

Fig. 1

1. Features

(1) Motion performance

Newly designed recirculation component facilitates smooth circulation of steel balls.

(2) Lightweight

The ball slide is fabricated to be approximately 20% lighter than LU Series by the application of resin to a part of its body.

(3) Reduced noise intensity

Resin components applied in ball circulating circuits reduce collision noise between steel balls and the inner wall of circulating circuits.

(4) Low dust generation

The structure is designed to prevent dust generation.

(5) Excellent dust-proofing

It is designed to minimize the clearance between the side of rails and the inner walls of the slide, and prevent foreign matters from entering the ball slide.

(6) High corrosion resistance

High corrosion-resistant martensite stainless steel is incorporated as a standard feature to provides excellent corrosion resistance.

(7) Easy to handle

Safety design includes a retainer that prevents steel balls from dropping out of the ball slide even when the slide is removed from the rail.

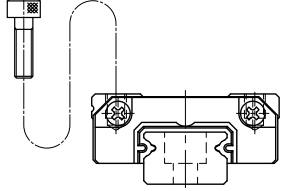
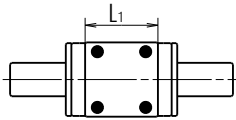
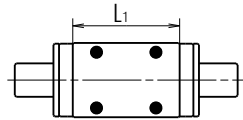
(8) Long-term maintenance-free

Superb features of NSK K1 Lubrication unit realize a long-term, maintenance-free operation.

(9) Fast delivery

Lineup of random-matching rails and ball slides facilitates fast delivery. (PU09 to PU15)

2. Ball slide shape

Ball slide Model	Shape/installation method	Type (Upper row, Rating: Lower row, Ball slide length)	
		Standard type	High-load type
		Standard	Long
AR TR AL UR BL BR		TR, AR, AL 	UR, BL, BR 

3. Accuracy and preload

(1) Running parallelism of ball slide

Table 1

Unit: μm

Rail length (mm)		Preloaded assembly (not random matching)				Random-matching type
		Super precision P4	High precision P5	Precision grade P6	Normal grade PN	Normal grade PC
over	or less					
-	50	2	2	4.5	6	6
50	80	2	3	5	6	6
80	125	2	3.5	5.5	6.5	6.5
125	200	2	4	6	7	7
200	250	2.5	5	7	8	8
250	315	2.5	5	8	9	9
315	400	3	6	9	11	11
400	500	3	6	10	12	12
500	630	3.5	7	12	14	14
630	800	4.5	8	14	16	16
800	1 000	5	9	16	18	18
1 000	1 250	6	10	17	20	20

(2) Accuracy standard

The preloaded assembly has four accuracy grades; Super precision P4, High precision P5, Precision grade P6, and normal grade PN, while the random-matching type has Normal grade PC only.

Table 2 shows the accuracy standard for the preloaded assembly type while Table 3 shows the accuracy standard for the random-matching types.

> Tolerance of preloaded assembly type

Table 2

Unit: μm

Characteristics	Accuracy grade	Super precision P4	High precision P5	Precision grade P6	Normal grade PN
Mounting height H		± 10	± 15	± 20	± 40
Variation of H (All ball slides on a set of rails)		5	7	15	25
Mounting width W_2 or W_3		± 15	± 20	± 30	± 50
Variation of W_2 or W_3 (All ball slides on reference rail)		7	10	20	30
Running parallelism of surface C to surface A	Shown in Table 1 and Fig. 2				
Running parallelism of surface D to surface B					

> Tolerance of random-matching type: Normal grade PC

Table 3

Unit: μm

Characteristics	Model No.	PU09, 12 and 15
Mounting height H		± 20
Variation of mounting height H		15 ① 30 ②
Mounting width W_2 or W_3		± 20
Variation of mounting width W_2 or W_3		20
Running parallelism of surface C to surface A	Shown in Table 1 and Fig. 2	
Running parallelism of surface D to surface B		

