A-5-3.3 LU Series (Miniature type)

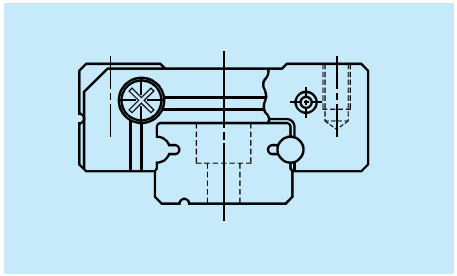


Fig. 1 LU Series

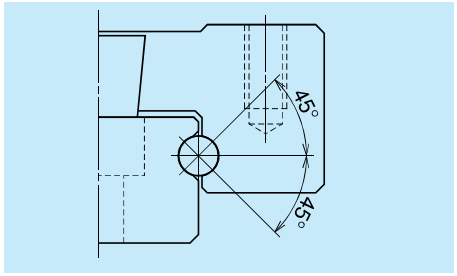


Fig. 2 Balls are in contact.

(1) Features

1. Super-small type

This compact guide owes its design to the single ball groove on both right and left sides (Gothic arch) .

2. Equal load carrying capacity in vertical and lateral directions

Contact angle is set at 45 degrees, equally load carrying capacity in vertical and lateral directions. This also provides equal rigidity in both directions.

3. Stainless steel is also standardized

Items made of the martensitic stainless steel are available as standard.

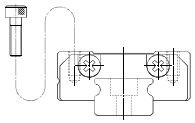
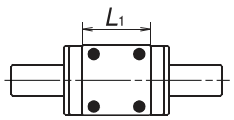
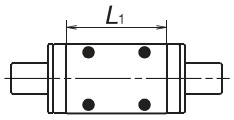
4. Some series have a ball retainer

Ball slide types AR and TR come with a ball retainer. Balls are retained in the retainer and do not fall out when the bearing is withdrawn from the rail. (Ball slides of random-matching parts as well as LU15 come with ball retainer.)

5. Fast delivery

The series enables random matching of rails and ball slides for prompt delivery. (LU09 to LU15)

(2) Ball slide shape

Ball slide Model	Shape/installation method	Type	
		Standard type	High-load type
AL TL AR TR BL UL		AL, TL, AR, TR 	BL, UL 

(3) Accuracy and preload

1. Runing parallelism tolerance

Table 1

Unit: μm

Rail length (mm) over	or less	Preloaded assembly type (not random matching) Super precision P4	High precision P5	Precision grade P6	Normal grade PN	Random-matching type Normal grade PC
–	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	1000	5	9	16	18	18
1000	1250	6	10	17	20	20

2. Accuracy standard

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

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 face C to face A Running parallelism of face D to face B	Refer to Table 1 and Fig. 3			

• Tolerance of random-matching type: Normal grade PC

Table 3 Unit: μm

Characteristics \ Accuracy grade	Normal grade PC
Mounting height ***H***	±20
Variation of mounting height ***H***	40
Mounting width W_2 or W_3	±20
Variation of mounting width W_2 or W_3	40
Running parallelism of face C to face A Running parallelism of face D to face B	Refer to Table 1 and Fig. 3

3. Assembled accuracy

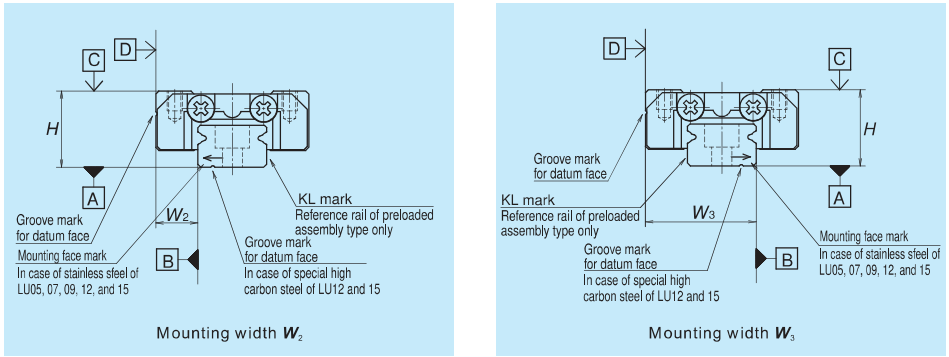


Fig. 3

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

4. Preload and rigidity

We offer three levels of preload: Slight preload (Z1) and Fine clearance (Z0), along with random-matching type of Fine clearance (ZT). Values for preloaded 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) Slight preload (Z1)	Rigidity (N/μm) Slight preload (Z1)
Standard type	LU05 TL	0 – 3	15
	LU07 AL	0 – 8	22
	LU09 AL, TL	0 – 12	26
	LU09 AR, TR	0 – 10	30
	LU12 AL, TL	0 – 17	33
	LU12 AR, TR	0 – 17	33
	LU15 AL	0 – 33	45
High-load type	LU09 BL, UL	0 – 17	43
	LU12 BL, UL	0 – 25	52
	LU15 BL	0 – 51	75

Note: Clearance of fine clearance Z0 is 0 to 3 μm. Therefore, preload is zero.
However, Z0 of PN grade is 3 to 10 μm.
Clearance values of the random-matching type are shown in Table 5.

• Clearance of random-matching type

Table 5 Unit: μm

Model No.	Fine clearance ZT
LU09	0 – 15
LU12	
LU15	

(4) Available length of rail

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

Table 6 Length limitation of rails Unit: mm

Series	Material \ Size	05	07	09	12	15
LU	Special high carbon steel	–	–	1200	1800	2000
	Stainless steel	210	375	600	800	1000

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

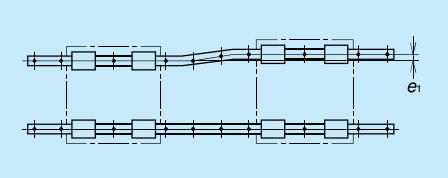


Fig. 4

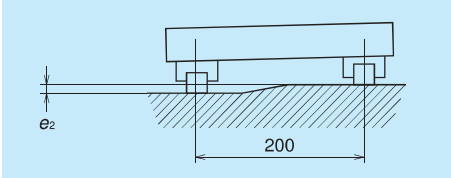


Fig. 5

Table 7

Unit: μm

Value	Preload	Model No.				
		LU05	LU07	LU09	LU12	LU15
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 μm/200 mm				
	Z1	90 μm/200 mm				

2. Shoulder height of the mounting face and corner radius r

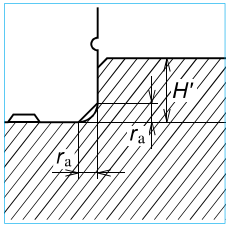


Fig. 6 Shoulder for the rail datum face

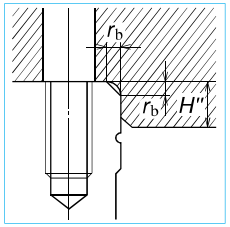


Fig. 7 Shoulder for the ball slide datum face

Table 8

Unit: mm

Model No.	Corner radius (maximum)		Shoulder height	
	r_a	r_b	H'	H''
LU05	0.2	0.2	0.7	2
LU07	0.2	0.3	1.2	3
LU09	0.3	0.3	1.9	3
LU12	0.3	0.3	2.5	4
LU15	0.3	0.5	3.5	5

(6) Lubrication accessories

There is no standard grease fitting for LU05 to LU15.
For LU Series, apply grease directly to ball groove, etc. using a point nozzle.

