

A-4-4.2 RB Model

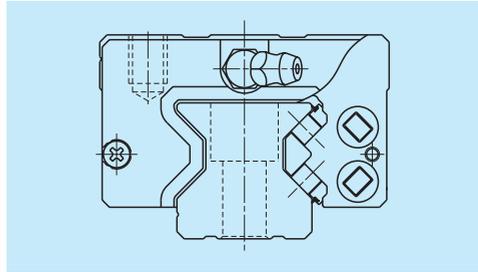


Fig. 1 RB Model

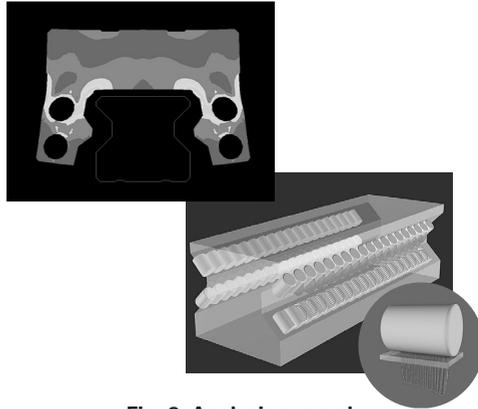


Fig. 2 Analysis example

1. Features

(1) Super-low type

With low mounting height, the RB model is effective for compact machine design.

(2) Super-high load capacity

The RB model can contribute to lower center of gravity of machines, while maintaining the load capacity of the RA model.

(3) Super-high rigidity

Using NSK's advanced analysis technology, we pursued a complete, optimal design, down to the detailed shape of roller slides and rails, thereby realizing super-high rigidity superior to that of competitor's roller guides.

(4) Super-high motion accuracy

NSK has developed its own unique method of simulating rolling element passage vibration and method of designing optimal roller slide specifications for damping roller passage vibration. These developments have dramatically enhanced roller slide motion accuracy for the RB model.

(5) Smooth motion

Installation of a retaining piece between rollers restrains roller skew peculiar to roller slides, thereby achieving smooth motion.

(6) Low friction

Using rollers for rolling elements helps minimize dynamic friction.

2. Roller slide shape

Roller slide shape code	Shape/installation method	Type (Upper row, Rating: Lower row, Roller slide length)	
		High-load Standard	Super-high-load Long
AL TL BL UL		AL · TL (excluding RB55AL)	BL (excluding RB55 and RB65)
EM GM		EM	GM

3. Accuracy and preload

(1) Running parallelism of roller slide

Table 1

Unit: μm

Accuracy grade	Preloaded assembly (not interchangeable)			
	Ultra precision P3	Super precision P4	High precision P5	Precision grade P6
Rail length(mm)				
over				
or less				
- 50	2	2	2	4
50 - 80	2	2	3	4
80 - 125	2	2	3	4
125 - 200	2	2	3.5	5
200 - 250	2	2.5	4.5	6
250 - 315	2	2.5	5	6.5
315 - 400	2	3	5.5	7
400 - 500	2	3	6	7.5
500 - 630	2	3.5	6.5	8.5
630 - 800	2	4	7	9.5
800 - 1 000	2.5	4.5	7.5	10
1 000 - 1 250	3	5	8.5	12
1 250 - 1 600	3.5	5.5	9.5	13
1 600 - 2 000	4	6.5	11	14
2 000 - 2 500	4.5	7.5	12	16
2 500 - 3 150	5.5	8.5	13	18
3 150 - 4 000	6	9.5	14	19

(2) Accuracy standard

The preloaded assembly has four accuracy grades; Ultra precision P3, Super precision P4, High precision P5, and Precision P6 grades.

