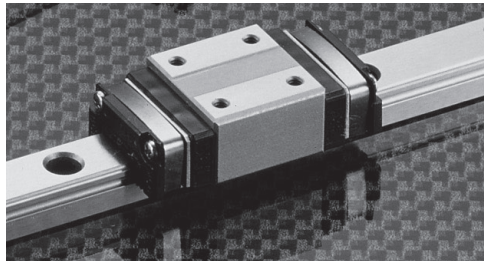
A-5-2.5 Miniature LH Model



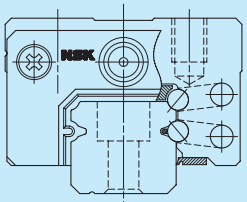


Fig. 1 LH Model

1. Features

(1) High self-aligning capability (rolling direction)

Similar to a DF arrangement of angular contact bearings, Miniature LH models offer large self-aligning capability with the internal intersection of the contact lines of the balls and grooves reducing moment rigidity.
This increases the capacity to absorb errors in installation.

(2) High vertical load carrying capacity

The contact angle is set at 50 degrees, thus increasing load carrying capacity as well as rigidity in the vertical direction.

(3) High resistance against impact load

The bottom ball groove forms a Gothic arch and the center of the top and bottom grooves are offset as shown in **Fig. 2**.
Vertical load is generally carried by the top rows at two contact points, but with this design, the bottom rows also carry load when a large impact load is applied vertically as shown in **Fig. 3**. This assures high resistance to impact load.

(4) High accuracy

As shown in **Fig. 4**, fixing the master rollers to the ball grooves is easy thanks to the Gothic arch groove. This makes for easy and accurate measuring of ball grooves.

(5) High corrosion resistance

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

(6) Easy to handle

Safe design includes a retainer that prevents steel balls from dropping out of the ball slide even when the slide is removed from the rail. (LH10-12)

(7) Long-term maintenance-free

Superb features of the NSK K1 lubrication unit realize long-term, maintenance-free operation.

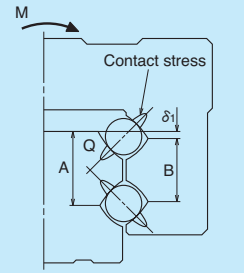


Fig. 2 Enlarged illustration of the offset Gothic arch groove

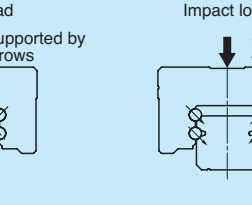


Fig. 3 When load is applied

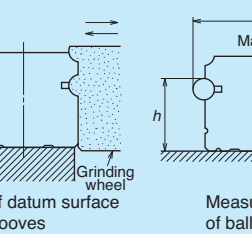
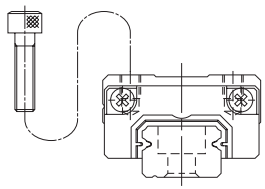
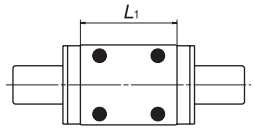


Fig. 4 Rail grinding and measuring

2. Ball slide shape

Ball slide shape code	Shape/installation method	Type
AN		AN 

3. Accuracy and preload

(1) Running parallelism of ball slide

Table 1 Unit: μm

Rail length (mm) over	or less	Preloaded assembly: Super precision P4	High precision P5	Precision grade P6	Normal grade PN
–	50	2	2	4.5	6
50	80	2	3	5	6
80	125	2	3.5	5.5	6.5
125	200	2	4	6	7
200	250	2.5	5	7	8
250	315	2.5	5	8	9
315	400	3	6	9	11
400	500	3	6	10	12
500	630	3.5	7	12	14
630	800	4.5	8	14	16