(7) Dust proof components

1. Standard specification

End seal: Provided to both ends of the ball slide as a standard feature.
LU05TL, LU07AL, LU09AL, and LU09TL can install as an option.

• 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
LU	0.3	0.3	0.5	0.5	0.5

2. NSK K1™

Dimension of installing NSK K1 shown in Table 10.

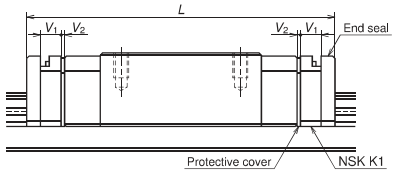


Table 10

Unit: mm

Model No.	Ball slide length	Ball slide model	Standard ball slide length	Ball slide length installed with two NSK K1 *L*	Per NSK K1 thickness V_1	[illegible] V_2
LU05	Standard	TL	18*	24.4	2.0	0.5
LU07	Standard	AL	20.4*	29.4	2.5	0.5
LU09	Standard	AR, TR	30	36.4	2.7	0.5
	Standard	AL, TL	26.8*	34.2		
	Long	BL, UL	41	47.4		
LU12	Standard	AR	35.2	42.2	3.0	0.5
	Standard	AL, TL	34	41		
	Long	BL, UL	47.5	54.5		
LU15	Standard	AL	43.6	51.8	3.5	0.6
	Long	BL	61	69.2		

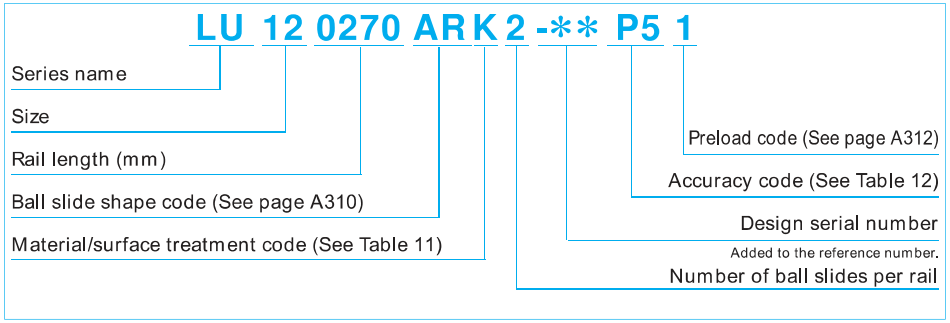
*) Standard ball slide length of LU05TL, LU07AL, LU09AL and LU09TL does not include thickness of the end seal thickness (1.5 mm). However, it includes the height of the screw head for end cap installation (Included length – LU05, 0.8 mm; LU07, no projection; LU09, 1 mm)

Note: Ball slide length equipped with NSK K1 =
(Standard ball slide length) + (Thickness of NSK K1, V_1 × Number of NSK K1) +
(Thickness of the protective cover V_2 × 2)

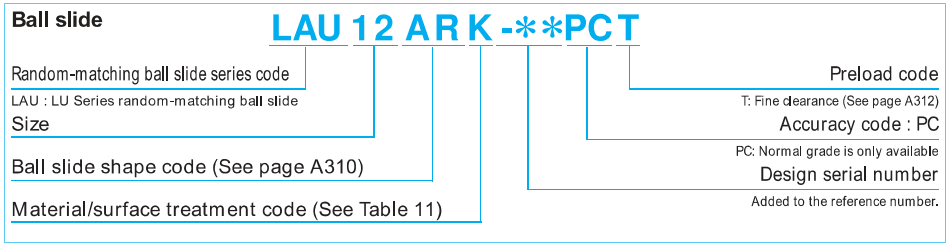
(8) Reference number

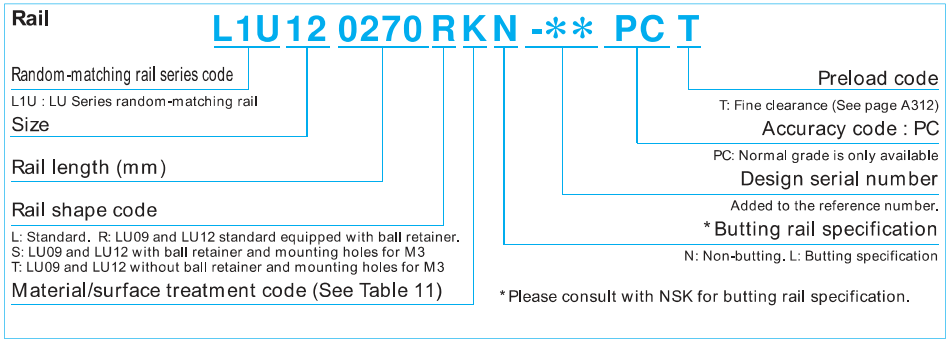
Reference numbers shall be set to individual NSK linear guide when its specifications are finalized, and it is indicated on its specification drawing.
Please specify the reference number, except design serial number, to identify the product when ordering, requiring estimates, or inquiring about specifications from NSK.

1. Reference number for preloaded assembly



2. Reference number for random-matching type





Reference number for assembly of random-matching ball slide and rail is the same as the coding of preloaded assembly. However, preload code is fine clearance "T" (Refer to page A312).

Table 11 Material/surface treatment code

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

Table 12 Accuracy code

Accuracy	Standard (Without NSK K1)	With NSK K1
Super precision grade	P4	K4
High precision grade	P5	K5
Precision grade	P6	K6
Normal grade	PN	KN
Normal grade (random-matching type)	PC	KC

Note: Refer to Page A38 for NSK K1 lubrication unit.

