A-5-4.1 HA Series

1. Features

(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 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 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.

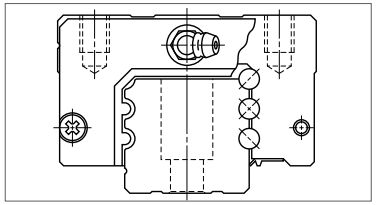


Fig. 1 HA Series

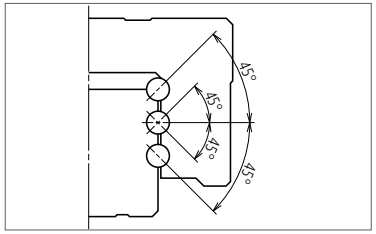


Fig. 2 Super rigidity design

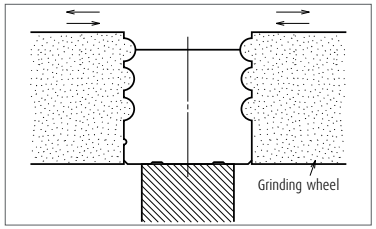


Fig. 3 Rail grinding

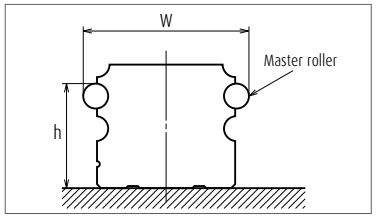


Fig. 4 Measuring groove accuracy

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.

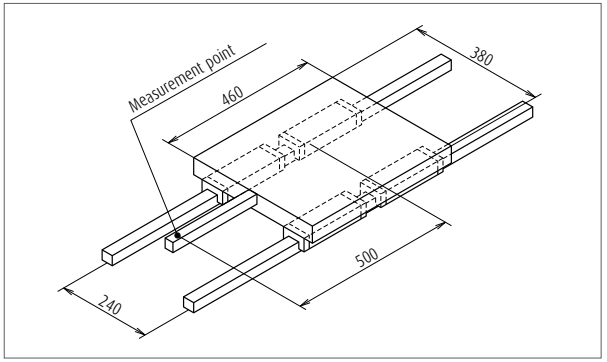


Fig. 5 Schematic view of measurement of ball passage vibration

HA Series

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

Conventional Series

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

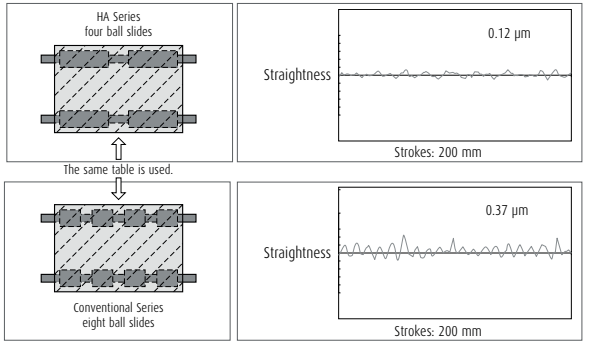
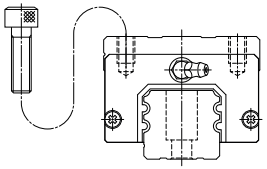
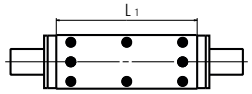
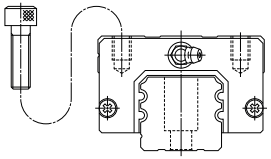
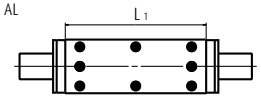
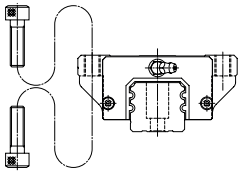
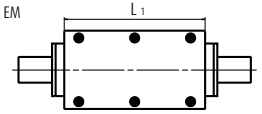


Fig. 6 Measurement results of HA Series and conventional Series

2. Ball slide shape

Ball slide Model	Shape/installation method	Type
AN		AN 
AL		AL 
EM		EM 

3. Accuracy and preload

(1) Running parallelism of ball slide

Table 1

Unit: μm

Rail length (mm) over	Rail length (mm) or less	Preloaded assembly: Ultra precision P3	Preloaded assembly: Super precision P4	Preloaded assembly: 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

Characteristics \ Accuracy grade	Ultra precision P3	Super precision P4	High precision P5
Mounting height H	±10	±10	±20
Variation of H (All ball slides on a set of rails)	3	5	7
Mounting width W2 or W3	±15	±15	±25
Variation of W2 or W3 (All ball slides on reference rail)	3	7	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

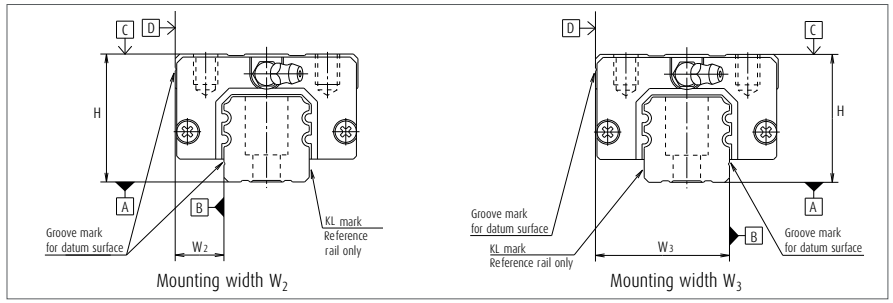


Fig. 7

(4) Preload and rigidity

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

Table 3

Model No.	Preload (N): Slight preload (Z1)	Preload (N): Medium preload (Z3)	Rigidity (N/μm): Slight preload (Z1)	Rigidity (N/μm): 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 limitation. The dimension in parenthesis is for stainless steel products. 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