(2) Accuracy standard

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

• **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	±20	±40	±80
Variation of H (All ball slides on a set of rails)	3	5	7	15
Mounting width W_2 or W_3	±10	±15	±25	±50
Variation of W_2 or W_3 (All ball slides on reference rail)	5	7	10	20
Running parallelism of surface C to surface A Running parallelism of surface D to surface B	Shown in **Table 1**, **Fig. 5**			

(3) Combinations of accuracy and preload

Table 3

		Accuracy grade			
		Super precision	High precision	Precision grade	Normal grade
Without NSK K1 lubrication unit		P4	P5	P6	PN
With NSK K1 lubrication unit		K4	K5	K6	KN
With NSK K1 for food and medical equipment		F4	F5	F6	FN
Preload	Fine clearance Z0	○	○	○	○
	Slight preload Z1	○	○	○	○

(4) Assembled accuracy

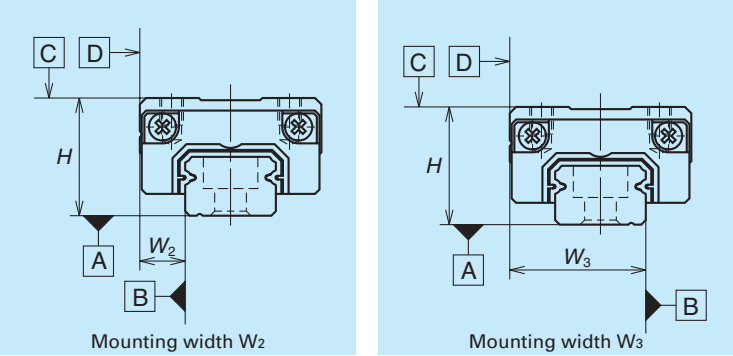


Fig. 5

(5) Preload and rigidity

We offer two levels of preload: Slight preload Z1 and Fine clearance Z0.

• **Preload and rigidity of preloaded assembly**

Table 4

Model No.	Preload (N)	Rigidity (N/μm)	
		Vertical direction	Lateral direction
	Slight preload Z1	Slight preload Z1	Slight preload Z1
LH08AN	5	33	23
LH10AN	9	44	31
LH12AN	22	68	47

Note: Clearance for Fine clearance Z0 is 0 to 3μm. Therefore, preload is zero. However, Z0 of PN grade is 0 to 5μm.

4. Maximum rail length

Table 5 shows the limitations of rail length (maximum length). However, the limitations vary by accuracy grades.

Table 5 Length limitations of rails

Unit: mm

Model	Size / Material	08	10	12
LH	Stainless steel	375	600	800

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

5. Installation

(1) Permissible values of mounting error

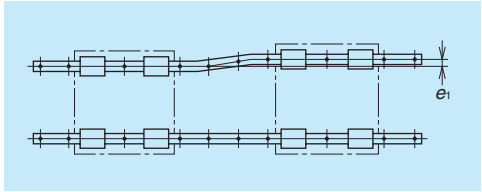


Fig. 6

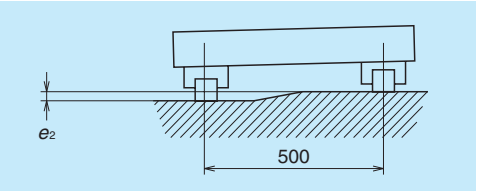


Fig. 7

Table 6

Unit: μm

Value	Preload	Model No.		
		LH08	LH10	LH12
Permissible values for parallelism error of two rails e_1	Z0	9	12	19
	Z1	8	11	18
Permissible values for height error of two rails e_2	Z0	375μm/500mm		
	Z1	330μm/500mm		

