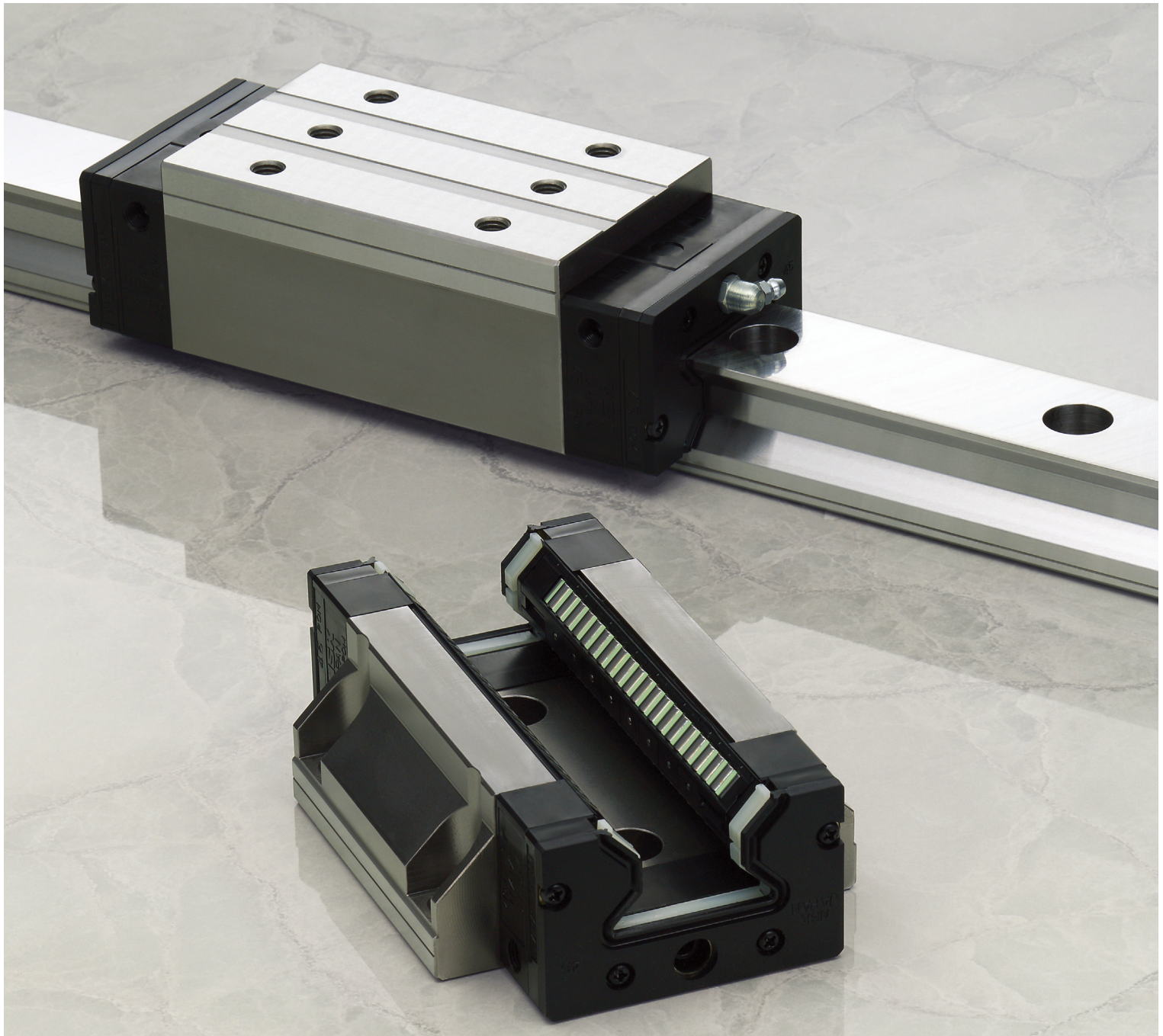


# NSK Linear Guide™

## Roller Guide RA Series

A roller guide series employing advanced analysis technology offers super-high load capacity and rigidity.

The latest series is now available in the random matching of rails and roller slides, which includes random matching with preload for higher accuracy and rigidity, allowing the users to select rails and roller slides in single unit quantities.



# The fruits of comprehensive technology of NSK. RA series roller guides handle a diversity of applications

The RA series of roller guides is the product of a combination of NSK's extensive experience in roller bearings and linear guide technologies. The result is an optimal design that takes full advantage of NSK's unique expertise to realize super-high load capacity, rigidity and motion accuracy, plus smooth motion. Capable of handling a variety of applications, the RA series supports high machine performance.

## RA series features support high machine performance

### Super-long Life

#### Super-high load capacity

NSK has realized super-high load capacity, now the highest performance in the world, and achieved unprecedented operating life.

#### Maintenance-free

Installing an NSK K1™ lubrication unit assures long-term, maintenance-free operation.

#### Highly dust-proof

The high performance seals as standard equipment completely block the entry of foreign matter and maintain primary performance over the long term.

### Contribution to High-precision Manufacturing

#### Super-high rigidity

Super-high rigidity provides high-precision manufacturing.

#### Super-high motion accuracy

Coupled with NSK's unique design approach, the vibration caused by roller passage has been substantially reduced. This will greatly contribute to improve machining quality.

#### Smooth motion

The installation of a retaining piece achieves smooth motion, resulting in stable positioning accuracy.

The RA series is available in eight models:  
RA15, 20, 25, 30, 35, 45, 55 and 65.

### Used in Many Fields

#### Complete series

Series includes a full lineup from small to large, including low-profile sizes. You can choose the model according to the application.

#### Interchangeable mounting dimensions

Outside dimensions and mounting dimensions conform to standard dimensions for the market, so RA series roller guides can be used without having to alter machine design. (See page 13 for mounting surface dimensions)

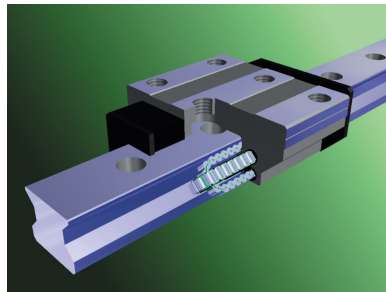
#### Low friction

Uses rollers for rolling elements to hold down dynamic friction.

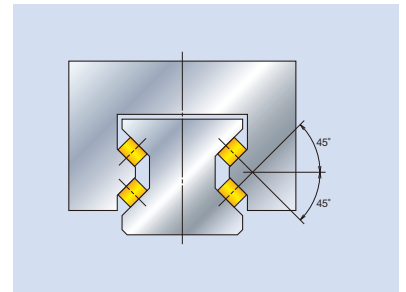


## Optimal Design

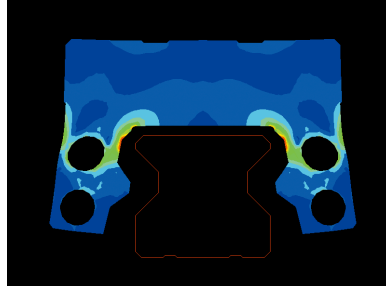
NSK executed a comprehensive, detailed performance simulation of roller guides by integrating its analysis technology and the tribology technology that the company had been developing over many years. Down to the dimensions and shapes of component details, we have attained an optimal design completely.



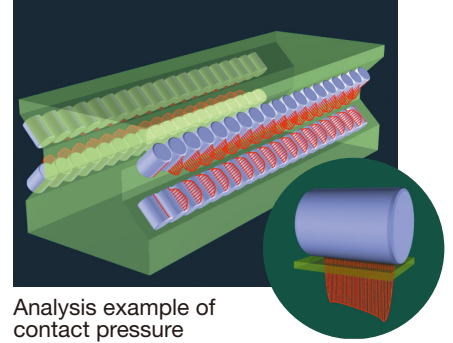
Smooth motion by use of retaining pieces



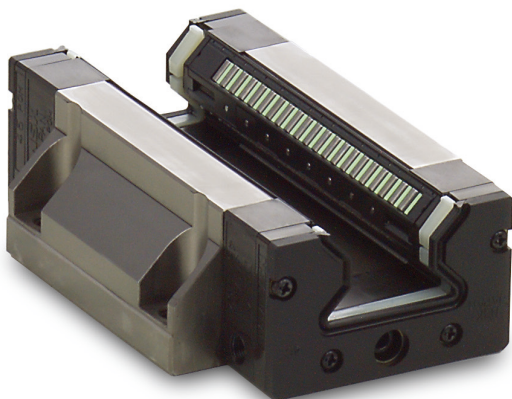
Balanced four-directional iso-load specifications



Example of roller slide deformation analysis



Analysis example of contact pressure distribution of rollers



## Random-matching Type

RA25, 30, 35, 45, 55, 65

### Random matching of rails and roller slides

#### Accuracy compatibility

The roller guides of random-matching type comply with the assembly specification of the precision grade of P6.

#### Random matching with preload

The random combinations of roller slide and rail provide the constant rigidity with an adequate preload. (Preload code: ZZ)

#### Random matching

The rails and roller slides can be selected in single unit quantities.

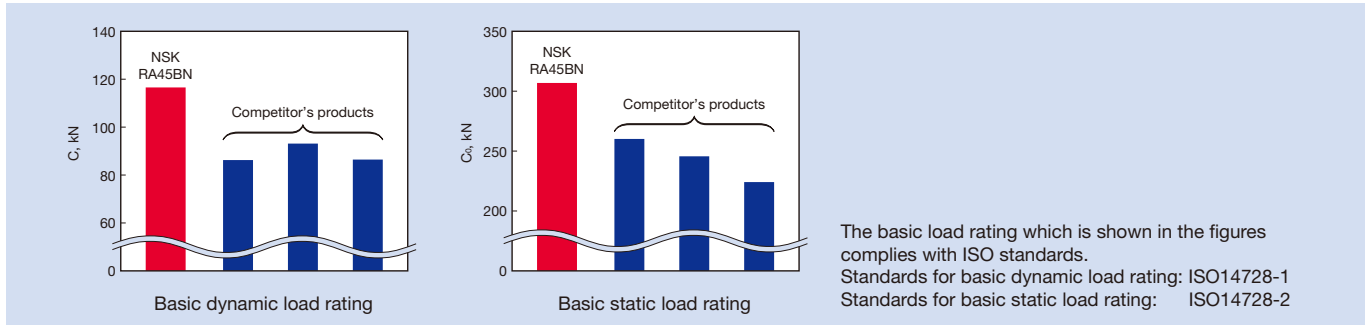
# A variety of contributions to improve the performance of machine

## Features

### 1. Super-high load capacity

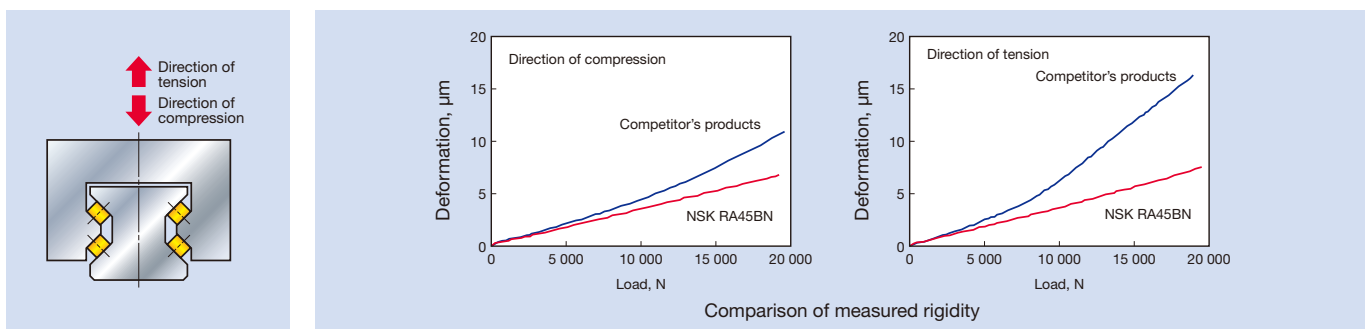
By installing rollers that are the largest possible diameter and length within the existing standard cross-section dimension in a rational layout based on analysis technology, we have realized the world's highest load capacity\*, far superior to conventional roller guides. Super-long life is achieved and impact load can be sufficiently handled.

