

A-I -8 Linear Guides New Series

A-I -8.1 NSK Linear Guides Miniature LH Series

(1) Features

- A Large self-aligning property • Capable of high mounting error absorption.
- A High vertical load capacity • 50° contact angle enlarges vertical load capacity and rigidity.
- A Withstands high impact load • Offset Gothic arch groove enables high impact resistance.
- A High corrosion resistance • High corrosion resistant martensitic stainless steel is used as standard material.
- A Easy handling • Ball retainer prevents balls from falling off the ball slide, even if a ball slide is taken out from the rail (#10 and 12).
- A Long term, maintenance • Optional NSK K1™ lubrication unit supports long term, maintenance-free operation.

(2) Specification Number

when making inquiries about liner guides of which specifications are not finalized yet, you may use the reference number coding system excluding the design serial number described below. The coding system finalizing the reference number as the product identification, we assign the design serial number and omit the last code (II) which refers to use two linear guides as a set for a motion axis. Please be advised that the reference number is only to identify the linear guide with one rail. When you use two linear guides as a set, order two identical linear guides in one reference number or specify reference numbers of each linear guide.

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

Series code					
Size No.					II : Two rails, No code: One rail
Rail length (mm)					Preload code Z0: Precise clearance Z1: Very light preload
Ball slide shape code					Accuracy grade PN: Normal P6: Precision P5: High precision P4: Super precision
Material and surface treatment code K: Stainless steel					Clearance symbol
Number of ball slides per rail					

* Please note that we assign the design number, and omit the last code (II) that indicates a use of two rails as a set to finalize the reference number as product identification.

(3) Rail Length

The maximum single rail length is shown in the following table. Two rails must be butted for longer lengths.

Table I -8 -1. Maximum rail length

	Unit: mm		
Size No.	08	10	12
Maximum rail length	375	600	800

(4) Accuracy Standard

Four accuracy grades are available: super precision P4, high precision P5, precision P6, and normal PN.

Table I -8 -2. Accuracy standard

Accuracy grade		Unit: μm			
		Super precision P4	High precision P5	Precision P6	Normal PN
Items					
Assembly height H		±10	±20	±40	±80
Variation of assembly height H (All slides on a pair of rails)		3	5	7	15
Assembly width dimension W ₂ or W ₃		±10	±15	±25	±50
Variation of assembly width dimension W ₂ or W ₃ (All slides on datum rails)		5	7	10	20
Running parallelism of face C against face A		See Fig. I -8 -1. and Fig. I -8 -2.			
Running parallelism of face D against face B		Refer to Table I -8 -3. for tolerance			

Table I -8 -3. Running parallelism of ball slide

Accuracy grade	Unit: μm			
	P4	P5	P6	PN
Total rail length (mm)				
Over ~ below 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

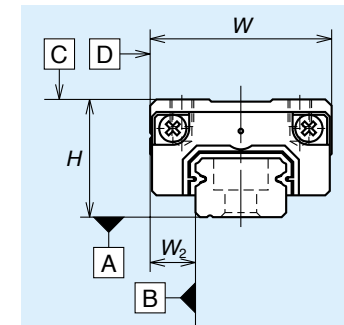


Fig. I -8 -1. Mounting width W₂ (Standard)

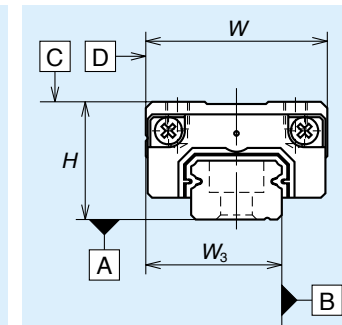


Fig. I -8 -2. Mounting width W₃ (Semi-standard)

(5) Preload and Clearance

This product is available with a slight preload, Z1, or a slight clearance, Z0 (0-3 microns of clearance for all accuracy grades except PN which has 0-5 microns of clearance).

