

LM Guide HSR – Four-Way Equal-Load Type

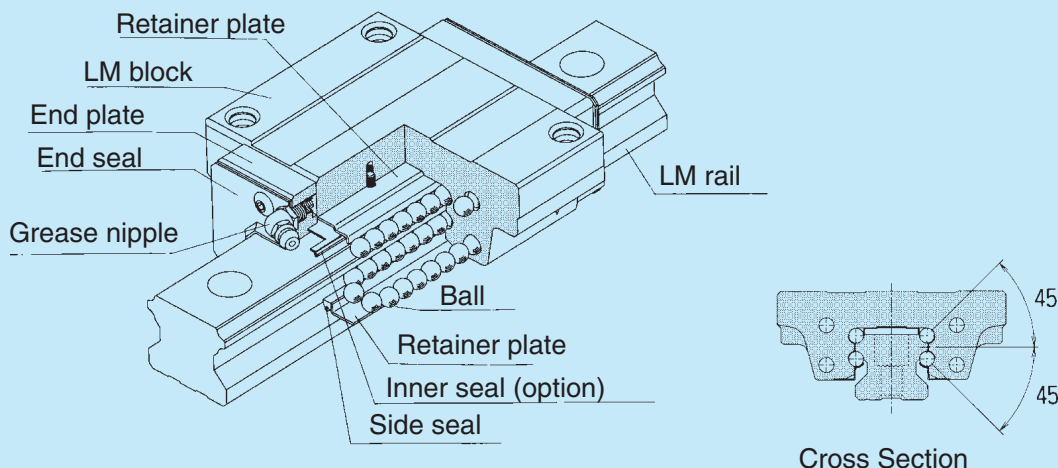


Fig. 1 Construction of Model HSR

Construction and Features

Balls roll in four rows of a precisely-ground raceway on an LM rail and an LM block. The end plate attached to the LM block causes the trains of balls to circulate.

As the balls are held in place by the retainer plate, they do not fall off if the LM block is removed from the rail (except for types HSR 8, 10, and 12).

The four trains of balls are arranged so that the contact angle is 45° , allowing each train of balls to bear an equal rated load in all four directions: radial, reverse-radial, and the two lateral directions. This type can therefore be used in any installation direction. Moreover, HSR enables the application of a well-balanced preload, making it possible to increase rigidity in the four directions while maintaining a low friction coefficient. The low-profile design and use of high-rigidity LM blocks provide stable, highly accurate linear motion.

Four-way equal load

The raceways are arranged at 45° in relation one another, so that each train of balls bears an equal rated load in all four directions: radial, reverse-radial, and the two lateral directions. This type can therefore be used in any installation directions and boasts a wide range of uses.

High rigidity

The excellent balance among the four rows of raceways enables the application of a sufficient preload, providing the LM Guide with a high degree of rigidity and freeing it from undesired strain. Moreover, due to the strength of the mounting bolts and LM block used, type HSR is in use in a wide range of heavy-cutting machine tools.

Self-adjusting capability

Self-adjustment is performed automatically due to the circular-arc groove design (face-to-face DF). Installation errors can therefore be compensated for, even under a preload, resulting in highly precise and smooth linear motion.

High durability

Even under a preload or uneven load, no differential sliding occurs to the balls, thereby enabling smooth ball rolling. Wear is thus limited, and long-term precision is ensured.

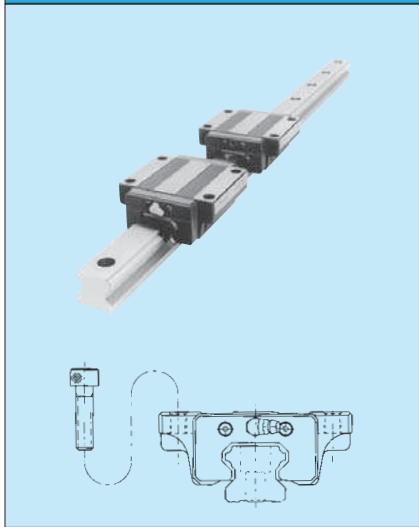
Stainless steel type available

Upon request, we can provide stainless steel LM blocks, rails, and balls.

Types and Features

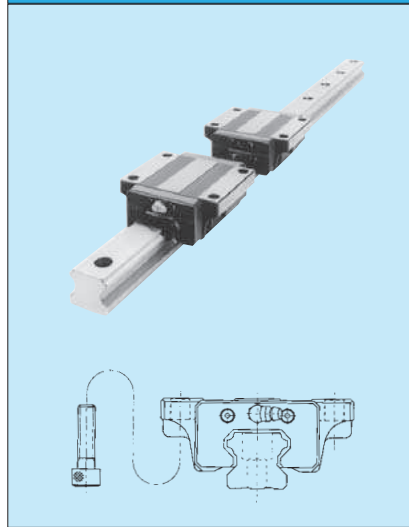
Standard heavy-load types

Type HSR-A



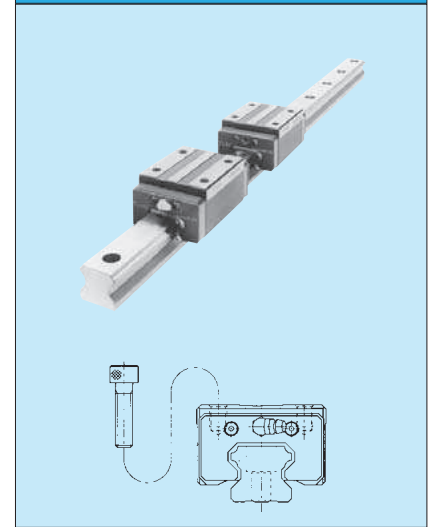
The flange of the LM block is provided with tapped holes to enable simple assembly, making it suitable for use in build-up systems.
Four-bolt type

Type HSR-B



The LM blocks can be attached to a table from below. For use with a table in which a through hole cannot be drilled.
Four-bolt type

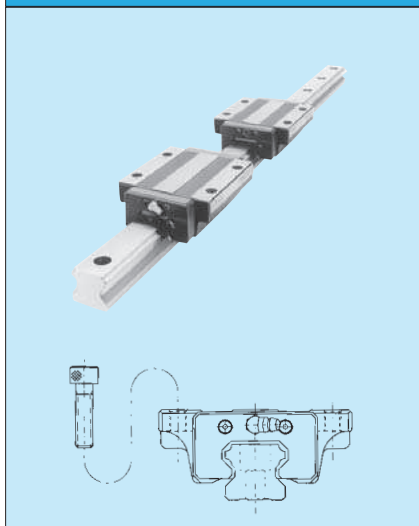
Type HSR-R



The narrowed flange of the LM block is provided with tapped holes, making it convenient for use in build-up systems. Can be used to replace the former type NSR-TBA.
Four-bolt type

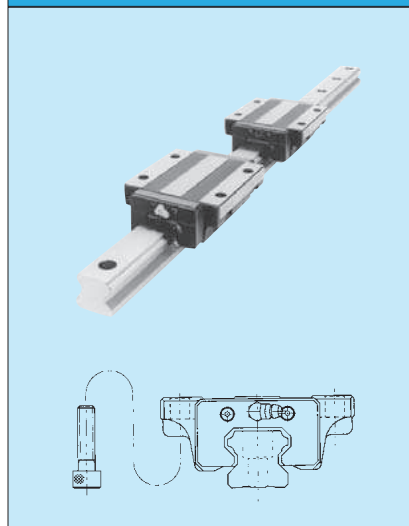
Standard ultra-heavy-load types

Type HSR-LA



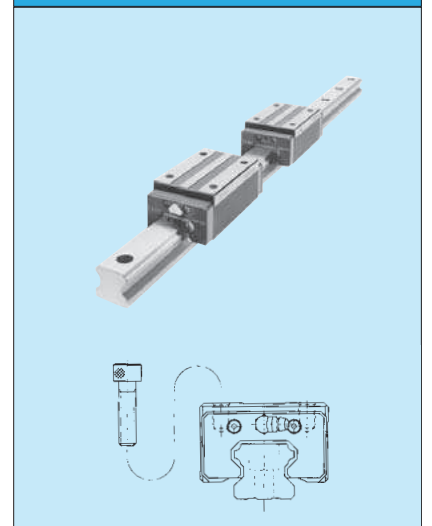
While the cross-sectional dimensions are the same as for type HSR-A, the LM block is longer. The number of effective balls is greater than in type HSR-A.
Four-bolt type

Type HSR-LB

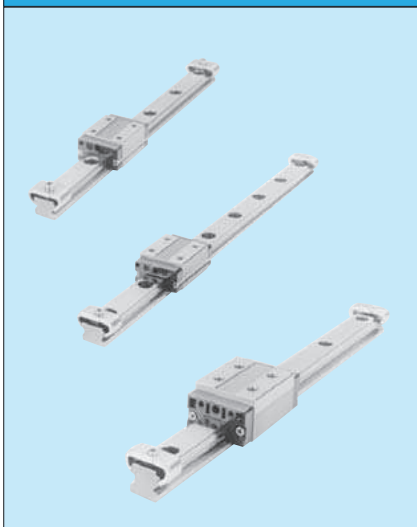


While the cross-sectional dimensions are the same as for type HSR-B, the LM block is longer. The number of effective balls is greater than in type HSR-B.
Four-bolt type

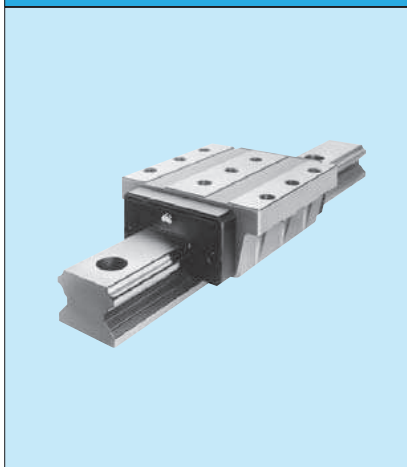
Type HSR-LR



While the cross-sectional dimensions are the same as for type HSR-R, the LM block is longer. The number of effective balls is greater than in type HSR-R.
Four-bolt type

Miniature four-way equal-load type**HSR 8/10/12R**

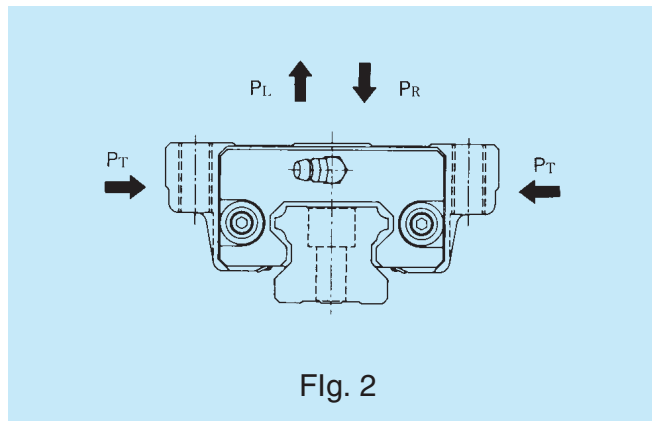
This series features the smallest LM Guide models. As the LM block is slim, it must be fastened in place using the tapped holes provided on the top surface.