• Tolerance of preloaded assembly

Characteristics	Accuracy grade	Ultra precision P3	Super precision P4	High precision P5	Precision grade P6
Mounting height H		± 8	± 10	± 20	± 40
Variation of H (All roller slides on a set of rails)		3	5	7	15
Mounting width W_2 or W_3		± 10	± 15	± 25	± 50
Variation of W_2 or W_3 (All roller slides on reference rail)		3	7	10	20
Running parallelism of surface C to surface A Running parallelism of surface D to surface B		Shown in Table 1 and Fig. 4			

(3) Assembled accuracy

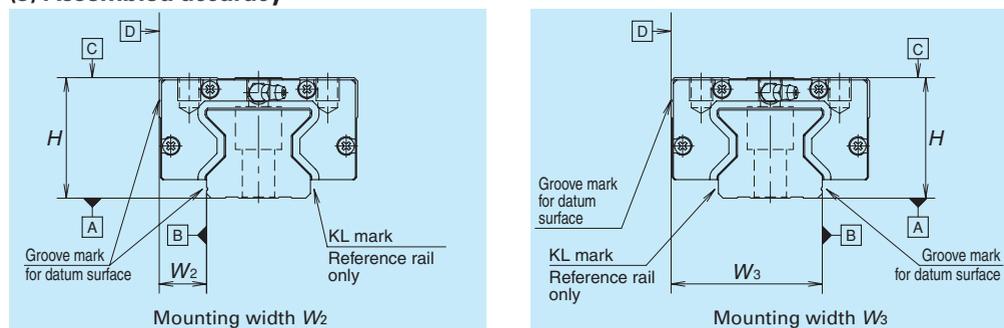


Fig. 3

(4) Preload and rigidity

One type of preload is available: Medium preload Z3 for preloaded assembly.

Model No.		Preload (N)
		Medium preload (Z3)
High-load	RB30 AL, EM	3 890
	RB35 AL, EM	5 330
	RB45 AL, EM	9 280
	RB55 AL, TL, EM	12 900
	RB65 AL, EM	21 000
Super-high-load	RB30 BL, GM	4 760
	RB35 BL, GM	6 740
	RB45 BL, GM	11 600
	RB55 BL, UL, GM	16 800
	RB65 BL, UL, GM	28 800

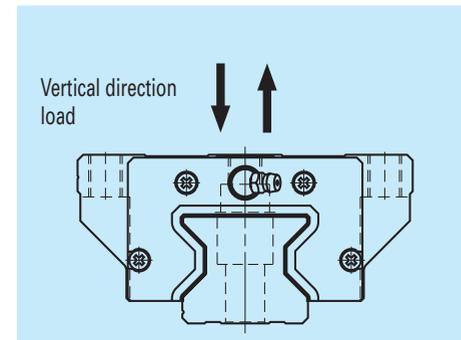


Fig. 4 Direction of load

• Rigidity of medium preload

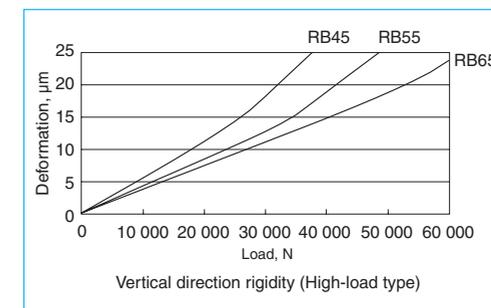
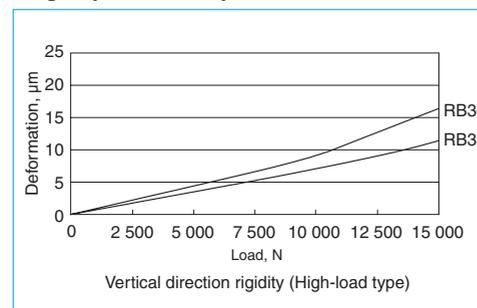


Fig. 5 Vertical direction theoretical rigidity line: High-load type (Roller slide shape: AL, TL, EM)

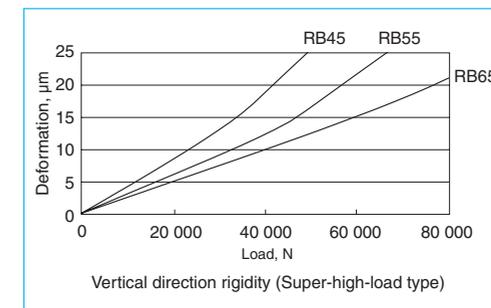
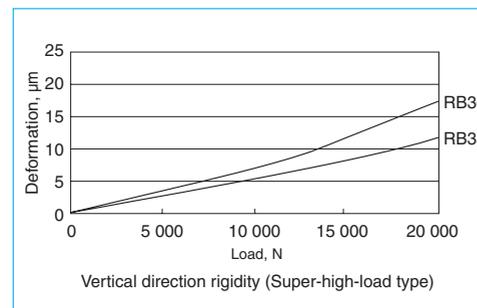


Fig. 6 Vertical direction theoretical rigidity line: Super-high-load type (Roller slide shape: BL, UL, GM)

4. Maximum rail length

Table 4 shows the limitations of rail length (maximum length). However, the limitations vary by accuracy grades.

