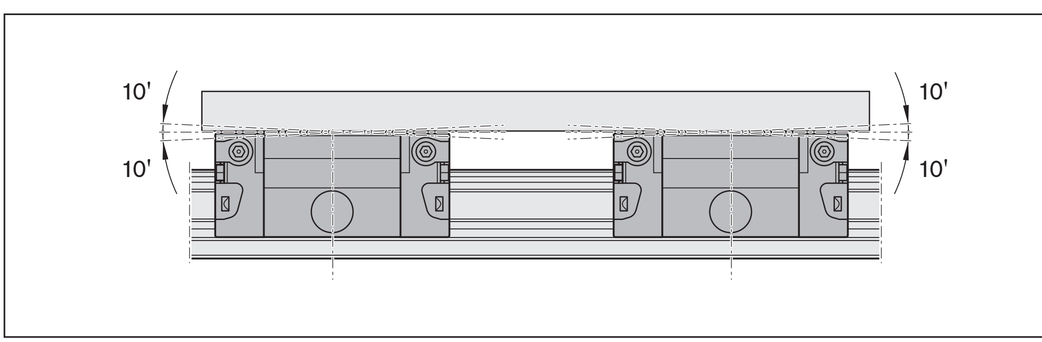
$$S_2 = b \cdot X$$

Key

S_2 = Permissible vertical offset of the ball runner blocks (mm)
b = distance between runner blocks (mm)
X = calculation factor, longitudinal direction (–)

Permissible deviation from straightness in the longitudinal direction with two consecutive Super ball runner blocks

The ball runner blocks can automatically compensate unevenness of 10' in the longitudinal direction.



Installation tolerances

General notes

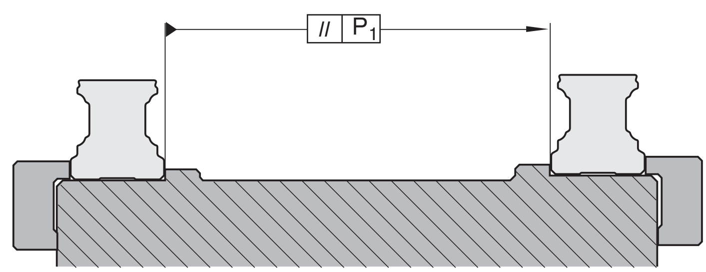
The following notes on mounting apply to all ball rail systems.
Rexroth ball rail systems are high-grade quality products.
Particular care must be taken during transportation and subsequent mounting. The same care must be taken with cover strips.
All steel parts are protected with anti-corrosion oil.
It is not necessary to remove this oil provided the recommended lubricants are used.

⚠ In the case of overhead installation (hanging installation), the ball runner block can release from the guide rail due to the balls being lost or broken. Secure the ball runner block from falling!

Parallelism of the rails after mounting

Values measured on the ball guide rails and the ball runner blocks

The values for the parallelism offset P1 apply to the entire standard range of ball runner blocks.
The parallelism offset $\mathbf{P_1}$ raises the preload slightly on one side. If you comply with the table values, the effect on the service life is, in general, negligible.



Ball runner block	Size	Parallelism offset P_1 (mm) with preload class			
		C0	C1	C2	C3
Steel ball runner blocks with precision installation[1)]	**15**	0.015	0.009	0.005	0.004
	20	0.018	0.011	0.006	0.004
	25	0.019	0.012	0.007	0.005
	30	0.021	0.014	0.009	0.006
	35	0.023	0.015	0.010	0.007
	45	0.028	0.019	0.012	0.009
	55	0.035	0.025	0.016	0.011
	65	0.048	0.035	0.022	0.016
Steel ball runner blocks, short	**15**	0.018	0.011	–	–
	20	0.022	0.013	–	–
	25	0.023	0.014	–	–
	30	0.025	0.017	–	–
	35	0.028	0.018	–	–
Super ball runner blocks	**15**	0.025	0.017	–	–
	20	0.029	0.021	–	–
	25	0.032	0.023	–	–
	30	0.035	0.026	–	–
	35	0.040	0.030	–	–
Aluminum ball runner blocks	**15**	0.021	0.014	–	–
	25	0.026	0.017	–	–
	30	0.029	0.019	–	–
	35	0.035	0.022	–	–

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload
C3 = High preload

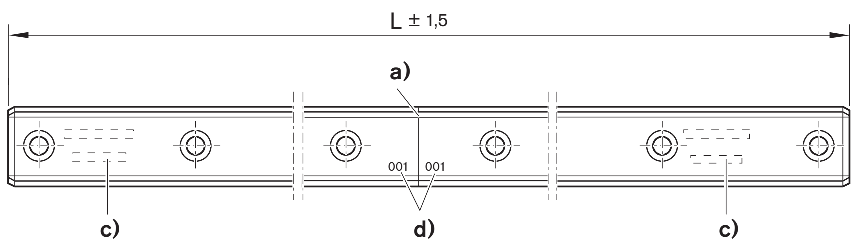
1) The precision installation unit is a rigid, high-precision surrounding structure.
With standard installation, the surrounding structure is of flexible design and it is possible to work with **double** the tolerance values of the parallelism offset.

Composite ball guide rails

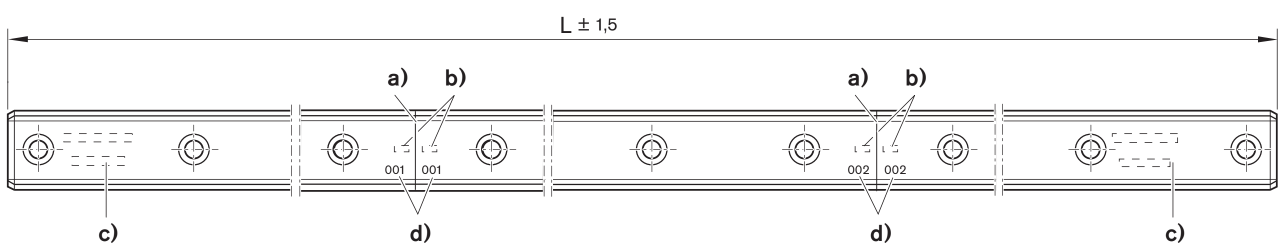
Notes on guide rails

- Matching sections of a composite guide rail are identified as such by a label on the packaging. All sections of the same rail have the same serial rail number.
- The numbering is marked on the top of the guide rail.

Guide rail made up of two sections



Guide rail made up of three or more sections



L = Rail length (mm)
n_B = Number of holes (–)

a) Joint
b) Serial rail number
c) Full rail identification code on first and last sections
d) Joint number

Note on cover strip

- For composite rails, a one-piece cover strip to cover the total length L is supplied separately.
- Secure the cover strip!

Note on the adjoining structure

Permissible hole position tolerances of the mounting holes for the adjoining structure

Size	Hole position tolerance (mm)
15 – 35	Ø 0.2
45 – 65	Ø 0.3

Notes on lubrication

⚠ If using a progressive lubrication system, with grease lubrication, please pay attention to the minimum dosing amount for relubrication stated in table 9.

⚠ We recommend carrying out initial lubrication separately using a grease gun before connecting to the central lubrication system.
If using a central lubrication system, you must make sure that all the pipes and elements are filled with lubricant and do not contain any air pockets until they are connected to the consumer (ball runner block).
The number of pulses results from the partial amounts and the piston distributor size.

- **With fluid grease lubrication according to table 9**
- **With oil lubrication according to table 14**

⚠ The seals on the ball runner block must be oiled or greased with the respective lubricant before installation.

⚠ If you use different lubricants than the ones stated, you may find that relubrication intervals are shorter and that performance decreases with short stroke and load ratio; in addition, chemical interactions can take place between the plastics, lubricants and the preservative agents. In addition, pumpability in single-line central lubrication systems must be guaranteed.

⚠ Pumping or storage tanks for the lubricant must be fitted with a stirrer to guarantee the flow of lubricant (to avoid funneling in the tank).

⚠ You must not use lubricants containing solid lubricating components (like graphite and MoS_2 for example)!

⚠ In the case of basic lubrication at the factory, grease and oil lubrication are possible.
In the case of re, it is not possible to change from grease to oil lubrication.

⚠ You must lubricate ball runner blocks without lubrication at the factory before commissioning.

⚠ When applying lubricant at the start or after a relatively long standstill, carry out two to five lubrication pulses in succession. When the system is in operation, 3 to 4 pulses per hour are recommended, irrespective of the distance traveled. If possible, carry out lubrication in one lubricating stroke. Carry out cleaning cycles (see “Maintenance”).

⚠ In the case of environmental influences such as contamination, vibration, jolting, etc., we recommend shortening the relubrication intervals appropriately. Even under normal operating conditions, the system must be relubricated at the latest after 2 years due to aging of the grease.

If your application involves more demanding environmental requirements (such as clean room, vacuum, food industry applications, increased exposure to fluids or aggressive media, extreme temperatures), please consult us. Each application must be considered on its own merits in order to chose the most appropriate lubricant. Be sure to have all the information concerning your application at hand when contacting us.

Rexroth recommends piston distributors manufactured by SKF. These should be installed as close as possible to the lube ports of the ball runner blocks. Long lines and small line diameters should be avoided, and the lines should be laid on an upward slant. Install the lines at a gradient.

Refer to the chapter entitled “Ball runner block accessories” for a selection of possible lube ports (in this connection, contact the manufacturer of your lubrication system too).

If other consumers are connected to the single-line centralized lubrication system, the weakest link in the chain will determine the lubrication cycle time.

For the “Dynalub” product and material safety data sheet, visit our Web page www.boschrexroth.de/brl

Notes on Dynalub

⚠ Pay attention to the assignment of the ball rail system

Under conventional environmental conditions this ground-fiber, homogeneous grease is ideally suited for the lubrication of linear elements:

- With loads up to 50 % C
- With short-stroke applications > 1 mm
- For the permissible speed range of ball rail systems

The product and material safety data sheet is available on our Web page at www.boschrexroth.de/brl.

Dynalub 510
Grease type
Properties:

- Lithium-based, high-performance grease of NLGI grade 2 according to DIN 51818 (KP2K-20 according to DIN 51825)
- Good water resistance
- Corrosion protection
- Temperature range: -20 to +80 °C

Material numbers for Dynalub 510:

- R3416 037 00 (cartridge 400 g)
- R3416 035 00 (hobbock 25 kg)

Alternative greases:

- Castrol Longtime PD2
- Elkalub GLS 135/N2

Dynalub 520
Liquid grease
Properties:

- Lithium-based, high-performance grease of NLGI grade 00 according to DIN 51818 (GP00K-20 according to DIN 51826)
- Good water resistance
- Corrosion protection
- Temperature range: -20 to +80 °C

Material numbers for Dynalub 520:

- R3416 043 00 (cartridge 400 g)
- R3416 042 00 (bucket 5 kg)

Alternative greases:

- Castrol Longtime PD00
- Elkalub GLS 135/N00

Notes on lubricant oil

We recommend **Shell Tonna S3 M 220** or similar products with the following properties:

- Special demulsifying oil CLP or CGLP as per DIN 51517-3 for machine bed tracks and tool guides
- A blend of highly refined mineral oils and additives
- Can be used even when mixed with significant quantities of metalworking fluids

Lubrication

Lubrication using a grease gun or a progressive feeder system

⚠ Pay attention to the “Note on lubrication” chapter: We recommend **Dynalub 510.** For more information, refer to the “Note on lubrication” chapter.

⚠ Never commission ball runner blocks without having carried out basic lubrication on them. In the case of pre-lubrication at the factory initial lubrication is not necessary. Rexroth ball rail systems are delivered preserved.

Initial lubrication of the ball runner blocks (basic lubrication)
Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- Attach one lube port per ball runner block on the left-hand **or** the right-hand side and lubricate it!

Initial lubrication is applied in three partial quantities as specified in table 1:

1. Grease the ball runner block with the first partial quantity as per table 1, pressing it in slowly with the help of a grease gun.
2. Run the ball runner block with three double strokes of 3 ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (normal stroke)				
	Material number (not initially greased)		**Material number (pre-lubricated)**		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm^3)				
15	0.4 (3x)		Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (3x)				
25	1.4 (3x)				
30	2.2 (3x)				
35	2.2 (3x)				
45	–				
55	9.4 (3x)		–		
65	15.4 (3x)				
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	2.7 (3x)		–		

Table 1

Stroke < 2 · ball runner block length B_1 (short stroke)

- Attach two lube ports per ball runner block; one each on the left-hand **and** the right-hand side and lubricate them!

Initial lubrication is applied to each fitting in three partial quantities as specified in table 2:

1. Grease each fitting on the ball runner block with the first partial quantity as per table 2, pressing it in slowly with the help of a grease gun.
2. Run the ball runner block with three double strokes of 3 ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (short stroke)				
	Material number (not pre-lubricated)		**Material number (pre-lubricated)**		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm^3)				
	left	**right**			
15	0.4 (3x)	0.4 (3x)	Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (3x)	0.7 (3x)			
25	1.4 (3x)	1.4 (3x)			
30	2.2 (3x)	2.2 (3x)			
35	2.2 (3x)	2.2 (3x)			
45	–				
55	9.4 (3x)	9.4 (3x)	–		
65	15.4 (3x)	15.4 (3x)			
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	2.7 (3x)	2.7 (3x)	–		

Table 2

Lubrication using a grease gun or a progressive feeder system (continued)

Relubrication of runner blocks

Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- If the relubrication interval according to diagram 1 or 2 ☞ 216 has been reached, insert the relubrication amount in accordance with table 3.

Size	Relubrication (normal stroke) Material number		Material number		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm^3)		**Partial amount** (cm^3)		
15	0.4 (1x)		0.4 (2x)		
20	0.7 (1x)		0.7 (2x)		
25	1.4 (1x)		1.4 (2x)		
30	2.2 (1x)		2.2 (2x)		
35	2.2 (1x)		2.2 (2x)		
45	–		4.7 (2x)		
55	9.4 (1x)		–		
65	15.4 (1x)		–		
20/40	–		1.0 (2x)		
25/70	–		1.4 (2x)		
35/90	2.7 (1x)		–		

Table 3

Stroke < 2 ball runner block length B_1 (short stroke)

- If the relubrication interval according to diagram 1 or 2 ☞ 216 has been reached, insert the relubrication amount in accordance with table 4 **per** lube port.
- Per lubrication cycle, the ball runner block should be run with a double stroke of 3 · ball runner block length B_1; however, the minimum stroke must be ball runner block length B_1.

Size	Relubrication (short stroke) Material number		Material number		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm^3)		**Partial amount per port** (cm^3)		
	left	**right**	**left**		**right**
15	0.4 (1x)	0.4 (1x)	0.4 (2x)		0.4 (2x)
20	0.7 (1x)	0.7 (1x)	0.7 (2x)		0.7 (2x)
25	1.4 (1x)	1.4 (1x)	1.4 (2x)		1.4 (2x)
30	2.2 (1x)	2.2 (1x)	2.2 (2x)		2.2 (2x)
35	2.2 (1x)	2.2 (1x)	2.2 (2x)		2.2 (2x)
45	–		4.7 (2x)		4.7 (2x)
55	9.4 (1x)	9.4 (1x)	–		
65	15.4 (1x)	15.4 (1x)	–		
20/40	–		1.0 (2x)		1.0 (2x)
25/70	–		1.4 (2x)		1.4 (2x)
35/90	2.7 (1x)	2.7 (1x)	–		

Table 4

Lubrication

Load-dependent relubrication intervals for grease lubrication using grease guns or progressive feeder systems ("dry axes")

The following conditions apply:

- Grease lubricant Dynalub 510 or alternatively Castrol Longtime PD 2
- No exposure to metalworking fluids
- Standard seals (SS)
- Ambient temperature: T = 20 – 30 °C

Key

C = Dynamic load capacity (N)
F_{comb} = Dynamically combined equivalent load (N)
F_{comb}/C = Load ratio (–)
s = Relubrication interval as running distance (km)

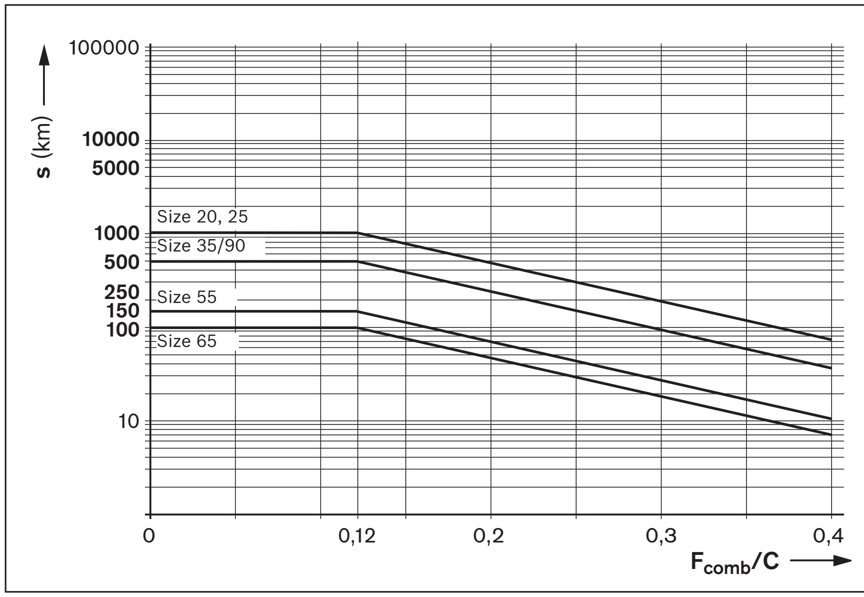
Definition of F_{comb}/C

The load ratio F_{comb}/C describes the ratio of the dynamic equivalent load with combined load on the bearing F_{comb} (taking into account the internal pre-tensioning force F_{pr}) and the dynamic load capacity C.

Please consult us regarding the relubrication intervals in the following cases:

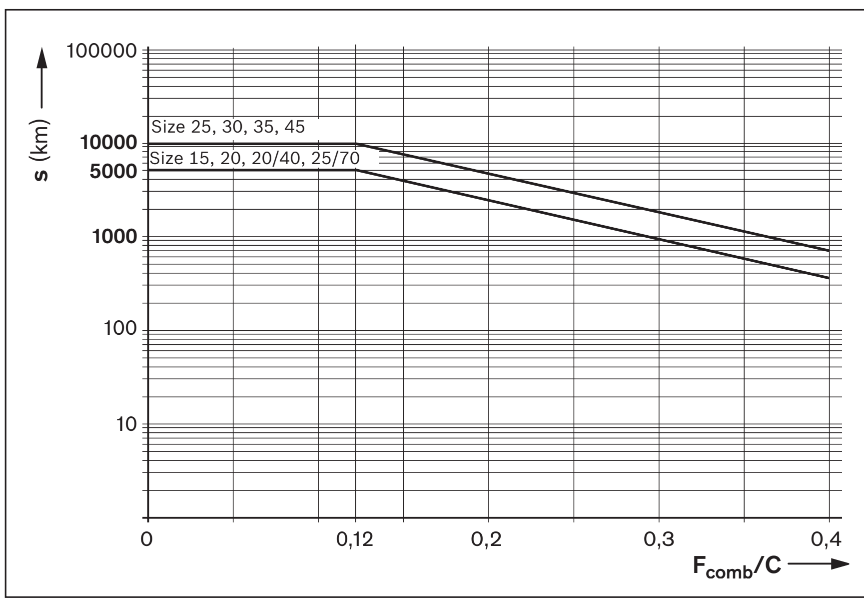
- exposure to metalworking fluids
- with dust coverage (wood, paper, etc.)
- use of double-lipped seals (DS)
- use of standard seals (SS) in combination with end seals or FKM seals or seal kits

⚠ Pay attention to the notes on lubrication!



Graph 1

Material number		
R16.. ... 10	**R16.. ... 11**	**R16.. ... 60**



Graph 2

Material number				
R20.. ... 04	**R16.. ... 20**	**R20.. ... 30**	**R16.. ... 70**	**R20.. ... 90**
R20.. ... 05	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**	
R20.. ... 06	**R16.. ... 22**	**R20.. ... 32**	**R16.. ... 72**	
R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**	

Liquid grease lubrication via single-line piston distributor systems

Fluid grease: We recommend **Dynalub 520**

⚠ Never commission ball runner blocks without having carried out basic lubrication on them. In the case of pre-lubrication at the factory initial lubrication is not necessary. Rexroth ball rail systems are delivered preserved.

Initial lubrication of the ball runner blocks (basic lubrication)
Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- ▶ Attach one lube port per ball runner block on the left-hand **or** the right-hand side and lubricate it!

Initial lubrication is applied in three partial quantities as specified in table 5:

1. Grease the ball runner block with the first partial quantity as per table 5, pressing it in slowly with the help of a grease gun.
2. Run the ball runner block with three double strokes of 3 · ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (normal stroke)				
	Material number (not initially greased)		Material number (pre-lubricated)		
	R16.. ... 10	R20.. ... 04/0Z	R16.. ... 20/2Z	R20.. ... 30/3Z	R16.. ... 70/7Z
	R16.. ... 11	R20.. ... 05	R16.. ... 21	R20.. ... 31	R16.. ... 71
	R16.. ... 60	R20.. ... 06/0Y	R16.. ... 22/2Y	R20.. ... 32/3Y	R16.. ... 72/7Y
		R20.. ... 07	R16.. ... 23	R20.. ... 33	R16.. ... 73
				R20.. ... 90	
	Partial amount (cm^3)				
15	0.4 (3x)		Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (3x)				
25	1.4 (3x)				
30	2.2 (3x)				
35	2.2 (3x)				
45	–				
55	9.4 (3x)		–		
65	15.4 (3x)				
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	2.7 (3x)		–		

Table 5

Stroke < 2 · ball runner block length B_1 (short stroke)

- ▶ Attach two lube ports per ball runner block; one each on the left-hand **and** the right-hand side and lubricate them!

Initial lubrication is carried out three times per port using the partial amount stated in table 6:

1. Grease each fitting on the ball runner block with the first partial quantity as per table 6, pressing it in slowly with the help of a grease gun.
2. Run the ball runner block with three double strokes of 3 · ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (short stroke)				
	Material number (not initially greased)		Material number (pre-lubricated)		
	R16.. ... 10	R20.. ... 04/0Z	R16.. ... 20/2Z	R20.. ... 30/3Z	R16.. ... 70/7Z
	R16.. ... 11	R20.. ... 05	R16.. ... 21	R20.. ... 31	R16.. ... 71
	R16.. ... 60	R20.. ... 06/0Y	R16.. ... 22/2Y	R20.. ... 32/3Y	R16.. ... 72/7Y
		R20.. ... 07	R16.. ... 23	R20.. ... 33	R16.. ... 73
				R20.. ... 90	
	Partial amount per port (cm^3)				
	left	**right**			
15	0.4 (3x)	0.4 (3x)	Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (3x)	0.7 (3x)			
25	1.4 (3x)	1.4 (3x)			
30	2.2 (3x)	2.2 (3x)			
35	2.2 (3x)	2.2 (3x)			
45	–				
55	9.4 (3x)	9.4 (3x)	–		
65	15.4 (3x)	15.4 (3x)			
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	2.7 (3x)	2.7 (3x)	–		

Table 6

Lubrication

Relubrication of runner blocks

Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- If the relubrication interval according to diagram 3 or 4 has been reached, insert the relubrication amount in accordance with table 7.

Size	Relubrication (normal stroke)				
	Material number		Material number		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
		Partial amount (cm³)			**Partial amount** (cm³)
15		0.4 (1x)			0.4 (2x)
20		0.7 (1x)			0.7 (2x)
25		1.4 (1x)			1.4 (2x)
30		2.2 (1x)			2.2 (2x)
35		2.2 (1x)			2.2 (2x)
45	–				4.7 (2x)
55		9.4 (1x)	–		
65		15.4 (1x)			
20/40	–				1.0 (2x)
25/70					1.4 (2x)
35/90		2.7 (1x)	–		

Table 7

Note

The necessary number of pulses is the integer quotient from the minimum relubrication amount according to table 7 and the smallest permissible piston distributor size (≙ minimum number of pulses) according to table 9.

The smallest permissible piston distributor size also depends on the mounting orientation.

The lubrication cycle results from dividing the relubrication interval by the determined number of pulses (c.f. the rating example).

Stroke < 2 · ball runner block length B_1 (short stroke)

- If the relubrication interval according to diagram 3 or 4 has been reached, insert the relubrication amount in accordance with table 8 **per** lube port.
- Calculate the required pulse count and lubricant cycle time in the same way as for relubrication (normal stroke).
- Per lubrication cycle, the ball runner block should be run with a double stroke of 3 · ball runner block length B_1; however, the minimum stroke must be ball runner block length B_1.

Size	Relubrication (short stroke)			
	Material number		Material number	
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23 R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm³)		**Partial amount per port** (cm³)	
	left	**right**	**left**	**right**
15	0.4 (1x)	0.4 (1x)	0.4 (2x)	0.4 (2x)
20	0.7 (1x)	0.7 (1x)	0.7 (2x)	0.7 (2x)
25	1.4 (1x)	1.4 (1x)	1.4 (2x)	1.4 (2x)
30	2.2 (1x)	2.2 (1x)	2.2 (2x)	2.2 (2x)
35	2.2 (1x)	2.2 (1x)	2.2 (2x)	2.2 (2x)
45	–		4.7 (2x)	4.7 (2x)
55	9.4 (1x)	9.4 (1x)	–	
65	15.4 (1x)	15.4 (1x)		
20/40	–		1.0 (2x)	1.0 (2x)
25/70			1.4 (2x)	1.4 (2x)
35/90	2.7 (1x)	2.7 (1x)	–	

Table 8

⚠ Pay attention to the notes on lubrication!

Liquid grease lubrication via single-line piston distributor systems (continued)

Load-dependent relubrication intervals for liquid grease lubrication via single-line piston distributor systems (“dry axes”)

The following conditions apply:

- Liquid grease Dynalub 520 or alternatively Castrol Longtime PD 00
- No exposure to metalworking fluids
- Standard seals (SS)
- Ambient temperature: T = 20 – 30 °C

Key

C	= Dynamic load capacity	(N)
F_{comb}	= Dynamically combined equivalent load	(N)
F_{comb}/C	= Load ratio	(–)
s	= Relubrication interval as running distance	(km)

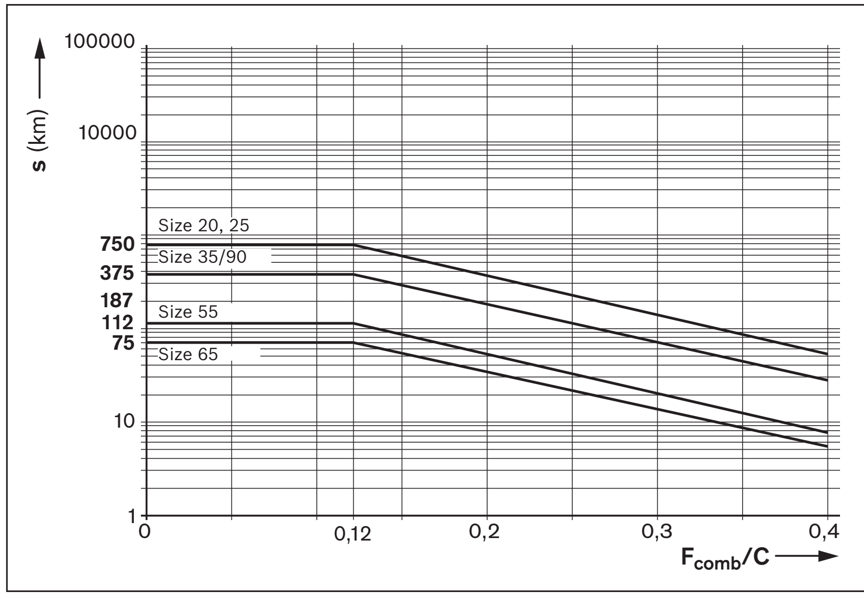
Definition of F_{comb}/C

The load ratio F_{comb}/C describes the ratio of the dynamic equivalent load with combined load on the bearing F_{comb} (taking into account the internal pre-tensioning force F_{pr}) and the dynamic load capacity C.

Please consult us regarding the relubrication intervals in the following cases:

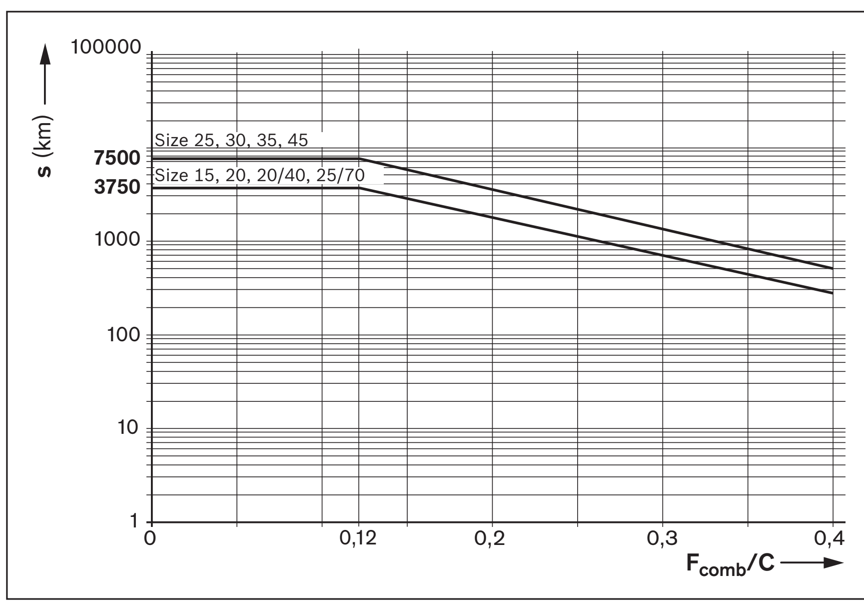
- exposure to metalworking fluids
- with dust coverage (wood, paper, etc.)
- use of double-lipped seals (DS)
- use of standard seals (SS) in combination with end seals or FKM seals or seal kits

⚠ Pay attention to the notes on lubrication!



