

LM Guide Type SHW - Caged Ball, wide, low center-of-gravity type

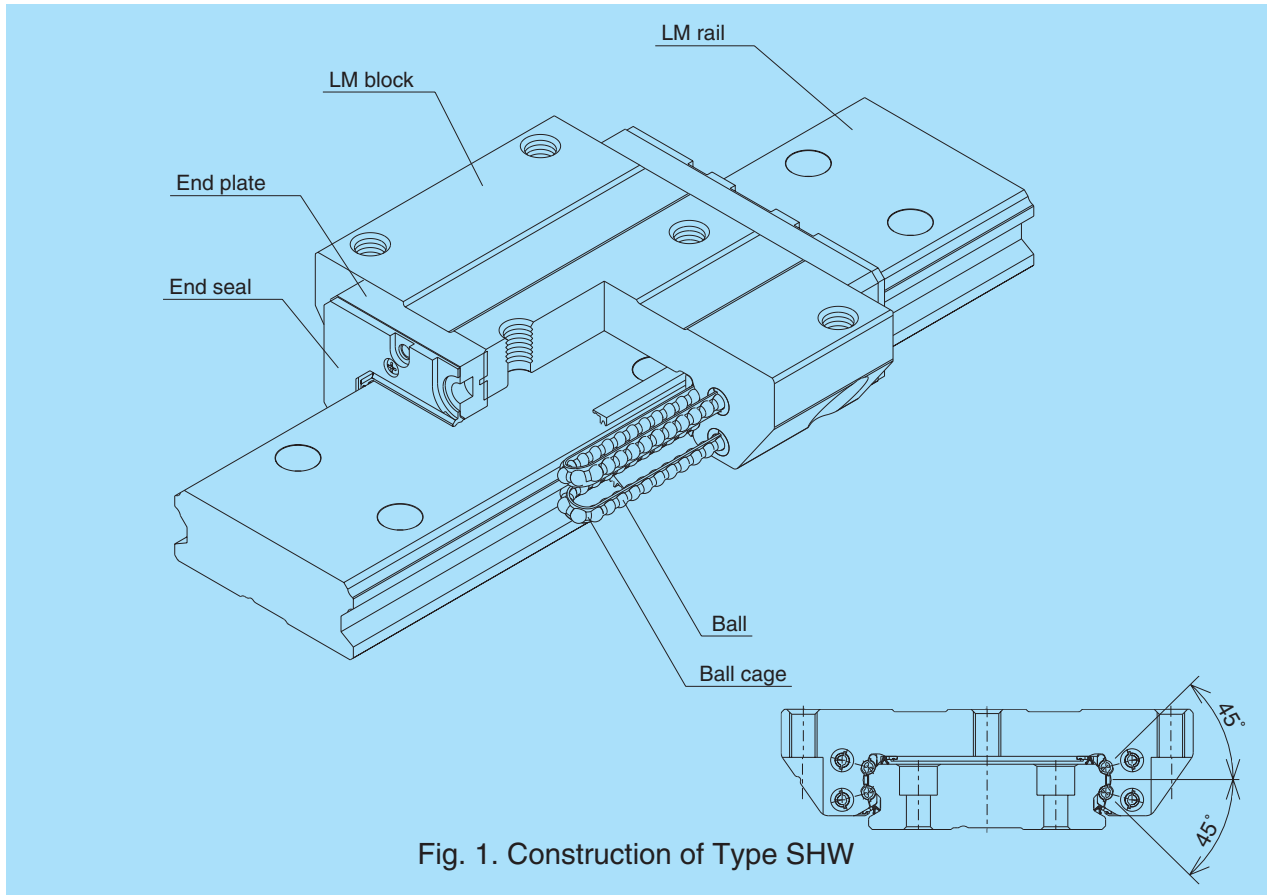


Fig. 1. Construction of Type SHW

Construction and Features

The Caged Ball structure of this wide, high-rigidity LM Guide ensures low noise, long-term maintenance-free operation and superior high speeds.

Greater width and low center of gravity

Type SHW has mounting compatibility with LM Guide type HRW. SHW has a greater rail width and inherits the low center-of-gravity structure of HRW. Therefore, it is optimal for parts where space saving or MC moment rigidity is required.

Four-way equal load

The raceways are arranged at 45° (in relation to one another, so that each train of balls bears an equal load rating in all four directions: radial, reverse-radial, and two lateral directions). This type can be put to a wide range of applications.

Self-adjusting capability

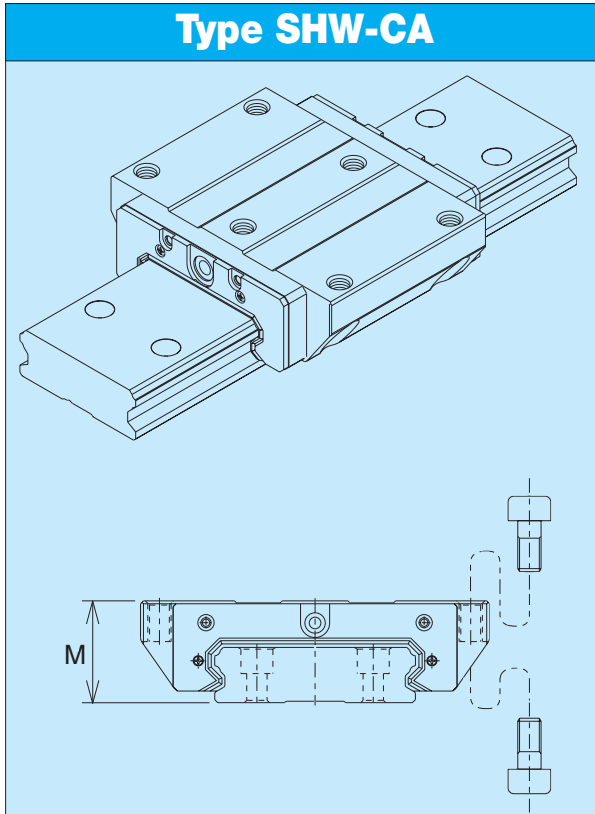
Self-adjustment is enabled by THK's unique circular-arc-groove design (face-to-face DF). As a result of this capability, installation errors can be absorbed even under preload, producing high-precision, smooth linear motion.

Low dust generation

Since the ball cage contains lubricant, this structure has excellent low dust-generative characteristics.

