A-5-4.1 HA Series



1. Features (1) High motion accu

(1) High motion accuracy

High motion accuracy is achieved in both narrow and wide ranges by the adoption of ultra-long ball slides and the optimum design of the ball recirculation component.

(2) Ball passage vibration reduced to one-third of our conventional models

Our extensive performance tests show ball passage vibration has been reduced to onethird of our conventional models, dramatically improving straightness in table unit.

(3) Installation of rail with greater accuracy

Increased counterbore depth of the rail mounting hole reduces rail deflection, which is caused by bolt tightening when fixing the rail to the mounting base to 50% or less. This feature restrains the pitching motion of ball slide whose frequency matches to the mounting hole pitch.

In addition, the length of mounting hole pitch has been reduced by one-half of the conventional models, so the rail can be more accurately installed in position.

(4) High rigidity and load capacity with lower friction

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

(5) Compact design

Reduced body size enables more compact machinery.

(6) Four-way equal load distribution

Contact angle is set at 45 degrees in all grooves, dispersing the load to four ball rows irrespective of load direction. This realizes equal rigidity and load carrying capacity in vertical and lateral directions and provides well-balanced design.

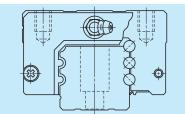
(7) Strong against shock load

Load from any direction, vertical and lateral,

is received by four ball rows at all times. The number of the ball row which receives the load is larger than in other linear guides, making this series stronger against shock load.

(8) High accuracy at manufacturing

Fixing the measuring rollers to the ball grooves is easy thanks to the Gothic arch groove. Ball-groove measuring is accurate and simple. This benefits a highly precise and stable manufacturing.





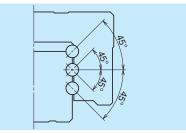


Fig. 2 Super rigidity design

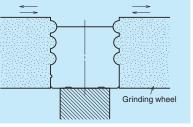


Fig. 3 Rail grinding

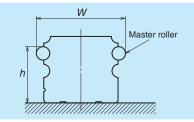


Fig. 4 Measuring groove accuracy

Measurement results of ball passage vibration

Ball passage vibration can translate into posture changes in the ball slide which result from ball passage (circulation). In the HA Series, this vibration has been substantially reduced to one-third of conventional models.

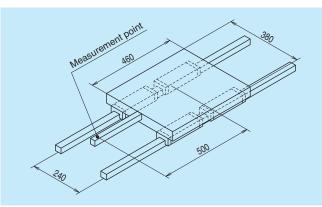


Fig. 5 Schematic view of measurement of ball passage vibration

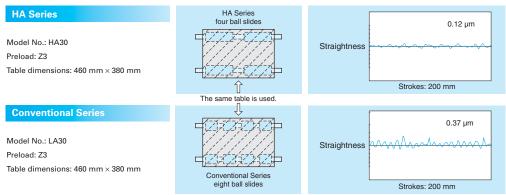
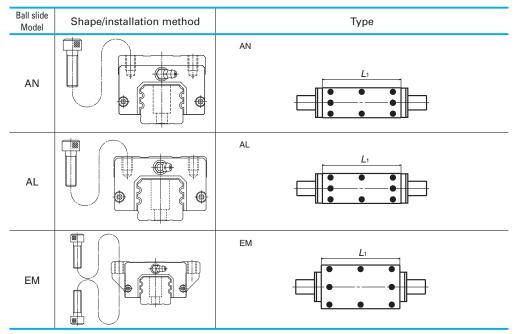


Fig. 6 Measurement results of HA Series and conventional Series

2. Ball slide shape



3. Accuracy and preload

(1) Running parallelism of ball slide

	Table 1 Unit: μ				
	Р	reloaded assem	bly		
Rail length (mm) over or less	Ultra precision F	Super 3 precision P4	High precision P5		
- 200	2	2	4		
200 – 250	2	2.5	5		
250 – 315	2	2.5	5		
315 – 400	2	3	6		
400 - 500	2	3	6		
500 - 630	2	3.5	7		
630 - 800	2	4.5	8		
800 – 1 000	2.5	5	9		
1 000 – 1 250	3	6	10		
1 250 – 1 600	4	7	11		
1 600 – 2 000	4.5	8	13		
2 000 – 2 500	5	10	15		
2 500 – 3 150	6	11	17		
3 150 – 4 000	9	16	23		

(2) Accuracy standard

Three accuracy grades are available: Ultra precision P3, Super precision P4 and High precision P5.

	Table 2		Unit: µm	
Accuracy grade Characteristics	Ultra precision P3	Super precision P4	High precision P5	HA S
Mounting height <i>H</i> Variation of <i>H</i> (All ball slides on a set of rails)	±10 3	±10 5	±20 7	eries
Mounting width W_2 or W_3 Variation of W_2 or W_3 (All ball slides on reference rail)	±15 3	±15 7	±25 10	
Running parallelism of surface C to surface A Running parallelism of surface D to surface B		Refer to Table 1 and Fig. 7		

(3) Assembled accuracy

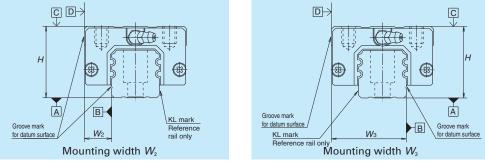


Fig. 7

(4) Preload and rigidity

Slight preload Z1 and Medium preload Z3 are available for preload, which can be selected for specific applications.