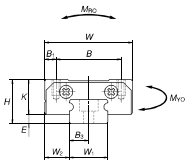
(9) Dimensions

LU-AL (LU15 is equipped with ball retainer)
LU-TL (Large mounting hole)
LU-AR (With ball retainer)
LU-TR (Large mounting hole, with ball retainer)

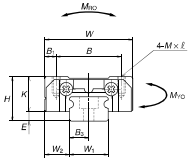
LU 12 0270 AR K 2 - P5 1**

- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A310)
- Material/surface treatment code (See Table 11)
- Number of ball slides per rail
- Design serial number (Added to the reference number.)
- Accuracy code (See Table 12)
- Preload code (See page A312)

Front view

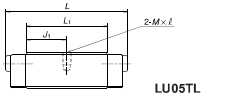


LU05TL, LU07AL
LU09AL, TL

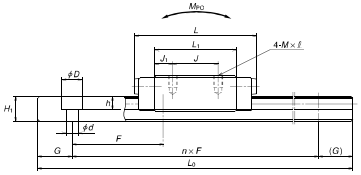


LU09AR, TR
LU12AL, TL, AR, TR
LU15AL

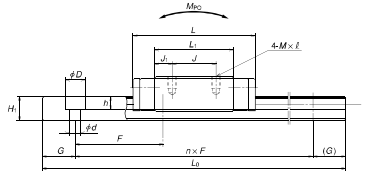
Side view



LU05TL



LU07AL
LU09AL, LU09TL



LU09AR, TR
LU12AL, TL, AR, TR
LU15AL

Model No.	Assembly			Ball slide									Width	Height
	Height			Width	Length	Mounting hole								
	H	E	W_2	W	L	B	J	M×pitch×ℓ	B_1	L_1	J_1	K	W_1	H_1
LU05TL	6	1	3.5	12	18	8	—	M2×0.4×1.5	2	12	6	5	5	3.2
LU07AL	8	1.5	5	17	20.4	12	8	M2×0.4×2.4	2.5	13.6	2.8	6.5	7	4.7
LU09AL **LU09TL**	10	2.2	5.5	20	26.8	15	13 10	M2×0.4×2.5 M3×0.5×3	2.5	18	2.5 4	7.8	9	5.5
LU09AR **LU09TR**	10	2.2	5.5	20	30	15	13 10	M2×0.4×2.5 M3×0.5×3	2.5	20	3.5 5	7.8	9	5.5
LU12AL **LU12TL**	13	3	7.5	27	34	20	15	M2.5×0.45×3 M3×0.5×3.5	3.5	21.8	3.4	10	12	7.5
LU12AR **LU12TR**	13	3	7.5	27	35.2	20	15	M2.5×0.45×3 M3×0.5×3.5	3.5	21.8	3.4	10	12	7.5
LU15AL	16	4	8.5	32	43.6	25	20	M3×0.5×4	3.5	27	3.5	12	15	9.5

Remarks 1) LU05TL, LU07AL, LU09TL, LU09AR, LU09TR, LU12AR and LU12TR come in stainless steel only.
2) Ball slide of LU05TL has only two mounting tap holes in the center.
3) End seals of LU05TL, LU07AL, LU09AL and LU09TL are available on request.

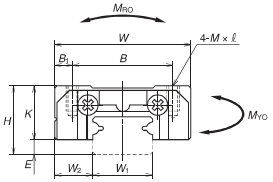
Random matching with retainer: LU09 - 12 are AR/TR, LU15 is AL.

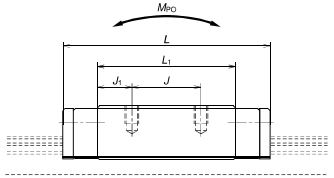
Reference number for ball slide of random-matching type

LAU-AR (With ball retainer)
LAU-TR (Large mounting hole, with ball retainer)
LAU-AL (LU15 is equipped with ball retainer)

LAU 12 AR K -PC T**

- Random-matching ball slide series code (LAU : LU Series random-matching ball slide)
- Size
- Ball slide shape code (See page A310)
- Material/surface treatment code (See Table 11)
- Preload code (T: Fine clearance (See page A312))
- Accuracy code : PC (PC: Normal grade is only available)
- Design serial number (Added to the reference number.)



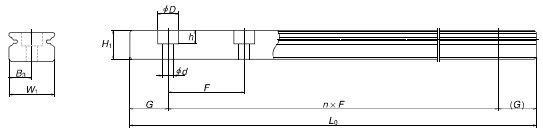


Reference number for rail of random-matching type

L1U 12 0270 R K N - PC T**

- Random-matching rail series code (L1U : LU Series random-matching rail)
- Size
- Rail length (mm)
- Rail shape code (See page A315)
- Material/surface treatment code (See Table 11)
- *Butting rail specification (N: Non-butting, L: Butting specification)
- Design serial number (Added to the reference number.)
- Accuracy code : PC (PC: Normal grade is only available)
- Preload code (T: Fine clearance (See page A312))

*Please consult with NSK for butting rail specification.



Unit: mm

Rail					Basic load rating					Ball dia.	Weight	
Pitch	Mounting bolt hole		G	Max. length L_{0MAX} ( ) for stainless	Dynamic	Static	Static moment				Ball slide	Rail
F	d×D×h	B_3	(Reference)		C (N)	C_0 (N)	M_{RO} (N · m)	M_{PO} (N · m)	M_{YO} (N · m)	D_W	(g)	(g/100mm)
15	2.3×3.3×1.5	2.5	5	— (210)	545	740	1.93	1.22	1.22	1.2	4	11
15	2.4×4.2×2.3	3.5	5	— (375)	1090	1370	4.90	2.66	2.66	1.587	10	23
20	2.6×4.5×3 3.5×6×4.5	4.5	7.5	1200 (600)	1760	2220	10.2	6.10	6.10	2	17	35
20	2.6×4.5×3 3.5×6×4.5	4.5	7.5	— (600)	1490	2150	9.9	6.10	6.10	1.587	19	35
25	3×5.5×3.5 3.5×6×4.5	6	10	1800 (800)	2830	3500	21.1	11.4	11.4	2.381	38	65
25	3×5.5×3.5 3.5×6×4.5	6	10	— (800)	2830	3500	21.1	11.4	11.4	2.381	38	65
40	3.5×6×4.5	7.5	15	2000 (1000)	5550	6600	49.5	25.6	25.6	3.175	70	105

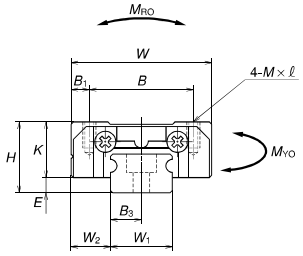
4) To fix rail of LU05TL, use M2 x 0.4 cross-recessed pan head machine screw for precision instrument.
(JCIS 10-70 No. 0 pan head machine screw No.1.)
(JCIS : Japanese Camera Industrial Standard.)
5) The basic dynamic load rating is a load that furnishes 50 km rating fatigue life; it is a vertical and constant load to the ball slide mounting surface. When converting the basic dynamic load rating C to the dynamic load rating C_{100} for 100 km rating fatigue life, divide the C by 1.26.