Table I -8 -4. preload and rigidity

	Preload (N)	rigidity (N/ μm)	
		Vertical direction	Lateral direction
	Slight preload Z1	Slight preload Z1	Slight preload Z1
LH08	5	33	23
LH10	9	44	31
LH12	22	68	47

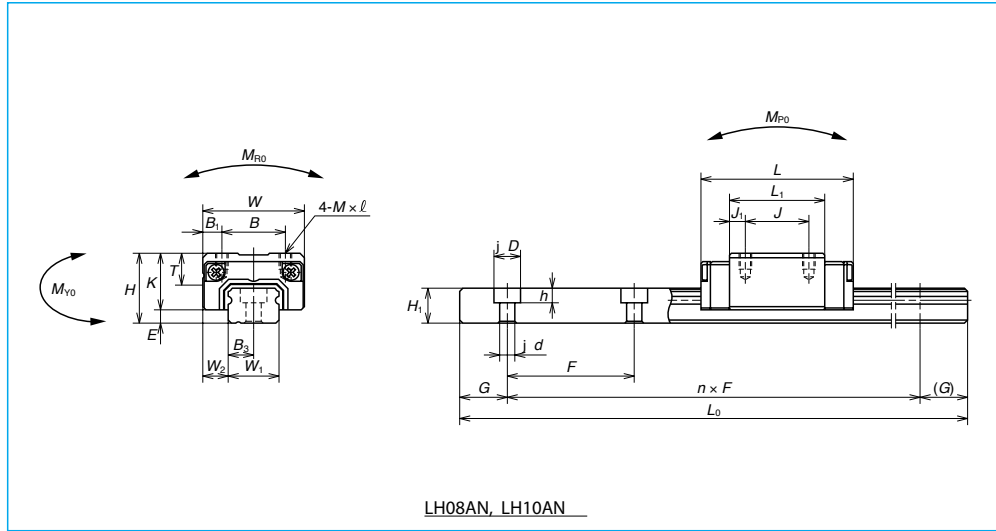
(6) Option

The NSK K1™ lubrication unit is available as an option. Refer to Table I -8 -5 for dimension of linear guides equipped with the NSK K1™.

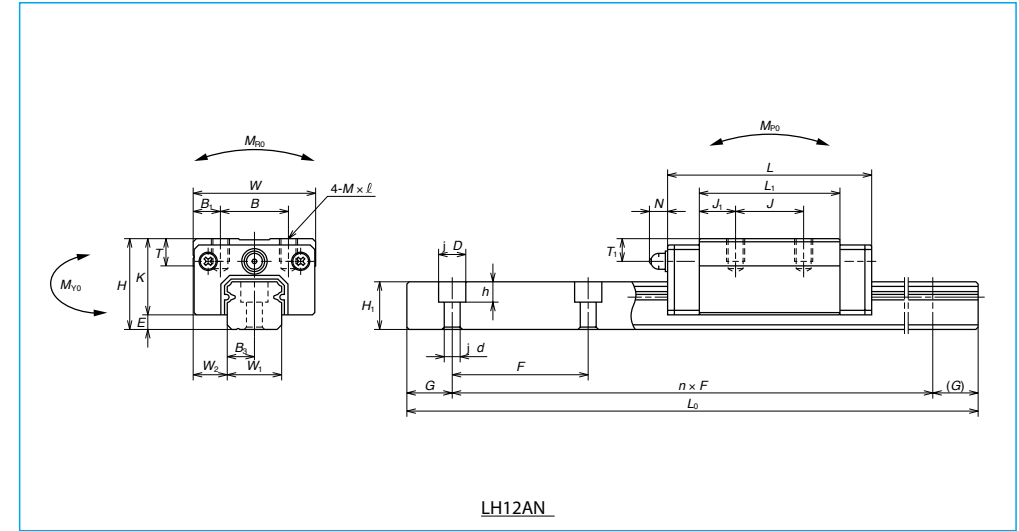
Table I -8 -5. Dimension of linear guides equipped with NSK K1™ Unit: μm