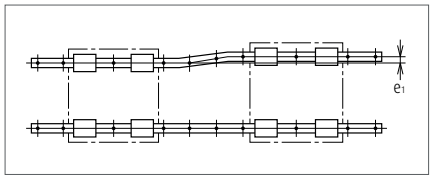


Fig. 8

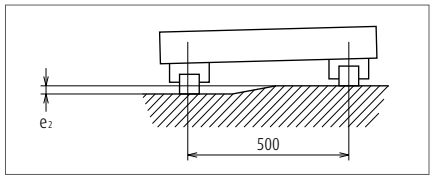


Fig. 9

Table 5

Unit: μm

Value	Preload	Model No.				
		HA25	HA30	HA35	HA45	HA55
Permissible values of parallelism in two rails e_1	Z1	20	20	23	26	34
	Z3	15	14	17	19	25
Permissible values of parallelism (height) in two rails e_2	Z1, Z3	250 μm/500 mm				

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

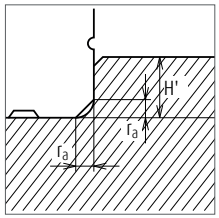


Fig. 10 Shoulder for the rail datum surface

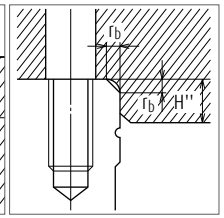


Fig. 11 Shoulder for the ball slide datum surface

Table 6

Unit: mm

Model No.	Corner radius (maximum)		Shoulder height	
	r_a	r_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

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 × 1, you require a connector to connect to a grease fitting mounting hole with M6 × 0.75. The connector is available from NSK.

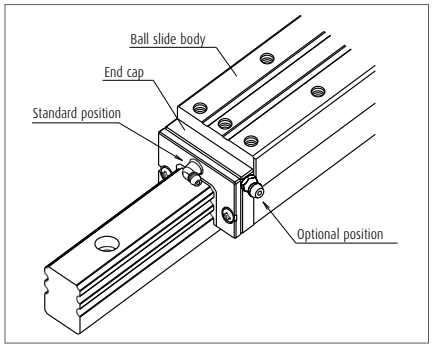


Fig. 13 Mounting position of lubrication accessories

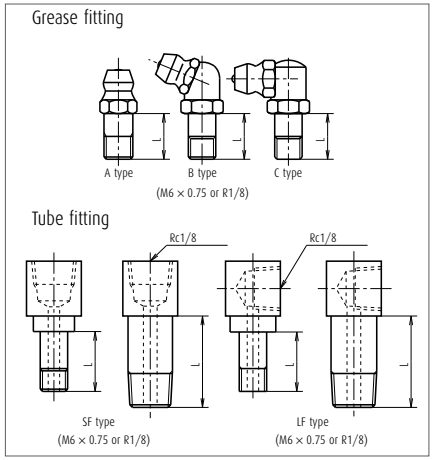


Fig. 12 Grease fitting and tube fitting

Table 7

Unit: mm

Model No.	Dust-proof specification	Dimension L		
		Grease fitting	Tube fitting	
			SF Type	LF Type
HA25	Standard	5	5	5
HA25	With NSK K1	14	12	12
HA25	Double seal	10	9	9
HA25	Protector	10	9	9
HA30	Standard	5	6	6
HA30	With NSK K1	14	12	13
HA30	Double seal	12	10	11
HA30	Protector	12	11	11
HA35	Standard	5	6	6
HA35	With NSK K1	14	12	13
HA35	Double seal	12	10	11
HA35	Protector	12	11	11
HA45	Standard	8	13.5	17
HA45	With NSK K1	18	22	21.5
HA45	Double seal	14	18	17
HA45	Protector	14	16	17
HA55	Standard	8	13.5	17
HA55	With NSK K1	18	22	21.5
HA55	Double seal	14	18	17
HA55	Protector	14	16	17

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.

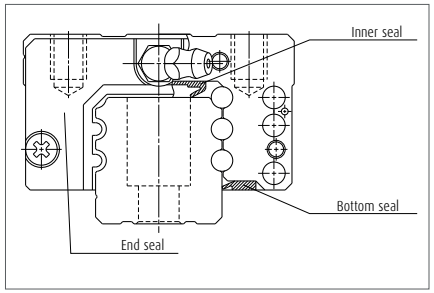


Fig. 14

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.

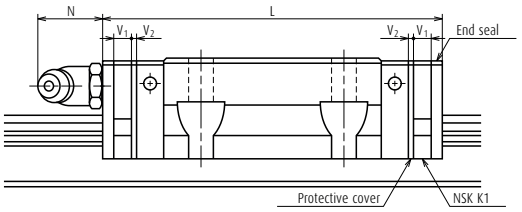


Table 9

Unit: mm

Model No.	Ball slide model	Standard ball slide length	Ball slide length installed with two NSK K1 L	Per NSK K1 thickness V_1	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 × Number of NSK K1) + (Thickness of the protective cover V_2 × 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_3, and V_4 when the end seal and the protector are installed.