Model	Size	30	35	45	55	65
RB		3 900	3 900	3 650	3 600	3 600

Note: Rails can be butted if user requirements exceed the rail length shown in the table. Please consult NSK.

5. Installation

(1) Permissible values of mounting error

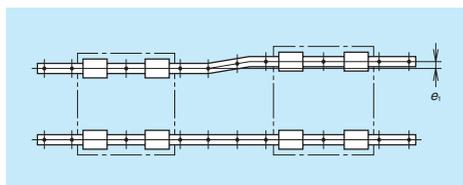


Fig. 7

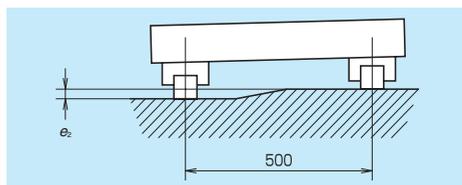


Fig. 8

Value	Model No.				
	RB30	RB35	RB45	RB55	RB65
Permissible values for parallelism error of two rails e_1	11	13	17	19	30
Permissible values for height error of two rails e_2	150 μm / 500 mm				

(2) Shoulder height of the mounting surface and corner radius r

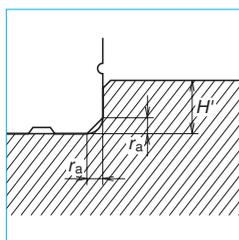


Fig. 9 Shoulder for the rail datum surface

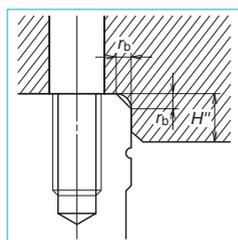


Fig. 10 Shoulder for the roller slide datum surface

Model No.	Corner radius (maximum)		Shoulder height	
	r_a	r_b	H'	H''
RB30	1	1	5	6
RB35	1	1	5	6
RB45	1.5	1	6	8
RB55	1.5	1.5	7	10
RB65	1.5	1.5	8	11

6. Lubrication components

Refer to pages A58 and D13 for the lubrication of linear guides.

(1) Types of lubrication accessories

Fig. 13 and Table 8 show grease fittings and tube fittings.

(2) Mounting position of lubrication accessories

- The standard position for grease fittings is at the end face of the roller slide, but we can mount them on the side of the end cap for as an option. (Fig. 11) Please consult NSK for the installation of grease or tube fittings to the roller slide body.
- A lubrication hole can also be provided on the top of the end cap. Fig.12 and Table 7 show the mounting position.
- Using a piping unit with thread of M6 × 1 requires a connector to connect it to a grease fitting mounting hole with M6 × 0.75. The connectors are available from NSK.

