THK

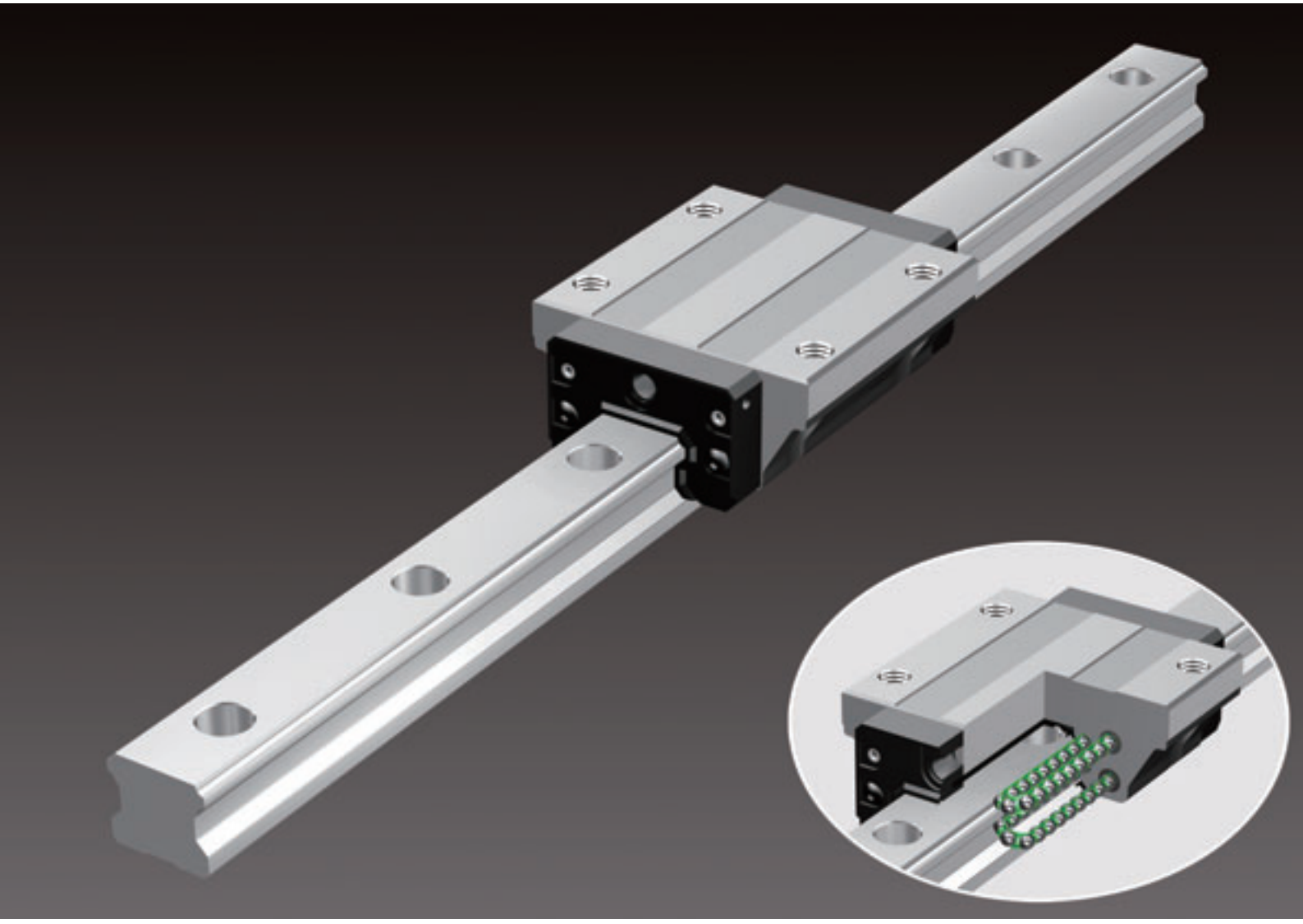
Caged Ball™

Compliant with
New Accuracy Standards

Caged Ball LM Guide

Ball Cage Effect
Global Standard Size

SHS



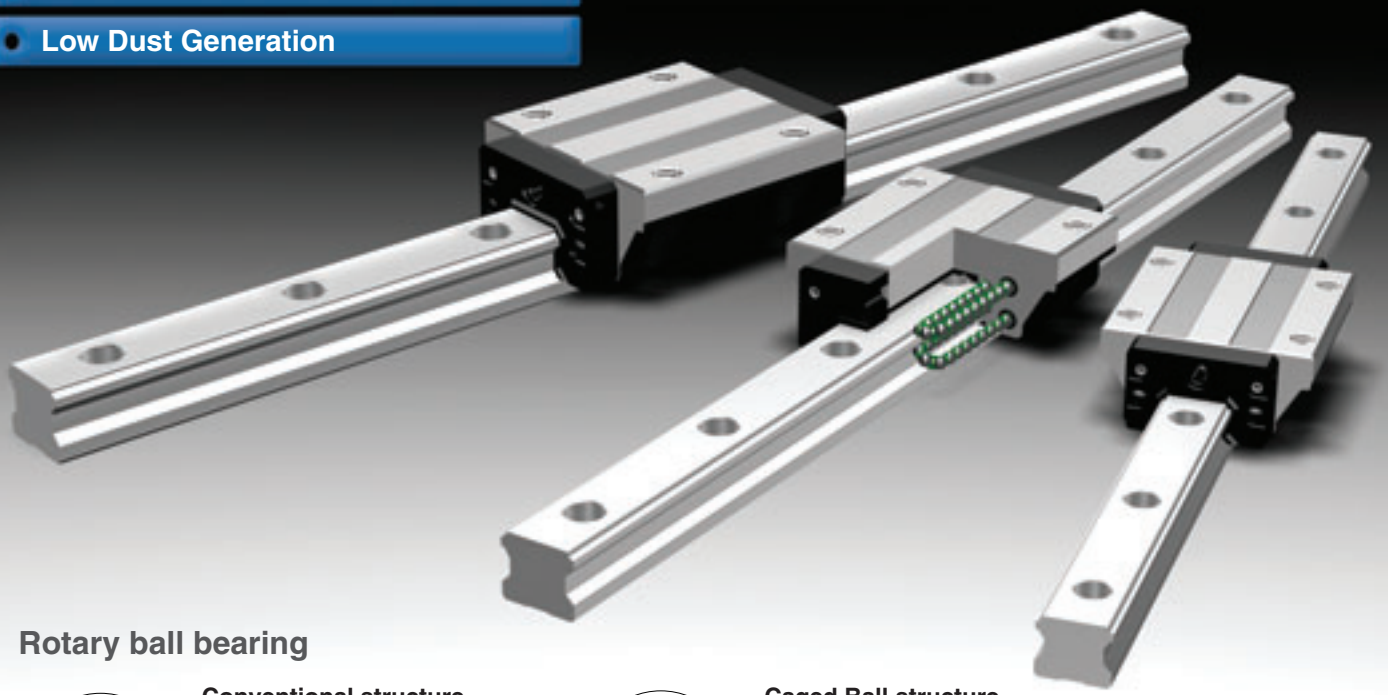
THK CO., LTD.
TOKYO. JAPAN

CATALOG No.235-13E

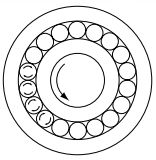
Ball Cage Effect

The early forms of ball bearings were full-ball types without ball cages. Friction between balls caused loud noise, made high-speed rotation impossible and shortened the service life. Twenty years later, a Caged Ball design was developed for ball bearings. The new design enabled high-speed rotation at a low noise level, and extended the service life despite the reduced number of balls used. It marked a major development in the history of ball bearings.
Similarly, the quality of needle bearings was significantly improved by the caged needle structure.
With cage-less, full-ball types of ball bearings, balls make metallic contact with one another and produce loud noise. In addition, they rotate in opposite directions, causing the sliding contact between two adjacent balls to occur at a speed twice the ball-spinning rate. It results in severe wear and shortens the service life.
In addition, without a cage, balls make point contact to increase bearing stress, thus facilitating breakage of the oil film. In contrast, each caged ball contacts the cage over a wide area. Therefore, the oil film does not break, the noise level is low and balls can rotate at a high speed, resulting in a long service life.

- **Long Service Life and Long-term Maintenance-free Operation**
- **Superbly High Speed**
- **Low Noise, Acceptable Running Sound**
- **Smooth Motion**
- **Low Dust Generation**

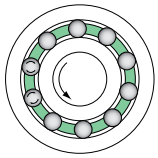


Rotary ball bearing



Conventional structure

- Adjacent balls contact each other at a point. As a result, contact stress is high and the oil film breaks due to friction.
- The service life becomes shorter.

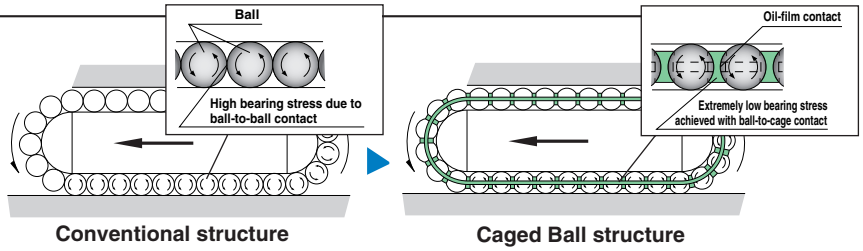


Caged Ball structure

- The service life is prolonged due to the elimination of wear caused by friction between balls.
- The absence of friction between balls results in reduced heat generation during high-speed rotation.
- The absence of friction between balls eliminates collision noise of the balls.
- The even spacing of the balls enables them to move smoothly.
- Retention of lubricant in the ball cage ensures a long service life.