Table 10

Unit: mm

Model No.	Thickness of end seal: V_3	Thickness 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

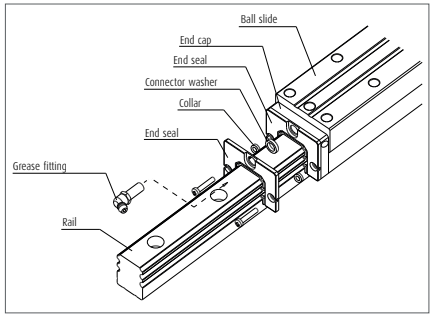


Fig. 15 Double seal

(4) Caps to plug the rail mounting bolt hole

Table 11 Caps to plug rail bolt hole

Model No.	Bolt to secure rail	Cap reference No.	Quantity /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

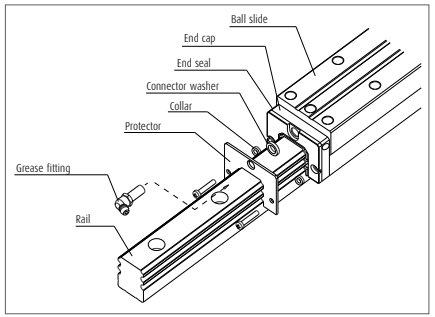


Fig. 16 Protector

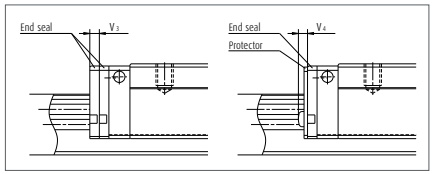


Fig. 17

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.

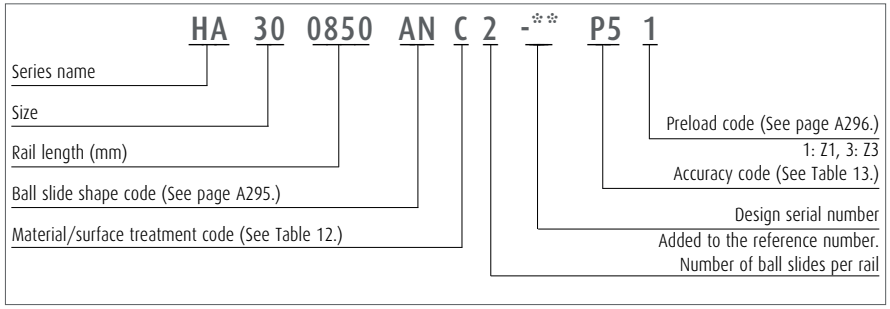


Table 12 Material/surface treatment code

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

Table 13 Accuracy code

Accuracy	Standard (Without NSK K1)	With NSK K1
Ultra precision grade	P3	K3
Super precision grade	P4	K4
High precision grade	P5	K5

Note Refer to page A38 for NSK K1 lubrication unit.

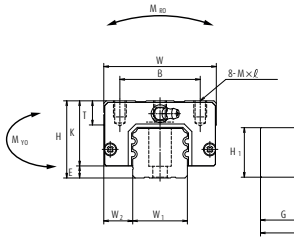
9. Dimensions

HA-AN
HA-AL

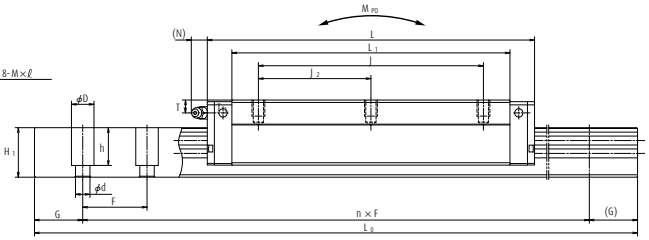
HA 30 0850 AN C 2 -** P5 1

- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A295.)
- Material/surface treatment code (See Table 12.)
- Number of ball slides per rail
- Added to the reference number.
- Design serial number
- Accuracy code (See Table 13.)
- Preload code (See page A296.) 1: Z1, 3: Z3

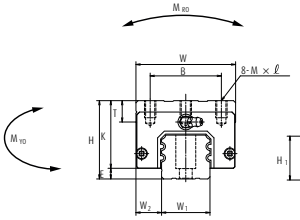
Front view of AL type



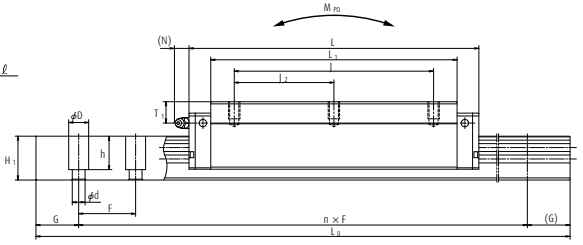
Side view of AL type



Front view of AN type



Side view of AN type



Unit: mm

Model No.	Assembly			Ball slide											Rail	
	Height			Width	Length	Mounting hole							Grease fitting			Width	Height
	H	E	W_2	W	L	B	J	J_2	M × pitch × ℓ	L_1	K	T	Hole size	T_1	N	W_1	H_1
HA25AN	40	5.5	12.5	48	147.8	35	100	50	M6×1.0×10	126	34.5	12	M6×0.75	10	11	23	22
HA30AN	45	7.5	16	60	177.2	40	120	60	M8×1.25×11	149	37.5	14	M6×0.75	9.5	11	28	28
HA35AN	55	7.5	18	70	203.6	50	140	70	M8×1.25×12	173	47.5	15	M6×0.75	15	11	34	30.8
HA35AL	48	7.5	18	70	203.6	50	140	70	M8×1.25×10	173	40.5	15	M6×0.75	8	11	34	30.8
HA45AN	70	10	20.5	86	233.4	60	160	80	M10×1.5×16	197	60	17	Rc1/8	20	13	45	36
HA45AL	60	10	20.5	86	233.4	60	160	80	M10×1.5×16	197	50	17	Rc1/8	10	13	45	36
HA55AN	80	12	23.5	100	284.4	75	206	103	M12×1.75×18	245	68	18	Rc1/8	21	13	53	43.2
HA55AL	70	12	23.5	100	284.4	75	206	103	M12×1.75×16	245	58	18	Rc1/8	11	13	53	43.2

