

# Ball Rail Systems

R310EN 2202 (2009.06)

The Drive & Control Company



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## General Product Description

## New Features at a Glance

### Double-Lipped Seal (DS) for Ball Runner Blocks

For applications where the Ball Rail Systems are exposed to high levels of contamination such as metal chips, wood dust, metalworking fluids, etc.


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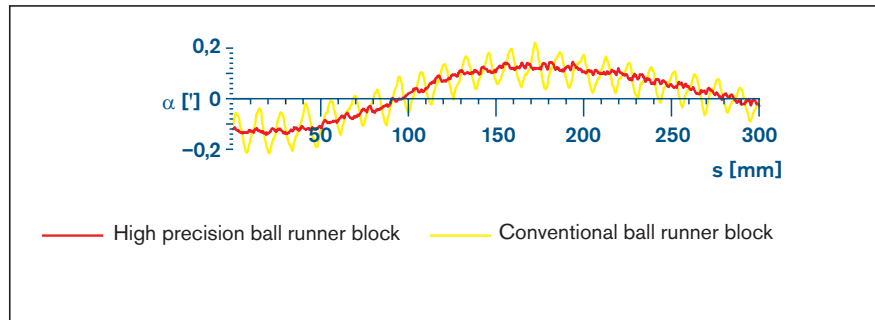


### High precision ball runner blocks, steel version

Ball runner blocks now with even better travel accuracy.

Frictional drag variation and frictional drag levels have been reduced still further.


For details,  72



### Super Ball Runner Blocks, steel version, with new recirculation geometry

Available in design styles:

- FKS – Flanged, short, standard height
- SKS – Slimline, short, standard height

For details,  88



### Ball Guide Rails for use on cast mineral parts

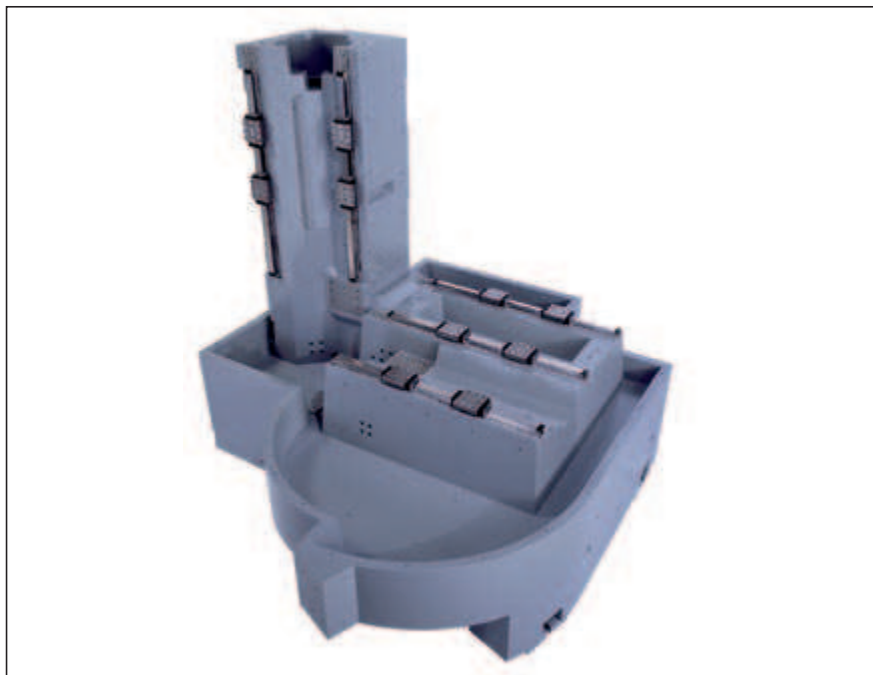
Ball guide rails with flat bases make it easier to position the ball guide rail on mounting bases made of cast and ground mineral materials with cast-in metallic threaded anchors.

A 50 percent larger contact area results in a lower surface pressure between the ball guide rail and the shaped contact surface of the cast mineral part.

These rails can also be used in standard applications.

Sizes 25 – 45 available on request.

For details,  122 – 127



**V-Guide Rails for simplified mounting**

The V-guide rail has no mounting holes. It is installed by press-fitting it into mounting base.

The mating cavity for the rail can be produced using a standard contour milling machine. It is not necessary to drill any holes.