Caged Ball LM Guide

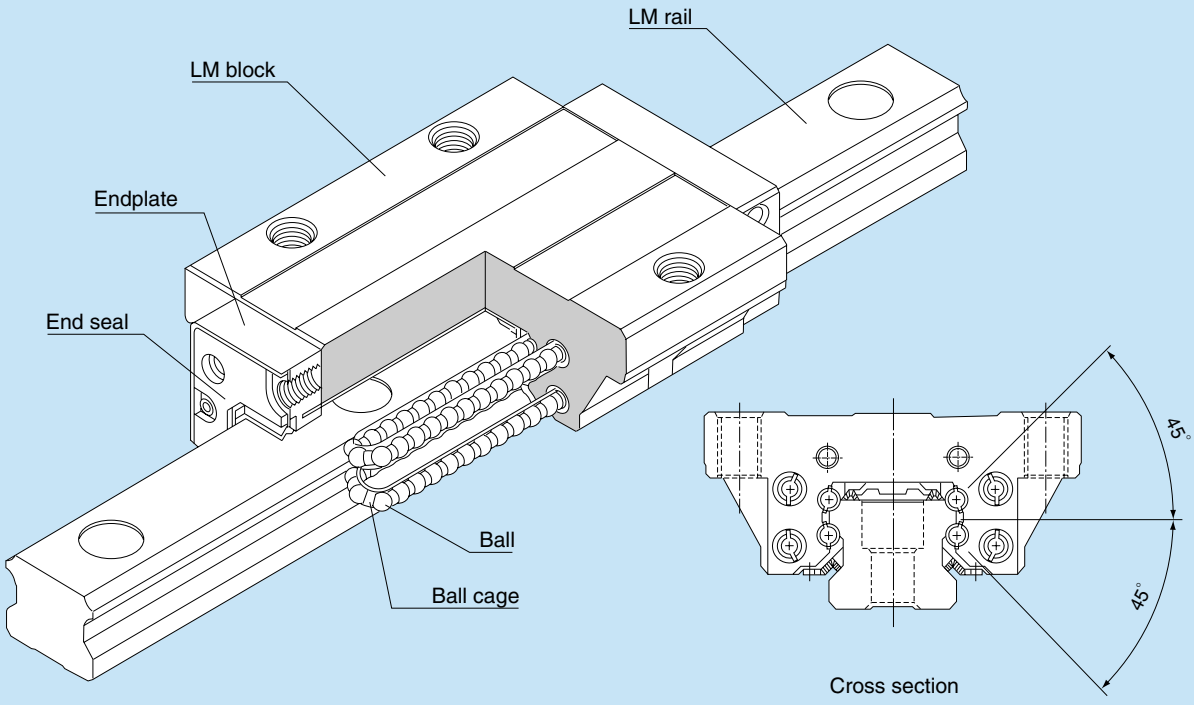
With the Caged Ball LM Guide, the use of a ball cage allows lines of evenly spaced balls to circulate, thus eliminating friction between the balls.
In addition, grease held in a space between the ball circulation path and the ball cage (grease pocket) is applied on the contact surface between each ball and the ball cage as the ball rotates, forming an oil film on the ball surface. This minimizes the risk of oil-film break.



Conventional structure　　Caged Ball structure

Global Standard Type
Caged Ball LM Guide

SHS



Structure of Model SHS

Balls roll in four rows of raceways precision-ground on an LM rail and an LM block, and ball cages and endplates incorporated in the LM block allow the balls to circulate.
Each row of balls is placed at a contact angle of 45° so that the rated loads applied to the LM block are uniform in the four directions (radial, reverse-radial and lateral directions), enabling the LM Guide to be used in all orientations. In addition, the LM block can receive a well-balanced preload, increasing the rigidity in the four directions while maintaining a constant, low friction coefficient. With the low sectional height and the high rigidity design of the LM block, SHS achieves highly accurate and stable linear motion.

● 4-way equal load

Each row of balls is placed at a contact angle of 45° so that the rated loads applied to the LM block are uniform in the four directions (radial, reverse-radial and lateral directions), enabling the LM Guide to be used in all orientations and in extensive applications.

● Self-adjustment capability

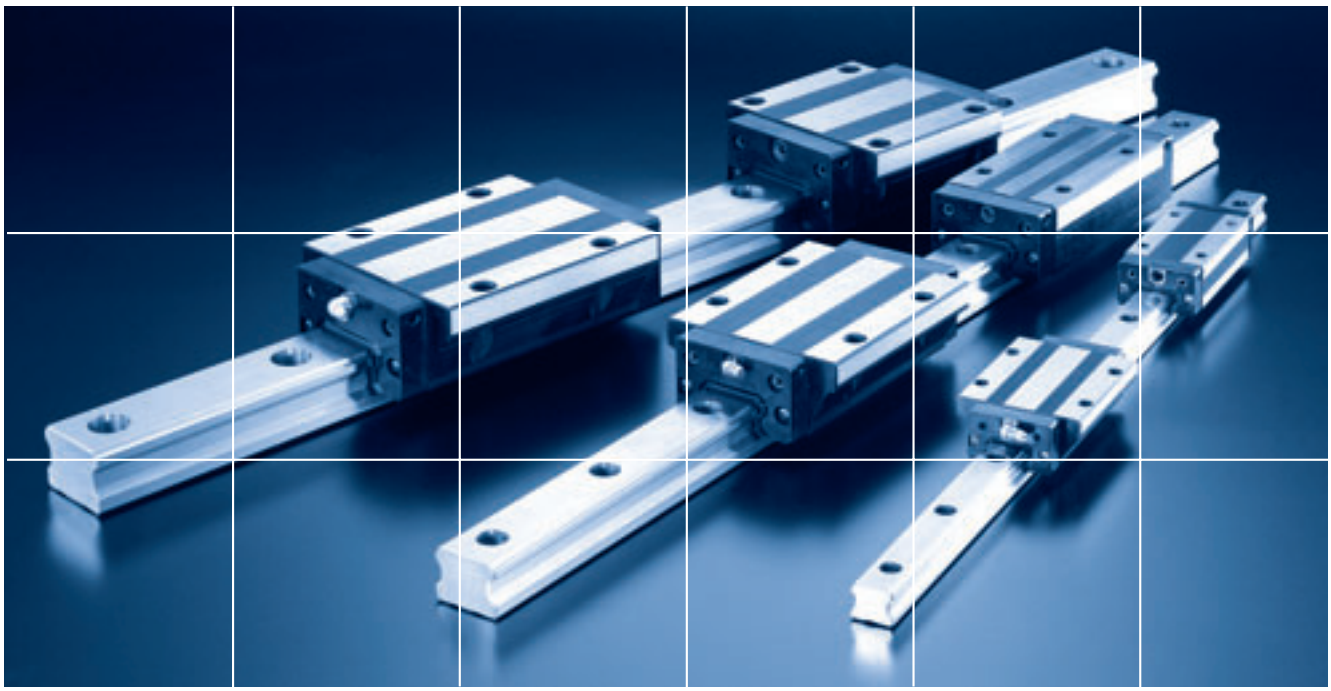
The self-adjustment capability through Face-to-Face configuration of THK's unique circular-arc grooves (DF set) enables a mounting error to be absorbed even under a preload, thus achieving highly accurate, smooth linear motion.

● Global standard size

SHS is designed to have dimensions almost the same as that of model HSR, which THK as a pioneer of the linear motion system has developed and is practically a global standard model.

● Low center of gravity, high rigidity

As a result of downsizing the LM rail section, the center of gravity is lowered and the rigidity is increased.



SHS Outline

Model SHS - Product Overview

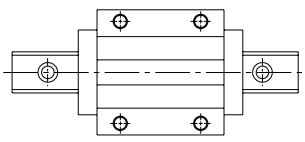
Model SHS has the same dimensions as model HSR, which is the de facto global standard full-ball LM guide, and can be mounted in any orientation since it is 4-way equal load type.

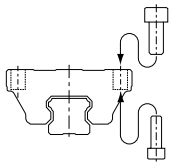
Major applications **Machining center / NC lathe / drilling machine / electric discharge machine / conveyance system.**

Model SHS-C

The flange of the LM block has tapped holes. It can be mounted from the top or the bottom. It can be used in places where the table cannot have through holes for mounting bolts.

- SHS 15C
- SHS 20C
- SHS 25C
- SHS 30C
- SHS 35C
- SHS 45C
- SHS 55C
- SHS 65C

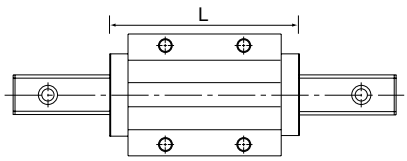


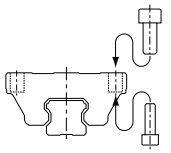


Model SHS-LC

The LM block has the same sectional shape as model SHS-C, but has a longer overall LM block length (L) and a greater rated load capacity.

- SHS 15LC
- SHS 20LC
- SHS 25LC
- SHS 30LC
- SHS 35LC
- SHS 45LC
- SHS 55LC
- SHS 65LC

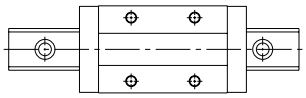


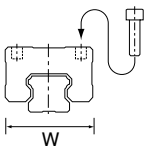


Model SHS-V

The LM block has a smaller width (W) and is equipped with tapped holes. It is suitable for places where space for the table width is limited.

- SHS 15V
- SHS 20V
- SHS 25V
- SHS 30V
- SHS 35V
- SHS 45V
- SHS 55V
- SHS 65V

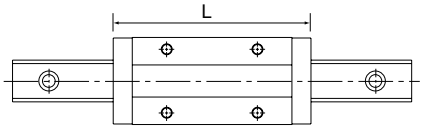


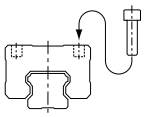


Model SHS-LV

The LM block has the same sectional shape as model SHS-V, but has a longer overall LM block length (L) and a greater rated load capacity.

- SHS 15LV
- SHS 20LV
- SHS 25LV
- SHS 30LV
- SHS 35LV
- SHS 45LV
- SHS 55LV
- SHS 65LV

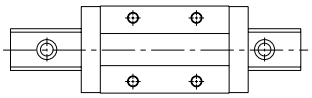


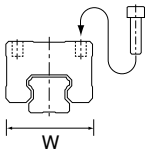


Model SHS-R

The LM block has a smaller width (W) and the mounting holes are tapped. It succeeds the height dimension of full-ball type LM Guide HSR-R.

- SHS 15R
- SHS 25R
- SHS 30R
- SHS 35R
- SHS 45R
- SHS 55R

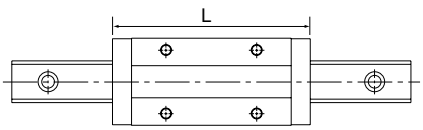


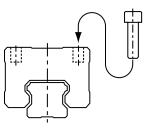


Model SHS-LR

The LM block has the same sectional shape as model SHS-R, but has a longer overall LM block length (L) and a greater rated load capacity.

- SHS 25LR
- SHS 30LR
- SHS 35LR
- SHS 45LR
- SHS 55LR





*1: Dimensional table for model SHS

Model SHS-C / SHS-LC
→ pages 11-12

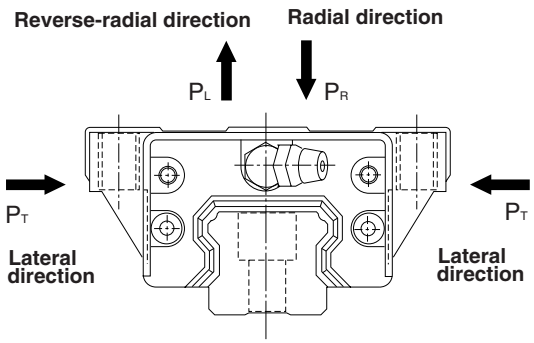
Model SHS-V / SHS-LV
→ pages 13-14

Model SHS-R / SHS-LR
→ pages 15-16

Rated Loads in All Directions

Model SHS is capable of receiving loads in all four directions: radial, reverse-radial and lateral directions.

The basic load ratings are uniform in the four directions (radial, reverse-radial and lateral directions), and their actual values are provided in the dimensional table*1 for SHS.



Equivalent Load

When the LM block of model SHS receives loads in all directions simultaneously, the equivalent load is obtained from the equation below.

$$P_E = P_R\ (P_L) + P_T$$

where

P_E	: Equivalent load ·Radial direction ·Reverse-radial direction ·Lateral direction	(N)	P_R P_L P_T	: Radial load : Reverse-radial load : Lateral load	(N) (N) (N)

Service life

The service life of an LM Guide is subject to variations even under the same operational conditions. Therefore, it is necessary to use the nominal life defined below as a reference value for obtaining the service life of the LM Guide.