Model No.	Ball slide length equipped with two NSK K1s
LH08	31
LH10	40
LH12	54

(7) Dimensions of LH Series



LH08AN, LH10AN



LH12AN

Table I -8-6

Model No.	Assembly dimension			Ball slide dimension												
	Height H	E	W ₂	Width W	Length L	Tapped hole						Grease fitting				
						B	J	M × Pitch × l	B ₁	L ₁	J ₁	K	T	Mounting hole	T ₁	N
LH08AN	11	2.1	4	16	24	10	10	M2 × 0.4 × 2.5	3	15	2.5	8.9	-	-	-	-
LH10AN	13	2.4	5	20	31	13	12	M2.6 × 0.45 × 3	3.5	20.2	4.1	10.6	6	-	-	-
LH12AN	20	3.2	7.5	27	45	15	15	M4 × 0.7 × 5	6	31	8	16.8	6	φ3	5	4

Note: LH10 and LH12 are constructed with a ball retainer which prevents balls from falling out even if the bearing is taken out from the rail.

Unit: mm

Rail dimension							Basic load rating						Ball diameter	Weight	
Rail width W ₁	Rail height H ₁	Bolt pitch F	Bolt hole d × D × h	B ₃	G (std.)	Maximum length L _{max}	Dynamic C(N)	Static C ₀ (N)	Static moment (N · m)			D _w	Bearing (g)	Rail (g/100mm)	
									M _{RO}	M _{PO}	M _{VO}				
8	5.5	20	2.4 × 4.2 × 2.3	4	7.5	375	240	2630	7.3	4.5	3.8	1.2000	13	31	
10	6.5	25	3.5 × 6 × 3.5	5	10	600	2250	4500	16	10	8.8	1.5875	26	44	
12	10.5	40	3.5 × 6 × 4.5	6	15	800	5650	11300	47	42	35	2.3812	82	88	



A-1 -8.2 NSK Linear Guides HA Series

Unparalleled motion accuracy, rigidity, and load capacity—new HA Series Linear Guides open up new possibilities for machine tools. The HA Series is a new member of NSK's linear guide product line, long respected for its outstanding accuracy and reliability. NSK's exclusive design achieves the highest level of motion accuracy. High rigidity and high load capacity have also been achieved, leading to significant improvement in machine tool quality.



(1) Features

A High motion accuracy

High motion accuracy is achieved in both narrow and wide ranges by adopting ultra-long ball slides and new design features.

A Vibration caused by ball passage reduced to

one-third of our conventional models
The ultra-long ball slides and new design have reduced the vibration caused by ball passage to one-third of our conventional models, contributing to improved straightness of the table (based on the accuracy measurement of narrow range motion, compared with our conventional models).

A High rigidity and load capacity with low friction

High rigidity, high load capacity, and low friction are achieved by increasing the number of balls.

A Dust proof seals

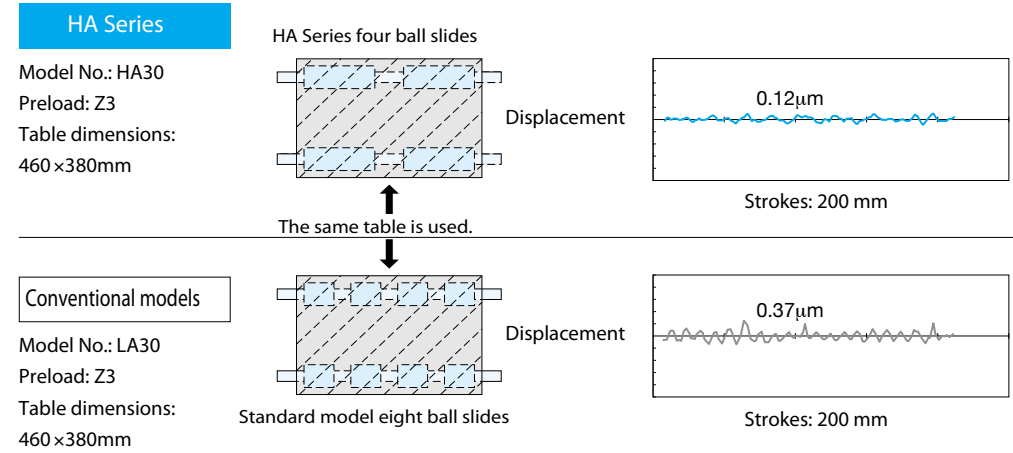
Dust-tight high performance end seals, bottom seals, and inner seals are built-in as standard features, facilitating long-term machining capability with high accuracy.