\* Compared with products of the same size, as of September 1, 2003, researched by NSK.



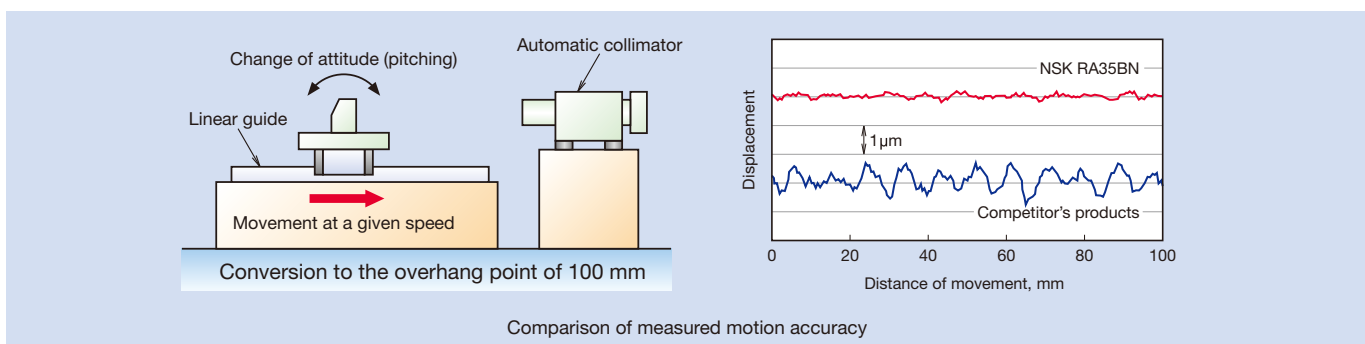
### 2. Super-high rigidity

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.



### 3. 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 RA series.

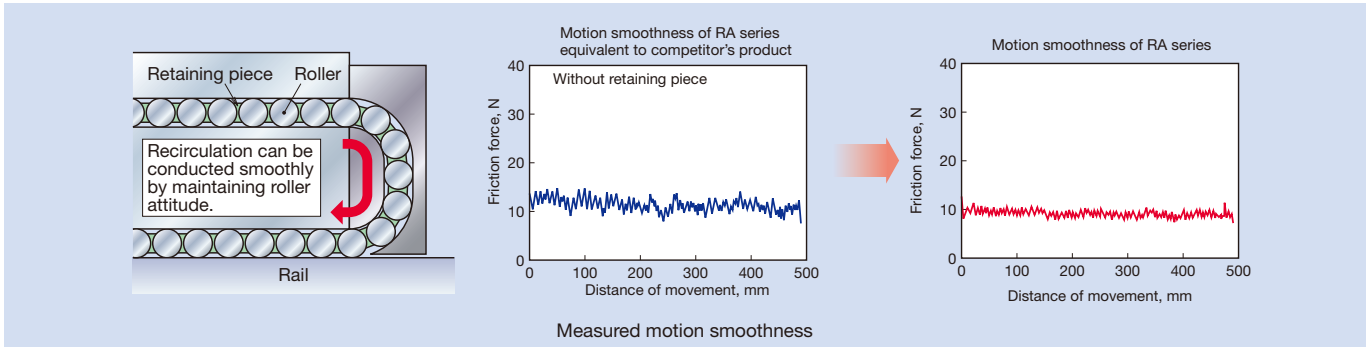


### 4. Mounting dimensions compatibility

The outer and mounting dimensions of RA series are based on market standards. RA series can be replaced without altering equipment design. (See page 13 for mounting surface dimensions)

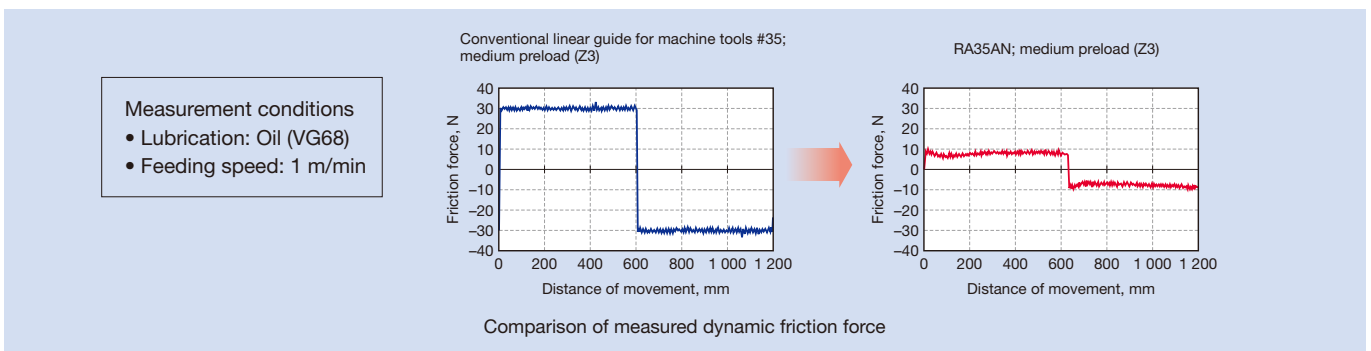
## 5. Smooth motion

Installing a retaining piece between rollers and restraining the skew peculiar to roller bearings achieve smooth motion. The reduction of friction variation provides stable tracking in the complicated trajectory control.



## 6. Low friction

Using rollers for rolling elements helps minimize dynamic friction.

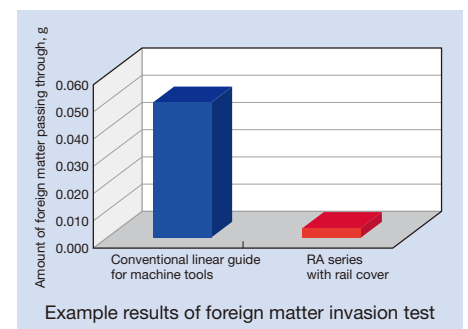


## 7. Highly dust-proof and maintenance-free operation

Roller slides include high performance seals as standard equipment. The seal completely blocks the entry of foreign matter into the rolling surface and prevents loss of performance. In addition, rail covers\* are also available for severe operating conditions. (Rail covers reduce the amount of foreign matter to 1/10 that of conventional linear guide for machine tools.)

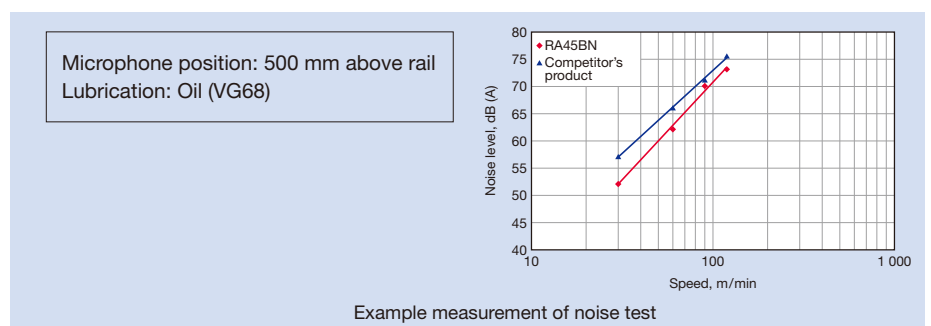
The highly regarded NSK K1™ lubrication unit is also available to satisfy customer needs for long-term, maintenance-free operation.

\* Rail covers are only available for the models of RA25 to RA65.



## 8. Low noise

A retaining piece is provided between rollers to prevent collision of rollers to minimize noise.



# Abundant variations to meet a wide variety of needs

## Specifications

### 1. Roller Slide Types and Shapes

- Two types of roller slides are available in this series: one with a mounting flange and a square type with tapped holes and no flange.
- A compact, low-profile square type is now available.
- On the mounting hole of the flange type, the tapped part is used to fix the roller slide from the top surface, and the minor diameter can be used as a bolt hole from the bottom. This provides mounting from both directions, top and bottom.
- Roller slide length can be specified by standard high load type or special long, super-high load type.