LU-BL (High-load type)
LU-UL (High-load type, large mounting hole)

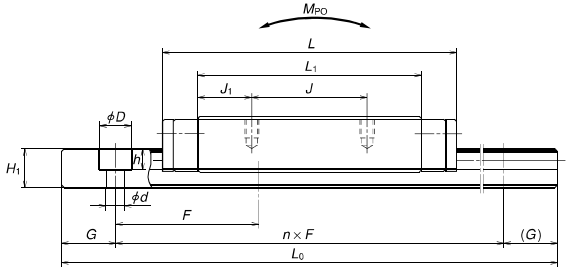
LU 12 0270 BL K 2 - P5 1**

- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A310)
- Material/surface treatment code (See Table 11)
- Number of ball slides per rail
- Added to the reference number. Design serial number
- Accuracy code (See Table 12)
- Preload code (See page A312)

Front view



Side view



Unit: mm

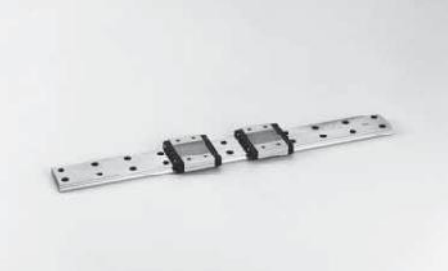
Model No.	Assembly			Ball slide									Rail		
	Height			Width	Length	Mounting hole							Width	Height	
	H	E	W_2	W	L	B	J	M×pitch×ℓ	B_1	L_1	J_1	K	W_1	H_1	
LU09BL	10	2.2	5.5	20	41	15	16	M2×0.4×2.5	2.5	31.2	7.6	7.8	9	5.5	
LU09UL								M3×0.5×3							
LU12BL	13	3	7.5	27	47.5	20	20	M2.5×0.45×3	3.5	35.3	7.65	10	12	7.5	
LU12UL								M3×0.5×3.5							
LU15BL	16	4	8.5	32	61	25	25	M3×0.5×4	3.5	44.4	9.7	12	15	9.5	

Pitch	Rail				Basic load rating					Ball dia.	Weight	
	Mounting bolt hole	B_3	G	Max. length L_{DMAX} ( ) for stainless	Dynamic	Static	Static moment				Ball slide	Rail
F	d×D×h		(Reference)		C (N)	C_0 (N)	M_{RO} (N · m)	M_{PO} (N · m)	M_{YO} (N · m)	D_W	(g)	(g/100mm)
20	2.6×4.5×3 3.5×6×4.5	4.5	7.5	1200 (600)	2600	3900	17.9	17.2	17.2	2	29	35
25	3×5.5×3.5 3.5×6×4.5	6	10	1800 (800)	4000	5700	34.5	28.3	28.3	2.381	59	65
40	3.5×6×4.5	7.5	15	2000 (1000)	8100	11300	84.5	69.5	69.5	3.175	107	105

Remarks 1) LU09UL is available only in stainless steel.
2) LU15BL is equipped with ball retainer.

3) The basic dynamic load rating is a load that furnishes 50 km rating fatigue life; it is a vertical and constant load to the ball slide mounting surface. When converting the basic dynamic load rating C to the dynamic load rating C_{100} for 100 km rating fatigue life, divide the C by 1.26.

A-5-3.4 LE Series
(Miniature type)



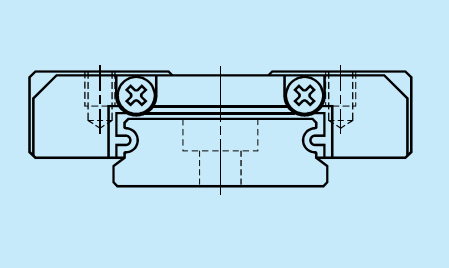


Fig. 1 LE Series

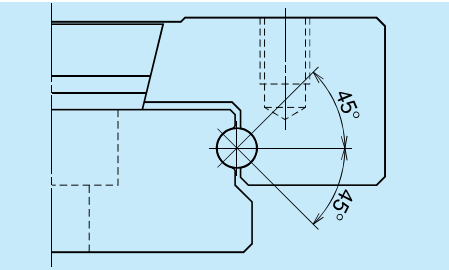


Fig. 2 Balls in contact

(1) Features

1. Ideal for use of single rail

LE Series linear guides are miniature and wide rail type. Thanks to the wide rail, load carrying capacity is high against moment load from rolling direction.

2. Equal load carrying capacity in vertical and lateral directions

Contact angle is set at 45 degrees, equally dispersing the load from vertical and lateral directions. This also provides equal rigidity in the two directions.

3. Guides are super-thin.

Super-thin guides owe their design to the single ball groove on right and left sides (Gothic arch).

4. High accuracy

Fixing the master rollers is easy thanks to the Gothic arch groove. Groove measuring is accurate and easy.

5. Stainless steel is standard.

Rails and ball slides are made of martensitic stainless steel.

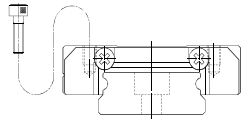
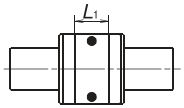
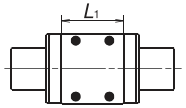
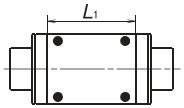
6. Ball retainer is available in some series.

Some series come with a ball retainer (ball slide model: AR and TR). Balls are retained in the retainer and do not fall out when a ball slide is withdrawn from the rail (random-maching ball slides come with a ball retainer).