Nominal life

The nominal life means the total travel distance that 90% of a group of units of the same LM Guide model can achieve without flaking (scale-like exfoliation on the metal surface) after individually running under the same conditions.

$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P_C}\right)^3 \times 50$$

L	: Nominal life	(km)
C	: Basic dynamic load rating*1	(N)
P_C	: Calculated load	(N)
f_H	: Hardness factor	(see Fig. 1)
f_T	: Temperature factor	
f_C	: Contact factor	(see Table 1)
f_W	: Load factor	(see Table 2)

Service life time

Once the nominal life (L) has been obtained, the service life time can be obtained using the equation on the right if the stroke length and the number of reciprocations are constant.

$$L_h = \frac{L \times 10^6}{2 \times \ell_s \times n_1 \times 60}$$

L_h	: Service life time	(h)
ℓ_s	: Stroke length	(mm)
n_1	: No. of reciprocations per min	(min^{-1})

f_H : Hardness factor

To ensure the achievement of the optimum load capacity of the LM Guide, the raceway hardness must be between 58 and 64 HRC.
At hardness below this range, the basic dynamic and static load ratings decrease. Therefore, the rating values must be multiplied by the respective hardness factors (f_H).
Since the LM Guide has sufficient hardness, the f_H value for the LM Guide is normally 1.0 unless otherwise specified.

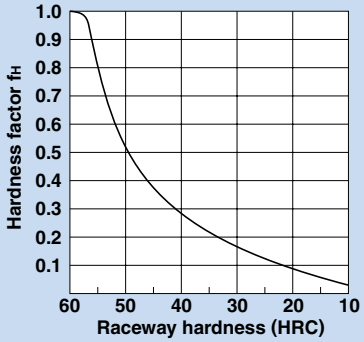


Fig. 1

f_C : Contact factor

When multiple LM blocks are used in close contact with each other, it is difficult to achieve uniform load distribution due to moment loads and mounting-surface accuracy. When using multiple blocks in close contact with each other, multiply the basic load rating (C or C_0) by the corresponding contact factor indicated in Table 1.

Note: When uneven load distribution is expected in a large machine, consider using a contact factor from Table 1.

Table 1 Contact Factor (f_C)

Number of blocks used in close contact	Contact factor f_C
2	0.81
3	0.72
4	0.66
5	0.61
6 or more	0.6
Normal use	1

f_T : Temperature factor

Since the service temperature of Caged Ball LM Guides is normally 80°C or below, the f_T value is 1.0.

f_W : Load factor

In general, reciprocating machines tend to produce vibrations or impact during operation. It is especially difficult to accurately determine all vibrations generated during high-speed operation and impacts produced each time the machine starts and stops. Therefore, where the effects of speed and vibration are estimated to be significant, divide the basic dynamic load rating (C) by a load factor selected from Table 2, which contains empirically obtained data.

Table 2 Load Factor (f_W)

Vibration/impact	Speed (V)	f_W
Faint	Very slow V≦0.25m/s	1 to 1.2
Weak	Slow 0.25<V≦1m/s	1.2 to 1.5
Medium	Medium 1<V≦2m/s	1.5 to 2
Strong	Fast V>2m/s	2 to 3.5

***1: Basic dynamic load rating (C)**

It refers to a load with a constant magnitude and direction under which the nominal life (L) of a group of identical LM Guide units independently operating is 50 km.

***1: Preload**

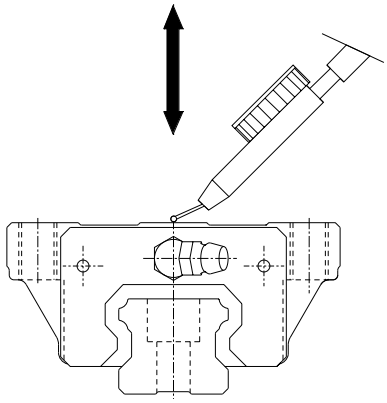
Preload is an internal load applied to the rolling elements (balls) of an LM block in advance in order to increase its rigidity.
The clearance of all model SHS units is adjusted to the designated value before being shipped. Therefore, it is unnecessary to adjust the preload.

Radial Clearance Standard

Since the radial clearance of an LM Guide greatly affects the running accuracy, load carrying capacity and rigidity of the LM Guide, it is important to select an appropriate clearance according to the application.

In general, selecting a negative clearance (i.e., a preload[*1] is applied) while taking into account possible vibrations and impact generated from reciprocating motion favorably affects the service life and the accuracy.

Radial clearance



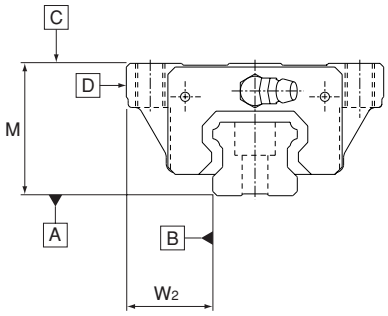
Unit: μm

Model No. \ Indication symbol	Normal	Light preload	Medium preload
	No symbol	C1	C0
15	– 5 to 0	–12 to – 5	—
20	– 6 to 0	–12 to – 6	–18 to –12
25	– 8 to 0	–14 to – 8	–20 to –14
30	– 9 to 0	–17 to – 9	–27 to –17
35	–11 to 0	–19 to –11	–29 to –19
45	–12 to 0	–22 to –12	–32 to –22
55	–15 to 0	–28 to –16	–38 to –28
65	–18 to 0	–34 to –22	–45 to –34

Accuracy Standard

The accuracy of model SHS is specified in terms of running parallelism (*1), dimensional tolerance for height and width, and height and width difference between a pair (*2,*3) when two or more LM blocks are used on one rail or when two or more rails are mounted on the same plane.

The accuracy of model SHS is categorized into Normal grade (no symbol), High-accuracy grade (H), Precision grade (P), Super precision grade (SP) and Ultra precision grade (UP), as indicated in the table below.



Unit: mm

Model No.	Accuracy standard	Nomal grade	High-accuracy grade	Precision grade	Super precision grade	Ultra precision grade
	Item	No Symbol	H	P	SP	UP
15 20	Dimensional tolerance for height M	±0.07	±0.03	$^{0}_{-0.03}$	$^{0}_{-0.015}$	$^{0}_{-0.008}$
	Difference in height M	0.02	0.01	0.006	0.004	0.003
	Dimensional tolerance for width W_2	±0.06	±0.03	$^{0}_{-0.02}$	$^{0}_{-0.015}$	$^{0}_{-0.008}$
	Difference in width W_2	0.02	0.01	0.006	0.004	0.003
	Running parallelism of surface C against surface A	as shown in the table below				
	Running parallelism of surface D against surface B	as shown in the table below				
25 30 35	Dimensional tolerance for height M	±0.08	±0.04	$^{0}_{-0.04}$	$^{0}_{-0.02}$	$^{0}_{-0.01}$
	Difference in height M	0.02	0.015	0.007	0.005	0.003
	Dimensional tolerance for width W_2	±0.07	±0.03	$^{0}_{-0.03}$	$^{0}_{-0.015}$	$^{0}_{-0.01}$
	Difference in width W_2	0.025	0.015	0.007	0.005	0.003
	Running parallelism of surface C against surface A	as shown in the table below				
	Running parallelism of surface D against surface B	as shown in the table below				
45 55	Dimensional tolerance for height M	±0.08	±0.04	$^{0}_{-0.05}$	$^{0}_{-0.03}$	$^{0}_{-0.015}$
	Difference in height M	0.025	0.015	0.007	0.005	0.003
	Dimensional tolerance for width W_2	±0.07	±0.04	$^{0}_{-0.04}$	$^{0}_{-0.025}$	$^{0}_{-0.015}$
	Difference in width W_2	0.03	0.015	0.007	0.005	0.003
	Running parallelism of surface C against surface A	as shown in the table below				
	Running parallelism of surface D against surface B	as shown in the table below				
65	Dimensional tolerance for height M	±0.08	±0.04	$^{0}_{-0.05}$	$^{0}_{-0.04}$	$^{0}_{-0.03}$
	Difference in height M	0.03	0.02	0.01	0.007	0.005
	Dimensional tolerance for width W_2	±0.08	±0.04	$^{0}_{-0.05}$	$^{0}_{-0.04}$	$^{0}_{-0.03}$
	Difference in width W_2	0.03	0.02	0.01	0.007	0.005
	Running parallelism of surface C against surface A	as shown in the table below				
	Running parallelism of surface D against surface B	as shown in the table below				

LM Rail Length and Running Parallelism for Models SHS

Unit: μm

LM rail length (mm)		Running Parallelism Values				
Above	Or less	Normal grade	High-accuracy grade	Precision grade	Super precision grade	Ultra precision grade
		No Symbol	H	P	SP	UP
—	50	5	3	2	1.5	1
50	80	5	3	2	1.5	1
80	125	5	3	2	1.5	1
125	200	5	3.5	2	1.5	1
200	250	6	4	2.5	1.5	1
250	315	7	4.5	3	1.5	1
315	400	8	5	3.5	2	1.5
400	500	9	6	4.5	2.5	1.5
500	630	11	7	5	3	2
630	800	12	8.5	6	3.5	2
800	1000	13	9	6.5	4	2.5
1000	1250	15	11	7.5	4.5	3
1250	1600	16	12	8	5	4
1600	2000	18	13	8.5	5.5	4.5
2000	2500	20	14	9.5	6	5
2500	3150	21	16	11	6.5	5.5
3150	4000	23	17	12	7.5	6
4000	5000	24	18	13	8.5	6.5

***1: Running parallelism**

It refers to the parallelism error between the LM block and the LM rail datum plane when the LM block travels the whole length of the LM rail with the LM rail secured on the reference datum plane using bolts.

***2: Difference in height M**

It indicates the difference between the minimum and maximum values of height (M) of each of the LM blocks used on the same plane in combination.

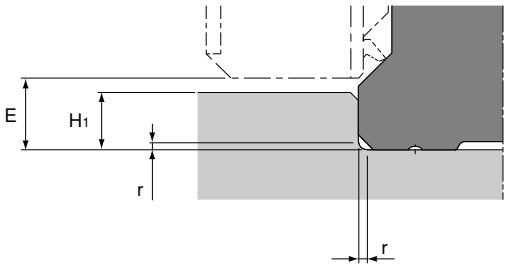
***3: Difference in width W_2**

It indicates the difference between the minimum and maximum values of the width (W_2) between each of the LM blocks, mounted on one LM rail in combination, and the LM rail.

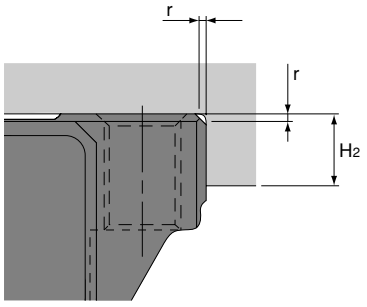
Shoulder Height of the Mounting Base and the Corner Radius

Normally, the mounting base for the LM rail and the LM block has a datum plane on the side face of the shoulder of the base in order to allow easy installation and highly accurate positioning.