Heavy-duty four-way equal-load type**HSR 100/120/150
HA/HB/HR**

Can be used for large machine tools and even buildings

Load Rating and Permissible Moment in Various Directions

Load rating



Type HSR can bear loads in all four directions: radial, reverse-radial, and two lateral directions.

The basic load ratings of HSR are equivalent to one another in all four directions (radial, reverse-radial and two lateral directions). The values are presented in the corresponding dimension tables.

Equivalent load

An equivalent load for type HSR when loads in all four directions are exerted on its LM block simultaneously can be obtained using the following equation:

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

where

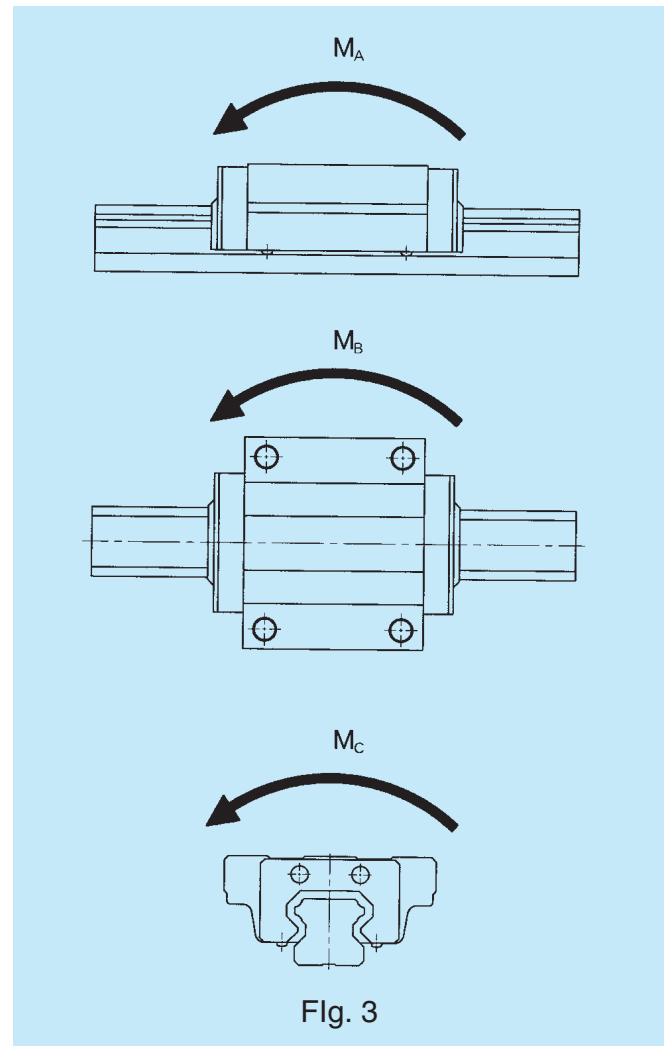
P_E : equivalent load (N)
 - In the radial direction
 - In the reverse-radial direction
 - In the lateral direction

P_R : radial load (N)

P_L : reverse-radial load (N)

P_T : lateral load (N)

Permissible moment



In type HSR, a single LM block can bear moments in all directions. Table 1 presents the permissible moments in directions M_A , M_B , and M_C for a single LM block and two LM blocks laid over one another (no data for direction M_C).

Table 1 Static Permissible Moment

Unit: kNm

Model No.	Clearance symbol	M_A		M_B		M_C
		Single block	Double block	Single block	Double block	Single block
HSR 8		0.0039	0.026	0.0039	0.026	0.0088
HSR 10		0.0098	0.062	0.0098	0.062	0.0196
HSR 12		0.0333	0.20	0.0333	0.20	0.052
HSR 15		0.07	0.37	0.07	0.37	0.10
HSR 20		0.16	0.82	0.16	0.82	0.23
HSR 20 L		0.27	1.4	0.27	1.4	0.31
HSR 25		0.27	1.4	0.27	1.4	0.4
HSR 25 L		0.46	2.4	0.46	2.4	0.51
HSR 30		0.43	2.3	0.43	2.3	0.65
HSR 30 L		0.73	3.7	0.73	3.7	0.86
HSR 35		0.64	3.4	0.64	3.4	1.0
HSR 35 L		1.1	5.6	1.1	5.6	1.4
HSR 45		1.3	6.9	1.3	6.9	2.1
HSR 45 L		2.1	10.9	2.1	10.9	2.8
HSR 55		2.2	11.7	2.2	11.7	3.6
HSR 55 L		3.7	18.8	3.7	18.8	4.8
HSR 65		4.2	21.0	4.2	21.0	6.6
HSR 65 L		7.2	35.8	7.2	35.8	8.9
HSR 85		10.2	56.5	10.2	56.5	12.6
HSR 85 L		12.4	63.5	12.4	63.5	16.7
HSR 100		16.9	86.1	16.9	86.1	25.3
HSR 120		22.5	113.5	22.5	113.5	34.8
HSR 150		29.2	146.9	29.2	146.9	52.4

Accuracy Standards

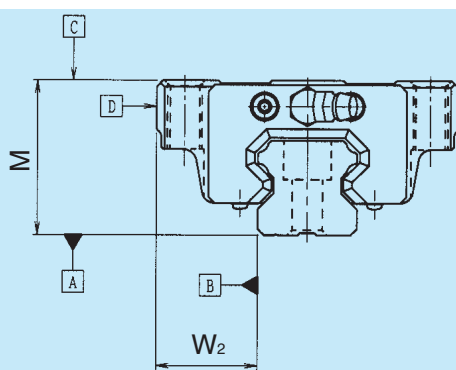


Fig. 4

The accuracy of type HSR is divided into five grades, normal, high, precision, super-precision, and ultra-precision, in accordance with the model numbers shown in Table 2.

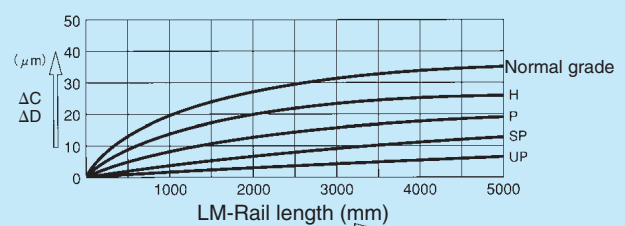


Fig. 5 Relationship Between LM-Rail Length and Running Parallelism

Table 2 Accuracy Standard

Unit: mm

A-IV

Model No.	Accuracy standard	Normal	High	Precision	Super-precision	Ultra-precision
	Item	No symbol	H	P	SP	UP
HSR 8 HSR 10 HSR 12	Tolerance for height M	± 0.08	± 0.04	± 0.02	± 0.01	—
	Tolerance for the height M difference among LM blocks	0.015	0.007	0.005	0.003	—
	Tolerance for rail-to-block lateral distance W_2	± 0.05	± 0.025	± 0.015	± 0.010	—
	Tolerance for rail-to-block lateral distance W_2 difference among LM blocks	0.02	0.01	0.007	0.005	—
	Running Parallelism of surface C with surface A	C (as per Fig. 5)				
	Running parallelism of surface D with surface B	D (as per Fig. 5)				
HSR 15 HSR 20	Tolerance for height M	± 0.1	± 0.03	$\begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.008 \end{smallmatrix}$
	Tolerance for the height M difference among LM blocks	0.02	0.01	0.006	0.004	0.003
	Tolerance for rail-to-block lateral distance W_2	± 0.1	± 0.03	$\begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.008 \end{smallmatrix}$
	Tolerance for rail-to-block lateral distance W_2 difference among LM blocks	0.02	0.01	0.006	0.004	0.003
	Running Parallelism of surface C with surface A	C (as per Fig. 5)				
	Running parallelism of surface D with surface B	D (as per Fig. 5)				
HSR 25 HSR 30 HSR 35	Tolerance for height M	± 0.1	± 0.04	$\begin{smallmatrix} 0 \\ -0.04 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.02 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.01 \end{smallmatrix}$
	Tolerance for the height M difference among LM blocks	0.02	0.015	0.007	0.005	0.003
	Tolerance for rail-to-block lateral distance W_2	± 0.1	± 0.04	$\begin{smallmatrix} 0 \\ -0.04 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.02 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.01 \end{smallmatrix}$
	Tolerance for rail-to-block lateral distance W_2 difference among LM blocks	0.03	0.015	0.007	0.005	0.003
	Running Parallelism of surface C with surface A	C (as per Fig. 5)				
	Running parallelism of surface D with surface B	D (as per Fig. 5)				
HSR 45 HSR 55	Tolerance for height M	± 0.1	± 0.05	$\begin{smallmatrix} 0 \\ -0.05 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.02 \end{smallmatrix}$
	Tolerance for the height M difference among LM blocks	0.03	0.015	0.007	0.005	0.003
	Tolerance for rail-to-block lateral distance W_2	± 0.1	± 0.05	$\begin{smallmatrix} 0 \\ -0.05 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.02 \end{smallmatrix}$
	Tolerance for rail-to-block lateral distance W_2 difference among LM blocks	0.03	0.02	0.01	0.007	0.005
	Running Parallelism of surface C with surface A	C (as per Fig. 5)				
	Running parallelism of surface D with surface B	D (as per Fig. 5)				
HSR 65 HSR 85 HSR100 HSR120 HSR150	Tolerance for height M	± 0.1	± 0.07	$\begin{smallmatrix} 0 \\ -0.07 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.05 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$
	Tolerance for the height M difference among LM blocks	0.03	0.02	0.01	0.007	0.005
	Tolerance for rail-to-block lateral distance W_2	± 0.1	± 0.07	$\begin{smallmatrix} 0 \\ -0.07 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.05 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$
	Tolerance for rail-to-block lateral distance W_2 difference among LM blocks	0.03	0.025	0.015	0.010	0.007
	Running Parallelism of surface C with surface A	C (as per Fig. 5)				
	Running parallelism of surface D with surface B	D (as per Fig. 5)				