7. Fast delivery

The series enables random matching of rails and ball slides (interchangeability) for prompt delivery. (LE09 to LE15)

(2) Ball slide shape

Ball slide Model	Shape/installation method	Type		
		Medium-load type	Standard type	High-load type
AL TL AR TR BL UL CL SL		CL, SL 	AL, TL, AR, TR 	BL, UL 

Specification	Detail	Type		
Mounting hole	Normal	CL*	AL, AR	BL*
	Large	SL*	TL, TR	UL*
Ball retainer	Without	CL, SL	AL, TL	BL, UL
	With	—	AR, TR	—

* Only applicable to LE09

(3) Accuracy and preload

1. Runing parallelism tolerance

Table 1

Unit: μm

Rail length (mm) over	or less	Preloaded assembly type (not random matching) High precision P5	Precision grade P6	Normal grade PN	Random-matching type Normal grade PC
–	50	2	4.5	6	6
50	80	3	5	6	6
80	125	3.5	5.5	6.5	6.5
125	200	4	6	7	7
200	250	5	7	8	8
250	315	5	8	9	9
315	400	6	9	11	11
400	500	6	10	12	12
500	630	7	12	14	14
630	800	8	14	16	16
800	1000	9	16	18	18
1000	1250	10	17	20	20

2. Accuracy standard

The preloaded assembly types products have three accuracy grades; High precision P5, Precision P6, and Normal PN grades, while the random-matching type has Normal PC grade.
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

Table 2 Unit: μm

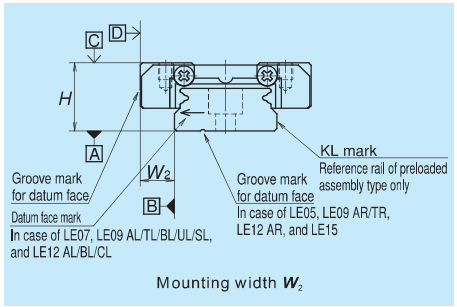
Characteristics \ Accuracy grade	High precision P5	Precision grade P6	Normal grade PN
Mounting height ***H***	±15	±20	±40
Variation of ***H*** (All ball slides on a set of rails)	7	15	25
Mounting width W_2 or W_3	±20	±30	±50
Variation of W_2 or W_3 (All ball slides on reference rail)	10	20	30
Running parallelism of face C to face A Running parallelism of face D to face B	Refer to Table 1 and Fig. 3		

• Tolerance of random-matching type: Normal grade, PC

Table 3 Unit: μm

Characteristics \ Accuracy grade	Normal grade PC
Mounting height ***H***	±20
Variation of mounting height ***H***	40
Mounting width W_2 or W_3	±20
Variation of mounting width W_2 or W_3	40
Running parallelism of face C to face A Running parallelism of face D to face B	Refer to Table 1 and Fig. 3

3. Assembled accuracy



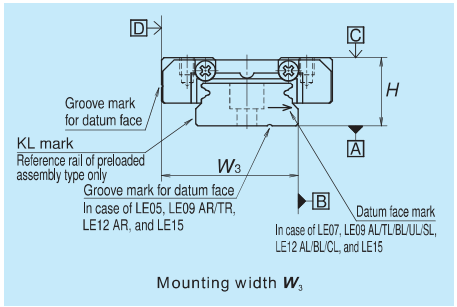


Fig. 3

4. Preload and rigidity

We offer three levels of preload: Slight preload (Z1) and Fine clearance (Z0), along with random-matching type of Fine clearance (ZT). Values for preloaded 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) Slight preload (Z1)	Rigidity (N/μm) Slight preload (Z1)
Sutandard type	LE05 AL	0 – 23	36
	LE07 TL	0 – 29	46
	LE09 AL, TL, AR, TR	0 – 37	61
	LE12 AL, AR	0 – 40	63
	LE15 AL, AR	0 – 49	66
Medium-load type	LE05 CL	0 – 18	29
	LE07 SL	0 – 16	28
	LE09 CL, SL	0 – 21	33
	LE12 CL	0 – 23	36
	LE15 CL	0 – 29	44
High-load type	LE07 UL	0 – 43	71
	LE09 BL, UL	0 – 54	86
	LE12 BL	0 – 59	97
	LE15 BL	0 – 75	114

Note: Clearance of fine clearance Z0 is 0 to 3 μm. Therefore, preload is zero.
However, Z0 of PN grade is 3 to 10 μm.
Clearance values of the random-matching type are shown in Table 5.

• Clearance of random-matching type

Table 5 Unit: μm

Model No.	Fine clearance ZT
LE09	0 – 15
LE12	
LE15	

(4) Available length of rail

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

Table 6 limitations of rail length (single rail) Unit: mm

Series	Material \ Size	05	07	09	12	15
LE	Stainless steel	150	600	800	1000	1200

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

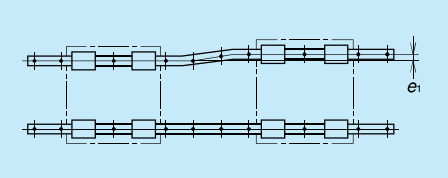


Fig. 4

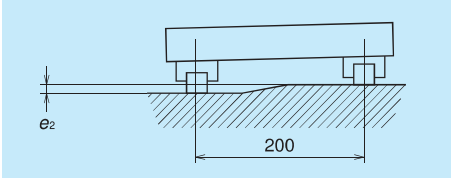


Fig. 5

Table 7

Unit: μm

Value	Preload	Model No.				
		LE05	LE07	LE09	LE12	LE15
Permissible values of parallelism in two rails e_1	Z0, ZT	10	12	15	18	22
	Z1	5	7	10	13	17
Permissible values of parallelism (height) in two rails e_2	Z0, ZT	50 μm/200 mm				
	Z1	35 μm/200 mm				

2. Shoulder height of the mounting face and corner radius r

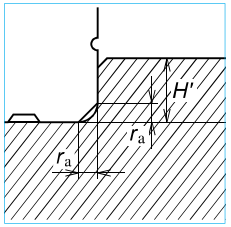


Fig. 6 Shoulder for the rail datum face

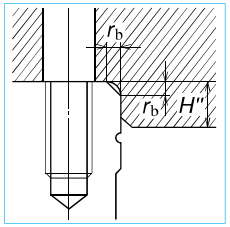


Fig. 7 Shoulder for the ball slide datum face

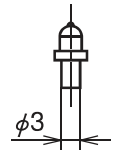
Table 8

Unit: mm

Model No.	Corner radius (maximum)		Shoulder height	
	r_a	r_b	H'	H''
LE05	0.2	0.2	1.1	2
LE07	0.2	0.3	1.7	3
LE09	0.3	0.3	3.5	3
LE12	0.3	0.3	3.5	4
LE15	0.3	0.5	3.5	5

(6) Lubrication accessories

LE15 AR can select drive-in type grease fitting as option.
There is no standard grease fitting for LE05 to 12.
For LE05 to 15, apply grease directly to ball groove, etc. using a point nozzle.



Drive-in type

(7) Dust proof components

1. Standard specification

End seal: Provided to both ends of the 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
LE	0.4	0.4	0.8	1.0	1.2

2. NSK K1™

The dimension of linear guides equipped with NSK K1 are shown in Table 10.