For details, [☞](#) [📄](#) 136

**Wide Runner Blocks BNS and CNS with new recirculation geometry and with optional ball chain**

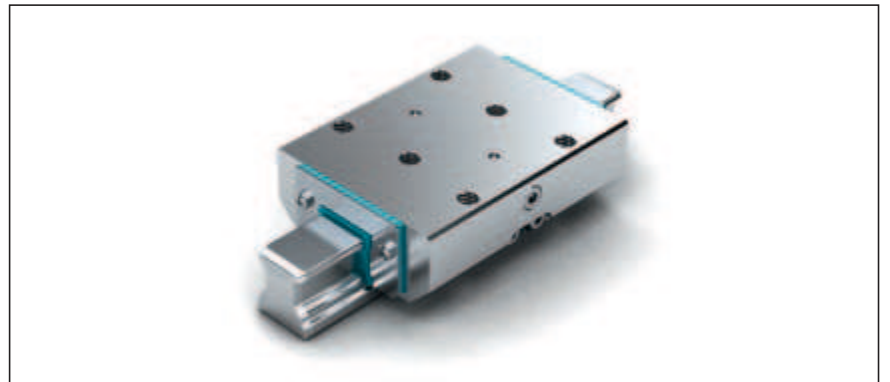
Available in sizes:

- 20/40
- 25/70

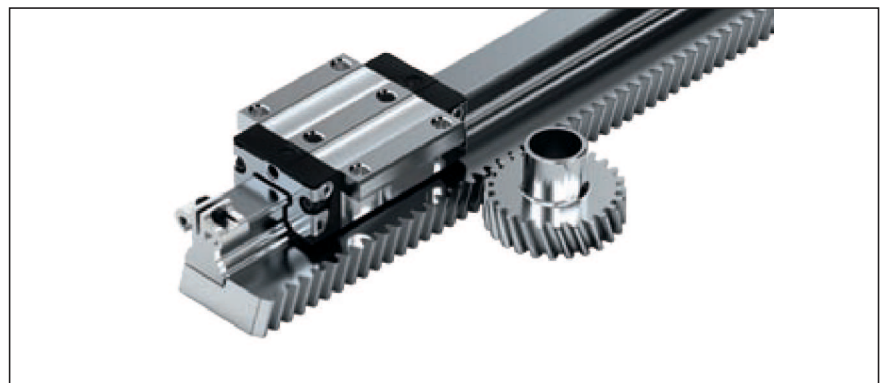
For details, [☞](#) [📄](#) 140

**Clamping and Braking Units**

For details, [☞](#) [📄](#) 182

**Rack and pinion drives for Ball Runner Blocks**

For details, [☞](#) [📄](#) 218



# Product Description

## Characteristic features

### Make up your own compact linear motion guideways from interchangeable standard stock elements...

Rexroth manufactures its ball guide rails and ball runner blocks with such high precision, especially in the running track zone, that each individual component element can be replaced by another at any time.

This makes infinite combinations possible within each accuracy class.

And it enables a high standard of logistics that are unique worldwide.

Each element can be individually ordered and separately stocked. Both sides of the guide rail can be used as reference edges.

## Highlights

- Same load capability in all four main load directions
- Very low noise level and best travel performance
- Excellent dynamic characteristics:  
Travel speed:  $v_{\max}$  up to 10 m/s  
Acceleration:  $a_{\max} = 500 \text{ m/s}^2$
- Long-term lubrication, up to several years
- Minimum quantity lubrication system with integrated reservoir for oil lubrication<sup>1)</sup>
- Lube ports with metal threads on all sides<sup>1)</sup>
- 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 runner block
- 60% weight saving with aluminum runner block (compared to the steel version)

## Further highlights

- Interchangeability with Rexroth's Roller Rail Systems and eLINE Ball Rail Systems
- Integrated, inductive and wear-free measuring system as an option
- Extensive range of accessories
- Attachments can be bolted to ball runner blocks from above or below<sup>1)</sup>
- 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 runner block<sup>1)</sup>
- 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)<sup>1)</sup>

- Resist NR: Ball runner block body made of corrosion-resistant steel per EN 10088
- Resist NR II: Ball runner block body, ball guide rail and all steel parts made from corrosion-resistant steel per EN 10088
- Resist CR: Ball runner block body and ball guide rail made of steel with matte-silver hard-chrome plated corrosion-resistant coating