The corner of the mounting shoulder must be machined to have a recess, or machined to be smaller than the corner radius "r," to prevent interference with the chamfer of the LM rail or the LM block.



Shoulder for the LM rail



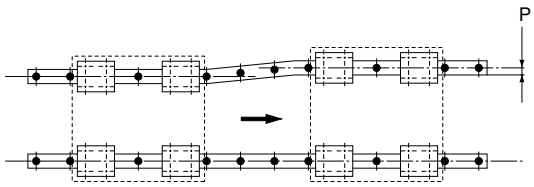
Shoulder for the LM block

Unit: mm

Model No.	Corner radius r (max)	Shoulder height for the LM rail H_1	Shoulder height for the LM block H_2	E
15	0.5	2.5	4	3
20	0.5	3.5	5	4.6
25	1	5	5	5.8
30	1	5	5	7
35	1	6	6	7.5
45	1	7.5	8	8.9
55	1.5	10	10	12.7
65	1.5	15	10	19

Error Allowance in the Parallelism Between Two Rails

The following table shows error allowances in parallelism (P) between two rails that will not affect the service life in normal operation.

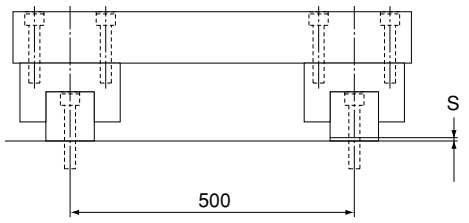


Unit: μm

Model No.	Clearance C0	Clearance C1	Normal clearance
15	—	18	25
20	18	20	25
25	20	22	30
30	27	30	40
35	30	35	50
45	35	40	60
55	45	50	70
65	55	60	80

Error Allowance in Vertical Level Between Two Rails

The values in the table indicate the error allowance in vertical level (S) between two rails per 500 mm of the axis-to-axis distance, and are proportional to the axis-to-axis distance.

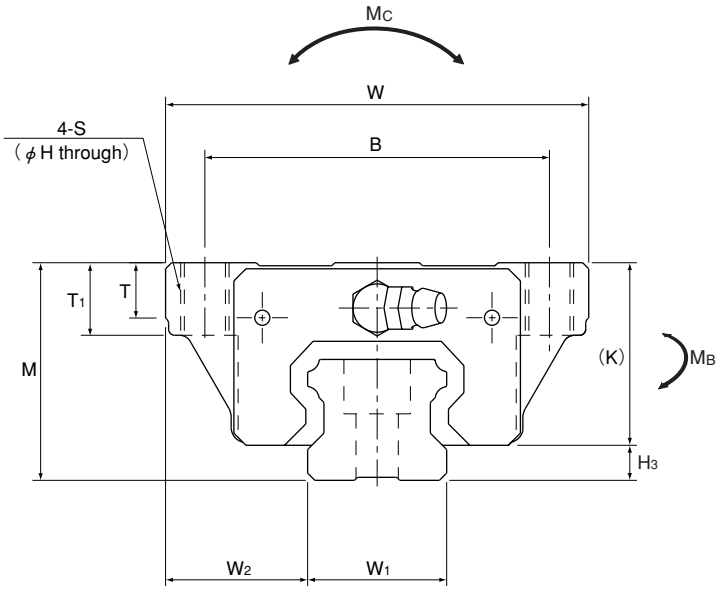


Unit: μm

Model No.	Clearance C0	Clearance C1	Normal clearance
15	—	85	130
20	50	85	130
25	70	85	130
30	90	110	170
35	120	150	210
45	140	170	250
55	170	210	300
65	200	250	350

Models SHS-C/SHS-LC

Dimensional Table for Models SHS-C/SHS-LC



Model No.	Outer dimensions			LM block dimensions										
	Height M	Width W	Length L	B	C	S	H	L_1	T	T_1	K	N	E	Grease nipple
SHS 15C **SHS 15LC**	24	47	64.4 79.4	38	30	M 5	4.4	48 63	5.9	8	21	5.5	5.5	PB1021B
SHS 20C **SHS 20LC**	30	63	79 98	53	40	M 6	5.4	59 78	7.2	10	25.4	6.5	12	B-M6F
SHS 25C **SHS 25LC**	36	70	92 109	57	45	M 8	6.8	71 88	9.1	12	30.2	7.5	12	B-M6F
SHS 30C **SHS 30LC**	42	90	106 131	72	52	M10	8.5	80 105	11.5	15	35	8	12	B-M6F
SHS 35C **SHS 35LC**	48	100	122 152	82	62	M10	8.5	93 123	11.5	15	40.5	8	12	B-M6F
SHS 45C **SHS 45LC**	60	120	140 174	100	80	M12	10.5	106 140	14.1	18	51.1	10.5	16	B-PT1/8
SHS 55C **SHS 55LC**	70	140	171 213	116	95	M14	12.5	131 173	16	21	57.3	11	16	B-PT1/8
SHS 65C **SHS 65LC**	90	170	221 272	142	110	M16	14.5	175 226	18.8	24	71	19	16	B-PT1/8

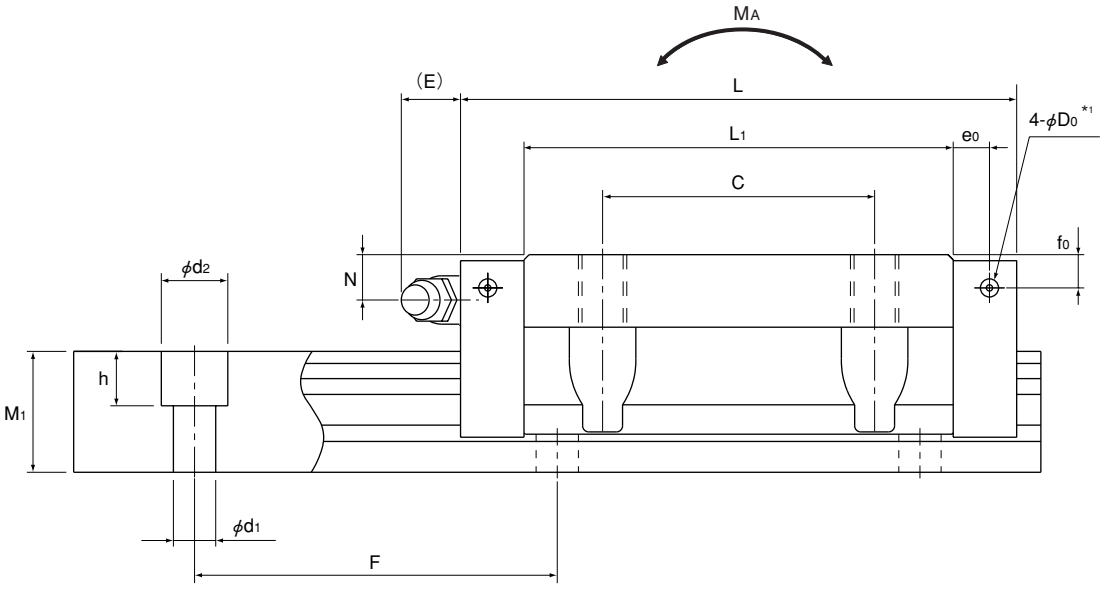
■ Example of model number coding

SHS25 LC 2 QZ KKHH C0 +1200L P Z - Ⅱ

1 2 3 4 5 6 7 8 9 10

1 Model number 2 Type of LM block 3 No. of LM blocks used on the same rail 4 With QZ Lubricator
5 Contamination protection accessory symbol (see page 19) 6 Radial clearance symbol (see page 7)
7 LM rail length (in mm) 8 Accuracy symbol (see page 8) 9 With steel tape 10 No. of rails used on the same plane

Note This model number indicates that an LM block and an LM rail constitute one set (i.e., the required number of sets when 2 rails are used in parallel is 2).
Those models equipped with QZ Lubricator cannot have a grease nipple.



Unit: mm

	Pilot holes for side nipples				LM rail dimensions						Basic load rating		Static permissible moment [kN-m]*3						Mass	
	e_0	f_0	D_0	H_3	Width W_1 $^{0}_{-0.05}$	W_2	Height M_1	Pitch F	$d_1 \times d_2 \times h$	Length Max*2	C [kN]	C_0 [kN]	M_A 1 block	M_A Double blocks	M_B 1 block	M_B Double blocks	M_C 1 block		LM block [kg]	LM rail [kg/m]
	4	4	3	3	15	16	13	60	4.5×7.5×5.3	2500	14.2 17.2	24.2 31.9	0.175 0.296	0.898 1.43	0.175 0.296	0.898 1.43	0.16 0.212		0.23 0.29	1.3
	4.3	5.3	3	4.6	20	21.5	16.5	60	6×9.5×8.5	3000	22.3 28.1	38.4 50.3	0.334 0.568	1.75 2.8	0.334 0.568	1.75 2.8	0.361 0.473		0.46 0.61	2.3
	6	5.5	3	5.8	23	23.5	20	60	7×11×9	3000	31.7 36.8	52.4 64.7	0.566 0.848	2.75 3.98	0.566 0.848	2.75 3.98	0.563 0.696		0.72 0.89	3.2
	5.5	6	5.2	7	28	31	23	80	9×14×12	3000	44.8 54.2	66.6 88.8	0.786 1.36	4.08 6.6	0.786 1.36	4.08 6.6	0.865 1.15		1.34 1.66	4.5
	6.5	5.5	5.2	7.5	34	33	26	80	9×14×12	3000	62.3 72.9	96.6 127	1.38 2.34	6.76 10.9	1.38 2.34	6.76 10.9	1.53 2.01		1.9 2.54	6.2
	8	8	5.2	8.9	45	37.5	32	105	14×20×17	3090	82.8 100	126 166	2.05 3.46	10.1 16.3	2.05 3.46	10.1 16.3	2.68 3.53		3.24 4.19	10.4
	10	8	5.2	12.7	53	43.5	38	120	16×23×20	3060	128 161	197 259	3.96 6.68	19.3 31.1	3.96 6.68	19.3 31.1	4.9 6.44		5.35 6.97	14.5
	10	12	5.2	19	63	53.5	53	150	18×26×22	3000	205 253	320 408	8.26 13.3	40.4 62.6	8.26 13.3	40.4 62.6	9.4 11.9		10.7 13.7	23.7

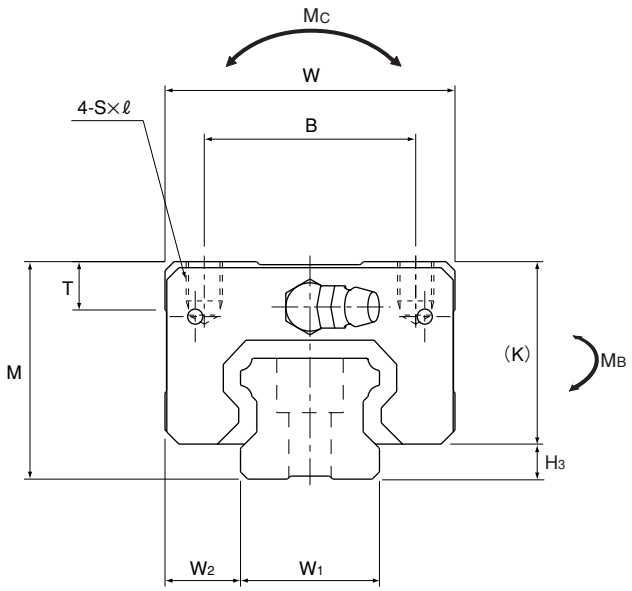
Note *1 Pilot holes for side nipples are not drilled through in order to prevent foreign material from entering the product. THK will mount grease nipples per your request. Therefore, do not use the side nipple pilot holes for purposes other than mounting a grease nipple.

