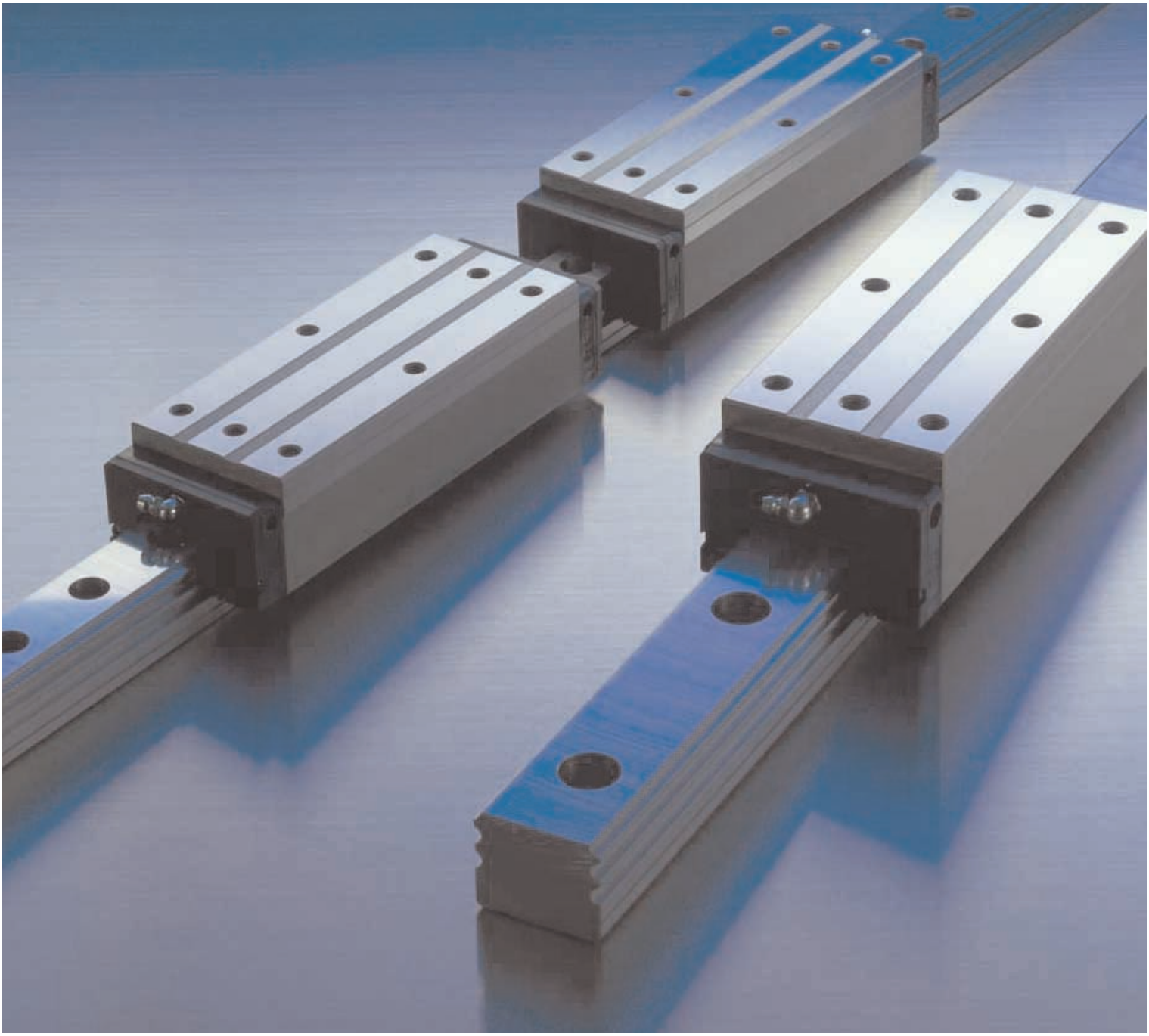
MOTION & CONTROL
NSK

NSK Linear Guides™
HA Series for Machine Tools

New!