Fig. 1 Square type

Roller slide shape code

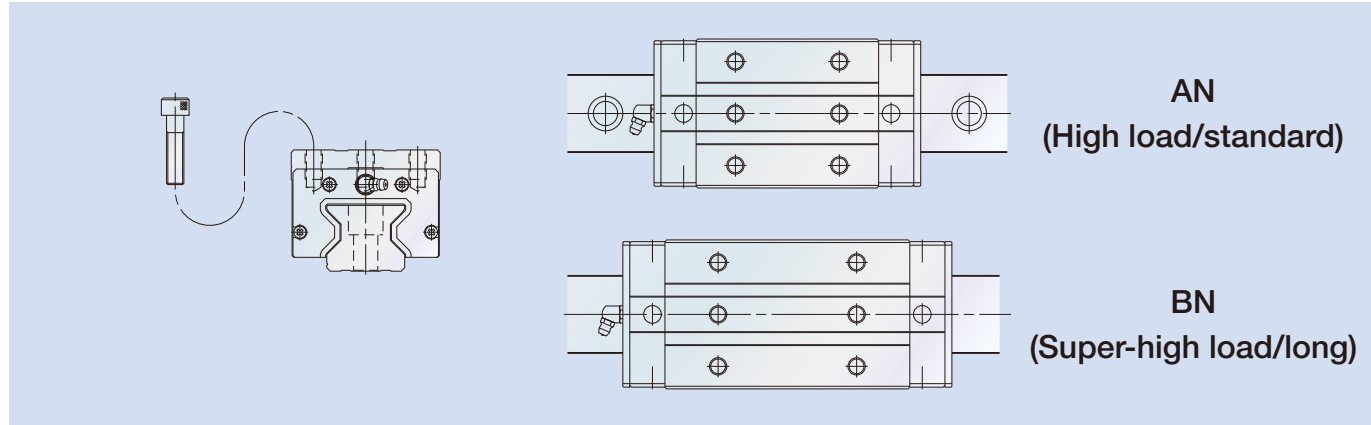


Fig. 2 Low-profile type

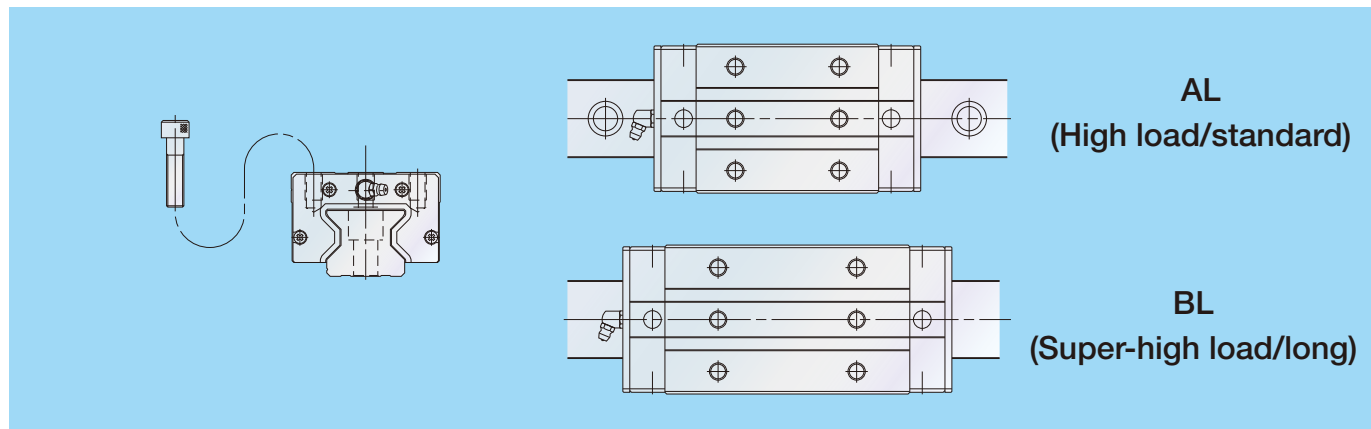
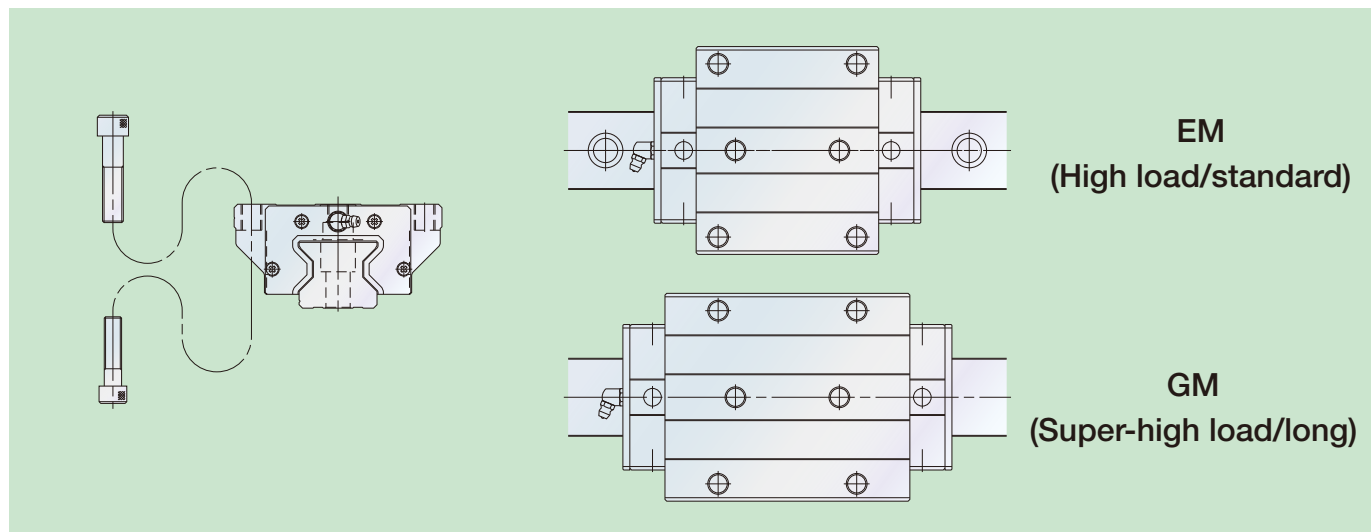


Fig. 3 Flange type



## 2. Accuracy

Four accuracy grades are available: ultra super precision P3, super precision P4, high precision P5, and precision P6.

Table 1 Accuracy standards

Unit: mm

Accuracy standards	Accuracy grades				
	Ultra super precision P3	Super precision P4	High precision P5	Precision P6	Random-matching Precision P6
Mounting height: Dimensions in mounting height $H$	$\pm 0.008$	$\pm 0.010$	$\pm 0.020$	$\pm 0.040$	$\pm 0.020$
Mounting width: Dimensions in mounting width $W_2$ or $W_3$	$\pm 0.010$	$\pm 0.015$	$\pm 0.025$	$\pm 0.050$	$\pm 0.025$
Variation of mounting height dimension $H$	0.003	0.005	0.007	0.015	0.015
Variation of mounting width dimension $W_2$ or $W_3^*$	0.003	0.007	0.010	0.020	0.020
Running parallelism of face C against face A Running parallelism of face D against face B	Refer to Table 2				

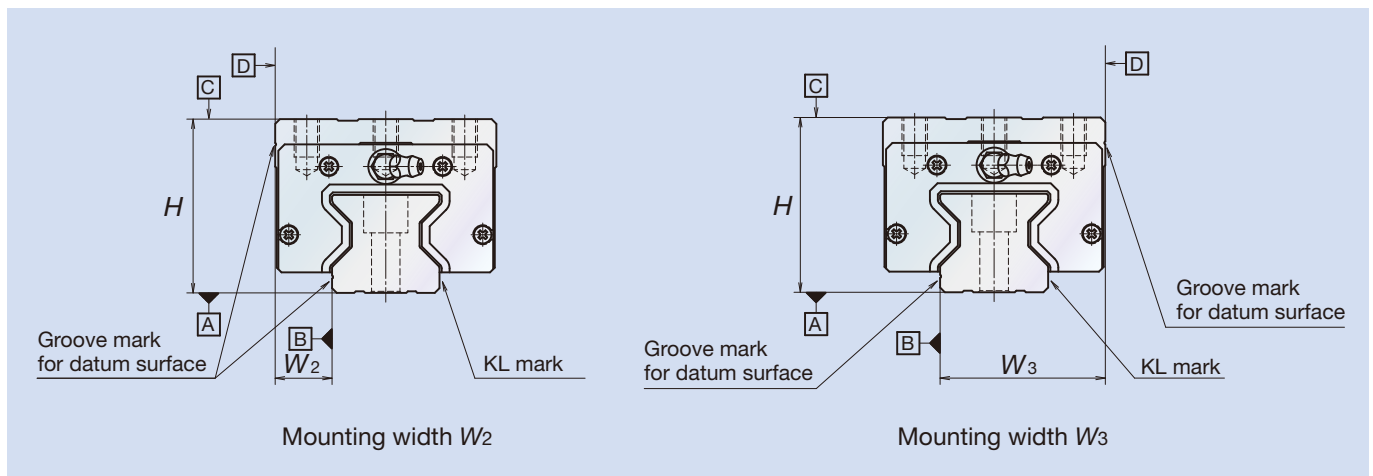
\* Difference in roller slides on the reference side roller guide.

Table 2 Running parallelism

Unit:  $\mu\text{m}$

Rail length (mm)	Ultra super precision P3	Super precision P4	High precision P5	Precision P6
Over – 50 or less	2	2	2	4.5
50 – 80	2	2	3	5
80 – 125	2	2	3.5	5.5
125 – 200	2	2	4	6
200 – 250	2	2.5	5	7
250 – 315	2	2.5	5	8
315 – 400	2	3	6	9
400 – 500	2	3	6	10
500 – 630	2	3.5	7	12
630 – 800	2	4	8	14
800 – 1 000	2.5	4.5	9	16
1 000 – 1 250	3	5	10	17
1 250 – 1 600	4	6	11	19
1 600 – 2 000	4.5	7	13	21
2 000 – 2 500	5	8	15	22
2 500 – 3 000	6	9.5	17	25
3 150 – 3 500	9	16	23	30

Fig. 4 Specifications of accuracy



### 3. Preload and Rigidity

We offer two levels of preload: Medium preload Z3 and Slight preload Z1.

Table 3 Preload

Unit: N

Model No.		Slight preload (Z1)	Medium preload (Z3)
High-load type	RA15 AN, AL, EM	–	1 030
	RA20 AN, EM	–	1 920
	RA25 AN, AL, EM	880	2 920
	RA30 AN, AL, EM	1 170	3 890
	RA35 AN, AL, EM	1 600	5 330
	RA45 AN, AL, EM	2 780	9 280
	RA55 AN, AL, EM	3 870	12 900
Super-high-load type	RA65 AN, EM	6 300	21 000
	RA15 BN, BL, GM	–	1 300
	RA20 BN, GM	–	2 400
	RA25 BN, BL, GM	1 060	3 540
	RA30 BN, BL, GM	1 430	4 760
	RA35 BN, BL, GM	2 020	6 740
	RA45 BN, BL, GM	3 480	11 600
	RA55 BN, BL, GM	5 040	16 800
RA65 BN, GM	8 640	28 800	