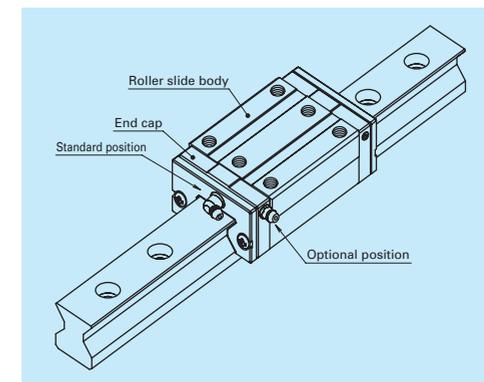


Fig. 11 Mounting position of lubrication accessories

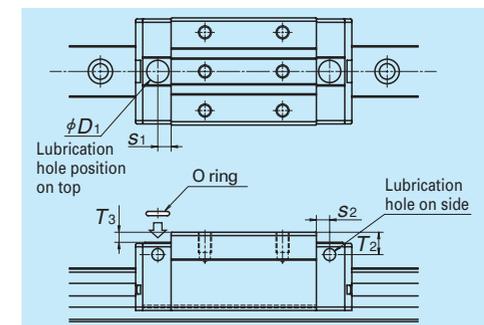


Fig.12 Top and side lubrication hole positions

Model No.	Grease fitting size	s_2	T_2	O ring (JIS)	D_1	s_1	T_3
RB30	M6×0.75	5	6.5	P7	10.4	6	0.5
RB35	M6×0.75	5.5	6.5	P7	10.4	7	0.4
RB45	M6×0.75	7.2	6.5	P7	10.4	7.2	0.4
RB55	M6×0.75	7.2	8	P7	10.4	7.2	0.4
RB65	M6×0.75	7.2	10	P7	10.4	7.2	0.4

Note: Grease fittings and tube fittings cannot be mounted on the top of the end cap.

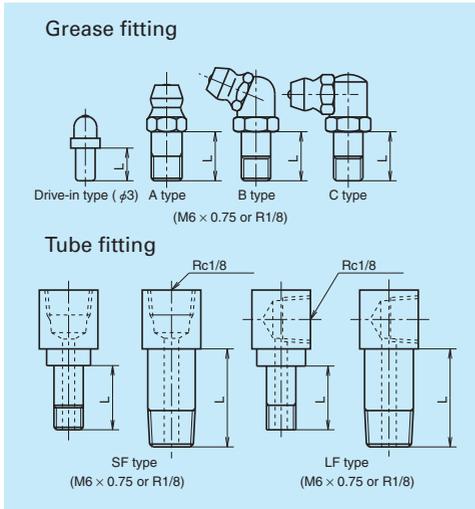


Fig. 13 Grease fitting and tube fitting

7. Dust-resistant components

(1) Standard specification

The RB model is equipped with end, inner and bottom seals to prevent foreign matter from entering the inside of the roller slide. Under normal applications, the RB model can be used without modification.

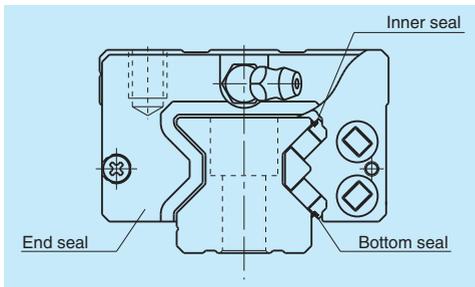


Fig. 14

Table 9 Seal friction per roller slide (maximum value)

Model	Size	Unit: N				
		30	35	45	55	65
RB		5	6	8	8	14

Table 8 Unit: mm

Model No.	Dust-resistant specification	Dimension L		
		Grease fitting / Drive-in type	SF type	LF type
RB30	Standard	5	-	-
	With NSK K1	10	-	-
	Double seal	8	-	-
RB35	Protector	8	-	-
	Standard	5	5	5
	With NSK K1	14	15	16
RB45	Double seal	12	12	12
	Protector	12	12	12
	Standard	5	5	5
RB55	With NSK K1	14	15	16
	Double seal	12	12	12
	Protector	12	12	12
RB65	Standard	8	13.5	17
	With NSK K1	18	20	21.5
	Double seal	14	16	17
RB65	Protector	14	16	17
	Standard	8	13.5	17
	With NSK K1	20	20	20
RB65	Double seal	14	18	17
	Protector	14	16	17

(2) NSK K1™ lubrication unit

Table 10 shows the dimensions of linear guides equipped with NSK K1 lubrication units.

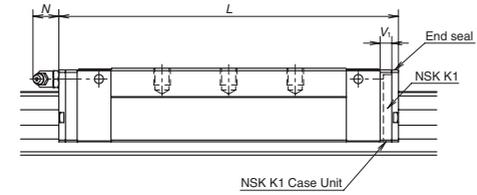


Table 10 Dimensions when equipped with NSK K1 lubrication units

Model No.	Roller slide length	Roller slide model	Standard roller slide length	Unit: mm		
				Roller slide length with two NSK K1 installed L	Thickness of single NSK K1 V ₁	Protrusion of grease fitting N
RB30	Standard	AL, EM	110.8	122.8	6	(11)
	Long	BL, GM	135.4	147.4		
RB35	Standard	AL, EM	123.8	136.8	6.5	(11)
	Long	BL, GM	152	165		
RB45	Standard	AL, EM	154	168	7	(14)
	Long	BL, GM	190	204		
RB55	Standard	AL, TL, EM	184	198	7	(14)
	Long	BL, UL, GM	234	248		
RB65	Standard	AL, EM	228.4	243.4	7.5	(14)
	Long	BL, UL, GM	302.5	317.5		

Note: Slide length when equipped with NSK K1 = (standard roller slide length) + (V₁ thickness of single NSK K1 unit) × (number of K1 units) + (V₂ thickness of the protective cover) × 2.

