

THK

Added Model No.

NEW

Caged Ball LM Guide SPR/SPS

Adopts 8 Rows of Raceways

Achieves Super-Low Waving and Ultra-High Rigidity



For details, visit THK at www.thk.com

*Product information is updated regularly on the THK website.

THK CO., LTD.
TOKYO, JAPAN

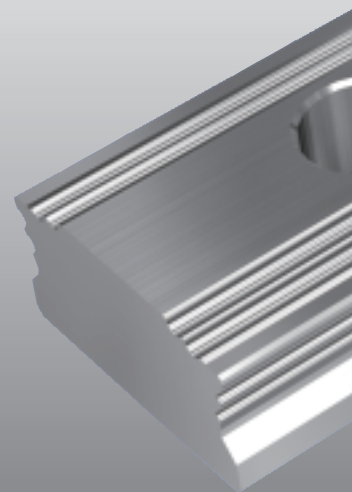
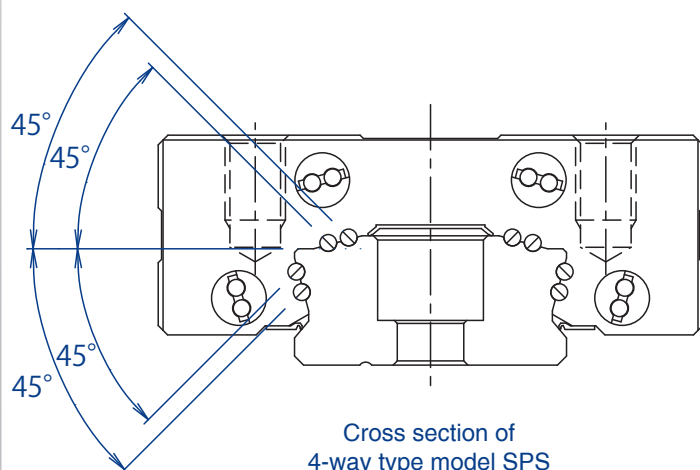
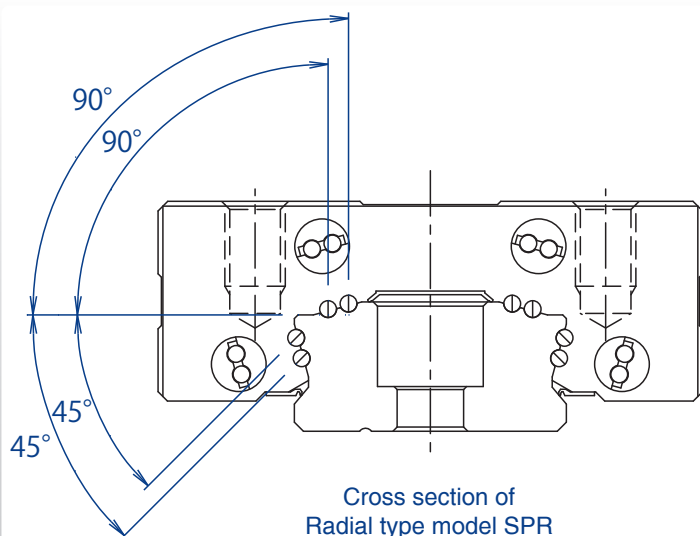
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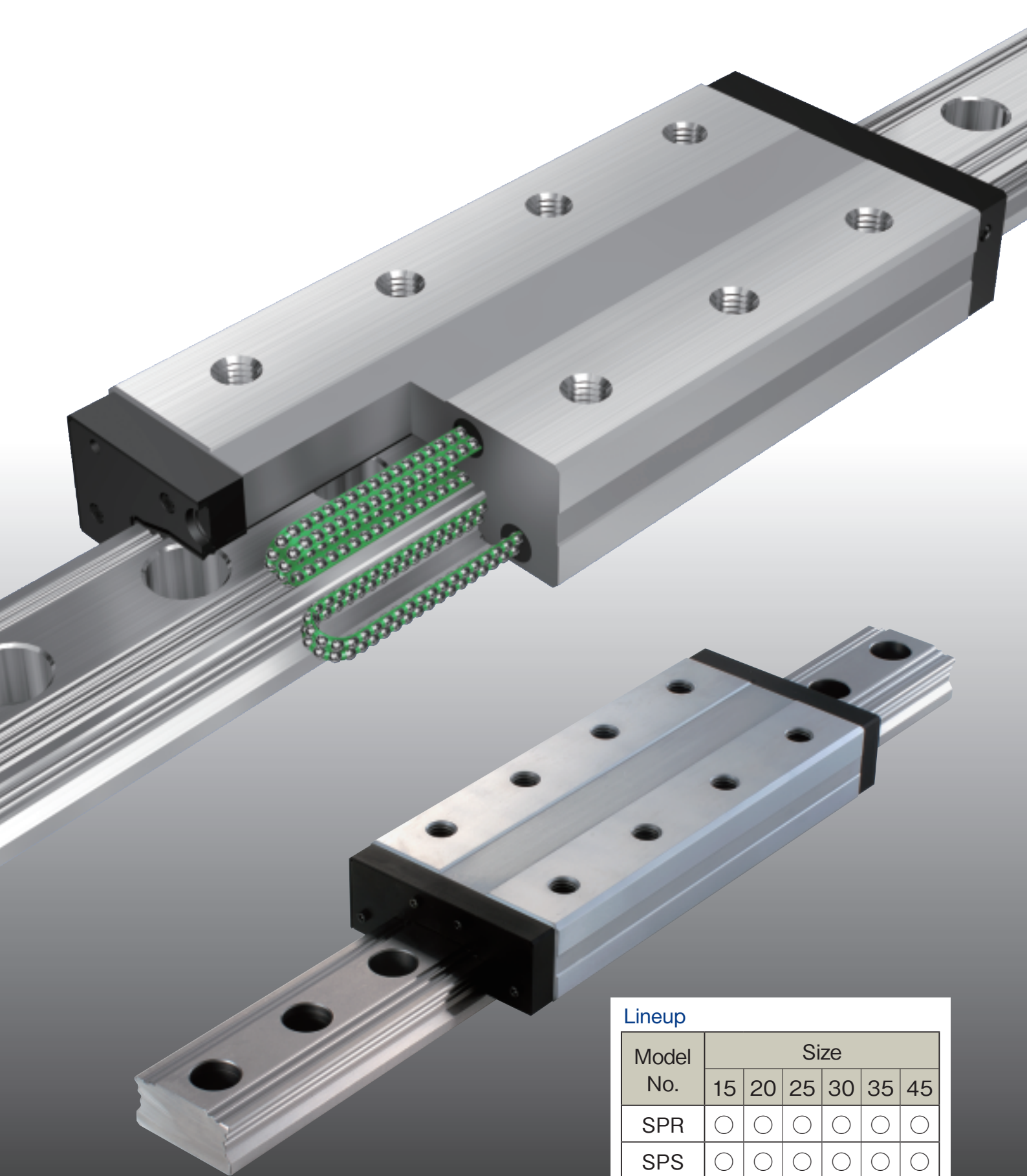
Caged Ball LM Guide