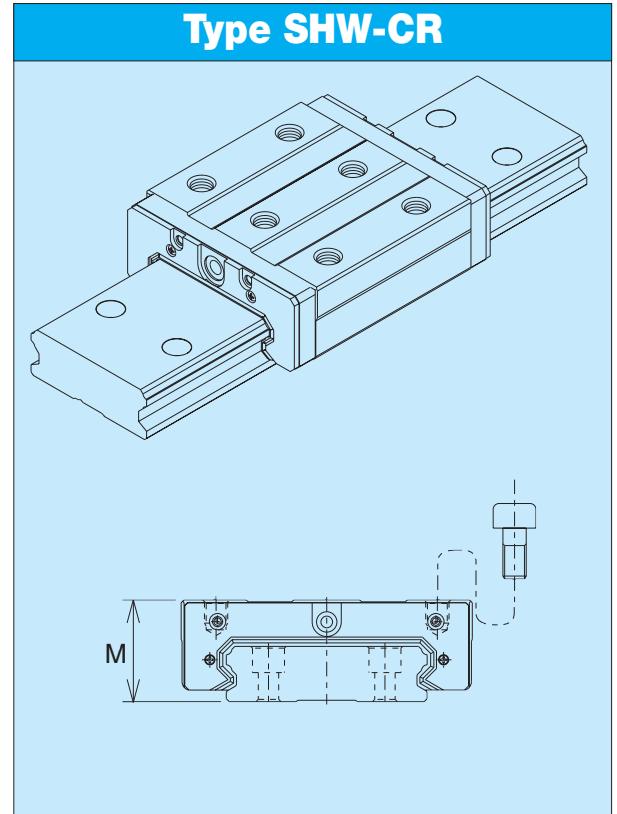
Types and Features

Type SHW-CA

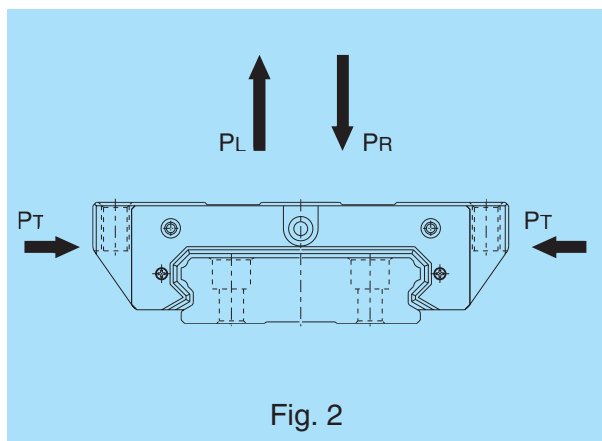


A wide, low center-of-gravity type combined with the four-way equal load structure. The mounting holes for the LM block are tapped and their flange bottom faces are bored, enabling the LM block to be mounted on either the top or bottom of the rail (secured at 4 points).

Type SHW-CR



A compact, wide, low center-of-gravity type. The LM block is mounted using the taps on the top face.



Load rating

Type SHW LM Guide can bear loads in all four directions: radial, reverse-radial, and the two lateral directions.

The basic load rating is uniform in all 4 directions (radial, reverse-radial, and the two lateral directions). Values for those directions are presented with the dimensions.

Equivalent load

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

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

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

P_R : radial load (N)

P_L : reverse-radial load (N)

P_T : lateral load (N)

Permissible moment

In type SHW, a single LM block can bear moments in all directions. Table 1 presents the permissible moments in directions MA, MB and MC for a single LM block and double LM blocks laid over one another (no data available for direction MC).

Table 1 Type SHW Static Permissible Moment

Unit : kNm

Direction Model No.	M _A		M _B		M _C
	Single block	Double block	Single block	Double block	Single block
SHW 12CA/CR	0.0228	0.12	0.0228	0.12	0.0405
SHW 12HR	0.0511	0.246	0.0511	0.246	0.0621
SHW 14	0.0466	0.236	0.0466	0.236	0.0904
SHW 17	0.0591	0.298	0.0591	0.298	0.164
SHW 21	0.0806	0.434	0.0806	0.434	0.229
SHW 27	0.187	0.949	0.187	0.949	0.455
SHW 35	0.603	3	0.603	3	1.63
SHW 50	1.46	7.37	1.46	7.37	3.97