	Table 3				
Ma dal Na	Prelo	ad (N)	Rigidity (N/µm)		
Model No.	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	

4. Maximum rail length

Table 4 shows the limitations of rail length.However, the limitations vary by accuracy grades.

Table 4 Length limitations of rails Unit: mm

					•
Series Size	25	30	35	45	55
HA	3 960	4 000	4 000	3 990	3 960

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

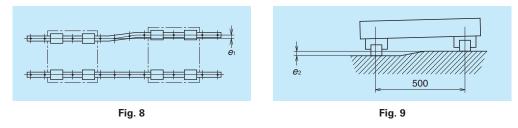
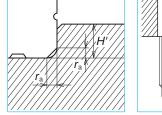


Table 5 Unit: μm						
Value	Preload	Model No.				
value	Fleidau	HA25	HA30	HA35	HA45	HA55
Permissible values of	Z1	20 20 23 26 34				
parallelism in two rails e1	Z3	15 14 17 19 25				
Permissible values of	71 70	050 /500				
parallelism (height) in two rails e_2	Z1,Z3		250 μm/500 mm			

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



	(<i>r</i> _b)/ <i>H</i> "	
	Ś	
Ĺ		

		Table 6		Unit: mm
Model No.	Corner radiu	s (maximum)	Shoulde	er height
would no.	r _a	Γ _b	H	H"
HA25	0.5	0.5	5	5
HA30	0.5	0.5	6	6
HA35	0.5	0.5	6	6
HA45	0.7	0.7	8	8
HA55	0.7	0.7	10	10

Fig. 10 Shoulder for t rail datum surface

the	Fig. 11	Shoulder for the ball
ce		slide datum surface

6. Lubrication components

Refer to pages A38 and D13 for linear guide lubrication.

(1) Types of lubrication accessories

Fig. 12 and Table 7 show grease fittings and tube fittings.

We provide lubrication accessories with extended thread body length (L) for the addition of dust-proof accessories such as NSK K1 lubrication unit, double seal and protector.

We provide a suitable lubrication accessory for the special requirement on dust-proof accessories.

Consult NSK for a lubrication accessory with extended length of thread body for your convenience of replenishing lubricant.

When you require stainless lubrication accessories, please ask NSK.

(2) Mounting position of lubrication accessories

The standard position of grease fittings is the end face of ball slide. We mount them on the side of end cap for an option. (Fig. 13)

Please consult NSK for installation of grease or tube fittings to the ball slide body or the side of end cap.

When using a piping unit with thread of $M6 \times 1$, you require a connector to connect to a grease fitting mounting hole with M6 \times 0.75. The connector is available from NSK.

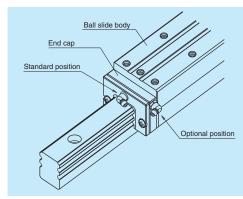


Fig. 13 Mounting position of lubrication accessories

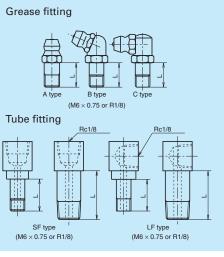


Fig. 12 Grease fitting and tube fitting

	1	Table 7	Unit: mm
Model No.	Dust-proof specification	Grease fitting	Tube fitting
	specification	Thread body length L	Thread body length L
	Standard	5	5
HA25	With NSK K1	14	12
RA25	Double seal	10	9
	Protector	10	9
	Standard	5	6
HA30	With NSK K1	14	13
RA30	Double seal	12	11
	Protector	12	11
	Standard	5	6
HA35	With NSK K1	14	13
TA35	Double seal	12	11
	Protector	12	11
	Standard	8	17
HA45	With NSK K1	18	21.5
TA45	Double seal	14	17
	Protector	14	17
	Standard	8	17
HA55	With NSK K1	18	21.5
11400	Double seal	14	17
	Protector	14	17

HA Series

7. Dust-proof components (1) Standard Specification

The HA Series can be readily used as they have a dust protection means for normal conditions. As the standard equipment, the ball slides have an end seal on both ends, bottom seals at the bottom, and an inner seal in inside.