New Advanced LM Guide

Achieves super-low waving and ultra-high rigidity by adopting 8 rows of raceways in the LM Guide.

These models adopt (1) 8 rows of raceways, (2) small-diameter balls and (3) super-long blocks in order to realize super-low waving and ultra-high rigidity that surpass the conventional LM Guide. With this approach, the number of effective balls is substantially increased, and the amplitude of the rolling element in motion is minimized. These new models realize super-low waving comparable to hydrostatic guide and the deformation of the ball is minimized to achieve ultra-high rigidity that surpasses even roller guides. The two models contribute to higher accuracy of equipment.





Lineup

Model No.	Size					
	15	20	25	30	35	45
SPR	☐	☐	☐	☐	☐	☐
SPS	☐	☐	☐	☐	☐	☐

Main intended application

Ultra-precision machine/High accuracy machining center/Lathe/Surface grinder/Semiconductor manufacturing equipment/FPD manufacturing equipment/Inspection apparatus/High performance measuring instrument

Caged Ball LM Guide

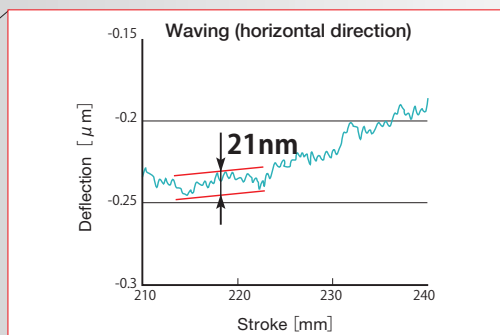
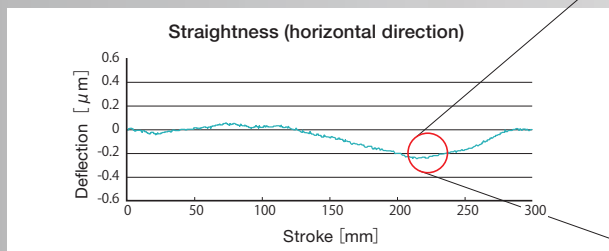
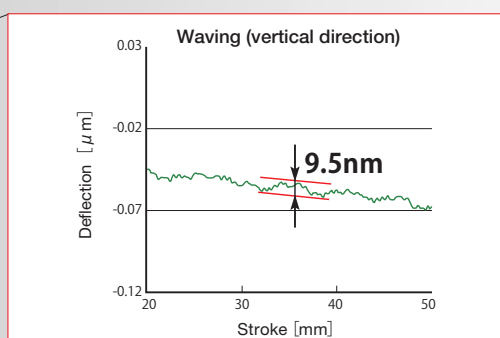
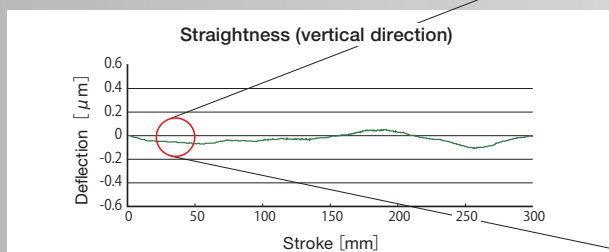
Super-low waving and ultra-high rigidity have been verified.

[Waving evaluation]

The waving values of models SPR/SPS are approximately $\frac{1}{10}$ of that (100 to 300 nm) of conventional ordinary LM Guides.

Conditions

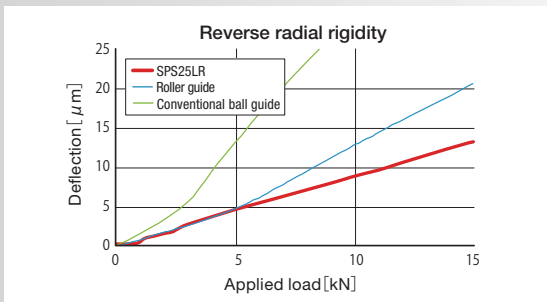
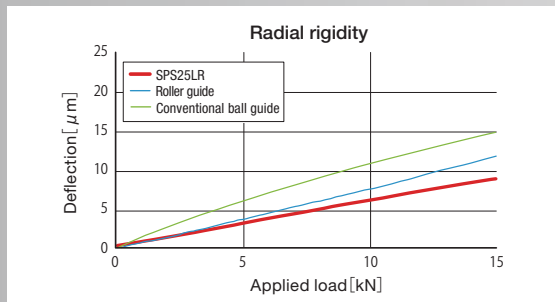
Tested model	SPS25LR
Rail span	250mm
Block span	250mm
Measurement point	250 mm above the center of the table
Measurement direction	Vertical and horizontal



* Internal evaluation record

[Rigidity comparison evaluation]

Models SPR/SPS achieve very high rigidity.



* This test was intended to compare C1 clearance.

Rated Loads in All Directions

Models SPR/SPS are capable of receiving loads in all four directions: radial, reverse-radial and lateral directions.

The basic load ratings of model SPR are represented by the symbols in the radial direction indicated in the figure on the right, and the actual values are provided in the dimensional tables*¹ for SPR. The values in the reverse-radial and lateral directions of model SPR are obtained from the table.

The basic load ratings of model SPS are equal in all the four directions (radial, reverse radial and lateral directions), and their actual values are provided in the specification table*¹ for SPS.