Fig. 5 Direction of load

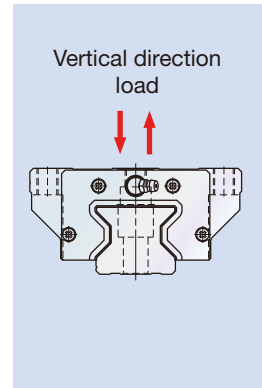
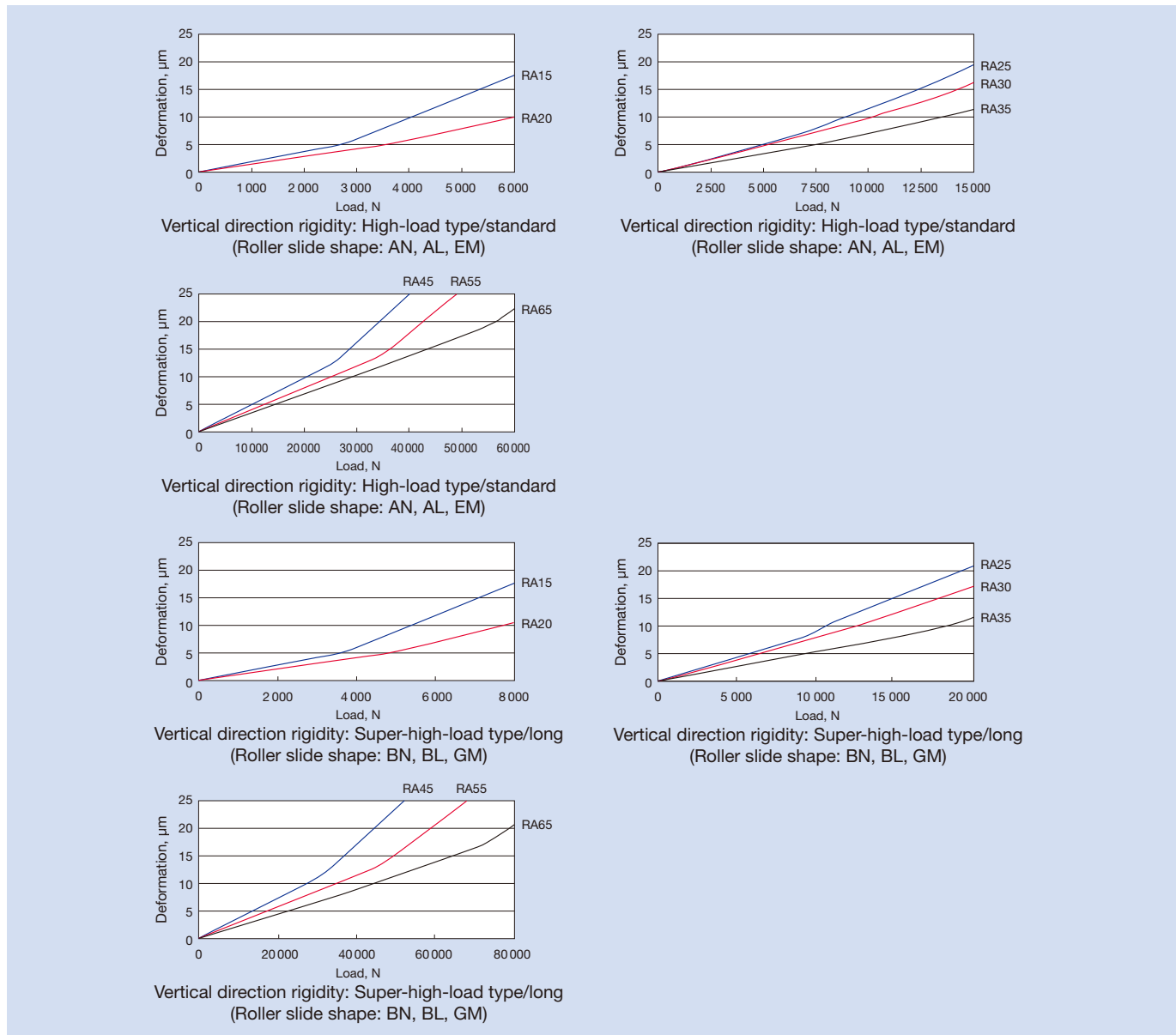


Fig. 6 Rigidity measurement data





## 4. Basic Load Rating and Rated Life

Basic dynamic load rating that expresses load capacity is established by ISO standards (ISO14728-1) for linear guides. With basic dynamic load rating, direction and size do not fluctuate so that rated fatigue life is 100 km. Load rating for NSK Linear Guide complies with ISO standards. With the RA series, dynamic load rating is the same in both the vertical and horizontal directions (4-way equal load specs.). Rated fatigue life  $L$  is calculated by the following formula when load  $F$  is applied to the roller slide in the horizontal or vertical direction only.

- This life formula is different from that for linear guides with ball rolling elements.
- $f_w$  is load factor. Refer to the respective value from the following table 4 as a guideline according to potential vibration and the impact of the machine in which the linear guide is used, and select the load factor.

$$L = 100 \times \left( \frac{C}{f_w \cdot F} \right)^{\frac{10}{3}} \text{ (km)}$$

Table 4 Load factor  $f_w$

Impact and/or vibration	Load factor
No impact and vibration from the outside	1.0 – 1.5
With impact and/or vibration from the outside	1.5 – 2.0
With heavy impact and/or vibration from the outside	2.0 – 3.0

Load applied to the linear guide (ball slide load) comes from various directions up/down and right/left directions and/or as moment load. Sometimes more than one type of load is applied simultaneously. Sometimes volume and direction of the load may change.

Varying load cannot be used as it is to calculate life of linear guide. Therefore, it is necessary to use a hypothetical load to ball slide with a constant volume, which would generate a value equivalent to an actual fatigue life. This is called “dynamic equivalent load.” For actual calculation, use the loads of Table 5.

Fig. 7 Direction of load

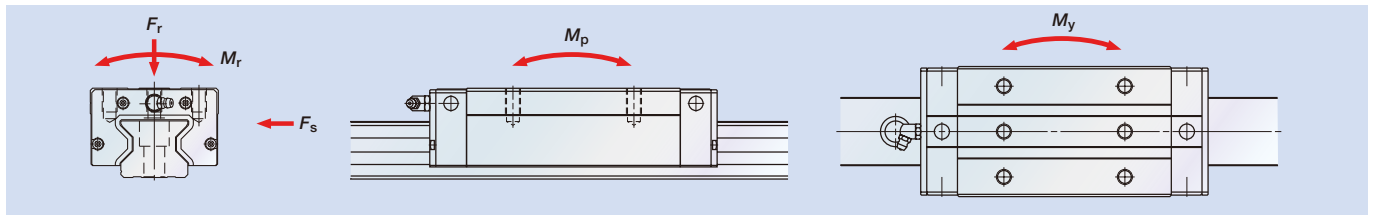


Table 5 Loads in the arrangement of linear guide

Pattern	Arrangement of linear guide	Loads necessary to calculate dynamic equivalent load					Dynamic equivalent load
		Load		Moment load			
		Up/down (vertical)	Right/left (lateral)	Rolling	Pitching	Yawing	
1		$F_r$	$F_s$	$M_r$	$M_p$	$M_y$	$F_r = F_r$ $F_{se} = F_s \tan \alpha$ $F_{re} = \mathcal{E}_r M_r$ $F_{pe} = \mathcal{E}_p M_p$ $F_{ye} = \mathcal{E}_y M_y$ $\alpha$ : Contact angle (=45°) Dynamic equivalent coefficient $\mathcal{E}_r$ : Rolling direction $\mathcal{E}_p$ : Pitching direction $\mathcal{E}_y$ : Yawing direction
2		$F_r$	$F_s$	$M_r$			
3		$F_r$	$F_s$		$M_p$	$M_y$	
4		$F_r$	$F_s$				

Table 6 Dynamic equivalent coefficient

Model No.	Dynamic equivalent coefficient (1/m)		
	$\mathcal{E}_r$	$\mathcal{E}_p$	$\mathcal{E}_y$
RA15 High load type	105	95	95
RA15 Super-high load type	105	70	70
RA20 High load type	79	74	74
RA20 Super-high load type	79	55	55
RA25 High load type	71	64	64
RA25 Super-high load type	71	50	50
RA30 High load type	56	58	58
RA30 Super-high load type	56	44	44
RA35 High load type	46	53	53
RA35 Super-high load type	46	39	39
RA45 High load type	37	40	40
RA45 Super-high load type	37	30	30
RA55 High load type	33	34	34
RA55 Super-high load type	33	24	24
RA65 High load type	26	28	28
RA65 Super-high load type	26	19	19

Formula is determined by the relationship of loads in terms of volume. Full dynamic equivalent load can be easily obtained by using each coefficient.

After obtaining the dynamic equivalent of the necessary load directions from Table 6, use the formulas below to calculate full dynamic equivalent loads.

- When  $F_r$  is the largest load:  $F_e = F_r + 0.5F_{se} + 0.5F_{re} + 0.5F_{pe} + 0.5F_{ye}$
- When  $F_{se}$  is the largest load:  $F_e = 0.5F_r + F_{se} + 0.5F_{re} + 0.5F_{pe} + 0.5F_{ye}$
- When  $F_{re}$  is the largest load:  $F_e = 0.5F_r + 0.5F_{se} + F_{re} + 0.5F_{pe} + 0.5F_{ye}$
- When  $F_{pe}$  is the largest load:  $F_e = 0.5F_r + 0.5F_{se} + 0.5F_{re} + F_{pe} + 0.5F_{ye}$
- When  $F_{ye}$  is the largest load:  $F_e = 0.5F_r + 0.5F_{se} + 0.5F_{re} + 0.5F_{pe} + F_{ye}$

For the values of each dynamic equivalent load in the formulas above, disregard load directions and take the absolute value.

## 5. Lubrication Specifications

### (1) Mounting position of lubrication accessories

- The standard position of grease fittings and tube fittings is the end face of the roller slide. (Fig. 8)  
A lubrication hole can be provided on the side or the top face of the end cap or roller slide. Mounting positions are shown in the Figs. 8 and 9, and Tables 7.1 and 7.2.
- For mounting on top of the face of end cap, an O ring is required. For the model AN and BN, two O rings as well as spacers are required.
- When using a piping unit with a thread of M6 × 1, a connector is required to connect the piping unit to a grease fitting mounting hole with M6 × 7.5. Connectors are available from NSK.

### (2) Cautions for oil lubrication

- If oil lubrication is used, the oil may not pervade the rolling surface in accordance with the roller slide mounting conditions such as upside down mounting and wall mounting. In these situations, consult with NSK.
- When using an oil mist lubricating system, please confirm how much oil is needed for each outlet port.

Fig. 8 Mounting position of lubrication accessories

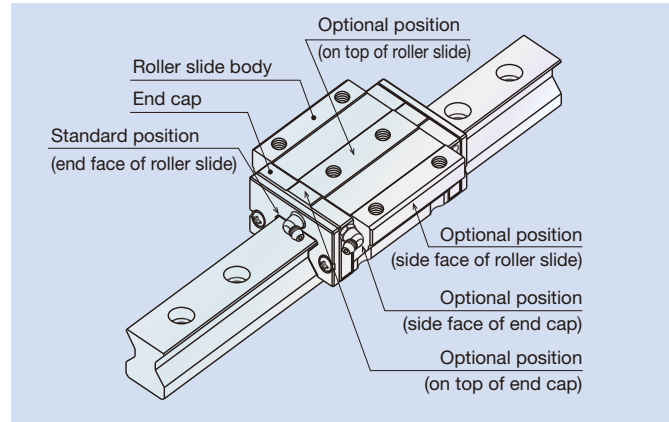


Fig. 9 Top and side lubrication hole positions

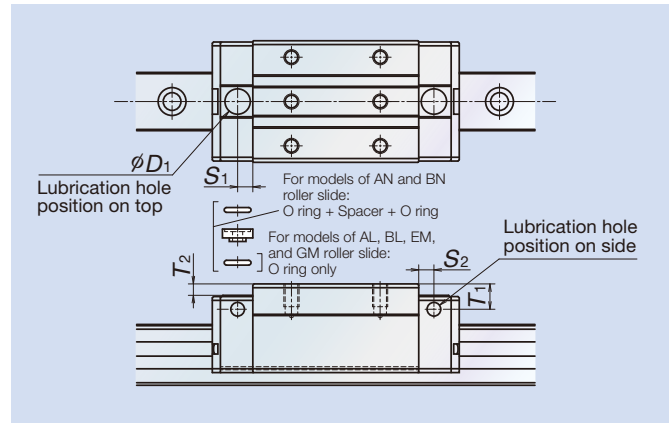


Table 7.1 Lubrication hole positions

Unit: mm

Model No.	Roller slide shape code	Grease nipple size	$s_2$	$T_1$	Spacer	$D_1$	$s_1$	$T_2$
RA15	AN, BN	$\phi 3$	4	7	Necessary	8.2	4.4	4.2
RA20		$\phi 3$	4	4	–	9.2	5.4	0.2
RA25		M6×0.75	6	10	Necessary	10.2	6	4.5
RA30		M6×0.75	5	10	Necessary	10.2	6	3.5
RA35		M6×0.75	5.5	15	Necessary	10.2	7	7.4
RA45		Rc 1/8	7.2	20	Necessary	10.2	7.2	10.4
RA55		Rc 1/8	7.2	21	Necessary	10.2	7.2	10.4
RA65		Rc 1/8	7.2	19	–	10.2	7.2	0.4