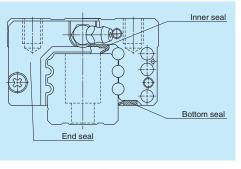


Fig. 14

Table 8 Seal friction per ball slide (maximum value)

					Unit: N
Series Size	25	30	35	45	55
HA	17	17	19	21	22

(2) NSK K1[™] lubrication unit

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

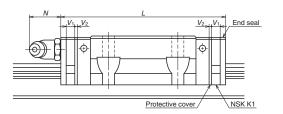


	Table 9					
Model No.	Ball slide model	Standard ball slide length	Ball slide length installed with two NSK K1 L	Per NSK K1 thickness V1	Protective cover thickness V ₂	Protruding area of the grease fitting N
HA25	AN, EM	147.8	159.8	5.0	1.0	(14)
HA30	AN, EM	177.2	190.2	5.5	1.0	(14)
HA35	AN, AL, EM	203.6	216.6	5.5	1.0	(14)
HA45	AN, AL, EM	233.4	248.4	6.5	1.0	(15)
HA55	AN,AL, EM	284.4	299.4	6.5	1.0	(15)

Note: Ball slide length equipped with NSK K1 =

(Standard ball slide length) + (Thickness of NSK K1, $V_1 \times$ Number of NSK K1) + (Thickness of the protective cover $V_2 \times 2)$

(3) Double seal and protector

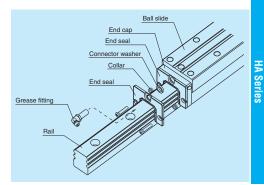
For the HA Series, double seal and protectors can be installed only before shipping from the factory. Please consult with NSK when you require dust tight protection.

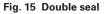
Table 10 shows the increased thickness of $V_{\scriptscriptstyle 3},$ and $V_{\scriptscriptstyle 4}$ when the end seal and the protector are installed.

	Table 10	Unit: mm
Model No.	Thickness	Thickness
would no.	of end seal: $V_{\scriptscriptstyle 3}$	of protector: V_4
HA25	3.2	3.6
HA30	4.4	4.2
HA35	4.4	4.2
HA45	5.5	4.9
HA55	5.5	4.9

(4) Caps to plug the rail mounting bolt hole

Table 11 Caps to plug rail bolt hole										
Model No.	Bolt to	Сар	Quantity							
	secure rail	reference No.	/case							
HA25	M6	LG-CAP/M6	20							
HA30, HA35	M8	LG-CAP/M8	20							
HA45	M12	LG-CAP/M12	20							
HA55	M14	LG-CAP/M14	20							





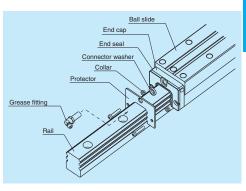


Fig. 16 Protector

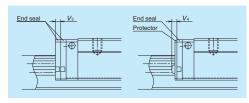


Fig. 17

HA Series

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.



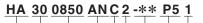
Table 12 Material/surface treatment code

Description
Special high carbon steel (NSK standard)
Special high carbon steel with surface treatment
Other, special

Table 13 Accuracy code										
Accuracy	Standard (Without NSK K1)	With NSK K1								
Ultra precision grade	P3	К3								
Super precision grade	P4	K4								
High precision grade	P5	K5								

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

9. Dimensions HA-AN HA-AL

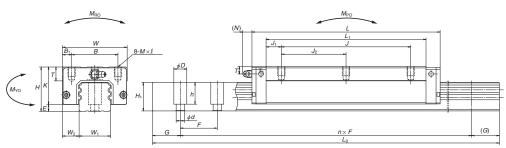




Front view of AL type

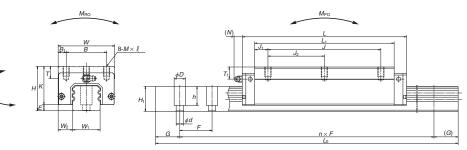
Side view of AL type

1: Z1, 3: Z3



Front view of AN type

Side view of AN type



Unit: mm

	A	ssemb	ly					Ball slide									
Model No	Height			Width	Length	Mounting hole								Grease	fittin	g	
Woder No.	Н	E	<i>W</i> ₂	W	L	В	J	J ₂	$M \times \text{pitch} \times \ell$	<i>B</i> ₁	L ₁	J_1	К	Т	Hole size	<i>T</i> ₁	N
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
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	11
HA35AL	48	7.5	10	70	203.0	50	140	70	M8×1.25×10	10	175	10.5	40.5	15	IVI6×0.75	8	
HA45AN	70	10	20.5	86	233.4	60	160	80	M10×1.5×16	13	197	18.5	60	17	Rc1/8	20	13
HA45AL	60	10	20.5	00	233.4	00	100	00	1011021.5210	13	197	10.0	50	17	NC1/0	10	13
HA55AN	80	12	23.5	100	284.4	75	206	102	M12×1.75×18	12.5	245	19.5	68	18	Rc1/8	21	13
HA55AL	70	12	23.5	100	204.4	75	200	103	IVITZXT./5X18	12.5	245	19.5	58	18	nc1/8	11	13

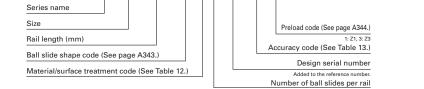
Notes: 1) The HA Series does not have a ball retainer. Be aware that the balls fall out when a ball slide is withdrawn from the rail.