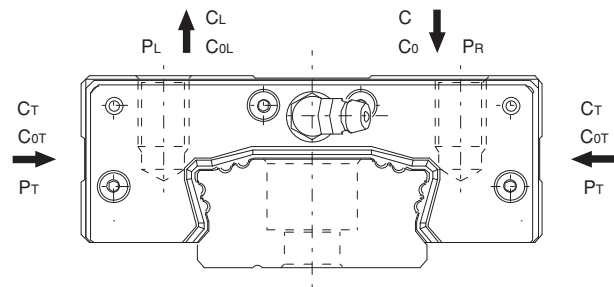
Rated Loads in All Directions with Model SPR

Direction	Model SPR	
	Basic dynamic load rating	Basic static load rating
Radial direction	C	C ₀
Reverse-radial direction	C _L =0.71C	C _{0L} =0.71C ₀
Lateral direction	C _T =0.44C	C _{0T} =0.35C ₀

*1: Dimensional table for models SPR/SPS

Model SPR-LR → page 9

Model SPS-LR → page 11



Equivalent Load

When the LM block of model SPR receives a reverse-radial load and a lateral load simultaneously, the equivalent load is obtained from the equation below.

$$P_E = X \cdot P_L + Y \cdot P_T$$

P_E : Equivalent load [N]
 • Reverse-radial direction
 P_L : Reverse-radial load [N]
 P_T : Lateral load [N]
 X, Y : Equivalent factor

Equivalent Factor of Model SPR

P _E	X	Y
Equivalent load in reverse-radial direction	1	2

Note: If a reverse-radial load and a horizontal load are simultaneously applied, calculate the equivalent reverse-radial load.

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

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

P_E : Equivalent load [N]
 • Radial direction
 • Reverse-radial direction
 P_R : Radial load [N]
 P_L : Reverse-radial load [N]
 P_T : Lateral load [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 pieces on the metal surface) after individually running under the same conditions.

*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.

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

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 Table1)

f_W : Load factor (see Table2)

[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 reciprocations are constant.

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

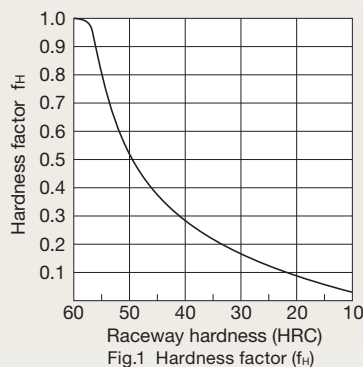
L_h : Service life time [h]

ℓ_s : Stroke length [mm]

n₁ : Number of reciprocations per minute [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. If the hardness is lower than this range, the basic dynamic load rating and the basic static load rating decrease. Therefore, it is necessary to multiply each rating by the respective hardness factor (f_H). Since the LM Guide has sufficient hardness, the f_H value for the LM Guide is normally 1.0 unless otherwise specified.



● 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_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 C₀) by the corresponding contact factor indicated in Table1.

Note) If uneven load distribution is expected in a large machine, take into account the respective contact factor indicated in Table1.

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_W : Load Factor

In general, reciprocating machines tend to involve vibrations or impact during operation. It is extremely difficult to accurately determine all vibrations generated during high-speed operation and impact during frequent start and stop.

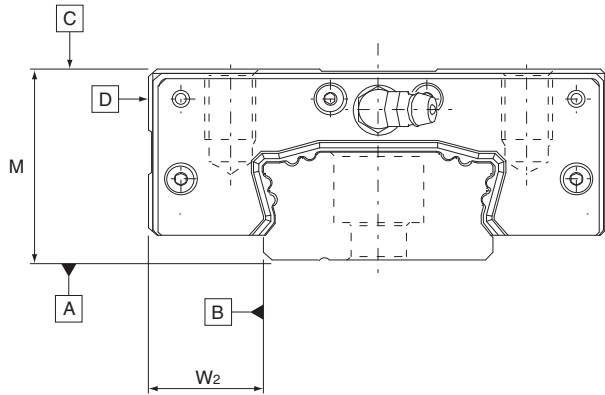
Therefore, where the effects of speed and vibration are estimated to be significant, divide the basic dynamic load rating (C) by a load factor selected from Table2, which contains empirically obtained data.