1) depends on type

## Codes for design styles of all the available ball runner blocks and ball guide rails

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

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

Definition Ball Runner Block design style <sup>2)</sup>		Code (example)		
		F	N	S
Width	Flanged	F		
	Slimline			
	Wide			
	Compact			
Length	Normal		N	
	Long			
	Short			
Height	Standard height			S
	High			
	Low			

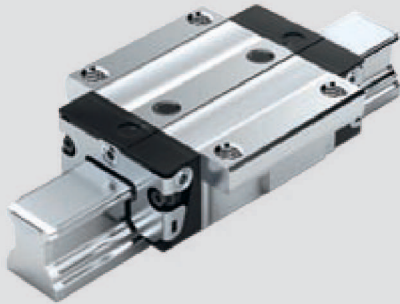
2) For each ball runner block and ball guide rail type, any design styles that are not available will be indicated in gray lettering.

Definition Ball Guide Rail design style <sup>2)</sup>		Code (example)		
		S	N	S
Width	Slimline	S		
	Wide			
Length	Normal		N	
Height	Standard height			S

## Design style examples

### Standard Ball Rail System

FNS – Flanged, normal, standard height



SNS – Slimline, normal, standard height

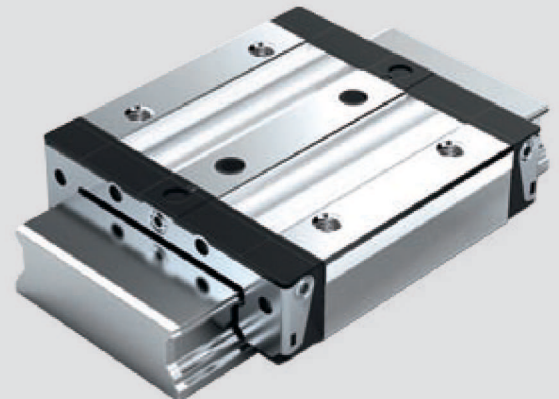


### Wide Ball Rail System

BNS – Wide, normal, standard height



CNS – Compact, normal, standard height



#### Proven cover strip for ball guide rail mounting holes

- A single cover for all holes – saves time and money
- Made of corrosion-resistant spring steel per EN 10088
- Easy to fit – simply clip on and secure





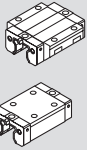
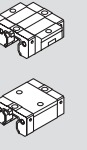