*2 The maximum length under "Length" indicates the standard maximum length of an LM rail.

*3 Static permissible moment: 1 block: permissible static moment value with 1 LM block
Double blocks: permissible static moment value with 2 blocks closely contacting with each other

Models SHS-V/SHS-LV

Dimensional Table for Models SHS-V/SHS-LV



Model No.	Outer dimensions			LM block dimensions								
	Height M	Width W	Length L	B	C	S× ℓ	L_1	T	K	N	E	Grease nipple
SHS 15V **SHS 15LV**	24	34	64.4 79.4	26	26 34	M4×4	48 63	5.9	21	5.5	5.5	PB1021B
SHS 20V **SHS 20LV**	30	44	79 98	32	36 50	M5×5	59 78	8	25.4	6.5	12	B-M6F
SHS 25V **SHS 25LV**	36	48	92 109	35	35 50	M6×6.5	71 88	8	30.2	7.5	12	B-M6F
SHS 30V **SHS 30LV**	42	60	106 131	40	40 60	M8×8	80 105	8	35	8	12	B-M6F
SHS 35V **SHS 35LV**	48	70	122 152	50	50 72	M8×10	93 123	14.7	40.5	8	12	B-M6F
SHS 45V **SHS 45LV**	60	86	140 174	60	60 80	M10×15	106 140	14.9	51.1	10.5	16	B-PT1/8
SHS 55V **SHS 55LV**	70	100	171 213	75	75 95	M12×15	131 173	19.4	57.3	11	16	B-PT1/8
SHS 65V **SHS 65LV**	90	126	221 272	76	70 120	M16×20	175 226	19.5	71	19	16	B-PT1/8

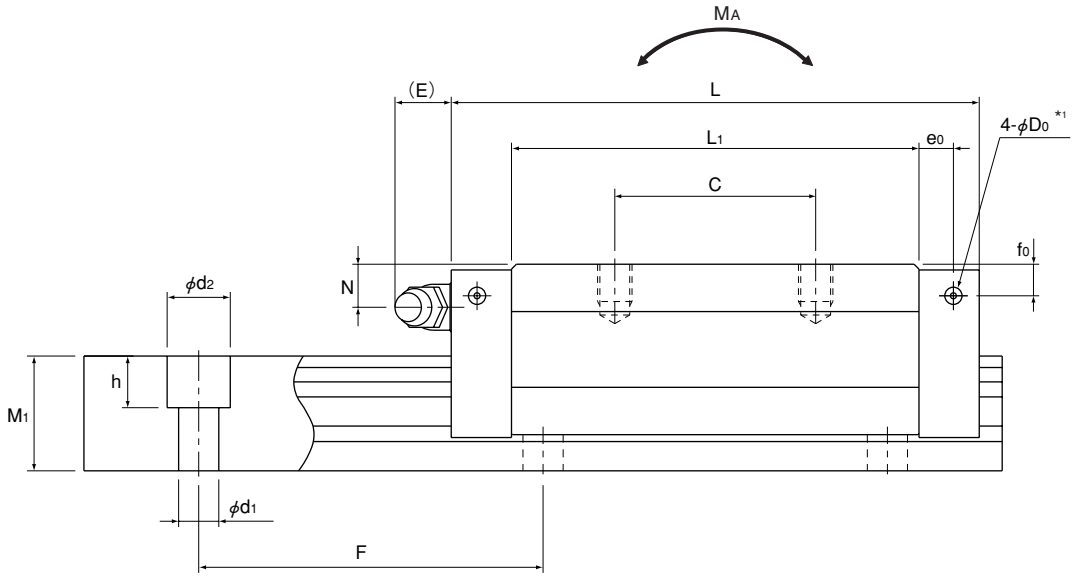
■ Example of model number coding

SHS30 V 2 QZ KKHH C1 +1240L P Z - II

1 2 3 4 5 6 7 8 9 10

1 Model number 2 Type of LM block 3 No. of LM blocks used on the same rail 4 With QZ Lubricator
5 Contamination protection accessory symbol (see page 19) 6 Radial clearance symbol (see page 7)
7 LM rail length (in mm) 8 Accuracy symbol (see page 8) 9 With steel tape 10 No. of rails used on the same plane

Note This model number indicates that an LM block and an LM rail constitute one set (i.e., the required number of sets when 2 rails are used in parallel is 2).
Those models equipped with QZ Lubricator cannot have a grease nipple.



Unit: mm

	Pilot holes for side nipples				LM rail dimensions						Basic load rating		Static permissible moment [kN-m]*3					Mass	
	e_0	f_0	D_0	H_3	Width W_1 $^{0}_{-0.05}$	W_2	Height M_1	Pitch F	$d_1 \times d_2 \times h$	Length Max*2	C [kN]	C_0 [kN]	M_A 1 block	M_A Double blocks	M_B 1 block	M_B Double blocks	M_C 1 block	LM block [kg]	LM rail [kg/m]
	4	4	3	3	15	9.5	13	60	4.5×7.5×5.3	2500	14.2 17.2	24.2 31.9	0.175 0.296	0.898 1.43	0.175 0.296	0.898 1.43	0.16 0.212	0.19 0.22	1.3
	4.3	5.3	3	4.6	20	12	16.5	60	6×9.5×8.5	3000	22.3 28.1	38.4 50.3	0.334 0.568	1.75 2.8	0.334 0.568	1.75 2.8	0.361 0.473	0.35 0.46	2.3
	6	5.5	3	5.8	23	12.5	20	60	7×11×9	3000	31.7 36.8	52.4 64.7	0.566 0.848	2.75 3.98	0.566 0.848	2.75 3.98	0.563 0.696	0.54 0.67	3.2
	5.5	6	5.2	7	28	16	23	80	9×14×12	3000	44.8 54.2	66.6 88.8	0.786 1.36	4.08 6.6	0.786 1.36	4.08 6.6	0.865 1.15	0.94 1.16	4.5
	6.5	5.5	5.2	7.5	34	18	26	80	9×14×12	3000	62.3 72.9	96.6 127	1.38 2.34	6.76 10.9	1.38 2.34	6.76 10.9	1.53 2.01	1.4 1.84	6.2
	8	8	5.2	8.9	45	20.5	32	105	14×20×17	3090	82.8 100	126 166	2.05 3.46	10.1 16.3	2.05 3.46	10.1 16.3	2.68 3.53	2.54 3.19	10.4
	10	8	5.2	12.7	53	23.5	38	120	16×23×20	3060	128 161	197 259	3.96 6.68	19.3 31.1	3.96 6.68	19.3 31.1	4.9 6.44	4.05 5.23	14.5
	10	12	5.2	19	63	31.5	53	150	18×26×22	3000	205 253	320 408	8.26 13.3	40.4 62.6	8.26 13.3	40.4 62.6	9.4 11.9	8.41 10.7	23.7

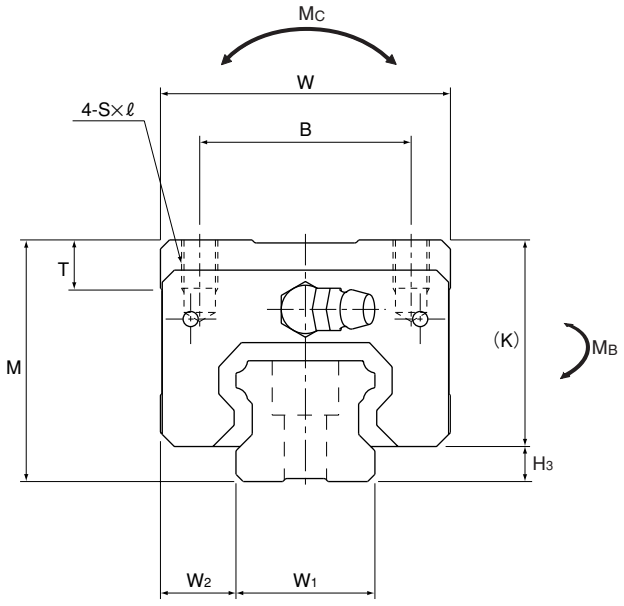
Note *1 Pilot holes for side nipples are not drilled through in order to prevent foreign material from entering the product. THK will mount grease nipples per your request. Therefore, do not use the side nipple pilot holes for purposes other than mounting a grease nipple.

*2 The maximum length under "Length" indicates the standard maximum length of an LM rail.

*3 Static permissible moment: 1 block: permissible static moment value with 1 LM block
Double blocks: permissible static moment value with 2 blocks closely contacting with each other

Models SHS-R/SHS-LR

Dimensional Table for Models SHS-R/SHS-LR



Model No.	Outer dimensions			LM block dimensions								
	Height M	Width W	Length L	B	C	S× ℓ	L_1	T	K	N	E	Grease nipple
SHS 15R	28	34	64.4	26	26	M4×5	48	5.9	25	9.5	5.5	PB1021B
SHS 25R **SHS 25LR**	40	48	92 109	35	35 50	M6×8	71 88	8	34.2	11.5	12	B-M6F
SHS 30R **SHS 30LR**	45	60	106 131	40	40 60	M8×10	80 105	8	38	11	12	B-M6F
SHS 35R **SHS 35LR**	55	70	122 152	50	50 72	M8×12	93 123	14.7	47.5	15	12	B-M6F
SHS 45R **SHS 45LR**	70	86	140 174	60	60 80	M10×17	106 140	14.9	61.1	20.5	16	B-PT1/8
SHS 55R **SHS 55LR**	80	100	171 213	75	75 95	M12×18	131 173	19.4	67.3	21	16	B-PT1/8