Graph 3

Material number		
R16.. ... 10	**R16.. ... 11**	**R16.. ... 60**



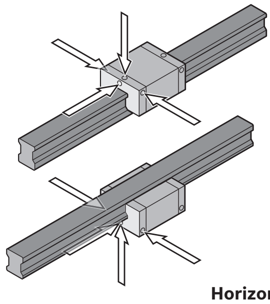
Graph 4

Material number				
R20.. ... 04	**R16.. ... 20**	**R20.. ... 30**	**R16.. ... 70**	**R20.. ... 90**
R20.. ... 05	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**	
R20.. ... 06	**R16.. ... 22**	**R20.. ... 32**	**R16.. ... 72**	
R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**	

Lubrication

Mounting orientation I – normal stroke

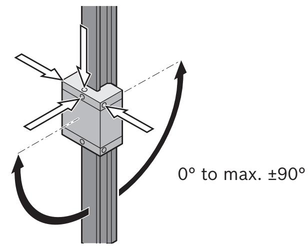
Horizontal
1 lube port can be used on a ball bearing guide on the left **or** on the right



Horizontal, top-down
Same port

Mounting orientation II – normal stroke

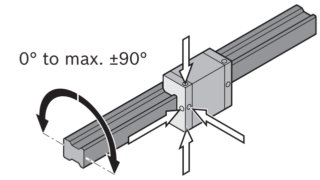
Vertical to inclined horizontal
1 lube port at top end cap



Vertical to inclined horizontal, top-down
Same port

Mounting orientation III – normal stroke

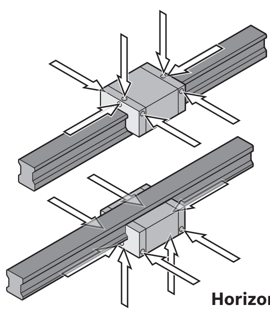
Wall mounting
1 lube port can be used on a ball bearing guide on the left **or** on the right



Same port

Mounting orientation IV – short stroke

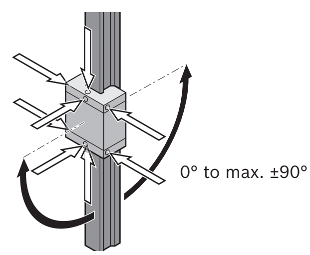
Horizontal
2 lube ports with one port each on the left-hand ball bearing guide **and** on the right-hand one



Horizontal, top-down
Same ports

Mounting orientation V – short stroke

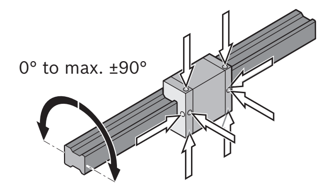
Vertical to inclined horizontal
2 lube ports with one port each on the top ball bearing guide **and** on the bottom one



Vertical to inclined horizontal, top-down
Same ports

Mounting orientation VI – short stroke

Wall mounting
2 lube ports with one port each on the left-hand ball bearing guide **and** on the right-hand one



Same ports

Smallest permissible piston distributor sizes for fluid grease lubrication via single-line consumption lubrication systems[1)]

<table>
<tr><th colspan="5">Ball runner block</th><th colspan="11">Smallest permissible piston distributor size
(≙ minimum number of pulses)
per port (cm³) with fluid grease of NLGI grade 00
Size</th></tr>
<tr><th colspan="4">Material number</th><th>Part number</th><th>15</th><th>20</th><th>25</th><th>30</th><th>35</th><th>45</th><th>55</th><th>65</th><th>20/40</th><th>25/70</th><th>35/90</th></tr>
<tr><td colspan="4">R16.. ... 10</td><td>Horizontal I, IV</td><td rowspan="3">–</td><td rowspan="3">0.30</td><td rowspan="3">0.30</td><td rowspan="3">–</td><td rowspan="3">–</td><td rowspan="3">–</td><td rowspan="3">0.30</td><td rowspan="3">0.30</td><td rowspan="3">–</td><td rowspan="3">–</td><td rowspan="3">0.30</td></tr>
<tr><td colspan="4">R16.. ... 11</td><td>Vertical II, V</td></tr>
<tr><td colspan="4">R16.. ... 60</td><td>Wall mount. III, VI</td></tr>
<tr><td>R20.. ... 04</td><td>R16.. ... 20</td><td>R20.. ... 30</td><td>R16.. ... 70</td><td>Horizontal I, IV</td><td rowspan="7">0.03</td><td rowspan="2">0.03</td><td rowspan="2">0.03</td><td rowspan="2">0.06</td><td rowspan="2">010</td><td rowspan="2">0.10</td><td rowspan="7" colspan="2">–</td><td rowspan="2">0.03</td><td rowspan="2">0.03</td><td rowspan="7">–</td></tr>
<tr><td>R20.. ... 0Z</td><td>R16.. ... 2Z</td><td>R20.. ... 3Z</td><td>R16.. ... 7Z</td><td>Vertical II, V</td></tr>
<tr><td>R20.. ... 05</td><td>R16.. ... 21</td><td>R20.. ... 31</td><td>R16.. ... 71</td><td rowspan="5">Wall mount. III, VI</td><td rowspan="5">0.06</td><td rowspan="5">0.06</td><td rowspan="5">0.10</td><td rowspan="5">0.20</td><td rowspan="5">0.20</td><td rowspan="5">0.06</td><td rowspan="5">0.06</td></tr>
<tr><td>R20.. ... 06</td><td>R16.. ... 22</td><td>R20.. ... 32</td><td>R16.. ... 72</td></tr>
<tr><td>R20.. ... 0Y</td><td>R16.. ... 2Y</td><td>R20.. ... 3Y</td><td>R16.. ... 7Y</td></tr>
<tr><td>R20.. ... 07</td><td>R16.. ... 23</td><td>R20.. ... 33</td><td>R16.. ... 73</td></tr>
<tr><td></td><td></td><td>R20.. ... 90</td><td></td></tr>
</table>

Table 9

1) The following conditions apply:
- Fluid grease Dynalub 520 (or alternatively Castrol Longtime PD 00) and piston distributor made by SKF
- Lubrication channels must be filled
- Ambient temperature T = 20 – 30 °C

Oil lubrication via single-line piston distributor systems
Oil lubricant

We recommend **Shell Tonna S3 M220** with the following properties:

- Special demulsifying oil CLP or CGLP as per DIN 51517-3 for machine bed tracks and tool guides
- A blend of highly refined mineral oils and additives
- Can also be used if intensely mixed with coolants/lubricants.

⚠ Pay attention to the notes on lubrication!

⚠ Never commission ball runner blocks without having carried out basic lubrication on them. In the case of pre-lubrication at the factory initial lubrication is not necessary. Rexroth ball rail systems are delivered preserved.

Initial lubrication of the ball runner blocks (basic lubrication)
Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- Attach one lube port per ball runner block on the left-hand **or** the right-hand side and lubricate it!

Initial lubrication is applied in two partial quantities as specified in table 10:

1. Apply the first of the oil quantities as specified in table 10 to the ball runner block.
2. Run the ball runner block with three double strokes of 3 · ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (normal stroke) Material number (not initially greased)		Material number (pre-lubricated)		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm^3)				
15	0.4 (2x)		Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (2x)				
25	1.0 (2x)				
30	1.1 (2x)				
35	1.2 (2x)				
45	–				
55	3.6 (2x)		–		
65	6.0 (2x)				
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	1.8 (2x)		–		

Table 10

Stroke < 2 · ball runner block length B_1 (short stroke)

- Attach two lube ports per ball runner block; one each on the left-hand **and** the right-hand side and lubricate them!

Initial lubrication is carried out twice per port using the partial amount stated in table 11:

1. Apply the first of the oil quantities as specified in table 11 to each fitting of the ball runner block.
2. Run the ball runner block with three double strokes of 3 · ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (short stroke) Material number (not pre-lubricated)		Material number (pre-lubricated)		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm^3)				
	left	**right**			
15	0.4 (2x)	0.4 (2x)	Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (2x)	0.7 (2x)			
25	1.0 (2x)	1.0 (2x)			
30	1.1 (2x)	1.1 (2x)			
35	1.2 (2x)	1.2 (2x)			
45	–				
55	3.6 (2x)	3.6 (2x)	–		
65	6.0 (2x)	6.0 (2x)			
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	1.8 (2x)	1.8 (2x)	–		

Table 11

Lubrication

Relubrication of runner blocks

Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- If the relubrication interval according to diagram 5 or 6 has been reached, insert the relubrication amount in accordance with table 12.

Note

The necessary number of pulses is the integer quotient from the minimum relubrication amount according to table 12 and the smallest permissible piston distributor size (≙ minimum number of pulses) according to table 14.
The smallest permissible piston distributor size also depends on the mounting orientation.
The lubrication cycle results from dividing the relubrication interval by the determined number of pulses (c.f. the rating example).

Size	**Relubrication (normal stroke)**				
	Material number		**Material number**		
	R16.. ... 10	**R20.. ... 04/0Z**	**R16.. ... 20/2Z**	**R20.. ... 30/3Z**	**R16.. ... 70/7Z**
	R16.. ... 11	**R20.. ... 05**	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**
	R16.. ... 60	**R20.. ... 06/0Y**	**R16.. ... 22/2Y**	**R20.. ... 32/3Y**	**R16.. ... 72/7Y**
		R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**
				R20.. ... 90	
	Partial amount (cm^3)		**Partial amount** (cm^3)		
15	0.4 (1x)		0.4 (1x)		
20	0.7 (1x)		0.7 (1x)		
25	1.0 (1x)		1.0 (1x)		
30	1.1 (1x)		1.1 (1x)		
35	1.2 (1x)		1.2 (1x)		
45	–		2.2 (1x)		
55	3.6 (1x)		–		
65	6.0 (1x)				
20/40	–		0.7 (1x)		
25/70			1.1 (1x)		
35/90	1.8 (1x)		–		

Table 12

Stroke < 2 · ball runner block length B_1 (short stroke)

- If the relubrication interval according to diagram 5 or 6 has been reached, insert the relubrication amount in accordance with table 13 **per** lube port.
- Calculate the required pulse count and lubricant cycle time in the same way as for relubrication (normal stroke).
- Per lubrication cycle, the ball runner block should be run with a double stroke of 3 · ball runner block length B_1; however, the minimum stroke must be ball runner block length B_1.

⚠ Pay attention to the notes on lubrication!

Size	**Relubrication (short stroke)**				
	Material number		**Material number**		
	R16.. ... 10	**R20.. ... 04/0Z**	**R16.. ... 20/2Z**	**R20.. ... 30/3Z**	**R16.. ... 70/7Z**
	R16.. ... 11	**R20.. ... 05**	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**
	R16.. ... 60	**R20.. ... 06/0Y**	**R16.. ... 22/2Y**	**R20.. ... 32/3Y**	**R16.. ... 72/7Y**
		R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**
				R20.. ... 90	
	Partial amount per port (cm^3)		**Partial amount per port** (cm^3)		
	left	**right**	**left**		**right**
15	0.4 (1x)	0.4 (1x)	0.4 (1x)		0.4 (1x)
20	0.7 (1x)	0.7 (1x)	0.7 (1x)		0.7 (1x)
25	1.0 (1x)	1.0 (1x)	1.0 (1x)		1.0 (1x)
30	1.1 (1x)	1.1 (1x)	1.1 (1x)		1.1 (1x)
35	1.2 (1x)	1.2 (1x)	1.2 (1x)		1.2 (1x)
45	–		2.2 (1x)		2.2 (1x)
55	3.6 (1x)	3.6 (1x)	–		
65	6.0 (1x)	6.0 (1x)			
20/40	–		0.7 (1x)		0.7 (1x)
25/70			1.1 (1x)		1.1 (1x)
35/90	1.8 (1x)	1.8 (1x)	–		

Table 13

Oil lubrication via single-line piston distributor systems (continued)

Load-dependent relubrication intervals for oil lubrication via single-line piston distributor systems ("dry axes")

The following conditions apply:
- Shell Tonna S3 M220 lubricant oil
- No exposure to metalworking fluids
- Standard seals (SS)
- Ambient temperature:
  T = 20 – 30 °C

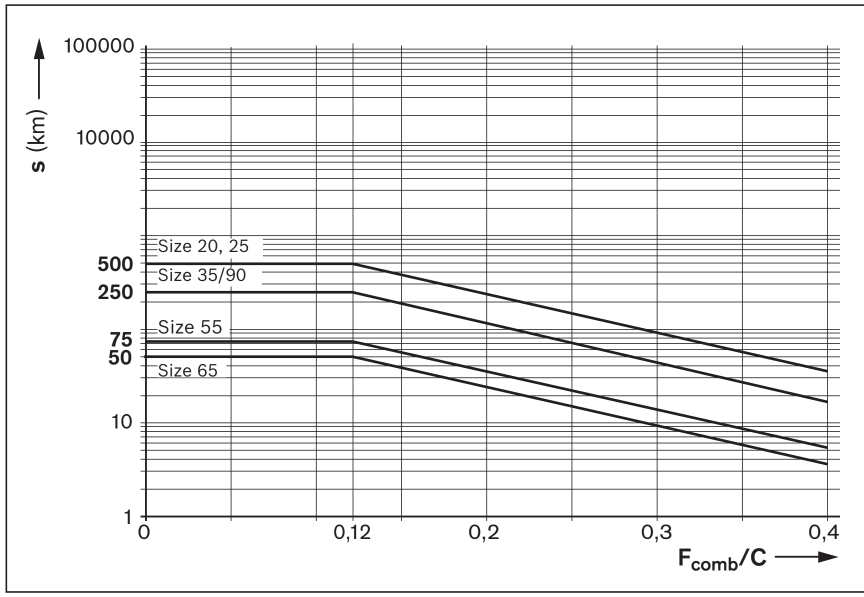
Key

C = Dynamic load capacity (N)
F_{comb} = Dynamically combined equivalent load (N)
F_{comb}/C = Load ratio (–)
s = Relubrication interval as running distance (km)

Definition of F_{comb}/C
The load ratio F_{comb}/C describes the ratio of the dynamic equivalent load with combined load on the bearing F_{comb} (taking into account the internal pre-tensioning force F_{pr}) and the dynamic load capacity C.

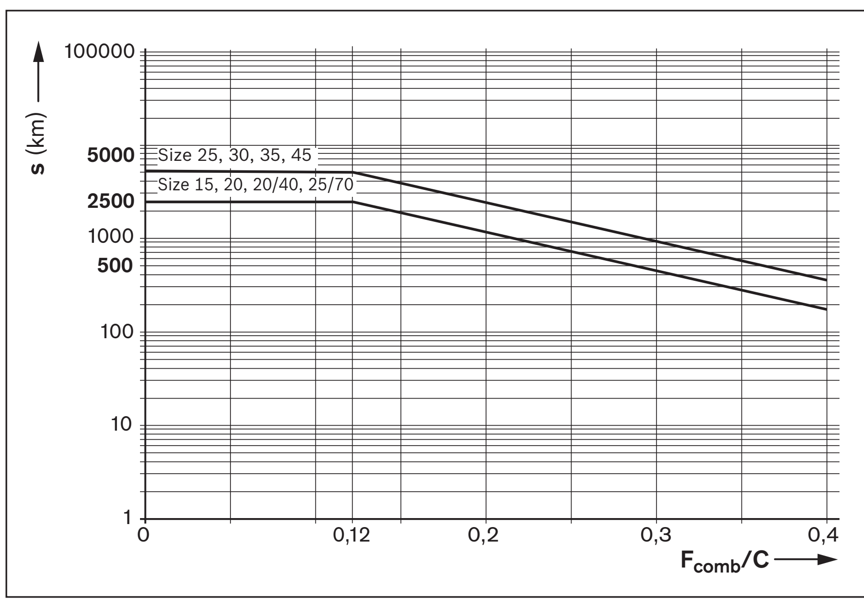
Please consult us regarding the relubrication intervals in the following cases:
- exposure to metalworking fluids
- with dust coverage (wood, paper, etc.)
- use of double-lipped seals (DS)
- use of standard seals (SS) in combination with end seals or FKM seals or seal kits

⚠ Pay attention to the notes on lubrication!



Graph 5

Material number		
R16.. ... 10	**R16.. ... 11**	**R16.. ... 60**

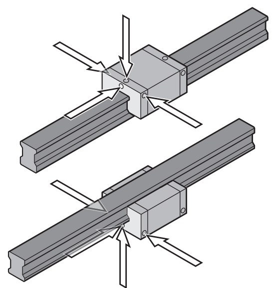


Graph 6

Material number				
R20.. ... 04	**R16.. ... 20**	**R20.. ... 30**	**R16.. ... 70**	**R20.. ... 90**
R20.. ... 05	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**	
R20.. ... 06	**R16.. ... 22**	**R20.. ... 32**	**R16.. ... 72**	
R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**	

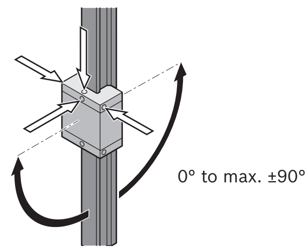
Lubrication

Mounting orientation I – normal stroke
Horizontal
1 lube port can be used on a ball bearing guide on the left **or** on the right



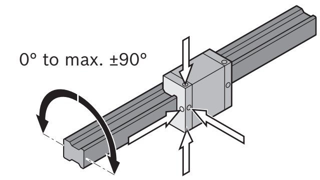
Horizontal, top-down
Same port

Mounting orientation II – normal stroke
Vertical to inclined horizontal
1 lube port at top end cap



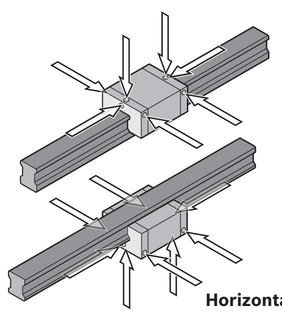
Vertical to inclined horizontal, top-down
Same port

Mounting orientation III – normal stroke
Wall mounting
1 lube port can be used on a ball bearing guide on the left **or** on the right



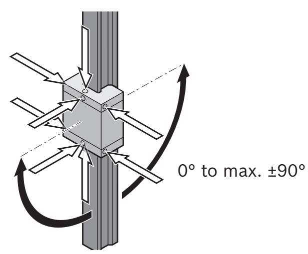
Same port

Mounting orientation IV – short stroke
Horizontal
2 lube ports with one port each on the left-hand ball bearing guide **and** on the right-hand one



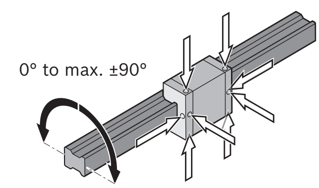
Horizontal, top-down
Same ports

Mounting orientation V – short stroke
Vertical to inclined horizontal
2 lube ports with one port each on the top ball bearing guide **and** on the bottom one



Vertical to inclined horizontal, top-down
Same ports

Mounting orientation VI – short stroke
Wall mounting
2 lube ports with one port each on the left-hand ball bearing guide **and** on the right-hand one



Same ports

Smallest permissible piston distributor sizes for oil lubrication via single-line consumption lubrication systems[1)]

Ball runner block					Smallest permissible piston distributor size (≙ minimum number of pulses) per port (cm^3) with oil viscosity 220 m^2/s										
					Size										
Material number				**Part number**	**15**	**20**	**25**	**30**	**35**	**45**	**55**	**65**	**20/40**	**25/70**	**35/90**
R16.. ... 10 **R16.. ... 11** **R16.. ... 60**				**Horizontal I, IV** **Vertical II, V** **Wall mount. III, VI**	–	0.60		–			1.50		–		0.60
R20.. ... 04 **R20.. ... 0Z** **R20.. ... 05** **R20.. ... 06** **R20.. ... 0Y** **R20.. ... 07**	**R16.. ... 20** **R16.. ... 2Z** **R16.. ... 21** **R16.. ... 22** **R16.. ... 2Y** **R16.. ... 23**	**R20.. ... 30** **R20.. ... 3Z** **R20.. ... 31** **R20.. ... 32** **R20.. ... 3Y** **R20.. ... 33** **R20.. ... 90**	**R16.. ... 70** **R16.. ... 7Z** **R16.. ... 71** **R16.. ... 72** **R16.. ... 7Y** **R16.. ... 73**	**Horizontal I, IV** **Vertical II, V**	0.03	0.03	0.03	0.06	0.10	0.10	–		0.03	0.03	–
				Wall mount. III, VI		0.06	0.06	0.10	0.16	0.16			0.06	0.06	

Table 14

1) The following conditions apply:
- Fluid grease Shell Tonna S3 M 220 and piston distributor made by SKF
- Lubrication channels must be filled
- Ambient temperature T = 20 – 30 °C

Design example for lubrication of a typical 2-axis application with centralized lubrication

X-axis

Component or parameter	Given data
Ball runner block	Size 35; 4 pcs.; C = 51,800 N; Material numbers: R1651 323 20
Ball guide rail	Size 35; 2 rails; L = 1,500 mm; part numbers: R1605 333 61
Combined equivalent dynamic load on bearing	F_{comb} = 12,570 N (per ball runner block) considering the preload (here C2)
Stroke	500 mm
Average linear speed	v_m = 1 m/s
Temperature	20 – 30 °C
Mounting orientation	Horizontal
Lubrication	Single-line centralized lubrication system for all axes with liquid grease Dynalub 520
Exposure to contaminants	No exposure to fluids, chips, dust

Design variables	**Design input (per runner block)**	**Information sources**
1. Normal or short-stroke?	Normal stroke: Stroke ≥ 2 · ball runner block length B_1 500 mm ≥ 2 · 77 mm 500 mm ≥ 154 mm! i.e. normal stroke applicable!	▶ Normal stroke formula, ball runner block length B_1
2. Initial lubrication quantity	1 lube port, initial lubrication quantity: pre-lubricated with Dynalub 510 before shipment	▶ Initial lubrication amount from table 5
3. Relubrication quantity	1 lube port, relubrication quantity: 2.2 cm³ (2x)	▶ Relubrication amount from table 7
4. Mounting orientation	Mounting orientation 1 – normal stroke (horizontal)	▶ Installation position from overview
5. Piston distributor size	Permissible piston distributor size: 0.1 cm³	▶ Piston distributor size from table 9 size 35, installation position I (horizontal)
6. Number of pulses	$\text{Number of pulses} = \dfrac{2 \cdot 2.2\ \text{cm}^3}{0.1\ \text{cm}^3} = 44$	▶ $\text{Number of pulses} = \dfrac{\text{Quantity} \cdot \text{relubrication amount}}{\text{perm. piston distributor size}}$
7. Load ratio	$\text{Load ratio} = \dfrac{12{,}570\ \text{N}}{51{,}800\ \text{N}} = 0.24$	▶ Load ratio = F_{comb}/C F_{comb} and C from specifications
8. relubrication interval	Relubrication interval: 2,150 km	▶ Relubrication interval from diagram 4: Curve size 35 at load ratio 0.24
9. Lubrication cycle	$\text{Lube cycle} = \dfrac{2{,}150\ \text{km}}{44} = 48\ \text{km}$	▶ $\text{Lube cycle} = \dfrac{\text{relubrication interval}}{\text{Number of pulses}}$
Interim result (X-axis)	With the X-axis, you must insert a minimum amount of 0.1 cm³ Dynalub 520 per ball runner block every 48 km.	

Y-axis

Component or parameter	Given data
Ball runner block	Size 25; 4 pcs.; C = 28,600 N; Material numbers: R1651 223 20
Ball guide rail	Size 25; 2 rails; L = 1,000 mm; part numbers: R1605 232 31
Combined equivalent dynamic load on bearing	F_{comb} = 3,420 N (per ball runner block) considering the preload (here C2)
Stroke	50 mm (short stroke)
Average linear speed	v_m = 1 m/s
Temperature	20 – 30 °C
Mounting orientation	Vertical
Lubrication	Single-line centralized lubrication system for all axes with liquid grease Dynalub 520
Exposure to contaminants	No exposure to fluids, chips, dust

Design variables	Design input (per runner block)	Information sources
1. Normal or short-stroke?	Normal stroke: Stroke ≥ 2 · ball runner block length B_1 50 mm ≥ 2 · 57.8 mm 50 mm < 115.6 mm! i.e. short stroke applicable!	▶ Normal stroke formula, ball runner block length B_1
2. Initial lubrication quantity	2 lube ports, initial lubrication quantity per lube port: pre-lubricated with Dynalub 510 before shipment	▶ Initial lubrication amount from table 6
3. Relubrication quantity	2 lube ports, relubrication quantity per port: 1.4 cm^3 (2x)	▶ Relubrication amount from table 8
4. Mounting orientation	Mounting orientation V – short stroke (vertical to inclined horizontal)	▶ Installation position from overview
5. Piston distributor size	Permissible piston distributor size: 0.03 cm^3	▶ Piston distributor size from table 9 size 25, installation position V (vertical to inclined horizontal)
6. Number of pulses	Pulse count = $\frac{2 \cdot 1.4\ cm^3}{0.03\ cm^3} = 94$	▶ $\text{Number of pulses} = \frac{\text{Quantity} \cdot \text{relubrication amount}}{\text{perm. piston distributor size}}$
7. Load ratio	Load ratio = $\frac{3{,}420\ N}{28{,}600\ N} = 0.12$	▶ Load ratio = F_{comb}/C F_{comb} and C from specifications
8. relubrication interval	Relubrication interval: 7,500 km	▶ Relubrication interval from diagram 4: Curve size 25 at load ratio 0.12
9. Lubrication cycle	Lube cycle = $\frac{7{,}500\ km}{94} = 80\ km$	▶ Lube cycle = $\frac{\text{relubrication interval}}{\text{Number of pulses}}$

Interim result (Y-axis)

With the Y-axis, you must insert a minimum amount of 0.03 cm^3 Dynalub 520 per ball runner block and lube port every 80 km.

Final result (two-axis lubrication)

Since both axes are to be supplied by a single-line consumption lubrication system in this example, the X-axis with its lower lubrication cycle of 48 km determines the overall cycle, i.e. the Y-axis is also lubricated every 48 km.

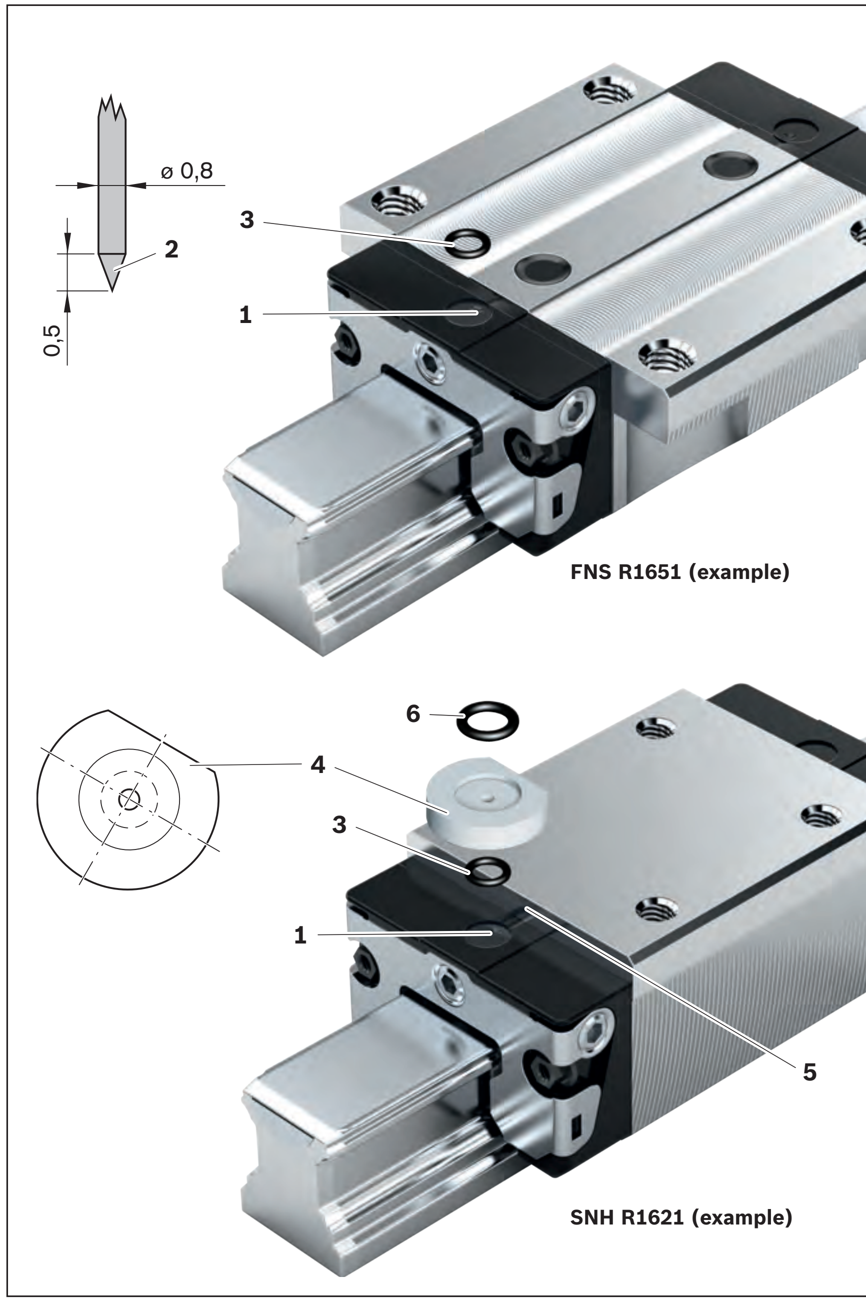
The number of ports and the minimum lubricant quantities determined for each axis remain the same.

Lubrication from above, lubrication from above without lubrication adapter
For all ball runner blocks prepared for lubrication from above.
(Exceptions: high ball runner blocks SNH R1621 and SLH R1624)
In the O-ring recess there is a further pre-formed small recess (1).
Do not drill it open.
Risk of contamination!