Patent Pending

Premier motion accuracy and rigidity—
innovative linear guide design, compatible with high precision machine tools



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.

Features

High motion accuracy

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

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).

High rigidity and load capacity with low friction

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

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.

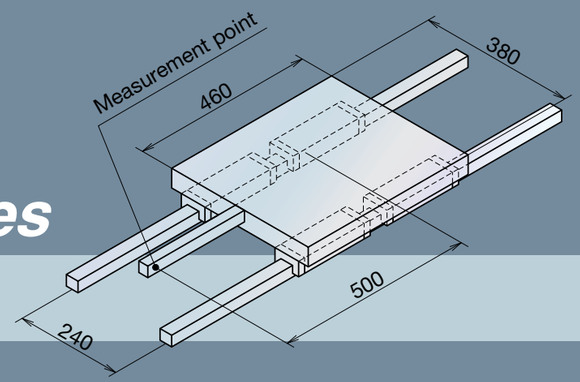
Application

For a variety of machine tools

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.

Linear Guide HA Series

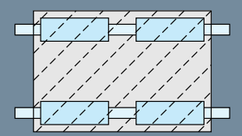
Test results of the vibration caused by ball passage



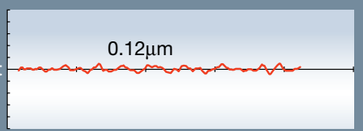
HA Series

Model No.: HA30
Preload: Z3
Table dimensions:
460×380mm

HA Series four ball slides



Displacement

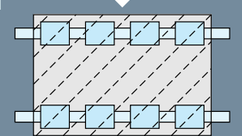


Strokes: 200 mm

The same table is used.

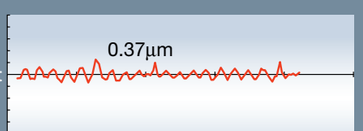
Conventional models

Model No.: LA30
Preload: Z3
Table dimensions:
460×380mm



Standard model eight ball slides

Displacement



Strokes: 200 mm

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.

High rigidity and load capacity, achieved by NSK's new proprietary design

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:

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

Fig. 1. Comparisons of dynamic load rating of HA and LA Series

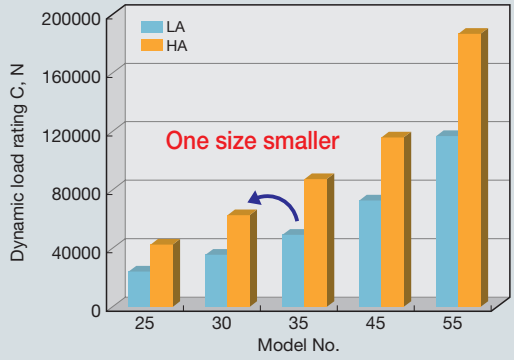


Fig. 2. Comparisons of rigidity of HA and LA Series

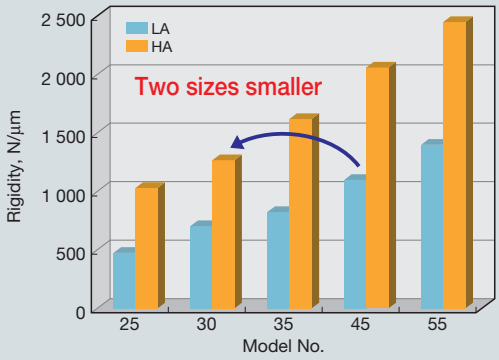
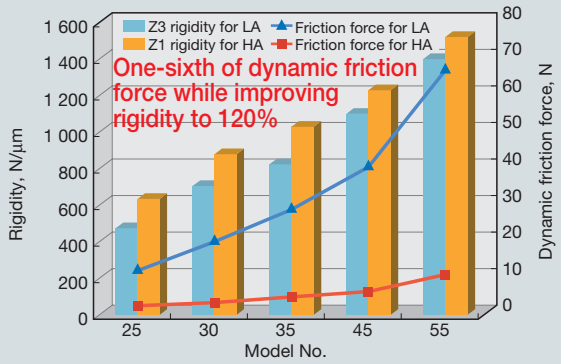