Radial clearance

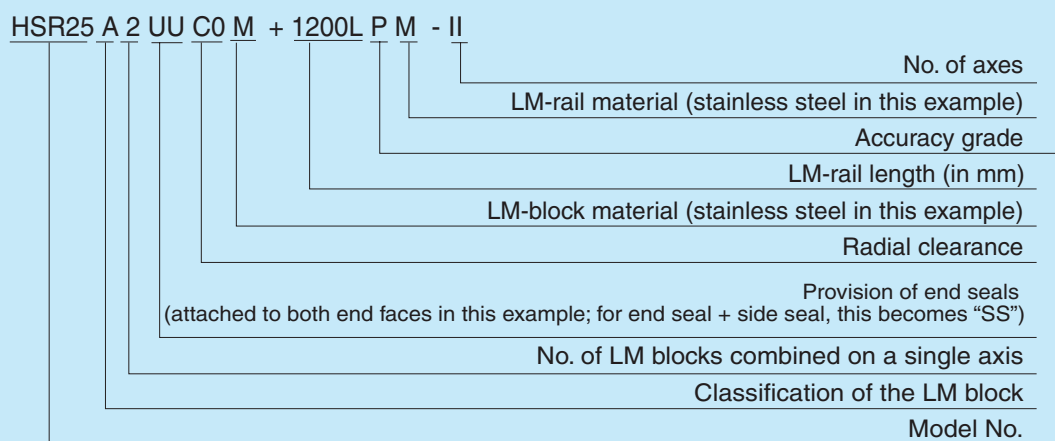
Table 3 presents the radial clearances of types HSR.

Table 3 Radial Clearances

Unit: μm

Model No.	Clearance symbol	Nomal	Under a light preload	Medium preload
		No symbol	C1	C0
HSR 8		± 1	- 4 ~ - 1	—
HSR 10		± 2	- 5 ~ - 1	—
HSR 12		± 3	- 6 ~ - 2	—
HSR 15		- 4 ~ + 2	- 12 ~ - 4	—
HSR 20		- 5 ~ + 2	- 14 ~ - 5	- 23 ~ - 14
HSR 25		- 6 ~ + 3	- 16 ~ - 6	- 26 ~ - 16
HSR 30		- 7 ~ + 4	- 19 ~ - 7	- 31 ~ - 19
HSR 35		- 8 ~ + 4	- 22 ~ - 8	- 35 ~ - 22
HSR 45		- 10 ~ + 5	- 25 ~ - 10	- 40 ~ - 25
HSR 55		- 12 ~ + 5	- 29 ~ - 12	- 46 ~ - 29
HSR 65		- 14 ~ + 7	- 32 ~ - 14	- 50 ~ - 32
HSR 85		- 16 ~ + 8	- 36 ~ - 16	- 56 ~ - 36
HSR100		- 19 ~ + 9	- 42 ~ - 19	- 65 ~ - 42
HSR120		- 21 ~ + 10	- 47 ~ - 21	- 73 ~ - 47
HSR150		- 23 ~ + 11	- 51 ~ - 23	- 79 ~ - 51

Model-number coding



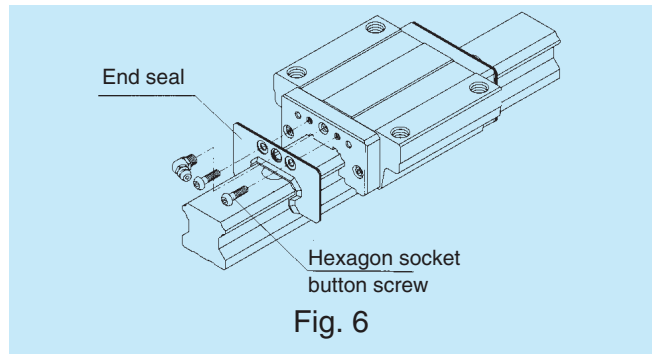
Note: This coding is based on the assumption of one set of code for a one-axis unit.
(A configuration of two axes installed in parallel is given at least two sets of code.)

Contamination Protection

Types HSR is provided with end and side seals as standard contamination-protection accessories.

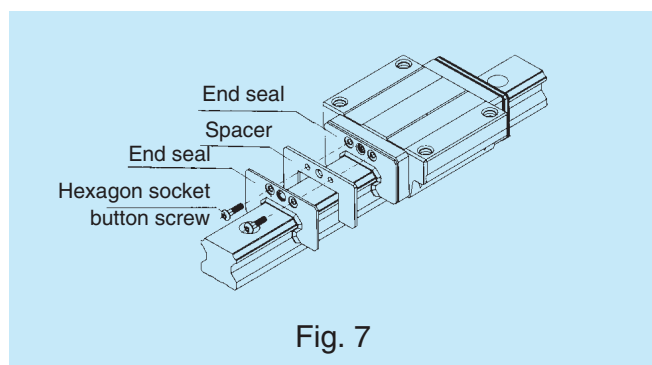
End seal

Standard accessory



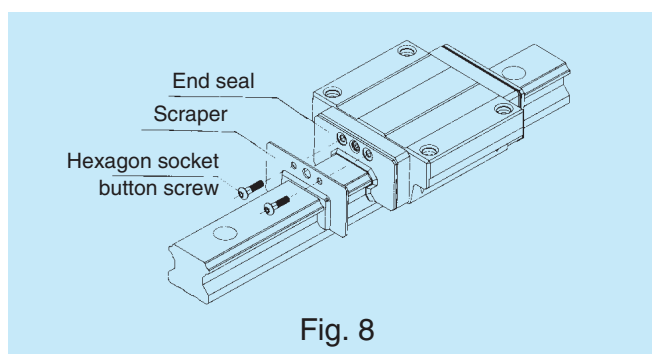
Double seal

Use two end seals to enhance the contamination-protection capacity



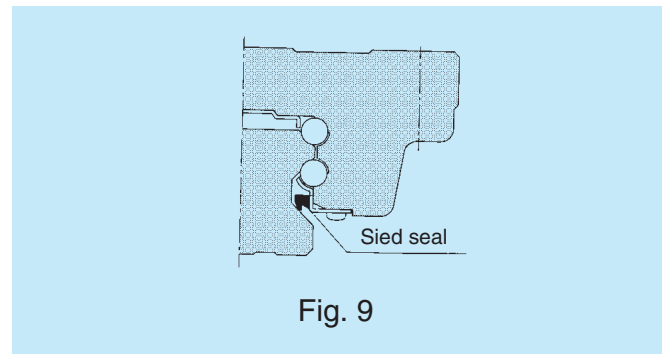
Scraper

Removes spatters and similar large foreign matter



Side seal

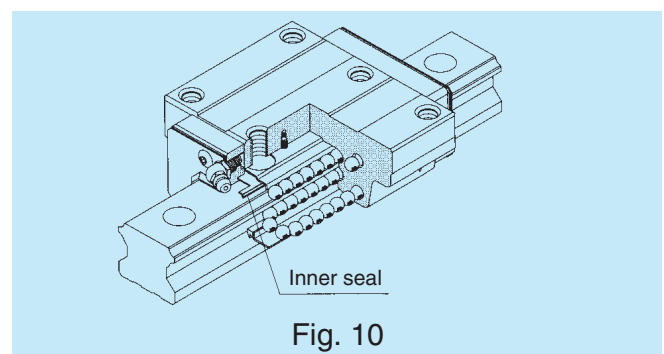
Prevents contaminants from entering an LM block from below



Inner seal

Installed in a LM block

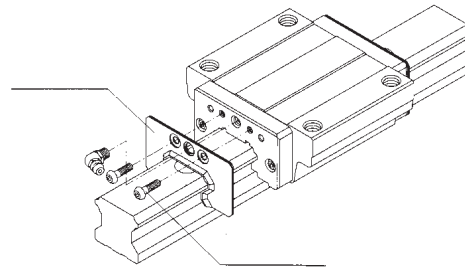
Applicable model Nos.: HSR 30/35/45/55/65/85



Contamination-protection-accessory symbol

Where a contamination-protection accessory is required, specify so using the symbols shown below.

Some models do not accept contamination-protection accessories. Confirm which parts are applicable by referring to Table 4.



Attaching a contamination-protection accessory to an LM block changes the block overall length. Add to dimension L the increment specified in the corresponding dimension table.