Table 7.2 Lubrication hole positions

Unit: mm

Model No.	Roller slide shape code	Grease nipple size	$s_2$	$T_1$	$D_1$	$s_1$	$T_2$
RA15	AL, BL, EM, GM	$\phi 3$	4	3	8.2	4.4	0.2
RA20	EM, GM	$\phi 3$	4	4	9.2	5.4	0.2
RA25	AL, BL, EM, GM	M6×0.75	6	6	10.2	6	0.4
RA30		M6×0.75	5	7	10.2	6	0.4
RA35		M6×0.75	5.5	8	10.2	7	0.4
RA45		Rc 1/8	7.2	10	10.2	7.2	0.4
RA55		Rc 1/8	7.2	11	10.2	7.2	0.4
RA65		EM, GM	Rc 1/8	7.2	19	10.2	7.2

Fig. 10 Grease fitting and Tube fitting

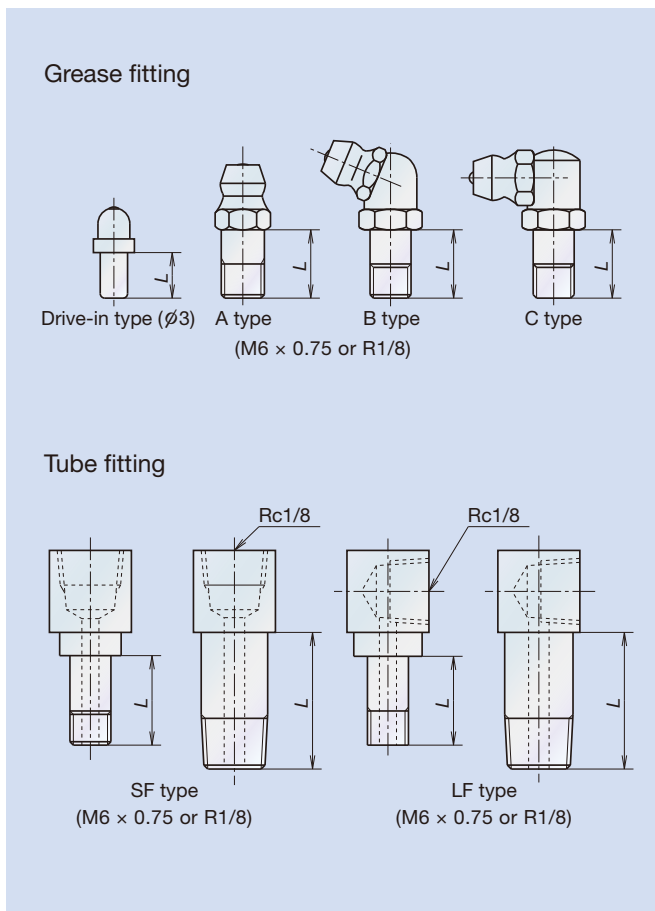


Table 8

Unit: mm

Model No.	Dust-proof specification	Grease fitting Drive-in type	Tube fitting
		Thread body length L	Thread body length L
RA15	Standard	5	–
	With NSK K1	10	–
	Double seal	8	–
	Protector	8	–
RA20	Standard	5	–
	With NSK K1	10	–
	Double seal	8	–
	Protector	8	–
RA25	Standard	5	5
	With NSK K1	12	12
	Double seal	10	9
	Protector	10	9
RA30	Standard	5	6
	With NSK K1	14	15
	Double seal	12	11
	Protector	12	11
RA35	Standard	5	6
	With NSK K1	14	15
	Double seal	12	11
	Protector	12	11
RA45	Standard	8	17
	With NSK K1	18	21.5
	Double seal	14	17
	Protector	14	17
RA55	Standard	8	17
	With NSK K1	18	21.5
	Double seal	14	17
	Protector	14	17
RA65	Standard	8	17
	With NSK K1	20	20
	Double seal	14	17
	Protector	14	17

## 6. Dust-proof

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

For severe usage conditions, optional rail covers are available. Contact NSK for information on how to mount the cover. The linear guide can also be equipped with a lubrication unit NSK K1 that has already proven its effectiveness with other NSK Linear Guide.

Table 9 Optional parts for dust-proofing

Name	Objective
NSK K1	Porous part containing oil enhances lubrication function.
Double seal	Sealing effect is enhanced by using pairs of side seals.
Protector	Removes large dust particles and protects side seals from hot and hard dust particles.
Rail cover**	Covers top of rail to prevent foreign matter from getting in the rail mounting holes.
Bolt hole cap	Prevents foreign matter such as cutting dust from collecting in the rail mounting holes.

\* Inner seals for RA15 and RA20 are available as options. \*\* Rail cover is applicable to RA25 to RA65.

Fig. 11 Rail cover



Fig. 12 View of the roller slide equipped with the dust-proof parts

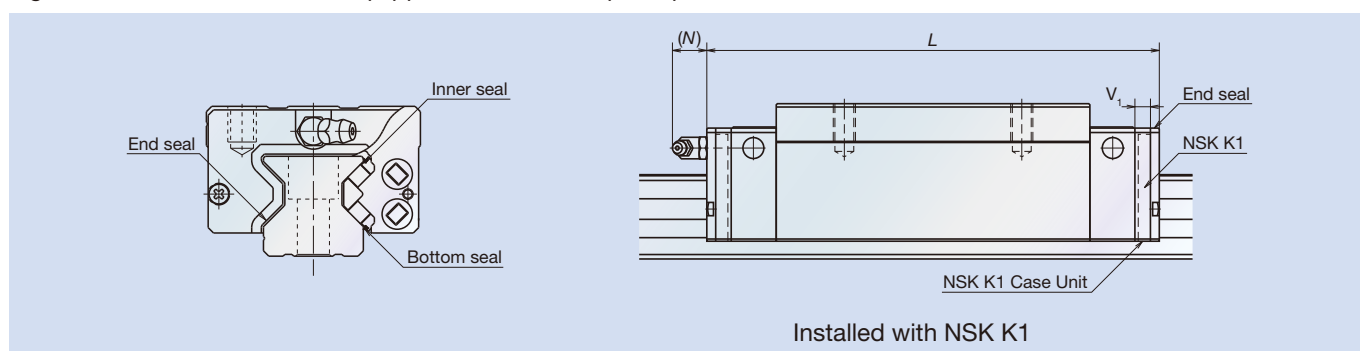


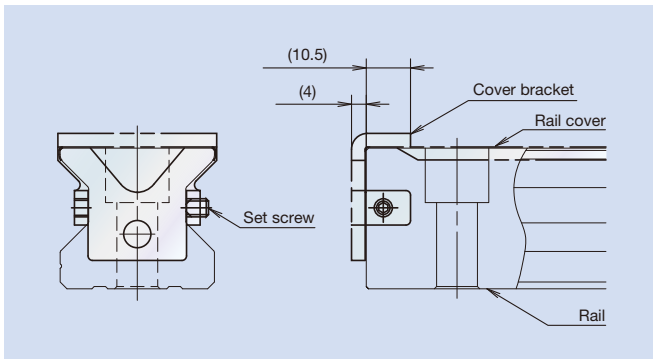
Table 10 Dimensions of roller slide assembly equipped with the optional parts

Unit: mm

Model No.	Roller slide shape code	Roller slide length			
		Standard roller slide length	Roller slide length installed with NSK K1	Length of NSK K1 Case Unit $V_1$	Protruding area of the grease fitting $N$
RA15	AN, AL, EM	70	79	4.5	(3)
	BN, BL, GM	85.4	94.4		
RA20	AN, EM	86.5	95.5	4.5	(3)
	BN, GM	106.3	115.3		
RA25	AN, AL, EM	97.5	107.5	5	(11)
	BN, BL, GM	115.5	125.5		
RA30	AN, AL, EM	110.8	122.8	6	(11)
	BN, BL, GM	135.4	147.4		
RA35	AN, AL, EM	123.8	136.8	6.5	(11)
	BN, BL, GM	152	165		
RA45	AN, AL, EM	154	168	7	(14)
	BN, BL, GM	190	204		
RA55	AN, AL, EM	184	198	7	(14)
	BN, BL, GM	234	248		
RA65	AN, EM	228.4	243.4	7.5	(14)
	BN, GM	302.5	317.5		

Above dimensions are for the assembly length of a roller slide equipped with one of the optional dust-proof parts on each end. Please consult with NSK for the dimensions when more than one kind of optional parts are used.

Fig. 13 End configuration of rail equipped with the rail cover



When the rail cover is used, use the cover bracket to secure the rail cover. Fig. 13 shows the dimensions for the cover bracket. The required room at the end of the rail is:

- Inside: 10.5 mm or less
  - Outside: 4 mm or less
- (Common to the models of RA25 to RA65)

Please confirm the interference with your machine at the stroke end.

- Machine stroke
- Room for the end of the rail

Table 11 Height of rails equipped with rail cover Unit: mm

Model No.	Standard rail height $H_1$	Rail height installed with rail cover
RA25	24	24.25
RA30	28	28.25
RA35	31	31.25
RA45	38	38.3
RA55	43.5	43.8
RA65	55	55.3

The height of the rail with the rail cover is shown in Table 11.

Table 12 Cap to plug rail mounting bolt hole

Model No.	Bolt to secure rail	Cap reference No.	Quantity/case
RA15	M4	LG-CAP/M4	20/case
RA20	M5	LG-CAP/M5	20/case
RA25	M6	LG-CAP/M6	20/case
RA30, RA35	M8	LG-CAP/M8	20/case
RA45	M12	LG-CAP/M12	20/case
RA55	M14	LG-CAP/M14	20/case
RA65	M16	LG-CAP/M16	20/case

Bolt size for rail mounting and cap reference number are shown in Table 12.

## 7. Installation

### (1) Mounting tolerance

Mounting tolerance results in harmful effects such as shortened operating life, deterioration in motion accuracy, and friction variation.

NSK particularly focuses on operating life, and sets an operating life value of more than 10 000 km calculated under the following conditions as mounting tolerance:

- The load per roller slide is 10% of basic dynamic load rating  $C$ .
- The rigidity of machine is infinite.

The tolerance in Fig. 14 is shown in the Table 13 as typical tolerance.