(3) Double seal and protector

For the RB Model, double seals and protectors can be installed only before shipping from the factory.

Table 11 shows the increased thickness when end seals and protectors are installed.

Table 11 Unit: mm

Model No.	Thickness of end seal V ₃	Thickness of protector V ₄
RB30	3.4	3.6
RB35	3.4	3.6
RB45	4	4.2
RB55	4	4.2
RB65	5	5.5

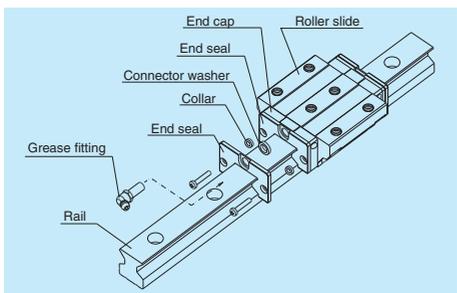


Fig. 15 Double seal

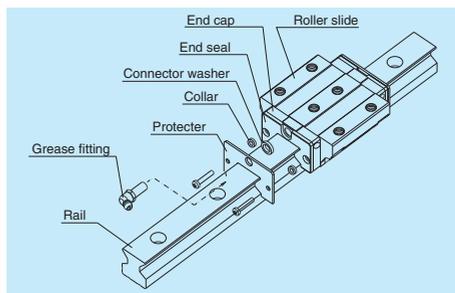


Fig. 16 Protector

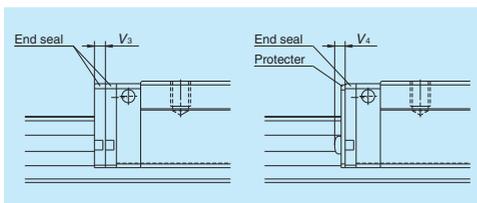


Fig. 17

(4) Caps to plug the rail mounting bolt hole

Table 12 Caps to plug rail bolt hole

Model No.	Bolt to secure rail	Cap reference No.	Quantity /case
RB30, RB35	M8	LG-CAP/M8	20
RB45	M12	LG-CAP/M12	20
RB55	M14	LG-CAP/M14	20
RB65	M16	LG-CAP/M16	20

(5) Bellows

Consult NSK when attaching bellows.

8. Dynamic friction force

- Dynamic friction force indications per roller slide are shown in **Table 13**.
- These values are assumed under actual conditions with standard specifications (two end seals, inner seal and bottom seal equipped) packed with standard grease (NSK Grease AS2)
- Dynamic friction force varies with grease.

Table 13 Dynamic friction force

Unit: N

Model No.	High-load type	Super-high-load type
RB30	33	42
RB35	42	53
RB45	56	69
RB55	80	95
RB65	120	138

Note: Values in Table 13 are indications.
Please refer to them.

9. Reference number

A reference number (designation) is set and indicated on the specification drawing for an individual NSK linear guide when its specifications are finalized.

Please specify the reference number, except design serial number, to identify the product when ordering, requiring estimates, or inquiring about specifications from NSK.

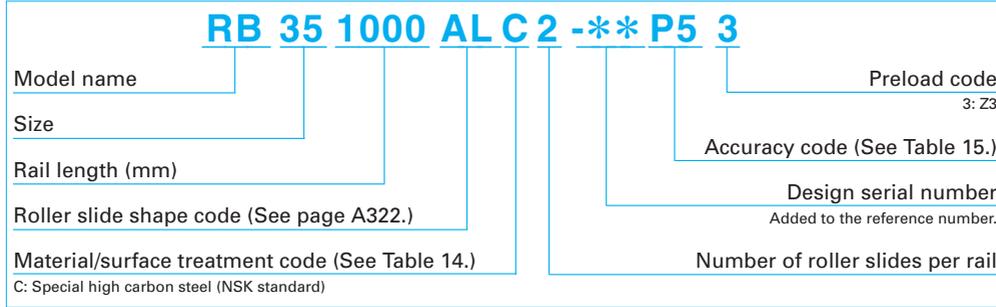


Table 14 Material/surface treatment code

Code	Description
C	Special high carbon steel (NSK standard)
D	Special high carbon steel with surface treatment
Z	Other, special