Table 4 HSR: LM Block Overall Length with Contamination-protection Accessory Attached

Unit: mm

Model. No.	UU		SS		DD		ZZ		KK		LL		RR	
HSR8R/M	O	24	×	-	×	-	×	-	×	-	×	-	×	-
HSR10R/M	O	31	×	-	×	-	×	-	×	-	×	-	×	-
HSR12R/M	O	45	×	-	×	-	×	-	×	-	×	-	×	-
HSR15A/AM B/BM R/RM	O	56.6	O	56.6	O	61.8	Δ	58.2	Δ	63.4	O	56.6	O	56.6
HSR20A/AM B/BM R/RM CA/CAM CB/CBM	O	74	O	74	O	80.6	O	76.6	O	83.2	O	74	O	74
HSR20LA/LAM LB/LBM LR/LRM HA/HAM HB/HBM		90		90		96.6		92.6		99.2		90		90
HSR25A/AM B/BM R/RM CA/CAM CB/CBM	O	83.1	O	83.1	O	90.7	O	86.7	O	94.3	O	83.1	O	83.1
HSR25LA/LAM LB/LBM LR/LRM HA/HAM HB/HBM		102.2		102.2		109.8		105.8		113.4		102.2		102.2
HSR30A/AM B/BM R/RM CA/CAM CB/CBM	O	98	O	98	O	105.6	O	101.6	O	109.2	O	98	O	98
HSR30LA/LAM LB/LBM LR/LRM HA/HAM HB/HBM		120.6		120.6		128.2		124.2		131.8		120.6		120.6
HSR35A/AM B/BM R/RM CA/CAM CB/CBM	O	109.4	O	109.4	O	117	O	113	O	120.6	O	109.4	O	109.4
HSR35LA/LAM LB/LBM LR/LRM HA/HAM HB/HBM		134.8		134.8		142.4		138.4		146		134.8		134.8
HSR45A/B/R/CA/CB	O	139	O	139	O	146.2	O	144.2	O	151.4	O	139	O	139
HSR45LA/LB/LR/HA/HB		170.8		170.8		178		176		183.2		170.8		170.8
HSR55A/B/R/CA/CB	O	163	O	163	O	170.2	O	168.2	O	175.4	O	163	O	163
HSR55LA/LB/LR/HA/HB		201.1		201.1		208.3		206.3		213.5		201.1		201.1
HSR65A/B/R/CA/CB	O	186	O	186	O	193.2	O	191.2	O	198.4	O	186	O	186
HSR65LA/LB/LR/HA/HB		245.5		245.5		252.7		250.7		258.9		245.5		245.5
HSR85A/B/R/CA/CB	O	245.6	O	245.6	O	252.8	O	252.4	O	259.6	×	-	×	-
HSR85LA/LB/LR/HA/HB		303		303		310.2		309.8		317		-		-
HSR100HA/HB/HR	O	334	O	334	×	-	×	-	×	-	×	-	×	-
HSR120HA/HB/HR	O	365	O	365	×	-	×	-	×	-	×	-	×	-
HSR150HA/HB/HR	O	396	O	396	×	-	×	-	×	-	×	-	×	-

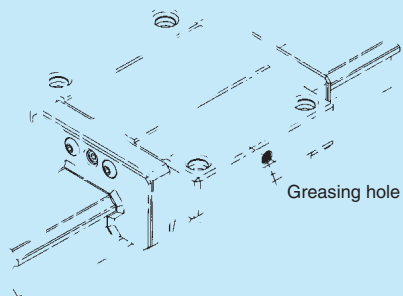
Note: O = Applicable

×

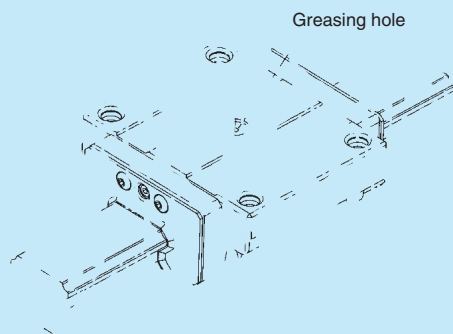
Δ = Applicable, but a grease nipple cannot be attached; contact us

Semi-standard greasing hole

For type HSR, a greasing hole is semi-standard. When placing an order, specify the application of the hole required.



Greasing
Side-Hole Specifications



Greasing
Top-Hole Specifications

Fig. 11

For details, contact us.

Seal resistance value

For the maximum value of seal resistance of seals type HSR...UU per LM block in which grease is applied, see Table 5.

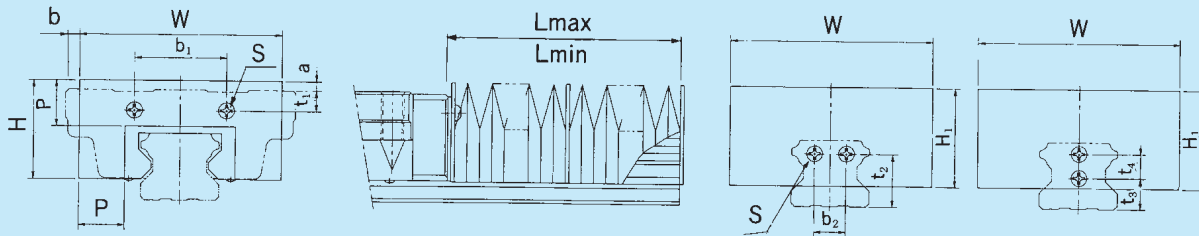
Table 5 Maximum Resistance Value of seals

Unit: N

Model No.	Seal resistance value
HSR 8	0.5
HSR 10	0.8
HSR 12	1.2
HSR 15	2.0
HSR 20	2.5
HSR 25	3.9
HSR 30	7.8
HSR 35	11.8
HSR 45	19.6
HSR 55	19.6
HSR 65	34.3
HSR 85	34.3
HSR 100	—
HSR 120	—
HSR 150	—

Dedicated Bellows JH for LM-Guide Type HSR

Shown below are the dimensions of dedicated bellows JH for type HSR. When ordering the bellows, specify the relevant model number shown in the table below.



Unit: mm

Model No.	Boundary dimensions																A	Applicable LM-Guide model
	W	H	H ₁	P	b ₁	A/B type t ₁	R type	b ₂	t ₂	t ₃	t ₄	Mounting bolt S	A/B type a	R type	A/B type b	R type	($\frac{L_{max}}{L_{min}}$)	
JH15	55	27	30	15	25	2.5	6.5	—	—	10	—	*M4 × 8	7.5	3.5	-4	-10.5	5	HSR15
JH20	66	32	35	17	34	5	5	—	—	6	8	M3 × 0.5 × 6	7	7	-1.5	-11	6	HSR20
JH25	78	38	38	20	30	7	11	—	—	10	8	M3 × 0.5 × 6	8.5	4.5	-4	-15	7	HSR25
JH30	84	42	42	20	40	8	11	—	—	11	10	M4 × 0.7 × 8	7	4	3	-12	7	HSR30
JH35	88	43	43	20	40	9	16	14	23	—	—	M4 × 0.7 × 8	4	—	6	-9	7	HSR35
JH45	100	51	51	20	58	10	20	20	29	—	—	M5 × 0.8 × 10	—	—	10	-7	7	HSR45
JH55	108	54	54	20	66	11	21	26	35	—	—	M5 × 0.8 × 10	—	—	16	-4	7	HSR55
JH65	132	68	68	20	80	19	19	32	42	—	—	M6 × 12	—	—	19	-3	7	HSR65
JH85	170	88	88	30	105	23	23	44	50	—	—	M6 × 12	—	—	22.5	-7	10	HSR85

Notes:

1. Mounting bolts marked with a “*” for model JH15 are provided on the LM-rail side only. On the LM block, tapping screws of nominal size at “2x5” are used.
2. In installation positions other than horizontal (e.g., vertical and wall-hung), the expansion ratios differ from those given in this table (guideline: A-1.5). When placing an order, specify your installation direction.
3. If bellows are attached to both ends of an LM block, a grease nipple cannot be installed there. In such a case, contact us.

Model-number coding

JH25 - 60/420

$$\text{Bellows dimensions} \left(\frac{\text{length when compressed}}{\text{length when expanded}} \right)$$

Model No. (bellows for type HSR25 in this example)

Note: A bellows length can be calculated as shown below.

$$L_{min} = \frac{S}{(A-1)} \quad S: \text{stroke length in (mm)}$$

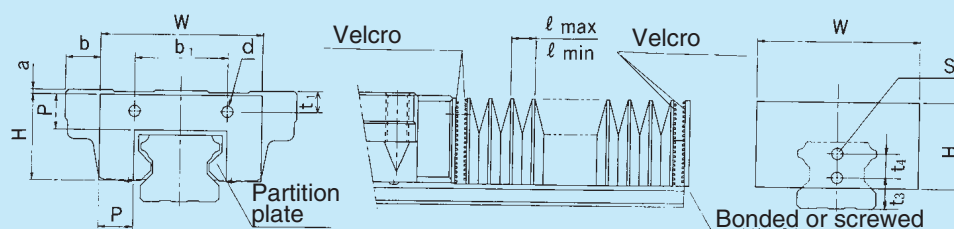
$$L_{max} = L_{min} \times A \quad A: \text{expansion ratio}$$

DH Bellows Designed for Type HSR

For types HSR15, HSR20, and HSR25, a bellows-type DH with the features specified below is available. When placing an order, specify model numbers, which are shown below.

Features

1. The width and height are smaller than those of conventional bellows. As a result, type DS does not protrude over the top surface of an LM block. The expansion ratio is equal to or greater than that of a conventional bellows.
2. Each ridge of the bellows has a partition plate to prevent the bellows from lifting. As a result, type DS can be used in the vertical, wall-hung, and tilted positions.
3. Excellent high-speed operation, up to as high as 120 m/min.
4. Can be equipped with Velcro, enabling use at any desired length, either by cutting a regular-length product into short sections or by joining more multiple pieces using an adhesive.
5. As with conventional types, type DS can also be fastened using screws. When doing so, hold the plate (1.6 mm in thickness) between the LM block and the bellows.