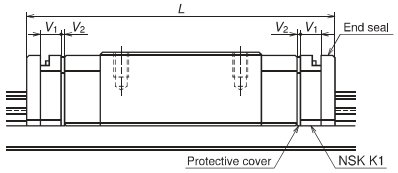


Table 10

Unit: mm

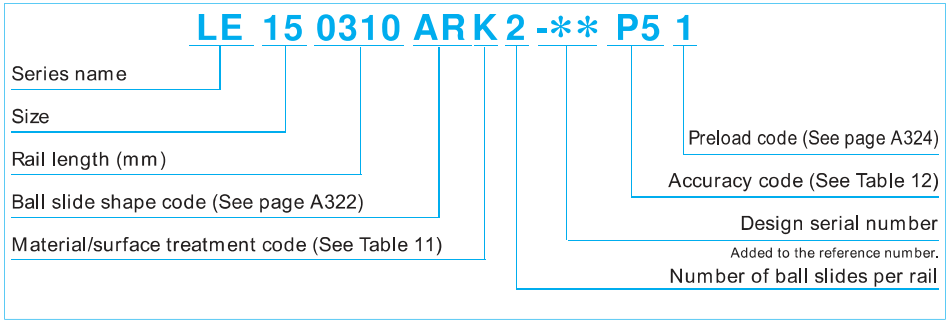
Model No.	Ball slide length	Ball slide model	Standard ball slide length	Ball slide length installed with two NSK K1 *L*	Per NSK K1 thickness V_1	[illegible] V_2
LE07	Standard	TL	31	37	2.5	0.5
	Long	UL	42	48		
	Short	SL	22.4	28.4		
LE09	Standard	AL, TL	39	46	3.0	0.5
	Standard	AR, TR	39.8	46.8		
	Long	BL, UL	50.4	57.4		
	Short	CL, SL	26.4	33.4		
LE12	Standard	AL	44	52	3.5	0.5
	Standard	AR	45	53		
	Long	BL	59	67		
	Short	CL	30.5	38.5		
LE15	Standard	AL	55.0	64.6	4.0	0.8
	Standard	AR	56.6	66.2		
	Long	BL	74.4	84		
	Short	CL	41.4	51		

Note: Ball slide length equipped with NSK K1 =
(Standard ball slide length) + (Thickness of NSK K1, V_1 × Number of NSK K1) + (Thickness of the protective cover V_2 × 2)

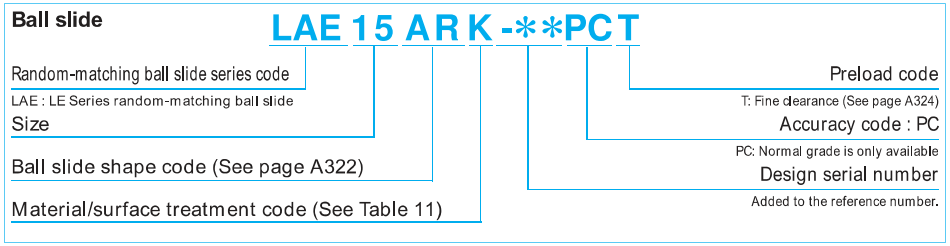
(8) Reference number

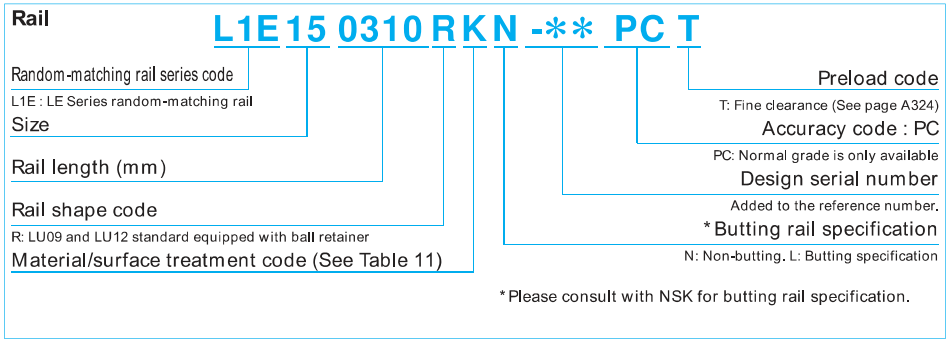
Reference numbers shall be set to individual NSK linear guide when its specifications are finalized, and it is indicated on its specification drawing.
Please specify the reference number, except design serial number, to identify the product when ordering, requiring estimates, or inquiring about specifications from NSK.

1. Reference number for preloaded assembly



2. Reference number for random-matching type





Reference number for assembly of random-matching ball slide and rail is the same as the coding of preloaded assembly. However, preload code is fine clearance "T" (Refer to page A324).

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
High precision grade	P5	K5
Precision grade	P6	K6
Normal grade	PN	KN
Normal grade (random-matching type)	PC	KC

Note: Refer to Page A38 for NSK K1 lubrication unit.

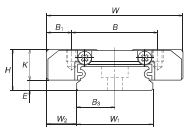
(9) Dimensions

LE-AL
LE-TL (Large mounting hole)
LE-AR (With ball retainer)
LE-TR (Large mounting hole, with ball retainer)

LE 15 0310 AR K 2 - ** P5 1**

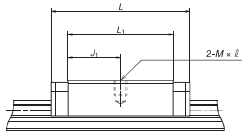
- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A322)
- Material/surface treatment code (See Table 11)
- Number of ball slides per rail
- Design serial number (Added to the reference number.)
- Accuracy code (See Table 12)
- Preload code (See page A324)

Front view

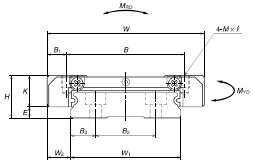


LE05, 07, 09, 12

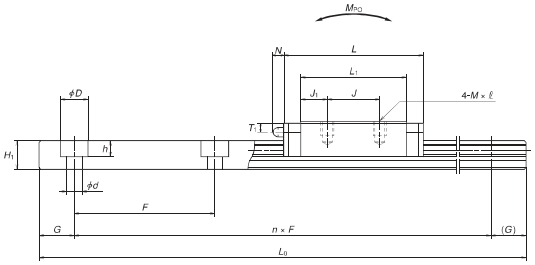
Side view



LE05



LE15



LE07, 09, 12, 15

Model No.	Assembly			Ball slide									Grease fitting			Width	Height
	Height			Width	Length	Mounting hole							Hole size				
	H	E	W_2	W	L	B	J	$M \times \text{pitch} \times \ell$	B_3	L_1	J_1	K		T_3	N	W_1	H_1
LE05AL	6.5	1.4	3.5	17	24	13	—	M2.5×0.45×2	2	17	8.5	5.1	—	—	—	10	4
LE07TL	9	2	5.5	25	31	19	10	M3×0.5×3	3	21.2	5.6	7	—	—	—	14	5.2
LE09AL LE09TL	12	4	6	30	39	21	12	M2.6×0.45×3 M3×0.5×3	4.5	27.6	7.8	8	—	—	—	18	7.5
LE09AR LE09TR	12	4	6	30	39.8	21	12	M2.6×0.45×3 M3×0.5×3	4.5	27.6	7.8	8	—	—	—	18	7.5
LE12AL LE12AR	14	4	8	40	44 45	28	15	M3×0.5×4	6	31	8	10	—	—	—	24	8.5
LE15AL LE15AR	16	4	9	60	55 56.6	45	20	M4×0.7×4.5	7.5	38.4	9.2	12	— ϕ3	— 3.2	— 3	42	9.5