1. Heat up a pointed metal punch (2) with diameter of 0.8 mm.
2. Use the metal spike to carefully open the recess (1) and pierce it.
   Pay attention to the maximum permissible depth T_{max} stated in the table!
3. Insert the O-ring (3) into the recess (the O-ring is not supplied with the ball runner block.
   Ball runner block accessory)

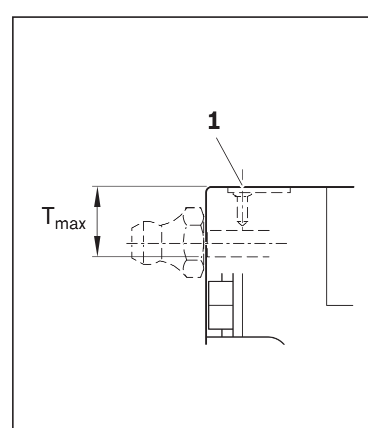
Lubrication from above with lube adapter
(Ball runner block accessory)
A lube adapter is needed for high runner blocks, if lubrication is to be performed through the carriage.
In the O-ring recess there is a further pre-formed small recess (1).
Do not drill it open.
Risk of contamination!

1. Heat up a pointed metal punch (2) with diameter of 0.8 mm.
2. Use the metal spike to carefully open the recess (1) and pierce it.
   Pay attention to the maximum permissible depth T_{max} stated in the table!
3. Insert O-ring (3) in the recess (O-ring is supplied with the lube adapter).
4. Insert the lube adapter at a slant into the recess and press the straight side (4) against the steel part (5). Use grease to fix the adapter in place.
5. Place O-ring (6) in the lube adapter (O-ring is supplied with the lube adapter).



FNS R1651 (example)
SNH R1621 (example)

Size	Lubrication opening at top: Maximum permissible depth for piercing T_{max} (mm)	
	Ball runner block standard height/high	Ball runner block low profile
15	3.6	–
20	3.9	4.4
25	3.3	4.9
30	6.6	–
35	7.5	–
45	8.8	–
20/40	4.0	–
25/70	2.1	–
35/90	7.9	–



Maintenance

Cleaning cycle

Dirt can settle and encrust on guide rails, especially when these are not enclosed.
To ensure that seals and cover strips retain their functionality, this dirt must be removed at regular intervals.
It is advisable to perform at least one full cleaning cycle over the entire installed rail length at least twice a day, but at the latest every 8 hours.
Before shutting down the machine, always perform a cleaning cycle.
Shorten the maintenance intervals for systems exposed to metalworking fluids.

Checking accessories

All accessories used for scraping or wiping the guide rails must be checked at regular intervals.

In environments with heavy contamination, it is advisable to replace all the parts directly exposed to such contamination.

We recommend checking the accessories at least once a year.

The Drive & Control Company

Bosch Rexroth AG
Ernst-Sachs-Straße 100
97424 Schweinfurt, Germany
Phone +49 9721 937-0

www.boschrexroth.com

Find your local contact person here:
www.boschrexroth.com/contact

R999000485 (2014-12)
replaces:
- R310EN 2202 (2009.06) (Ball Rail Systems)
- R310EN 2225 (2011.04) (Resist NRII ball rail systems)
- R310EN 2213 (2006.02) (High-precision ball runner blocks)
- R310EN 2218 (2012-01) (High-speed ball rail systems)

The Drive & Control Company

Rexroth
Bosch Group

Ball Rail Systems BSCL

Ball Runner Blocks, Ball Guide Rails, accessories

The Ball Rail System Compact Line BSCL

The new Ball Rail System BSCL (Ball Rail Systems Compact Line) complements the existing linear guide program and provides application-specific performance for the middle performance and price segments. Its performance data fulfills the demands of standard tasks and complements the high-precision BSHP series.
BSCL Ball Guide Rails are available in six sizes, six Runner Block types, three preload classes and three accuracy classes (N, H, P).
Also with this series, rails and Runner Blocks in the respective sizes can be combined and delivered worldwide in the shortest time from stock. A peculiarity of the BSCL linear guides: Guide Rails can be shortened to the desired length using simple tools, without the need for costly end machining.
With a new structural design and significantly lower material use, Rexroth has achieved an outstanding application-oriented price-performance ratio.
Connection elements are available for special ambient conditions.

With the expanded product portfolio, Bosch Rexroth can cover all requirements economically.

Advanced product information on the Ball Rail System BSCL using the QR code:
In addition to the material number, a QR code can also be found on the BSCL Runner Block. This leads to further product descriptions and enables the user to call up extensive information on the product. This includes the instructions and the catalog, which contains all technical information.
A connection to the eShop, the short product name for the Runner Block as well as the production plant and the production date are in preparation.

Contents

At a glance

Six Runner Block designs made of steel in accordance with ISO 12090-1

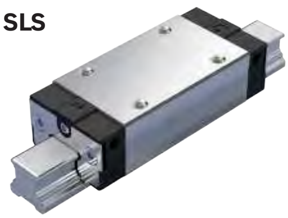
FNS

SNS

SNH

FLS

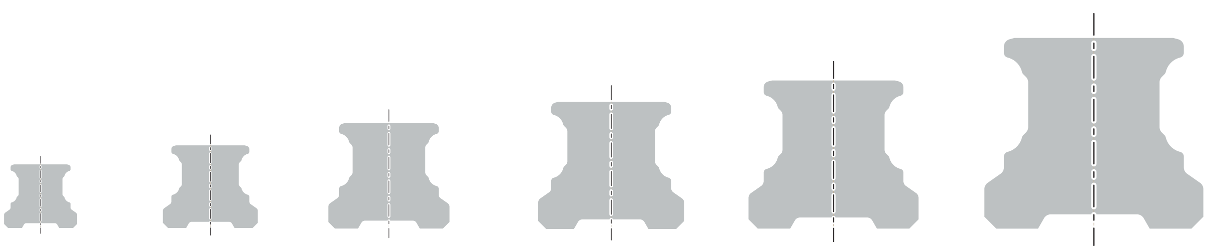
SLS



SLH

FNS = Flanged, normal, standard height
FLS = Flanged, long, standard height
SNS = Slimline, normal, standard height
SLS = Slimline, long, standard height
SNH = Slimline, normal, high
SLH = Slimline, long, high

Six sizes from 15 to 45



Size 15 **Size 20** **Size 25** **Size 30** **Size 35** **Size 45**

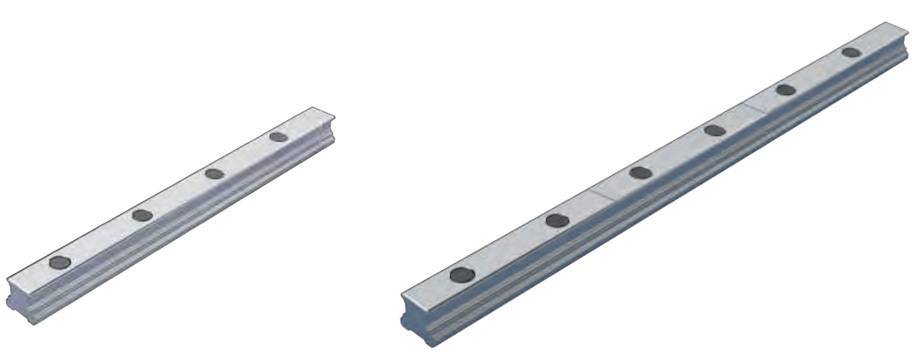
Three accuracy classes:

N (normal)	**H (high)**	**P (precision)**

Three preload classes:

C0 (without preload)	**C1 (moderate preload)**	**C2 (average preload)**

Guide Rails for mounting from above with plastic mounting hole plugs:
BSCL Ball Guide Rails can be supplied as factory lengths or cut-to-size either in one or more parts (detailed descriptions can be found in the chapter “Ball Guide Rails”).



Product description

TOP logistics thanks to interchangeability and Ball Guide Rails in factory lengths

- Ball Guide Rails and Ball Runner Blocks are precisely manufactured in the ball raceway sector to allow Runner Blocks and Ball Guide Rails of the same size to be combined not only within but also beyond the respective accuracy class
- Ball Guide Rails can be ordered in factory lengths and shortened to the desired length without costly end machining, also at the customer's location
- A market-oriented product portfolio and the interchangeability of Ball Guide Rails and Ball Runner Blocks allow deliveries to be made on time from stock

O-arrangement of the raceways

- 4-row Profiled Rail System in O-arrangement. Low amount of friction due to 2-point rolling contact
- The same high load ratings in all four main directions of loading
- High torque capacity and torsional moment compared to an X-array
- High degree of system rigidity and accuracy, optionally available with zero-clearance pre-tensioning

Patented entry-zone geometry and optimized deflection

- Lowest frictional oscillation in connection with low friction force
- Improved travel accuracy

Integrated lubrication and sealing

- Relubricatable on all sides with 8 connections, lubricating elements in M4 (sizes 15 and 20) and M6 (sizes 25 - 45)
- Ball Runner Blocks are prelubricated at the factory
- Lubrication with grease, liquid grease and oil possible
- Integrated all-round sealing by means of end seals and longitudinal seals

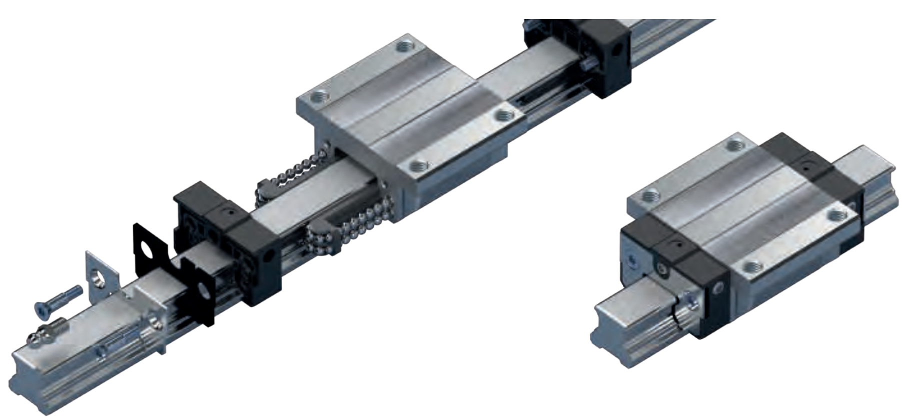
Range of accessories:

- Front seal, Front Lube Unit and cover plate wiper

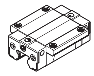
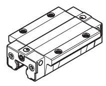
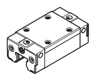
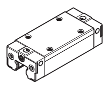
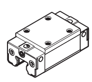
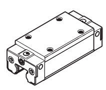
Technical data

- Load ratings:
  C_{50} from 11,500 to 99,800 N
  C_0 from 11,700 to 120,000 N
- Speeds up to 3 m/s
- Acceleration up to 250 m/s²

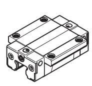
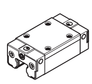
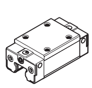
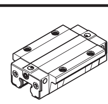
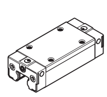
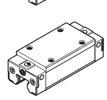
Ball Rail System BSCL with FNS Ball Runner Block made of steel (components and assembly)



Ball Runner Block designs

		Application area	Load-bearing capacity	Special feature
FNS **R205A**		For normal rigidity requirements	High	For mounting from above and below
FLS **R205B**		For high rigidity requirements	Very high	For mounting from above and below
SNS **R205C**		For restricted space in the transverse direction	High	For mounting from above
SLS **R205D**		For restricted space in the transverse direction and high rigidity requirements	Very high	For mounting from above
SNH **R205E**		For restricted space in the transverse direction and high rigidity requirements	High	Higher rigidity than SNS
SLH **R205F**		For restricted space in the transverse direction and high rigidity requirements	Very high	Higher rigidity than SLS

Ball Runner Blocks with load ratings and load moments

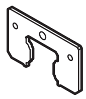
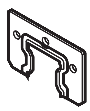
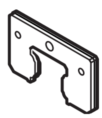
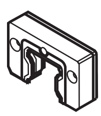
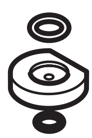
		Size	15	20	25	30	35	45
FNS **R205A**		C_{50}[2)]	11,500	18,400	27,500	39,300	54,100	78,100
		C_{100}[1)]	9,100	14,600	21,800	31,200	42,900	62,000
		C_0	11,700	19,600	30,600	42,200	56,600	83,000
SNS **R205C**		M_{t50}[2)]	98	190	340	590	970	1,790
		M_{t100}[1)]	78	150	270	470	770	1,420
		M_{t0}	100	210	380	640	1,030	1,930
SNH **R205E**		M_{L50}[2)]	79	160	280	450	720	1,320
		M_{L100}[1)]	63	130	220	360	570	1,050
		M_{L0}	82	170	310	490	760	1,420
FLS **R205B**		C_{50}[2)]	14,500	22,800	35,300	49,100	69,300	99,800
		C_{100}[1)]	11,500	18,100	28,000	39,000	55,000	79,200
		C_0	16,800	27,100	44,200	58,800	81,600	120,000
SLS **R205D**		M_{t50}[2)]	130	240	440	740	1,260	2,320
		M_{t100}[1)]	100	190	350	590	1,000	1,840
		M_{t0}	150	290	550	890	1,480	2,780
SLH **R205F**		M_{L50}[2)]	140	260	490	770	1,300	2,380
		M_{L100}[1)]	110	210	390	610	1,030	1,890
		M_{L0}	160	320	620	920	1,530	2,860

1) Determination of the dynamic load capacities and load moments is based on a travel life of 100,000 m according to DIN ISO 14728-1.
2) The determination of the dynamic load capacity and load moments is based on a 50,000 m travel life according to DIN ISO 14728-1.

See the chapter "General technical data and calculations" for the definition of the formula symbols

Ball Runner Block accessories

Connection elements are additionally available as options for the Ball Runner Blocks.

	Application area
Cover plate wiper 	The cover plate wiper is used as an additional element to strip off any accumulated coarse dirt or swarf or in the event of solidified dirt on the Ball Guide Rail.
Front seal 	Front seals provide effective protection for the Ball Runner Block, preventing fine dirt or metal particles, as well as coolant or cutting fluid from working their way in. This means that the sealing effect is improved even more.
Seal kit 	When using cover plate wiper and front seal simultaneously, the seal kit is recommended.
Front Lube Unit 	When very frequent relubrication is required, Front Lube Units allow travel distances of up to 5,000 km without relubrication under normal loads. The function is only assured where there is no exposure to liquids and little contamination. The maximum permissible operating temperature is 60°C.
Lubrication adapter 	For oil and grease lubrication from above for SNH and SLH Ball Runner Blocks (high versions).

Ball Guide Rails

BSCL Ball Guide Rails can be supplied as factory lengths or Ball Guide Rails cut-to-size (desired customer length).

Ball Guide Rail KSE-...-SNS; R2055 Standard Ball Guide Rail made of steel, for mounting from above, with plastic mounting hole plugs	**Description**
Factory lengths	Factory lengths are Guide Rails without end machining which are only available in four-meter sections. A factory length has an overall length of approx. 4,150 mm with a usable length (good length) of at least 3,600 mm in one piece of the respective accuracy class. The maximum good length is 4,150 mm. The good length is specified on the packaging and charged upon delivery. The plastic mounting hole plugs used to seal the mounting holes must be ordered separately. The factory lengths can be cut to the desired length by the user. You can obtain information in this respect from your sales partner and your local Bosch Rexroth sales companies.
Desired customer length	BSCL Ball Guide Rails can be cut before delivery. The maximum lengths for a one-piece rail section can be found in the “Ball Guide Rails” section. If longer rails are required, Bosch Rexroth will supply them as multi-piece Ball Guide Rails. The plastic mounting hole plugs used to seal the mounting holes belong to the scope of delivery.

Notes

General notes

- Combining different accuracy classes
  When you combine Ball Guide Rails and Ball Runner Blocks of different accuracy classes, the tolerances change for dimensions H and A3. See “Accuracy classes and their tolerances.”

Intended Use

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

Misuse

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

- the transport of persons

General Safety Instructions

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

Directives and standards

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

DIN EN ISO 12100

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

Directive 2006/42/EC

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

Directive 2001/95/EC

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

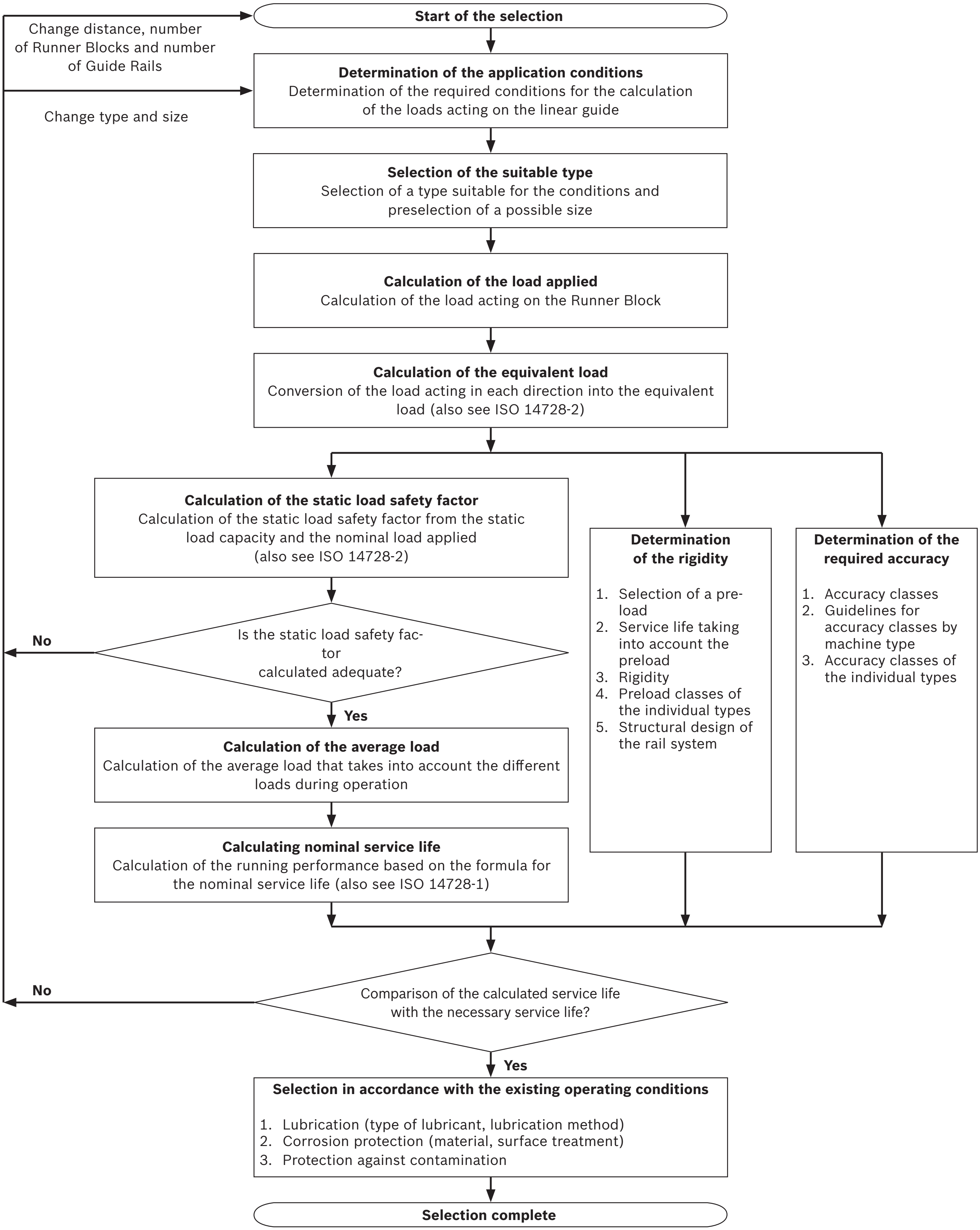
Directive 85/374/EEC

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

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

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

Selection of a linear guide acc. to DIN 637



General technical data and calculations

General notes

The general technical data and calculations apply to all Ball Rail Systems BSCL. This means to all Ball Runner Blocks and Ball Guide Rails. Specific technical data relating to the individual Ball Runner Blocks and Ball Guide Rails is given separately.

Load capacity definition based on 50 and 100 km

The definition of the load rating is based on a nominal service life of 10^5 m = 100 km in the European region, whereas a load carrier definition based on a service life of 50 km has become prevalent in the Asian region. The conversion factor between both values is $C_{50} = 1.26 \times C_{100}$. Both values for the dynamic load ratings and load moments (which can be told by the index) are specified in this catalog.
The following calculation chapter is based on the carrier load definition C_{100}.

Travel speed

v_{max} : 3 m/s

Acceleration

a_{max} : 250 m/s^2

If preload force F_{pr} is canceled, a_{max} = 50 m/s^2 applies
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Operating temperature range

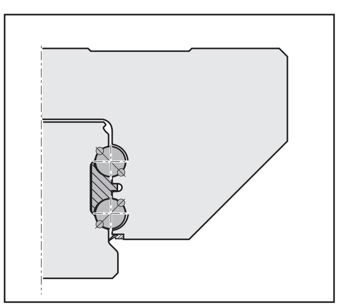
t : -10 to 80 °C

Up to 100°C is allowed for a short time.

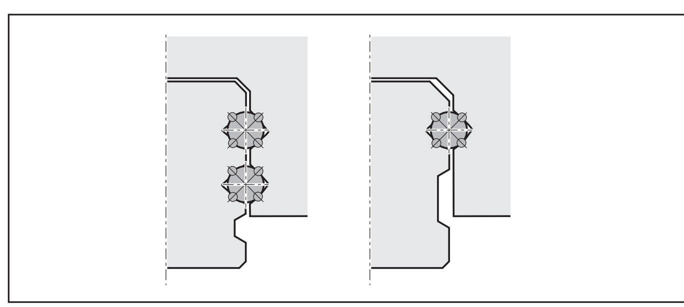
Friction

μ: 0.002 - 0.003

Friction coefficient μ without seal friction



2-point contact

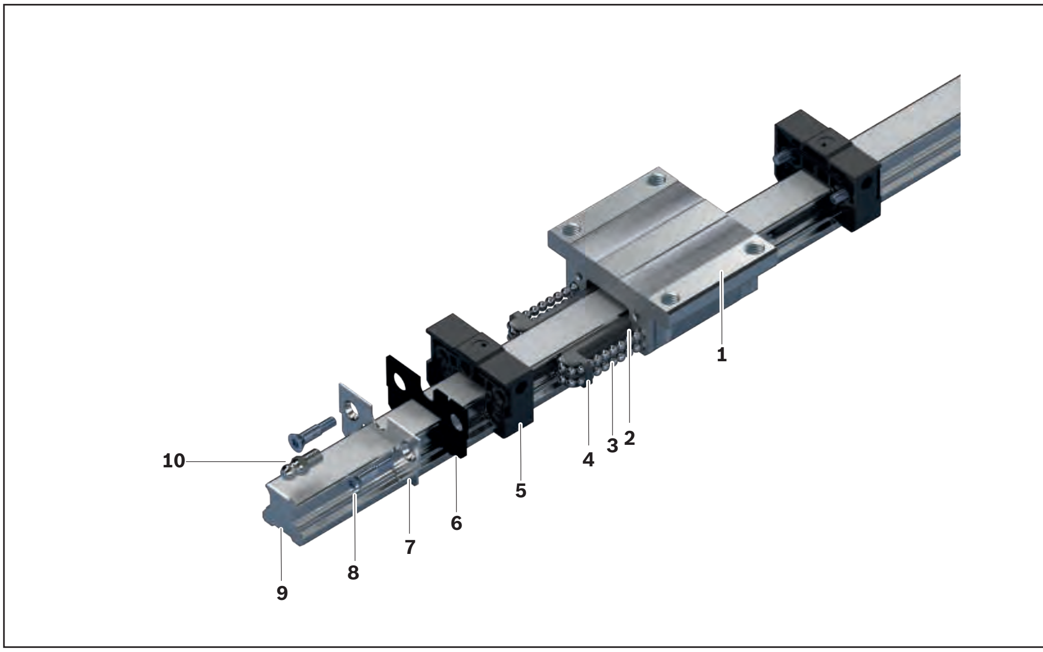


4-point contact

Due to the Rexroth design with four rows of balls, there are always **two points of contact** in all the directions of loading. This reduces the friction to a minimum.

Other Ball Rail Systems with two or four rows of balls with **four points of contact** have multiple friction: the Gothic raceway profile causes higher friction due to the differential slip with lateral loading with a comparable preload without load (up to five times the friction coefficient depending on the raceway curvature and the load). This high friction leads correspondingly to greater heat.

Material specifications



Item	Part	Material
1	Ball Runner Block body	Steel
2	Steel bearing plate	Anti-friction bearing steel
3	Balls	Anti-friction bearing steel
4	Frame	Plastic TEE-E
5	Ball guide	Plastic POM
6	Sealing plate	Elastomer NBR
7	Front panel	Corrosion-resistant steel 1.4306
8	Countersunk screws	Galvanized carbon steel
9	Ball Guide Rail	Heat-treated steel
10	Lube nipple	Galvanized carbon steel

General technical data and calculations

How to select a linear guide according to DIN 637 is described on page 10. The necessary calculations are explained in the following chapter. They are integrated in the “Linear Motion Designer” calculation program.

Forces and moments

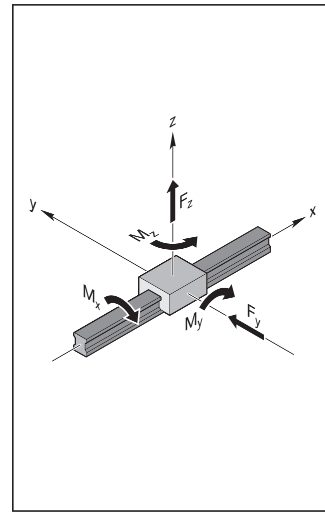
In Rexroth Ball Rail Systems the raceways are arranged at a pressure angle of 45°.
This results in the same high load capacity of the entire system in all four main directions of loading.
The Ball Runner Blocks may be subjected to both forces and load moments.

Forces in the main directions of loading

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

Moments

- Torsional moment M_x (around the y-axis)
- Longitudinal moment M_y (around the y-axis)
- Longitudinal moment M_z (around the z-axis)



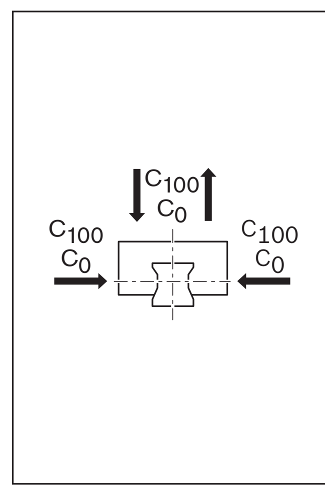
Definition of load capacities

Dynamic load capacity C_{100}

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

Static load rating C_0

Static load in the load direction that corresponds to a calculated load in the center of the contact point with the greatest load between the ball and raceway of 4200 MPa.
Note: With this stress at the contact point, permanent overall deformation of the ball and raceway occurs that corresponds to about 0.0001 times the ball diameter. (according to DIN ISO 14728-1).



Definition of moment load capacities

Dynamic torsional moment load capacity M_{t100}

Comparative dynamic moment about the x-axis which causes a load equivalent to the dynamic load capacity C_{100} .

Static torsional moment load capacity M_{t0}

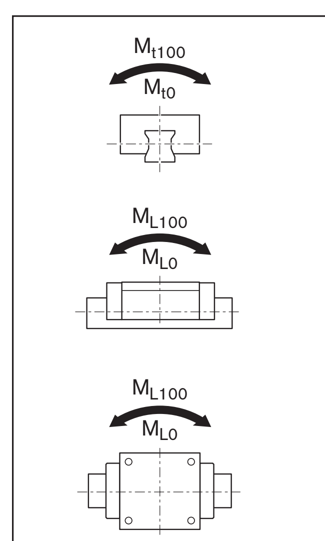
The comparable static moment around the x-axis that induces a load corresponding to the static load capacity C_0.

Dynamic longitudinal moment load capacity M_{L100}

The dynamic comparable dynamic moment around the transverse axis y or the vertical axis z that induces a load corresponding to the dynamic load capacity C_{100}.

Static longitudinal moment load capacity M_{L0}

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



Definition and calculation of the nominal service life

The calculated service life which an individual linear rolling bearing, or a group of apparently identical rolling element bearings operating under the same conditions, can attain with a 90% probability, with contemporary, commonly used materials and manufacturing quality under conventional operating conditions (as per ISO 14728-1).

Nominal life in meters

$$(1) \quad L = \left(\frac{C_{100}}{f_w \cdot F_m}\right)^3 \cdot 10^5 \text{ m}$$

Due to impact loads and vibration, additional stress is placed on the point of contact between ball and raceway. It is difficult to accurately determine these conditions of use. However, these increase with increasing travel speed. The load factor f_w (see table) takes into account the effects of shock and vibration on the service life of the BSCL.

Conditions of use	Travel speed	Load factor f_w
No impact loads and vibrations	v < 15 m/min	1.0 ... 1.2
Low impact loads and vibrations	15 m/min ≤ v < 60 m/min	1.2 ... 1.5
Moderate impact loads and vibrations	60 m/min ≤ v < 120 m/min	1.5 ... 2.0
High impact loads and vibrations	v ≥ 120 m/min	2.0 ... 3.5

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

$$(2) \quad L_h = \frac{L}{2 \cdot s \cdot n \cdot 60}$$

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

Nominal life at variable speed

$$(3) \quad L_h = \frac{L}{60 \cdot v_m}$$

As an alternative, it is possible to use formula (3) to calculate the service life in operating hours using the average speed v_m.. This average speed v_m is calculated with speeds that can be changed on a stepwise basis using discrete time steps q_{tn} of the individual load stages (4).

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

Modified service life

$$L_{na} = a_1 \cdot \left(\frac{C_{100}}{f_w \cdot F_m}\right)^3 \cdot 10^5 \text{ m}$$

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

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

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

Notes

DIN ISO 14728-1 limits the validity of the formula (1) to dynamically equivalent loads $F_m < 0.5\ C_{100}$. However, in our tests we verified that under ideal operating conditions this service life formula can be applied up to loads of $F_m = C_{100}$. Under some circumstances, with stroke lengths below 2 · Ball Runner Block length B_1 (see the dimension tables) a load rating reduction may be necessary. Please consult us.

General technical data and calculations

Load on bearing for calculating the service life

Note

In general, both the static and dynamic load ratios should not be below the minimum value of 4.0. In the case of applications that place high demands on rigidity and/or the service life, a higher load ratio is necessary.