Table 15 Accuracy code

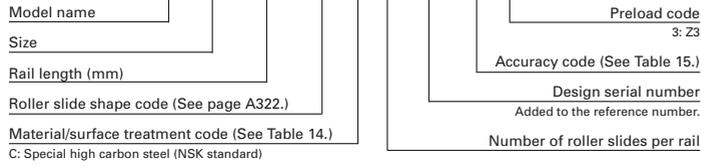
Accuracy	Standard (Without NSK K1)	With NSK K1
Ultra precision grade	P3	K3
Super precision grade	P4	K4
High precision grade	P5	K5
Precision grade	P6	K6

Note: Refer to pages A58 for details on NSK K1 lubrication units.

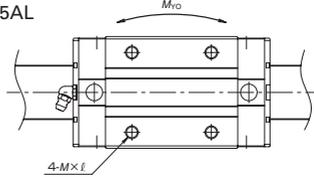
10. Dimensions

RB-AL-TL (High-load / Standard)
RB-BL-UL (Super-high-load / Long)

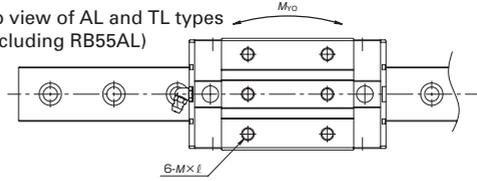
RB 35 1000 AL C 2 - P5 3**



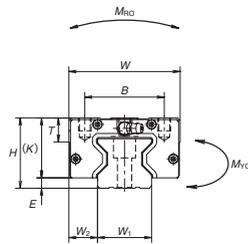
Top view of RB55AL



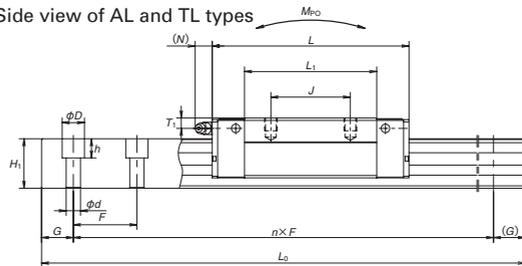
Top view of AL and TL types (excluding RB55AL)



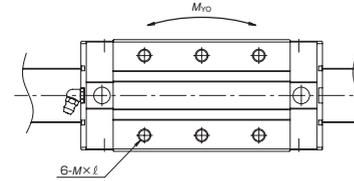
Front view



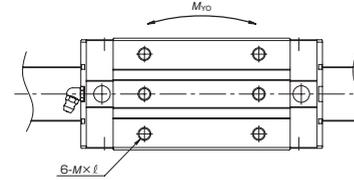
Side view of AL and TL types



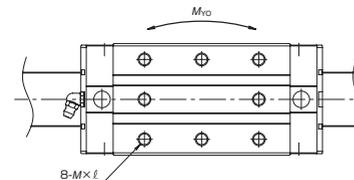
Top view of RB55BL and RB65BL



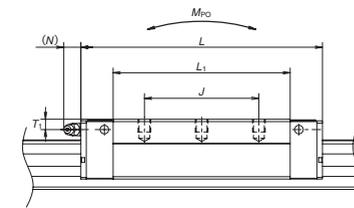
Top view of UL type



Top view of BL type (excluding RB55 and RB65)