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 load rating							Weight	
Pitch	Mounting bolt hole	G	Maximum length	2)Dynamic		Static	Static moment (N·m)				Ball slide	Rail
F	d × D × h	(reference)	$L_{0max.}$	[50km] C_{50}(N)	[100km] C_{100}(N)	C_0 (N)	M_{RO}	M_{PO}		M_{YO}	(kg)	(kg/m)
								One slide	Two slides	One slide Two slides		
30	7×11×16.5	20	3 960	54 000	43 000	115 000	670	2 060	10 100	2 060 10 100	1.2	3.7
40	9×14×21	20	4 000	79 500	63 500	166 000	1 140	3 550	17 400	3 550 17 400	1.8	5.8
40	9×14×23.5	20	4 000	111 000	88 000	226 000	1 950	5 650	27 100	5 650 27 100	3.0	7.7
40	9×14×23.5	20	4 000	111 000	88 000	226 000	1 950	5 650	27 100	5 650 27 100	2.6	7.7
52.5	14×20×27	22.5	3 990	147 000	117 000	295 000	3 700	8 450	40 500	8 450 40 500	6.0	12.0
52.5	14×20×27	22.5	3 990	147 000	117 000	295 000	3 700	8 450	40 500	8 450 40 500	5.0	12.0
60	16×23×32.5	30	3 960	232 000	184 000	445 000	6 500	15 400	75 000	15 400 75 000	9.4	17.2
60	16×23×32.5	30	3 960	232 000	184 000	445 000	6 500	15 400	75 000	15 400 75 000	7.8	17.2

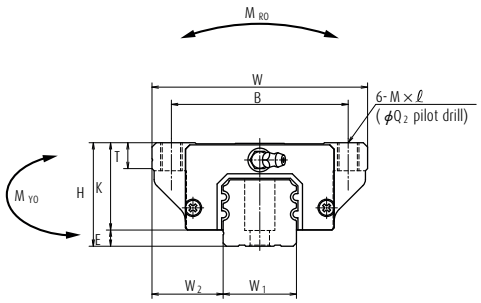
2) The basic load rating comply with the ISO standard. (ISO 14728-1, 14728-2)
C_{50}; the basic dynamic load rating for 50 km rated fatigue life C_{100}; the basic dynamic load rating for 100 km rated fatigue life

HA-EM

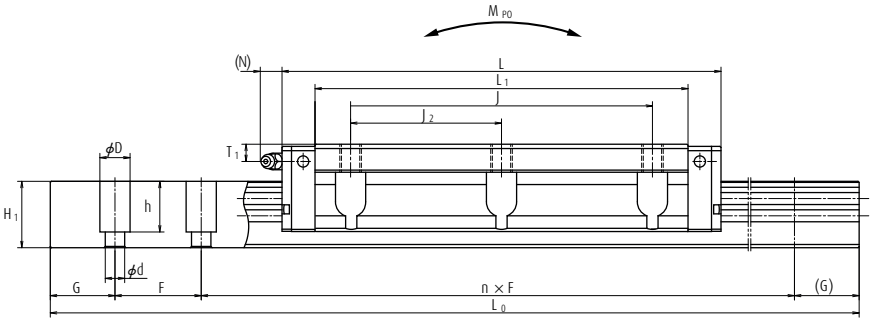
HA 30 0850 EM C 2 -** P5 1

- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A295.)
- Material/surface treatment code (See Table 12.)
- Number of ball slides per rail
- Design serial number (Added to the reference number.)
- Accuracy code (See Table 13.) (1: Z1, 3: Z3)
- Preload code (See page A296.)

Front view of EM type



Side view of EM type



Unit: mm

Model No.	Assembly			Ball slide												Rail	
	Height			Width	Length	Mounting hole								Grease fitting			Width	Height
	H	E	W_2	W	L	B	J	J_2	M × pitch × ℓ	Q_1	L_1	K	T	Hole size	T_1	N	W_1	H_1
HA25EM	36	5.5	23.5	70	147.8	57	100	50	M8×1.25×10	6.8	126	30.5	11	M6×0.75	6	11	23	22
HA30EM	42	7.5	31	90	177.2	72	120	60	M10×1.5×12	8.6	149	34.5	11	M6×0.75	6.5	11	28	28
HA35EM	48	7.5	33	100	203.6	82	140	70	M10×1.5×13	8.6	173	40.5	12	M6×0.75	8	11	34	30.8
HA45EM	60	10	37.5	120	233.4	100	160	80	M12×1.75×15	10.5	197	50	13	Rc1/8	10	13	45	36
HA55EM	70	12	43.5	140	284.4	116	206	103	M14×2×18	12.5	245	58	15	Rc1/8	11	13	53	43.2

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 load rating							Weight	
Pitch	Mounting bolt hole	G	Maximum length	2)Dynamic		Static	Static moment (N-m)				Ball slide	Rail
F	d × D × h	(reference)	$L_{0max.}$	[50km] C_{50}(N)	[100km] C_{100}(N)	C_0 (N)	M_{RO}	M_{PO}		M_{YO}	(kg)	(kg/m)
								One slide	Two slides	One slide Two slides		
30	7×11×16.5	20	3 960	54 000	43 000	115 000	670	2 060	10 100	2 060 10 100	1.6	3.7
40	9×14×21	20	4 000	79 500	63 500	166 000	1 140	3 550	17 400	3 550 17 400	2.6	5.8
52.5	9×14×23.5	20	4 000	111 000	88 000	226 000	1 950	5 650	27 100	5 650 27 100	3.8	7.7
60	14×20×27	22.5	3 990	147 000	117 000	295 000	3 700	8 450	40 500	8 450 40 500	6.6	12.0
60	16×23×32.5	30	3 960	232 000	184 000	445 000	6 500	15 400	75 000	15 400 75 000	11	17.2

2) The basic load rating comply with the ISO standard. (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

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 ultra-long 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.