Fig. 14 Mounting tolerance

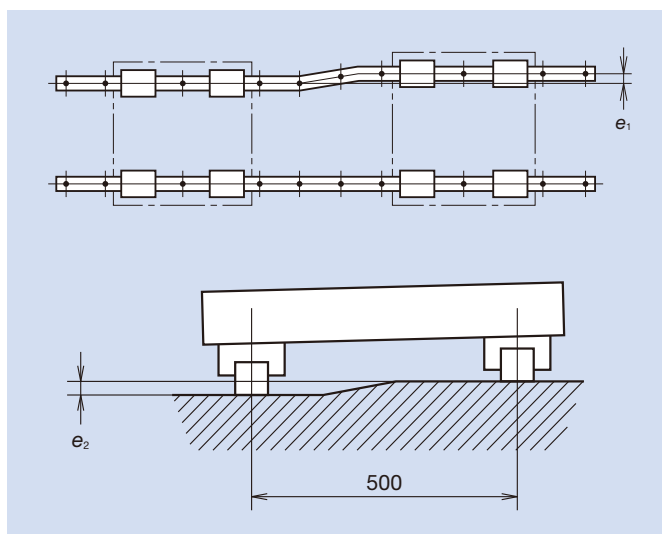


Table 13 Mounting tolerance of RA series Unit:  $\mu\text{m}$

Model No.	Parallelism tolerance of two roller guides $e_1$		Height tolerance of two roller guides $e_2$	
	Z1	Z3, ZZ	Z1	Z3, ZZ
RA15	-	5	-	150 $\mu\text{m}$ / 500 mm
RA20	-	7		
RA25	14	9	290 $\mu\text{m}$ / 500 mm	
RA30	18	11		
RA35	21	13		
RA45	27	17		
RA55	31	19		
RA65	49	30		

### (2) Shoulder height and corner radius of mounting surface

When using the shoulders, which rise perpendicularly to the mounting surface, for accurate installation of a roller guide, refer to Fig. 15 and Table 14 for the dimensions.

Fig. 15 Datum face of roller guide and shoulder

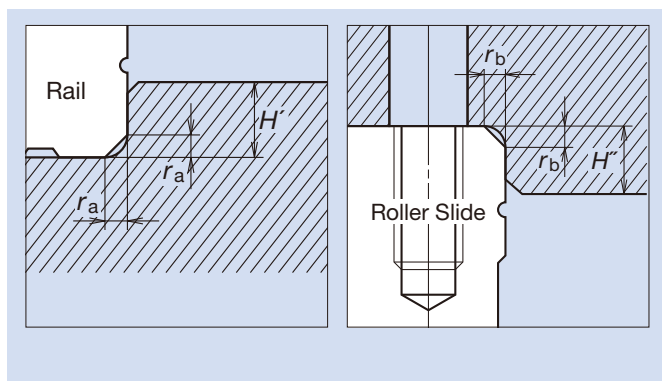


Table 14 Shoulder height and corner radius of attachment Unit: mm

Model No.	Shoulder Height		Chamfer (maximum)	
	$H'$	$H''$	$r_a$	$r_b$
RA15	3	4	0.5	0.5
RA20	4	5	0.5	0.5
RA25	4	5	0.5	1.0
RA30	5	6	1.0	1.0
RA35	5	6	1.0	1.0
RA45	6	8	1.5	1.0
RA55	7	10	1.5	1.5
RA65	11	11	1.5	1.5

## 8. Maximum rail length

Table 15 shows the limitations of rail length. However, the limitations vary by accuracy grades.

Table 15 Length limitation of rails

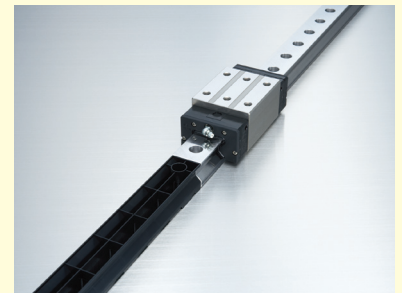
Unit: mm

Size	RA15	RA20	RA25	RA30	RA35	RA45	RA55	RA65
Length	2 000	3 000	3 000	3 500	3 500	3 500	3 500	3 500

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

### Handling Precautions

- ① Operating temperature limits should normally be less than 80°C.
- ② If using NSK K1™, service temperature should not exceed 50°C (or 80°C instantaneously). Make sure the unit does not come in contact with organic solvents with that can be used for degreasing. Do not place the unit in a location exposed to white kerosene or rust prevention oil containing white kerosene.
- ③ When transferring the roller slide onto the rail, or vice versa:
  - Do not remove an unnecessary roller slide from the rail as much as you can.
  - Use the provided provisional rail to prevent dents or scratches on the raceways caused by the roller slide that is jammed into the one from the other. It also prevents the rollers from dropping.
  - When transferring the roller slide onto the rail, or vice versa, butt the provisional rail up against the rail and slide it directly from one onto the other.
  - Use a clean provisional rail. Do not use the provisional rail that is contaminated with particles or uses different grease from that of the relevant roller slide.



# RA Series dimension table

## Square type (tapped mounting holes)

### RA-AN (High-load type/standard), RA-BN (Super-high-load type/long)

#### Assembly

Example of specification number: **RA 35 1000 AN C 2 - \*\* P6 Z**

Series code: RA  
 Size No.: 35  
 Rail length (mm): 1000  
 Roller slide shape code AN, BN  
 Material and surface treatment code, C: Special high carbon steel (NSK standard)

Preload code 1: Z1 Slight preload  
 3: Z3 Medium preload  
 Z: Random matching with preload  
 Accuracy grade<sup>\*1</sup> (Without NSK K1): P3, P4, P5, P6  
 (With NSK K1): K3, K4, K5, K6  
 Design serial number: \*\*  
 Number of roller slides per rail: 2

\*1 Only P6 and K6 grades are available for the random-matching type.

#### Random-matching rail

Example of specification number: **R1A 35 1000 L C N - \*\* P6 Z**

RA Series random-matching rail code: R1A  
 Size No.: 35  
 Rail length (mm): 1000  
 Rail shape code L: Standard  
 Material and surface treatment code, C: Special high carbon steel (NSK standard)

Preload code Z: Random matching with preload  
 Accuracy grade P6: Precision  
 Design serial number: \*\*  
 Butting specification  
 N: Non-butting specification L: Butting specification

#### Random-matching roller slide

Example of specification number: **RAA 35 AN P6 Z - F**

RA Series random-matching roller slide code: RAA  
 Size No.: 35  
 Roller slide shape code AN, BN

Option code  
 No code: No surface treatment  
 F: Fluoride low temperature chrome plating  
 C: No surface treatment + rail cover  
 CF: Fluoride low temperature chrome plating + rail cover  
 Z: Random matching with preload  
 Accuracy grade P6: Precision

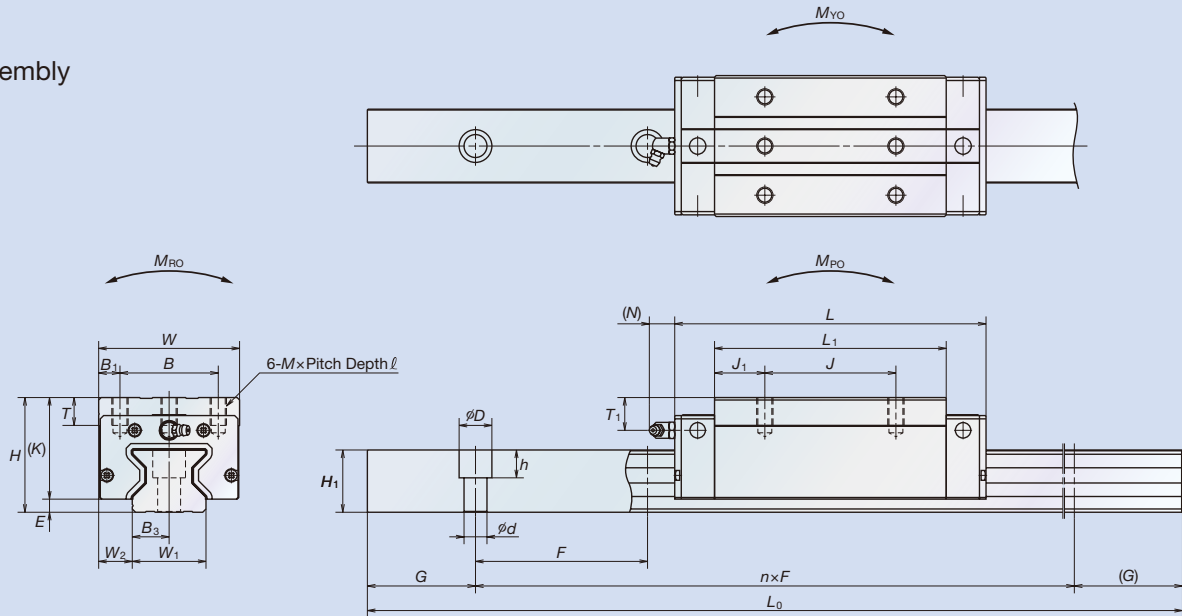
Model No.	Assembly			Roller slide												
	Height <i>H</i>	<i>E</i>	<i>W</i> <sub>2</sub>	Width <i>W</i>	Length <i>L</i>	Mounting hole			<i>B</i> <sub>1</sub>	<i>L</i> <sub>1</sub>	<i>J</i> <sub>1</sub>	<i>K</i>	<i>T</i>	Grease fitting		
						<i>B</i>	<i>J</i>	<i>M</i> × Pitch × <i>ℓ</i>						Mounting hole	<i>T</i> <sub>1</sub>	<i>N</i>
RA15AN RA15BN	28	4	9.5	34	70 85.4	26	26	M4×0.7×6	4	44.8 60.2	9.4 17.1	24	8	φ3	8	3
RA20AN RA20BN	30	5	12	44	86.5 106.3	32	36 50	M5×0.8×6	6	57.5 77.3	10.75 13.65	25	12	φ3	4	3
RA25AN RA25BN	40	5	12.5	48	97.5 115.5	35	35 50	M6×1×9	6.5	65.5 83.5	15.25 16.75	35	12	M6×0.75	10	11
RA30AN RA30BN	45	6.5	16	60	110.8 135.4	40	40 60	M8×1.25×11	10	74 98.6	17 19.3	38.5	14	M6×0.75	10	11
RA35AN RA35BN	55	6.5	18	70	123.8 152	50	50 72	M8×1.25×12	10	83.2 111.4	16.6 19.7	48.5	15	M6×0.75	15	11
RA45AN RA45BN	70	8	20.5	86	154 190	60	60 80	M10×1.5×17	13	105.4 141.4	22.7 30.7	62	17	R <sub>C</sub> 1/8	20	14
RA55AN RA55BN	80	9	23.5	100	184 234	75	75 95	M12×1.75×18	12.5	128 178	26.5 41.5	71	18	R <sub>C</sub> 1/8	21	14
RA65AN RA65BN	90	13	31.5	126	228.4 302.5	76	70 120	M16×2×20	25	155.4 229.5	42.7 54.75	77	22	R <sub>C</sub> 1/8	19	14

\* Select either one of two F dimensions, the standard or the parenthesized semi-standard dimensions, for the pitch of rail fixing bolt holes. If not specified, the standard dimension of F is applied.