			Rail					Basic I	oad rati	ng			We	eight
Width	Height	Pitch	Mounting	G	Maximum	Dynamic	Static		Static	momen	t (N·m)		Ball	Rail
			bolt hole		length	С	<i>C</i> ₀	$M_{\scriptscriptstyle { m RO}}$	N	1 _{PO}	N	1 _{YO}	slide	
W_1	H ₁	F	$d \times D \times h$	(Reference)	L _{0max}	(N)	(N)		One slide	Two slides	One slide	Two slides	(kg)	(kg/m)
23	22	30	7×11×16.5	20	3 960	54 000	115 000	670	2 060	10 100	2 060	10 100	1.2	3.7
28	28	40	9×14×21	20	4 000	79 500	166 000	1 140	3 550	17 400	3 550	17 400	1.8	5.8
34	30.8	40	9×14×23.5	20	4 000	111 000	226 000	1 950	5 650	27 100	5 650	27 100	3.0	7.7
54	30.0	40	3×14×23.5	20	4 000	111 000	220 000	1 900	5 050	27 100	5 050	27 100	2.6	1.1
45	36	52.5	14×20×27	22.5	3 990	147 000	295 000	3 700	0 150	40 500	0 150	40 500	6.0	12.0
40	30	52.5	14720727	22.0	3 990	147 000	235 000	3 700	0 4 5 0	40 500	0 4 5 0	40 500	5.0	12.0
53	43.2	60	16×23×32.5	30	3 960	232 000	445 000	6 500	15 400	75 000	15 100	75 000	9.4	17.2
03	43.Z	00	10723832.5	30	5 900	232 000	445 000	0.500	15 400	/5 000	15 400	/5 000	7.8	17.2

2) Basic dynamic load rating is a load that allows for a 50-km rating fatigue life and is a vertical and constant load on the ball slide mounting surface. To convert C to C_{100} for a 100-km rating fatigue life, divide C by 1.26.

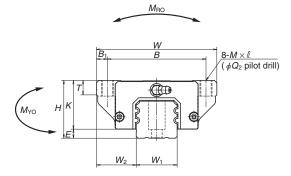
HA-EM

HA Series



HA 30 0850 EMC 2 -** P5 1

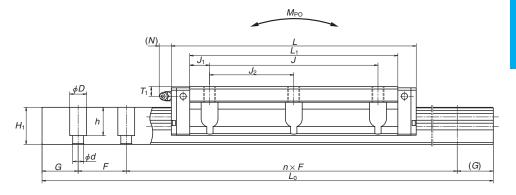
Front view of EM type



	A	ssem	ıbly		Ball slide													
Model No	Height			Width	Length		Mounting hole									Grease	fittin	g
Nodel No	Н	E	W_2	W	L	В	B J J ₂		$M \times \text{pitch} \times \ell$	<i>Q</i> ₂	<i>B</i> ₁	L ₁	J_1	К	Т	Hole size	<i>T</i> 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	14.5	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	16.5	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	18.5	50	13	Rc1/8	10	13
HA55EM	70	12	43.5	140	284.4	116	206	103	M14×2×18	12.5	12	245	19.5	58	15	Rc1/8	11	13

Notes: 1) HA Series does not have a ball retainer. Be aware that the balls fall out when a ball slide is withdrawn from the rail.

Side view of EM type



Unit: mm

			Rail	Basic load rating							We	eight		
Width	Height	Pitch	Mounting	G	Maximum	Dynamic	Static	Static moment (N·m)				Ball	Rail	
			bolt hole		length	С	C_{\circ}	$M_{\scriptscriptstyle \rm RO}$	M _{RO} M _{PO} M _{YO}			1 _{YO}	slide	
VV_1	<i>H</i> ₁	F	$d \times D \times h$	(Reference)	L _{omax}	(N)	(N)		One slide	Two slides	One slide	Two slides	(kg)	(kg/m)
23	22	30	7×11×16.5	20	3 960	54 000	115 000	670	2 060	10 100	2 060	10 100	1.6	3.7
28	28	40	9×14×21	20	4 000	79 500	166 000	1 140	3 550	17 400	3 550	17 400	2.6	5.8
34	30.8	40	9×14×23.5	20	4 000	111 000	226 000	1 950	5 650	27 100	5 650	27 100	3.8	7.7
45	36	52.5	14×20×27	22.5	3 990	147 000	295 000	3 700	8 450	40 500	8 450	40 500	6.6	12.0
53	43.2	60	16×23×32.5	30	3 960	232 000	445 000	6 500	15 400	75 000	15 400	75 000	11	17.2

2) Basic dynamic load rating is a load that allows for a 50-km rating fatigue life and is a vertical and constant load on the ball slide mounting surface. To convert C to C₁₀₀ for a 100-km rating fatigue life, divide C by 1.26.

A-5-4.2 HS Series



1. Features

(1) High motion accuracy

High motion accuracy is achieved in both narrow and wide ranges by adopting ultralong ball slides and optimum design features for the ball recirculation component.

(2) Ball passage vibration reduced to one-third of our conventional models

Tests show ball passage vibration has been reduced to one-third of our conventional models, dramatically improving straightness in table unit.

(3) Installation of rail with greater accuracy

Increased counterbore depth of the rail mounting hole reduces rail deflection, which is caused by bolt tightening when fixing the rail to the mounting base, to 50% or less. This feature restrains the pitching motion of ball slide whose frequency matches to the mounting hole pitch.

In addition, the mounting hole pitch has been reduced by one-half of the conventional models, so the rail can be more accurately installed in position.

(4) High rigidity and load capacity with lower friction

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

(5) Compact design

Reduced body size enables more compact machinery.