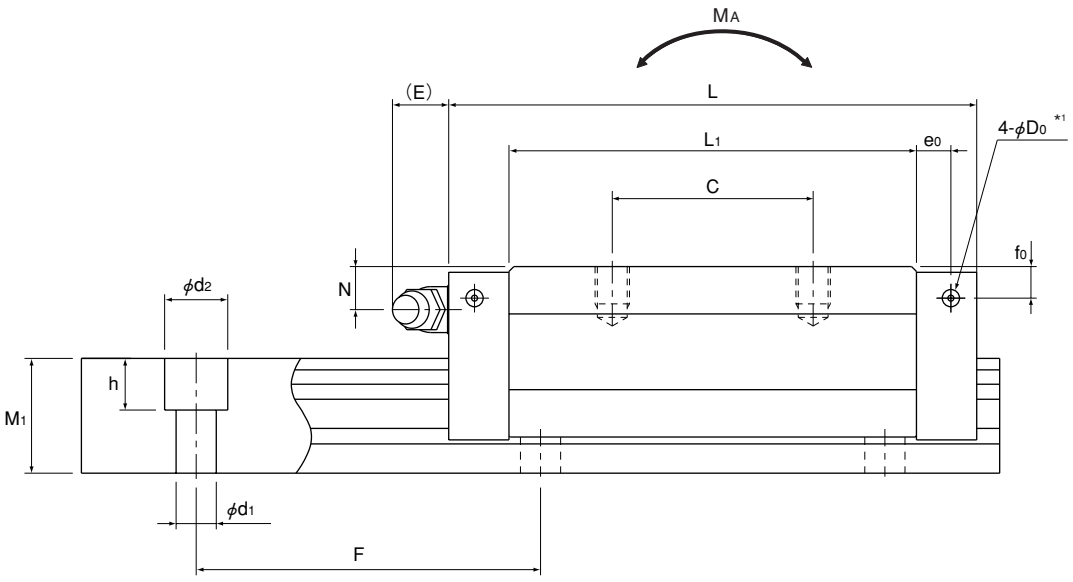
■ Example of model number coding

SHS45 LR 2 QZ KKHH C0 +1200L P Z - II

1 2 3 4 5 6 7 8 9 10

1 Model number 2 Type of LM block 3 No. of LM blocks used on the same rail 4 With QZ Lubricator
5 Contamination protection accessory symbol (see page 19) 6 Radial clearance symbol (see page 7)
7 LM rail length (in mm) 8 Accuracy symbol (see page 8) 9 With steel tape 10 No. of rails used on the same plane

Note This model number indicates that an LM block and an LM rail constitute one set (i.e., the required number of sets when 2 rails are used in parallel is 2).
Those models equipped with QZ Lubricator cannot have a grease nipple.



Unit: mm

	Pilot holes for side nipples				LM rail dimensions						Basic load rating		Static permissible moment [kN-m]*3					Mass	
					Width W_1 $^{0}_{-0.05}$	W_2	Height M_1	Pitch F	$d_1 \times d_2 \times h$	Length Max*2	C [kN]	C_0 [kN]	M_A 1 block	M_A Double blocks	M_B 1 block	M_B Double blocks	M_C 1 block	LM block [kg]	LM rail [kg/m]
	e_0	f_0	D_0	H_3															
	4	8	3	3	15	9.5	13	60	4.5×7.5×5.3	2500	14.2	24.2	0.175	0.898	0.175	0.898	0.16	0.22	1.3
	6	9.5	3	5.8	23	12.5	20	60	7×11×9	3000	31.7 36.8	52.4 64.7	0.566 0.848	2.75 3.98	0.566 0.848	2.75 3.98	0.563 0.696	0.66 0.8	3.2
	5.5	9	5.2	7	28	16	23	80	9×14×12	3000	44.8 54.2	66.6 88.8	0.786 1.36	4.08 6.6	0.786 1.36	4.08 6.6	0.865 1.15	1.04 1.36	4.5
	6.5	12.5	5.2	7.5	34	18	26	80	9×14×12	3000	62.3 72.9	96.6 127	1.38 2.34	6.76 10.9	1.38 2.34	6.76 10.9	1.53 2.01	1.8 2.34	6.2
	8	18	5.2	8.9	45	20.5	32	105	14×20×17	3090	82.8 100	126 166	2.05 3.46	10.1 16.3	2.05 3.46	10.1 16.3	2.68 3.53	3.24 4.19	10.4
	10	18	5.2	12.7	53	23.5	38	120	16×23×20	3060	128 161	197 259	3.96 6.68	19.3 31.1	3.96 6.68	19.3 31.1	4.9 6.44	5.05 6.57	14.5

Note *1 Pilot holes for side nipples are not drilled through in order to prevent foreign material from entering the product. THK will mount grease nipples per your request. Therefore, do not use the side nipple pilot holes for purposes other than mounting a grease nipple.

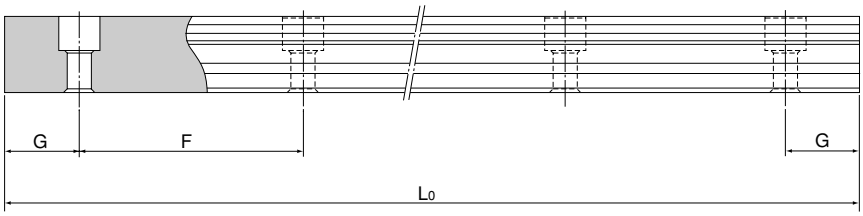
*2 The maximum length under "Length" indicates the standard maximum length of an LM rail.

*3 Static permissible moment: 1 block: permissible static moment value with 1 LM block
Double blocks: permissible static moment value with 2 blocks closely contacting with each other

SHS

Standard Length and Maximum Length of the LM Rail

The table below shows the standard LM rail lengths and the maximum lengths of model SHS variations. If the maximum length of the desired LM rail exceeds them, connected rails will be used. Contact THK for details.
For the G dimension when a special length is required, we recommend selecting the corresponding G value from the table. The longer the G dimension is, the less stable the G area may become after installation, thus adversely affecting accuracy.

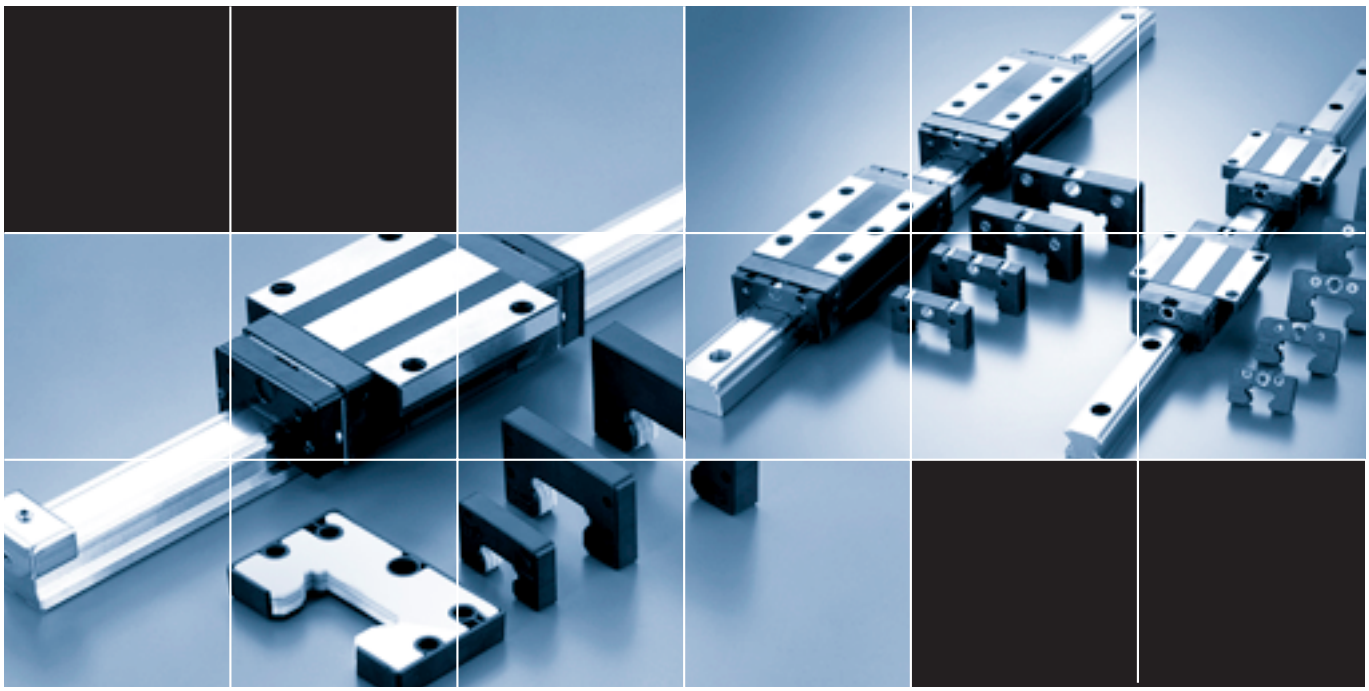


Standard Length and Maximum Length of the LM Rail for Model SHS

Unit: mm

Model No.	SHS 15	SHS 20	SHS 25	SHS 30	SHS 35	SHS 45	SHS 55	SHS 65
Standard LM rail length (L_0)	160	220	220	280	280	570	780	1270
	220	280	280	360	360	675	900	1570
	280	340	340	440	440	780	1020	2020
	340	400	400	520	520	885	1140	2620
	400	460	460	600	600	990	1260	
	460	520	520	680	680	1095	1380	
	520	580	580	760	760	1200	1500	
	580	640	640	840	840	1305	1620	
	640	700	700	920	920	1410	1740	
	700	760	760	1000	1000	1515	1860	
	760	820	820	1080	1080	1620	1980	
	820	940	940	1160	1160	1725	2100	
	940	1000	1000	1240	1240	1830	2220	
	1000	1060	1060	1320	1320	1935	2340	
	1060	1120	1120	1400	1400	2040	2460	
	1120	1180	1180	1480	1480	2145	2580	
	1180	1240	1240	1560	1560	2250	2700	
	1240	1360	1300	1640	1640	2355	2820	
	1360	1480	1360	1720	1720	2460	2940	
	1480	1600	1420	1800	1800	2565	3060	
	1600	1720	1480	1880	1880	2670		
		1840	1540	1960	1960	2775		
		1960	1600	2040	2040	2880		
		2080	1720	2200	2200	2985		
		2200	1840	2360	2360	3090		
			1960	2520	2520			
			2080	2680	2680			
			2200	2840	2840			
			2320	3000	3000			
			2440					
Standard pitch F	60	60	60	80	80	105	120	150
G	20	20	20	20	20	22.5	30	35
Max length	2500	3000	3000	3000	3000	3090	3060	3000