#### Ball chain (optional)

- Optimizes noise levels

## General Product Description

## Product Overview, Ball Runner Blocks with Load Capacities and Moments

Ball runner blocks		Page	Size	15	20	25	30	35	45	55	65			
				Load capacities (N) and load moments (Nm)										
Standard, Heavy Duty, High Precision Ball Runner Blocks made of steel <sup>3)</sup> Resist NR <sup>4)</sup> Resist CR <sup>6)</sup>		FNS R1651 <sup>3)6)</sup> R2001 <sup>4)</sup>	36	C	1)	7 800	18 800	22 800	31 700	41 900	68 100	98 200	123 000	
				C	2)	7 280	17 400	21 300	29 300	41 900	63 300	–	–	
		101	C <sub>0</sub>	1)	13 500	24 400	30 400	41 300	54 000	85 700	121 400	192 700		
			C <sub>0</sub>	2)	12 100	21 700	27 300	37 200	54 000	77 100	–	–		
		42	SNS R1622 <sup>3)6)</sup> R2011 <sup>4)</sup>	102	M <sub>t</sub>	1)	74	240	320	540	890	1 830	3 100	4 850
					M <sub>t</sub>	2)	69	220	300	500	890	1 700	–	–
	48	SNH R1621 <sup>3)6)</sup>	102	M <sub>t0</sub>	1)	130	310	430	720	1 160	2 310	3 860	7 610	
				M <sub>t0</sub>	2)	120	285	400	665	1 160	2 145	–	–	
	48	SNH R1621 <sup>3)6)</sup>	102	M <sub>L</sub>	1)	40	130	180	290	440	890	1 540	2 430	
				M <sub>L</sub>	2)	37	120	170	270	440	825	–	–	
	48	SNH R1621 <sup>3)6)</sup>	102	M <sub>Lo</sub>	1)	71	165	240	380	565	1 130	1 905	3 815	
				M <sub>Lo</sub>	2)	66	155	225	350	565	1 050	–	–	
Standard Ball Runner Blocks made of steel <sup>3)</sup> Resist NR <sup>4)</sup> Resist CR <sup>6)</sup>		FLS R1653 <sup>3)6)</sup> R2002 <sup>4)</sup>	38	C	1)	10 000	24 400	30 400	40 000	55 600	90 400	124 200	163 000	
				C	2)	9 000	23 100	27 500	38 000	53 000	81 900	–	–	
		101	FLS R1653 <sup>3)6)</sup> R2002 <sup>4)</sup>	101	C <sub>0</sub>	1)	20 200	35 200	45 500	57 800	81 000	128 500	170 000	289 000
					C <sub>0</sub>	2)	17 500	32 500	39 500	53 700	75 600	111 400	–	–
		44	SLS R1623 <sup>3)6)</sup> R2012 <sup>4)</sup>	103	M <sub>t</sub>	1)	96	310	430	690	1 200	2 440	3 950	6 440
					M <sub>t</sub>	2)	86	295	390	655	1 145	2 210	–	–
	50	SLH R1624 <sup>3)6)</sup>	103	M <sub>t0</sub>	1)	190	450	650	1 000	1 740	3 470	5 400	11 420	
				M <sub>t0</sub>	2)	170	425	590	950	1 660	3 145	–	–	
	50	SLH R1624 <sup>3)6)</sup>	103	M <sub>L</sub>	1)	75	225	345	495	830	1 700	2 630	4 620	
				M <sub>L</sub>	2)	68	215	310	470	790	1 540	–	–	
	50	SLH R1624 <sup>3)6)</sup>	103	M <sub>Lo</sub>	1)	150	330	510	715	1 215	2 425	3 600	8 190	
				M <sub>Lo</sub>	2)	135	310	460	680	1 160	2 195	–	–	
Standard Ball Runner Blocks made of steel <sup>3)</sup> Resist NR <sup>4)</sup> Resist CR <sup>6)</sup>		FKS R1665 <sup>3)6)</sup> R2000 <sup>4)</sup>	40	C	1)	5 400	12 400	15 900	22 100	29 300	–	–	–	
				C	2)	4 600	12 400	14 000	22 100	29 300	–	–	–	
		102	FKS R1665 <sup>3)6)</sup> R2000 <sup>4)</sup>	102	C <sub>0</sub>	1)	8 100	13 600	18 200	24 800	32 400	–	–	–
					C <sub>0</sub>	2)	6 700	13 600	15 200	24 800	32 400	–	–	–
		46	SKS R1666 <sup>3)6)</sup> R2010 <sup>4)</sup>	103	M <sub>t</sub>	1)	52	150	230	380	640	–	–	–
					M <sub>t</sub>	2)	44	150	205	380	640	–	–	–
	103	SKS R1666 <sup>3)6)</sup> R2010 <sup>4)</sup>	103	M <sub>t0</sub>	1)	80	170	260	430	700	–	–	–	
				M <sub>t0</sub>	2)	70	170	230	430	700	–	–	–	
	103	SKS R1666 <sup>3)6)</sup> R2010 <sup>4)</sup>	103	M <sub>L</sub>	1)	19	52	82	133	200	–	–	–	
				M <sub>L</sub>	2)	16	52	72	133	200	–	–	–	
	103	SKS R1666 <sup>3)6)</sup> R2010 <sup>4)</sup>	103	M <sub>Lo</sub>	1)	28	58	94	150	220	–	–	–	
				M <sub>Lo</sub>	2)	24	58	83	150	220	–	–	–	
	FNN R1693 <sup>3)6)</sup>	52	C	1)	–	14 500	22 800	–	–	–	–	–		
			C <sub>0</sub>	1)	–	24 400	30 400	–	–	–	–	–		
	56	SNN R1694 <sup>3)6)</sup>	56	M <sub>t</sub>	1)	–	190	320	–	–	–	–	–	
				M <sub>t0</sub>	1)	–	310	430	–	–	–	–	–	
				M <sub>L</sub>	1)	–	100	180	–	–	–	–	–	
				M <sub>Lo</sub>	1)	–	165	240	–	–	–	–	–	
	FKN R1663 <sup>3)6)</sup>	54	C	1)	–	9 600	15 900	–	–	–	–	–		
			C <sub>0</sub>	1)	–	13 600	18 200	–	–	–	–	–		
	58	SKN R1664 <sup>3)6)</sup>	58	M <sub>t</sub>	1)	–	120	230	–	–	–	–	–	
				M <sub>t0</sub>	1)	–	170	260	–	–	–	–	–	
58	SKN R1664 <sup>3)6)</sup>	58	M <sub>L</sub>	1)	–	40	82	–	–	–	–	–		
			M <sub>Lo</sub>	1)	–	58	94	–	–	–	–	–		
Super Ball Runner Blocks made of steel <sup>3)</sup> Resist CR <sup>6)</sup>		FKS 1661 <sup>3)6)</sup> SKS 1662 <sup>3)6)</sup>	90	C	1)	3 900	10 100	11 400	15 800	21 100	–	–	–	
				F <sub>max</sub>	1)	1 500	3 900	4 400	6 100	8 100	–	–	–	
	92	SKS 1662 <sup>3)6)</sup>	92	M <sub>t</sub>	1)	39	130	170	270	450	–	–	–	
M <sub>tmax</sub>				1)	15	50	65	105	175	–	–	–		