Notes ① Variation on the same rail / ② Variation on multiple rails

(3) Assembled accuracy

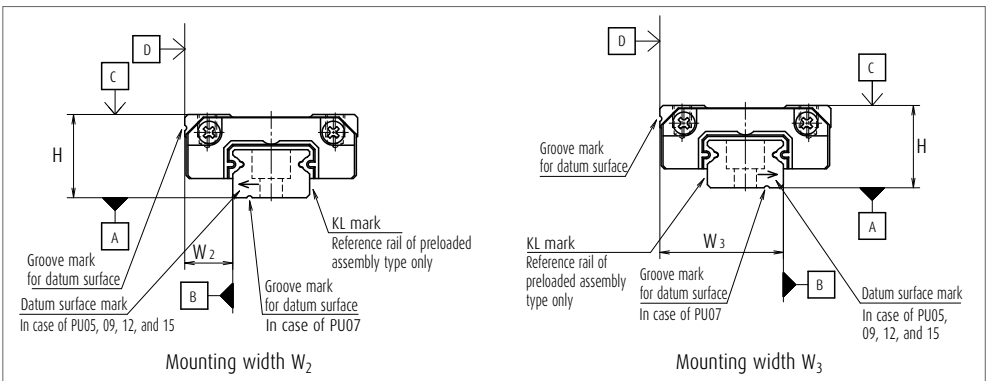


Fig. 2

Note Please refer to page A67 for marks on the datum surfaces.

(4) Preload and rigidity

We offer three levels of preload: Slight preload Z1 and Fine clearance Z0 for preloaded assembly type, along with Fine clearance ZT for random-matching type. Values for preload and rigidity of the preloaded assembly type are shown in **Table 4**. Rigidities are for the median of the preload range.

> Preload and rigidity of preloaded assembly

Table 4

Model No.		Preload (N)	Rigidity (N/μm)
		Slight preload (Z1)	Slight preload (Z1)
Standard type	PU05TR	0 - 3	17
	PU07AR	0 - 8	22
	PU09TR	0 - 10	30
	PU12TR	0 - 17	33
	PU15AL	0 - 33	45
High-load type	PU09UR	0 - 14	46
	PU12UR	0 - 25	52
	PU15BL	0 - 51	75

Note Clearance of Fine clearance Z0 is 0 to 3 μm. Therefore, preload is zero.

> Clearance of random-matching type

Table 5

Unit : μm

Model No.		Fine clearance ZT
Standard type	PU09TR	3 or less
	PU12TR	
	PU15AL	
High-load type	PU09UR	5 or less
	PU12UR	
	PU15BL	

4. Maximum rail length

Table 6 shows the limitations of rail length (maximum length). However, the limitations vary by accuracy grade.

Table 6 Length limitations of rails

Unit: mm

Series	Size	05	07	09	12	15
	Material					
PU	Stainless steel	210	375	600	800	1 000

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

5. Installation

(1) Permissible values of mounting error

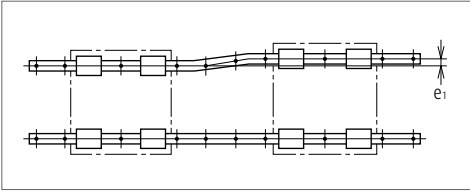


Fig. 3

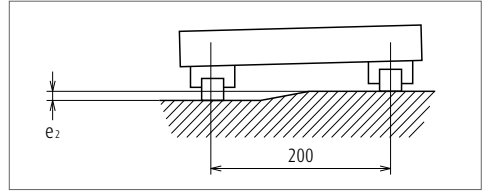


Fig. 4

Table 7

Unit: μm

Value	Preload	Model No.				
		PU05	PU07	PU09	PU12	PU15
Permissible values of parallelism in two rails e_1	Z0, ZT	10	12	15	20	25
	Z1	7	10	13	15	21
Permissible values of parallelism (height) in two rails e_2	Z0, ZT	150 $\mu\text{m}/200\text{ mm}$				
	Z1	90 $\mu\text{m}/200\text{ mm}$				

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

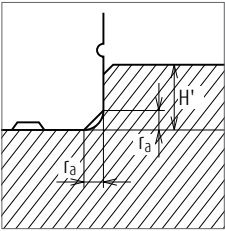


Fig. 5 Shoulder for the rail datum face

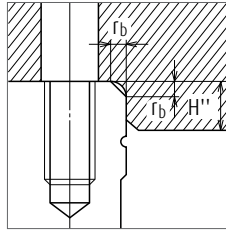


Fig. 6 Shoulder for the ball slide datum face

Table 8

Unit: mm

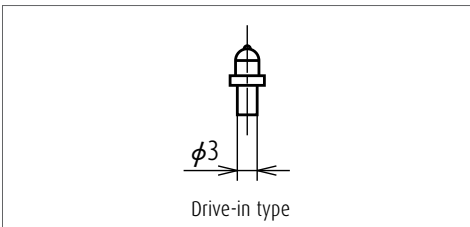
Model No.	Corner radius (maximum)		Shoulder height	
	r_a	r_b	H'	$H''^*)$
PU05	0.2	0.2	0.7	2.3
PU07	0.2	0.3	1.2	2.5
PU09	0.3	0.3	1.9	2.6
PU12	0.3	0.3	2.5	3.4
PU15	0.3	0.5	3.5	4.4

*) H'' is the minimum recommended value based on the dimension T in dimension table.