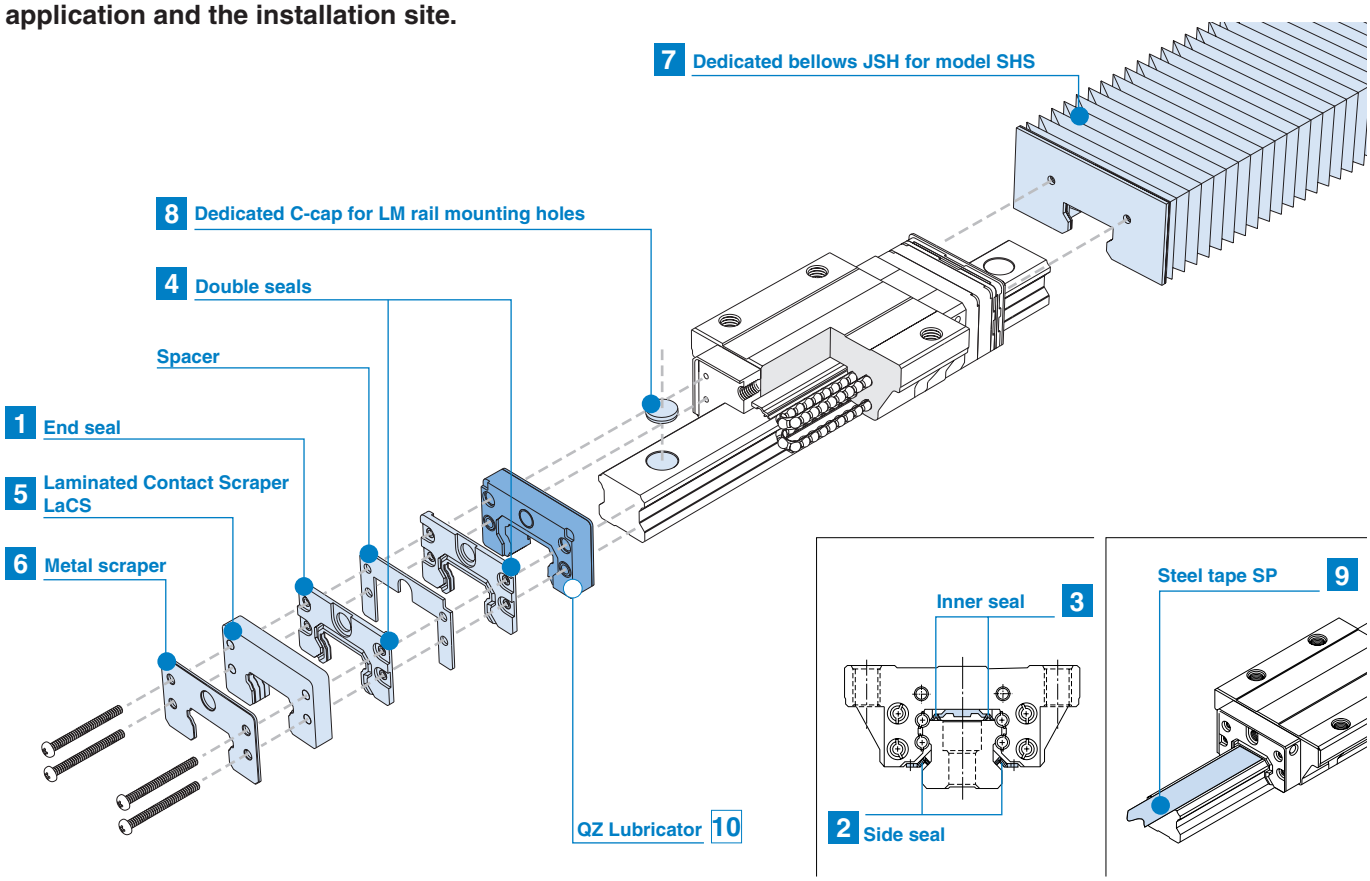
Note 1: The maximum length varies with accuracy grades. Contact THK for details.
Note 2: If connected rails are not allowed and a greater length than the maximum values above is required, contact THK .



SHS OPTIONS

Options

For model SHS, contamination protection and lubrication accessories are available. Make a selection according to the application and the installation site.

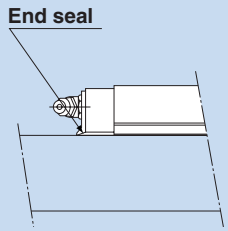


Contamination Protection Accessories

When foreign matter enters an LM system, it will cause abnormal wear or shorten the service life. It is necessary to prevent foreign matter from entering the system. Therefore, when possible entrance of foreign matter is predicted, it is important to select an effective sealing device or contamination protection device that meets the working conditions.

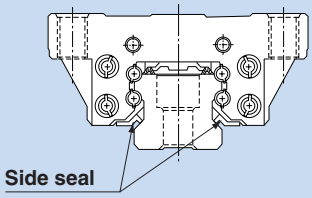
1 End seal

Used in locations exposed to dust.



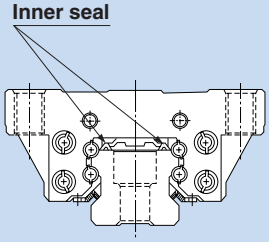
2 Side seal

Used in locations where dust may enter the LM block from the side or bottom surface, such as vertical, horizontal and inverted mounts.



3 Inner seal

Used in locations severely exposed to dust or cutting chips.



Seals and Scrapers

1 to 4 Seals

Highly wear-resistant end seals made of special resin rubber and side seals for increased contamination protection effect are available.

If desiring a contamination protection accessory, specify it with the corresponding symbol indicated in table 3.
For the supported model numbers for contamination protection accessories and the overall LM block length with a contamination protection accessory attached (dimension L), see table 4.

Seal resistance value

For the maximum seal resistance value per LM block when a lubricant is applied on seal SHS ··· SS, refer to the corresponding value provided in table 1.

Table 1 Maximum Seal Resistance Value of Seal SHS ··· SS

Unit: N

Model No.	Seal resistance value
15	4.5
20	7.0
25	10.5
30	17.0
35	20.5
45	30.0
55	31.5
65	43.0

5 6 Scrapers

Laminated Contact Scraper LaCS®

For locations with an even more adverse working conditions, the Laminated Contact Scraper LaCS is available.
LaCS removes minute foreign matter adhering to the LM rail in multiple stages and prevents it from entering the LM block with a laminated contact structure (3-layer scraper).

Features

- Since the 3 layers of scrapers fully contact the LM rail, LaCS is highly capable of removing minute foreign matter.
- Since it uses oil-impregnated, foam synthetic rubber with a self-lubricating function, low friction resistance is achieved.

Basic Specifications of LaCS

① Service temperature range of LaCS: -20°C to +80°C
② Resistance of LaCS: indicated in table 2

*Note that LaCS is not sold alone.

Table 2 Resistance of LaCS

Unit: N

Model No.	Resistance of LaCS
15	5.2
20	6.5
25	11.7
30	18.2
35	20.8
45	26.0
55	32.5
65	39.0

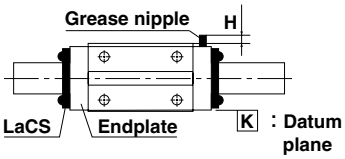
Note 1: Each resistance value in the table only consists of that of LaCS, and does not include sliding resistances of seals and other accessories.
Note 2: For the maximum service speed of LaCS, contact THK.

Table 3 Symbols of Contamination Protection Accessories for Model SHS

Symbol	Contamination protection accessory
UU	With end seal
SS	With end seal + side seal + inner seal
DD	With double seals + side seal + inner seal
ZZ	With end seal + side seal + inner seal + metal scraper
KK	With double seals + side seal + inner seal + metal scraper
SSHH	With end seal + side seal + inner seal + LaCS
DDHH	With double seals + side seal + inner seal + LaCS
ZZHH	With end seal + side seal + inner seal + metal scraper + LaCS
KKHH	With double seals + side seal + inner seal + metal scraper + LaCS

For Models Attached with Contamination Protection Accessories SSHH, DDHH, ZZHH or KKHH

Models attached with dust prevention accessories SSHH, DDHH, ZZHH or KKHH have a grease nipple in the location indicated in the figure below. The table on the right shows incremental dimensions with the grease nipple.



Note: When desiring the mounting location for the grease nipple other than the one indicated in the figure above, contact THK.

Unit: mm

Model No.	Incremental dimension with grease nipple H	Nipple type
15C/LC	—	PB107
15R/V/LV	4.7	PB107
20C/LC	—	PB107
20V/LV	4.5	PB107
25C/LC	—	PB107
25R/LR/V/LV	4.7	PB107
30C/LC	—	A-M6F
30R/LR/V/LV	7.4	A-M6F
35C/LC	—	A-M6F
35R/LR/V/LV	7.4	A-M6F
45C/LC	—	A-M6F
45R/LR/V/LV	7.7	A-M6F
55C/LC	—	A-M6F
55R/LR/V/LV	7.4	A-M6F
65C/LC	—	A-M6F
65V/LV	6.9	A-M6F

For Models Attached with Contamination Protection Accessories UU or SS

For the mounting location of the grease nipple (N) and its incremental dimension (E) when contamination protection accessories UU or SS are attached, see the corresponding dimensional table (see page 11 to 16).

For Models Attached with Contamination Protection Accessories DD, ZZ or KK

For the mounting location of the grease nipple and its incremental dimension when contamination protection accessories DD, ZZ or KK are attached, contact THK.

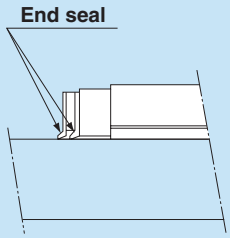
Table 4 Overall LM Block Length (Dimension L) of Model SHS with a Contamination Protection Accessory Attached

Unit: mm

Model No.	UU	SS	DD	ZZ	KK	SSHH	DDHH	ZZHH	KKHH
15C/V/R	64.4	64.4	69.8	66.8	72.2	78.6	84	79.8	85.2
15LC/LV	79.4	79.4	84.8	81.8	87.2	93.6	99	94.8	100.2
20C/V	79	79	85.4	83	89.4	93.6	100	96	102.4
20LC/LV	98	98	104.4	102	108.4	112.6	119	115	121.4
25C/V/R	92	92	101.6	100.4	107.6	112	119.2	114.4	121.6
25LC/LV/LR	109	109	118.6	117.4	124.6	129	136.2	131.4	138.6
30C/V/R	106	106	116	113.8	122.4	129.4	138	131.8	140.4
30LC/LV/LR	131	131	141	138.8	147.4	154.4	163	156.8	165.4
35C/V/R	122	122	134.8	132.4	142.2	148	157.8	150.4	160.2
35LC/LV/LR	152	152	164.8	162.4	172.2	178	187.8	180.4	190.2
45C/V/R	140	140	152.8	151.2	161	169	178.8	172.2	182
45LC/LV/LR	174	174	186.8	185.2	195	203	212.8	206.2	216
55C/V/R	171	171	186.6	184.2	195.4	202	213.2	205.2	216.4
55LC/LV/LR	213	213	228.6	226.2	237.4	244	255.2	247.2	258.4
65C/V	221	221	238.6	236.2	248.6	258	270.4	261.2	273.6
65LC/LV	272	272	289.6	287.2	299.6	309	321.4	312.2	324.6

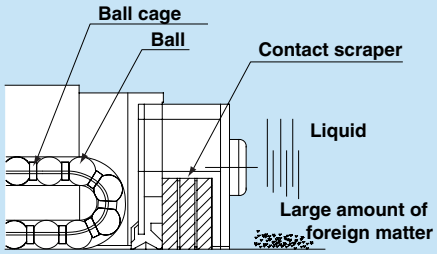
4 Double seals

Used in locations exposed to much dust or many cutting chips.



5 LaCS

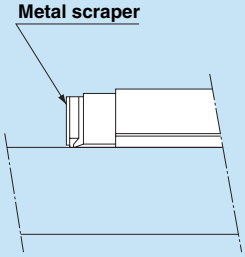
Used in harsh environments exposed to foreign matter such as fine dust and liquids.