Table 2 Load Factor (f_W)

Vibrations/impact	Speed (V)	f _W
Faint	Very low V ≤ 0.25m/s	1 to 1.2
Weak	Low 0.25 < V ≤ 1m/s	1.2 to 1.5
Medium	Medium 1 < V ≤ 2m/s	1.5 to 2
Strong	High V > 2m/s	2 to 3.5

Accuracy Standard

Model SPR/SPS has two different accuracy grades. Accuracy standard 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 2 or more LM blocks are used on one rail or when 2 or more rails are mounted on the same plane.



*1 Running of Parallelism

Refers to the tolerance for parallelism between the LM block and the LM rail reference surface when the LM block travels the whole length of the LM rail with the LM rail secured on the reference reference surface using bolts.

*2 Difference in Height M

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

*3 Difference in Width W₂

Indicates a difference between the maximum and minimum values of the width (W₂) between each of the LM blocks, mounted on one LM rail in combination, and the LM rail.

Accuracy Standard

Unit: mm

Model No.	Accuracy standard	Super precision grade	Ultra precision grade
	Item	SP	UP
SPR/SPS15 SPR/SPS20	Dimensional tolerance in height M	0 -0.015	0 -0.008
	Difference in height M	0.004	0.003
	Dimensional tolerance in width W ₂	0 -0.015	0 -0.008
	Difference in width W ₂	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	
SPR/SPS25 SPR/SPS30 SPR/SPS35	Dimensional tolerance in height M	0 -0.02	0 -0.01
	Difference in height M	0.005	0.003
	Dimensional tolerance in width W ₂	0 -0.015	0 -0.01
	Difference in width W ₂	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	
SPR/SPS45	Dimensional tolerance in height M	0 -0.03	0 -0.015
	Difference in height M	0.005	0.003
	Dimensional tolerance in width W ₂	0 -0.025	0 -0.015
	Difference in width W ₂	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	

Running Parallelism

Unit: μm

LM rail length [mm]		Running Parallelism Values	
Above	Or less	Super precision grade	Ultra precision grade
		SP	UP
—	50	1.5	1
50	80	1.5	1
80	125	1.5	1
125	200	1.5	1
200	250	1.5	1
250	315	1.5	1
315	400	2	1.5
400	500	2.5	1.5
500	630	3	2
630	800	3.5	2
800	1000	4	2.5
1000	1250	4.5	3
1250	1600	5	4
1600	2000	5.5	4.5
2000	2500	6	5
2500	3090	6.5	5.5

Radial Clearance Standard

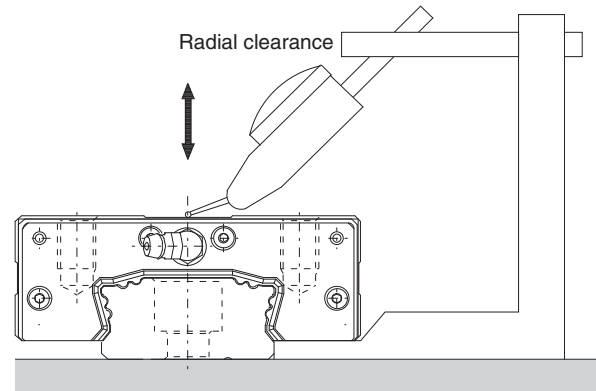
Model SPR/SPS has two levels of radial clearance (preload). Since the radial clearance greatly affects the running accuracy, load carrying capacity and rigidity of the LM Guide, it is important to select an appropriate clearance according to the application. An appropriate radial clearance helps to eliminate possible vibrations and impact generated from the equipment's motion and favorably affects the service life and the accuracy of the LM Guide.

Unit: μm		
Indication symbol	Light Preload	Medium Preload
Model No.	C1	C0
SPR/SPS15	-6 to -4	—
SPR/SPS20	-7 to -4	—
SPR/SPS25	-8 to -5	-10 to -8
SPR/SPS30	-8 to -5	-12 to -9
SPR/SPS35	-9 to -5	-13 to -10
SPR/SPS45	-11 to -7	-16 to -12

* When C0 clearance is needed for Models SPR/SPS15 and 20W, contact THK.