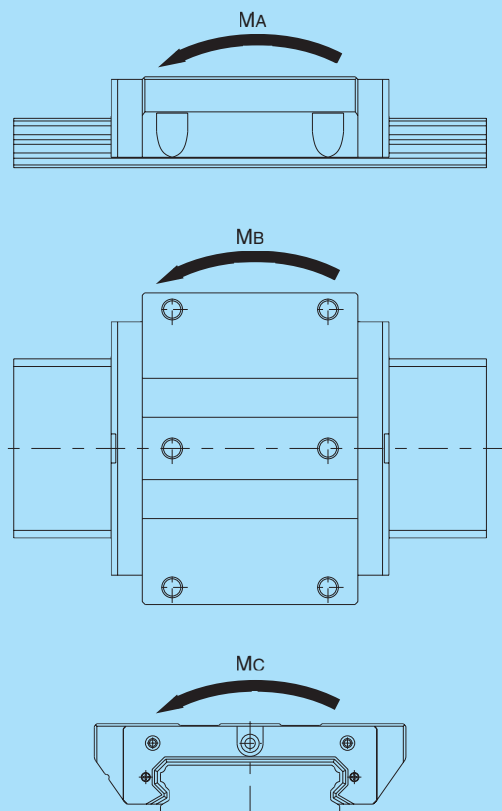


Fig. 3

Accuracy Standards

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

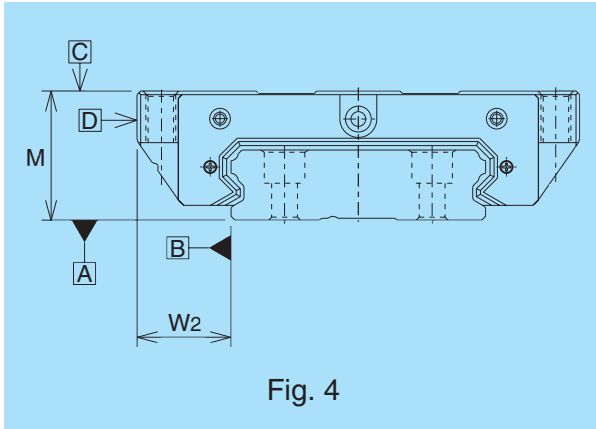


Fig. 4

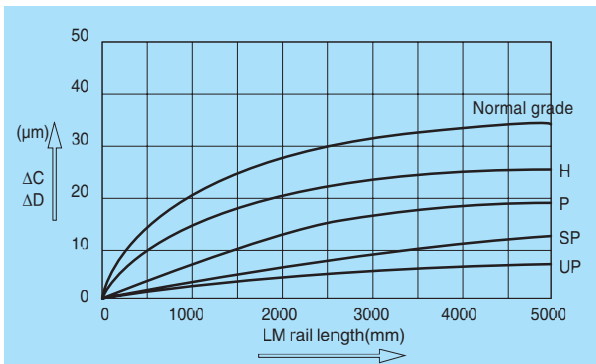


Fig. 5 Relationship Between LM Rail Length and Running Parallelism

Table 2 Accuracy Standard

Unit: mm

Model No.	Accuracy standard	Normal	High	Precision	Super-precision	Ultra-precision
SHW 12 14	Item	No symbol	H	P	SP	UP
	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 the rail-to-block lateral distance W ₂ difference among LM blocks	0.02	0.01	0.007	0.005	-
	Running parallelism of LM block surface C with respect to surface A	ΔC (See Fig.5)				
	Running parallelism of LM block surface D with respect to surface B	ΔD (See Fig.5)				
SHW 17 21	Item	No symbol	H	P	SP	UP
	Tolerance for height M	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	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	0 -0.03	0 -0.015	0 -0.008
	Tolerance for the rail-to-block lateral distance W ₂ difference among LM blocks	0.02	0.01	0.006	0.004	0.003
	Running parallelism of LM block surface C with respect to surface A	ΔC (See Fig.5)				
	Running parallelism of LM block surface D with respect to surface B	ΔD (See Fig.5)				
SHW 27 35	Item	No symbol	H	P	SP	UP
	Tolerance for height M	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	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	0 -0.04	0 -0.02	0 -0.01
	Tolerance for the rail-to-block lateral distance W ₂ difference among LM blocks	0.03	0.015	0.007	0.005	0.003
	Running parallelism of LM block surface C with respect to surface A	ΔC (See Fig.5)				
	Running parallelism of LM block surface D with respect to surface B	ΔD (See Fig.5)				
SHW 50	Item	No symbol	H	P	SP	UP
	Tolerance for height M	±0.1	±0.05	0 -0.05	0 -0.03	0 -0.02
	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	0 -0.05	0 -0.03	0 -0.02
	Tolerance for the rail-to-block lateral distance W ₂ difference among LM blocks	0.03	0.02	0.01	0.007	0.005
	Running parallelism of LM block surface C with respect to surface A	ΔC (See Fig.5)				
	Running parallelism of LM block surface D with respect to surface B	ΔD (See Fig.5)				

Radial Clearance

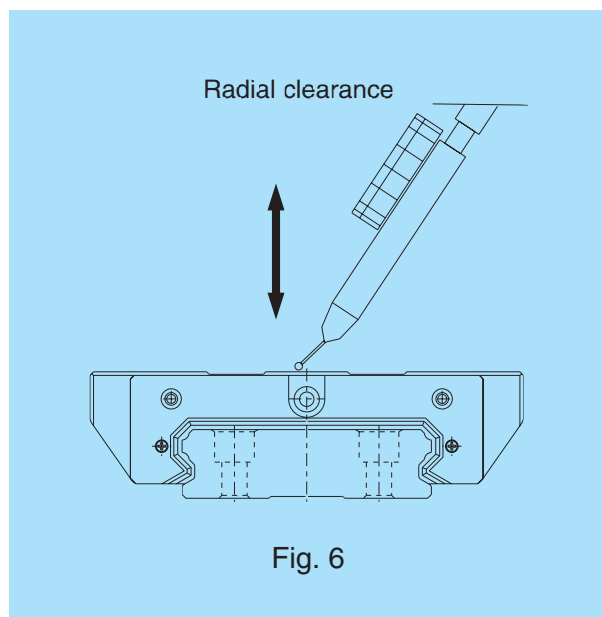


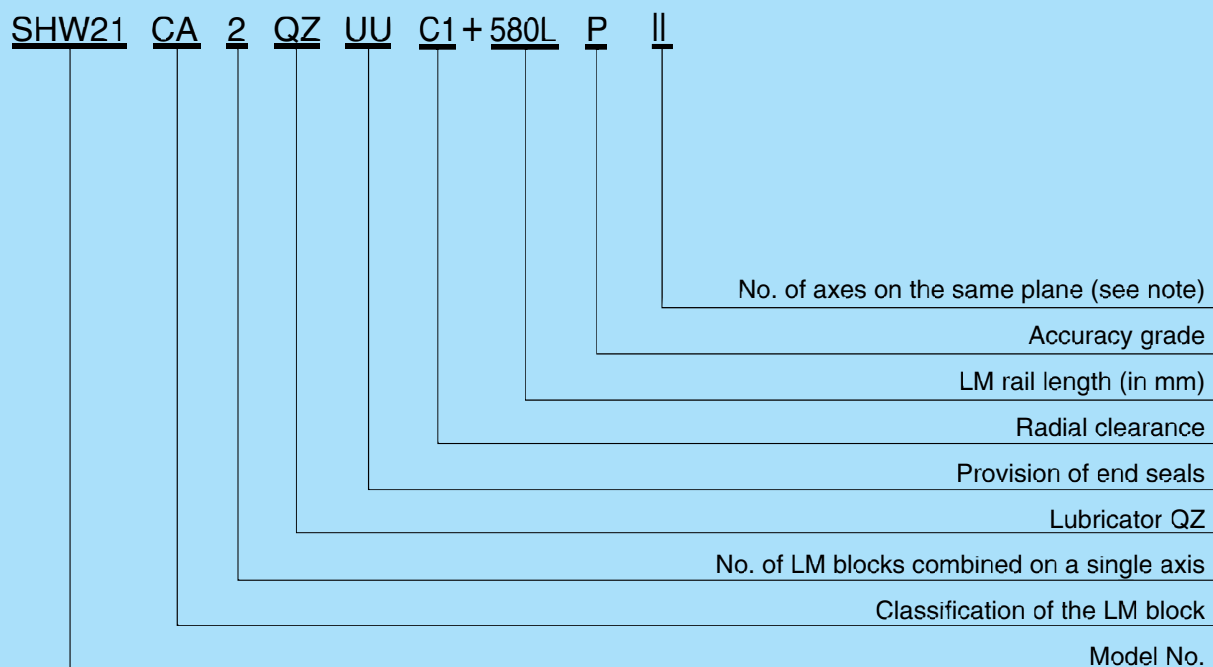
Table 3 Type SHW Radial Clearance

Unit : μm

Clearance symbol	Normal	Under a light preload	Under a medium preload
Model No.	No symbol	C1	C0
SHW 12	-1.5 ~ 0	-4 ~ -1	-
SHW 14	-2 ~ 0	-5 ~ -1	-
SHW 17	-3 ~ 0	-7 ~ -3	-
SHW 21	-4 ~ +2	-8 ~ -4	-
SHW 27	-5 ~ +2	-11 ~ -5	-
SHW 35	-8 ~ +4	-18 ~ -8	-28 ~ -18
SHW 50	-10 ~ +5	-24 ~ -10	-38 ~ -24

Note: No symbol is given to a normal clearance. C0 and C1 clearances should be included in respective model number codes (see Model-number Coding below).