With tensile loads, check the screw stability. See the chapter entitled “Mounting instructions”.

Dynamic load ratio

$$\frac{C_{100}}{F_{m,\ max}}$$

Static load ratio

$$\frac{C_0}{F_{eff,\ max}}$$

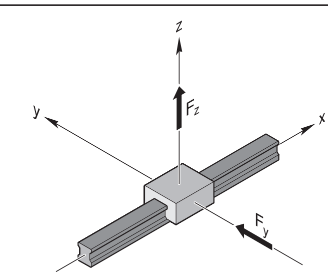
Combined equivalent load

In the case of a combined vertical and horizontal external load, calculate the dynamic equivalent load F_{comb} according to formula (5).

Note

The structure of the Ball Rail System permits this simplified calculation.

$$F_{comb} = |F_y| + |F_z| \quad (5)$$



Note

Reduce an external load that affects the Ball Runner Block at any angle with the correct sign to F_y and F_z and insert the amounts into formula (5) or (6).

Combined equivalent load in conjunction with moments

Using formula (6), you can combine all the partial loads that occur in a load case into one single comparison load. i.e. the combined equivalent load.

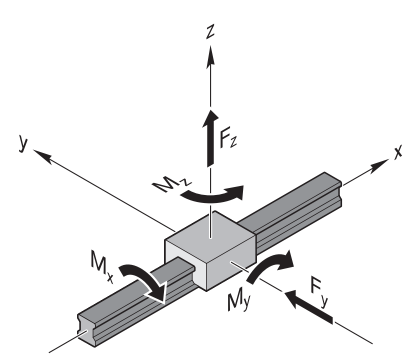
Notes

Including moments as stated in formula (6) only applies to an individual Ball Guide Rail with just one Ball Runner Block. The formula is simpler for other combinations.

The forces and moments plotted in the coordinate system can also have an effect in the opposite direction. Reduce an external load that affects the Ball Runner Block at any angle to F_y and F_z and insert the amounts into formula (6).

The structural design of the Ball Runner Blocks allows this simplified calculation.

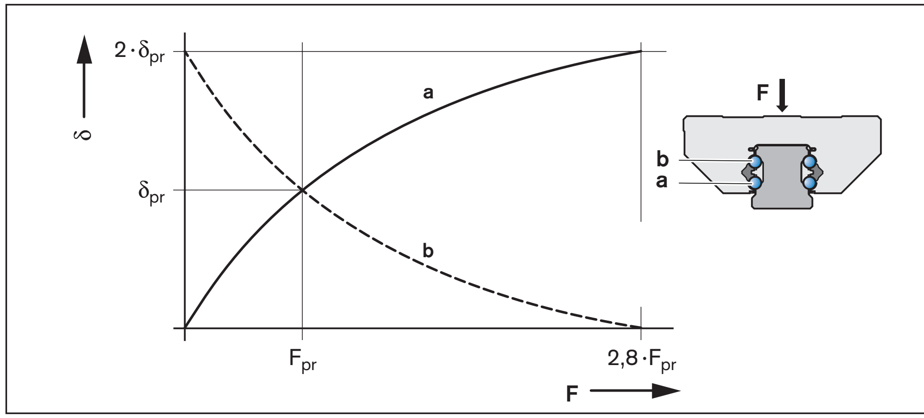
$$F_{comb} = |F_y| + |F_z| + C_{100} \cdot \frac{|M_x|}{M_{t100}} + C_{100} \cdot \frac{|M_y|}{M_{L100}} + C_{100} \cdot \frac{|M_z|}{M_{L100}} \quad (6)$$



Considering the internal preloading force F_{pr}

To increase the rigidity and precision of the guide system, it is advisable to use pre-tensioned Ball Runner Blocks (c.f. "System Preloading Selection Criterion").

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



a	=	loaded (lower) row of balls	δ_{pr}	=	Deformation of the rolling contact at F_{pr} (–)
b	=	non-loaded (upper) row of balls	F	=	load on the Ball Runner Block (N)
δ	=	Deformation of the rolling contact at F (–)	F_{pr}	=	Internal preload force (N)

Effective equivalent load on bearing

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

Note

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

$$F_{eff} = F_{comb} \tag{7}$$

Case 1

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

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

$$F_{eff} = \left(\frac{F_{comb}}{2.8 \cdot F_{pr}} + 1\right)^{3/2} \cdot F_{pr} \tag{8}$$

Case 2

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

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

General technical data and calculations

Dynamic equivalent load on bearing

With different load stages, calculate the dynamic equivalent load on bearing according to formula (9).

$$(9)\quad F_m = \sqrt[3]{(F_{eff\,1})^3 \cdot \frac{q_{s1}}{100\,\%} + (F_{eff\,2})^3 \cdot \frac{q_{s2}}{100\,\%} + \dots + (F_{eff\,n})^3 \cdot \frac{q_{sn}}{100\,\%}}$$

Equivalent static load on bearing

With a combined vertical and horizontal external static load in conjunction with a static torsional or longitudinal moment, calculate the static equivalent load on bearing $F_{0\,comb}$ according to formula (10).

$$(10)\quad F_{0\,comb} = |F_{0y}| + |F_{0z}| + C_0 \cdot \frac{|M_{0x}|}{M_{t0}} + C_0 \cdot \frac{|M_{0y}|}{M_{L0}} + C_0 \cdot \frac{|M_{0z}|}{M_{L0}}$$

Notes

The static equivalent load on bearing $F_{0\,comb}$ must not exceed the static load capacity C_0. Formula (10) only applies when using a single Ball Guide Rail.

Reduce an external load that affects the Ball Runner Block at any angle to F_{0y} and F_{0z} and insert the amounts into formula (10).

Definitions and calculation for dynamic and static load ratios

Using the ratio of load rating to load of the Ball Runner Blocks, you can make a preselection of the guideway. The dynamic loading ratio C_{100}/F_{max} and the static loading ratio $C_0/F_{0\,max}$ should be selected according to the application. The necessary load ratings are calculated from this. The load rating overview yields the corresponding dimensions and format.

Recommended values for load ratios

The table below contains guideline values for the load ratios.

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

$$\text{Dynamic ratio} = \frac{C_{100}}{F_{max}}$$

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

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

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

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

Machine type/sector	Application example	C_{100}/Fmax	$C_0/F_{0\,max}$
Machine tools	**General**	6 ... 9	> 4
	Turning	6 ... 7	> 4
	Milling	6 ... 7	> 4
	Grinding	9 ... 10	> 4
	Engraving	5	> 3
Rubber and plastics processing machinery	**Injection molding**	8	> 2
Woodworking and wood processing machines	**Sawing, milling**	5	> 3
Assembly/handling technology and industrial robots	**Handling**	5	> 3
Oil hydraulics and pneumatics	**Raising/lowering**	6	> 4

Static load safety factor S_0

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

$$S_0 = \frac{C_0}{F_{0\,max}}$$

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

Conditions of use	Static load safety factor S_0
Overhead hanging arrangements or applications with serious potential risks	≥ 20
High dynamic load when at standstill, contamination.	8 - 12
Normal dimensioning of machinery and plant without full knowledge of the load parameters or connection details.	5 - 8
Full knowledge of all the load data. Vibration-free operation is ensured.	3 - 5

Key to formulas

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

Formula	Unit	Designation
M_x	Nm	Load due to the resulting moment around the x-axis
M_{0x}	Nm	Load due to the static moment around the x-axis
M_y	Nm	Load due to the resulting moment around the y-axis
M_{0y}	Nm	Load due to the static moment around the y-axis
M_z	Nm	Load due to the resulting moment around the z-axis
M_{0z}	Nm	Load due to the static moment around the z-axis
L	m	Nominal life (travel range)
L_h	h	Nominal life (time)
L_{na}	m	Modified nominal life (travel range)
L_{ha}	h	Modified nominal life (time)
n	rpm	Stroke repetition rate (double strokes)
q_{t1} ... q_{tn}	%	Discrete time steps for v_1 ... v_n of phases 1 ... n
s	m	Stroke length
S_0	–	Static load safety factor
v_m	m/min	Average linear speed
v_1 ... v_n	m/min	Travel speeds of phases 1 ... n
v	m/min	Travel speed
δ	–	Deformation of rolling contact at F
δ_{pr}	–	Deformation of rolling contact at F_{pr}
Refer to the table for the values		

System preload

Definition of preload

Ball Runner Blocks can be pre-tensioned to increase rigidity. The internal preload forces that occur in this connection must be considered in the life expectancy calculation. You can choose the preload class to match the area of application. Refer to the table for preload force F_{pr} .
Rigidity diagrams are available on request.

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

In general, the rigidity of the Ball Runner Block rises with increasing preload.
If vibrations occur, choose the correspondingly high preload (preload class C2).

Code	Preload	Application area
C0	**Without preload (clearance)**	For particularly smooth-running guide systems with the lowest possible friction for applications with large installation tolerances. Clearance versions are available only in accuracy classes N and H.
C1	**Moderate preload**	For precise guide systems with low external loads and high demands on overall rigidity.
C2	**Medium preload**	For precise guide systems with both high external loading and high demands on overall rigidity; also recommended for single-rail systems and high accelerations. Above average moment loads can be absorbed without significant elastic deflection. Further improved overall rigidity with only medium moment loads.

Preload force F_{pr} (N) of the Ball Runner Blocks

Material numbers	Format	Preload class	Size					
			15	**20**	**25**	**30**	**35**	**45**
R205A R205C R205E	FNS SNS SNH	C1	150	230	350	500	690	990
		C2	590	950	1,420	2,030	2,790	4,030
R205B R205D R205F	FLS SLS SLH	C1	180	290	450	620	880	1,270
		C2	750	1,180	1,820	2,540	3,580	5,150

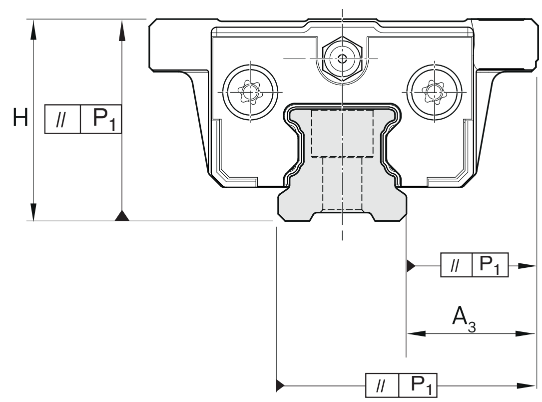
Example

- Area of application: Precise guide systems with low external load and high overall rigidity requirements. This results in preload class C1.
- Selected Ball Runner Block: FNS R205A 314 20
- The selected Ball Runner Block yields a preload force of F_{pr} = 690 N according to the table.

Accuracy classes

Accuracy classes and their tolerances

Ball Rail Systems BSCL are available in three accuracy classes.
For details of the available Ball Runner Blocks and Ball Guide Rails, see the “Material numbers” tables.

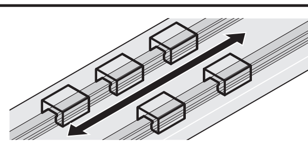
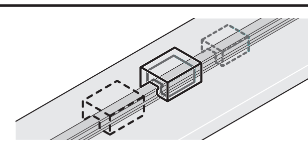


Key to illustration
H = Height tolerance (µm)
A_3 = Side tolerance (µm)
P_1 = Parallelism offset (µm)
L = Rail length (mm)

Precision manufacturing process makes interchangeability easy

Rexroth manufactures its Ball Guide Rails and Ball Runner Blocks with such high precision, especially in the ball raceway zone, that each individual component element is fully interchangeable. For example, a Ball Runner Block can be used without problems on various Ball Guide Rails of the same size. Similarly, different Ball Runner Blocks can also be used on one and the same Ball Guide Rail.

Steel Ball Rail Systems

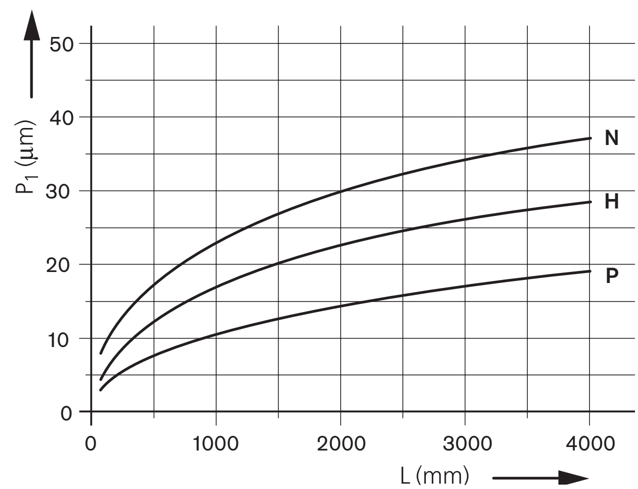
		
Measured at middle of Runner Block	For any Ball Runner Block/rail combination at any position on rail	For different Ball Runner Blocks at same position on rail

Accuracy classes	**Tolerances of the dimensions (µm)**		**Max. differences of dimensions H and A_3 on one rail (µm)**
	H	**A_3**	**ΔH, ΔA_3**
N	±100	±40	30
H	±40	±20	15
P	±20	±10	7

Guide systems with parallel rails

When choosing the preload class, also pay attention to the permissible parallelism offset of the rails (“Accuracy class selection criterion”).
When specifying Ball Rail Systems of accuracy class N, we recommend preload class C0 or C1 to avoid distortive stress due to the tolerances.

Parallelism offset P_1 of the Ball Rail System in operation
Measured at middle of Runner Block



Tolerances for combination of accuracy classes

Ball Runner Blocks			Ball Guide Rails N (µm)	H (µm)	P (µm)
N	Tolerance, dimension H	(µm)	**±100**	**±48**	±32
	Tolerance of dimension A_3	(µm)	**±40**	**±28**	±22
	Max. diff. Dimensions H and A_3 on one rail	(µm)	**30**	**30**	30
H	Tolerance, dimension H	(µm)	**±92**	**±40**	**±24**
	Tolerance of dimension A_3	(µm)	**±32**	**±20**	**±14**
	Max. diff. Dimensions H and A_3 on one rail	(µm)	**15**	**15**	**15**
P	Tolerance, dimension H	(µm)	±88	**±36**	**±20**
	Tolerance of dimension A_3	(µm)	±28	**±16**	**±10**
	Max. diff. Dimensions H and A_3 on one rail	(µm)	7	**7**	**7**

Recommendations for combining accuracy classes
Recommended with **relatively large Ball Runner Block distances** and long strokes:
Ball Guide Rail in higher accuracy class than Ball Runner Blocks.
Recommended with **small Ball Runner Block distances** and short strokes:
Ball Runner Blocks in higher accuracy class than Ball Guide Rail.

Ball Runner Block ordering example

Ordering Ball Runner Blocks

The material number is composed of the code numbers for the individual options. Each option has its own code number.

Order example

- Ball Runner Blocks FNS
- Size 30
- Preload class C1
- Accuracy class H
- With standard sealing
- Prelubricated

Material number: R205A 713 20

BSCL Ball Runner Block	R205	A	7	1	3	20
Format	**A** = FNS (flanged, normal, standard height)					
	B = FLS (flanged, long, standard height)					
	C = SNS (slimline, normal, standard height)					
	D = SLS (slimline, long, standard height)					
	E = SNH (slimline, normal, high)					
	F = SLH (slimline, long, high)					
Size	**1** = size 15					
	8 = size 20					
	2 = size 25					
	7 = size 30					
	3 = size 35					
	4 = size 45					
Preload	**9** = preload class C0					
	1 = preload class C1					
	2 = preload class C2					
Accuracy	**4** = accuracy class N					
	3 = accuracy class H					
	2 = accuracy class P					
Lubrication	**20** = standard seal, prelubricated and preserved					

BSCL Ball Runner Block type key

BALL RUNNER BLOCK CS	KWE	-	0	3	0	-	F	N	S	-	C	1	-	H	-	1
				1				2			3			4		5

1 Size

Feature	Designation
015	Size 15
020	Size 20
025	Size 25
030	Size 30
035	Size 35
045	Size 45

2 Format

Feature	Designation
FNS	Flanged, normal, standard height
FLS	Flanged, long, standard height
SNS	Slimline, normal, standard height
SLS	Slimline, long, standard height
SNH	Slimline, normal, high
SLH	Slimline, long, high

3 Preload class

Feature	Designation
C0	Without preload
C1	Preload class C1 (moderate preload)
C2	Preload class C2 (average preload)

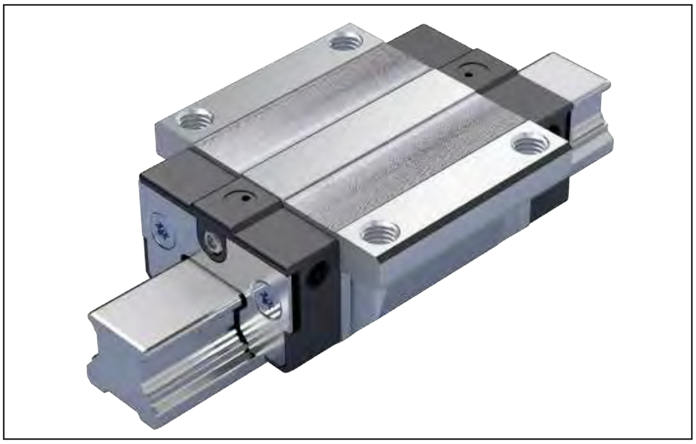
4 Accuracy class

Feature	Designation
N	Normal
H	High
P	Precision

5 Lubrication (Runner Block)

Feature	Designation
1	With initial lubrication, preserved

FNS – flanged, normal, standard height – R205A



Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s^2

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s^2)

Note

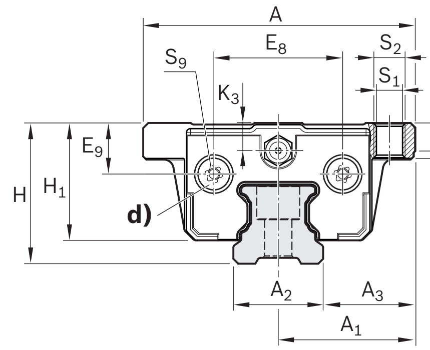
Can be used on all BSCL Ball Guide Rails KSE-...-SNS

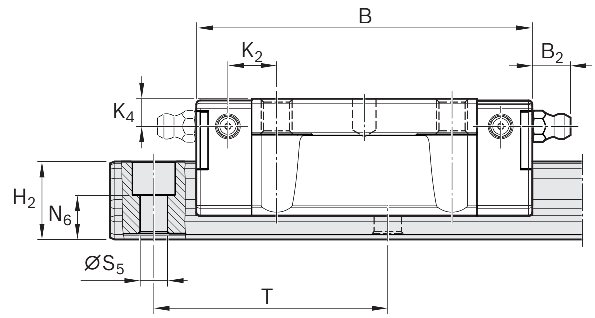
Options and material numbers

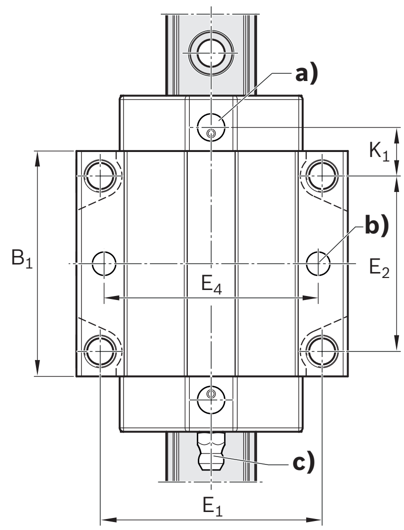
Size	Ball Runner Block with size	Preload class			Accuracy class			Standard seal
		C0	C1	C2	N	H	P	Prelubricated
15	R205A 1	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
20	R205A 8	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
25	R205A 2	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
30	R205A 7	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
35	R205A 3	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
45	R205A 4	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20

Size	Load ratings (N)			Load moments (Nm)					
	C_{50} 1)	C_{100} 2)	C_0	M_{t50} 1)	M_{t100} 2)	M_{t0}	M_{L50} 1)	M_{L100} 2)	M_{L0}
15	11,500	9,100	11,700	98	78	100	79	63	82
20	18,400	14,600	19,600	190	150	210	160	130	170
25	27,500	21,800	30,600	340	270	380	280	220	310
30	39,300	31,200	42,200	590	470	640	450	360	490
35	54,100	42,900	56,600	970	770	1,030	720	570	760
45	78,100	62,000	83,000	1,790	1,420	1,930	1,320	1,050	1,420

1) Dynamic load capacity and load moments based on a travel life of 50,000 m.
2) Dynamic load capacity and load moments based on a travel life of 100,000 m.







a) For O-ring
Size 15: Ø 4 · 1.0 (mm)
size 20 - 45: Ø 5 · 1.0 (mm)
open lube fitting if necessary (see the “Lubrication” chapter).
b) Recommended position for pin holes (dimensions E_4 see the “Mounting” chapter)
Due to production-related issues, pre-drilled holes
may be present at this position. They are suitable for drilling out.
c) Lube nipple, size 15 - 20:
Ball-type lube nipple M4x5, B_2 = 3.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 - 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
d) For Rexroth connection elements. Only use original screws and observe the specified tightening torques.

The lube nipple is included in the scope of delivery (not installed).
Connection is possible on all sides.
Open lube fittings on the side if necessary (see the “Lubrication” section).

Size	Dimensions (mm)											
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	E_9	H	H_1	H_2
15	47.0	23.50	15.0	16.00	58.2	39.2	38.0	30.0	20.5	7.8	24.0	19.90	14.10
20	63.0	31.50	20.0	21.50	75.0	49.6	53.0	40.0	29.0	10.15	30.0	25.30	17.00
25	70.0	35.00	23.0	23.50	86.2	57.8	57.0	45.0	33.0	13.0	36.0	30.00	20.00
30	90.0	45.00	28.0	31.00	97.7	67.4	72.0	52.0	42.0	14.25	42.0	35.35	23.00
35	100.0	50.00	34.0	33.00	110.5	77.0	82.0	62.0	50.0	15.7	48.0	40.40	26.50
45	120.0	60.00	45.0	37.50	137.5	97.0	100.0	80.0	61.0	19.5	60.0	50.30	33.00

Size	Dimensions (mm)											Weight (kg)
	K_1	K_2	K_3	K_4	N_1	$N_6^{\pm 0.5}$	S_1	S_2	S_5	S_9	T	V_1	m
15	8.0	9.1	3.80	3.80	5.2	8.6	4.3	M5	4.5	M2.5x5	60.0	5.0	0.18
20	11.8	11.8	5.65	5.65	7.7	10.0	5.3	M6	6.0	M2.5x6	60.0	6.0	0.41
25	12.5	12.5	7.00	7.00	9.0	11.3	6.7	M8	7.0	M3x6.5	60.0	7.5	0.60
30	14.0	14.7	7.25	7.25	11.0	12.0	8.5	M10	9.0	M3x6.5	80.0	7.0	1.01
35	14.5	16.2	7.00	7.00	12.0	15.5	8.5	M10	9.0	M3x6.5	80.0	8.0	1.51
45	17.3	19.5	10.50	10.50	15.0	17.0	10.4	M12	14.0	M3x6.5	105.0	10.0	2.92

FLS – flanged, long, standard height – R205B

Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s²

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note

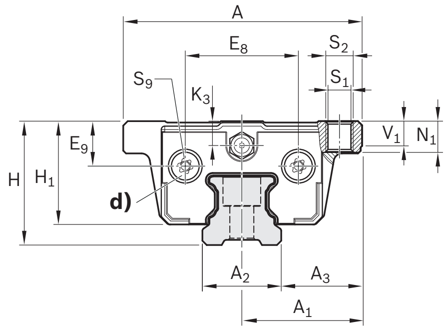
Can be used on all BSCL Ball Guide Rails KSE-...-SNS

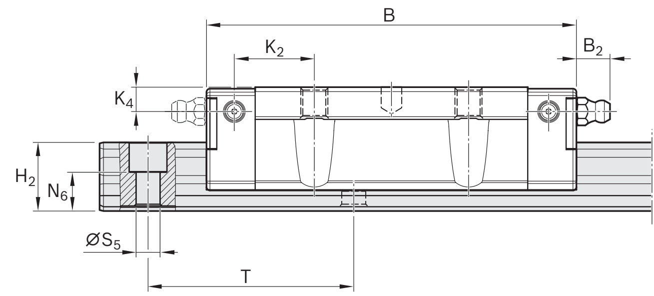
Options and material numbers

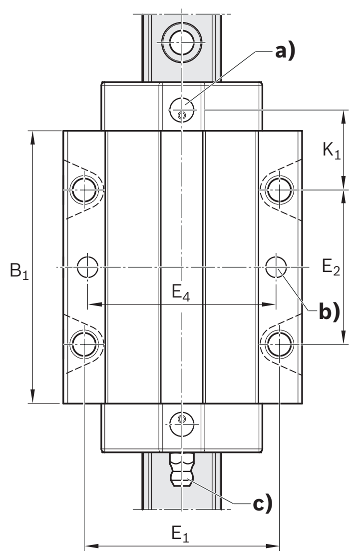
Size	Ball Runner Block with size	Preload class			Accuracy class			Standard seal
		C0	C1	C2	N	H	P	Prelubricated
15	R205B 1	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
20	R205B 8	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
25	R205B 2	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
30	R205B 7	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
35	R205B 3	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
45	R205B 4	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20

Size	Load ratings (N)			Load moments (Nm)					
	C_{50} 1)	C_{100} 2)	C_0	M_{t50} 1)	M_{t100} 2)	M_{t0}	M_{L50} 1)	M_{L100} 2)	M_{L0}
15	14,500	11,500	16,800	130	100	150	140	110	160
20	22,800	18,100	27,100	240	190	290	260	210	320
25	35,300	28,000	44,200	440	350	550	490	390	620
30	49,100	39,000	58,800	740	590	890	770	610	920
35	69,300	55,000	81,600	1,260	1,000	1,480	1,300	1,030	1,530
45	99,800	79,200	120,000	2,320	1,840	2,780	2,380	1,890	2,860

1) Dynamic load capacity and load moments based on a travel life of 50,000 m.
2) Dynamic load capacity and load moments based on a travel life of 100,000 m.







a) For O-ring
Size 15: Ø 4 · 1.0 (mm)
size 20 - 45: Ø 5 · 1.0 (mm)
open lube fitting if necessary (see the “Lubrication” chapter).

b) Recommended position for pin holes (dimensions E_4 see the “Mounting” chapter)
Due to production-related issues, pre-drilled holes
may be present at this position. They are suitable for drilling out.

c) Lube nipple, size 15 - 20:
Ball-type lube nipple M4x5, B_2 = 3.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 - 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!

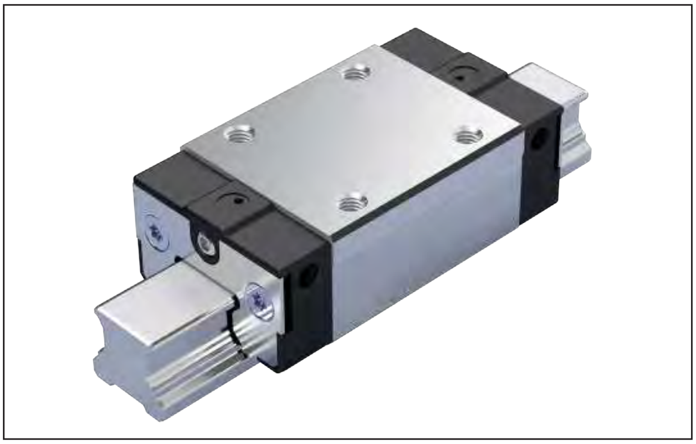
d) For Rexroth connection elements. Only use original screws and observe the specified tightening torques.

The lube nipple is included in the scope of delivery (not installed).
Connection is possible on all sides.
Open lube fittings on the side if necessary (see the “Lubrication” section).