(9) Improve rating life dramatically

New ball groove geometry is introduced, which has been developed by utilizing NSK's state-of-the-art tribological and analytical technologies. Due to the optimized distribution of contact surface pressures, the rating life has dramatically increased.
As compared with the conventional products, the load rating capacity has increased to 1.3 times, while the life span has increased to twice*1.

*1: Representative values of series.

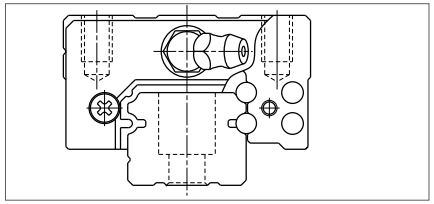


Fig. 1 HS Series

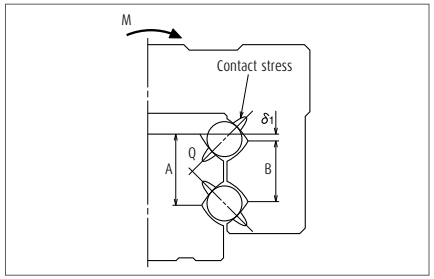


Fig. 2 Enlarged illustration: Offset Gothic arch

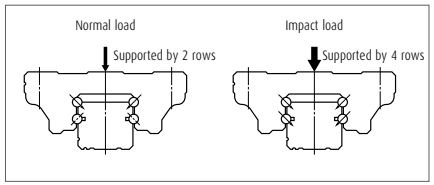


Fig. 3 When load is applied

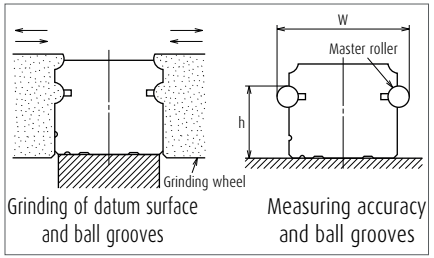


Fig. 4 Rail-grinding and measuring

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.

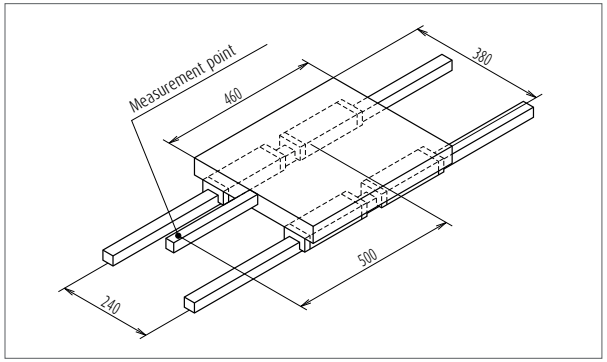


Fig. 5 Schematic view of measurement of ball passage vibration

HS Series

Model No.: HS30
Preload: Z1
Table dimensions: 460 mm × 380 mm

Conventional Series

Model No.: LS30
Preload: Z1
Table dimensions: 460 mm × 380 mm

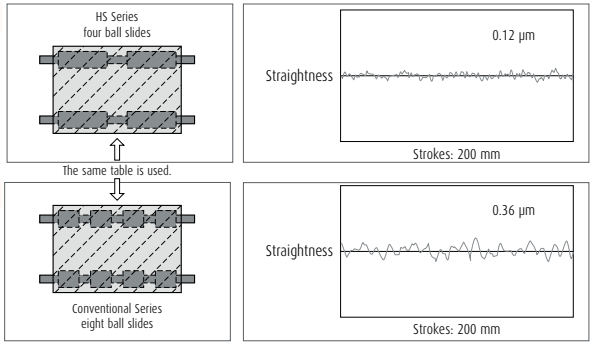
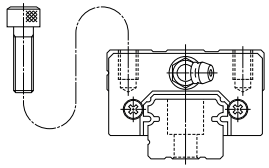
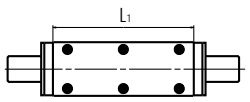
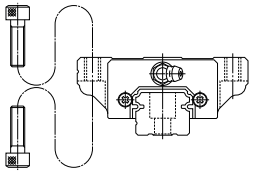
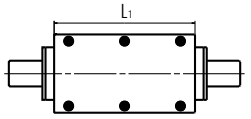


Fig. 6 Measurement results of HS Series and conventional Series

2. Ball slide shape

Ball slide Model	Shape/installation method	Type
AL		AL 
EM		EM 

3. Accuracy and preload

(1) Running parallelism of ball slide

Table 1

Unit: μm

Rail length (mm) over	Rail length (mm) or less	Preloaded assembly: 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

Characteristics \ Accuracy grade	Ultra precision P3	Super precision P4	High precision P5
Mounting height H	±10	±10	±20
Variation of H (All ball slides on a set of rails)	3	5	7
Mounting width W2 or W3	±15	±15	±25
Variation of W2 or W3 (All ball slides on reference rail)	3	7	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

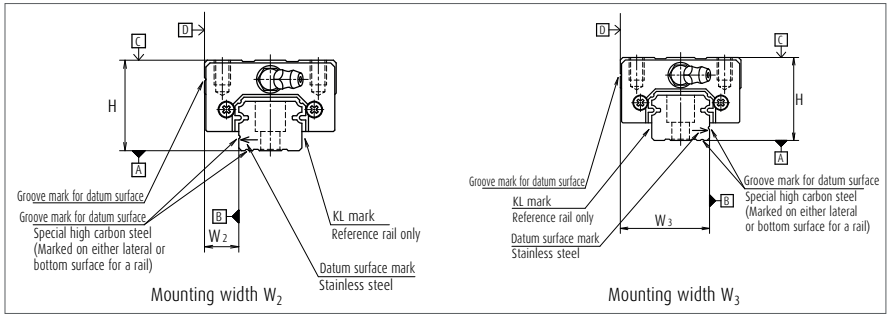


Fig. 7

(4) Preload and rigidity

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

Table 3

Model No.	Preload (N)		Rigidity (N/μm)			
			Vertical direction		Lateral 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