Model-number Coding



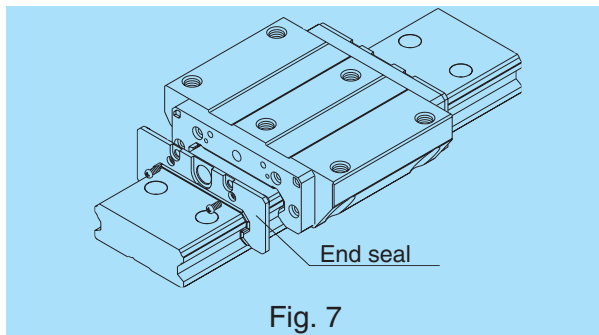
- Note:
- This coding is based on the assumption of one set of symbols for a one-axis unit. (A configuration of two axes installed in parallel is given at least two sets of symbols.)
 - When attaching a grease nipple, specify "with grease nipple."
 - A grease nipple is not available for types installed with QZ Lubricator.

Contamination Protection

For type SHW, various contamination-protection accessories are available.

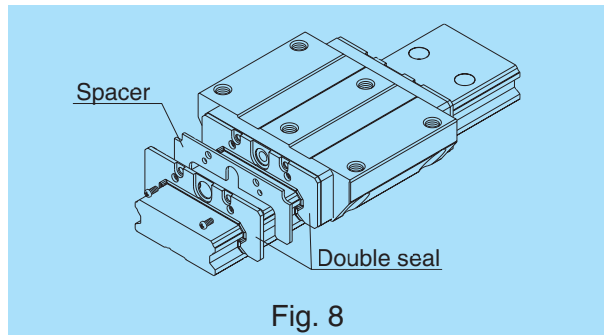
End seal

When attached to both end faces of an LM block, the end seals prevent foreign matter and the like that adhere to the LM rail top surface and sides from entering the LM block. The seal is also available as a means to prevent lubricant leakage from the LM block.



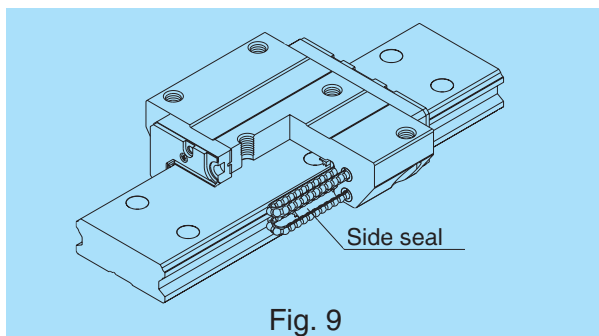
Double seal

Use two end seals to enhance the contamination-protection capacity.



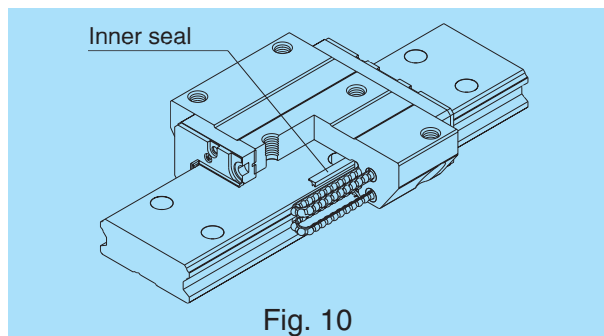
Side seal

Prevents contaminants from entering an LM block from below. The seal also prevents lubricant leakage from the bottom sides of the LM block.



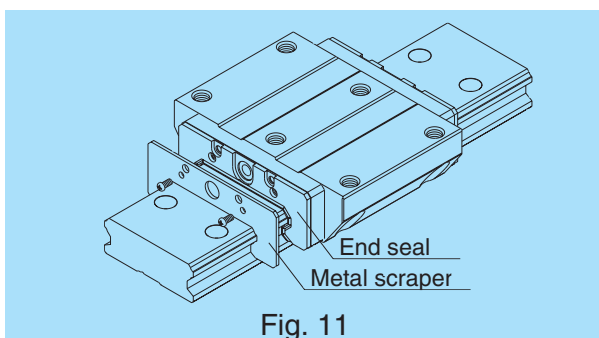
Inner seal

When minute foreign matter and dust that have not been blocked by end seals enter the LM block, the inner seal prevents them from entering the raceways. The seal also helps to retain lubricant on the raceways.



Metal scraper (non-contact)

Removes cutting chips, spatters, sand dusts and other relatively large foreign matter and hard substances that tightly adhere to the LM block.



Contamination-protection-accessory symbols

Where a contamination-protection accessory is required, specify the corresponding symbol shown in Table 4. Attaching a contamination-protection accessory to an LM block changes the block overall length depending on the block type (see Table 5).

Table 4 Contamination-protection-accessory Symbols

Symbol	Contamination-protection accessory
UU	End seal (both ends)
SS	End seal + side seal + inner seal
ZZ	End seal + side seal + inner seal + metal scraper
DD	Double seals + side seal + inner seal
KK	Double seals + side seal + inner seal + metal scraper

Table 5 LM Block Overall Length with an Accessory Attached

Unit : mm

Model No.	UU	SS	DD	ZZ	KK
SHW12 CAM/CRM	37	37	-	-	-
SHW12 HRM	50.4	50.4	-	-	-
SHW14 CAM/CRM	45.5	45.5	-	-	-
SHW17 CAM/CRM	51	51	54	53.4	56.4
SHW21 CA/CR	59	59	64	63.2	68.2
SHW27 CA/CR	72.8	72.8	78.6	77.8	83.6
SHW35 CA/CR	107	107	114.4	112	119.4
SHW50 CA/CR	141	141	149.2	147.4	155.6

Grease nipple

Standard-specification LM Guides are not provided with grease nipples. When using them under harsh conditions, select Lubricator QZ* (optional) or Laminated Contact Scraper LaCS* (optional). When insufficient lubrication is still assumed even with these options, select those types with grease nipples.