Side view of BL type



Model No.	Assembly			Roller slide												
	Height	Pitch	Mounting bolt hole	Width	Length	Mounting hole				Grease fitting	Width					
						B	J	Number of holes	M x pitch x L			L1	K	T	Hole size	T1
RB30AL RB30BL	38	6.5	16	60	110.8 135.4	40	40 60	6 8	M8 x 1.25 x 7	74 98.6	31.5	14	φ 3	5	2.6	28
RB35AL RB35BL	44	6.5	18	70	123.8 152	50	50 72	6 8	M8 x 1.25 x 8	83.2 111.4	37.5	15	M6 x 0.75	6.5	11	34
RB45AL RB45BL	52	8	20.5	86	154 190	60	60 80	6 8	M10 x 1.5 x 10	105.4 141.4	44	17	M6 x 0.75	6.5	14	45
RB55AL RB55TL RB55BL RB55UL	63	9	23.5	100	184	65 75	75	4	M12 x 1.75 x 12	128	54	18	Rc1/8	8.5	14	53
234					75 75	95	6	178								
228.4					70	70	6	155.4								
302.5					110	120	6	229.5								
RB65AL RB65BL RB65UL	75	10	31.5	126	228.4 302.5	76	70 120	6	M16 x 2 x 16	155.4 229.5	65	22	Rc1/8	10	14	63

Notes: 1) Select either the standard dimension for pitch F as shown without parentheses or the semi-standard dimension as shown inside parentheses. If not specified, the standard dimension for F will be applied.

Unit: mm

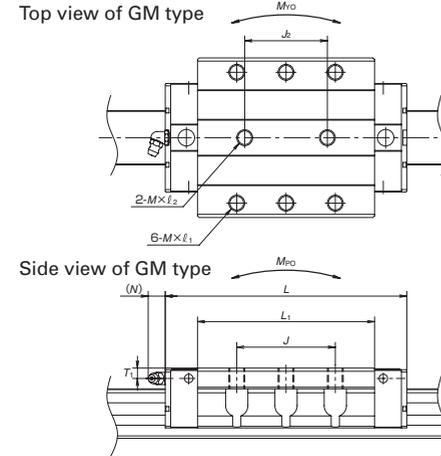
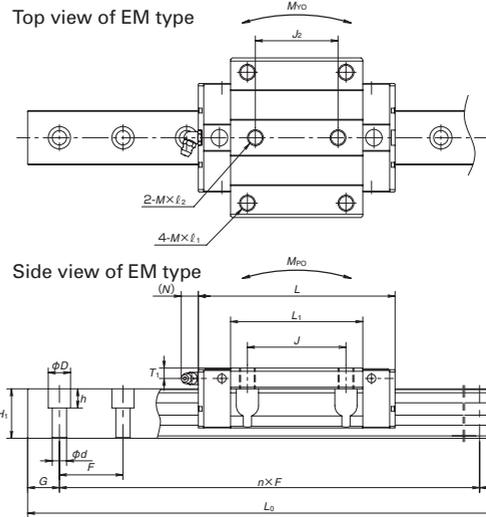
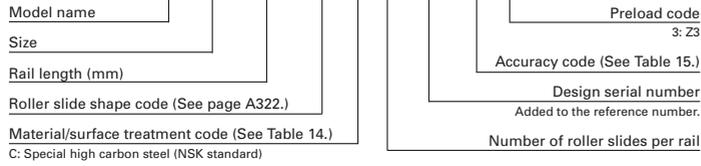
Rail		Basic load ratings								Weight				
Height	Pitch	Mounting bolt hole	G	Maximum length	² Dynamic		Static	Static moment (N-m)				Roller slide	Rail	
					[50km]	[100km]		C ₀	M _{P0}		M _{Y0}			
					C ₅₀ (N)	C ₁₀₀ (N)	(N)		One slide	Two slides	One slide	Two slides	(kg)	(kg/m)
28	40 (80)	9 x 14 x 12	20	3 900	47 800	38 900	93 500	1 670	1 140	7 100	1 140	7 100	0.71	4.9
					58 500	47 600	121 000	2 170	1 950	11 500	1 950	11 500	0.91	
31	40 (80)	9 x 14 x 12	20	3 900	65 500	53 300	129 000	2 810	1 800	11 000	1 800	11 000	1.0	6.8
					82 900	67 400	175 000	3 810	3 250	17 800	3 250	17 800	1.5	
38	52.5 (105)	14 x 20 x 17	22.5	3 650	114 000	92 800	229 000	6 180	4 080	24 000	4 080	24 000	1.9	10.9
					143 000	116 000	305 000	8 240	7 150	39 000	7 150	39 000	2.6	
43.5	60 (120)	16 x 23 x 20	30	3 600	159 000	129 000	330 000	10 200	7 060	41 000	7 060	41 000	3.4	14.6
					207 000	168 000	462 000	14 300	13 600	72 000	13 600	72 000	4.7	
					259 000	210 000	504 000	19 200	12 700	78 500	12 700	78 500	7.2	
52	75 (150)	18 x 26 x 22	35	3 600	355 000	288 000	756 000	28 700	28 600	153 000	28 600	153 000	9.5	20.5
					259 000	210 000	504 000	19 200	12 700	78 500	12 700	78 500	7.2	

2) Basic load ratings comply with ISO standards (ISO 14728-1, 14728-2).