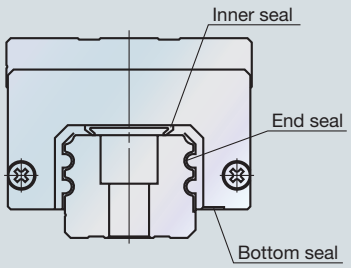
Fig. 3. Comparisons of dynamic friction force and rigidity



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. 4.
The design enables long-term machining capability with high accuracy.

Fig. 4. View of linear guides with dust-proof seals



Long-term, maintenance-free operation

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

Table 1. Dimension of linear guides equipped with NSK K1® lubrication unit

unit: mm

Model No.	Ball slide length equipped with two NSK K1s L	Thickness of NSK K1, V_1	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, V_1×Number of NSK K1)+
(Thickness of the protection cover V_2 ×2)

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.)

Extensive lineup of various accuracy grades

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 2. Accuracy standard unit: μm

Items \ Accuracy grade	Ultra super precision P3	Super precision P4	High precision P5	Precision P6
Assembly height H	±10	±10	±20	±40
Variation of assembly height H (All slides on a pair of rails)	3	5	7	15
Mounting width W_2 or W_3	±15	±15	±25	±50
Variation of mounting width W_2 or W_3 (All slides on datum rails)	3	7	10	20
Running parallelism of face C against face A Running parallelism of face D against face B	Refer to Table 3 for tolerance. See Fig. 5 and Fig. 6.			

Table 3. Running parallelism tolerance unit: μm

Total rail length (mm) \ Accuracy grade	P3	P4	P5	P6
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. 5. Mounting width (W_2) and running parallelism