6. Lubrication accessory

Model of PU15 can select drive-in type grease fitting as an option.

For the models of PU05 to PU12, apply grease directly to the ball grooves of rail using a point nozzle.



7. Dust-proof components

(1) Standard specification

An end seal provided to both ends of a ball slide as a standard feature.

Seal friction per standard ball slide is shown in **Table 9**.

Table 9 Seal friction per ball slide (maximum value)

Unit: N

Series Size	05	07	09	12	15
PU	0.3	0.3	0.5	0.5	0.5

(2) NSK K1 lubrication unit

Table 10 shows the dimension of linear guides equipped with the NSK K1 lubrication unit.

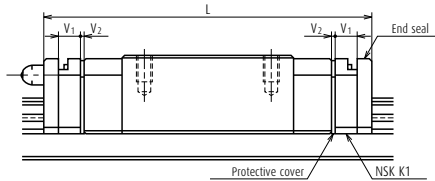


Table 10

Unit: mm

Model No.	Ball slide length	Ball slide model	Standard ball slide length	Ball slide length installed with two NSK K1 L	Thickness of NSK K1, V ₁	Thickness of protective cover, V ₂
PU05	Standard	TR	19.4	24.4	2	0.5
PU07	Standard	AR	23.4	29.4	2.5	0.5
PU09	Standard	TR	30	36.4	2.7	0.5
PU09	Long	UR	41	47.4	2.7	0.5
PU12	Standard	TR	35	42	3	0.5
PU12	Long	UR	48.7	55.7	3	0.5
PU15	Standard	AL	43	51.2	3.5	0.6
PU15	Long	BL	61	69.2	3.5	0.6

Note Ball slide length equipped with NSK K1 = (Standard ball slide length) + (Thickness of NSK K1, V₁ × Number of NSK K1) + (Thickness of the protective cover V₂ × 2)

8. Reference number

Reference numbers shall be set to individual NSK linear guide when its specifications are finalized, and it is indicated on its specification drawing.

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

(1) Reference number for preloaded assembly

	PU	15	0470	AL	K	2	-**	P5	1	
Series name									Preload code (See page A194.)	
Size									0: Z0, 1: Z1	
Rail length (mm)									Accuracy code (See Table 12.)	
Ball slide shape code (See page A192.)									Design serial number	
Material/surface treatment code (See Table 11.)									Added to the reference number.	
K: Stainless steel									Number of ball slides per rail	

(2) Reference number for random-matching type

Ball slide	PAU	15	AL	S	-K	
Random-matching ball slide series code					Option code	
PAU: PU Series random-matching ball slide					-K: Equipped with NSK K1	
Size					Material code	
Ball slide shape code (See page A192.)					S: Stainless steel	

Rail	P1U	15	0470	R	K	N	-**	PC	T	
Random-matching rail series code									Preload code (See page A194.)	
P1U: PU Series random-matching rail									T: Fine clearance	
Size									Accuracy code: PC	
Rail length (mm)									PC: Normal grade is only available.	
Rail shape code									Design serial number	
S: PU09, 12. R: PU15									Added to the reference number.	
Material/surface treatment code (See Table 11.)									*Butting rail specification	
									N: Non-butting. L: Butting specification	

*Please consult with NSK for butting rail specification.

The reference number coding for the assembly of random-matching type is the same as that of preloaded assembly. However, only preload code of "fine clearance T" is available (refer to page A194).

Table 11 Material/surface treatment code

Code	Description
K	Stainless steel
H	Stainless steel with surface treatment
Z	Other, special

Table 12 Accuracy code

Accuracy	Standard (Without NSK K1)	With NSK K1	With NSK K1 for food and medical equipment
Super precision grade	P4	K4	F4
High precision grade	P5	K5	F5
Precision grade	P6	K6	F6
Normal grade	PN	KN	FN
Normal grade (random-matching type)	PC	KC	FC

Note Refer to pages A38 and A61 for the NSK K1 lubrication unit.