(6) High load carrying capacity to vertical direction

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

(7) High resistance against impact load

The bottom ball groove is formed in Gothic arch and the center of the top and bottom grooves are offset as shown in **Fig. 2**. The vertical load is usually carried by top two ball rows at where balls are contacting at two points. Because of this design, the bottom ball rows will carry the load when a large impact load is applied as shown in **Fig. 3**. This

assures high resistance to the impact load. (8) High accuracy at manufacturing

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

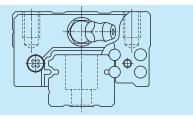


Fig. 1 HS Series

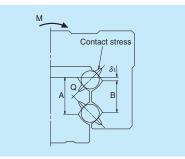


Fig. 2 Enlarged illustration: Offset Gothic arch

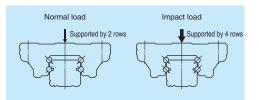
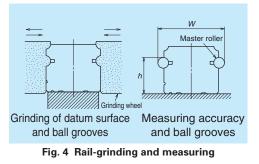


Fig. 3 When load is applied



Measurement results of ball passage vibration

Ball passage vibration can translate into posture changes in the ball slide which result from ball passage (circulation). In the HS Series, this vibration has been substantially reduced to one-third of conventional models.

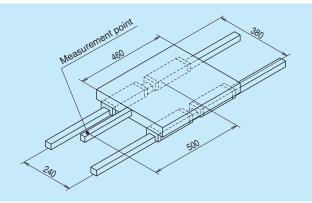


Fig. 5 Schematic view of measurement of ball passage vibration

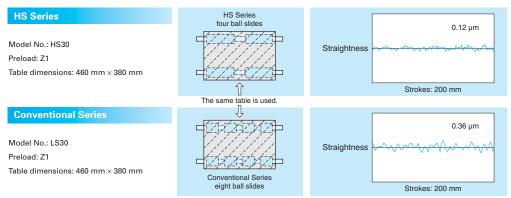
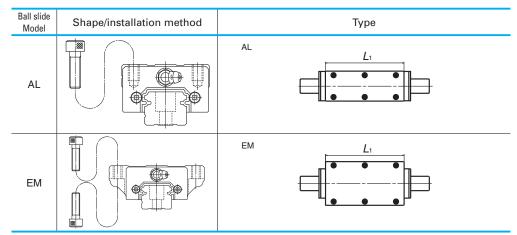


Fig. 6 Measurement results of HS Series and conventional Series

2. Ball slide shape



3. Accuracy and preload

(1) Running parallelism of ball slide

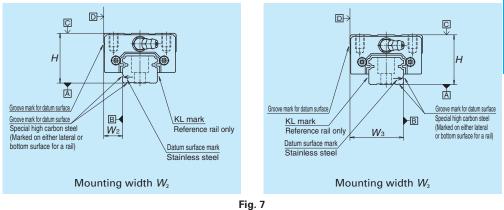
	Tabl	Unit: µm					
	Pre	loaded assembly					
Rail length (mm) over or less	Ultra precision P3	Super precision P4	High precision P5				
- 200	2	2	4				
200 – 250	2	2.5	5				
250 – 315	2	2.5	5				
315 – 400	2	3	6				
400 - 500	2	3	6				
500 - 630	2	3.5	7				
630 - 800	2	4.5	8				
800 - 1 000	2.5	5	9				
1 000 – 1 250	3	6	10				
1 250 – 1 600	4	7	11				
1 600 – 2 000	4.5	8	13				
2 000 – 2 500	5	10	15				
2 500 – 3 150	6	11	17				
3 150 – 4 000	9	16	23				

(2) Accuracy Standard

Three accuracy grades are available: Ultra precision P3, Super precision P4 and High precision P5.

	Table 2		Unit: µm	
Accuracy grade Characteristics	Ultra precision P3	Super precision P4	High precision P5	S SH
Mounting height <i>H</i> Variation of <i>H</i> (All ball slides on a set of rails)	±10 3	±10 5	±20 7	eries
Mounting width W_2 or W_3 Variation of W_2 or W_3 (All ball slides on reference rail)	±15 3	±15 7	±25 10	
Running parallelism of surface C to surface A Running parallelism of surface D to surface B		Refer to Table 1 and Fig . 7	1	

(3) Assembled accuracy



(4) Preload and rigidity

			Table 3								
	Prolo	ad (N)	Rigidity (N/µm)								
Model No.	11010		Vertical	direction	Lateral of	direction					
	Slight preload (Z1)	Medium preload (Z3)	Slight preload (Z1)	Medium preload (Z3)	Slight preload (Z1)	Medium preload (Z3)					
HS15	98	785	260	530	173	355					
HS20	147	1 030	305	600	212	415					
HS25	245	1 620	385	735	263	505					
HS30	390	2 550	505	965	345	665					
HS35	590	3 550	610	1 140	415	780					

Slight preload Z1 and Medium preload Z3 are available for preload, which can be selected for specific applications.

4. Maximum rail length

Table 4 shows the limitation. The dimension in parenthesis is for stainless steel products. However, the limitations vary by accuracy grades.