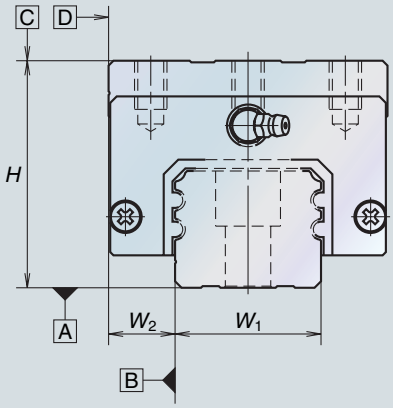


Fig. 6. Mounting width (W_3) and running parallelism

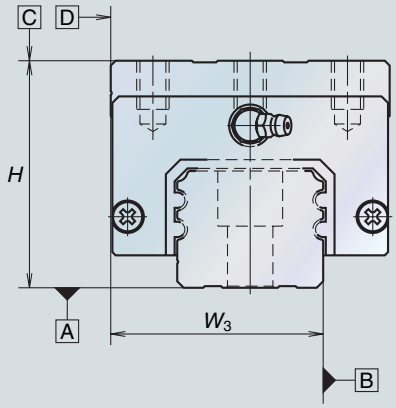


Table 4. Preload and rigidity

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

Dimensions

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. 7. AN Type

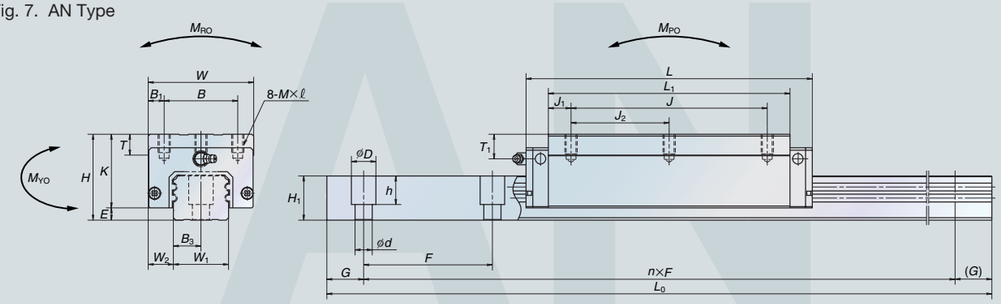
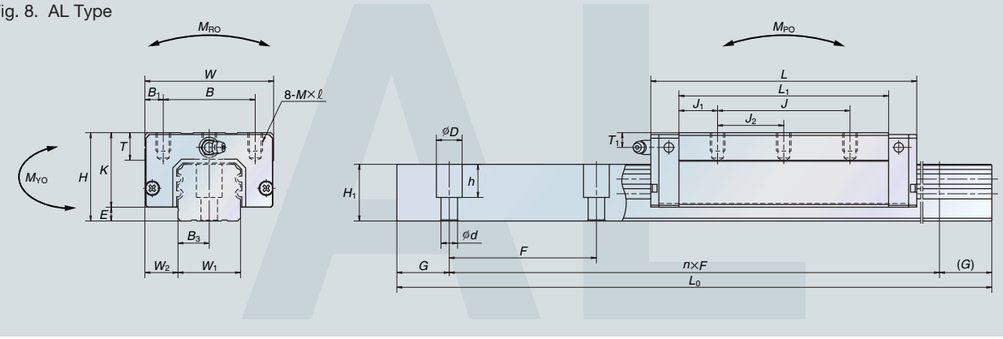


Fig. 8. AL Type



Assembly dimensions for AN Type and AL Type

unit: mm

Model No.	Assembly dimension			Ball slide dimension												Rail dimension							Basic load rating					Ball diameter	Weight	
	Height			Width	Length	Tapped hole								Grease nipple			Rail width	Rail height	Bolt pitch	Bolt hole			Maximum length	Dynamic	Static	Static moment (N•m)				Bearing	Rail
	H	E	W_2	W	L	B	J	J_2	M×pitch×ℓ	B_1	L_1	J_1	K	T	Mounting hole	T_1	N	W_1	H_1	F**	d×D×h**	B_3	G (recommended)	L_0max*	C (N)	C_0 (N)	M_{RO}	M_{PO}	M_{YO}	D_W	(kg)	(kg/m)
HA25AN	40	5.5	12.5	48	147.8	35	100	50	M6×1.0×10	6.5	126	13	34.5	12	M6×0.75	10	11	23	22	30/60	7×11×16.5/9	11.5	20	3 960 (2 000)	42 700	99 600	855	1 680	1 680	3.968	1.2	3.7
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	28	28	40/80	9×14×21/12	14	20	4 000 (2 000)	63 000	143 000	1 470	2 920	2 920	4.762	1.8	5.8
HA35AN HA35AL	55 48	7.5	18	70	203.6	50	140	70	M8×1.25×12	10	173	16.5	47.5 40.5	15	M6×0.75	15 8	11	34	30.8	40/80	9×14×23.5/12	17	20	4 000 (2 000)	87 500	196 500	2 470	4 620	4 620	5.556	3.0 2.6	7.7
HA45AN HA45AL	70 60	10	20.5	86	233.4	60	160	80	M10×1.5×16	13	197	18.5	60	17	Rc1/8	20 10	13	45	36	52.5/105	14×20×27/17	22.5	22.5	3 990 (2 000)	116 000	255 000	4 380	6 850	6 850	6.350	6.0 5.0	12.0
HA55AN HA55AL	80 70	12	23.5	100	284.4	75	206	103	M12×1.75×18	12.5	245	19.5	68	18	Rc1/8	21 11	13	53	43.2	60/120	16×23×32.5/20	26.5	30	3 960 (2 000)	187 000	398 000	8 100	13 500	13 500	7.937	9.4 7.8	17.2