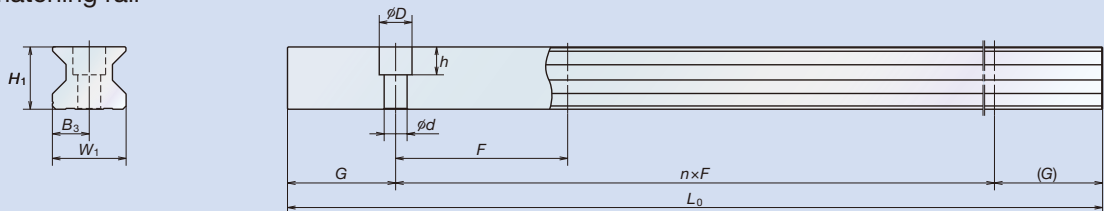
\* The random-matching type is available for the model of RA25 to RA65.



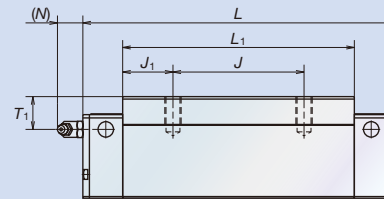
## Assembly



## Random-matching rail



## Random-matching roller slide



Unit: mm

Rail							Basic load rating					Weight	
Rail width $W_1$	Rail height $H_1$	Bolt pitch $F$	Bolt hole $d \times D \times h$	$B_3$	G (recommended)	Maximum length $L_{0max}$	Dynamic $C$ (N)	Static $C_0$ (N)	Static moment (N·m)			Roller slide (kg)	Rail (kg/m)
									$M_{RO}$	$M_{PO}$	$M_{VO}$		
15	16.3	60 (30)	4.5×7.5×5.3	7.5	20	2 000	10 300 13 000	27 500 37 000	260 350	210 375	210 375	0.21 0.30	1.6
20	20.8	60 (30)	6×9.5×8.5	10	20	3 000	19 200 24 000	52 500 70 000	665 890	505 900	505 900	0.38 0.50	2.6
23	24	30	7×11×9	11.5	20	3 000	29 200 35 400	72 700 92 900	970 1 240	760 1 240	760 1 240	0.60 0.91	3.4
28	28	40	9×14×12	14	20	3 500	38 900 47 600	93 500 121 000	1 670 2 170	1 140 1 950	1 140 1 950	1.0 1.3	4.9
34	31	40	9×14×12	17	20	3 500	53 300 67 400	129 000 175 000	2 810 3 810	1 800 3 250	1 800 3 250	1.6 2.1	6.8
45	38	52.5	14×20×17	22.5	22.5	3 500	92 800 116 000	229 000 305 000	6 180 8 240	4 080 7 150	4 080 7 150	3.0 4.1	10.9
53	43.5	60	16×23×20	26.5	30	3 500	129 000 168 000	330 000 462 000	10 200 14 300	7 060 13 600	7 060 13 600	4.9 6.7	14.6
63	55	75	18×26×22	31.5	35	3 500	210 000 288 000	504 000 756 000	19 200 28 700	12 700 28 600	12 700 28 600	9.3 12.2	22.0

\* The basic load rating complies with ISO standards (ISO14728-1, ISO14728-2).  
If the above basic dynamic load rating (100 km rating) is converted into 50 km rating, use the following formula:  
 $C_{50 km} = 1.23 \times C_{100 km}$

# RA Series dimension table

## Low profile type (tapped mounting holes)

### RA-AL (High-load type/standard), RA-BL (Super-high-load type/long)

#### Assembly

Example of specification number: **RA 35 1000 AL C 2 - \*\* P6 Z**

Series code: RA  
 Size No.: 35  
 Rail length (mm): 1000  
 Roller slide shape code: AL, BL  
 Material and surface treatment code, C: Special high carbon steel (NSK standard)

Preload code 1: Z1 Slight preload  
 3: Z3 Medium preload  
 Z: Random matching with preload  
 Accuracy grade<sup>\*2</sup> (Without NSK K1): P3, P4, P5, P6  
 (With NSK K1): K3, K4, K5, K6

Design serial number: \*\*  
 Number of roller slides per rail: 2

\*1 Only P6 and K6 grades are available for the random-matching type.

#### Random-matching rail

Example of specification number: **R1A 35 1000 L C N - \*\* P6 Z**

RA Series random-matching rail code: R1A  
 Size No.: 35  
 Rail length (mm): 1000  
 Rail shape code L: Standard  
 Material and surface treatment code, C: Special high carbon steel (NSK standard)

Preload code Z: Random matching with preload  
 Accuracy grade P6: Precision  
 Design serial number: \*\*  
 Butting specification  
 N: Non-butting specification L: Butting specification

#### Random-matching roller slide

Example of specification number: **RAA 35 AL P6 Z - F**

RA Series random-matching roller slide code: RAA  
 Size No.: 35  
 Roller slide shape code: AL, BL

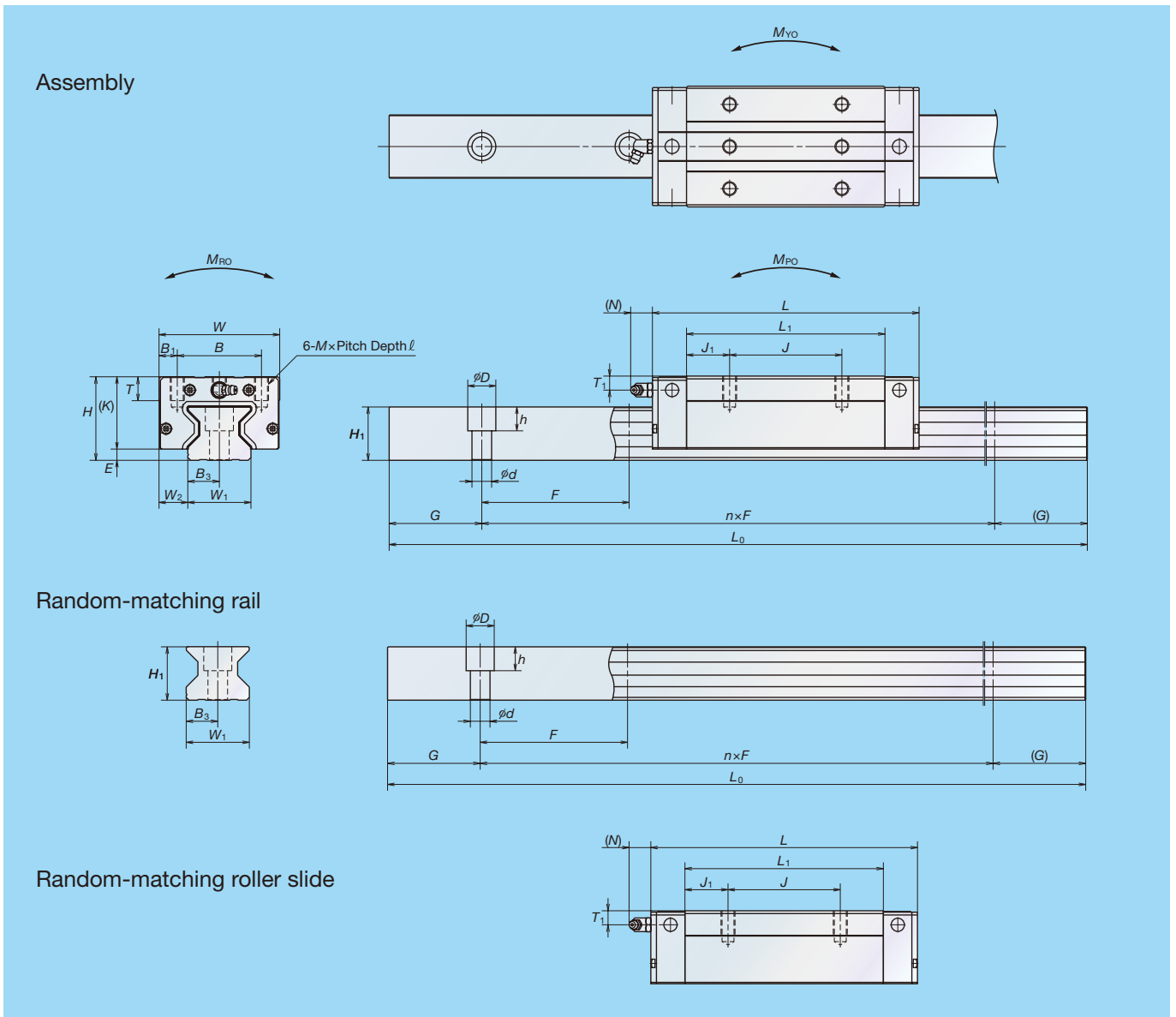
Option code  
 No code: No surface treatment  
 F: Fluoride low temperature chrome plating  
 C: No surface treatment + rail cover  
 CF: Fluoride low temperature chrome plating + rail cover

Z: Random matching with preload  
 Accuracy grade P6: Precision

Model No.	Assembly			Roller slide												
	Height <i>H</i>	<i>E</i>	<i>W</i> <sub>2</sub>	Width <i>W</i>	Length <i>L</i>	Mounting hole			<i>B</i> <sub>1</sub>	<i>L</i> <sub>1</sub>	<i>J</i> <sub>1</sub>	<i>K</i>	<i>T</i>	Grease fitting		
						<i>B</i>	<i>J</i>	<i>M</i> × Pitch × <i>ℓ</i>						Mounting hole	<i>T</i> <sub>1</sub>	<i>N</i>
RA15AL RA15BL	24	4	9.5	34	70 85.4	26	26	M4×0.7×5.5	4	44.8 60.2	9.4 17.1	20	8	φ3	4	3
RA25AL RA25BL	36	5	12.5	48	97.5 115.5	35	35 50	M6×1×8	6.5	65.5 83.5	15.25 16.75	31	12	M6×0.75	6	11
RA30AL RA30BL	42	6.5	16	60	110.8 135.4	40	40 60	M8×1.25×11	10	74 98.6	17 19.3	35.5	14	M6×0.75	7	11
RA35AL RA35BL	48	6.5	18	70	123.8 152	50	50 72	M8×1.25×12	10	83.2 111.4	16.6 19.7	41.5	15	M6×0.75	8	11
RA45AL RA45BL	60	8	20.5	86	154 190	60	60 80	M10×1.5×16	13	105.4 141.4	22.7 30.7	52	17	R <sub>C</sub> 1/8	10	14
RA55AL RA55BL	70	9	23.5	100	184 234	75	75 95	M12×1.75×18	12.5	128 178	26.5 41.5	61	18	R <sub>C</sub> 1/8	11	14

\* Select either one of two F dimensions, the standard or the parenthesized semi-standard dimensions, for the pitch of rail fixing bolt holes.  
 If not specified, the standard dimension of F is applied.

\* The random-matching type is available for the model of RA25 to RA65.