Size	Dimensions (mm)											
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	E_9	H	H_1	H_2
15	47.0	23.50	15.0	16.00	72.6	53.6	38.0	30.0	20.5	7.80	24.0	19.90	14.10
20	63.0	31.50	20.0	21.50	91.0	65.6	53.0	40.0	29.0	10.15	30.0	25.30	17.00
25	70.0	35.00	23.0	23.50	107.9	79.5	57.0	45.0	33.0	13.00	36.0	30.00	20.00
30	90.0	45.00	28.0	31.00	119.7	89.4	72.0	52.0	42.0	14.25	42.0	35.35	23.00
35	100.0	50.00	34.0	33.00	139.0	105.5	82.0	62.0	50.0	15.70	48.0	40.40	26.50
45	120.0	60.00	45.0	37.50	174.0	133.5	100.0	80.0	61.0	19.50	60.0	50.30	33.00

Size	Dimensions (mm)											Weight (kg)
	K_1	K_2	K_3	K_4	N_1	$N_6^{\pm 0.5}$	S_1	S_2	S_5	S_9	T	V_1	m
15	15.20	16.30	3.80	3.80	5.2	8.55	4.3	M5	4.4	M2.5x5	60.0	5.0	0.25
20	19.80	19.80	5.65	5.65	7.7	10.0	5.3	M6	6.0	M2.5x6	60.0	6.0	0.53
25	23.30	23.35	7.00	7.00	9.0	11.3	6.7	M8	7.0	M3x6.5	60.0	7.5	0.80
30	25.00	25.70	7.25	7.25	11.0	12.0	8.5	M10	9.0	M3x6.5	80.0	7.0	1.31
35	28.75	30.40	7.00	7.00	12.0	15.5	8.5	M10	9.0	M3x6.5	80.0	8.0	2.02
45	35.5	37.75	10.50	10.50	15.0	17.0	10.4	M12	14.0	M3x6.5	105.0	10.0	3.93

SNS – slimline, normal, standard height – R205C



Dynamic characteristics

Travel speed: v_{max} = 3 m/s
Acceleration: a_{max} = 250 m/s²
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note

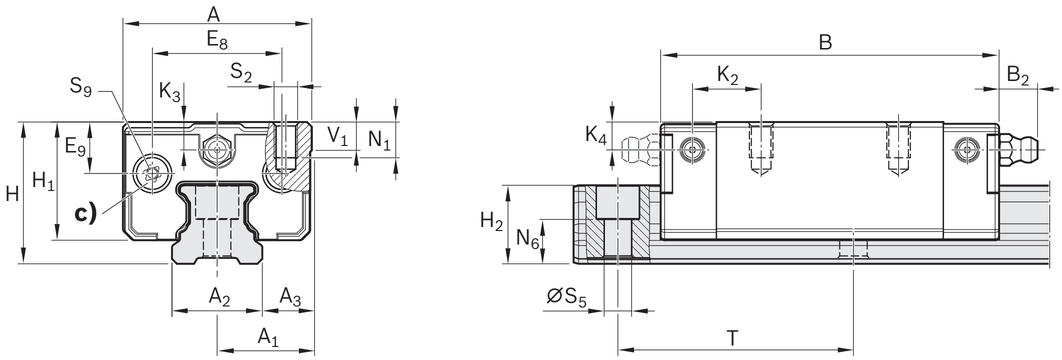
Can be used on all BSCL Ball Guide Rails KSE-...-SNS

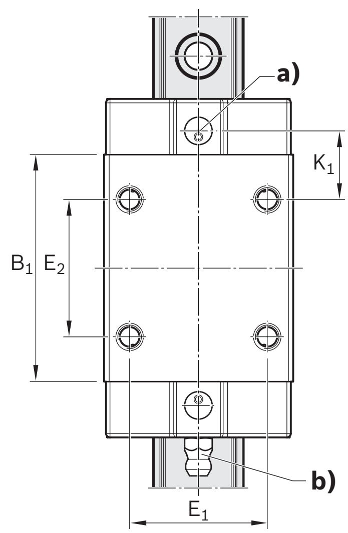
Options and material numbers

Size	Ball Runner Block with size	Preload class			Accuracy class			Standard seal
		C0	C1	C2	N	H	P	Prelubricated
15	R205C 1	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
20	R205C 8	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
25	R205C 2	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
30	R205C 7	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
35	R205C 3	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
45	R205C 4	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20

Size	Load ratings (N)			Load moments (Nm)					
	C_{50} 1)	C_{100} 2)	C_0	M_{t50} 1)	M_{t100} 2)	M_{t0}	M_{L50} 1)	M_{L100} 2)	M_{L0}
15	11,500	9,100	11,700	98	78	100	79	63	82
20	18,400	14,600	19,600	190	150	210	160	130	170
25	27,500	21,800	30,600	340	270	380	280	220	310
30	39,300	31,200	42,200	590	470	640	450	360	490
35	54,100	42,900	56,600	970	770	1,030	720	570	760
45	78,100	62,000	83,000	1,790	1,420	1,930	1,320	1,050	1,420

1) Dynamic load capacity and load moments based on a travel life of 50,000 m.
2) Dynamic load capacity and load moments based on a travel life of 100,000 m.





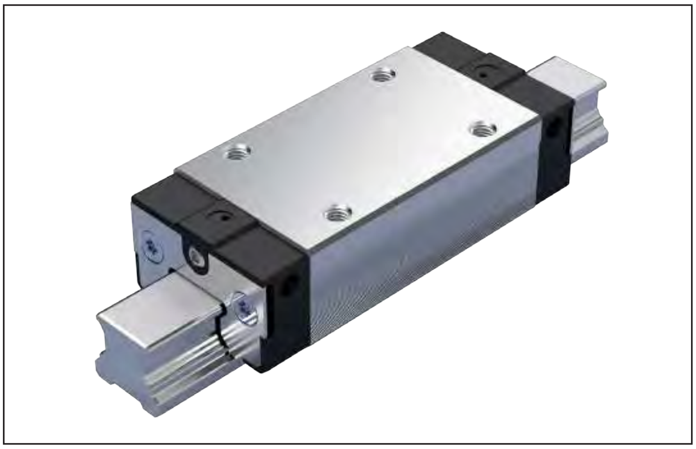
a) For O-ring
Size 15: Ø 4 · 1.0 (mm)
size 20 - 45: Ø 5 · 1.0 (mm)
open lube fitting if necessary (see the „Lubrication“ chapter).
b) Lube nipple, size 15 - 20:
Ball-type lube nipple M4x5, B_2 = 3.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 - 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
c) For Rexroth connection elements. Only use original screws and observe the specified tightening torques.

The lube nipple is included in the scope of delivery (not installed).
Connection is possible on all sides.
Open lube fittings on the side if necessary (see the “Lubrication” section).

Size	Dimensions (mm)											
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	E_9	H	H_1	H_2
15	34.0	17.0	15.0	9.50	58.2	39.2	26.0	26.0	20.5	7.80	24.0	19.90	14.10
20	44.0	22.0	20.0	12.00	75.0	49.6	32.0	36.0	29.0	10.15	30.0	25.30	17.00
25	48.0	24.0	23.0	12.50	86.2	57.8	35.0	35.0	33.0	13.00	36.0	30.00	20.00
30	60.0	30.0	28.0	16.00	97.7	67.4	40.0	40.0	42.0	14.25	42.0	35.35	23.00
35	70.0	35.0	34.0	18.00	110.5	77.0	50.0	50.0	50.0	15.70	48.0	40.40	26.50
45	86.0	43.0	45.0	20.50	137.5	97.0	60.0	60.0	61.0	19.50	60.0	50.30	33.00

Size	Dimensions (mm)											Weight (kg)
	K_1	K_2	K_3	K_4	N_3	$N_6^{\pm0.5}$	S_2	S_5	S_9	T	V_1	m
15	10.0	11.10	3.80	3.80	6.0	8.55	M4	4.4	M2.5x5	60.0	5.4	0.16
20	13.8	13.80	5.65	5.65	7.5	10.0	M5	6.0	M2.5x6	60.0	6.0	0.35
25	17.45	17.50	7.00	7.00	9.0	11.3	M6	7.0	M3x6.5	60.0	7.5	0.50
30	20.0	20.70	7.25	7.25	12.0	12.0	M8	9.0	M3x6.5	80.0	7.0	0.85
35	20.5	22.15	7.00	7.00	13.0	15.5	M8	9.0	M3x6.5	80.0	8.0	1.27
45	27.3	29.50	10.50	10.50	18.0	17.0	M10	14.0	M3x6.5	105.0	10.0	2.40

SLS – slimline, long, standard height – R205D



Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s²

(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note

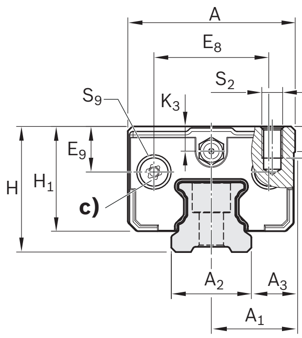
Can be used on all BSCL Ball Guide Rails KSE-...-SNS

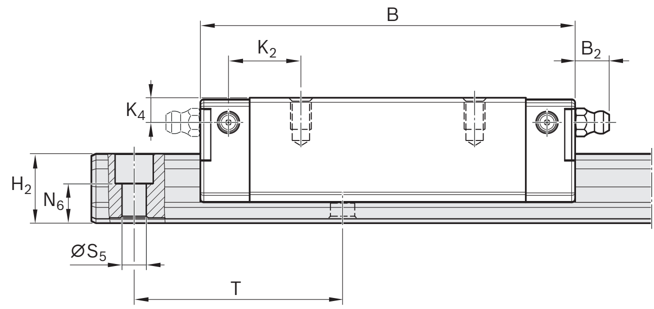
Options and material numbers

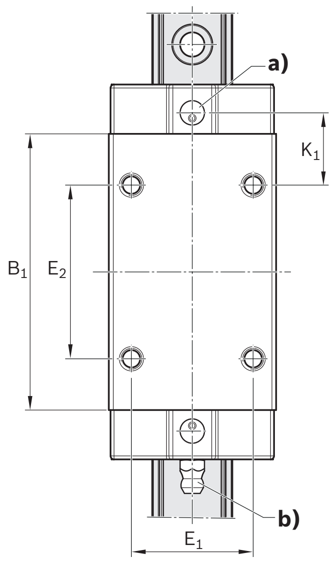
Size	Ball Runner Block with size	Preload class			Accuracy class			Standard seal
		C0	C1	C2	N	H	P	Prelubricated
15	R205D 1	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
20	R205D 8	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
25	R205D 2	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
30	R205D 7	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
35	R205D 3	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
45	R205D 4	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20

Size	Load ratings (N)			Load moments (Nm)					
	C_{50} 1)	C_{100} 2)	C_0	M_{t50} 1)	M_{t100} 2)	M_{t0}	M_{L50} 1)	M_{L100} 2)	M_{L0}
15	14,500	11,500	16,800	130	100	150	140	110	160
20	22,800	18,100	27,100	240	190	290	260	210	320
25	35,300	28,000	44,200	440	350	550	490	390	620
30	49,100	39,000	58,800	740	590	890	770	610	920
35	69,300	55,000	81,600	1,260	1,000	1,480	1,300	1,030	1,530
45	99,800	79,200	120,000	2,320	1,840	2,780	2,380	1,890	2,860

1) Dynamic load capacity and load moments based on a travel life of 50,000 m.
2) Dynamic load capacity and load moments based on a travel life of 100,000 m.







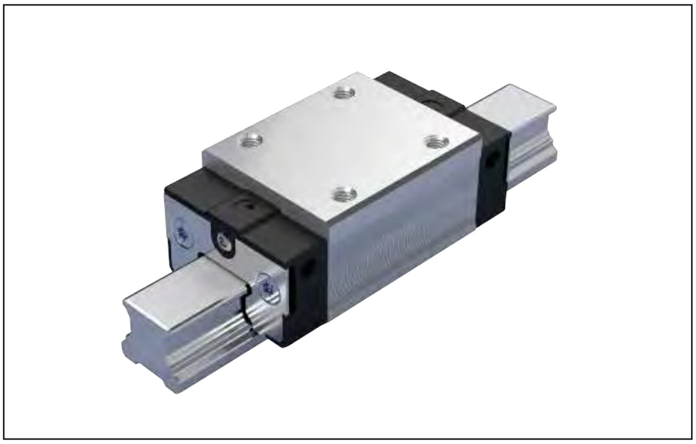
a) For O-ring
Size 15: Ø 4 · 1.0 (mm)
size 20 - 45: Ø 5 · 1.0 (mm)
open lube fitting if necessary (see the “Lubrication” chapter).
b) Lube nipple, size 15 - 20:
Ball-type lube nipple M4x5, B_2 = 3.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 - 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!
c) For Rexroth connection elements. Only use original screws and observe the specified tightening torques.

The lube nipple is included in the scope of delivery (not installed).
Connection is possible on all sides.
Open lube fittings on the side if necessary (see the “Lubrication” section).

Size	**Dimensions (mm)**											
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_2**	**E_8**	**E_9**	**H**	**H_1**	**H_2**
15	34.0	17.0	15.0	9.50	72.6	53.6	26.0	26.0	20.5	7.8	24.0	19.90	14.10
20	44.0	22.0	20.0	12.00	91.0	65.6	32.0	50.0	29.0	10.15	30.0	25.30	17.00
25	48.0	24.0	23.0	12.50	107.9	79.5	35.0	50.0	33.0	13.0	36.0	30.00	20.00
30	60.0	30.0	28.0	16.00	119.7	89.4	40.0	60.0	42.0	14.25	42.0	35.35	23.00
35	70.0	35.0	34.0	18.00	139.0	105.5	50.0	72.0	50.0	15.7	48.0	40.40	26.50
45	86.0	43.0	45.0	20.50	174.0	133.5	60.0	80.0	61.0	19.5	60.0	50.30	33.00

Size	**Dimensions (mm)**											**Weight (kg)**
	K_1	**K_2**	**K_3**	**K_4**	**N_3**	**$N_6^{\pm0.5}$**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**
15	17.20	18.30	3.80	3.80	6.0	8.55	M4	4.4	M2.5x5	60.0	5.4	0.22
20	14.80	14.80	5.65	5.65	7.5	10.0	M5	6.0	M2.5x6	60.0	6.0	0.46
25	20.80	20.85	7.00	7.00	9.0	11.3	M6	7.0	M3x6.5	60.0	7.5	0.67
30	21.00	21.70	7.25	7.25	12.0	12.0	M8	9.0	M3x6.5	80.0	7.0	1.11
35	23.75	25.40	7.00	7.00	13.0	15.5	M8	9.0	M3x6.5	80.0	8.0	1.71
45	35.55	37.75	10.50	10.50	18.0	17.0	M10	14.0	M3x6.5	105.0	10.0	3.24

SNH – slimline, normal, high – R205E



Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s²

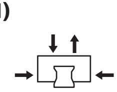
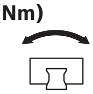
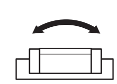
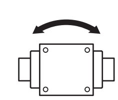
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note

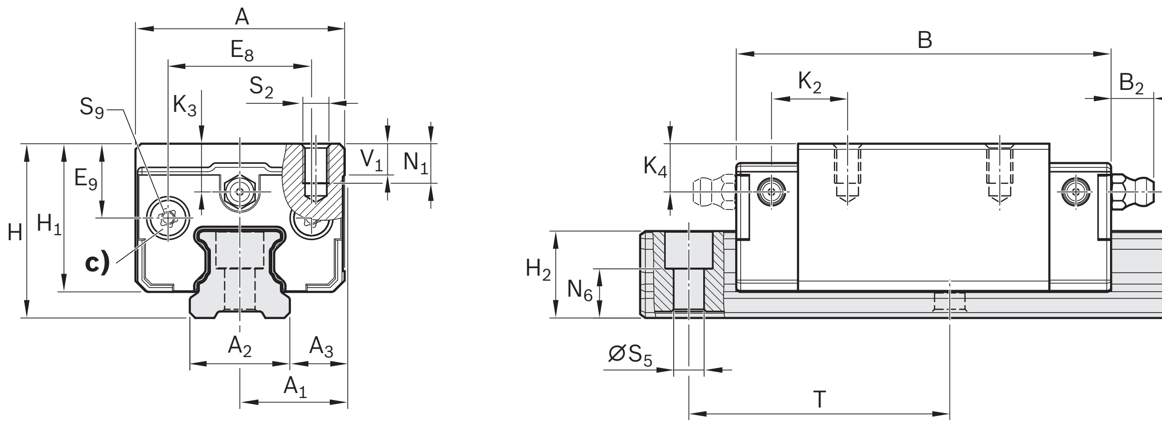
Can be used on all BSCL Ball Guide Rails KSE-...-SNS

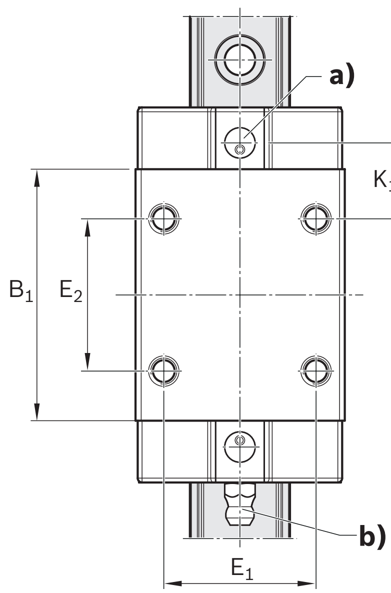
Options and material numbers

Size	Ball Runner Block with size	Preload class			Accuracy class			Standard seal
		C0	C1	C2	N	H	P	Prelubricated
15	R205E 1	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
25	R205E 2	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
30	R205E 7	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
35	R205E 3	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
45	R205E 4	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20

Size	Load ratings (N)			Load moments (Nm)					
									
	C_{50} 1)	C_{100} 2)	C_0	M_{t50} 1)	M_{t100} 2)	M_{t0}	M_{L50} 1)	M_{L100} 2)	M_{L0}
15	11,500	9,100	11,700	98	78	100	79	63	82
25	27,500	21,800	30,600	340	270	380	280	220	310
30	39,300	31,200	42,200	590	470	640	450	360	490
35	54,100	42,900	56,600	970	770	1,030	720	570	760
45	78,100	62,000	83,000	1,790	1,420	1,930	1,320	1,050	1,420

1) Dynamic load capacity and load moments based on a travel life of 50,000 m.
2) Dynamic load capacity and load moments based on a travel life of 100,000 m.





a) For O-ring
Size 15: Ø 4 · 1.0 (mm)
size 20 - 45: Ø 5 · 1.0 (mm)
open lube fitting if necessary (see the “Lubrication” chapter).

b) Lube nipple, size 15 - 20:
Ball-type lube nipple M4x5, B_2 = 3.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 - 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!

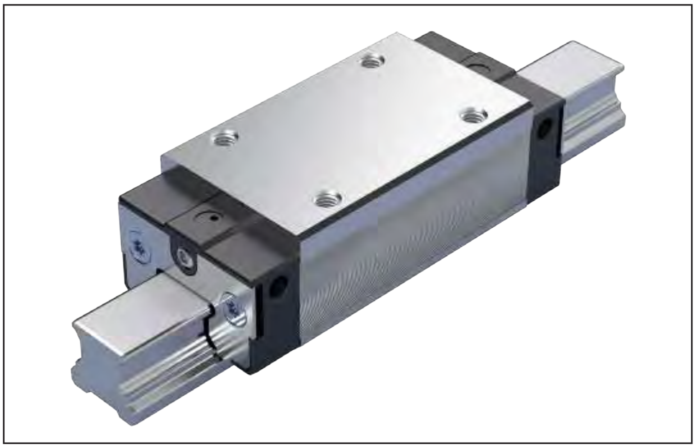
c) For Rexroth connection elements. Only use original screws and observe the specified tightening torques.

The lube nipple is included in the scope of delivery (not installed).
Connection is possible on all sides.
Open lube fittings on the side if necessary (see the “Lubrication” section).

Size	Dimensions (mm)												
	A	A_1	A_2	A_3	$B^{+0.5}$	B_1	E_1	E_2	E_8	E_9	H	H_1	H_2
15	34.0	17.0	15.0	9.50	58.2	39.2	26.0	26.0	20.5	11.8	28.0	23.90	14.10
25	48.0	24.0	23.0	12.50	86.2	57.8	35.0	35.0	33.0	17.0	40.0	34.00	20.00
30	60.0	30.0	28.0	16.00	97.7	67.4	40.0	40.0	42.0	17.25	45.0	38.35	23.00
35	70.0	35.0	34.0	18.00	110.5	77.0	50.0	50.0	50.0	22.7	55.0	47.40	26.50
45	86.0	43.0	45.0	20.50	137.5	97.0	60.0	60.0	61.0	29.5	70.0	60.30	33.00

Size	Dimensions (mm)											Weight (kg)
	K_1	K_2	K_3	K_4	N_3	$N_6^{\pm 0.5}$	S_2	S_5	S_9	T	V_1	m
15	10.0	11.1	7.8	7.8	6.0	8.55	M4	4.4	M2.5x5	60.0	5.4	0.20
25	17.45	17.5	11.0	11.0	9.0	11.3	M6	7.0	M3x6.5	60.0	7.5	0.59
30	20.0	20.7	10.25	10.25	12.0	12.0	M8	9.0	M3x6.5	80.0	7.0	0.95
35	20.5	22.15	14.0	14.0	13.0	15.5	M8	9.0	M3x6.5	80.0	8.0	1.57
45	27.3	29.5	20.5	20.5	18.0	17.0	M10	14.0	M3x6.5	105.0	10.0	3.03

SLH – slimline, long, high – R205F



Dynamic characteristics

Travel speed: v_{max} = 3 m/s

Acceleration: a_{max} = 250 m/s²

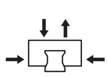
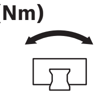
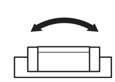
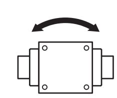
(If $F_{comb} > 2.8 \cdot F_{pr}$: a_{max} = 50 m/s²)

Note

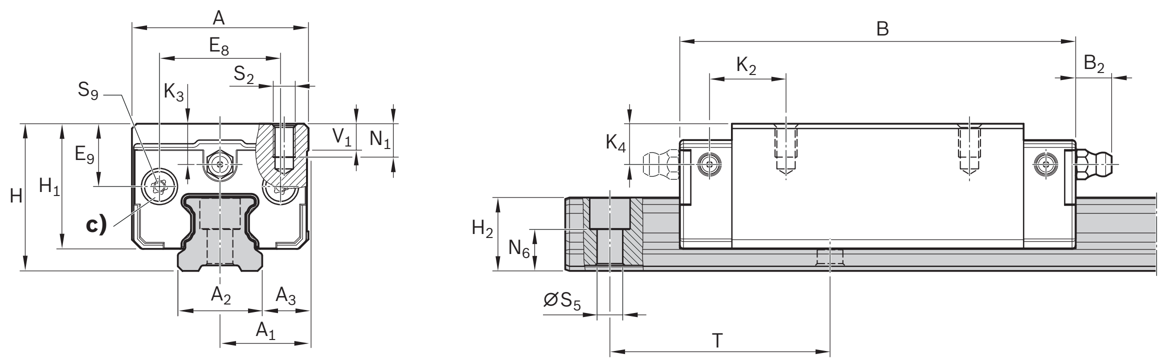
Can be used on all BSCL Ball Guide Rails KSE-...-SNS

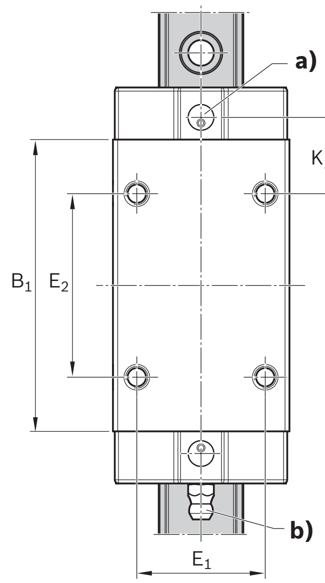
Options and material numbers

Size	Ball Runner Block with size	Preload class			Accuracy class			Standard seal
		C0	C1	C2	N	H	P	Prelubricated
25	R205F 2	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
30	R205F 7	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
35	R205F 3	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20
45	R205F 4	9			4	3	–	20
			1		4	3	2	20
				2	–	3	2	20

Size	Load ratings (N)			Load moments (Nm)					
									
	C_{50} 1)	C_{100} 2)	C_0	M_{t50} 1)	M_{t100} 2)	M_{t0}	M_{L50} 1)	M_{L100} 2)	M_{L0}
25	35,300	28,000	44,200	440	350	550	490	390	620
30	49,100	39,000	58,800	740	590	890	770	610	920
35	69,300	55,000	81,600	1,260	1,000	1,480	1,300	1,030	1,530
45	99,800	79,200	120,000	2,320	1,840	2,780	2,380	1,890	2,860

1) Dynamic load capacity and load moments based on a travel life of 50,000 m.
2) Dynamic load capacity and load moments based on a travel life of 100,000 m.





a) For O-ring
Size 15: Ø 4 · 1.0 (mm)
size 20 - 45: Ø 5 · 1.0 (mm)
open lube fitting if necessary (see the “Lubrication” chapter).

b) Lube nipple, size 15 - 20:
Ball-type lube nipple M4x5, B_2 = 3.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 5 mm!
Lube nipple, size 25 - 45:
Hydraulic-type lube nipple DIN 71412-A M6x8, B_2 = 9.5 mm
If you use different lube nipples, pay attention to the screw-in depth of 8 mm!

c) For Rexroth connection elements. Only use original screws and observe the specified tightening torques.

The lube nipple is included in the scope of delivery (not installed).
Connection is possible on all sides.
Open lube fittings on the side if necessary (see the “Lubrication” section).

Size	**Dimensions (mm)**											
	A	**A_1**	**A_2**	**A_3**	**$B^{+0.5}$**	**B_1**	**E_1**	**E_2**	**E_8**	**E_9**	**H**	**H_1**	**H_2**
25	48.0	24.0	23.0	12.50	107.9	79.5	35.0	50.0	33.0	17.00	40.0	34.00	20.00
30	60.0	30.0	28.0	16.00	119.7	89.4	40.0	60.0	42.0	17.25	45.0	38.35	23.00
35	70.0	35.0	34.0	18.00	139.0	105.5	50.0	72.0	50.0	22.70	55.0	47.40	26.50
45	86.0	43.0	45.0	20.50	174.0	133.5	60.0	80.0	61.0	29.50	70.0	60.30	33.00

Size	**Dimensions (mm)**										**Weight (kg)**
	K_1	**K_2**	**K_3**	**K_4**	**N_3**	**$N_6^{\pm0.5}$**	**S_2**	**S_5**	**S_9**	**T**	**V_1**	**m**
25	20.80	20.85	11.00	11.00	9.0	11.3	M6	7.0	M3x6.5	60.0	7.5	0.79
30	21.00	21.70	10.25	10.25	12.0	12.0	M8	9.0	M3x6.5	80.0	7.0	1.31
35	23.75	25.40	14.00	14.00	13.0	15.5	M8	9.0	M3x6.5	80.0	8.0	2.11
45	35.55	37.75	20.50	20.50	18.0	17.0	M10	14.0	M3x6.5	105.0	10.0	4.11

Ball Guide Rail ordering example

Ordering Ball Guide Rails

The material number is composed of the code numbers for the individual options. Each option has its own code number.

BSCL Ball Guide Rail SNS	**R2055**	**7**	**0**	**3**	**31**	**,xx mm**
Size	**1** = size 15					
	8 = size 20					
	2 = size 25					
	7 = size 30					
	3 = size 35					
	4 = size 45					
Cover	**0** = plastic mounting hole plugs					
Accuracy	**4** = accuracy class N					
	3 = accuracy class H					
	2 = accuracy class P					
Version	**3x** = number of partial sections					
	51 = factory length					
Length	**xx** = rail length in mm					

BSCL Ball Guide Rail type key

BALL GUIDE RAIL CS	KSE	-	0	3	0	-	S	N	S	-	H	-	M	A	-	A	K
				1				2			3		4			5	

1 Size

Feature	Designation
015	Size 15
020	Size 20
025	Size 25
030	Size 30
035	Size 35
045	Size 45

2 Format

Feature	Designation
SNS	Slimline, normal, standard height

3 Accuracy class

Feature	Designation
N	Normal
H	High
P	Precision

4 Mounting

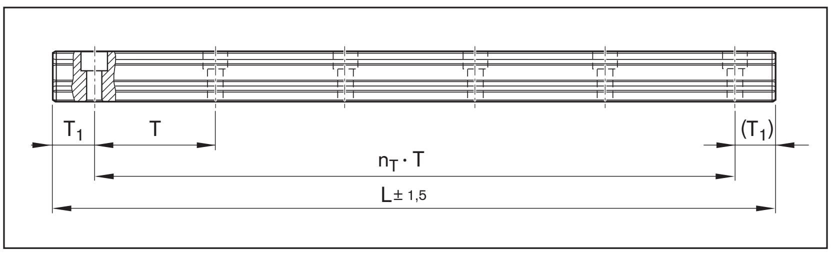
Feature	Designation
MA	Mounting from above

5 Cover

Feature	Designation
AK	With plastic mounting hole plugs

Recommended rail lengths

Ball Guide Rails can be manufactured in principal in any length. However, if possible, recommended rail lengths should be used at which the rails are cut in the middle between two mounting holes. Recommended rail lengths are more cost effective. The recommended rail length (preferred length) can be calculated as follows, or determined alternatively in the online configurators.



L	=	Recommended rail length	(mm)
L_W	=	Desired length of rail	(mm)
T	=	Pitch	(mm)
T_{1S}	=	Preferred dimension	(mm)
n_B	=	Number of holes	(–)
n_B	=	Number of pitches	(–)

a) Calculated from desired length:

$$L = \left(\frac{L_W}{T}\right)^{*} \cdot T - 4$$

* Round up quotient L_W/T to the nearest whole number!

b) Calculated from desired number of holes:

$$L = n_B \cdot T - 4 \text{ mm}$$

c) Calculated from desired number of divisions:

$$L = n_T \cdot T + 2 \cdot T_{1S}$$

Ordering example: one-piece rail of recommended rail length (up to L_{max}):

- Ball Guide Rail SNS
- Size 30
- Accuracy class H
- One-piece
- Calculated rail length 1676 mm, (20 · T, preferred dimension T_{1S} = 38 mm; number of holes n_B = 21)

Ordering data

Material number, rail length (mm)
T_1 / $n_T \cdot T$ / T_1 (mm)

R2055 703 31, 1676 mm
38 / 20 · 80 / 38 mm

Ordering example: multi-piece rail of recommended rail length (longer than L_{max}):

- Ball Guide Rail SNS
- Size 30
- Accuracy class H
- Calculated rail length 5116 mm, two partial sections (63 · T, preferred dimension T_{1S} = 38 mm; number of holes n_B = 64)

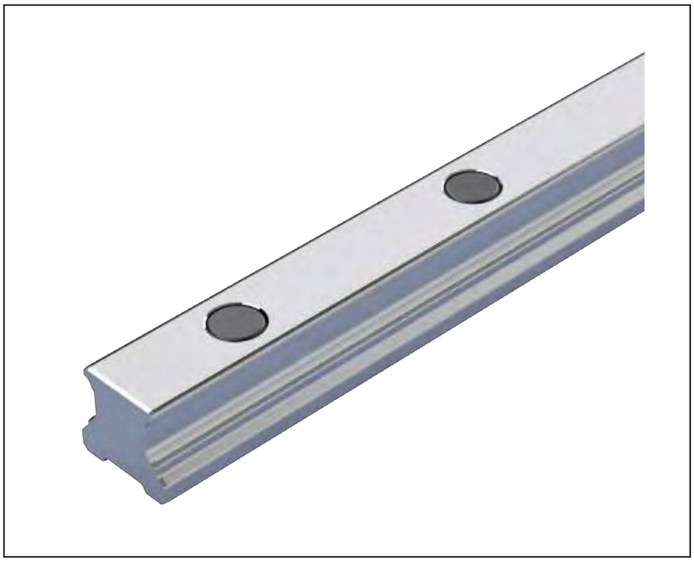
Ordering data

Material number with number of partial sections, rail length (mm)
T_1 / $n_T \cdot T$ / T_1 (mm)

R2055 703 32, 5116 mm
38 / 63 · 80 / 38 mm

In the case of rail lengths above $L_{max,}$ partial sections approved by Rexroth are joined together.