*1 Preload

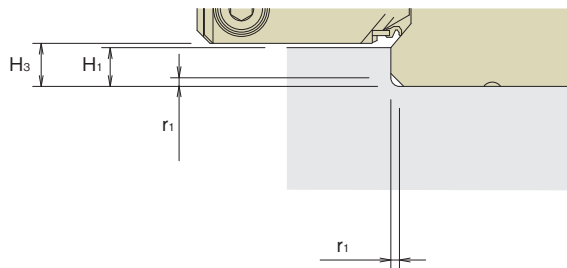
Indicates an internal load applied to the rolling elements (balls) of an LM block in order to increase its rigidity. Preload for the model SPR/SPS is adjusted at the time of manufacture.



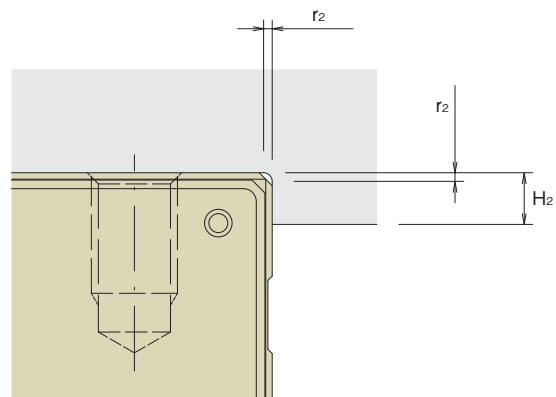
Shoulder Height of the Mounting Base and the Corner Radius

The mounting base for the LM rail and the LM block has a reference-surface 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

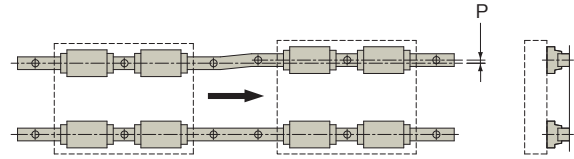
Unit: mm					
Model No.	Corner radius for the LM rail r_1 (max)	Shoulder height for the LM rail H_1	Corner radius for the LM block r_2 (max)	Shoulder height for the LM block H_2	H_3
SPR/SPS15	0.3	3	0.5	3.5	4
SPR/SPS20	0.3	3	0.5	4	4
SPR/SPS25	0.5	3.5	1	5	4.5
SPR/SPS30	1	4	1	6	5
SPR/SPS35	1	5	1	7	6
SPR/SPS45	1	7	1.5	8	8

Misalignment Allowance in the Parallelism between Two Rails

A mounting surface misalignment of the LM Guide may affect the service life. The following tables show approximate misalignment allowances in parallelism (P) between two rails in general use.

Unit: μm

Model No.	Clearance C1	Clearance C0
SPR/SPS15	5	—
SPR/SPS20	6.5	—
SPR/SPS25	8.5	7
SPR/SPS30	10.5	9
SPR/SPS35	13	10.5
SPR/SPS45	17.5	14.5

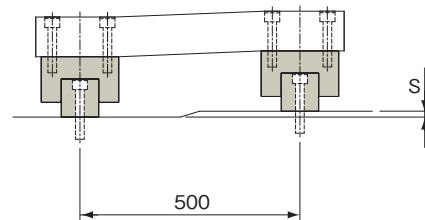


Misalignment Allowance in Vertical Level between Two Rails

The following tables show approximate misalignment allowance in vertical level (S) between two rails per axis-to-axis distance of 500 mm. The misalignment allowance in vertical level between two rails is proportionate to the axis-to-axis distances.

Unit: μm

Model No.	Clearance C1	Clearance C0
SPR15,20	110	—
SPR25	120	75
SPR30		
SPR35		
SPR45		



Unit: μm

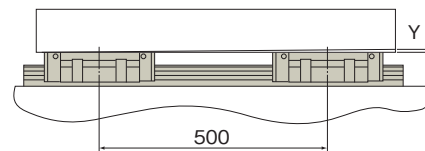
Model No.	Clearance C1	Clearance C0
SPS15,20	105	—
SPS25		70
SPS30		
SPS35		
SPS45		

Misalignment Allowance in Level in the Axial Direction

The following tables show misalignment allowance in level (Y) in the axial direction per 500 mm in distance between the LM blocks. The misalignment allowance in level (Y) in the axial direction is proportionate to the distance between the LM blocks.