Table 4 Length limitation of rails											
Series Size	15	20	25	30	35						
HS	2 000 (1 700)	3 960 (3 500)	3 960 (3 500)	4 000 (3 500)	4 000 (3 500)						

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

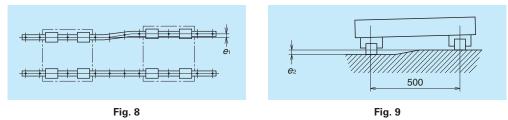
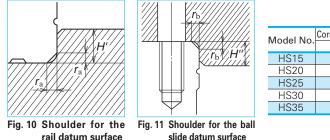


Table 5 Unit: μm											
Value	Preload										
value	Fleioau	HS15	HS20	HS25	HS30	HS35					
Permissible values of	Z1	18	20	26	31	37					
parallelism in two rails e1	Z3	12	14	18	22	26					
Permissible values of parallelism (height) in two rails e ₂	Z1, Z3		330 μm/500 mm								

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



slide datum surface

Table 6	
radius (maximum)	Shoulda

Unit: mm

	Corner radius	s (maximum)	Shoulder height			
Model No. HS15	ľa	ſ	H	Η"		
HS15	0.5	0.5	4	4		
HS20	0.5	0.5	4.5	5		
HS25	0.5	0.5	5	5		
HS30	0.5	0.5	6	6		
HS35	0.5	0.5	6	6		

6. Lubrication components

Refer to pages A38 and D13 for linear guide lubrication.

(1) Types of lubrication accessories

Fig. 12 and Table 7 show grease fittings and tube fittings.

We provide lubrication accessories with extended thread body length (L) for the addition of dust-proof accessories such as NSK K1 lubrication unit, double seal and protector.

We provide a suitable lubrication accessory for the special requirement on dust-proof accessories.

Consult NSK for a lubrication accessory with extended length of thread body for your convenience of replenishing lubricant.

When you require stainless lubrication accessories, please ask NSK.

(2) Mounting position of lubrication accessories

The standard position of grease fittings is the end face of ball slide. We mount them on the side of end cap for an option. (Fig. 13)

Please consult NSK for installation of grease or tube fittings to the ball slide body or the side of end cap.

When using a piping unit with thread of $M6 \times 1$, you require a connector to connect to a grease fitting mounting hole with M6 \times 0.75. The connector is available from NSK.

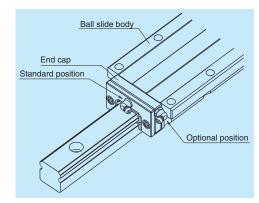


Fig. 13 Mounting position of lubrication accessories

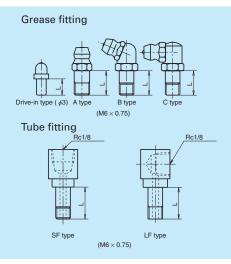


Fig. 12 Grease fitting and tube fitting

	٦	Table 7	Unit: mm	
Model No.	Dust-proof specification	Grease fitting Drive-in	Tube fitting	
	specification	Thread body length L	Thread body length L	
	Standard	5	-	
11015	With NSK K1	10	-	
HS15	Double seal	*	-	
	Protector	*	-	
	Standard	5	-	
HS20	With NSK K1	10	-	
HS20	Double seal	8	-	
	Protector	8	-	
	Standard	5	6	
HS25	With NSK K1	12	11	
H525	Double seal	10	9	
	Protector	10	9	
	Standard	5	6	
HS30	With NSK K1	14	13	
п530	Double seal	12	11	
	Protector	12	11	
	Standard	5	6	
HS35	With NSK K1	14	13	
пэээ	Double seal	12	11	
	Protector	12	11	

*) A connector is required for this model. Please contact NSK.

HS Series

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7. Dust-proof components (1) Standard Specification

The HS Series can be readily used as they have a dust protection means for normal conditions. As the standard equipment, the ball slides have an end seal on both ends.

Bottom seal is equipped on bottom as an option.

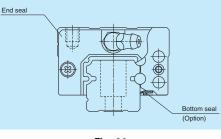


Fig. 14

Table 8 Seal friction per ball slide (maximum): end seal only

					Unit: N
Series Size	15	20	25	30	35
HS	3	3	3	3	4

(2) NSK K1[™] lubrication unit

Refer to Table 9 for dimension of linear guides equipped with the NSK K1 lubrication unit.

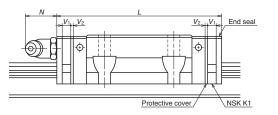


	Table 9											
Model No.	Ball slide model	Standard ball slide length	Ball slide length installed with two NSK K1 L	Per NSK K1 thickness V1	Protective cover thickness V ₂	Protruding area of the grease fitting N						
HS15	AL, EM	106	115.6	4.0	0.8	(5)						
HS20	AL, EM	119.7	130.3	4.5	0.8	(14)						
HS25	AL, EM	148	158.6	4.5	0.8	(14)						
HS30	AL, EM	176.1	188.1	5.0	1.0	(14)						
HS35	AL, EM	203.6	216.6	5.5	1.0	(14)						

Note: Ball slide length equipped with NSK K1 =

(Standard ball slide length) + (Thickness of NSK K1, V1 \times Number of NSK K1) + (Thickness of the protective cover V2 \times 2)

For the HS Series, double seal and protectors can be installed only before shipping from the factory. Please consult with NSK when you require dust tight protection.