SNS – with plastic mounting hole plugs – R2055



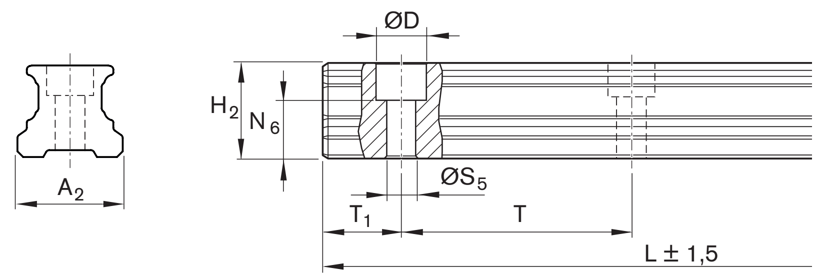
Ball Guide Rails KSE-...-SNS
For mounting from above with plastic mounting hole plugs

Notes

- Observe the notes for mounting!
  Please request the “Mounting instructions for Ball Rail Systems.”
- To avoid damage to the Runner Block, the mounting holes of the Guide Rails must be sealed with plastic mounting hole plugs.
- Plastic mounting hole plugs included in scope of supply.

Options and material numbers

Size	Ball Guide Rail with size	Accuracy class			Number of partial sections ., Rail length L (mm), ...		Hole spacing T (mm)	Recommended rail length in accordance with formula $L = n_B \cdot T - 4$ mm
		N	H	P	One-piece	Composite		Maximum number of holes n_B
15	R2055 10	4	3	2	31, ...	3., ...	60	64
20	R2055 80	4	3	2	31, ...	3., ...	60	64
25	R2055 20	4	3	2	31, ...	3., ...	60	64
30	R2055 70	4	3	2	31, ...	3., ...	80	48
35	R2055 30	4	3	2	31, ...	3., ...	80	48
45	R2055 40	4	3	2	31, ...	3., ...	105	36



Size	Dimensions (mm)										Weight m
	A_2	D	H_2	L_{max}	$N_6^{\pm 0.5}$	S_5	T	$T_{1\ min}$	T_{1S} 1)	$T_{1\ max}$	(kg/m)
15	15	7.4	14.1	3 836	8.55	4.5	60	10	28.0	50	1.2
20	20	9.4	17.0	3 836	10.00	6.0	60	10	28.0	50	1.8
25	23	11.0	20.0	3 836	11.30	7.0	60	10	28.0	50	2.6
30	28	15.0	23.0	3 836	12.00	9.0	80	12	38.0	68	3.6
35	34	15.0	26.5	3 836	15.50	9.0	80	12	38.0	68	5.1
45	45	20.0	33.0	3 776	17.00	14.0	105	16	50.5	89	7.7

1) Preferred dimension T_{1S} with tolerances ± 0.75 is recommended.

Overview of factory lengths

Size	Accuracy class		
	N	**H**	**P**
15	R205510451	R205510351	R205510251
20	R205580451	R205580351	R205580251
25	R205520451	R205520351	R205520251
30	R205570451	R205570351	R205570251
35	R205530451	R205530351	R205530251
45	R205540451	R205540351	R205540251

Factory lengths are Guide Rails without end machining which are only available in four-meter sections. A factory length has an overall length of approx. 4,150 mm with a usable length (good length) of at least 3,600 mm in one piece of the respective accuracy class. The maximum good length is 4,150 mm. The good length is specified on the packaging and charged upon delivery.

Note

- ▶ When ordering factory lengths, the plastic mounting hole plugs must be ordered separately. See the chapter entitled “Accessories”.
- ▶ The packaging of Guide Rails should only be opened with a suitable tool. Bosch Rexroth provides an appropriate tool for this purpose under part number R320105175.

Overview – accessories

Cover plate wiper

Two-piece front seal

Seal kit

Front Lube Unit

Lube nipple

Lube fittings

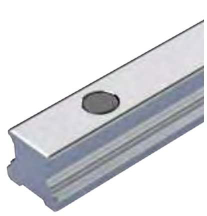
- Reducers
- Extensions
- Connectors
- Swivel fittings
- Swivel screw joints for plastic tubes

Plastic tube, O-rings, nozzle pipe

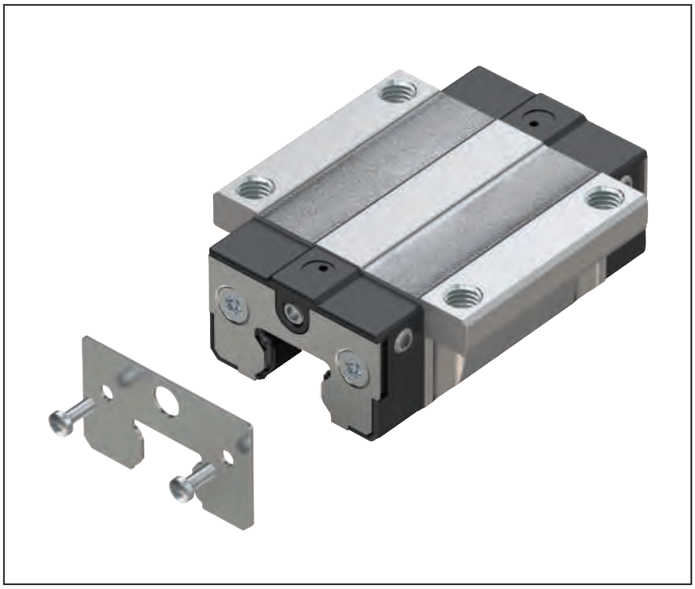
Lubrication adapter for high SNH or SLH Ball Runner Blocks

O-rings

Plastic mounting hole plugs

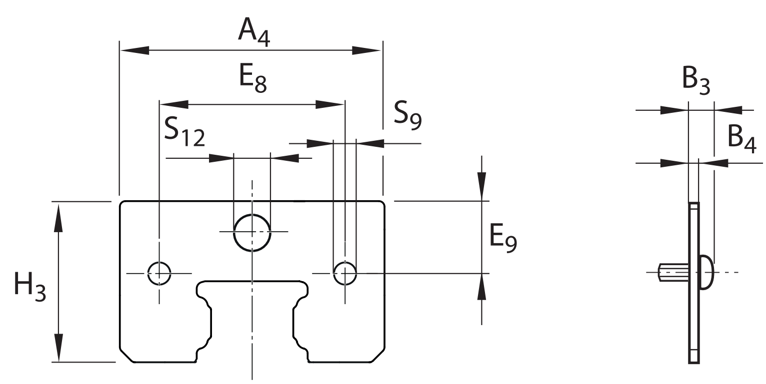


Cover plate wiper



- Material: Corrosion-resistant steel as per EN 10088
- Design: bright
- Precision design with a maximum gap dimension of 0.1 to 0.3 mm

Note for mounting
- The seal kit must be used when combining the cover plate wiper with the front seal.
  See seal kit.
- The fastening screws are included.
- When mounting, make sure that there is a uniform gap between the Ball Guide Rail and the cover plate wiper.
- Observe the minimum screw-in depth for the end-face lube fitting.
- Observe the mounting instructions.



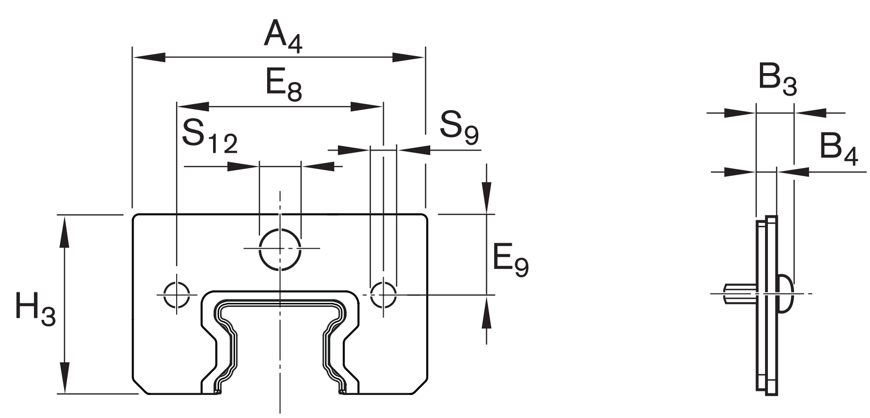
Size	Material number	Dimensions (mm)								Weight m (g)
		A_4	B_3	B_4	E_8	E_9	H_3	S_9	S_{12}	
15	R205Z 100 00	31.5	3.0	1.0	20.5	7.40	19.30	2.8	4.3	4.8
20	R205Z 800 00	42.2	3.0	1.0	29.0	8.70	23.40	2.8	5.0	7.5
25	R205Z 200 00	46.0	3.5	1.0	33.0	11.35	27.85	2.8	7.0	9.8
30	R205Z 700 00	58.0	3.5	1.0	42.0	12.40	32.90	3.5	7.0	13.9
35	R205Z 300 00	68.0	4.0	1.5	50.0	14.20	38.30	3.5	7.0	27.2
45	R205Z 400 00	83.3	4.0	1.5	61.0	17.70	48.00	3.5	7.0	39.9

Front seal

Two sections

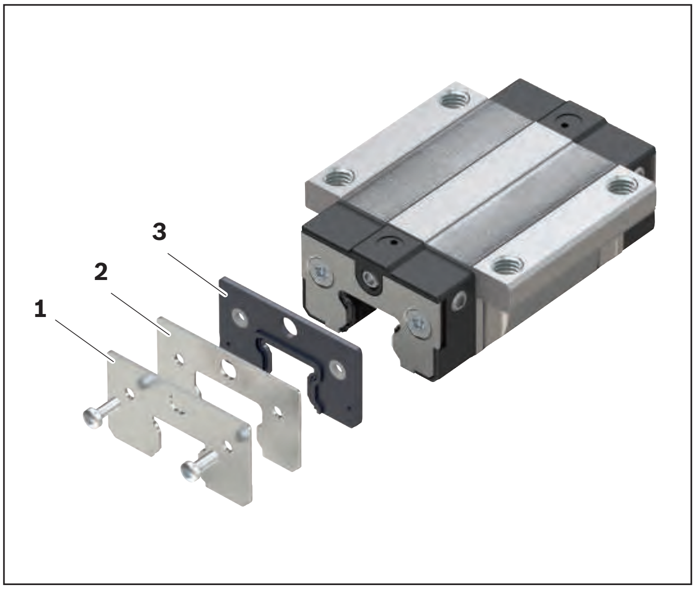
- Material: Corrosion-resistant steel according to DIN EN 10088 with plastic seal ring
- Design: bright

Note for mounting
- The fastening screws are included.
- Observe the minimum screw-in depth for the end-face lube fitting.
- The seal kit must be used when combining the front seal with the cover plate wiper.
  See seal kit.
- Observe the mounting instructions.



Size	Material number	Dimensions (mm)								Weight m
		A_4	B_3	B_4	E_8	E_9	H_3	S_9	S_{12}	(g)
15	R205Z 110 00	31.5	4.5	2.5	20.5	7.40	19.30	2.8	4.3	5.2
20	R205Z 810 00	42.2	4.5	2.5	29.0	8.70	23.40	2.8	5.0	7.9
25	R205Z 210 00	46.0	5.0	2.5	33.0	11.35	27.85	3.5	7.0	11.4
30	R205Z 710 00	58.0	5.0	2.5	42.0	12.40	32.90	3.5	7.0	16.2
35	R205Z 310 00	68.0	5.5	3.0	50.0	14.20	38.30	3.5	7.0	28.5
45	R205Z 410 00	83.3	5.5	3.0	61.0	17.70	48.00	3.5	7.0	42.6

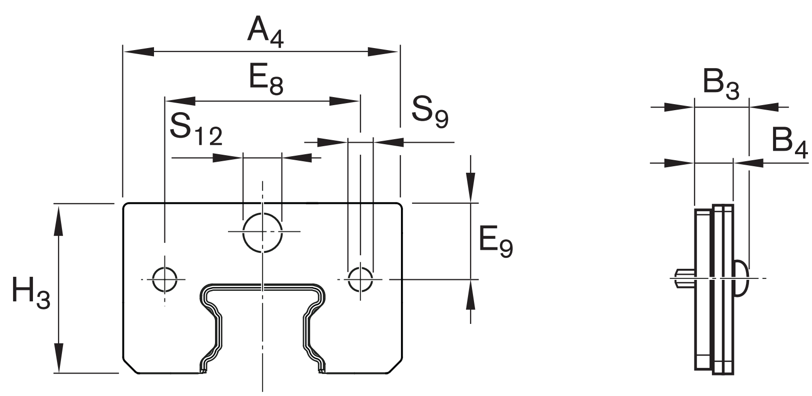
Seal kit



1 Cover plate wiper
2 Reinforcing plate
3 Two-piece front seal

Note for mounting

- ▶ The seal kit is recommended when combining the cover plate wiper with the front seal.
- ▶ The fastening screws are included.
- ▶ Observe the minimum screw-in depth for the end-face lube fitting.
- ▶ Observe the mounting instructions.



Size	Material number	Dimensions (mm)								Weight m
		A_4	B_3	B_4	E_8	E_9	H_3	S_9	S_{12}	(g)
15	R205Z 190 10	31.5	5.5	3.5	20.5	7.40	19.30	2.8	4.3	9.0
20	R205Z 890 10	42.2	5.5	3.5	29.0	8.70	23.40	2.8	5.0	14.4
25	R205Z 290 10	46.0	6.0	3.5	33.0	11.35	27.85	2.8	7.0	19.6
30	R205Z 790 10	58.0	6.0	3.5	42.0	12.40	32.90	3.5	7.0	28.5
35	R205Z 390 10	68.0	7.0	4.5	50.0	14.20	38.30	3.5	7.0	54.1
45	R205Z 490 10	83.3	7.0	4.5	61.0	17.70	48.00	3.5	7.0	80.9

Front Lube Units

For extended travel distances without relubrication

Advantages for mounting and operation
- Ball Runner Block only needs initial lubrication with grease
- Front Lube Units on both sides of the Ball Runner Block
- Low lubricant loss
- Reduced oil consumption
- No lubrication lines
- Max. operating temperature 60 °C
- Lube fitting on the end-face of the Front Lube Unit is suitable for lubricating the Ball Runner Block with grease.

Note for mounting
- The required mounting accessories (coated screws, seals and lube nipples) are supplied along with the units.
- Mount a Front Lube Unit on both sides of the Ball Runner Block!
- Observe the mounting instructions.

Notes:
Material: special plastic
The Front Lube Units are already filled with oil (Mobile SHC 639) and can be installed after the basic lubrication of the Ball Runner Block.

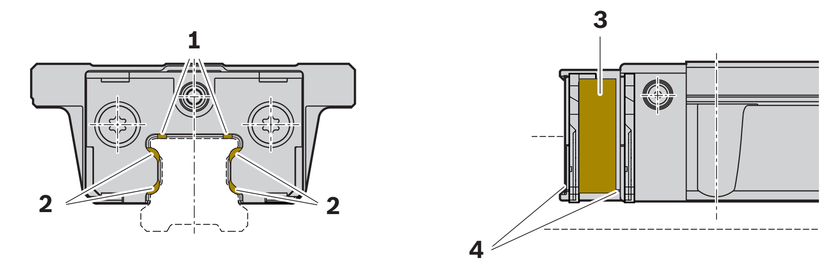
Rexroth recommends replacing the Front Lube Units every 3 years at the latest and re-lubricating the Ball Runner Block before mounting the new Front Lube Unit.

Relubrication of the Ball Runner Blocks
In clean operating environments, the Ball Runner Blocks can be relubricated with grease (Dynalub 510) at the end-face.
Relubrication of the Ball Runner Blocks **with grease lubricant** see the “Lubrication” chapter

⚠ An initial lubrication of the Ball Runner Blocks with grease lubricant is required before mounting the Front Lube Units! See section “Lubrication”.
⚠ If other types of lubricant oil are used, consider the compatibility of the lubricants and the travel distance!
⚠ If other types of lubricants are used, this may lead to a reduction in the lubrication intervals, the achievable travel in short-stroke applications, and the load capacities. Possible chemical interactions between the plastic materials, lubricants and preservative oils must also be taken into account.
The recommended lubrication intervals depend on environmental factors, load and load type.
Examples of environmental factors include swarf, mineral abrasion (or similar), solvent and temperature.
Examples of loads and stress types are oscillations, shocks and tilting.
⚠ The conditions of use are unknown to the manufacturer. Only the user's own trials or accurate monitoring can yield safety across lubrication intervals.
⚠ Do not use water-based coolant/lubricant on the Ball Guide Rails and Ball Runner Block!

Lubricant distribution

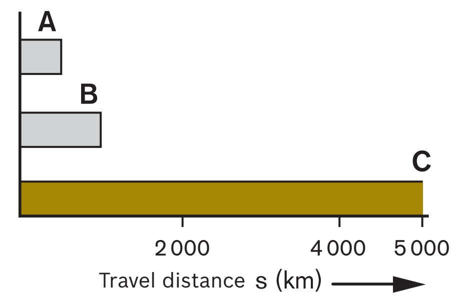
Due to the special design of the lubricant distribution, lubrication occurs primarily where it is needed: directly on the raceways and the top surfaces of the Ball Guide Rails.



1 Top surface of the Ball Guide Rail
2 Raceways of the ball guide
3 Oil reservoir
4 Seals

Travel distance

Size	Possible travel distance s with Front Lube Units (km)
15	5 000
20	5 000
25	5 000
30	5 000
35	2 500
45	1 250



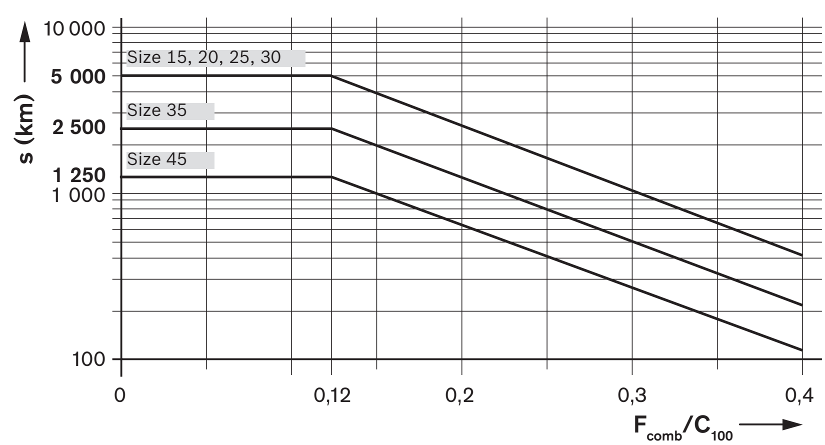
Previous travel distance s
A With oil lubrication up to 500 km
B With grease lubrication up to 1,000 km

Possible travel distance s
C With Front Lube Units up to 5,000 km

Load-dependent relubrication intervals for Ball Runner Blocks with Front Lube Units

This applies to the following conditions:

- Ball Runner Block lubricants: Dynalub 510 (NLGI 2 grease) or, alternatively, Castrol Longtime PD 2 (NLGI 2 grease)
- Front Lube Units lubricant: Mobil SHC 639 (synthetic oil)
- Maximum speed: v_{max} = 2 m/s
- No media pressurization
- Standard seals
- Ambient temperature: T = 20 – 30 °C



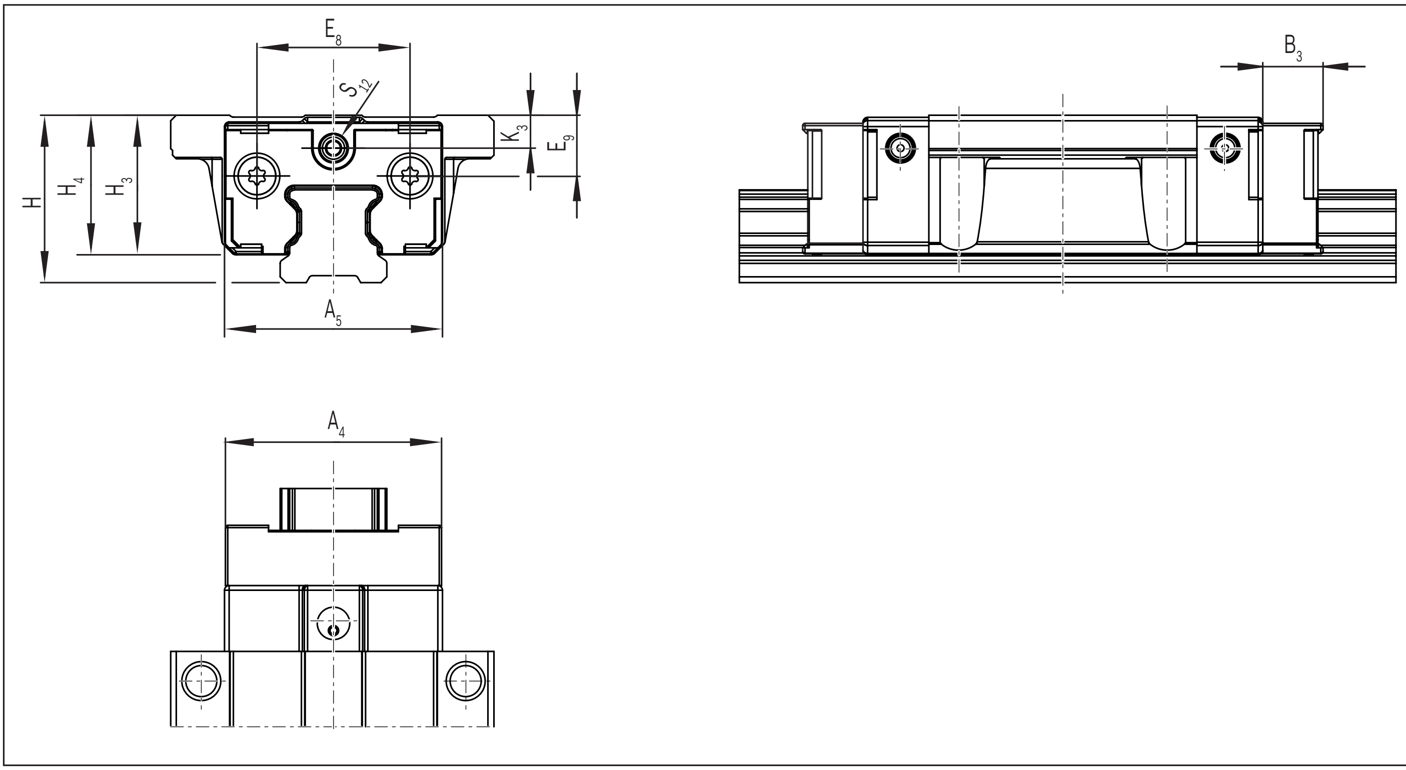
Definition F_{comb}/C_{100}

The load ratio F_{comb}/C_{100} is the quotient of the equivalent dynamic combined load on the bearing F_{comb} (considering the internal preloading force F_{pr}) and the dynamic load capacity C_{100}.

Key

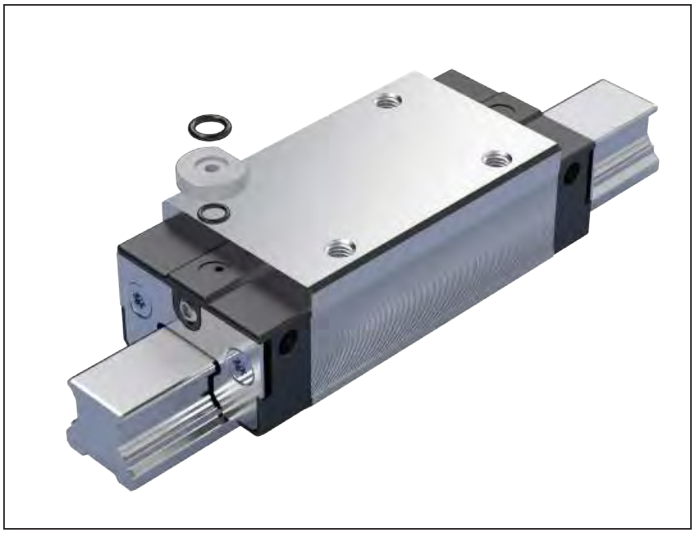
C_{100} = dynamic load capacity (N)
F_{comb} = dynamic combined equivalent load on bearing (N)
F_{comb}/C_{100} = load ratio (–)
s = relubrication interval as travel distance (km)

Front Lube Units



Size	Material number	Dimensions (mm)								Weight m
		A_4	B_3	E_8	E_9	H	H_3	K_3	S_{12}	(g)
15	R205Z 125 00	31.7	11.5	20.5	7.90	24.1	19.90	1.95	M4	9.6
20	R205Z 825 00	42.5	12.5	29.0	10.25	30.1	25.10	2.50	M4	17.1
25	R205Z 225 00	46.6	13.0	33.0	11.35	36.1	29.90	4.50	M6	23.8
30	R205Z 725 00	58.2	13.5	42.0	12.60	42.1	35.15	5.60	M6	33.8
35	R205Z 325 00	68.6	14.0	50.0	15.80	48.1	40.40	7.10	M6	52.8
45	R205Z 425 00	83.5	14.5	61.0	19.60	60.1	49.90	10.60	M6	78.3

Lubrication adapter

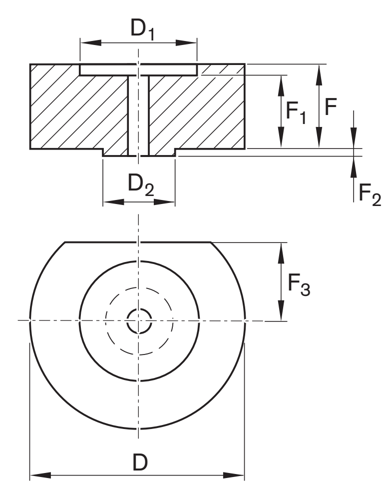


For oil and grease lubrication from above with high Ball Runner Blocks SNH R205E or SLH R205F

- Material: Plastic
- Quantity per pack: 1 pc.

Note for mounting

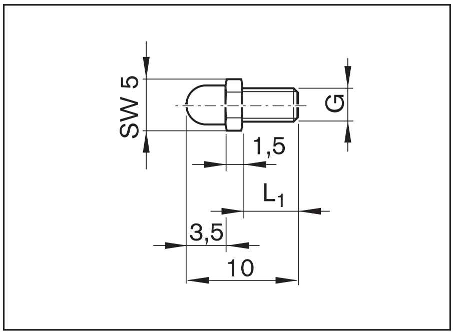
- O-rings are provided.
- Before mounting, use a heated metal tip to open the lube hole in the Ball Runner Block.
- For more details, see the “Lubrication and maintenance” chapter.