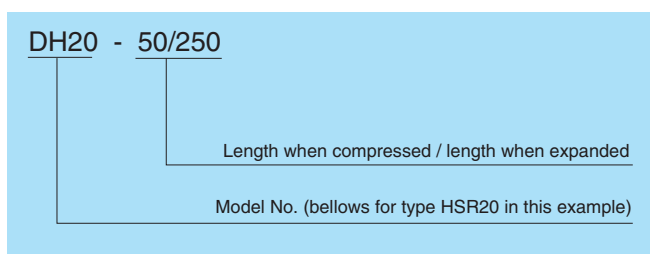


Unit: mm

Model No.	Boundary dimensions																		Applicable LM Guide model
					t ₁					a		b				Expansion ratio		Factor	
	W	H	P	b ₁	A/B type	R type	t ₃	t ₄	d	A/B type	R type	A/B type	R type	l _{max}	l _{min}	A	E	k	
DH15	35	19.5	8.5	25	2.5	6.5	10	—	3.5	0	4	6	−0.5	10	2.5	4	2	1.2	HSR15
DH20	45	25	10	34	5	5	6	8	4	0	0	9	−0.5	13	2.5	5	2	1.3	HSR20
DH25	52	29.5	12	30	7	11	10	8	4	0	4	9	−2	15	3	5	2	1.3	HSR25

Note : If bellows are attached to both ends of an LM block, a grease nipple cannot be installed there. In such a case, contact us.

Model-number coding



- Max length (Standard length) as a single piece is

$$L_{\min} = \frac{l_s}{(A - 1)} = \frac{530}{4} = 132.5 \approx 135$$

$$L_{\max} = A \times L_{\min} = 5 \times 135 = 675$$

Hence, the number of crests required is as follows:

$$n = \frac{L_{\max}}{P \times k} = \frac{675}{10 \times 1.3} = 51.9 \approx 52$$

$$L_{\max} (L_{\min}) = l_{\max} (l_{\min}) \times 200$$

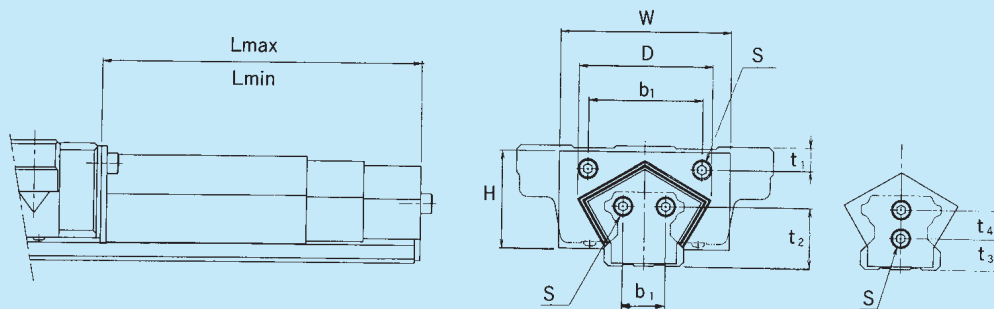
(E = plate thickness; 2 in the present example)

Thus, the bellows to be used are DH20-132/675.

LM Cover TPH Designed for Type HSR

The dimensions of type-HSR-dedicated LM cover type TPH are as shown below. When placing an order,

specify by the following model numbers.



Unit: mm

Model No.	Boundary dimensions										Applicable LM Guide model
	W	D (max)	H	b ₁	t ₁	b ₂	t ₂	t ₃	t ₄	Mounting bolt	
TPH 25	55	42	28	30	7	—	—	10	8	M3 × 0.5 × 6/	HSR 25
TPH 30	60	48	34	40	8	—	—	11	10	M4 × 0.7 × 8/	HSR 30
TPH 35	70	55	38	40	9	14	23	—	—	M4 × 0.7 × 8/	HSR 35
TPH 45	90	75	48	58	10	20	29	—	—	M5 × 0.8 × 10/	HSR 45
TPH 55	100	88	55	66	11	26	35	—	—	M5 × 0.8 × 10/	HSR 55

Unit: mm

Model No.	No. of sectors	L		Stroke
		min	max	
TPH 25	3	200	530	330
	3	150	380	230
	3	100	230	130
TPH 30	3	250	680	430
	3	200	530	330
	3	150	380	230
TPH 35	3	300	830	530
	3	250	680	430
	3	200	530	330
	3	150	380	230

Unit: mm

Model No.	No. of sectors	L		Stroke
		min	max	
TPH 45	3	350	980	630
	3	300	830	530
	3	250	680	430
	3	200	530	330
TPH 55	4	400	1460	1060
	4	350	1330	980
	4	300	1060	760
	4	250	860	610

Model-number coding

TPH55 - 400/1460

Lmax (cover length when expanded)

Lmin (cover length when compressed)

Model number (for HSR55)

Note : If bellows are attached to both ends of an LM block, a grease nipple cannot be installed there. In such a case, contact us.

Precautions on Use

Mounting-Surface Height and Corner Profile

Normally, mounting surfaces for LM blocks and rails have lateral reference surfaces to aid in positioning rails and blocks with a high degree of accuracy.

For the reference-surface shoulder height, see Table 6.

Furthermore, provide enough space to the corner profile of a mounting surface so that the corner does not interfere with chamfers made on the LM blocks or rails, or provide the corner with a radius smaller than corner radius r_1 and r_2 specified in Table 6.

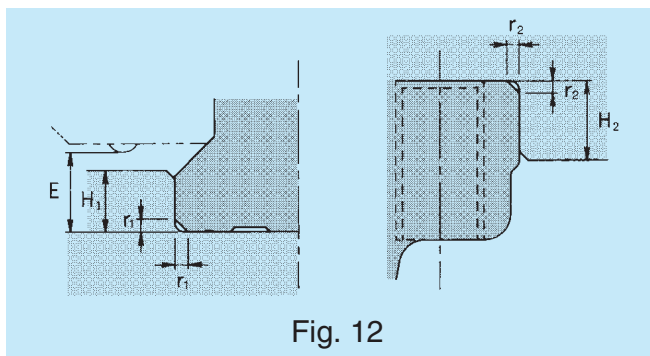
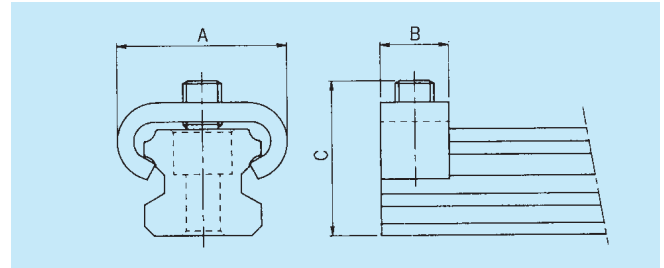


Fig. 12

Stopper

In miniature LM Guide HSR 8, 10, and 12, removal of the LM block from the rail may cause the balls to fall off. To prevent this, the LM block is delivered with stoppers installed. If the LM Guide is used without the stoppers, be careful not to allow the LM block to overrun.



Unit: mm

Model No.	A	B	C
HSR 8	12.5	6	10
HSR 10	15	6	11
HSR 12	18.5	7	16

Table 6 Mounting-Surface Shoulder Height and Corner Radius

Unit: mm

Model No.	LM rail corner radius r_1 (Max.)	LM block corner radius r_2 (Max.)	LM rail shoulder height H_1	LM block shoulder height H_2	E
HSR 8	0.3	0.5	1.6	6	2.1
HSR 10	0.3	0.5	1.7	5	2.2
HSR 12	0.8	0.5	2.6	4	3.1
HSR 15	0.5	0.5	3	4	3.5
HSR 20	0.5	0.5	3.5	5	4
HSR 25	1.0	1.0	5	5	5.5
HSR 30	1.0	1.0	5	5	7
HSR 35	1.0	1.0	6	6	7.5
HSR 45	1.0	1.0	8	8	10
HSR 55	1.5	1.5	10	10	13
HSR 65	1.5	1.5	10	10	14
HSR 85	1.5	1.5	12	14	16
HSR 100	2.0	2.0	16	16	20.5
HSR 120	2.5	2.5	17	18	20
HSR 150	2.5	2.5	20	20	22.5

LM-Rail Standard and Maximum Lengths

Table 7 presents the standard and maximum lengths of LM rails for type HSR. If your maximum length is not within the range of this table, we offer special LM rails intended for connected use.

For dimension G when a special length is specified, we recommend those listed in Table 7. A large dimension

G tends to reduce stability at the rail ends, which may degrade accuracy.

For connected use, we offer LM rails that ensure the elimination of level differences at joints. Therefore, when placing an order, please specify the overall length of the LM rails you require.

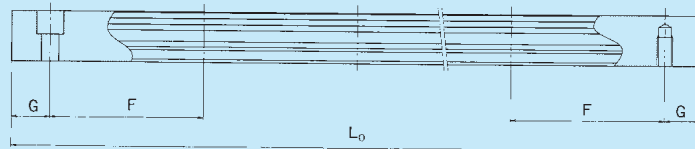


Table 7 LM Rail Standard and Maximum Lengths

Unit: mm

Model No.	HSR8	HSR10	HSR12	HSR15	HSR20	HSR25	HSR30	HSR35	HSR45	HSR55	HSR65	HSR85	HSR100	HSR120	HSR150
LM rail standard length (L ₀)	35	45	70	160	220	220	280	280	570	780	1270	1530	1340	1470	1600
	55	70	110	220	280	280	360	360	675	900	1570	1890	1760	1930	2100
	75	95	150	280	340	340	440	440	780	1020	2020	2250	2180	2390	2350
	95	120	190	340	400	400	520	520	885	1140	2620	2610	2600		
	115	145	230	400	460	460	600	600	990	1260					
	135	170	270	460	520	520	680	680	1095	1380					
	155	195	310	520	580	580	760	760	1200	1500					
	175	220	350	580	640	640	840	840	1305	1620					
	195	245	390	640	700	700	920	920	1410	1740					
	215	270	430	700	760	760	1000	1000	1515	1860					
	235	295	470	760	820	820	1080	1080	1620	1980					
	255	320	510	820	940	940	1160	1160	1725	2100					
	275	345	550	940	1000	1000	1240	1240	1830	2220					
		370	590	1000	1060	1060	1320	1320	1935	2340					
		395	630	1060	1120	1120	1400	1400	2040	2460					
		420	670	1120	1180	1180	1480	1480	2145	2580					
		445		1180	1240	1240	1560	1560	2250	2700					
		470		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	20	25	40	60	60	60	80	80	105	120	150	180	210	230	250
G	7.5	10	15	20	20	20	20	20	22.5	30	35	45	40	45	50
Max. length	(275)	(470)	(670)	2500 (1240)	3000 (1480)	3000 (2020)	3000 (2520)	3000 (2520)	3090	3060	3000	3000	3000	3000	3000

- Notes:
- The maximum length differs by accuracy grade. Contact us for details.
 - In special cases in which connected use is impossible but one of the maximum lengths specified here is required, contact us.
 - Numbers in parentheses indicate the maximum lengths of stainless steel types.