Unit: mm

Rail							Basic load rating					Weight	
Rail width $W_1$	Rail height $H_1$	Bolt pitch $F$	Bolt hole $d \times D \times h$	$B_3$	G (recommended)	Maximum length $L_{0max}$	Dynamic $C$ (N)	Static $C_0$ (N)	Static moment (N·m)			Roller slide (kg)	Rail (kg/m)
									$M_{R0}$	$M_{P0}$	$M_{Y0}$		
15	16.3	60 (30)	4.5×7.5×5.3	7.5	20	2 000	10 300 13 000	27 500 37 000	260 350	210 375	210 375	0.17 0.25	1.6
23	24	30	7×11×9	11.5	20	3 000	29 200 35 400	72 700 92 900	970 1 240	760 1 240	760 1 240	0.45 0.80	3.4
28	28	40	9×14×12	14	20	3 500	38 900 47 600	93 500 121 000	1 670 2 170	1 140 1 950	1 140 1 950	0.85 1.1	4.9
34	31	40	9×14×12	17	20	3 500	53 300 67 400	129 000 175 000	2 810 3 810	1 800 3 250	1 800 3 250	1.2 1.7	6.8
45	38	52.5	14×20×17	22.5	22.5	3 500	92 800 116 000	229 000 305 000	6 180 8 240	4 080 7 150	4 080 7 150	2.5 3.4	10.9
53	43.5	60	16×23×20	26.5	30	3 500	129 000 168 000	330 000 462 000	10 200 14 300	7 060 13 600	7 060 13 600	4.1 5.7	14.6

\* The basic load rating complies with ISO standards (ISO14728-1, ISO14728-2).  
If the above basic dynamic load rating (100 km rating) is converted into 50 km rating, use the following formula:  
 $C_{50 km} = 1.23 \times C_{100 km}$

# RA Series dimension table

## Flange type (for both tapped and bolt mounting holes)

### RA-EM (High-load type/standard), RA-GM (Super-high-load type/long)

#### Assembly

Example of specification number: **RA 35 1000 EM C 2 - \*\* P6 Z**

Series code: RA  
 Size No.: 35  
 Rail length (mm): 1000  
 Roller slide shape code EM, GM: EM  
 Material and surface treatment code, C: Special high carbon steel (NSK standard): C  
 Accuracy grade\*2: P6  
 Preload code 1: Z1 Slight preload  
 3: Z3 Medium preload  
 Z: Random matching with preload  
 Design serial number: \*\*  
 Number of roller slides per rail: 2

\*1 Only P6 and K6 grades are available for the random-matching type.

#### Random-matching rail

Example of specification number: **R1A 35 1000 L C N - \*\* P6 Z**

RA Series random-matching rail code: R1A  
 Size No.: 35  
 Rail length (mm): 1000  
 Rail shape code L: Standard: L  
 Material and surface treatment code, C: Special high carbon steel (NSK standard): C  
 Accuracy grade P6: Precision: P6  
 Preload code Z: Random matching with preload: Z  
 Design serial number: \*\*  
 Butting specification: N: Non-butting specification L: Butting specification

#### Random-matching roller slide

Example of specification number: **RAA 35 EM P6 Z - F**

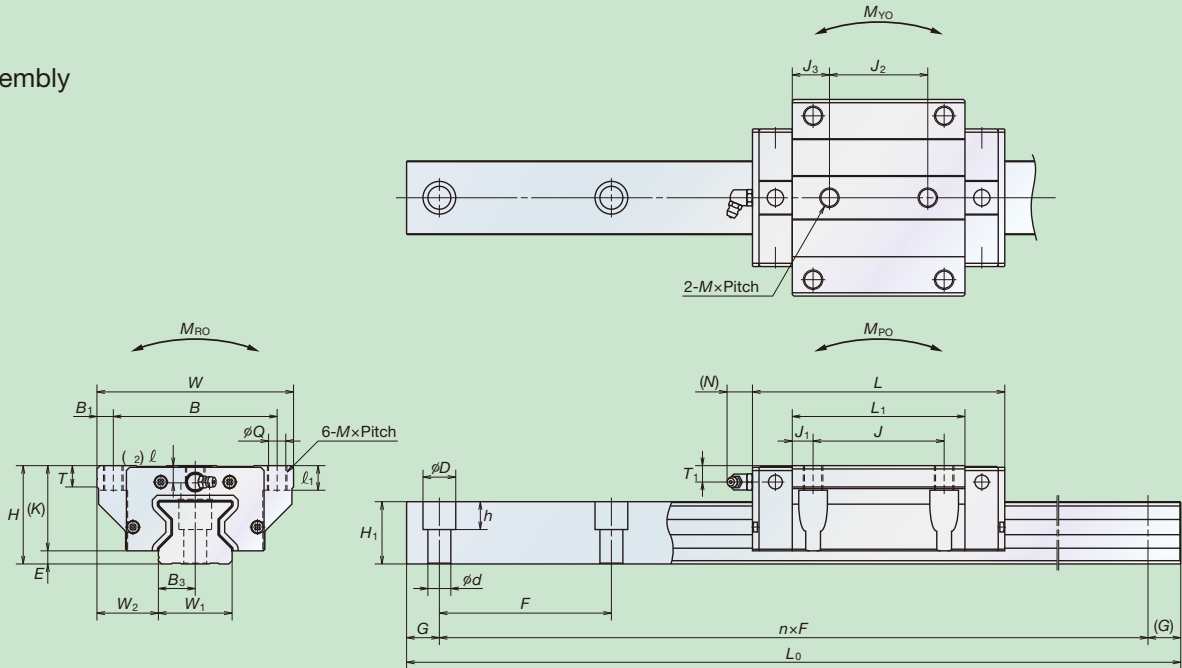
RA Series random-matching roller slide code: RAA  
 Size No.: 35  
 Roller slide shape code EM, GM: EM  
 Accuracy grade P6: Precision: P6  
 Preload code Z: Random matching with preload: Z  
 Option code: F: Fluoride low temperature chrome plating + rail cover

Model No.	Assembly					Roller slide										
	Height H	E	W <sub>2</sub>	Width W	Length L	Mounting hole					B <sub>1</sub>	L <sub>1</sub>	J <sub>1</sub>	J <sub>3</sub>	K	T
						B	J	J <sub>2</sub>	M×Pitch×l <sub>1</sub> (l <sub>2</sub> )	Q×l <sub>1</sub> (l <sub>2</sub> )						
RA15EM RA15GM	24	4	16	47	70 85.4	38	30	26	M5×0.8×8.5 (6.5)	4.4×8.5 (6.5)	4.5	44.8 60.2	7.4 15.1	9.4 17.1	20	8
RA20EM RA20GM	30	5	21.5	63	86.5 106.3	53	40	35	M6×1×9.5 (8)	5.3×9.5 (8)	5	57.5 77.3	8.75 18.65	11.25 21.15	25	10
RA25EM RA25GM	36	5	23.5	70	97.5 115.5	57	45	40	M8×1.25×10 (11)	6.8×10 (11)	6.5	65.5 83.5	10.25 19.25	12.75 21.75	31	11
RA30EM RA30GM	42	6.5	31	90	110.8 135.4	72	52	44	M10×1.5×12 (12.5)	8.6×12 (12.5)	9	74 98.6	11 23.3	15 27.3	35.5	11
RA35EM RA35GM	48	6.5	33	100	123.8 152	82	62	52	M10×1.5×13 (7)	8.6×13 (7)	9	83.2 111.4	10.6 24.7	15.6 29.7	41.5	12
RA45EM RA45GM	60	8	37.5	120	154 190	100	80	60	M12×1.75×15 (10.5)	10.5×15 (10.5)	10	105.4 141.4	12.7 30.7	22.7 40.7	52	13
RA55EM RA55GM	70	9	43.5	140	184 234	116	95	70	M14×2×18 (13)	12.5×18 (13)	12	128 178	16.5 41.5	29 54	61	15
RA65EM RA65GM	90	13	53.5	170	228.4 302.5	142	110	82	M16×2×24 (18.5)	14.6×24 (18.5)	14	155.4 229.5	22.7 59.75	36.7 73.75	77	22

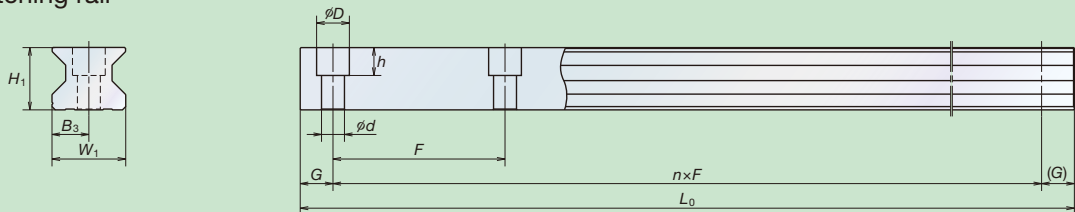
\* Select either one of two F dimensions, the standard or the parenthesized semi-standard dimensions, for the pitch of rail fixing bolt holes. If not specified, the standard dimension of F is applied.

\* The random-matching type is available for the model of RA25 to RA65.

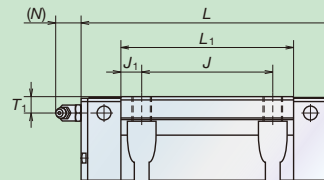
## Assembly



## Random-matching rail



## Random-matching roller slide



Unit: mm

		Rail								Basic load rating					Weight		
Grease fitting		Rail width		Rail height	Bolt pitch		Bolt hole		G (recommended)	Maximum length $L_{0max}$	Dynamic	Static	Static moment (N-m)			Roller slide	Rail
Mounting hole	$T_1$	$N$	$W_1$	$H_1$	$F$	$d \times D \times h$	$B_3$	C (N)			$C_0$ (N)	$M_{R0}$	$M_{P0}$	$M_{Y0}$	(kg)	(kg/m)	
$\phi 3$	4	3	15	16.3	60 (30)	4.5×7.5×5.3	7.5	20	2 000	10 300	27 500	260	210	210	0.21	1.6	
										13 000	37 000	350	375	375	0.28		
$\phi 3$	4	3	20	20.8	60 (30)	6×9.5×8.5	10	20	3 000	19 200	52 500	665	505	505	0.45	2.6	
										24 000	70 000	890	900	900	0.65		
M6×0.75	6	11	23	24	30	7×11×9	11.5	20	3 000	29 200	72 700	970	760	760	0.80	3.4	
										35 400	92 900	1 240	1 240	1 240	1.1		
M6×0.75	7	11	28	28	40	9×14×12	14	20	3 500	38 900	93 500	1 670	1 140	1 140	1.3	4.9	
										47 600	121 000	2 170	1 950	1 950	1.7		
M6×0.75	8	11	34	31	40	9×14×12	17	20	3 500	53 300	129 000	2 810	1 800	1 800	1.7	6.8	
										67 400	175 000	3 810	3 250	3 250	2.3		
$R_C 1/8$	10	14	45	38	52.5	14×20×17	22.5	22.5	3 500	92 800	229 000	6 180	4 080	4 080	3.2	10.9	
										116 000	305 000	8 240	7 150	7 150	4.3		
$R_C 1/8$	11	14	53	43.5	60	16×23×20	26.5	30	3 500	129 000	330 000	10 200	7 060	7 060	5.4	14.6	
										168 000	462 000	14 300	13 600	13 600	7.5		
$R_C 1/8$	19	14	63	55	75	18×26×22	31.5	35	3 500	210 000	504 000	19 200	12 700	12 700	12.2	22.0	
										288 000	756 000	28 700	28 600	28 600	16.5		

\* The basic load rating complies with ISO standards (ISO14728-1, ISO14728-2).

If the above basic dynamic load rating (100 km rating) is converted into 50 km rating, use the following formula:  
 $C_{50 km} = 1.23 \times C_{100 km}$

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