C₅₀: the basic dynamic load rating for 50 km rated fatigue life
C₁₀₀: the basic dynamic load rating for 100 km rated fatigue life

RB-EM (High-load / Standard)
RB-GM (Super-high-load / Long)

RB 35 1000EM C 2 -** P5 3



Model No.	Assembly			Roller slide														
	Height H	Pitch E	Mounting hole W_2	Width W	Length L	Mounting hole						Grease fitting				Width W_1		
						B	J	J_2	Number of holes	$M \times \text{pitch} \times \ell_1 (\ell_2)$	Q	L_1	K	T	Hole size		T_1	N
RB30EM RB30GM	38	6.5	31	90	110.8 135.4	72	52	44	6 8	M10×1.5×12 (8.5)	8.6	74 98.6	31.5	11	$\phi 3$	5	2.6	28
RB35EM RB35GM	44	6.5	33	100	123.8 152	82	62	52	6 8	M10×1.5×13 (11.5)	8.6	83.2 111.4	37.5	12	M6×0.75	6.5	11	34
RB45EM RB45GM	52	8	37.5	120	154 190	100	80	60	6 8	M12×1.75×15 (12.5)	10.5	105.4 141.4	44	13	M6×0.75	6.5	14	45
RB55EM RB55GM	63	9	43.5	140	184 234	116	95	70	6 8	M14×2×18 (18)	12.5	128 178	54	15	Rc1/8	8.5	14	53
RB65EM RB65GM	75	10	53.5	170	228.4 302.5	142	110	82	6 8	M16×2×24 (21)	14.6	155.4 229.5	65	15	Rc1/8	10	14	63

Notes: 1) Select either the standard dimension for pitch F as shown without parentheses or the semi-standard dimension as shown inside parentheses. If not specified, the standard dimension for F will be applied.

Rail		Basic load ratings							Weight					
Height H_1	Pitch F	Mounting bolt hole $d \times D \times h$	G (reference)	Maximum length L_{0max}	Dynamic		Static C_0 (N)	Static moment (N·m)				Roller slide (kg)	Rail (kg/m)	
					C_{50} (N)	C_{100} (N)		M_{r0}		M_{y0}				
28	40 (80)	9×14×12	20	3900	47 800 58 500	38 900 47 600	93 500 121 000	1 670 2 170	1 140 1 950	7 100 11 500	1 140 1 950	7 100 11 500	1.1 1.5	4.9
31	40 (80)	9×14×12	20	3900	65 500 82 900	53 300 67 400	129 000 175 000	2 810 3 810	1 800 3 250	11 000 17 800	1 800 3 250	11 000 17 800	1.5 2.0	6.8
38	52.5 (105)	14×20×17	22.5	3650	114 000 143 000	92 800 116 000	229 000 305 000	6 180 8 240	4 080 7 150	24 000 39 000	4 080 7 150	24 000 39 000	2.5 3.4	10.9
43.5	60 (120)	16×23×20	30	3600	159 000 207 000	129 000 168 000	330 000 462 000	10 200 14 300	7 060 13 600	41 000 72 000	7 060 13 600	41 000 72 000	4.7 6.6	14.6
52	75 (150)	18×26×22	35	3600	259 000 355 000	210 000 288 000	504 000 756 000	19 200 28 700	12 700 28 600	78 500 153 000	12 700 28 600	78 500 153 000	9.7 13.2	20.5

2) Basic load ratings comply with ISO standards (ISO 14728-1, 14728-2).
 C_{50} : the basic dynamic load rating for 50 km rated fatigue life
 C_{100} : the basic dynamic load rating for 100 km rated fatigue life