Attaching a grease nipple to an LM block changes the block overall length depending on the block type (for corresponding grease nipple types and their dimensions, see Table 6).

Table 6 Grease nipple dimensions

Model No.	Incremental length for a grease nipple (E)	Corresponding type
SHW 12	-	Ø2.2drilled hole
SHW 14	-	Ø2.2drilled hole
SHW 17	5	PB107
SHW 21	5.5	PB1021B
SHW 27	12	B-M6F
SHW 35	12	B-M6F
SHW 50	16	B-PT1/B

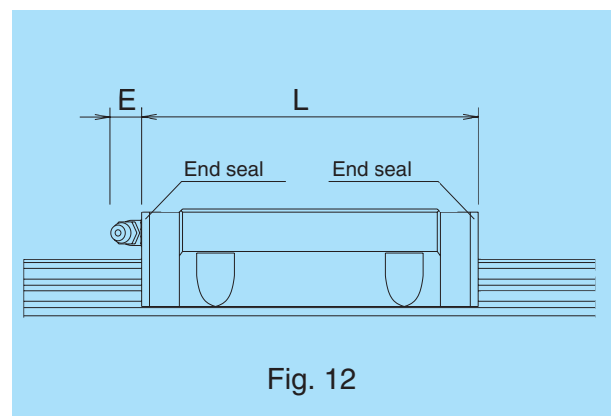


Fig. 12

Note: For dimension L, see Table 5 or the dimension table.

- Note 1: A grease nipple cannot be additionally mounted on standard type LM Guides.
- Note 2: For QZ Lubricator, see P.A-418. For Laminated Contact Scraper LaCS, see P.A-428.
- Note 3: A grease nipple cannot be installed on SHW12 and 14. These types can have greasing holes.
- Note 4: Do not use a greasing hole for a purpose other than greasing. It may cause damage to the LM Guide.
- Note 5: A grease nipple is not available for types installed with QZ Lubricator.

Special Bellows JSHW for Type SHW

The dimension of special bellows JSHW for type SHW are presented in Table 7. Specify the desired type from the following model numbers.

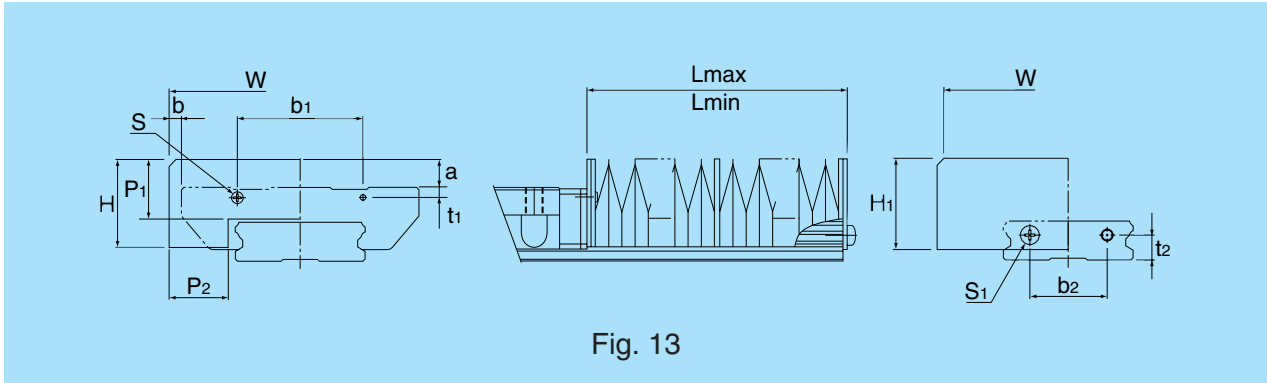


Table 7 Dimension of Type JSHW

Unit : mm

Model No.	Major dimensions									Applicable model
	W	H	H ₁	P ₁	P ₂	b ₁	t ₁	b ₂	t ₂	
JSHW 17	68	22	23	15	15.4	39	2.6	18	6	SHW 17
JSHW 21	75	25	26	17	17	35.8	2.9	22	7	SHW 21
JSHW 27	85	33.5	33.5	20	20	25	3.5	20	10	SHW 27
JSHW 35	120	35	35	20	20	75	7.5	40	13	SHW 35
JSHW 50	164	42	42	20	20	89.4	14	50	16	SHW 50

Model No.	Dimension by type					A
	Mounting bolt		a	b		
	S	S ₁		Type CA	Type CR	$\frac{L_{MAX}}{L_{MIN}}$
JSHW 17	M2/ ~ 4/	M3/ ~ 6/	8	4	9	5
JSHW 21	M2/ ~ 5/	M3/ ~ 6/	8	3.5	10.5	6
JSHW 27	M2.6/ ~ 6/	M3/ ~ 6/	10	2.5	11.5	7
JSHW 35	M3/ ~ 8/	M3/ ~ 6/	6	0	10	7
JSHW 50	M4/ ~ 12/	M4/ ~ 8/	-	1	17	7

- Note 1: For greasing when using the dedicated bellows, contact **THK**.
 Note 2: When using the dedicated bellows in an orientation other than horizontal (vertical, wall-hung, or hung upside-down), or when desiring a heat-resistant type, contact **THK**.
 Note 3: For the mounting bolts marked with *, use tapping screws.

Bellows Length Equation

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

$$L_{max} = L_{min} \times A \quad A: \text{Contraction/expansion rate}$$

Coding model No.

JSHW21

60/360

Bel lows dimensions retracted length
extended length

Model No.

A-III

C cap for LM rail mounting holes

If dust or foreign matter enters an LM rail mounting hole on the LM Guide, the contamination could also find its way inside of the block. This can be prevented by covering the mounting holes with the special caps provided and then ensuring that the caps are flush with the upper surface of the LM rail. Type C cap for LM rail mounting holes is made from a special synthetic resin that has excellent oil-proofing and wear-resistance properties, providing a high level of durability. The special caps for hexagonal-socket-head type bolts M4 to M8 are kept in stock as standard parts and can be ordered by specifying the model number listed in the table.