Tapped-Hole Rail Models of Type HSR

A-IV

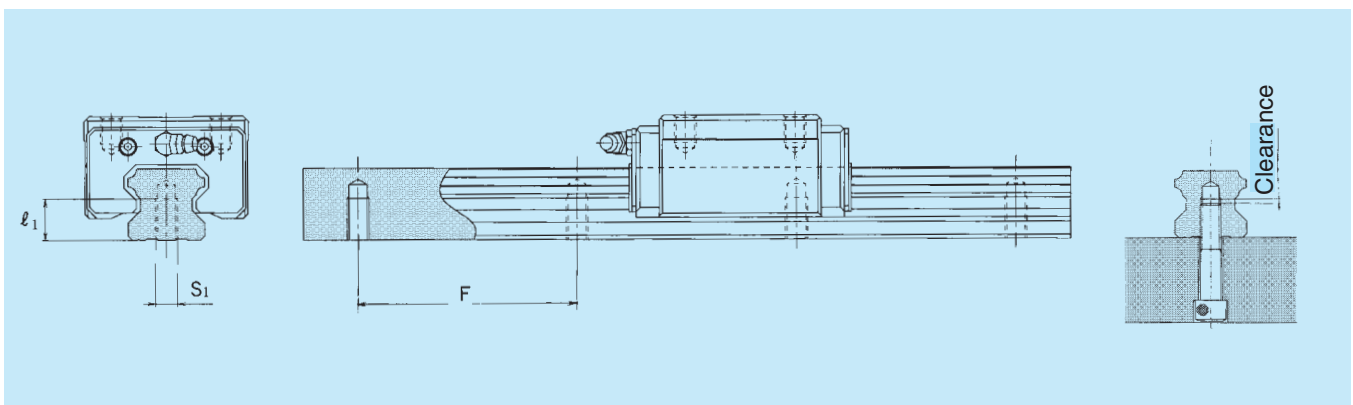
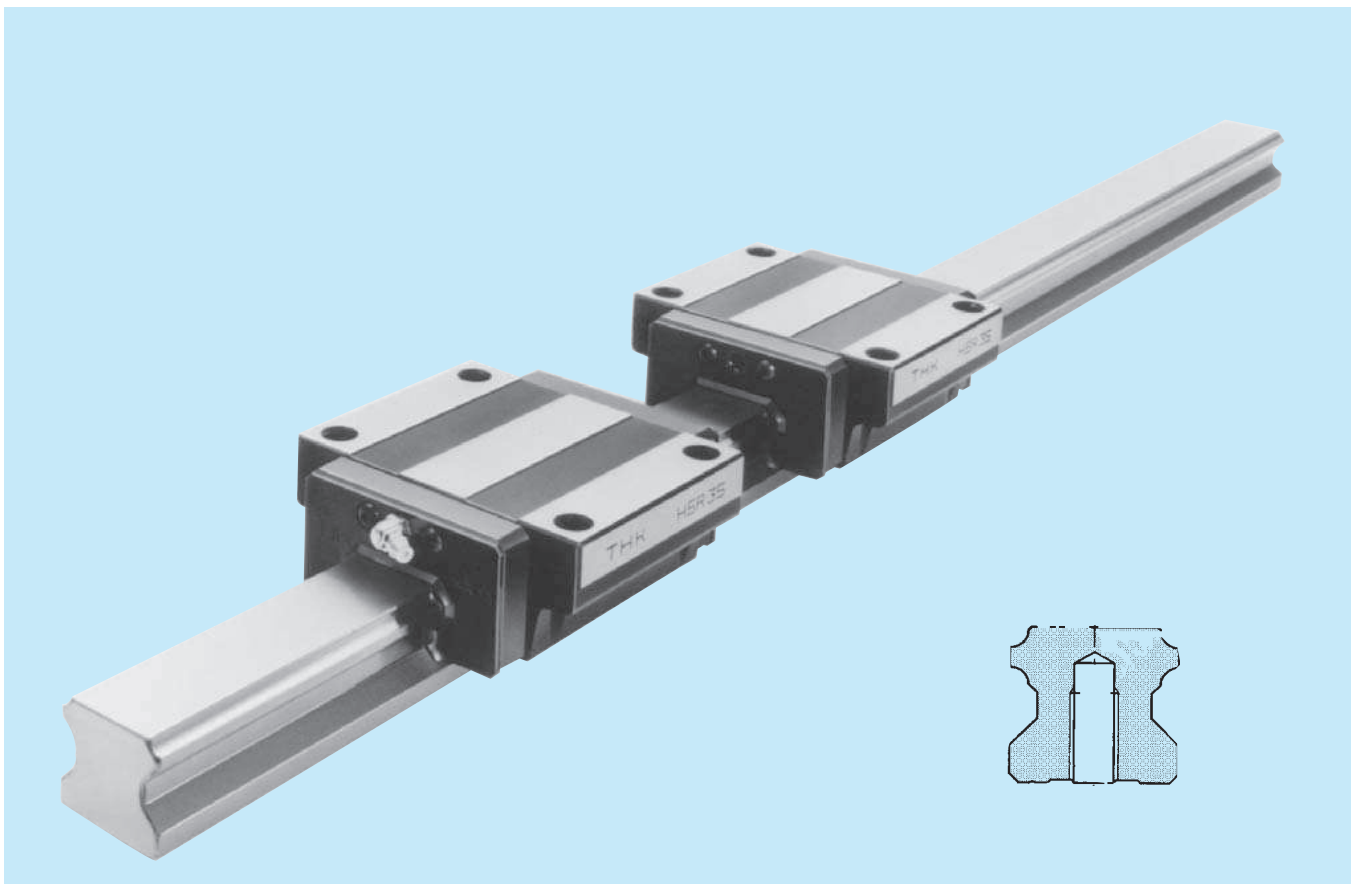


Table 8 Tapped-Hole Rail Dimensions

Unit: mm

Model No.	S_1	Effective tapped thread length R
HSR 15	M5 × 0.8	8
HSR 20	M6	10
HSR 25	M6	12
HSR 30	M8	15
HSR 35	M8	17
HSR 45	M12	24
HSR 55	M14	24
HSR 65	M20	30

1. Set the bolt length such that a clearance of 2 to 5 mm is reserved at the tip of each bolt when the bolt is tightened over the full length of the effective tapped thread (diagram shown above).

2. Model-number coding

HSR30 A2UU + 1000LH K

Tap-type symbol

3. The rail tap types also apply to type HSR-YR.
4. For the standard tapping pitch (F), see page A-256.

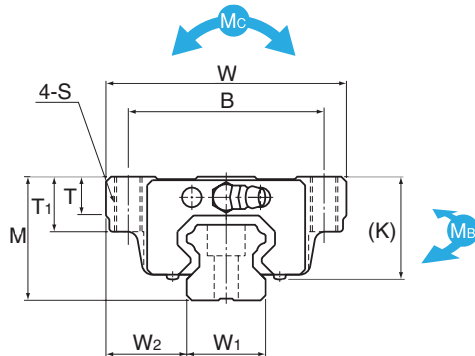
HSR-A Type HSR-LA Type

Standard type

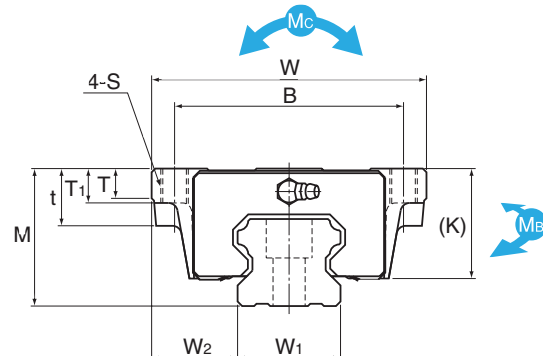
HSR-AM Type HSR-LAM Type

Stainless-steel type

Four-tapped-hole type



HSR15A - 35A/LA/AM/LAM

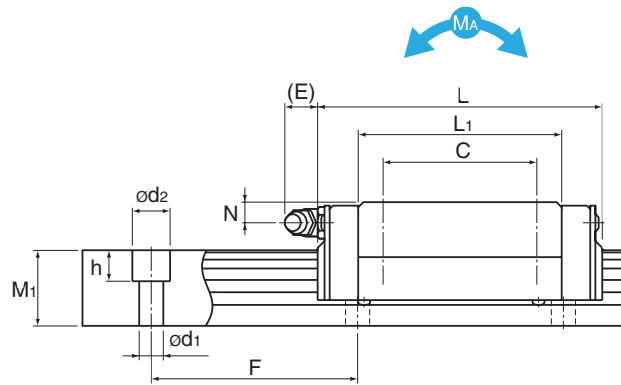


HSR45A - 85A/LA

Model No.	External dimensions			LM-block dimensions									
	Height M	Width W	Length L	B	C	S	L ₁	t	T	T ₁	K	N	E
HSR 15A HSR 15AM	24	47	56.6	38	30	M5	38.8	—	7	11	19.3	4.3	5.5
HSR 20A HSR 20AM	30	63	74	53	40	M6	50.8	—	10	9.5	26	5	12
HSR 20LA HSR 20LAM	30	63	90	53	40	M6	66.8	—	10	9.5	26	5	12
HSR 25A HSR 25AM	36	70	83.1	57	45	M8	59.5	—	11	16	30.5	6	12
HSR 25LA HSR 25LAM	36	70	102.2	57	45	M8	78.6	—	11	16	30.5	6	12
HSR 30A HSR 30AM	42	90	98	72	52	M10	70.4	—	9	18	35	7	12
HSR 30LA HSR 30LAM	42	90	120.6	72	52	M10	93	—	9	18	35	7	12
HSR 35A HSR 35AM	48	100	109.4	82	62	M10	80.4	—	12	21	40.5	8	12
HSR 35LA HSR 35LAM	48	100	134.8	82	62	M10	105.8	—	12	21	40.5	8	12
HSR 45A HSR 45LA	60	120	139 170.8	100	80	M12	98 129.8	25	13	15	50	10	16
HSR 55A HSR 55LA	70	140	163 201.1	116	95	M14	118 156.1	29	13.5	17	57	11	16
HSR 65A HSR 65LA	90	170	186 245.5	142	110	M16	147 206.5	37	21.5	23	76	19	16
HSR 85A HSR 85LA	110	215	245.6 303	185	140	M20	178.6 236	55	28	30	94	23	16