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

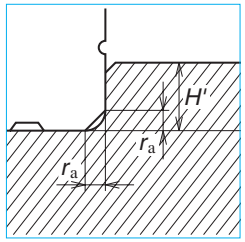


Fig. 8 Shoulder for the rail datum surface

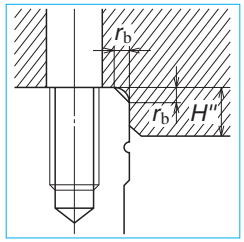


Fig. 9 Shoulder for the ball slide datum surface

Table 7

Unit: mm

Model No.	Corner radius (maximum)		Shoulder height	
	r_a	r_b	H'	H''
LH08	0.3	0.5	1.8	3
LH10	0.3	0.5	2.1	4
LH12	0.5	0.5	2.7	4

6. Lubrication accessory

Model LH12 can use drive-in grease fittings as an option.
For models LH08 to LH10, apply grease directly to the ball grooves of rail using a point nozzle.

Fig. 10

7. Dust-resistant components

(1) Standard specification

Under normal applications, the LH model can be used without modification thanks to its dust resistance. As standard equipment, the ball slides have an end seal on both ends and bottom seals at the bottom.
However, bottom seals are not used with LH08 and 10.

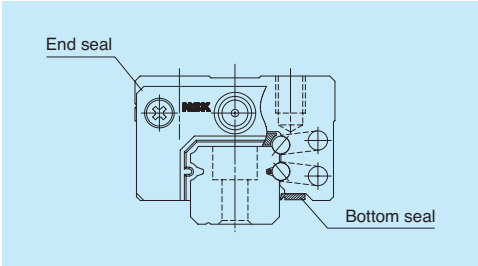


Fig. 11

Table 8 Seal friction per ball slide (maximum value)

Unit: N

Model \ Size	08	10	12
LH	0.5	1	1.5

(2) NSK K1™ lubrication unit

Table 9 shows the dimensions of linear guides equipped with NSK K1 lubrication units.

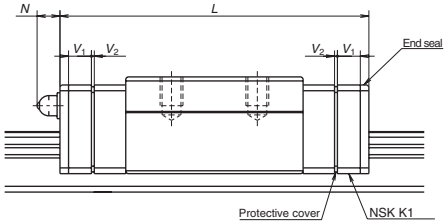


Table 9 Dimensions when equipped with NSK K1 lubrication units Unit: mm

Model No.	Ball slide length	Ball slide shape code	Standard ball slide length	Ball slide length with two NSK K1 installed L	Thickness of single NSK K1 V_1	Protective cover thickness V_2	Protrusion of grease fitting N
LH08	Standard	AN	24	31	3	0.5	—
LH10	Standard	AN	31	40	4	0.5	—
LH12	Standard	AN	45	54	4	0.5	(4)

Notes: 1) NSK K1 for food processing machinery/medical equipment are available for LH12.
2) Slide length when equipped with NSK K1 = (standard ball slide length) + (V_1 thickness of single NSK K1 unit) × (number of K1 units) + (V_2 thickness of the protective cover) × 2.

(3) Caps to plug the rail mounting bolt hole

Table 10 Caps to plug rail bolt hole

Model No.	Bolt to secure rail	Cap reference No.	Quantity /case
LH12	M3	LG-CAP/M3	20

8. Reference number

A reference number (designation) is set and indicated on the specification drawing for an individual NSK linear guide when its specifications are finalized.
Please specify the reference number, except design serial number, to identify the product when ordering, requiring estimates, or inquiring about specifications from NSK.

(1) Reference number for preloaded assembly

LH 12 0800 AN K 2 - ** **P5 1**

- Model name
- Size
- Rail length (mm)
- Ball slide shape code (See page A234.)
- Material/surface treatment code (See Table 11.)
  K: Stainless steel
- Number of ball slides per rail
- Design serial number
  Added to the reference number.
- Accuracy code (See Table 12.)
- Preload code (See page A235.)
  0: Z0, 1: Z1