(2) Application

The series is most suitable for machining centers, high-precision lathes, and grinding machines due to its high motion accuracy. In addition, it is also suitable for discharge machines because of its low friction and high rigidity.

(3) Mechanism of the vibration caused by ball passage

By extending the effective ball slide length, NSK has minimized posture changes in ball slide due to the vibration caused by ball passage. In addition, the vibration has been substantially reduced by adopting an optimally designed crowning shape.



(4) High rigidity and load capacity with low friction

High rigidity and high load capacity are realized by a substantial increase in the number of balls.

For instance, compared with LA35, the HA30 features:

- A the same dynamic load rating, while being one size smaller
- A the same rigidity, while being two sizes smaller
- A 120% higher rigidity with one-sixth friction of LA35

Fig. I -8 - 3. Comparisons of dynamic load rating of HA and LA Series

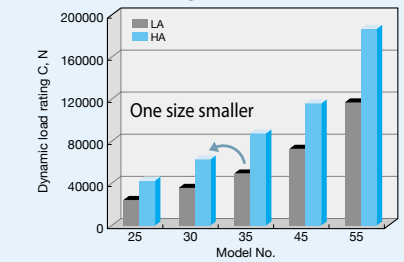


Fig. I -8 - 4. Comparisons of rigidity of HA and LA Series

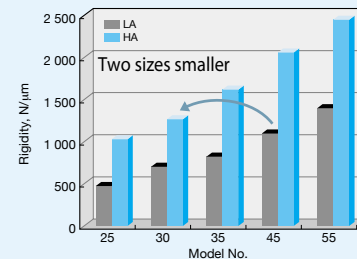
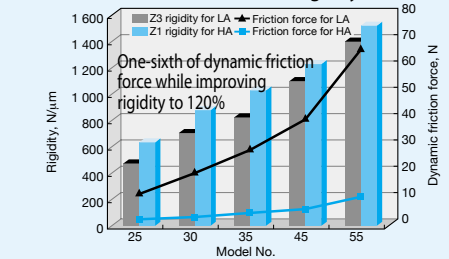
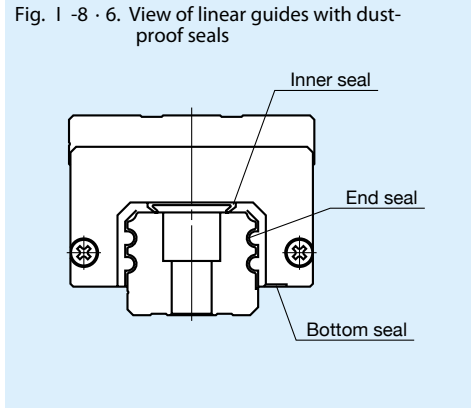


Fig. I -8 - 5. Comparisons of dynamic friction force and rigidity



(5) High dust proofing capability

Dust-tight high performance end seals, bottom seals, and inner seals are built-in as standard features, as shown in Fig. I -8 · 6. The design enables long-term machining capability with high accuracy.



(6) Long-term, maintenance-free operation

The NSK K1 lubrication unit (optional) can be installed to ensure long-term, maintenance-free operation.

Pioneering in the industry
Super-finished ball groove feature
The super-finished ball groove with a super-precision rolling groove is also available for even higher accuracy (optional).
(The super-finished ball groove can be applied for the ultra-high precision P3 grade.)