To insert a special cap into an LM rail mounting hole, lay a flat metal drift over the cap, as shown in Fig. 14, and then gently tap the drift until the cap is flush with the top of the LM rail.

Table 8 Main Dimensions of the Special Caps

Unit : mm

Model No.	C cap No.	Applicable bolt	Dimensions	
			D	H
SHW 12	C4	M4	7.8	1.0
SHW 14	C4	M4	7.8	1.0
SHW 17	C4	M4	7.8	1.0
SHW 21	C4	M4	7.8	1.0
SHW 27	C4	M4	7.8	1.0
SHW 35	C6	M6	11.4	2.7
SHW 50	C8	M8	14.4	3.7

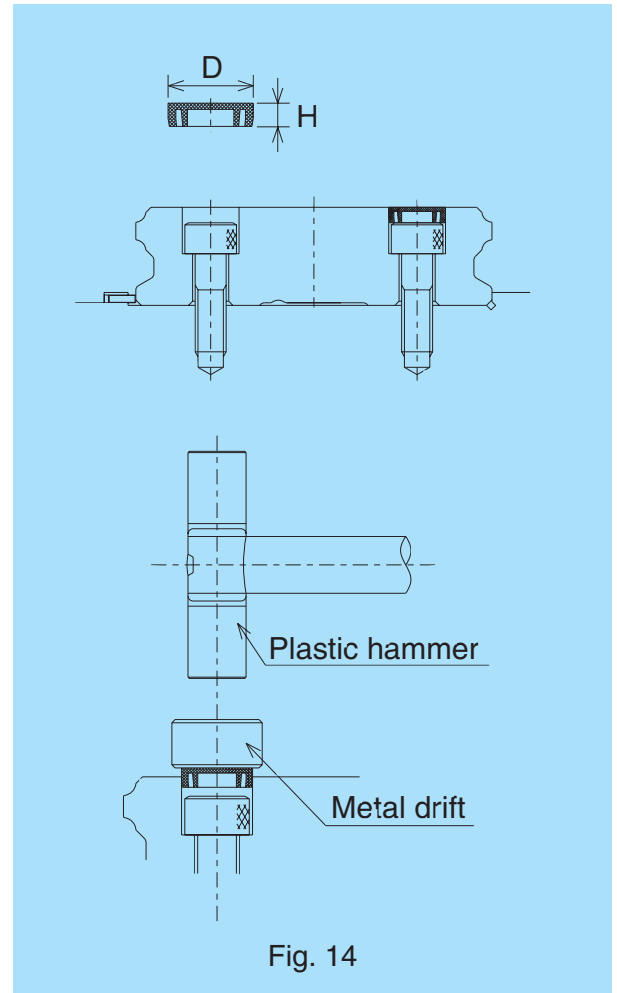


Fig. 14

Precautions on Use

Mounting-Surface Height and Corner Profile

For the reference-surface shoulder height of an LM block and LM rail, see Table 9. Provide enough space to the corner profile of a mounting surface so that the corner does not interfere with chambers made on the LM block or rail, or provide the corner with a radius smaller than corner radius r specified in Table 9.

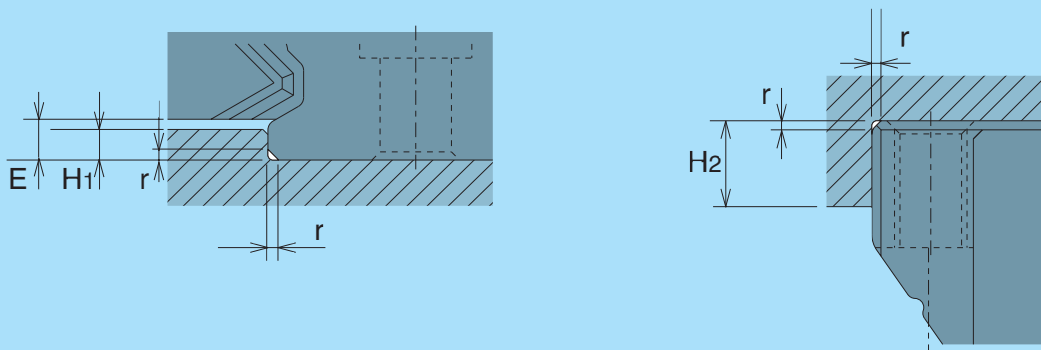


Fig. 15

Table 9 Mounting Shoulder Height and Corner Radius

Unit : mm

Model No.	Corner radius r (max.)	LM-rail shoulder height H_1	LM-block shoulder height H_2	E
SHW 12	0.5	1.5	4	2
SHW 14	0.5	1.5	5	2
SHW 17	0.4	2	4	2.5
SHW 21	0.4	2.5	5	3
SHW 27	0.4	2.5	5	3
SHW 35	0.8	3.5	5	4
SHW 50	0.8	3	6	3.4

Seal resistance Value

For the maximum value of seal resistance of type SHW LM Guide with seals (models UU and SS) per LM block, in which grease is applied, see Table 10.

Table 10 Seal Resistance

Unit : N

Model No.	Resistance	
	UU	SS
SHW 12CA/CR	1	1.4
SHW 12HR	1	1.8
SHW 14	1.2	1.8
SHW 17	1.4	2.2
SHW 21	4.9	6.9
SHW 27	4.9	8.9
SHW 35	9.8	15.8
SHW 50	14.7	22.7

LM-Rail Standard and Maximum Lengths

Table 11 presents the standard and maximum lengths of LM rails for type SHW. 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 the table. A large dimension G tends to reduce stability at the shaft 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.