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 2

Unit: mm

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

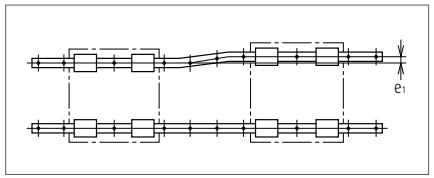


Fig. 8

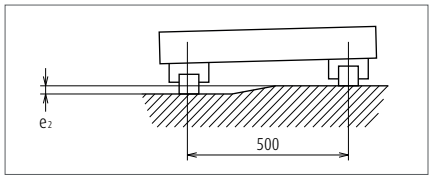


Fig. 9

Table 5

Unit: μm

Value	Preload	Model No.				
		HS15	HS20	HS25	HS30	HS35
Permissible values of parallelism in two rails e_1	Z1	18	20	26	31	37
	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

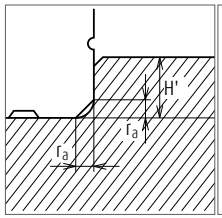


Fig. 10 Shoulder for the rail datum surface

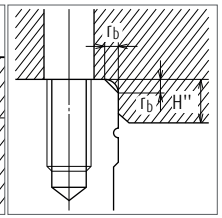


Fig. 11 Shoulder for the ball slide datum surface

Table 6

Unit: mm

Model No.	Corner radius (maximum)		Shoulder height	
	r_a	r_b	H'	H"
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 × 1, you require a connector to connect to a grease fitting mounting hole with M6 × 0.75. The connector is available from NSK.

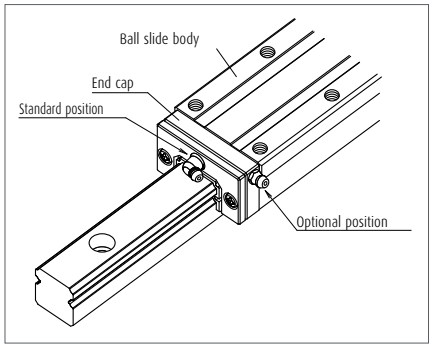


Fig. 13 Mounting position of lubrication accessories

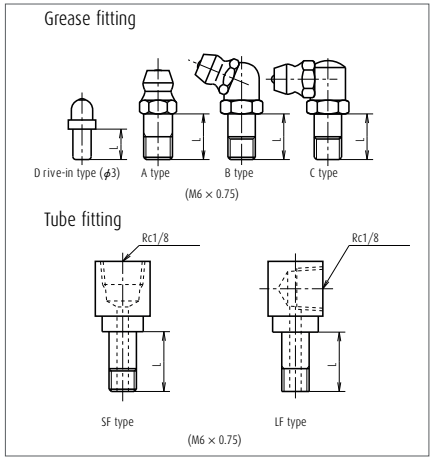


Fig. 12 Grease fitting and tube fitting

Table 7

Unit: mm

Model No.	Dust-proof specification	Dimension L		
		Grease fitting /Drive-in type	Tube fitting	
			SF Type	LF Type
HS15	Standard	5	–	–
HS15	With NSK K1	10	–	–
HS15	Double seal	*)	–	–
HS15	Protector	*)	–	–
HS20	Standard	5	–	–
HS20	With NSK K1	10	–	–
HS20	Double seal	8	–	–
HS20	Protector	8	–	–
HS25	Standard	5	6	6
HS25	With NSK K1	12	11	11
HS25	Double seal	10	9	9
HS25	Protector	10	9	9
HS30	Standard	5	6	6
HS30	With NSK K1	14	12	13
HS30	Double seal	12	10	11
HS30	Protector	12	10	11
HS35	Standard	5	6	6
HS35	With NSK K1	14	12	13
HS35	Double seal	12	10	11
HS35	Protector	12	10	11

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

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.

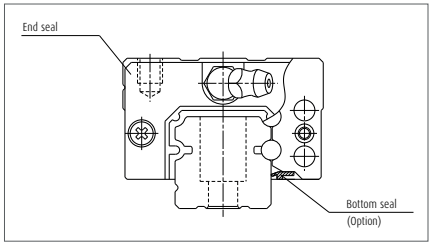


Fig. 14

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.

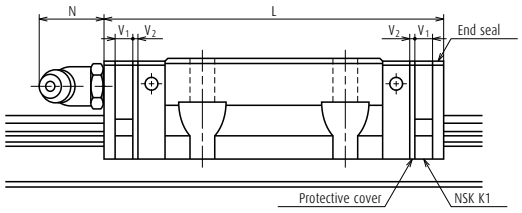


Table 9

Unit: mm

Model No.	Ball slide model	Standard ball slide length	Ball slide length installed with two NSK K1 L	Per NSK K1 thickness V_1	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, V_1 × Number of NSK K1) + (Thickness of the protective cover V_2 × 2)

(3) Double seal and protector

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_3 and V_4 when the end seal and the protector are installed.