Ball runner blocks		Page	Size	15	20	25	30	35	45	55	65	
					20/40	25/70		35/90				
				Load capacities (N) and load moments (Nm)								
High-Speed Ball Runner Blocks made of steel		FNS R2001 ... 9.	86	C <sup>1)</sup>	5 300	12 700	15 500	21 500	28 500	-	-	-
				C <sub>0</sub> <sup>1)</sup>	9 100	16 500	20 600	28 000	36 700	-	-	-
		SNS R2011 ... 9.	87	M <sub>t</sub> <sup>1)</sup>	50	160	210	360	600	-	-	-
				M <sub>t0</sub> <sup>1)</sup>	88	210	290	490	780	-	-	-
				M <sub>L</sub> <sup>1)</sup>	27	88	120	190	300	-	-	-
				M <sub>Lo</sub> <sup>1)</sup>	48	110	160	250	380	-	-	-
Ball Runner Blocks made of aluminum		FNS R1631	96	C <sup>1)</sup>	7 800	18 800	22 800	31 700	41 900	-	-	-
				C <sup>2)</sup>	7 280	17 400	21 300	29 300	41 900	-	-	-
		SNS R1632	98	F <sub>max</sub> <sup>1) 2)</sup>	3 000	7 200	8 800	12 200	16 200	-	-	-
				M <sub>t</sub> <sup>1)</sup>	74	240	320	540	890	-	-	-
				M <sub>t</sub> <sup>2)</sup>	69	220	300	500	890	-	-	-
				M <sub>tmax</sub> <sup>1) 2)</sup>	29	92	125	210	345	-	-	-
				M <sub>L</sub> <sup>1)</sup>	40	130	180	290	440	-	-	-
				M <sub>L</sub> <sup>2)</sup>	37	120	170	270	440	-	-	-
Ball Runner Block Resist NR II <sup>5)</sup>		FNS R2001 ... 0.	106	C <sup>1)</sup>	5 100	12 300	15 000	20 800	27 600	-	-	-
				C <sup>2)</sup>	4 700	11 400	14 000	19 300	27 600	-	-	-
		SNS R2011 ... 0.	107	C <sub>0</sub> <sup>1)</sup>	9 300	16 900	21 000	28 700	37 500	-	-	-
				C <sub>0</sub> <sup>2)</sup>	8 400	15 000	18 900	25 800	37 500	-	-	-
				M <sub>t</sub> <sup>1)</sup>	63	205	270	460	760	-	-	-
				M <sub>t</sub> <sup>2)</sup>	58	190	250	425	760	-	-	-
				M <sub>t0</sub> <sup>1)</sup>	90	215	295	500	805	-	-	-
				M <sub>t0</sub> <sup>2)</sup>	81	190	265	450	805	-	-	-
				M <sub>L</sub> <sup>1)</sup>	34	110	150	245	375	-	-	-
				M <sub>L</sub> <sup>2)</sup>	31	100	140	225	375	-	-	-
Wide Ball Runner Blocks made of steel <sup>3)</sup> Resist CR <sup>6)</sup>		BNS R1671 <sup>3)6)</sup>	142	C <sup>1)</sup>	-	13 650	29 000	-	58 200	-	-	-
				C <sup>2)</sup>	-	12 850	27 550	-	-	-	-	-
		CNS R1672 <sup>3)6)</sup>	146	C <sub>0</sub> <sup>1)</sup>	-	19 675	42 500	-	86 300	-	-	-
				C <sub>0</sub> <sup>2)</sup>	-	18 050	39 450	-	-	-	-	-
				M <sub>t</sub> <sup>1)</sup>	-	310	1 080	-	2 880	-	-	-
				M <sub>t</sub> <sup>2)</sup>	-	290	1 025	-	-	-	-	-
				M <sub>t0</sub> <sup>1)</sup>	-	450	1 580	-	4 270	-	-	-
				M <sub>t0</sub> <sup>2)</sup>	-	415	1 465	-	-	-	-	-
M <sub>L</sub> <sup>1)</sup>	-	95	305	-	920	-	-	-				
M <sub>L</sub> <sup>2)</sup>	-	90	290	-	-	-	-	-				
M <sub>Lo</sub> <sup>1)</sup>	-	135	450	-	1 370	-	-	-				
M <sub>Lo</sub> <sup>2)</sup>	-	125	420	-	-	-	-	-				