Table I -8 · 7. Dimension of linear guides equipped with NSK K1 lubrication unit
unit: mm

Model No.	Ball slide length equipped with two NSK K1 s L	Thickness of NSK K1, V1	Thickness of protection cover, V ₂
HA25	159.8	5.0	1.0
HA30	190.2	5.5	1.0
HA35	216.6	5.5	1.0
HA45	248.4	6.5	1.0
HA55	299.4	6.5	1.0

•Ball slide length equipped with NSK K1=
(Standard bearing length)+(Thickness of NSK K1, V₁×Number of NSK K1)+
(Thickness of the protection cover V₂ ×2)

(7) Accuracy standard and preload

Four accuracy grades are available: ultra super precision P3, super precision P4, high precision P5, and precision P6. Slight preload Z1 and medium preload Z3 are available for preload, which can be selected for specific applications.

Table I -8 · 8. Accuracy standard
Unit: μm

Accuracy grade	Ultra super precision	Super precision	High precision	Precision
	P3	P4	P5	P6
Items				
Assembly height H Variation of assembly height H (All slides on a pair of rails)	±10 3	±10 5	±20 7	±40 15
Mounting width W ₂ or W ₃ Variation of mounting width W ₂ or W ₃ (All slides on datum rails)	±15 3	±15 7	±25 10	±50 20
Running parallelism of face C against face A Running parallelism of face D against face B	Refer to Table I -8 · 9, Fig. I -8 · 6 and Fig. I -8 · 7.			

Table I -8 · 9. Running parallelism tolerance
Unit: μm

Accuracy grade	P3	P4	P5	P6
Total rail length (mm)				
Over ~ 200 or less	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	4.5	8	14
800 ~ 1 000	2.5	5	9	16
1 000 ~ 1 250	3	6	10	17
1 250 ~ 1 600	4	7	11	19
1 600 ~ 2 000	4.5	8	13	21
2 000 ~ 2 500	—	10	15	22
2 500 ~ 3 150	—	11	17	25
3 150 ~ 4 000	—	16	23	30

Fig. I -8 · 6. Mounting width (W₂) and running parallelism

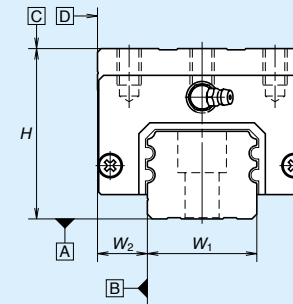


Fig. I -8 · 7. Mounting width (W₃) and running parallelism

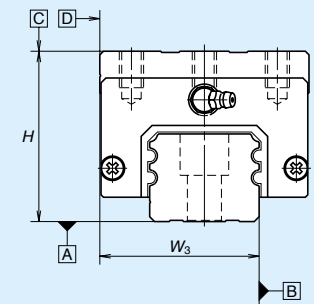


Table I -8 · 10. Preload and rigidity
unit: mm

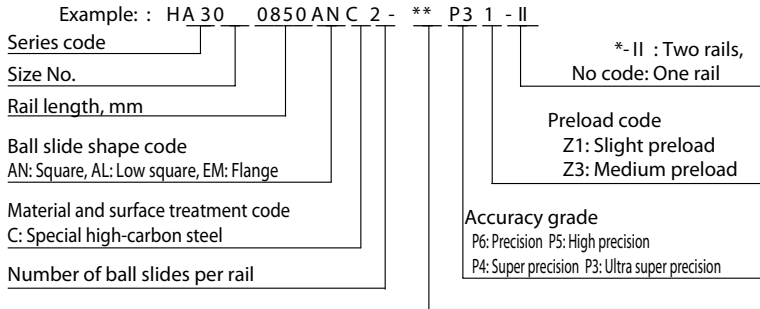
Model No.	Preload (N)		Rigidity (N/ μm)	
	Slight preload (Z1)	Medium preload (Z3)	Slight preload (Z1)	Medium preload (Z3)
HA25	735	2 990	635	1 030
HA30	1 030	4 400	880	1 270
HA35	1 470	6 100	1 030	1 620
HA45	1 960	8 150	1 230	2 060
HA55	3 150	13 100	1 520	2 450



(8) Dimensions of HA series

Three types of HA Series linear guides are available: AN Type, AL Type, and EM Type, all of which can be selected for specific applications.