Table 10

Unit: mm

Model No.	Thickness of end seal: V_3	Thickness 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 secure rail	Cap reference No.	Quantity /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

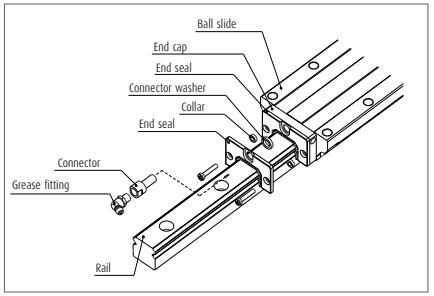


Fig. 15 Double seal

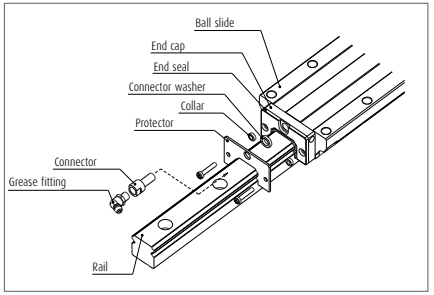


Fig. 16 Protector

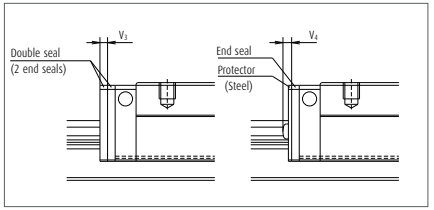


Fig. 17

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.

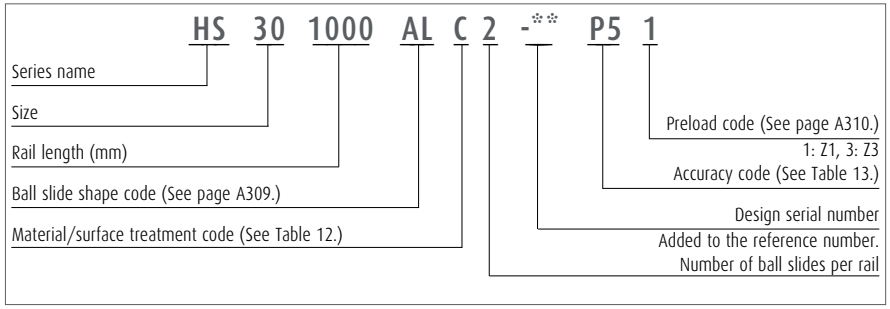


Table 12 Material/surface treatment code

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 13 Accuracy code

Accuracy	Standard (Without NSK K1)	With NSK K1
Ultra precision grade	P3	K3
Super precision grade	P4	K4
High precision grade	P5	K5

Note Refer to page A38 for NSK K1 lubrication unit.

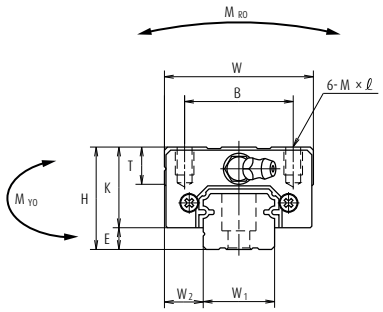
9. Dimensions

HS-AL

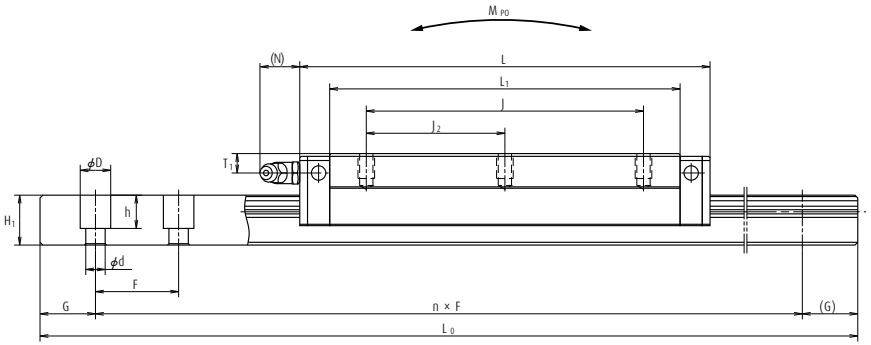
HS 30 1000 AL C 2 -** P5 1

- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A309.)
- Material/surface treatment code (See Table 12.)
- Added to the reference number. Number of ball slides per rail
- Design serial number
- Accuracy code (See Table 13.)
- Preload code (See page A310.) 1: Z1, 3: Z3

Front view of AL types



Side view of AL type



Unit: mm

Model No.	Assembly			Ball slide											Width	Height
	Height			Width	Length	Mounting hole							Grease fitting				
	H	E	W_2	W	L	B	J	J_2	M × pitch × ℓ	L_1	K	T	Hole size	T_1	N	W_1	H_1
HS15AL	24	4.6	9.5	34	106	26	60	30	M4×0.7×6	89.2	19.4	10	φ3	6	3	15	12.5
HS20AL	28	6	11	42	119.7	32	80	40	M5×0.8×7	102.5	22	12	M6×0.75	5.5	11	20	15.5
HS25AL	33	7	12.5	48	148	35	100	50	M6×1×9	126.4	26	12	M6×0.75	7	11	23	18
HS30AL	42	9	16	60	176.1	40	120	60	M8×1.25×12	150.7	33	13	M6×0.75	8	11	28	23
HS35AL	48	10.5	18	70	203.6	50	140	70	M8×1.25×12	175.6	37.5	14	M6×0.75	8.5	11	34	27.5