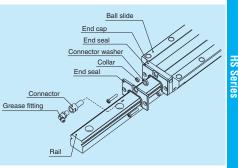
Table 10 shows the increased thickness of $V_{\scriptscriptstyle 3}$ and $V_{\scriptscriptstyle 4}$ when the end seal and the protector are installed.

	Table 10	Unit: mm
Model No.	Thickness	Thickness
would no.	of end seal: $V_{\scriptscriptstyle 3}$	of protector: V_4
HS15	2.8	3
HS20	2.5	2.7
HS25	2.8	3.2
HS30	3.6	4.2
HS35	3.6	4.2

(4) Caps to plug the rail mounting bolt hole

Table 11 Caps to plug rail bolt hole

Model No.	Bolt to	Сар	Quantity
would no.	secure rail	reference No.	/case
HS15	M3	LG-CAP/M3	20
HS15	M4	LG-CAP/M4	20
HS20	M5	LG-CAP/M5	20
HS25, HS30	M6	LG-CAP/M6	20
HS35	M8	LG-CAP/M8	20





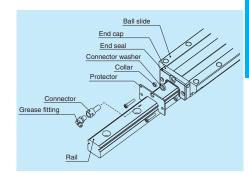


Fig. 16 Protector

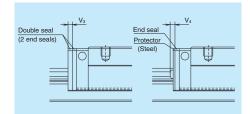


Fig. 17

HS Series

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.

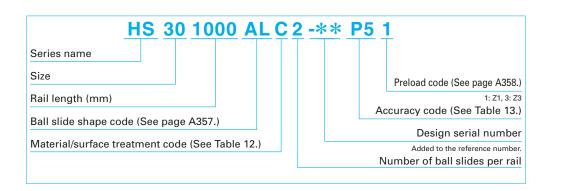


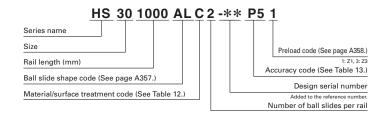
Table 12 Material/surface treatment code

Description
Special high carbon steel (NSK standard)
Stainless steel
Special high carbon steel with surface treatment
Stainless steel with surface treatment
Other, special

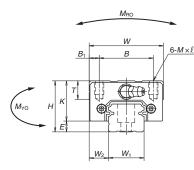
Table 13 Accuracy code									
Accuracy	Standard (Without NSK K1)	With NSK K1							
Ultra precision grade	P3	К3							
Super precision grade	P4	K4							
High precision grade	P5	K5							

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

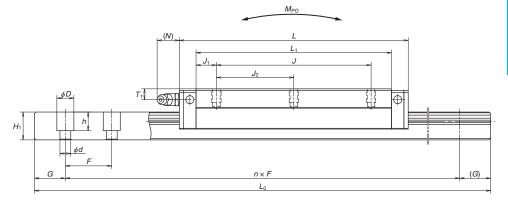
9. Dimensions HS-AL



Front view of AL types



Side view	of Al	_ type
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	A	ssemb	ly		Ball slide												
Model No.	Height			Width	Length		Mo	ounti	ng hole						Grease	fittin	g
woder no.	Н	E	<i>W</i> ₂	W	L	В	J	J_2	$M \times pitch \times \ell$	<i>B</i> ₁	L ₁	J_1	К	Т	Hole size	<i>T</i> ₁	N
HS15AL	24	4.6	9.5	34	106	26	60	30	M4×0.7×6	4	89.2	14.6	19.4	10	ø 3	6	3
HS20AL	28	6	11	42	119.7	32	80	40	M5×0.8×7	5	102.5	11.25	22	12	M6×0.75	5.5	11
HS25AL	33	7	12.5	48	148	35	100	50	M6×1×9	6.5	126.4	13.2	26	12	M6×0.75	7	11
HS30AL	42	9	16	60	176.1	40	120	60	M8×1.25×12	10	150.7	15.35	33	13	M6×0.75	8	11
HS35AL	48	10.5	18	70	203.6	50	140	70	M8×1.25×12	10	175.6	17.8	37.5	14	M6×0.75	8.5	11

Notes: 1) The HS Series does not have a ball retainer. Be aware that balls fall out when the ball slide is withdrawn from the rail. 2) External appearance of stainless steel ball slides differ from those of carbon steel ball slide.