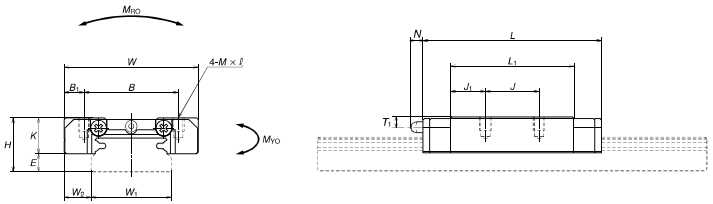
Remarks: 1) Ball slide of LE05 has only two mounting tap holes.

Random matching with retainer: AR, TR.
Reference number for ball slide of random-matching type

LAE-AR (With ball retainer)
LAE-TR (Large mounting hole with ball retainer)

Ball slide **LAE 15 AR K -**PCT**

- Random-matching ball slide series code (LAE : LE Series random-matching ball slide)
- Size
- Ball slide shape code (See page A322)
- Material/surface treatment code (See Table 11)
- Preload code (T: Fine clearance (See page A324))
- Accuracy code : PC (PC: Normal grade is only available)
- Design serial number (Added to the reference number.)

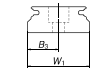


Reference number for rail of random-matching type

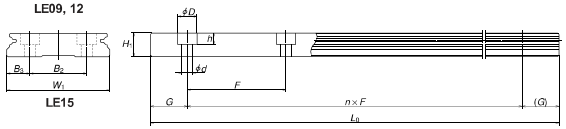
Rail **L1E 15 0310 R K N -** ** PC T**

- Random-matching rail series code (L1E : LE Series random-matching rail)
- Size
- Rail length (mm)
- Rail shape code (R: LU09 and LU12 standard equipped with ball retainer)
- Material/surface treatment code (See Table 11)
- *Butting rail specification (N: Non-butting. L: Butting specification)
- Design serial number (Added to the reference number.)
- Accuracy code : PC (PC: Normal grade is only available)
- Preload code (T: Fine clearance (See page A324))

*Please consult with NSK for butting rail specification.



LE09, 12



LE15

Unit: mm

Rail							Basic load rating					Ball dia.	Weight	
	Pitch	Mounting bolt hole		G	Max. length		Dynamic	Static	Static moment				Ball slide	Rail
B_2	F	$d \times D \times h$	B_3	(Reference)	$L_{0\max}$		C (N)	C_0 (N)	M_{RO} (N·m)	M_{PO} (N·m)	M_{YO} (N·m)	D_w	(g)	(g/100mm)
—	20	3×5×1.6	5	7.5	150		725	1110	5.65	2.58	2.58	1.200	11	34
—	30	3.5×6×3.2	7	10	600		1580	2350	16.7	7.20	7.20	1.587	25	55
—	30	3.5×6×4.5	9	10	800		3000	4500	36.5	17.3	17.3	2.000	40	95
—	30	3.5×6×4.5	9	10	800		3000	4500	36.5	17.3	17.3	2.000	40	95
—	40	4.5×8×4.5	12	15	1000		4350	6350	70.5	29.3	29.3	2.381	75	140
23	40	4.5×8×4.5	9.5	15	1200		7600	10400	207	59.0	59.0	3.175	150	275

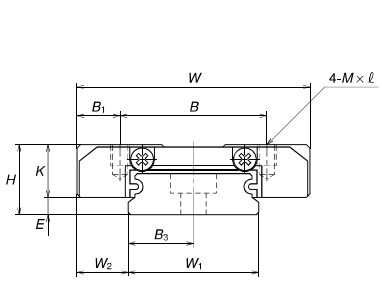
2) The basic dynamic load rating is a load that furnishes 50 km rating fatigue life; it is a vertical and constant load to the ball slide mounting surface.
3) When converting the basic dynamic load rating C to the dynamic load rating C_{100} for 100 km rating fatigue life, divide the C by 1.26.
For fixing a rail of LE05AL, use M2.5x0.45 cross-recessed pan head machine screw for precision instruments.
(JCIS 10-70 : No.0 pan head machine screw No.3) (JCIS : Japanese Camera Industrial Standard)

LE-BL (High-load type)
LE-UL (High-load type, large mounting hole)

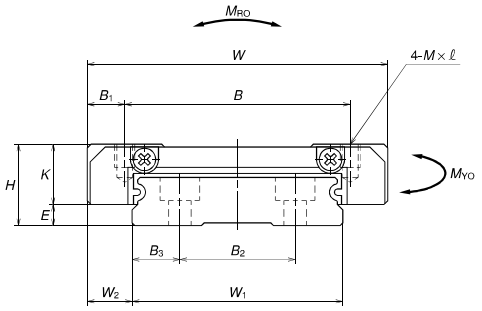
LE 15 0310 ARK 2 - ** P5 1**

- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A322)
- Material/surface treatment code (See Table 11)
- Number of ball slides per rail
- Design serial number (Added to the reference number.)
- Accuracy code (See Table 12)
- Preload code (See page A324)

Front view

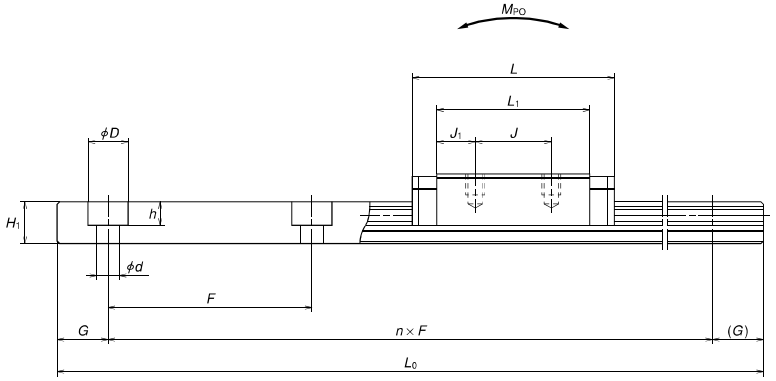


LE07, 09, 12



LE15

Side view



Unit: mm

Model No.	Assembly			Ball slide									Width	Height
	Height			Width	Length	Mounting hole								
	H	E	W_2	W	L	B	J	$M \times \text{pitch} \times \ell$	B_1	L_1	J_1	K	W_1	H_1
LE07UL	9	2	5.5	25	42	19	19	M3×0.5×3	3	32.2	6.6	7	14	5.2
LE09BL **LE09UL**	12	4	6	30	50.4	23	24	M2.6×0.45×3 M3×0.5×3	3.5	39	7.5	8	18	7.5
LE12BL	14	4	8	40	59	28	28	M3×0.5×4	6	46	9	10	24	8.5
LE15BL	16	4	9	60	74.4	45	35	M4×0.7×4.5	7.5	57.8	11.4	12	42	9.5