Size	Material number	Dimensions (mm)							Weight m
		D	D_1	D_2	F	F_1	F_2	F_3	(g)
15	R1621 100 05	12	6.2	3.4	3.7	3.1	0.5	3.20	0.5
25	R1621 200 05	15	7.2	4.4	3.8	3.2	0.5	5.85	0.9
30	R1621 700 05	16	7.2	4.4	2.8	2.2	0.5	6.10	0.7
35	R1621 300 05	18	7.2	4.4	6.8	6.2	0.5	6.80	2.2
45	R1621 400 05	20	7.2	4.4	9.8	9.2	0.5	8.30	4.1

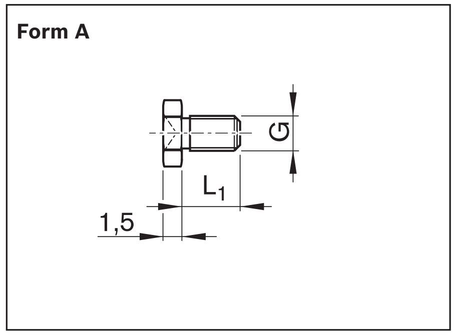
Lube nipple, lube fittings

Ball-type lube nipple

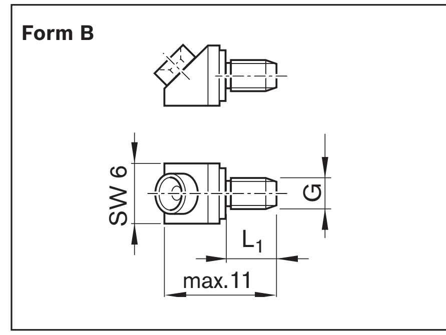


Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 006 01	M4	5	0.5

Funnel-type lube nipple according to DIN 3405

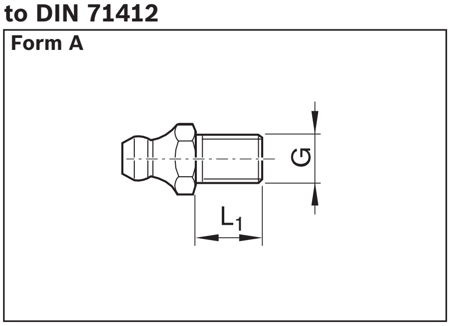


Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 069 09	M4	5	0.3



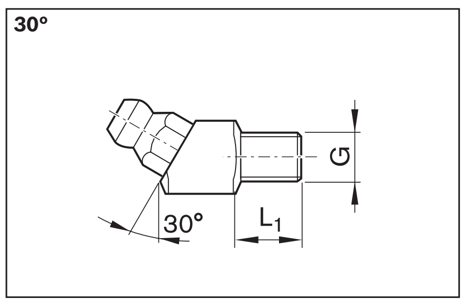
Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 070 09	M4	5	1.5

Hydraulic-type lube nipple according to DIN 71412

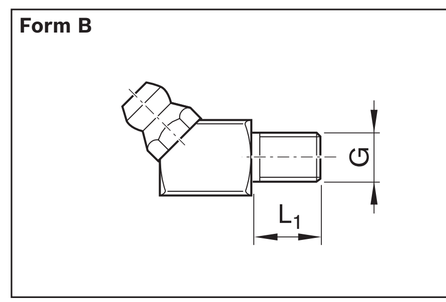


Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 008 02 R3417 016 02[1)]	M6	8	2.6

Hydraulic-type lube nipple according to DIN 71412



Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 023 02	M6	8	7.4

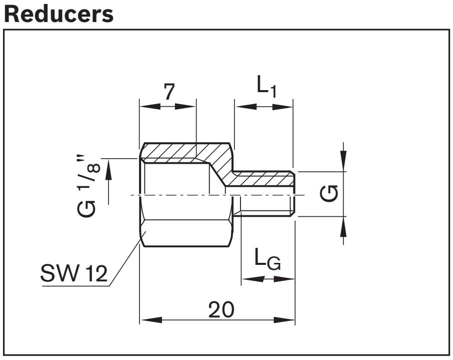


Material number	Dimensions (mm) G	L_1	Weight (g)
R3417 007 02	M6	8	7.4

1) Lube nipple Resist NR II made of corrosion-resistant steel according to DIN EN 10088

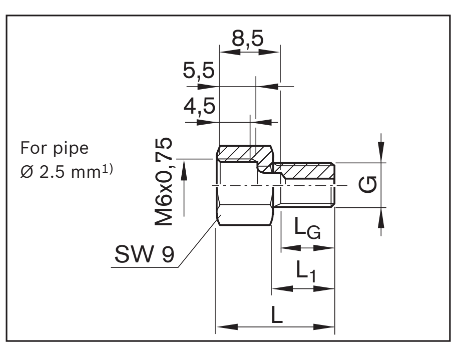
Lube fittings

Reducers

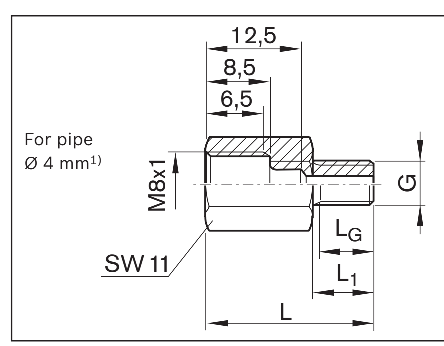


Material number	Dimensions (mm) G	L_1	L_G	Weight (g)
R3455 030 34	M6	8	6.5	7.5

Connectors



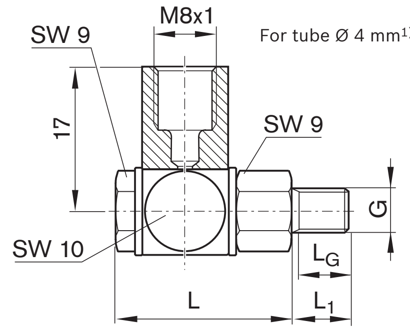
Material number	Dimensions (mm) G	L	L_1	L_G	Weight (g)
R3455 030 38	M6	15.5	8	6.5	4.1



Material number	Dimensions (mm) G	L	L_1	L_G	Weight (g)
R3455 030 37	M6	22	8	6.5	8.8

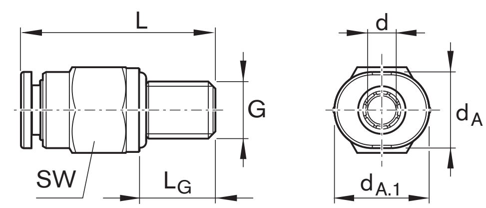
1) For connections according to DIN 2353 (solderless tube fittings)

Swivel fittings



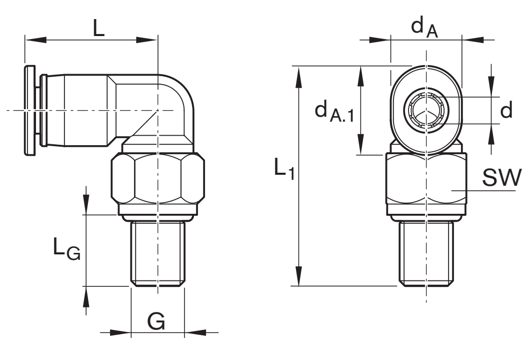
Material number	Dimensions (mm)				Weight
	G	L	L_1	L_G	(g)
R3417 018 09	M6	21.5	8	6.5	18.6

Straight connectors[2)] for plastic tubes and metal pipes



Material number	Dimensions (mm)							Weight
	d_A	$d_{A.1}$	d±0.1	G	L	L_G	SW	(g)
R3417 071 09	6.0	7	3	M4	16	5	6[3)]	1.4
R3417 035 09	8.5	10	4	M6	21	8	9	4.6
R3417 036 09	10.0	12	6	M6	22	8	10	4.8

Elbow plug-in connections rotatable[2)] for plastic tubes and metal pipes



Material number	Dimensions (mm)								Weight
	d_A	$d_{A.1}$	d±0.1	G	L	L_1	L_G	SW	(g)
R3417 072 09	6.0	7	3	M4	11	19	5	6[3)]	1.7
R3417 038 09	8.0	10	4	M6	20	25	8	9	5.1
R3417 039 09	10.5	12	6	M6	20	25	8	9	6.1

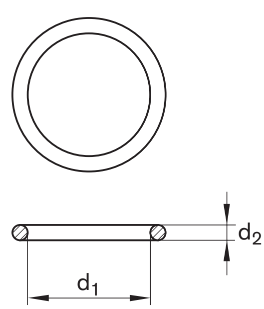
1) For connections according to DIN 2353 (solderless tube fittings)
2) Maximum lubricant pressure: 30 bar (exerting slow pressure with manual grease gun)
3) Maximum tightening torque: M_A = 0.5 Nm

Lube fittings, O-rings

Plastic tube Ø 3 mm for lube fittings

Material number	Dimensions external Ø (mm)	internal Ø (mm)	Length (m)	Weight (kg)
R3499 287 00	3	1.7	50	0.4

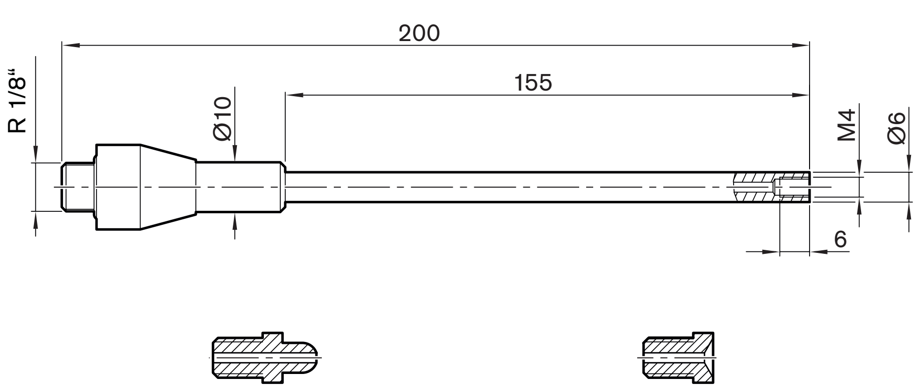
O-rings



Material number	d_1 x d_2 (mm)
R3411 130 01	4 x 1.0
R3411 131 01	5 x 1.0
R3411 003 01	6 x 1.5

Nozzle pipe

For manual grease guns.
For the lubrication of funnel-type and ball-type lube nipples for size 15 and 20 BSCL Ball Runner Blocks.
Scope of delivery:
1 x nozzle pipe
1 x interchangeable insert A for funnel-type lube nipple
1 x interchangeable insert B for ball-type lube nipple

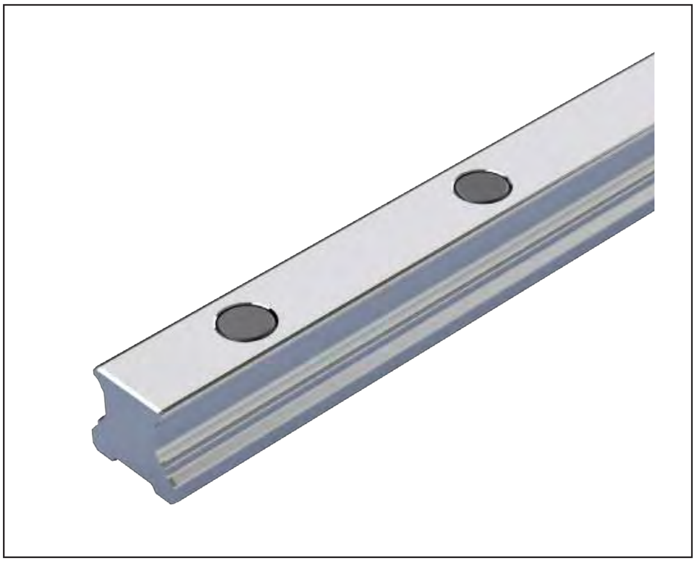


Interchangeable insert A for funnel-type lube nipple

Interchangeable insert B for ball-type lube nipple

Material number	Weight (g)
R345503106	158

Plastic mounting hole plugs



To avoid damage to the Runner Block, the mounting holes of the Guide Rails must be sealed with plastic mounting hole plugs.

Size	Material numbers of individual cap	Number of mounting hole plugs required for a factory length	Weight (g)
15	R1605 100 80	67	0.05
20	R1605 800 80	67	0.10
25	R1605 200 80	67	0.30
30	R1605 300 80	50	0.60
35	R1605 300 80	50	0.60
45	R1605 400 80	38	1.00

General mounting instructions

The following notes relating to mounting apply to all Ball Rail Systems. Please also observe the notes in the assembly instructions. They can be downloaded from the Rexroth media directory.

⚠ In the case of overhead installation (hanging installation) or vertical installation, the Ball Runner Block can release from the Ball Guide Rail due to the balls being lost or broken. Secure the Ball Runner Block from falling!
We recommend protection against falling loads!

⚠ Rexroth Ball Rail Systems are high-quality products. Use with extreme care during transport and mounting.

⚠ All steel parts are protected with anti-corrosion oil. These preservatives do not have to be removed as long as the recommended lubricants are used.

Installation examples

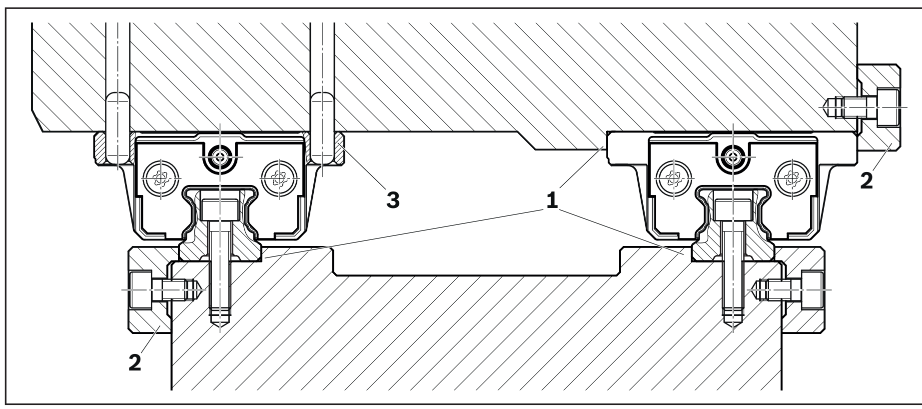
Ball Guide Rails
Each Ball Guide Rail has ground reference surfaces on both sides.

Ball Runner Blocks
Each Ball Runner Block has a ground reference edge on one side (see dimension V_1 in the dimension drawings).

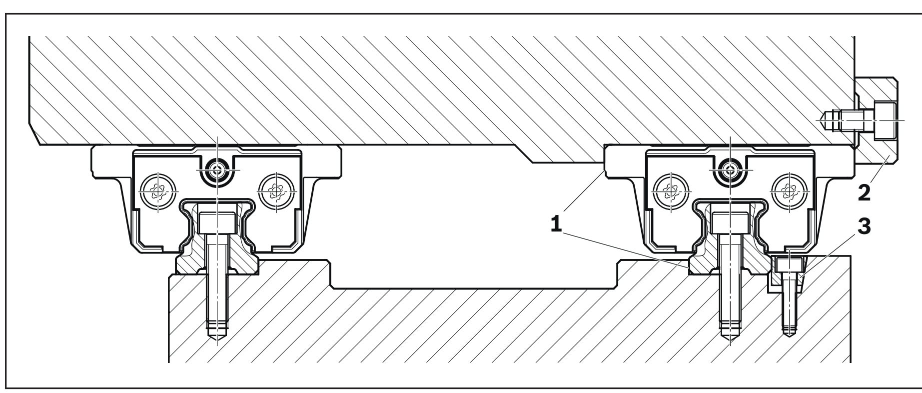
Possibilities for side fixing:

1 Reference edges
2 Clamping strips
3 Locating pins

Mounting with fixing of both Ball Guide Rails and both Ball Runner Blocks



Mounting with fixing of one Ball Guide Rail and one Ball Runner Block



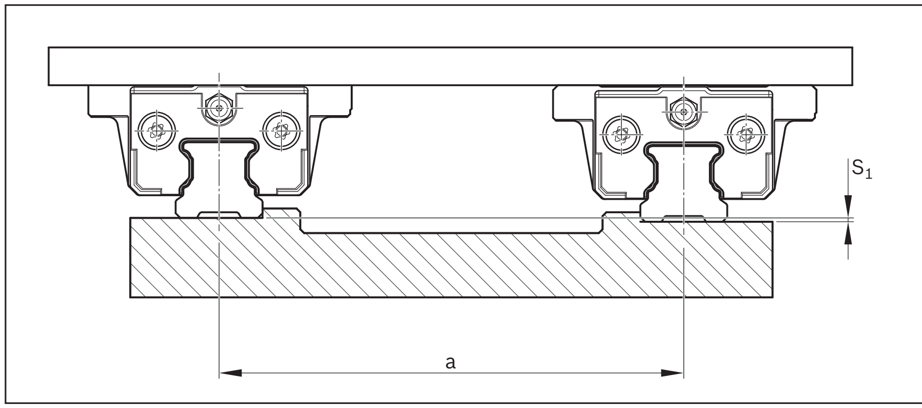
Notes

- Before installing the components, clean and degrease all mounting surfaces.
- Please ask for the “Mounting Instructions for Ball Rail Systems”.
- After mounting, it should be possible to move the Ball Runner Block easily.
- Ball Guide Rails without side fixing have to be aligned straight and parallel when mounting, preferably using a straightedge.
- Recommended limits for side load if no additional lateral retention is provided; see the chapter entitled “Mounting”.

Installation tolerances

Vertical offset

If you comply with the permissible vertical offset S_1 and S_2, the effect on the service life is, in general, negligible.

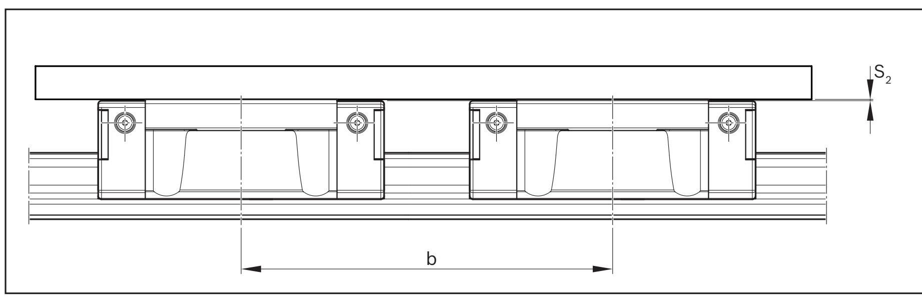


Permissible vertical offset in the transverse direction S_1
The tolerance for dimension H is to be deducted from the permissible vertical offset S_1 of the Ball Guide Rails according to the table containing the accuracy classes in the “General product description” chapter.
If $S_1 < 0$ applies, select other tolerances in the event of a combination of accuracy classes. See chapter “Accuracy classes”.

Calculation factor Y for preload class		
C0	**C1**	**C2**
$4.3 \cdot 10^{-4}$	$2.8 \cdot 10^{-4}$	$1.7 \cdot 10^{-4}$

$$S_1 = a \cdot Y$$

Permissible vertical offset in the longitudinal direction S_2
You must deduct from the permissible vertical offset S_2 of the Ball Runner Blocks the “Max. difference of dimension H on one rail” tolerance according to the table containing the accuracy classes in the “General product description” chapter. You must deduct the “Max. difference of dimension ∆H on one rail” tolerance from the permissible vertical offset S_2 of the Ball Runner Blocks according to the table with the accuracy classes in the “General product description” chapter.
If $S_2 < 0$ applies, select other tolerances in the event of a combination of accuracy classes. See chapter “Accuracy classes”.



Calculation factor X for Ball Runner Block length	
Normal	**Long**
$4.3 \cdot 10^{-5}$	$3.0 \cdot 10^{-5}$

$$S_2 = b \cdot X$$

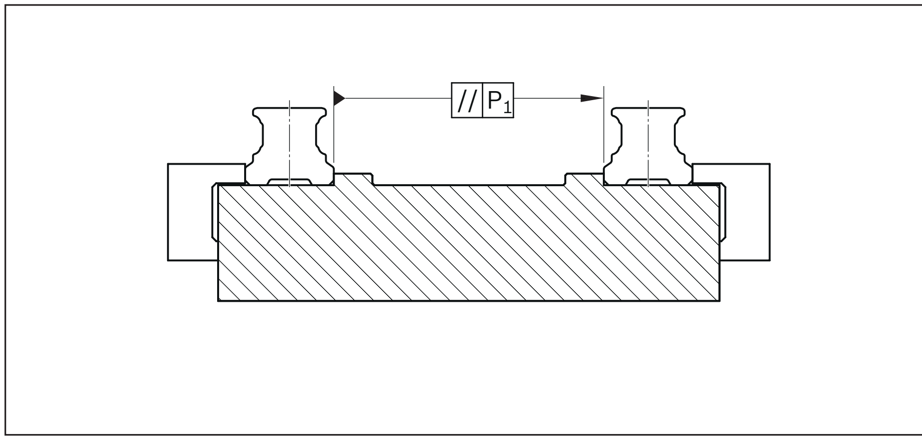
Key
S_1 = permissible vertical offset of the Ball Guide Rails (mm)
a = distance between Ball Guide Rails (mm)
Y = calculation factor, transverse direction (–)
S_2 = permissible vertical offset of the Ball Runner Blocks (mm)
b = distance between Ball Runner Blocks (mm)
X = calculation factor, longitudinal direction (–)

Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload

Installation Tolerances

Parallelism offset of the installed rails

Values measured on the Ball Guide Rails and the Ball Runner Blocks
The values for the parallelism offset P1 apply to the entire standard range of Ball Runner Blocks.
The parallelism offset $\mathbf{P_1}$ causes a slight rise in the preload.
If you comply with the table values, the effect on the service life is, in general, negligible.



Preload classes
C0 = Without preload (clearance)
C1 = Moderate preload
C2 = Average preload

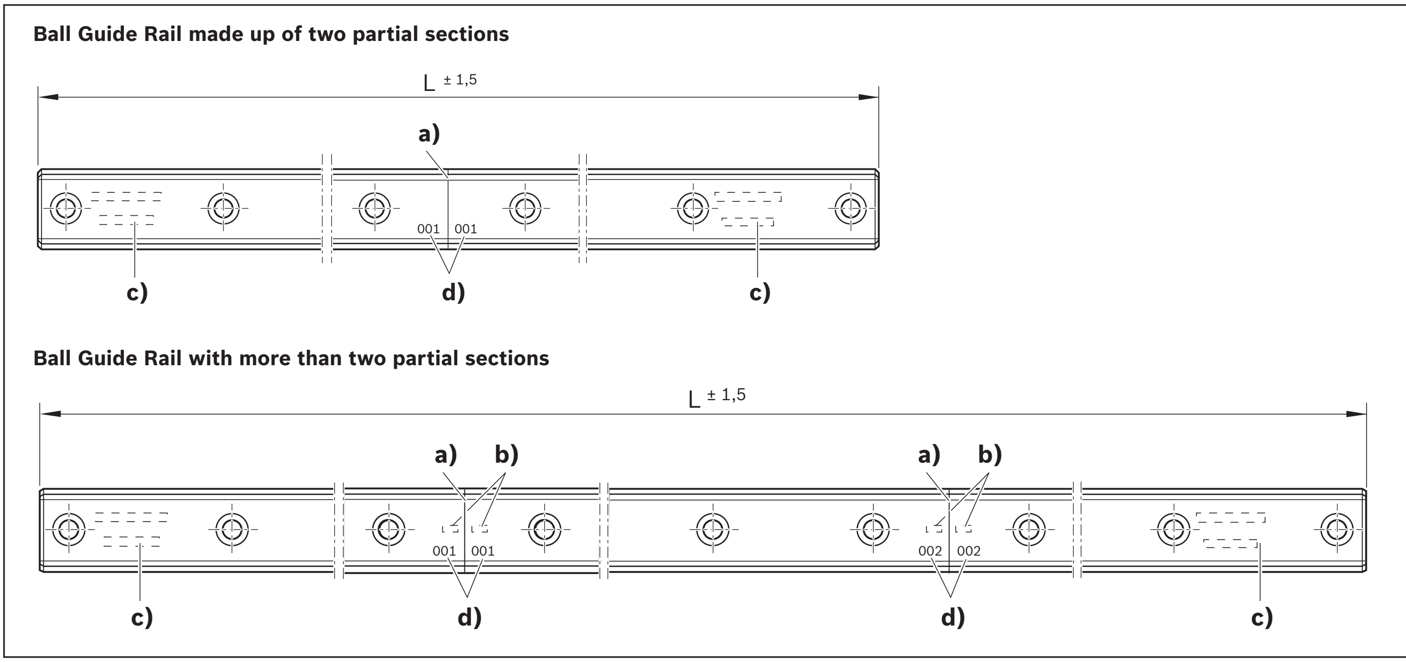
	Size	Parallelism offset P1 (mm) with preload class		
		C0	**C1**	**C2**
Ball Runner Blocks made of steel with precision installation[1)]	**15**	0.015	0.009	0.005
	20	0.018	0.011	0.006
	25	0.019	0.012	0.007
	30	0.021	0.014	0.009
	35	0.023	0.015	0.010
	45	0.028	0.019	0.012

1) The precision installation is a rigid, high-precision surrounding structure.
With standard installation, the surrounding structure is of flexible design and it is possible to work with **double** the tolerance values of the parallelism offset.

Composite Ball Guide Rails

Notes on Ball Guide Rails

- Matching partial sections of a composite Ball Guide Rail are identified as such by a label on the packaging. All partial sections of the same rail have the same serial rail number.
- The numbering is marked on the top of the Ball Guide Rail.



L = Rail length (mm)
n_B = Number of holes (–)

a) Joint
b) Rail number
c) Full rail identification on first and last sections
d) Joint identification number

Note on adjacent structures

Acceptable mounting hole tolerances for adjacent structures

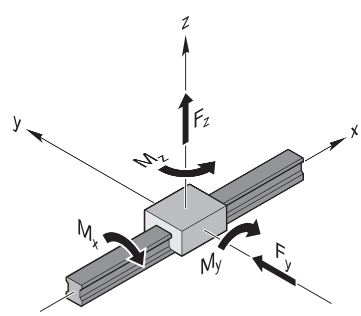
Size	Hole position tolerance (mm)
15 - 35	Ø 0.2
45	Ø 0.3

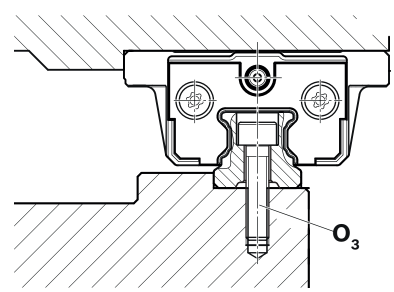
Mounting

Notes on the calculation of screw connections

In the bolt calculation, the maximum static tensile forces $F_{0\ z\ max}$, the maximum static torsional moments $M_{0\ x\ max}$ and the maximum static lateral forces $F_{0\ y\ max}$ without stop bars were determined. The decisive factor is the mounting of the rails from above (O_3).
The values for the strength class 8.8 are from DIN 637 (August 2013): Ball bearings – safety regulations for dimensioning and operation of Profiled Rail Systems with recirculating rolling elements. The calculation of the screw connections for strength classes 10.9 and 12.9 was based on the dimensions listed in the catalog (screw sizes, clamping lengths, screw-in depths, hole diameters). Deviant screw connections are to be recalculated according to VDI 2230.
Friction coefficient in the calculation:

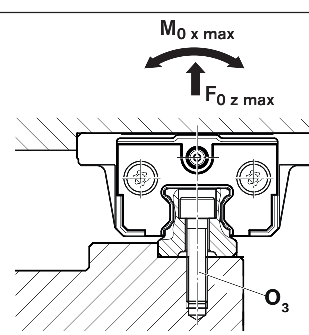
Coefficient of friction in the thread	$\mu_G = 0.125$
Coefficient of friction on the head surface	$\mu_K = 0.125$
Coefficient of friction in the joint	$\mu_T = 0.125$





Maximum static traction forces and torsional moments on Profiled Rail Systems (according to DIN 637)

The maximum load on a Profiled Rail System is defined not only by the static load-bearing capacity C_0 in accordance with ISO 14728-2 and the static moments M_{t0} from the rolling contact, but also by the screw connections. BSCL Ball Runner Blocks are fastened with four screws. Ball Guide Rails have a regularly spaced single-row threaded connection. If the BSCL Ball Runner Block is positioned exactly over a rail screw, this screw will absorb the largest portion of the load. For this reason, the load-bearing capacity is primarily dependent on the length of the BSCL Ball Runner Block, the rail hole spacing, the screw size and the width of the rail contact surface. Slipping or mismatches on exceeding a maximum load limit is primarily defined by the screw fastening of the rail.
The tables show the permitted static tensile forces $F_{0\ z\ max}$ and torsional moments $M_{0\ x\ ma}$ around the guide axis for Profiled Rail Systems in different versions for screw tightening torques of the strength class 8.8 (according to DIN 637) and the strength classes 10.9 and 12.9 (calculated with the dimensions of the Rexroth Ball Rail System BSCL).



Ball Rail Systems BSCL

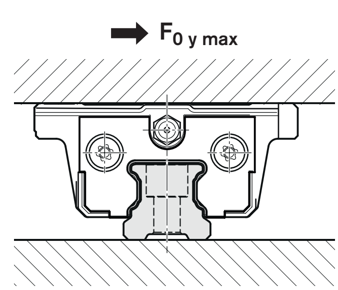
Size	Normal length (FNS, SNS, SNH)		Long (FLS, SLS, SLH)	
	$F_{0\ z\ max}$ (N)	$M_{0\ x\ max}$ (Nm)	$F_{0\ z\ max}$ (N)	$M_{0\ x\ max}$ (Nm)
Strength class 8.8 (according to DIN 637)				
15	3,700	26	4,200	30
20	6,400	60	7,300	68
25	9,400	100	10,800	120
30	18,500	240	21,100	280
35	18,500	300	21,100	340
45	45,900	970	52,400	1,100
Strength class 10.9 (calculated with the dimensions of the Rexroth Ball Rail Systems BSCL)				
15	6,270	42	7,170	48
20	10,800	99	12,300	110
25	15,500	160	17,700	180
30	28,700	370	32,800	420
35	28,700	450	32,800	510
45	69,700	1,480	79,600	1,700
Strength class 12.9 (calculated with the dimensions of the Rexroth Ball Rail Systems BSCL)				
15	7,570	51	8650	58
20	12,900	120	14,800	140
25	18,500	190	21,200	220
30	34,100	440	39,000	500
35	34,100	530	39,000	600
45	82,400	1,760	94,200	2,010

Mounting

Maximum static side load without stop strips (according to DIN 637)

For safe structural design the application includes the usage of stop strips on Runner Block and rail. If stop strips are not used on the Runner Block or the rail, then if a load is applied in the transverse direction the guideway may slip as soon as the side loads in the table are exceeded. The indicated maximum static lateral loads $F_{0\ y\ ma}$ apply for screws of strength class 8.8 (according to DIN 637) and for screws of strength class 10.9 and 12.9 (calculated with the dimensions of the Rexroth Ball Rail System BSCL) and an adjacent construction made of steel or cast iron.

Ball Rail Systems BSCL						
	Strength class					
	8.8		10.9		12.9	
Size	Standard length (FNS, SNS, SNH) $F_{0\ y\ max}$ (N)	Long (FLS, SLS, SLH) $F_{0\ y\ max}$ (N)	Standard length (FNS, SNS, SNH) $F_{0\ y\ max}$ (N)	Long (FLS, SLS, SLH) $F_{0\ y\ max}$ (N)	Standard length (FNS, SNS, SNH) $F_{0\ y\ max}$ (N)	Long (FLS, SLS, SLH) $F_{0\ y\ max}$ (N)
15	280	320	460	520	550	630
20	480	550	780	890	930	1,060
25	710	810	1,110	1,270	1,330	1,520
30	1,400	1,600	2,110	2,410	2,500	2,860
35	1,400	1,600	2,120	2,420	2,520	2,880
45	3,400	3,900	5,030	5,750	5,950	6,800



Tightening torques for Profiled Rail Systems (according to DIN 637)

The tightening torques for screw strength class 8.8 correspond to DIN 637. The tightening torques for the screw strength classes 10.9 and 12.9 were calculated for the dimensions of the Rexroth Ball Rail System BSCL.

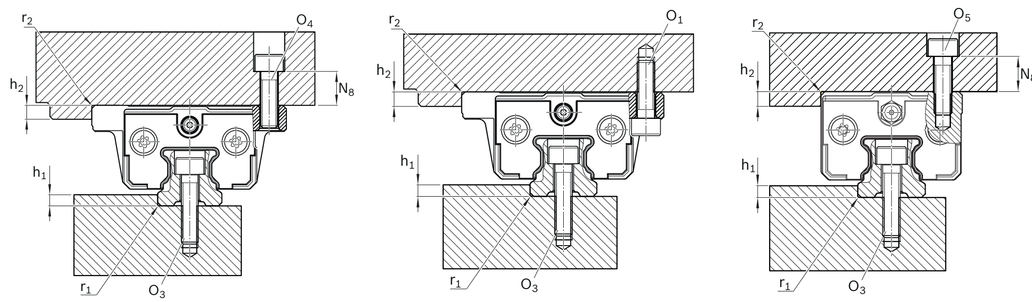
	Tightening torques M_A (Nm) for strength class		
	8.8	**10.9**	**12.9**
M4	3.0	4.4	5.2
M5	6.0	8.9	10.0
M6	10.0	15.0	17.0
M8	25.0	36.0	43.0
M10	49.0	71.0	83.0
M12	83.0	120.0	140.0

Mounting

Examples of combinations
The combinations shown here are examples. Basically, any Ball Runner Block may be combined with any of the Ball Guide Rail types offered.