Notes:

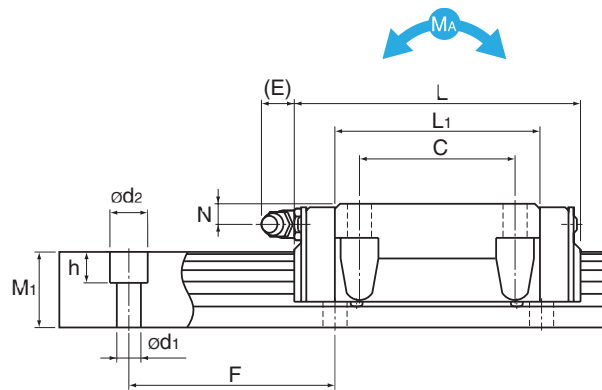
- An "M" in a model number indicates that the corresponding LM blocks, rails, and balls are made of stainless steel and are therefore corrosion- and environment-resistant.
- For products marked with a "*", stainless-steel end plates are available in cases in which they are to be used at 80°C or higher.



Unit: mm

Grease nipple	LM-rail dimensions					Basic load rating		Mass	
	Width W_1 ± 0.05	W_2	Height M_1	Pitch F	$d_1 \times d_2 \times h$	C kN	C_0 kN	LM block kg	LM rail kg/m
PB1021B	15	16	15	60	$4.5 \times 7.5 \times 5.3$	8.33	13.5	0.2	1.5
B-M6F	20	21.5	18	60	$6 \times 9.5 \times 8.5$	13.8	23.8	0.35	2.3
B-M6F	20	21.5	18	60	$6 \times 9.5 \times 8.5$	21.3	31.8	0.47	2.3
B-M6F	23	23.5	22	60	$7 \times 11 \times 9$	19.9	34.4	0.59	3.3
B-M6F	23	23.5	22	60	$7 \times 11 \times 9$	27.2	45.9	0.75	3.3
B-M6F	28	31	26	80	$9 \times 14 \times 12$	28	46.8	1.1	4.8
B-M6F	28	31	26	80	$9 \times 14 \times 12$	37.3	62.5	1.3	4.8
B-M6F	34	33	29	80	$9 \times 14 \times 12$	37.3	61.1	1.6	6.6
B-M6F	34	33	29	80	$9 \times 14 \times 12$	50.2	81.5	2	6.6
B-PT1/8	45	37.5	38	105	$14 \times 20 \times 17$	60 80.4	95.6 127	2.8 3.3	11
B-PT1/8	53	43.5	44	120	$16 \times 23 \times 20$	88.5 119	137 183	4.5 5.7	15.1
B-PT1/8	63	53.5	53	150	$18 \times 26 \times 22$	141 192	215 286	8.5 10.7	22.5
B-PT1/8	85	65	65	180	$24 \times 35 \times 28$	210 282	310 412	17 23	35.2

- For permissible static moments M_A , M_B , and M_C , see page A-265.
- For standard LM-rail lengths, see page A-276.
- For model-number coding, see page A-268.



Unit: mm

Grease nipple	LM rail dimensions					Basic load rating		Mass	
	Width W_1 ± 0.05	W_2	Height M_1	Pitch F	$d_1 \times d_2 \times h$	C kN	C_0 kN	LM block kg	LM rail kg/m
PB1021B	15	16	15	60	$4.5 \times 7.5 \times 5.3$	8.33	13.5	0.2	1.5
B-M6F	20	21.5	18	60	$6 \times 9.5 \times 8.5$	13.8	23.8	0.35	2.3
B-M6F	20	21.5	18	60	$6 \times 9.5 \times 8.5$	21.3	31.8	0.47	2.3
B-M6F	23	23.5	22	60	$7 \times 11 \times 9$	19.9	34.4	0.59	3.3
B-M6F	23	23.5	22	60	$7 \times 11 \times 9$	27.2	45.9	0.75	3.3
B-M6F	28	31	26	80	$9 \times 14 \times 12$	28	46.8	1.1	4.8
B-M6F	28	31	26	80	$9 \times 14 \times 12$	37.3	62.5	1.3	4.8
B-M6F	34	33	29	80	$9 \times 14 \times 12$	37.3	61.1	1.6	6.6
B-M6F	34	33	29	80	$9 \times 14 \times 12$	50.2	81.5	2	6.6
B-PT1/8	45	37.5	38	105	$14 \times 20 \times 17$	60 80.4	95.6 127	2.8 3.3	11
B-PT1/8	53	43.5	44	120	$16 \times 23 \times 20$	88.5 119	137 183	4.5 5.7	15.1
B-PT1/8	63	53.5	53	150	$18 \times 26 \times 22$	141 192	215 286	8.5 10.7	22.5
B-PT1/8	85	65	65	180	$24 \times 35 \times 28$	210 282	310 412	17 23	35.2

- For permissible static moments M_A , M_B , and M_C , see page A-265.
- For standard LM-rail lengths, see page A-276.
- For model-number coding, see page A-268.

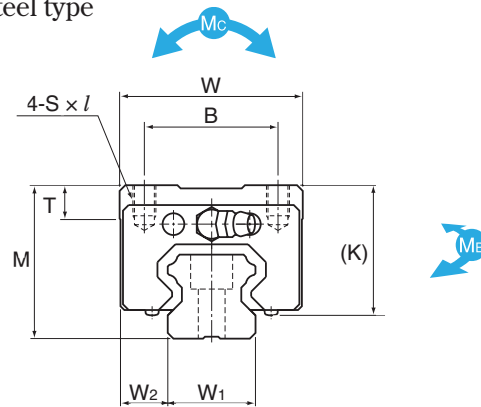
HSR-R Type HSR-LR Type

Standard type

HSR-RM Type HSR-LRM Type

Stainless-steel type

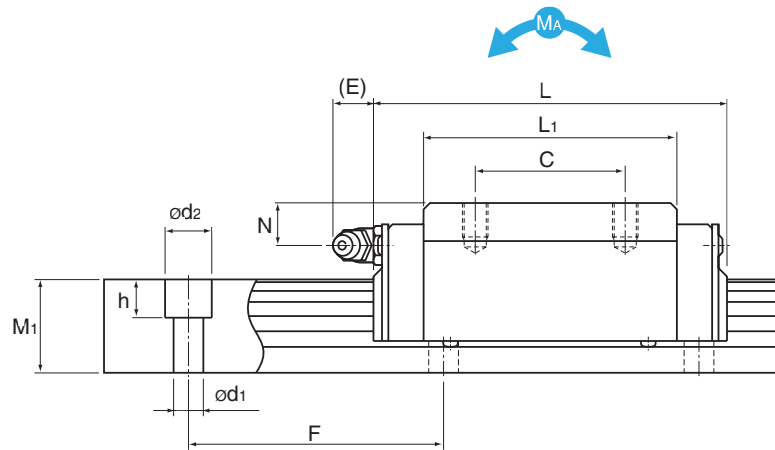
Four-tapped-hole type



Model No.	External dimensions			LM-block dimensions							
	Height M	Width W	Length L	B	C	S × l	L ₁	T	K	N	E
HSR 15R HSR 15RM	28	34	56.6	26	26	M4 × 5	38.8	6	23.3	8.3	5.5
HSR 20R HSR 20RM	30	44	74	32	36	M5 × 6	50.8	8	26	5	12
HSR 20LR HSR 2LRM	30	44	90	32	50	M5 × 6	66.8	8	26	5	12
HSR 25R HSR 25RM	40	48	83.1	35	35	M6 × 8	59.5	9	34.5	10	12
HSR 25LR HSR 25LRM	40	48	102.2	35	50	M6 × 8	78.6	9	34.5	10	12
HSR 30R HSR 30RM	45	60	98	40	40	M8 × 10	70.4	9	38	10	12
HSR 30LR HSR 30LRM	45	60	120.6	40	60	M8 × 10	93	9	38	10	12
HSR 35R HSR 35RM	55	70	109.4	50	50	M8 × 12	80.4	11.7	47.5	15	12
HSR 35LR HSR 35LRM	55	70	134.8	50	72	M8 × 12	105.8	11.7	47.5	15	12
HSR 45R HSR 45LR	70	86	139 170.8	60	60 80	M10 × 17	98 129.8	15	60	20	16
HSR 55R HSR 55LR	80	100	163 201.1	75	75 95	M12 × 18	118 156.1	20.5	67	21	16
HSR 65R HSR 65LR	90	126	186 245.5	76	70 120	M16 × 20	147 206.5	23	76	19	16
HSR 85R HSR 85LR	110	156	245.6 303	100	80 140	M18 × 25	178.6 236	29	94	23	16

Notes:

- An “M” in a model number indicates that the corresponding LM blocks, rails, and balls are made of stainless steel and are therefore corrosion- and environment-resistant.
- For products marked with a “*”, stainless-steel end plates are available in cases in which they are to be used at 80°C or higher.