Note 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	
Pitch F	Mounting bolt hole d × D × h	G (reference)	Max. length $L_{0max.}$ ( ) for stainless	3)Dynamic [50km] C_{50}(N)	3)Dynamic [100km] C_{100}(N)	Static C_0 (N)	Static moment (N·m) M_{RO}	M_{PO} One slide	M_{PO} Two slides	M_{YO} One slide	M_{YO} Two slides	Ball slide (kg)	Rail (kg/m)
30	*3.5×6×8.5 4.5×7.5×8.5	20	2 000 (1 700)	20 500	16 300	40 000	199	395	1 990	335	1 670	0.34	1.4
30	6×9.5×10.5	20	3 960 (3 500)	27 300	21 600	52 000	350	590	2 930	495	2 460	0.52	2.3
30	7×11×12	20	3 960 (3 500)	44 500	35 000	78 000	605	1 090	5 450	910	4 600	0.85	3.1
40	7×11×16	20	4 000 (3 500)	68 000	54 000	127 000	1 190	2 120	10 600	1 780	8 850	1.7	4.8
40	9×14×20	20	4 000 (3 500)	94 500	75 000	172 000	1 980	3 350	16 600	2 820	13 900	2.5	7.0

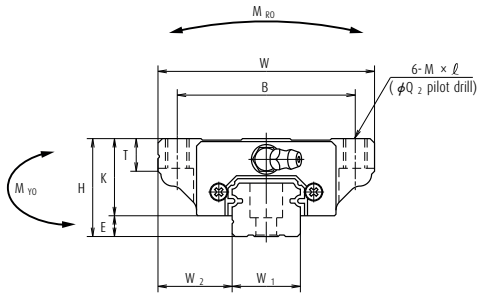
3) The basic load rating comply with the ISO standard. (ISO 14728-1, 14728-2)
C_{50}; the basic dynamic load rating for 50 km rated fatigue life C_{100}; the basic dynamic load rating for 100 km rated fatigue life
The basic static load rating shows static permissible load.
4) Parenthesized dimensions 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).

HS-EM

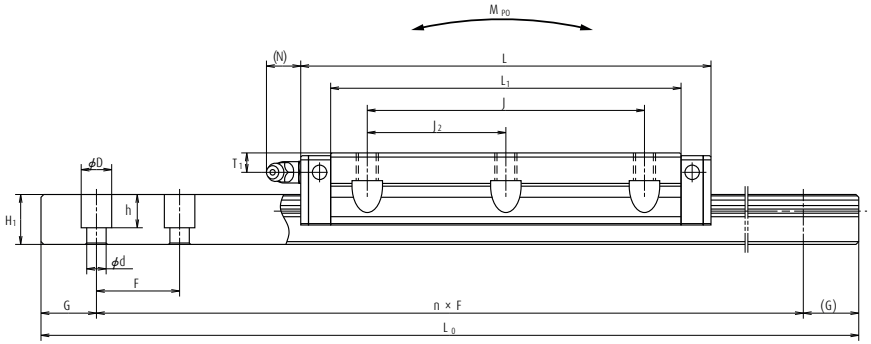
HS 30 1000 EM C 2 -** P5 1

- Series name
- Size
- Rail length (mm)
- Ball slide shape code (See page A309.)
- Material/surface treatment code (See Table 12.)
- Number of ball slides per rail
- Added to the reference number.
- Design serial number
- Accuracy code (See Table 13.)
- Preload code (See page A310.) 1: Z1, 3: Z3

Front view of EM type



Side view of EM type



Unit: mm

Model No.	Assembly			Ball slide												Width	Height
	Height			Width	Length	Mounting hole							Grease fitting				
	H	E	W_2	W	L	B	J	J_2	M × pitch × ℓ	Q_2	L_1	K	T	Hole size	T_1	N	W_1	H_1
HS15EM	24	4.6	18.5	52	106	41	60	30	M5×0.8×7	4.4	89.2	19.4	8	φ3	6	3	15	12.5
HS20EM	28	6	19.5	59	119.7	49	80	40	M6×1×9 (M6×1×9.5)	5.3	102.5	22	10	M6×0.75	5.5	11	20	15.5
HS25EM	33	7	25	73	148	60	100	50	M8×1.25×10 (M8×1.25×11.5)	6.8	126.4	26	11 (12)	M6×0.75	7	11	23	18
HS30EM	42	9	31	90	176.1	72	120	60	M10×1.5×12 (M10×1.5×14.5)	8.6	150.7	33	11 (15)	M6×0.75	8	11	28	23
HS35EM	48	10.5	33	100	203.6	82	140	70	M10×1.5×13 (M10×1.5×14.5)	8.6	175.6	37.5	12 (15)	M6×0.75	8.5	11	34	27.5

Note 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	
Pitch	Mounting bolt hole	G	Max. length	3)Dynamic		Static	Static moment (N·m)				Ball slide (kg)	Rail (kg/m)
F	d × D × h	(reference)	$L_{0max.}$ ( ) for stainless	[50km] C_{50}(N)	[100km] C_{100}(N)	C_0 (N)	M_{RO}	M_{PO}		M_{YO}		
								One slide	Two slides	One slide	Two slides	
30	*3.5×6×8.5 4.5×7.5×8.5	20	2 000 (1 700)	20 500	16 300	40 000	199	395	1 990	335	1 670	0.45	1.4
30	6×9.5×10.5	20	3 960 (3 500)	27 300	21 600	52 000	350	590	2 930	495	2 460	0.67	2.3
30	7×11×12	20	3 960 (3 500)	44 500	35 000	78 000	605	1 090	5 450	910	4 600	1.3	3.1
40	7×11×16	20	4 000 (3 500)	68 000	54 000	127 000	1 190	2 120	10 600	1 780	8 850	2.4	4.8
40	9×14×20	20	4 000 (3 500)	94 500	75 000	172 000	1 980	3 350	16 600	2 820	13 900	3.4	7.0

3) The basic load rating comply with the ISO standard. (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
The basic static load rating shows static permissible load.
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).