Rail						Basic load rating					Ball dia.	Weight	
	Pitch	Mounting bolt hole		G	Max. length	Dynamic	Static	Static moment				Ball slide	Rail
B_2	F	$d \times D \times h$	B_3	(Reference)	$L_{0\max}$	C (N)	C_0 (N)	M_{RO} (N·m)	M_{PO} (N·m)	M_{YO} (N·m)	D_W	(g)	(g/100mm)
—	30	3.5×6×3.2	7	10	600	2180	3700	26.4	17.3	17.3	1.587	39	55
—	30	3.5×6×4.5	9	10	800	4000	6700	54.5	37.5	37.5	2.000	58	95
—	40	4.5×8×4.5	12	15	1000	5800	9550	106	63.5	63.5	2.381	115	140
23	40	4.5×8×4.5	9.5	15	1200	10300	16000	320	135	135	3.175	235	275

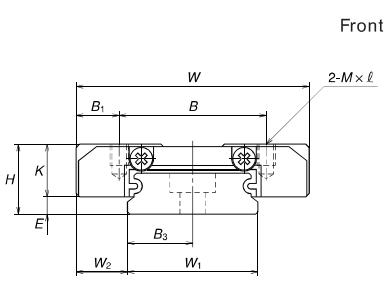
Remark: The basic dynamic load rating is a load that furnishes 50 km rating fatigue life; it is a vertical and constant load to the ball slide mounting surface.
When converting the basic dynamic load rating C to the dynamic load rating C_{100} for 100 km rating fatigue life, divide the C by 1.26.

LE-CL (Medium-load type)
LE-SL (Medium-load type, large mounting hole)

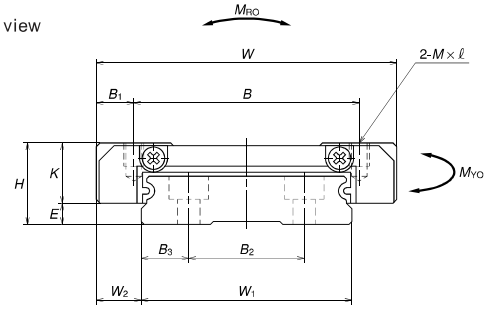
LE 15 0310 ARK 2 - P5 1**

- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A322)
- Material/surface treatment code (See Table 11)
- Number of ball slides per rail
- Design serial number (Added to the reference number.)
- Accuracy code (See Table 12)
- Preload code (See page A324)

Front view

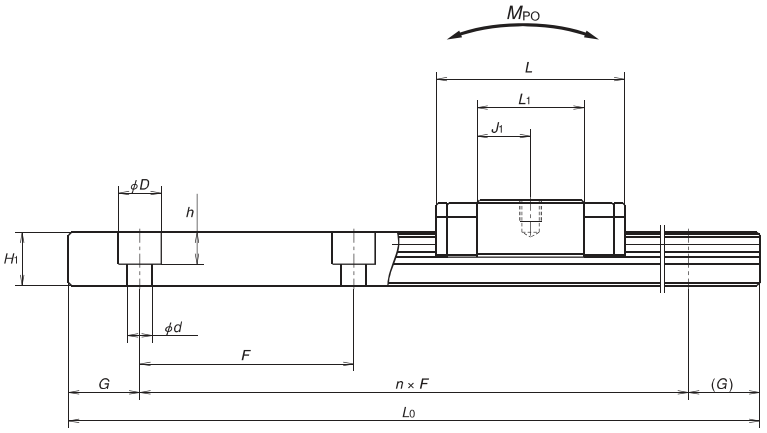


LE05, 07, 09, 12



LE15

Side view



Unit: mm

Model No.	Assembly			Ball slide									Width	Height
	Height			Width	Length	Mounting hole								
	H	E	W_2	W	L	B	J	M × pitch × ℓ	B_1	L_1	J_1	K	W_1	H_1
LE05CL	6.5	1.4	3.5	17	20	13	—	M2.5×0.45×2	2	13	6.5	5.1	10	4
LE07SL	9	2	5.5	25	22.4	19	—	M3×0.5×3	3	12.6	6.3	7	14	5.2
LE09CL **LE09SL**	12	4	6	30	26.4	21	—	M2.6×0.45×3 M3×0.5×3	4.5	15	7.5	8	18	7.5
LE12CL	14	4	8	40	30.5	28	—	M3×0.5×4	6	17.5	8.75	10	24	8.5
LE15CL	16	4	9	60	41.4	45	—	M4×0.7×4.5	7.5	24.8	12.4	12	42	9.5

Model No.	Rail						Basic load rating					Ball dia.	Weight	
	Pitch	Mounting bolt hole		G	Max. length		Dynamic	Static	Static moment				Ball slide	Rail
B_2	F	d × D × h	B_3	(Reference)	L_{0max}		C (N)	C_0 (N)	M_{RO} (N·m)	M_{PO} (N·m)	M_{YO} (N·m)	D_W	(g)	(g/100mm)
—	20	3×5×1.6	5	7.5	150		595	835	4.25	1.51	1.51	1.200	8	34
—	30	3.5×6×3.2	7	10	600		980	1170	8.35	2.01	2.01	1.587	17	55
—	30	3.5×6×4.5	9	10	800		1860	2240	18.2	4.85	4.85	2.000	25	95
—	40	4.5×8×4.5	12	15	1000		2700	3150	35.0	8.15	8.15	2.381	50	140
23	40	4.5×8×4.5	9.5	15	1200		5000	5650	113	19.4	19.4	3.175	110	275

Remarks: 1) Ball slide of CL and SL types have only two mounting tap holes in the center.

2) The basic dynamic load rating is a load that furnishes 50 km rating fatigue life; it is a vertical and constant load to the ball slide mounting surface. When converting the basic dynamic load rating C to the dynamic load rating C_{100} for 100 km rating fatigue life, divide the C by 1.26

3) For fixing a rail of LE05CL, use cross-recessed pan head machine screw for precision instruments M2.5x0.45 (JCIS 10-70 : Japan Camera Industry Association, No.0, class 3).