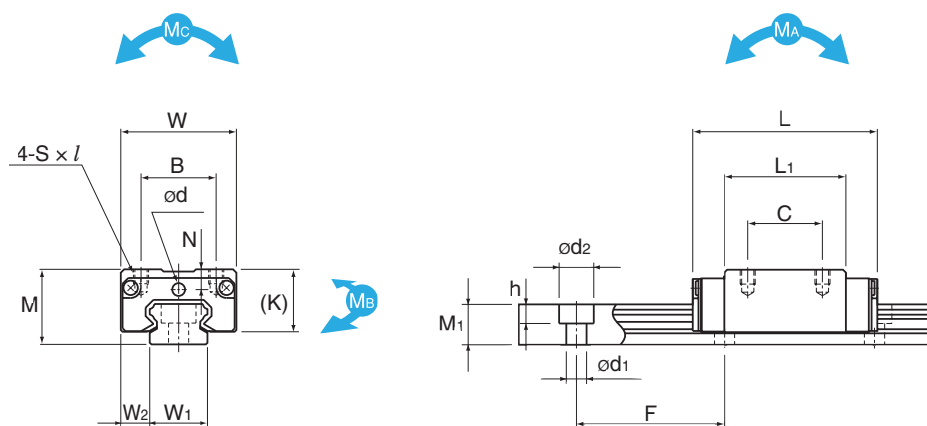
Unit: mm

Grease nipple	LM rail dimensions					Basic load rating		Mass	
	Width W_1 ± 0.05	W_2	Height M_1	Pitch F	$d_1 \times d_2 \times h$	C kN	C_0 kN	LM block kg	LM rail kg/m
PB1021B	15	9.5	15	60	$4.5 \times 7.5 \times 5.3$	8.33	13.5	0.18	1.5
B-M6F	20	12	18	60	$6 \times 9.5 \times 8.5$	13.8	23.8	0.25	2.3
B-M6F	20	12	18	60	$6 \times 9.5 \times 8.5$	21.3	31.8	0.35	2.3
B-M6F	23	12.5	22	60	$7 \times 11 \times 9$	19.9	34.4	0.54	3.3
B-M6F	23	12.5	22	60	$7 \times 11 \times 9$	27.2	45.9	0.67	3.3
B-M6F	28	16	26	80	$9 \times 14 \times 12$	28	46.8	0.9	4.8
B-M6F	28	16	26	80	$9 \times 14 \times 12$	37.3	62.5	1.1	4.8
B-M6F	34	18	29	80	$9 \times 14 \times 12$	37.3	61.1	1.5	6.6
B-M6F	34	18	29	80	$9 \times 14 \times 12$	50.2	81.5	2	6.6
B-PT1/8	45	20.5	38	105	$14 \times 20 \times 17$	60 80.4	95.6 127	2.6 3.1	11
B-PT1/8	53	23.5	44	120	$16 \times 23 \times 20$	88.5 119	137 183	4.3 5.4	15.1
B-PT1/8	63	31.5	53	150	$18 \times 26 \times 22$	141 192	215 286	7.3 9.3	22.5
B-PT1/8	85	35.5	65	180	$24 \times 35 \times 28$	210 282	310 412	13 16	35.2

- For permissible static moments M_A , M_B , and M_C , see page A-265.
- For standard LM-rail lengths, see page A-276.
- For model-number coding, see page A-268.

Miniature LM Guide Type HSR-R M

Stainless type

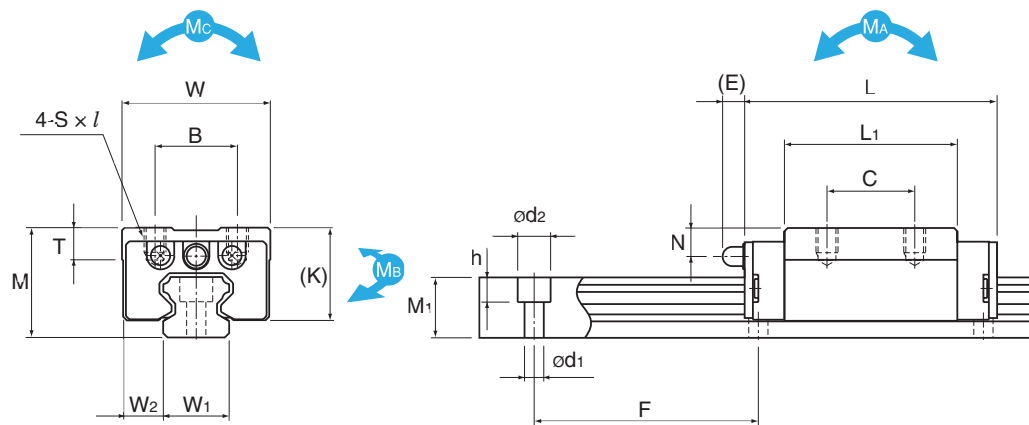


HSR8,10RM

Model No.	External dimensions			LM-block dimensions								
	Height M	Width W	Length L	B	C	S × l	L ₁	T	K	N	E	Oil hole d
HSR 8RM	11	16	24	10	10	M2 × 2.5	15	—	8.9	2.6	—	2.2
HSR 10RM	13	20	31	13	12	M2.6 × 2.5	20.1	—	10.8	3.5	—	2.5
HSR 12RM	20	27	45	15	15	M4 × 4.5	30.5	6	16.9	5.2	4.0	

Notes:

- An “M” in a model number indicates that the corresponding LM blocks, rails, and balls are made of stainless steel and are therefore corrosion- and environment-resistant.
- For permissible static moments M_A , M_B , and M_C , see page A-265.



HSR12RM

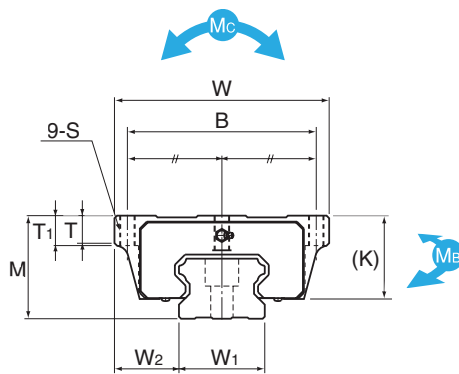
Unit: mm

Grease nipple	LM-rail dimensions					Basic load rating		Mass	
	Width W_1 ± 0.05	W_2	Height M_1	Pitch F	$d_1 \times d_2 \times h$	C kN	C_0 kN	LM block kg	LM rail kg/m
	8	4	6	20	$2.4 \times 4.2 \times 2.3$	1.08	2.16	0.012	0.3
—	10	5	7	25	$3.5 \times 6 \times 3.3$	1.96	3.82	0.025	0.45
PB-107	12	7.5	11	40	$3.5 \times 6 \times 4.5$	4.7	8.53	0.08	0.83

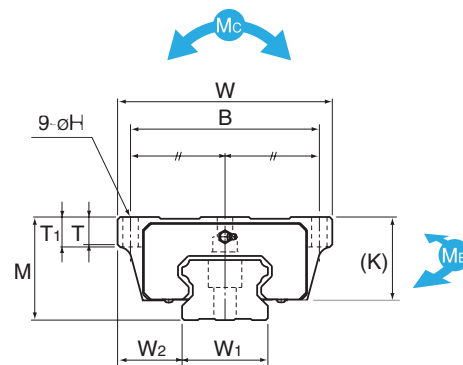
- For standard LM-rail lengths, see page A-276.
- For model-number coding, see page A-268.

Types HSR-HA, HSR-HB, and HSR-HR

Heavy-duty nine- and six-bolt type



HSR100A - 150HA

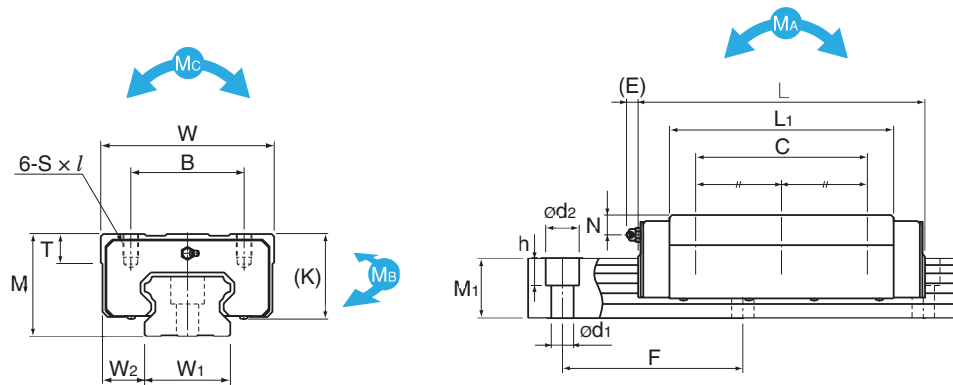


HSR100A - 150HB

Model No.	External dimensions			LM-block dimensions									
	Height M	Width W	Length L	B	C	H	S × l	L ₁	T	T ₁	K	N	E
HSR 100HA	120	250	334	220	200	—	M18	261	32	34.8	100	23	16
HSR 100HB		250		220		20	—		32	35			
HSR 100HR		200		130		—	M18 × 27		33	—			
HSR 120HA	130	290	365	250	210	—	M20	287	34	38	110	26.5	16
HSR 120HB		290		250		22	—		34	38			
HSR 120HR		220		146		—	M20 × 30		33.7	—			
HSR 150HA	145	350	396	300	230	—	M24	314	36	40	123	29	16
HSR 150HB		350		300		26	—		36	40			
HSR 150HR		266		180		—	M24 × 35		33	—			

Notes:

- For permissible static moments M_A , M_B , and M_C , see page A-265.
- For model-number coding, see page A-268.



HSR100A - 150HR

Unit: mm

Grease nipple	LM-rail dimensions					Basic load rating		Mass	
	Width W_1 ± 0.05	W_2	Height M_1	Pitch F	$d_1 \times d_2 \times h$	C kN	C_0 kN	LM block kg	LM rail kg/m
B-PT1/4	100	75	70	210	$26 \times 39 \times 32$	351	506	32	49
		75							
		50							
B-PT1/4	114	88	75	230	$33 \times 48 \times 43$	429	612	43	61
		88							
		53							
B-PT1/4	144	103	85	250	$39 \times 58 \times 46$	518	728	62	87
		103							
		61							

- For standard LM-rail lengths, see page A-276.