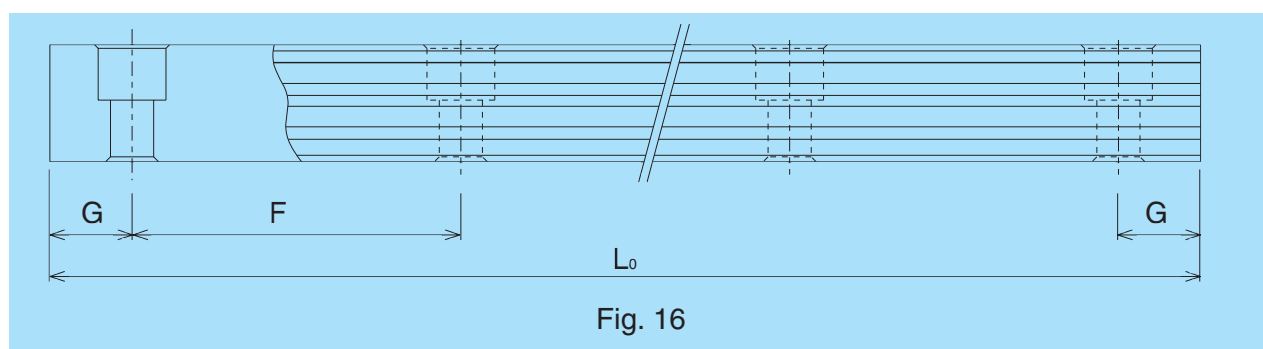


Table 11 Type SHW LM-Rail Standard and Maximum Lengths

Unit : mm

Model No.	SHW 12	SHW 14	SHW 17	SHW 21	SHW 27	SHW 35	SHW 50
LM-rail standard length (L ₀)	70	70	110	130	160	280	280
	110	110	190	230	280	440	440
	150	150	310	380	340	760	760
	190	190	470	480	460	1000	1000
	230	230	550	580	640	1240	1240
	270	270		780	820	1560	1640
	310	310					2040
	390	390					
	470	470					
		550					
		670					
Standard pitch F	40	40	40	50	60	80	80
G	15	15	15	15	20	20	20
Max. length	1000	1430	1800	1900	3000	3000	3000

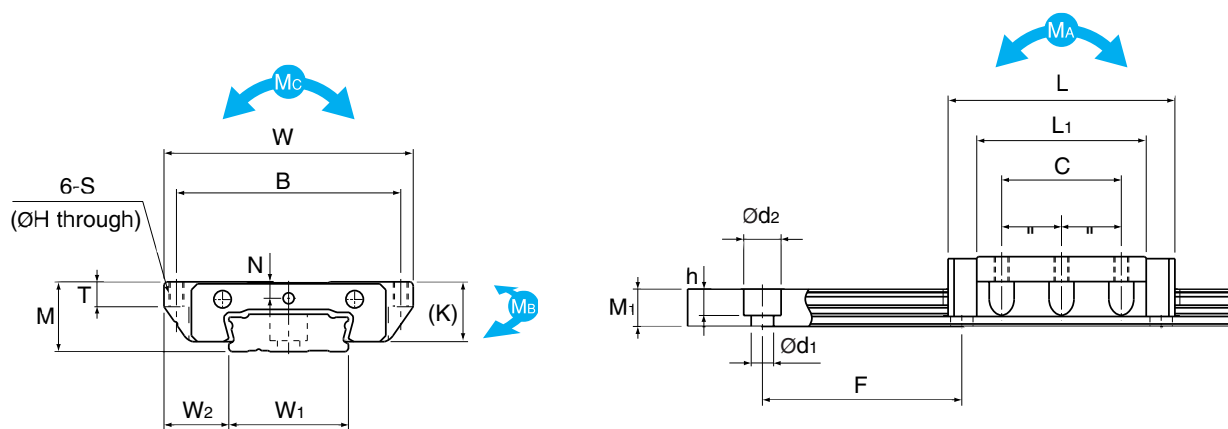
Note 1: The maximum length varies depending on the accuracy class. Be sure to contact THK.

Note 2: If the connected method is not available and the maximum length needs to be longer than the above table, contact THK.

Note 3: Types SHW 12, 14 and 17 are made of stainless steel.

Type SHW-CA

Flange type

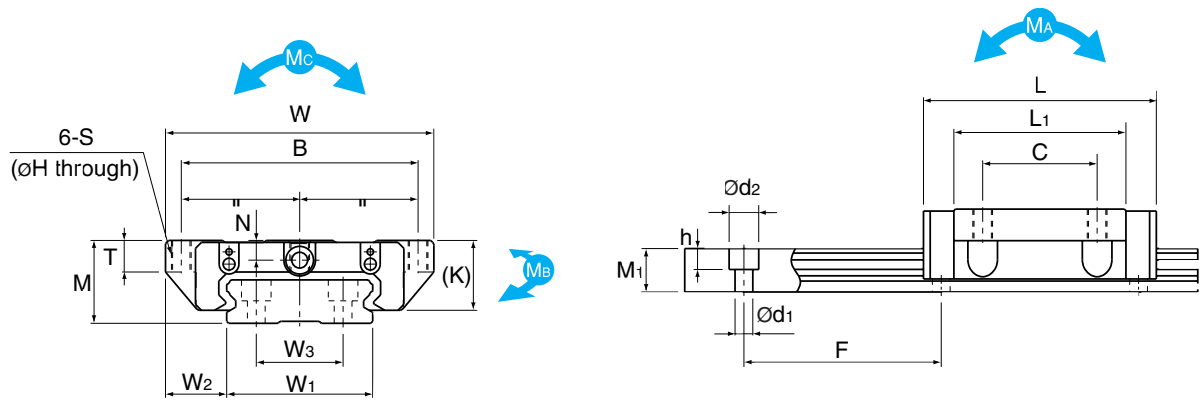


SHW12CAM, SHW14CAM

Model No.	External dimensions			LM Block dimensions							Grease nipple point
	Height M	Width W	Length L	B	C	S	H	L ₁	T	K	N
SHW 12CAM	12	40	37	35	18	M 3	2.5	27	4	2.8	2.8
SHW 14CAM	14	50	45.5	45	24	M 3	2.5	34	5	3.3	3.3
SHW 17CAM	17	60	51	53	26	M 4	3.3	38	6	4	4
SHW 21CA	21	68	59	60	29	M 5	4.4	43.6	8	17.7	5
SHW 27CA	27	80	72.8	70	40	M 6	5.3	56.6	10	23.5	6
SHW 35CA	35	120	107	107	60	M 8	6.8	83	14	31	7.6
SHW 50CA	50	162	141	144	80	M10	8.6	107	18	46	14

Note:

- To mount a grease nipple, an additional processing is required before shipping. Be sure to specify “with grease nipple.”
- For permissible static moments MA, MB and MC, see page A-185.
- For model no. coding, see page A-187.
- For standard LM-rail lengths, see page A-193.