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<sub>t</sub>** and **M<sub>L</sub>** from the table by 1.26.

1) Load capacities for Ball Runner Block **without** ball chain.

2) Load capacities for Ball Runner Block **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.

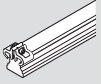
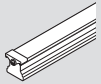
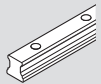
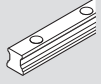
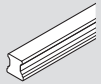
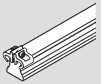
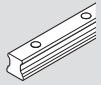
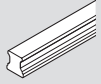
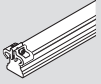
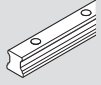
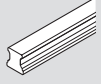
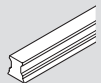
5) Resist NR II: All steel parts made of corrosion-resistant steel per EN 10088.

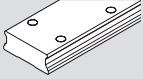
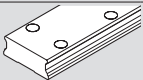
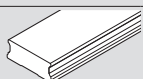
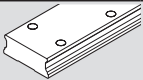
6) Resist CR: Ball runner block body made of steel with matte-silver hard-chrome plated corrosion-resistant coating.

For design style codes, 6

## General Product Description

## 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 Ball Guide Rails made of steel <sup>3)</sup>		SNS R1605 .3. .. / R1605 .B. .. 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 R1605 .6. .. / R1605 .D. .. For mounting from above, with cover strip and screw-down protective caps	124	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
		SNS R1605 .0. .. / R1605 .C. .. For mounting from above, with plastic mounting hole plugs	126	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	128	–	–	3 836	3 836	3 836	3 776	3 836	3 746
		SNS R1607 .0. .. For mounting from below	130	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
Standard Ball Guide Rails Resist NR II <sup>1)</sup>		SNS R2045 .3. .. For mounting from above, with cover strip and strip clamps	132	1 856	3 836	3 836	3 836	3 836	–	–	–
		SNS R2045 .0. .. For mounting from above, with plastic mounting hole plugs	133	1 856	3 836	3 836	3 836	3 836	–	–	–
		SNS R2047 .0. .. For mounting from below	133	1 856	3 836	3 836	3 836	3 836	–	–	–
Standard Ball Guide Rails Resist CR <sup>2)</sup>		SNS R1645 .3. .. For mounting from above, with cover strip and strip clamps	134	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 mounting hole plugs	135	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
		SNS R1647 .0. .. For mounting from below	135	3 836	3 836	3 836	3 836	3 836	3 776	3 836	3 746
V-Guide Rails		SNS R1608 .1. .. Without mounting holes, for press-fitting	137	3 836	3 836	3 836	–	–	–	–	–

Ball guide rails		Page	Size			
			20/40	25/70	35/90	
		Rail length (mm)				
Wide Ball Guide Rails made of steel		BNS R1675 .0. .. For mounting from above, with plastic mounting hole plugs	150	3 836	3 836	3 836
		BNS R1676 .5. .. For mounting from above, for steel mounting hole plugs	152	–	3 836	3 836
		BNS R1677 .0. .. For mounting from below	153	3 836	3 836	3 836
Wide Ball Guide Rails Resist CR <sup>2)</sup>		BNS R1673 .0. .. For mounting from above, with plastic mounting hole plugs	150	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) available upon request  
 Sizes 30 and 35: Length up to 5836 mm (one-piece) available upon request  
 Size 45: Length up to 5771 mm (one-piece) available upon request

For design style codes,  6