Assembly dimensions for EN Type

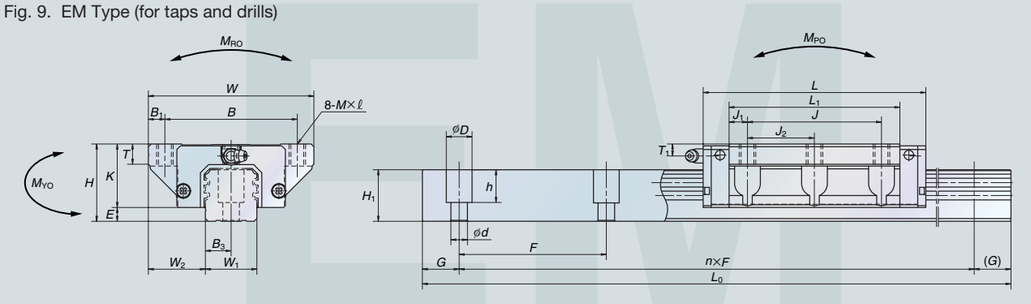
unit: mm

Model No.	Assembly dimension			Ball slide dimension													Rail dimension							Basic load rating					Ball diameter	Weight	
	Height			Width	Length	Hole position			Tapped hole	Drill hole					Grease nipple			Rail width	Rail height	Bolt pitch	Bolt hole			Maximum length	Dynamic	Static	Static moment (N•m)				Bearing	Rail
	H	E	W_2	W	L	B	J	J_2	M×pitch×ℓ	Diameter	B_1	L_1	J_1	K	T	Mounting Hole	T_1	N	W_1	H_1	F**	d×D×h**	B_3	G (recommended)	L_0max*	C (N)	C_0 (N)	M_{RO}	M_{PO}	M_{YO}	D_W	(kg)	(kg/m)
HA25EM	36	5.5	23.5	70	147.8	57	100	50	M8×1.25	ϕ6.3	6.5	126	13	30.5	11	M6×0.75	6	11	23	22	30/60	7×11×16.5/9	11.5	20	3 960 (2 000)	42 700	99 600	855	1 680	1 680	3.968	1.6	3.7
HA30EM	42	7.5	31	90	177.2	72	120	60	M10×1.5	ϕ8.6	9	149	14.5	34.5	11	M6×0.75	6.5	11	28	28	40/80	9×14×23.5/12	14	20	4 000 (2 000)	63 000	143 000	1 470	2 920	2 920	4.762	2.6	5.8
HA35EM	48	7.5	33	100	203.6	82	140	70	M10×1.5	ϕ8.6	9	173	16.5	40.5	12	M6×0.75	8	11	34	30.8	40/80	9×14×23.5/12	17	20	4 000 (2 000)	87 500	196 500	2 470	4 620	4 620	5.556	3.8	7.7
HA45EM	60	10	37.5	120	233.4	100	160	80	M12×1.75	ϕ10.5	10	197	18.5	50	13	Rc1/8	10	13	45	36	52.5/105	14×20×27/17	22.5	22.5	3 990 (2 000)	116 000	255 000	4 380	6 850	6 850	6.350	6.6	12.0
HA55EM	70	12	43.5	140	284.4	116	206	103	M14×2×21	ϕ12.5	12	245	19.5	58	15	Rc1/8	11	13	53	43.2	60/120	16×23×32.5/20	26.5	30	3 960 (2 000)	187 000	398 000	8 100	13 500	13 500	7.937	11	17.2

* The maximum length of the rail for P3 grade is 2000 mm.
** Rail mounting hole pitch F (standard 1/2 pitch) and bolt hole h (standard or deep hole) can be selected for all sizes.

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

Fig. 9. EM Type (for taps and drills)



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.

Example: HA 30 0850 AN C 2 - P3 Z1 - Ⅱ

- HA — Series code
- 30 — Size No.
- 0850 — Rail length, mm
- AN — Ball slide shape code; AN: Square, AL: Low square, EM: Flange
- C — Material and surface treatment code; C: Special high-carbon steel
- 2 — Number of ball slides per rail
- P3 — Accuracy grade; P6: Precision, P5: High precision, P4: Super precision, P3: Ultra super precision
- Z1 — Preload code; Z1: Slight preload, Z3: Medium preload
- Ⅱ — Ⅱ: Two rails, No code: One rail

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.