Structural drawing

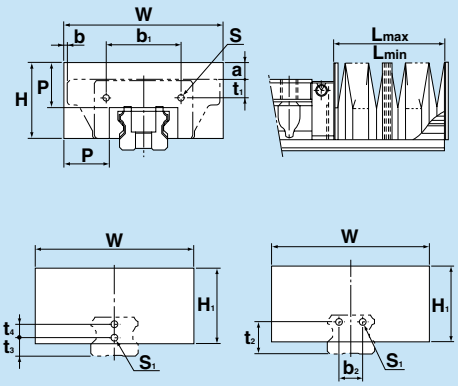
6 Metal scraper

Used in locations where welding spatter may adhere to the LM rail.



7 Dedicated bellows JSH for model SHS

Used in locations exposed to dust or cutting chips.



Models SHS15 to 30 **Models SHS35 to 65**

Note 1: When desiring to use the dedicated bellows other than in horizontal mount (i.e., vertical, wall and inverted mount), or when desiring a heat-resistant type of bellows, contact THK.
Note 2: For lubrication when using the dedicated bellows, contact THK.
Note 3: When using the dedicated bellows, the LM block and LM rail need to be machined so that the bellows can be mounted. Be sure to indicate that the dedicated bellows is required when ordering SHS.

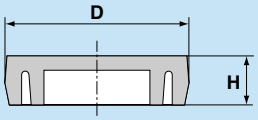
Note: The length of the bellows is calculated as follows.

$$Lmin = \frac{S}{(A-1)}$$ S: Stroke length (mm)

$$Lmax = Lmin \cdot A$$ A: Extension rate

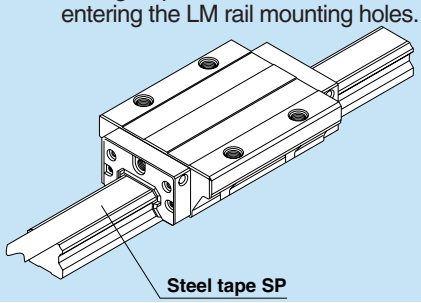
8 Dedicated C-cap

It prevents cutting chips from entering the LM rail mounting holes.



9 Steel tape SP

It prevents foreign matter, such as cutting chips, dust, or coolant from entering the LM rail mounting holes.



7 Dedicated Bellows JSH for Model SHS

For locations with an even more adverse working conditions, dedicated bellows are available. The dimensions of the dedicated bellows are provided below. When placing an order, specify the desired bellows type with the corresponding bellows model number indicated below.

Dimensional Table for JSH

Model No.	Main dimensions (mm)												Supported model
						t_1							
	W	H	H_1	P	b_1	Type C	Type V	Type R	b_2	t_2	t_3	t_4	
JSH 15	53	26	26	15	22.4	4	4	8	—	—	8	—	SHS 15
JSH 20	60	30	30	17	27.6	7.5	7.5	—	—	—	8	6	SHS 20
JSH 25	75	36	36	20	38	9.1	9.1	13.1	—	—	9	7	SHS 25
JSH 30	80	38	38	20	44	11	11	14	—	—	11	8	SHS 30
JSH 35	86	40.5	40.5	20	50	11	11	18	20	21.5	—	—	SHS 35
JSH 45	97	46	46	20	64.6	13.5	13.5	23.5	26	26.5	—	—	SHS 45
JSH 55	105	48	48	20	68	13	13	23	30	31.5	—	—	SHS 55
JSH 65	126	63	63	25	80	18	18	—	34	45	—	—	SHS 65

Supported model	Other dimensions (mm)								$\left(\frac{A}{Lmin}^{Lmax}\right)$
	Mounting bolt		a			b			
	S	S_1	Type C	Type V	Type R	Type C	Type V	Type R	
SHS 15	M2×8 ℓ	M4×8 ℓ	5	5	1	3	9.5	9.5	5
SHS 20	M2.6×8 ℓ	M3×6 ℓ	5	5	—	− 1.5	8	—	6
SHS 25	M3×8 ℓ	M3×6 ℓ	6	6	2	2.5	13.5	13.5	7
SHS 30	M3×10 ℓ	M3×6 ℓ	3	3	0	− 5	10	10	7
SHS 35	M4×10 ℓ	M4×8 ℓ	0	0	− 7	− 7	8	8	7
SHS 45	M4×12 ℓ	M4×8 ℓ	−5	−5	−15	−11.7	5.5	5.5	7
SHS 55	M5×12 ℓ	M5×10 ℓ	−9	−9	−19	−17.5	2.5	2.5	7
SHS 65	M6×14 ℓ	M6×12 ℓ	−8	−8	—	−22	0	—	9

Example of model number coding

JSH35-60/420
1 2

1 Model number ··· bellows for SHS35
2 Bellows dimensions (length when compressed / length when extended)

8 Dedicated C-cap for LM Rail Mounting Holes

If any of the LM rail mounting holes of an LM Guide is filled with cutting chips or foreign matter, they may enter the LM block structure. Entrance of such foreign matter can be prevented by covering each LM rail mounting hole with the dedicated cap so that the top of the mounting holes are on the same level as the LM rail top face.

The dedicated C-cap for LM rail mounting holes is highly durable since it uses a special synthetic resin with high oil resistance and high wear resistance. When placing an order, specify the desired cap type with the corresponding cap number indicated in the table on the right.

Major Dimensions of the Dedicated Cap

Model No.	C-cap model No.	Bolt used	Main dimensions mm	
			D	H
15	C 4	M 4	7.8	1.0
20	C 5	M 5	9.8	2.4
25	C 6	M 6	11.4	2.7
30	C 8	M 8	14.4	3.7
35	C 8	M 8	14.4	3.7
45	C12	M12	20.5	4.7
55	C14	M14	23.5	5.7
65	C16	M16	26.5	5.7

9 Steel Tape SP

By covering the LM rail mounting holes with an ultra thin stainless steel (SUS304) plate, the steel tape SP further increases sealability of the end seal, thus preventing foreign matter and water from entering the top face of the LM rail.

Note 1: To mount the steel tape, the LM block needs to be removed from the LM rail. This requires an LM block removing/mounting jig. Contact THK for details.
Note 2: When mounting the steel tape, the LM rail needs to be machined. Indicate that the steel tape is required when ordering the LM Guide.
Note 3: The steel tape is available for models SHS15 to 65.

Lubrication Accessories

10 QZ Lubricator™

The QZ Lubricator feeds the right amount of lubricant to the ball raceway on the LM rail. This allows an oil film to continuously be formed between the balls and the raceway, and drastically extends the lubrication and maintenance intervals.
When the QZ Lubricator is required, specify the desired type with the corresponding symbol indicated in table 1.
For supported LM Guide model numbers for the QZ Lubricator and overall LM block length with the QZ Lubricator attached (dimension L), see table 2 .

Features

- Supplements lost oil to drastically extend the lubrication/maintenance interval.
- Eco-friendly lubrication system that does not contaminate the surrounding area since it feeds the right amount of lubricant to the ball raceway.
- The user can select a type of lubricant that meets the intended use.

Significant Extension of the Maintenance Interval

Attaching the QZ Lubricator helps extend the maintenance interval throughout the whole load range from the light-load area to the heavy-load area.

Note 1: The QZ Lubricator is not sold alone.
Note 2: Those models equipped with the QZ Lubricator cannot have a grease nipple.
Note 3: When desiring both the QZ Lubricator and a grease nipple to be attached, contact THK.

Table 1 Parts Symbols for Model SHS with the QZ Lubricator Attached

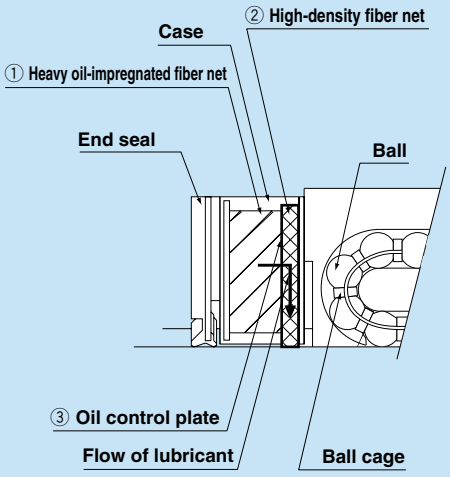
Symbol	Contamination protection accessories for LM Guide with QZ Lubricator attached
QZUU	With end seal + QZ Lubricator
QZSS	With end seal + side seal + inner seal + QZ Lubricator
QZDD	With double seals + side seal + inner seal + QZ Lubricator
QZZZ	With end seal + side seal + inner seal + metal scraper + QZ Lubricator
QZKK	With double seals + side seal + inner seal + metal scraper + QZ Lubricator
QZSSHH	With end seal + side seal + inner seal + LaCS + QZ Lubricator
QZDDHH	With double seals + side seal + inner seal + LaCS + QZ Lubricator
QZZZHH	With end seal + side seal + inner seal + metal scraper + LaCS + QZ Lubricator
QZKKHH	With double seals + side seal + inner seal + metal scraper + LaCS + QZ Lubricator

Table 2 Overall LM Block Length (Dimension L) of Model SHS with the QZ Lubricator Attached

Unit: mm

Model No.	QZUU	QZSS	QZDD	QZZZ	QZKK	QZSSHH	QZDDHH	QZZZHH	QZKKHH
15C/V/R	84.4	84.4	89.8	86.8	92.2	100	105.4	101.2	106.6
15LC/LV	99.4	99.4	104.8	101.8	107.2	115	120.4	116.2	121.6
20C/V	99	99	105.4	103	109.4	115.4	121.8	117.8	124.2
20LC/LV	118	118	124.4	122	128.4	134.4	140.8	136.8	143.2
25C/V/R	114.4	114.4	121.6	120.4	127.6	132	139.2	134.4	141.6
25LC/LV/LR	131.4	131.4	138.6	137.4	144.6	149	156.2	151.4	158.6
30C/V/R	127.4	127.4	136	133.8	142.4	149.4	158	151.8	160.4
30LC/LV/LR	152.4	152.4	161	158.8	167.4	174.4	183	176.8	185.4
35C/V/R	145	145	154.8	152.4	162.2	168	177.8	170.4	180.2
35LC/LV/LR	175	175	184.8	182.4	192.2	198	207.8	200.4	210.2
45C/V/R	173	173	182.8	181.2	191	199	208.8	202.2	212
45LC/LV/LR	207	207	216.8	215.2	225	233	242.8	236.2	246
55C/V/R	205.4	205.4	216.6	214.2	225.4	232	243.2	235.2	246.4
55LC/LV/LR	247.4	247.4	258.6	256.2	267.4	274	285.2	277.2	288.4
65C/V	256.2	256.2	268.6	266.2	278.6	288	300.4	291.2	303.6
65LC/LV	307.2	307.2	319.6	317.2	329.6	339	351.4	342.2	354.6

QZ Lubricator 10



The structure of the QZ Lubricator consists of three major components:
① a heavy oil-impregnated fiber net (functions to store lubricant).
② a high-density fiber net (functions to apply lubricant to the raceway).
③ an oil-control plate (functions to adjust oil flow).
The lubricant contained in the QZ Lubricator is fed by the capillary phenomenon, which is used also in felt pens and many other products, as the fundamental principle.