Table 11 Material/surface treatment code

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

Table 12 Accuracy code

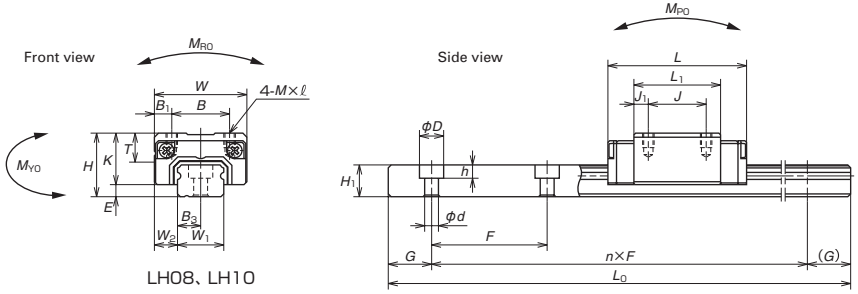
Accuracy	Standard (Without NSK K1)	With NSK K1	With NSK K1 for food and medical equipment
Super precision grade	P4	K4	F4
High precision grade	P5	K5	F5
Precision grade	P6	K6	F6
Normal grade	PN	KN	FN

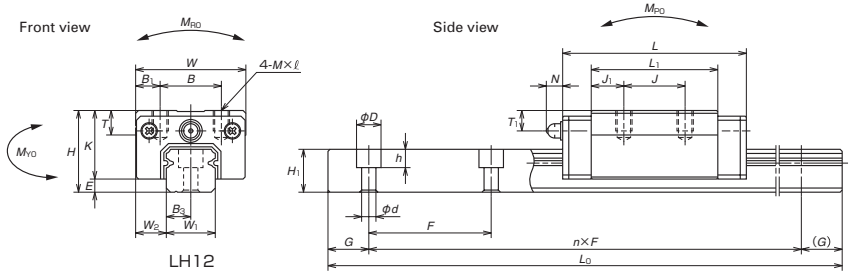
Note: Refer to pages A38 and A61 for details on NSK K1 lubrication units.

9. Dimensions

LH 12 0800 AN K 2 - P5 1**

- Model name
- Size
- Rail length (mm)
- Ball slide shape code (See page A234.)
- Material/surface treatment code (See Table 11.)
  K: Stainless steel
- Number of ball slides per rail
- Design serial number
  Added to the reference number.
- Accuracy code (See Table 12.)
- Preload code (See page A235.)
  0: Z0, 1: Z1





Unit: mm

Model No.	Assembly			Ball slide											Rail				Basic load ratings								Weight	
	Height			Width	Length	Mounting hole						Grease fitting			Width	Height	Pitch	Mounting bolt hole	G	Max. length	2)Dynamic		Static	Static moment (N·m)					Ball slide	Rail
																					[50km]	[100km]								
	H	E	W_2	W	L	B	J	M × pitch × ℓ	L_1	K	T	Hole size	T_1	N	W_1	H_1	F	d × D × h	(reference)	L_{0max}	C_{50}(N)	C_{100}(N)	C_0 (N)	M_{RO}	M_{PO} One slide	M_{PO} Two slides	M_{YO} One slide	M_{YO} Two slides	(g)	(g/100 mm)
LH08AN	11	2.1	4	16	24	10	10	M2×0.4×2.5	15	8.9	—	—	—	—	8	5.5	20	2.4×4.2×2.3	7.5	375	1 240	985	2 630	7.25	4.55	32.5	3.8	27.2	13	31
LH10AN	13	2.4	5	20	31	13	12	M2.6×0.45×3	20.2	10.6	6	—	—	—	10	6.5	25	3.5×6×3.5	10	600	2 250	1 790	4 500	16.2	10.5	73.0	8.8	61.0	26	44
LH12AN	20	3.2	7.5	27	45	15	15	M4×0.7×5	31	16.8	6	ϕ3	5	4	12	10.5	40	3.5×6×4.5	15	800	5 650	4 500	11 300	47.5	41.5	254	35	214	82	88

Notes: 1) LH08 does not have a ball retainer. Note that balls will fall out when the ball slide is removed from the rail.

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