AN Type
AL Type



* Please note that we assign the design number, and omit the last code (II) that indicates a use of two rails as a set to finalize the reference number as product identification.

Three types of HA Series linear guides are available: AN Type, AL Type, and EM Type, all of which can be selected for specific applications.

Fig. I -8 · 8 AN Type

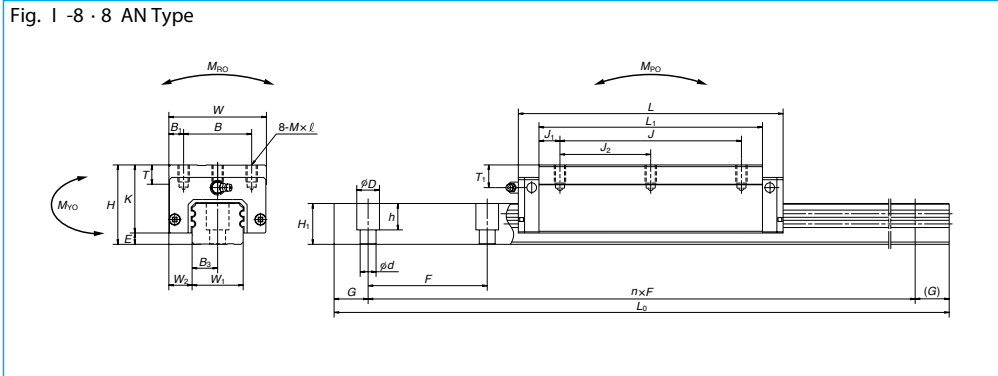


Table I -8 · 10

Model No.	Assembly dimension			Ball slide dimension													
	Height H	E	W ₂	Width W	Length L	Tapped hole					Grease fitting						
						B	J	J ₂	M × pitch × l	B ₁	L ₁	J ₁	K	T	Mounting hole	T ₁	N
HA25AN	40	5.5	12.5	48	147.8	35	100	50	M6 × 1 × 10	6.5	126	13	34.5	12	M6 × 0.75	10	11
HA30AN	45	7.5	16	60	177.2	40	120	60	M8 × 1.25 × 11	10	149	14.5	37.5	14	M6 × 0.75	9.5	11
HA35AN	55	7.5	18	70	203.6	50	140	70	M8 × 1.25 × 12	10	173	16.5	47.5	15	M6 × 0.75	15	8
HA35AL	48																
HA45AN	70	10	20.5	86	233.4	60	160	80	M10 × 1.5 × 16	13	197	18.5	60	7	Rc1/8	20	10
HA45AL	60																
HA55AN	80	12	23.5	100	284.4	75	206	103	M12 × 1.75 × 18	12.5	245	19.5	68	8	Rc1/8	21	11
HA55AL	70																

* Select either one of the dimensions for F and h (pitch of holes for rail fixing bolt). (The left is for standard types, while the right is for semi-standard types.)



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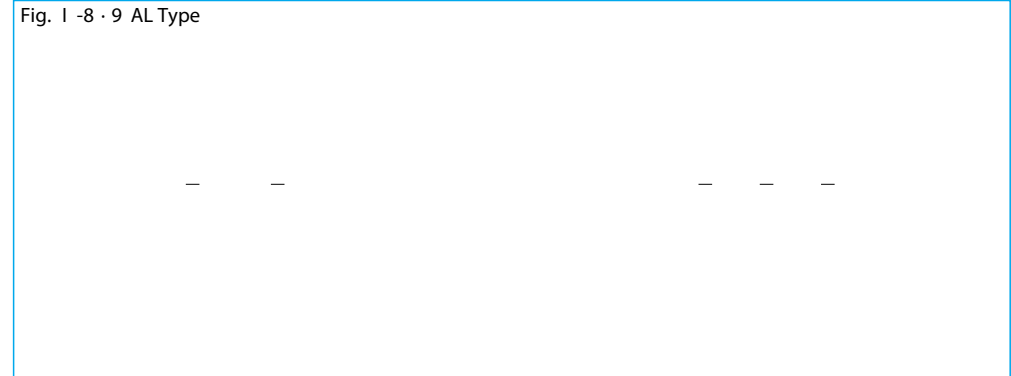
Specification number