Ball Guide Rail with Ball Runner Block

Ball Runner Blocks (flanged type) FNS, FLS	Ball Runner Blocks (flanged type) FNS, FLS	Ball Runner Blocks (slimline) SNS, SLS, SNH, SLH



Ball Guide Rails
R2055
(for mounting from above)

Size	Dimensions (mm)					
	$h_{1\,min}$	$h_{1\,max}$	h_2	N_8	$r_{1\,max}$	$r_{2\,max}$
15	2.5	3.5	4	6	0.4	0.6
20	2.5	4.0	5	9	0.6	0.6
25	3.0	5.0	5	10	0.8	0.8
30	3.0	5.0	6	10	0.8	0.8
35	3.5	6.0	6	13	0.8	0.8
45	4.5	8.0	8	14	0.8	0.8

Mounting screws
⚠ Always check the strength factor of the screws in the case of high lift-off loads!

For more information on this topic, see the “General mounting instructions” section.

Size	Screw sizes			
	Ball Runner Blocks			Ball Guide Rail
	O_1 ISO 4762 4 pc.	O_4 ISO 4762 4 pc.	O_5 ISO 4762 4 pc.	O_3 ISO 4762
15	M4x12	M5x12	M4x12	M4x20
20	M5x16	M6x16	M5x16	M5x25
25	M6x20	M8x20	M6x18	M6x30
30	M8x25	M10x20	M8x20	M8x30
35	M8x25	M10x25	M8x25	M8x35
45	M10x30	M12x30	M10x30	M12x45

Locating pins

⚠ If the guideline values for the permissible lateral force are exceeded (see the corresponding Ball Runner Blocks), you must fix them additionally by pinning.

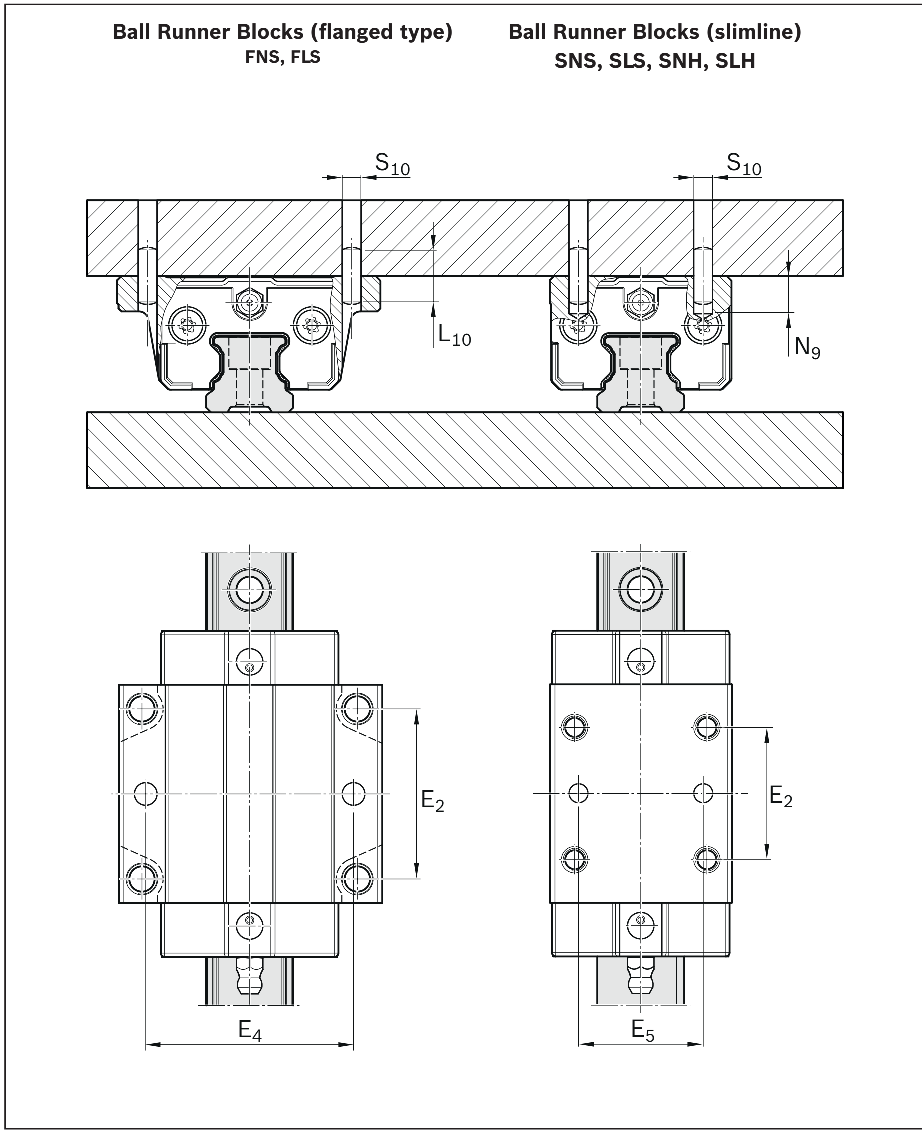
For the recommended dimensions for pin holes, refer to the dimension drawing and the dimensions.

Possible pin types

- Tapered pin (hardened) or
- Straight pin DIN ISO 8734

Note

- At the recommended positions for pin holes, there may be pre-drilled holes in the middle of the Ball Runner Block due to production-related issues (Ø < S_{10}).
  They are suitable for drilling out.
- If is necessary to carry out pinning at a different position (e.g. the middle lube fitting), dimension E_2 must not be exceeded in the longitudinal direction (for dimension E_2, refer to the dimension tables of the corresponding Ball Runner Blocks). Comply with dimensions E_4 and E_5!
- Do not complete the pin holes until after mounting.
- Please request the “Mounting Instructions for Profiled Rail Systems”.



Size	Dimensions (mm) E_4	E_5	L_{10} 1)	$N_{9\ max}$	S_{10} 1)
15	38	26	18	6.0	4
20	53	32	24	7.5	5
25	55	35	32	9.0	6
30	70	40	36	12.0	8
35	80	50	40	13.0	8
45	98	60	50	18.0	10

1) Tapered pin (hardened) or straight pin (DIN ISO 8734)

Notes on lubrication

The service life of the Ball Rail System crucially depends on the lubrication. For this purpose, the documentation, especially the chapter on lubrication, must be read and understood completely.

The operator is responsible for the selection and adequate supply of an appropriate lubricant to the Ball Rail System. These instructions do not exempt the operator from the individual examination of the conformity and suitability of the lubricant for its application.

⚠ To safeguard the supply of lubricant the lube fittings from the chapter "Accessories" must be used. When using other lube fittings it must be ensured that they are identical to Rexroth lube fittings.

Lubricants
(see chapter "Lubricants")

- Grease (NLGI 02)
- Liquid grease (NLGI 00)
- Oil (ISO VG 220)

Connecting elements
(See the chapter on "Accessories for Ball Runner Blocks")

- Lube nipple
- Straight connectors
- Pipe fittings
- O-rings, lubrication adapters (lube fitting above)

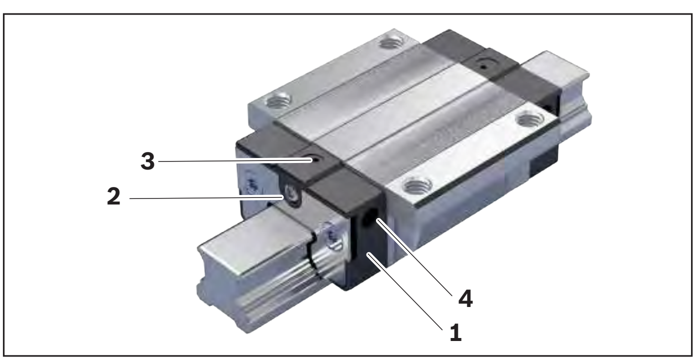
Injection

- Manually (grease gun)
- Progressive lubrication system
- Single-line piston distributor systems
- Lubrication with Front Lube Unit

Lubrication quantities, intervals, instructions

- Initial lubrication and relubrication
  (see the "Initial lubrication and relubrication" chapter)
- Relubrication intervals
  (see the "Relubrication intervals" chapter)
- Minimum dosing amount
  (see the "Minimum dosing amount" chapter)
- Lubrication cycle configuration
  (see the "Lubrication with one-point lubrication systems" chapter)

Lube fittings



BSCL Ball Runner Blocks feature four connection possibilities per end cap, through which a lubricant can be applied. Via the integrated channels in the end caps, the lubricant is evenly distributed among the four ball track turns.

1) End caps (2x)
2) Front lube fitting
3) Lube fitting above
4) Side lube fitting (2x per end cap)

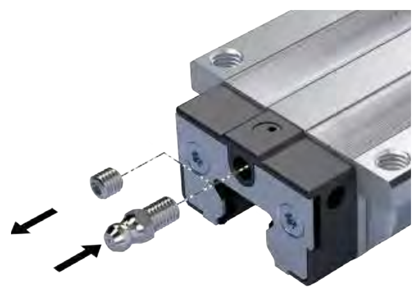
Lube fitting selection

For standard stroke (stroke > 2 x Ball Runner Block length B_1)
Lubrication at one of the two end caps is sufficient.
For a vertical or sloping installation position, lubrication must be done via the higher-lying end cap using liquid grease or oil.

For short stroke (stroke < 2 x Ball Runner Block length B_1)
Lubrication via both end caps is required.

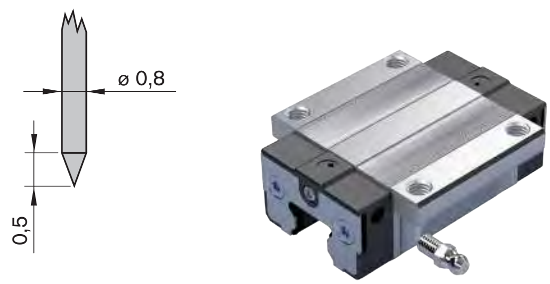
Starting up lube fittings

Front lube fitting:



1. Screw out the set screw.
2. Screw in the lubricating element vertically.

Side lube fitting (2x):



1. Heat the metal tip (Ø 0.8 mm).
2. Pierce the plastic of the pilot hole carefully with a hot metal tip. Maximum permissible penetration: 1 mm.
3. Screw in lubricating element vertically, if necessary, pre-cut thread with screw or tap.

Lube fitting above:

1. Heat the metal tip (Ø 0.8 mm).
2. Pierce the plastic of the pilot hole carefully with a hot metal tip. Maximum permissible penetration: 1 mm.
3. Place the O-ring into the recess.
(O-ring not included in the scope of delivery of the Ball Runner Block, see Accessories for Ball Runner Blocks).

Lube fitting above, high Runner Block:
Use a lubrication adapter

1. Open lube fitting (as with lube fitting above).
2. Place the O-ring into the recess.
3. Insert the lubrication adapter at a slant into the recess and press the straight side against the steel part. Use grease to fix the adapter in place.
4. Place the O-ring into the lubrication adapter.
(O-rings are included with the lubrication adapter).

Notes:

- Alternatively, it is possible to open the side and top lube fittings with a 0.8 or 1.0 mm Ø twist drill.
Pay attention to the maximum drilling depth of 1 mm. Make sure that no shavings enter into the lubrication channel.
- Only one lube fitting may be used for each end cap.
- Maximum lube pressure 30 bar, press slowly when lubricating with hand-operated grease gun.
- For a selection of possible lubrication elements, see the “Accessories for Ball Runner Blocks” chapter.
You can also get in touch with the manufacturer of the lubrication system.

Lubricants

BSCL Ball Runner Blocks can be lubricated with grease, liquid grease or oil:

	Grease (NLGI 2)	**Liquid grease (NLGI 00)**	**Oil (ISO VG 220)**
Injection	▶Grease gun ▶Progressive lubrication system	▶Single-line piston distributor systems ▶Progressive lubrication system	▶Single-line piston distributor systems ▶Progressive lubrication system
Recommendation	Dynalub 510 ▶NLGI grade 2 lithium-based high-performance grease according to DIN 51818 (KP2K-20 according to DIN 51825) ▶Good water resistance ▶Corrosion protection ▶Temperature range: –20 to +80 °C	Dynalub 520 ▶Lithium-based, high-performance grease NLGI grade 00 according to DIN 51818 (GP00K-20 according to DIN 51826) ▶Good water resistance ▶Corrosion protection ▶Temperature range: –20 to +80 °C	Shell Tonna S3 M 220 ▶▶ Demulsifying special oil for bed tracks and machine tool Guide Rails, (CLP according to DIN 51517-3, VG 220 according to ISO 3448) ▶A blend of highly refined mineral oils and additives ▶Can be used even when mixed with significant quantities of metalworking fluids
Approved alternative products	▶Castrol Longtime PD2 ▶Elkalub GLS 135/N2	▶Castrol Longtime PD00 ▶Elkalub GLS 135/N00	▶Mobil Vactra Oil No. 4

Table 1

⚠ If you use different lubricants from the ones stated, you may find that relubrication intervals are shorter and that performance decreases with short stroke and load ratio; in addition, chemical interactions can take place between the plastics, lubricants and the preservative agents. In addition, pumpability in single-line one-point lubrication systems must be guaranteed.

⚠ You must not use lubricants containing solid lubricating components (like graphite and MoS_2 for example)!

▶ Please consult us if the application involves special environmental requirements (such as clean room, vacuum, food industry applications, increased exposure to fluids or aggressive media, extreme temperatures). Each application must be considered on its own merits in order to chose the most appropriate lubricant. Be sure to have all the information concerning your application at hand when contacting us.
Pay attention to the chapter “Maintenance”.

Initial lubrication and relubrication

The following procedure is valid regardless of the type of lubricant injection method used.
For lubrication with one-point lubrication systems, additional notes and the configuration of the lubrication cycle is described in the chapter entitled “Lubrication with one-point lubrication systems”. For each application of lubricant, pay attention to the minimum dosage from Table 3 .

⚠ Never put Ball Runner Blocks into operation without basic lubrication. No initial lubrication is required if pre-lubricated at the factory. Rexroth Ball Rail Systems are supplied with preservation.

Initial lubrication:

⚠ BSCL Ball Runner Blocks have initial lubrication by default. Initial lubrication (basic lubrication) is merely necessary for non-lubricated Runner Blocks (material number R205X XXX 24).

⚠ The seals on the Ball Runner Block must be oiled or greased with the respective lubricant before being slid onto the Guide Rail.

1. Apply lubricant quantities in accordance with Table 2, for short stroke, apply in both end caps
2. Move the Ball Runner Block back and forth with three double strokes, stroke length > 3 x Runner Block length
3. Repeat steps 1 and 2 (lubrication with oil: repeat 1 x)
4. Check whether you can see a film of grease on the rail

Relubrication:

▸ When the re-lubrication interval as described in the chapter entitled “Relubrication” has been reached, then re-lubrication is necessary.

⚠ In the case of relubrication, it is not possible to change from grease to oil lubrication.

⚠ In the case of environmental influences such as contamination, high temperatures, vibration, impact load, etc., we recommend shortening the relubrication intervals.

⚠ Even under normal operating conditions, the system must be relubricated after two years at the latest due to aging of the grease.

⚠ For lubrication via one-point lubrication systems, the lubrication cycle is determined according to the chapter “Lubrication with one-point lubrication systems”.

1. Apply lubricant quantities in accordance with Table 2, for short stroke, apply in both end caps.
2. Move the Ball Runner Block back and forth with three double strokes, stroke length > 3 x Runner Block length

Lubrication quantities

Size	Initial lubrication (cm^3)[1)]		Relubrication (cm^3)	
	Grease (NLGI2) Liquid grease (NLGI00)	Oil (ISO VG 220)	Grease (NLGI2) Liquid grease (NLGI00)	Oil (ISO VG 220)
15	0.4 (3x)	0.6 (2x)	0.4 (2x)	0.6
20	0.7 (3x)	1.0 (2x)	0.7 (2x)	1.0
25	1.4 (3x)	1.5 (2x)	1.4 (2x)	1.5
30	2.2 (3x)	1.6 (2x)	2.2 (2x)	1.6
35	2.2 (3x)	1.8 (2x)	2.2 (2x)	1.8
45	4.7 (3x)	3.0 (2x)	5.7 (2x)	3.0

Table 2

1) ⚠ No initial lubrication is required for Runner Blocks with initial greasing (R205X XXX 20).

⚠ Pay attention to the notes on lubrication!

Relubrication intervals

The relubrication of Ball Rail Systems is load dependent. With the load ratio F_{comb}/C_{100}, the relubrication interval can be determined according to the diagrams (Fig. 1-3). After this distance has been traveled, the Ball Runner Block is to be relubricated (see the “Initial lubrication and relubrication” chapter).

The relubrication intervals were determined empirically under the following conditions:

- **Load ratio F_{comb}/C_{100}**
- No exposure to metalworking fluids
- Ambient temperature: T = 20 – 30°C
- Lubricant recommended by Rexroth

For deviant operating conditions, please ask, in particular in case of:

- Exposure to cooling lubricants
- Dust accumulation (wood, paper)
- Standard sealing (SS) in combination with front seal

Load-dependent relubrication intervals, grease NLGI 2

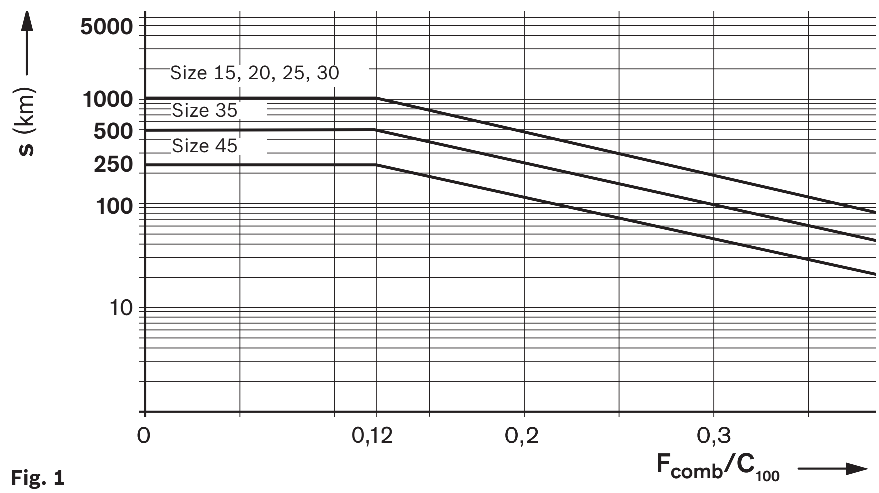


Fig. 1

Load-dependent relubrication intervals, liquid grease NLGI 00

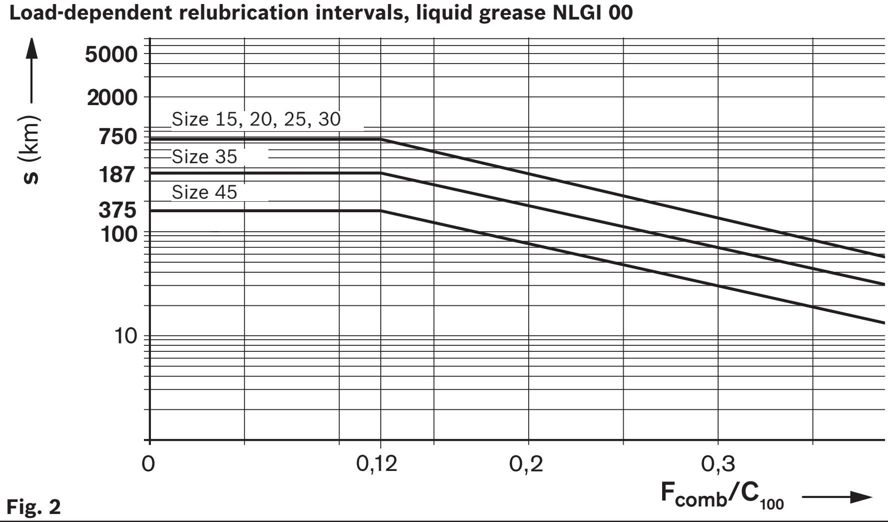


Fig. 2

Load-dependent relubrication intervals, oil ISO VG 220

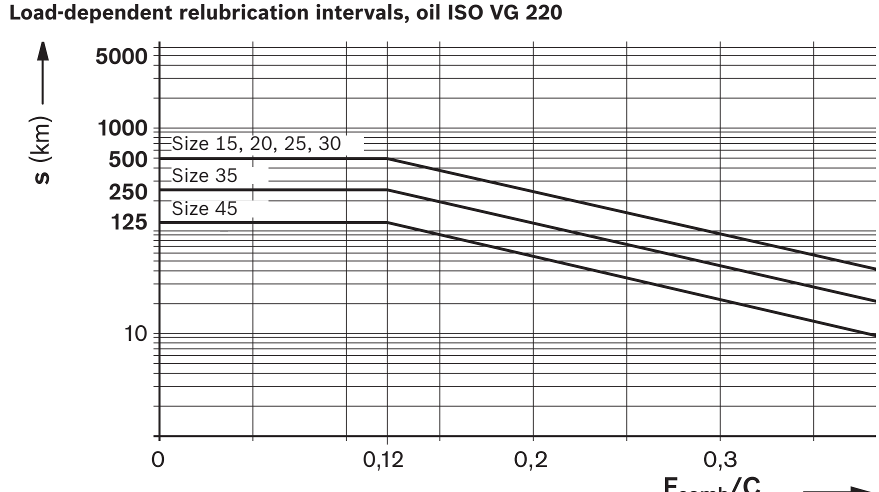


Fig. 3

Key

C_{100} = Dynamic load rating (N)
F_{comb} = combined equivalent dynamic load on bearing (N)
F_{comb}/C_{100} = load ratio (–)
s = Relubrication interval as travel distance (km)

⚠ Pay attention to the notes on lubrication!

Minimum amount, minimum piston distributor size

To ensure a uniform lubricant distribution in the Ball Runner Block, a minimum amount of lubricant as per Table 3 must be applied during each lubrication session. This is mainly relevant for automatic lubrication via single-line piston distributor[1)] or progressive lubrication[2)] systems. Applies to all installation positions. For short stroke, the amount per end cap indicated is valid.

Size	Grease (NLGI2) / liquid grease (NLGI00) (cm^3)	Oil (ISO VG 220) (cm^3)
15	0.3	0.4
20	0.3	0.6
25	0.3	0.6
30	0.3	0.6
35	0.3	0.6
45	0.3	1.0

Table 3

1) Liquid grease, oil
2) Grease, liquid grease, oil

Lubrication with one-point lubrication systems

There are two possibilities for supplying Ball Runner Blocks with a one-point lubrication system:

- ▶ Lubrication with progressive lubrication system (grease, liquid grease, oil)
- ▶ Lubrication with single-line piston distributor systems (liquid grease, oil)

The following procedure applies when configuring the lubrication cycle for one-point lubrication systems:

Step	Calculation process	Example: Ball Runner Block BSCL size 25 FNS Lubrication with single-line total loss lubrication system via piston distributor Oil (ISO VG 220) Load F_{comb} = 6.540 N
1. Determining the amount of lubricant	Table 2, chapter “Initial lubrication and relubrication”	Amount of lubricant size 25, oil: 1.5 cm^3
2. Determining the minimum piston distributor size/minimum dosage	Table 3, chapter “Minimum amount, minimum piston distributor size”	Minimum amount of lubricant size 25, oil: 0.6 cm^3 ▶ Selected piston distributor: 0.6 cm^3
3. Calculating the lubrication pulse rate for the application of the relubrication quantity	Pulse count $n = \frac{\text{Relubrication quantity (cm}^3\text{)}}{\text{Volume per lubrication pulse (cm}^3\text{)}}$ **Round up to next whole digit**	$n = \frac{1.5\ cm^3}{0.6\ cm^3} = 2.5$ ▶ For relubrication to inject the proper amount 3 lubrication pulses are needed.
4. Determining the relubrication interval from the chapter “Relubrication intervals”	Load ratio $L = \frac{\text{Dyn. equivalent bearing load (N)}}{\text{Dyn. load capacity (N)}}$ $L = \frac{F_{comb}}{C_{100}}$	Load ratio $L = \frac{6{,}540\ N}{21{,}800\ N} \approx 0.30$ Relubrication interval: 90 km (Fig. 3) ▶ For relubrication purposes, 1.5 cm^3 of lubricant must be injected after 90 km.
5. Calculating the lubrication cycle	Lube cycle = $\frac{\text{Relubrication interval (km)}}{\text{Number of pulses}}$	Lubrication cycle = $\frac{90\ km}{3}$ = 30 km Per Ball Runner Block (for short stroke per end cap) at least 0.6 cm^3 of lubricant oil must be supplied after no more than 30 km.

Notes:

⚠ We recommend carrying out initial lubrication manually before connecting to the one-point lubrication system.

⚠ All lines and elements must be filled with lubricant to the connection to the Ball Runner Blocks and must not contain air pockets.

⚠ Pumping or storage tanks for the lubricant should be fitted with a stirrer or follower piston to guarantee the flow (to avoid funneling in the tank).

⚠ When applying lubricant at the start or after a relatively long standstill, carry out 2 to 5 lubrication pulses in succession. When the system is in operation, 3 to 4 pulses per hour are recommended, irrespective of the distance traveled. If possible, carry out lubrication in one lubricating stroke. Carry out cleaning cycles (see “Maintenance”).
The user alone is responsible for selecting suitable metalworking fluids. An unfavorable selection of coolant/lubricant may lead to damage to the Ball Rail System. We recommend getting in touch with the manufacturer of the coolant/lubricant. Bosch Rexroth accepts no liability.
Lubricant and metalworking fluids must be coordinated.

- ▶ Rexroth recommends piston distributors manufactured by SKF. These should be installed as close as possible to the lube fittings of the Ball Runner Blocks. Long lines and small line diameters should be avoided, and the lines should be laid on an upward slant. Install the lines at a gradient.
- ▶ If other consumers are connected to the one-point lubrication system, the weakest link in the chain will determine the lubrication cycle time.

Maintenance

Cleaning cycle

Dirt can settle and encrust on Ball Guide Rails, especially when these are not enclosed. To ensure that seals and wipers retain their functionality, this dirt must be removed at regular intervals. It is advisable to perform at least one full cleaning cycle over the entire installed rail length every eight hours. In case of contamination or the use of a cooling lubricant, a shorter interval is recommended.

Before shutting down the machine, always perform a few lubricating pulses or lubricating strokes one after another. The lubrication pulses should take place over the maximum possible travel distance (cleaning cycle) while the axis is motion.

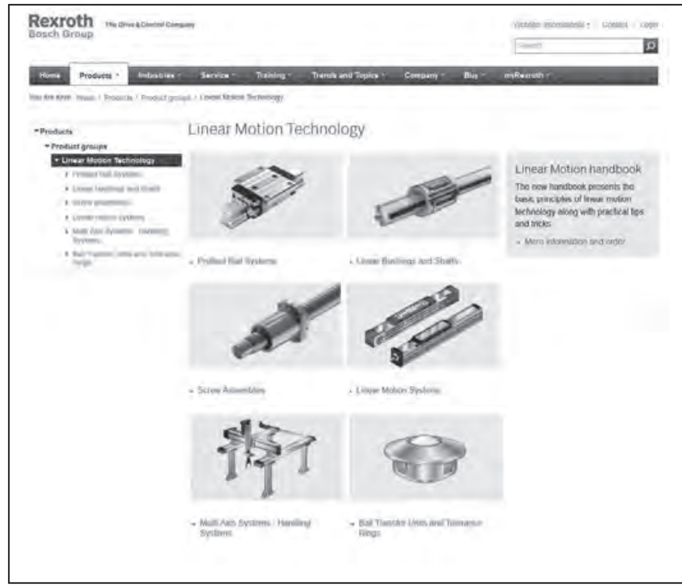
Maintenance

All elements used for scraping or wiping the Ball Guide Rails must be cleaned and lubricated at regular intervals.
We recommend annual maintenance.

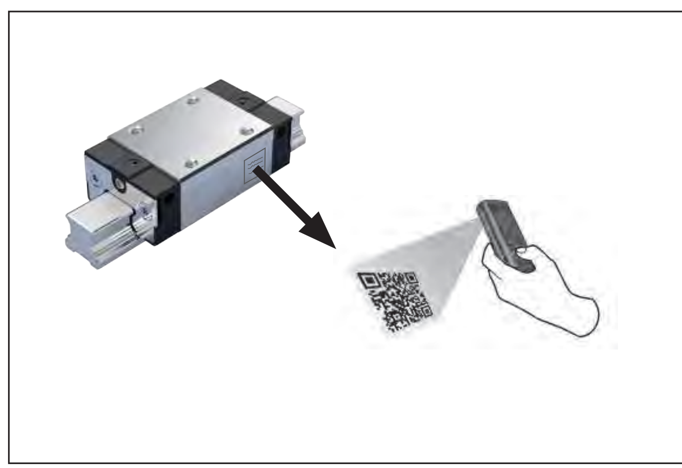
Further information

You can find extensive information here on products as well as training and service offers.

Product information:
www.boschrexroth.com/linear-motion-technology



Advanced product information on the Ball Rail System BSCL using the QR code:
In addition to the material number, a QR code can also be found on the BSCL Runner Block. This leads to further product descriptions and enables the user to call up extensive information on the product. This includes the instructions and the catalog, which contains all technical information.
A connection to the eShop, the short product name for the Runner Block as well as the production plant and the production date are in preparation.



Contact
https://addresses.boschrexroth.com/DE/en_US

Training:

http://www.boschrexroth.com/training

Service:

http://www.boschrexroth.com/service

The Drive & Control Company

Rexroth
Bosch Group

Bosch Rexroth Corporation
Headquarters
14001 South Lakes Drive
Charlotte, NC 28273
Telephone (800) REXROTH
(800) 739-7684
info@boschrexroth-us.com
www.boschrexroth-us.com

Find your local contact person here:
www.boschrexroth-us.com/contact

R999001214A (2017-10)