			Rail	Basic load rating								Weight		
Width	Height	Pitch	Mounting	Mounting G Maximum Dynamic Static Static moment (N·m)							Ball	Rail		
			Bolt hole		length L _{omax}	С	<i>C</i> ₀	M _{RO}	N	1 _{PO}	1 _{YO}	slide		
W_1	H_1	F	$d \times D \times h$	(Reference)	() for stainless	(N)	(N)		One slide	Two slides	One slide	Two slides	(g)	(kg/m)
15	12.5	30	*3.5×6×8.5 4.5×7.5×8.5	20	2 000 (1 700)	15 300	40 000	199	395	1 990	335	1 670	0.34	1.4
20	15.5	30	6×9.5×10.5	20	3 960 (3 500)	20 400	52 000	350	590	2 930	495	2 460	0.52	2.3
23	18	30	7×11×12	20	3 960 (3 500)	32 000	78 000	605	1 090	5 450	910	4 600	0.85	3.1
28	23	40	7×11×16	20	4 000 (3 500)	51 500	127 000	1 190	2 120	10 600	1 780	8 850	1.7	4.8
34	27.5	40	9×14×20	20	4 000 (3 500)	71 500	172 000	1 980	3 350	16 600	2 820	13 900	2.5	7.0

 Basic dynamic load rating is a load that allows for a 50-km rating fatigue life and is a vertical and constant load on the ball slide mounting surface. To convert C to C₁₀₀ for a 100-km rating fatigue life, divide C by 1.26.

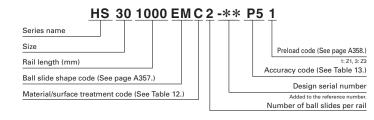
4) Parenthesized dimensions are applicable to stainless steel products.

*) Standard rail mounting bolt hole for HS15 is specified as hole for M3 (3.5 × 6 × 8.5). Please contact us to request a different hole for M4 (4.5 × 7.5 × 8.5).

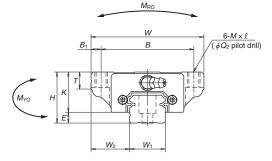
NSK

Unit: mm

HS-EM



Front view of EM type



		Side view of EM type	
		M _{PO}	
		$\begin{bmatrix} (N) \\ - & L \\ - & - \\ - & $	
H ₁			
	<i>φd</i> <i>F</i>	n× F	(G)
	- G	L_0	+= (G) >

	А	ssem	ıbly							Ball s	lide							
Model No.	Height			Width	Length			Μ	ounting hole							Grease	fittin	ıg
woder no.	H E W ₂		W	WL		J	J_2	$M \times \text{pitch} \times \ell$	<i>Q</i> ₂	<i>B</i> ₁	L ₁	L ₁ J ₁		Т	Hole size	<i>T</i> ₁	N	
HS15EM	24	4.6	18.5	52	106	41	60	30	M5×0.8×7	4.4	5.5	89.2	14.6	19.4	8	ø 3	6	3
HS20EM	28	6	19.5	59	119.7	49	80	40	M6×1×9 (M6×1×9.5)	5.3	5	102.5	11.25	22	10	M6×0.75	5.5	11
HS25EM	33	7	25	73	148	60	100	50	M8×1.25×10 (M8×1.25×11.5)	6.8	6.5	126.4	13.2	26	11 (12)	M6×0.75	7	11
HS30EM	42	9	31	90	176.1	72	120	60	M10×1.5×12 (M10×1.5×14.5)	8.6	9	150.7	15.35	33	11 (15)	M6×0.75	8	11
HS35EM	48	10.5	33	100	203.6	82	140	70	M10×1.5×13 (M10×1.5×14.5)	8.6	9	175.6	17.8	37.5	12 (15)	M6×0.75	8.5	11

Notes: 1) The HS Series does not have a ball retainer. Be aware that balls fall out when the ball slide is withdrawn from the rail. 2) External appearance of stainless steel ball slides differ from those of carbon steel ball slide.

			Rail	Basic load rating								Weight		
Width	Height	Pitch	Mounting	G	Maximum length	Dynamic	Static	Static moment (N·m)					Ball	Rail
			Bolt hole		L _{Omax}	С	<i>C</i> ₀	$M_{\rm RO}$	D <i>M</i> _{PO} <i>M</i> _{YO}					
W_1	H_1	F	$d \times D \times h$	(Reference)	() for stainless	(N)	(N)		One slide	Two slides	One slide	Two slides	(kg)	(kg/m)
15	12.5	30	*3.5×6×8.5 4.5×7.5×8.5	20	2 000 (1 700)	15 300	40 000	199	395	1 990	335	1 670	0.45	1.4
20	15.5	30	6×9.5×10.5	20	3 960 (3 500)	20 400	52 000	350	590	2 930	495	2 460	0.67	2.3
23	18	30	7×11×12	20	3 960 (3 500)	32 000	78 000	605	1 090	5 450	910	4 600	1.3	3.1
28	23	40	7×11×16	20	4 000 (3 500)	51 500	127 000	1 190	2 120	10 600	1 780	8 850	2.4	4.8
34	27.5	40	9×14×20	20	4 000 (3 500)	71 500	172 000	1 980	3 350	16 600	2 820	13 900	3.4	7.0

 Basic dynamic load rating is a load that allows for a 50-km rating fatigue life and is a vertical and constant load to the ball slide mounting surface. To convert C to C₁₀₀ for a 100-km rating fatigue life, divide C by 1.26.

4) Parenthesized dimensions are applicable to stainless steel products.

*) Standard rail mounting bolt hole for HS15 is specified as hole for M3 (3.5 × 6 × 8.5). Please contact us to request a different hole for M4 (4.5 × 7.5 × 8.5).