The specification number indicates the main specifications through numbers and codes. It is used until the final reference number (indicated in a specification drawing) is assigned upon confirming specifications with the user. The reference number consists of the specification number, the design serial number, and additional information.

Cautions

- Balls will fall out if a bearing is removed from the rail. A bearing may shift and fall out if the rail is tilted without using a stopper. • Be sure to take appropriate safety measures against falling loads when mounting a bearing upside down (e.g., when using a bearing facing downward from a ceiling-mounted rail).
- Be sure that ambient temperature does not exceed 50 °C (80 °C, instantaneous) when installing NSK K1™. In addition, do not allow the unit to come into contact with degreasing organic solvents.

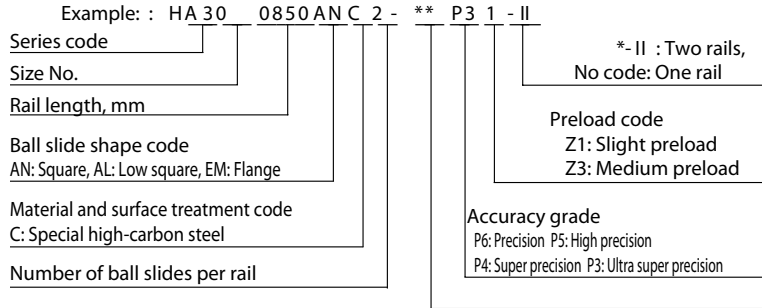
Fig. I -8 · 9 AL Type



unit: mm

Rail dimension							Basic load rating						Ball diameter	Weight	
Rail width W ₁	Rail height H ₁	Bolt pitch F ⁹	Bolt hole d × D × h ⁹	B ₃	G (recommended)	Maximum length L _{0max}	Dynamic C (N)	Static C ₀ (N)	Static moment (N · m)			D _w	Bearing (g)	Rail (g/100mm)	
									M _{RO}	M _{PO}	M _{VO}				
23	22	30/60	7 × 11 × 16.5/9	11.5	20	3 960	4 000	11 500	670	2 060	2 060	3.968	1.2	3.7	
28	28	40/80	9 × 14 × 23.5/12	14	20	4 000	7 950	16 000	1 140	3 550	3 550	4.762	1.8	5.8	
34	30.8	40/80	9 × 14 × 23.5/12	17	20	4 000	11 000	22 600	1 950	5 650	5 650	5.556	3.0	7.7	
45	36	52.5/105	14 × 20 × 27/17	22.5	22.5	3 990	147 000	295 000	3 700	8 450	8 450	6.350	6.0	12.0	
53	43.2	60/120	16 × 23 × 32.5/20	26.5	30	3 960	232 000	445 000	6 500	15 400	15 400	7.937	9.4	17.2	

EM Type



* Please note that we assign the design number, and omit the last code (II) that indicates a use of two rails as a set to finalize the reference number as product identification.

- Mounting holes for ball slides of EM type are for both taps and drills.