SHW17CAM, SHW21 ~ 50CA

Unit : mm

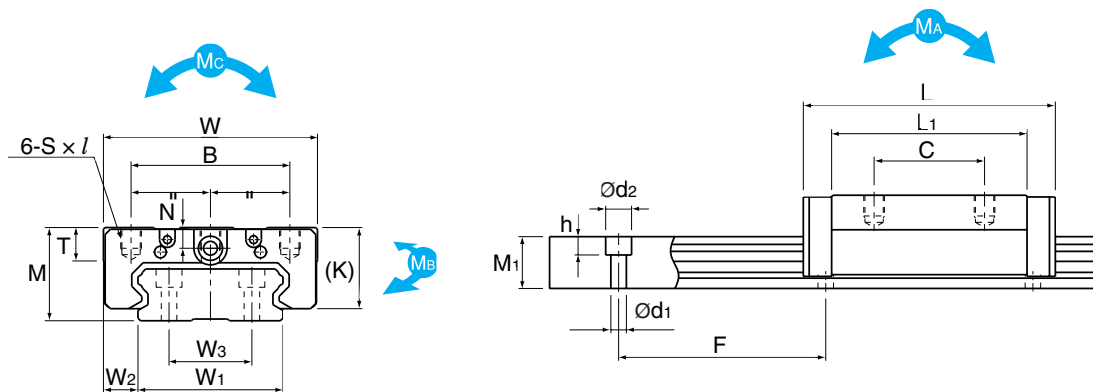
LM-rail dimensions						Basic load rating		Mass	
Width W ₁	W ₂	W ₃	Height M ₁	Pitch F	d ₁ × d ₂ × h	C kN	C ₀ kN	LM block kg	LM rail kg/m
18	11	—	6.6	40	4.5 × 7.5 × 5.3	4.31	5.66	0.05	0.8
24	13	—	7.5	40	4.5 × 7.5 × 5.3	7.05	8.98	0.1	1.23
33	13.5	18	8.6	40	4.5 × 7.5 × 5.3	7.65	10.18	0.15	1.9
37	15.5	22	11	50	4.5 × 7.5 × 5.3	8.24	12.8	0.24	2.9
42	19	24	15	60	4.5 × 7.5 × 5.3	16	22.7	0.47	4.5
69	25.5	40	19	80	7 × 11 × 9	35.5	49.2	1.4	9.6
90	36	60	24	80	9 × 14 × 12	70.2	91.4	3.7	15

Note:

- The initial hole for a grease nipple is not a through hole in order to prevent foreign matter from entering the block. When using a grease nipple, contact us.

Type SHW-CR

Compact type

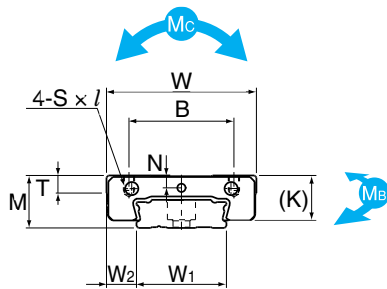


SHW27 ~ 50CR

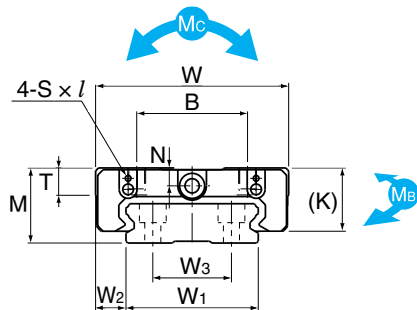
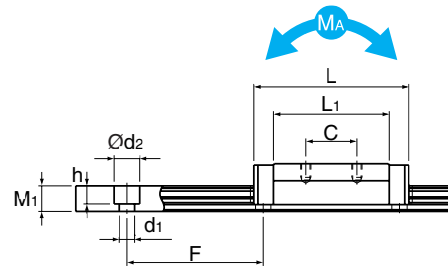
Model No.	External dimensions			LM-block dimensions						Grease nipple point
	Height M	Width W	Length L	B	C	S × R	L ₁	T	K	N
SHW 12CRM	12	30	37	21	12	M3 × 3.5	27	4	10	2.8
SHW 12HRM	12	30	50.4	21	24	M3 × 3.5	40.4	4	10	2.8
SHW 14CRM	14	40	45.5	28	15	M3 × 4	34	5	12	3.3
SHW 17CRM	17	50	51	29	15	M4 × 5	38	6	14.5	4
SHW 21CR	21	54	59	31	19	M5 × 6	43.6	8	17.7	5
SHW 27CR	27	62	72.8	46	32	M6 × 6	56.6	10	23.5	6
SHW 35CR	35	100	107	76	50	M8 × 8	83	14	31	7.6
SHW 50CR	50	130	141	100	65	M10 × 15	107	18	46	14

Note:

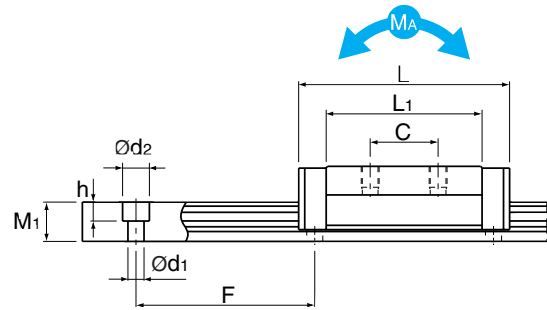
- To mount a grease nipple, an additional processing is required before shipping. Be sure to specify “with grease nipple.”
- For permissible static moments MA, MB and MC, see page A-185.
- For model no. coding, see page A-187.
- For standard LM-rail lengths, see page A-193.



SHW12CRM, SHW12HRM, SHW14CRM



SHW17CRM, SHW21CRM



Unit : mm

LM-rail dimensions						Basic load rating		Mass	
Width W ₁	W ₂	W ₃	Height M ₁	Pitch F	d ₁ × d ₂ × h	C kN	C ₀ kN	LM block kg	LM rail kg/m
18	6	—	6.6	40	4.5 × 7.5 × 5.3	4.31	5.66	0.04	0.8
18	6	—	6.6	40	4.5 × 7.5 × 5.3	5.56	8.68	0.06	0.8
24	8	—	7.5	40	4.5 × 7.5 × 5.3	7.05	8.98	0.08	1.23
33	8.5	18	8.6	40	4.5 × 7.5 × 5.3	7.65	10.18	0.13	1.9
37	8.5	22	11	50	4.5 × 7.5 × 5.3	8.24	12.8	0.19	2.9
42	10	24	15	60	4.5 × 7.5 × 5.3	16	22.7	0.36	4.5
69	15.5	40	19	80	7 × 11 × 9	35.5	49.2	1.2	9.6
90	20	60	24	80	9 × 14 × 12	70.2	91.4	3	15

Note:

- The initial hole for a grease nipple is not a through hole in order to prevent foreign matter from entering the block. When using a grease nipple, contact us.