Fig. I - 8 · 10 EM Type

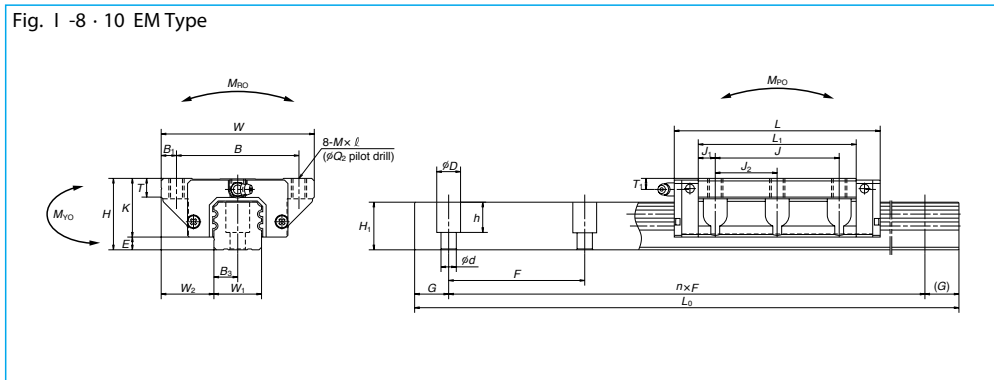


Table I - 8 · 10

Model No.	Assembly dimension			Ball slide dimension															
	Height H	E	W ₂	Width W	Length L	Mounting tap hole						Grease fitting							
						B	J	J ₂	M × pitch × l	Q ₂	B ₁	L ₁	J ₁	K	T	Mounting hole	T ₁	N	
HA25EM	36	5.5	23.5	70	147.8	57	100	50	M8 × 1.25 × 10	6.8	6.5	126	13	30.5	11	M6 × 0.75	6	11	
HA30EM	42	7.5	31	90	177.2	72	120	60	M10 × 1.5 × 12	8.6	9	149	4.5	34.5	11	M6 × 0.75	6.5	11	
HA35EM	48	7.5	33	100	203.6	82	140	70	M10 × 1.5 × 13	8.6	9	173	6.5	40.5	12	M6 × 0.75	8	11	
HA45EM	60	10	37.5	120	233.4	100	160	80	M12 × 1.75 × 15	10.5	10	197	8.5	50	13	Rc1/8	10	13	
HA55EM	70	12	43.5	140	284.4	116	206	103	M14 × 2 × 21	12.5	12	245	9.5	58	15	Rc1/8	11	13	

* Select either one of the dimensions for F and h (pitch of holes for rail fixing bolt).
(The left is for standard types, while the right is for semi-standard types.)

Specification number

The specification number indicates the main specifications through numbers and codes. It is used until the final reference number (indicated in a specification drawing) is assigned upon confirming specifications with the user. The reference number consists of the specification number, the design serial number, and additional information.

Cautions

- Balls will fall out if a bearing is removed from the rail. A bearing may shift and fall out if the rail is tilted without using a stopper.
- Be sure to take appropriate safety measures against falling loads when mounting a bearing upside down (e.g., when using a bearing facing downward from a ceiling-mounted rail).
- Be sure that ambient temperature does not exceed 50 °C (80 °C, instantaneous) when installing NSK K1™. In addition, do not allow the unit to come into contact with degreasing organic solvents.

unit: mm

Rail dimension							Basic load rating					Ball diameter	Weight	
Rail width W ₁	Rail height H ₁	Bolt pitch F ⁹	Bolt hole d × D × h ⁹	B ₃	G (recommended)	Maximum length L _{omax}	Dynamic C (N)	Static C ₀ (N)	Static moment (N · m)			D _w	Bearing (kg)	Rail (kg/100mm)
									M _{RO}	M _{PO}	M _{VO}			
23	22	30/60	7 × 11 × 16.5/9	11.5	20	3 960	4 000	1 5 000	6 70	2 060	2 060	3.968	1.6	3.7
28	28	40/80	9 × 14 × 21/12	14	20	4 000	7 950	1 66 000	1 40	3 550	3 550	4.762	2.6	5.8
34	30.8	40/80	9 × 14 × 23.5/12	17	20	4 000	11 000	2 26 000	1 950	5 650	5 650	5.556	3.8	7.7
45	36	52.5/105	14 × 20 × 27/17	22.5	22.5	3 990	14 700	2 95 000	3 700	8 450	8 450	6.350	6.6	12.0
53	43.2	60/120	16 × 23 × 32.5/20	26.5	30	3 960	23 200	4 45 000	6 500	15 400	15 400	7.937	11	17.2