Unit: μm

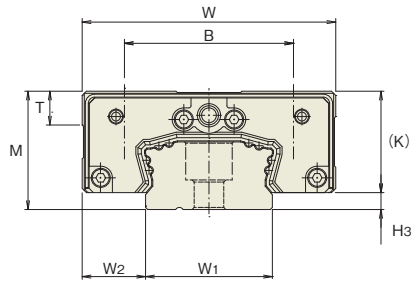
Model No.	Clearance C1	Clearance C0
SPR15,20	16	—
SPR25		9
SPR30		
SPR35		
SPR45		



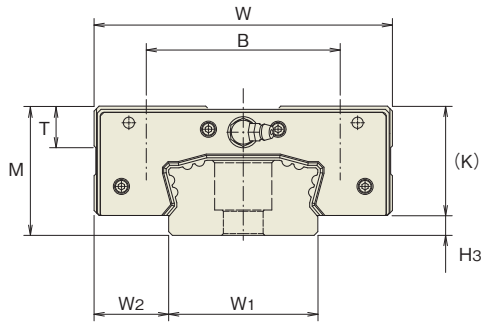
Unit: μm

Model No.	Clearance C1	Clearance C0
SPS15,20	20	—
SPS25	21	14
SPS30		
SPS35		
SPS45		

Model SPR-LR



Models SPR15,20



Models SPR25 to 45

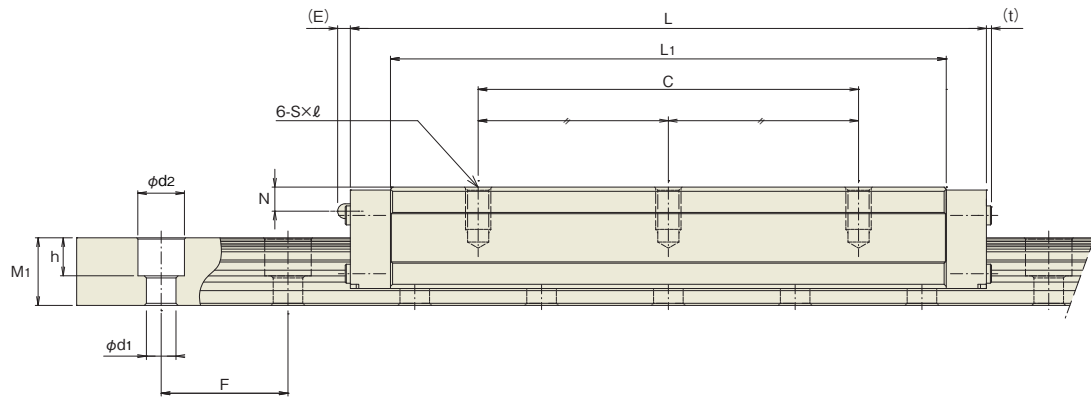
Model No.	Outer dimensions			LM block dimensions													
	Height M	Width W	Length L	t	Mounting hole				L ₁	T	K	N	f _o	E	e _o	D _o	Grease nipple
					B	C'	C	S×ℓ									
SPR15LR	25	50	121.5	0.8	34	—	70	M5×8	106.5	7	21	5.5	—	3.3	—	—	PB107
SPR20LR	28	60	150.5	1.2	40	—	90	M6×10	131.5	8	24	5.7	—	3	—	—	PB107
SPR25LR	31	72	180.1	—	47	40	120	M8×10.5	158.1	10	26.5	6.3	9.2	12	4.5	3.9	B-M6F
SPR30LR	38	90	207.8	—	58	45	135	M10×14	182.6	12	33	8.0	10.9	12	4.5	3.9	B-M6F
SPR35LR	44	100	235.5	—	66	50	150	M12×16	208.3	14	38	9.5	12.4	12	6	5.2	B-M6F
SPR45LR	52	120	288.5	—	78	65	195	M14×18.5	256.5	16	44	10.5	12.3	16	6	5.2	B-PT1/8

Model number coding

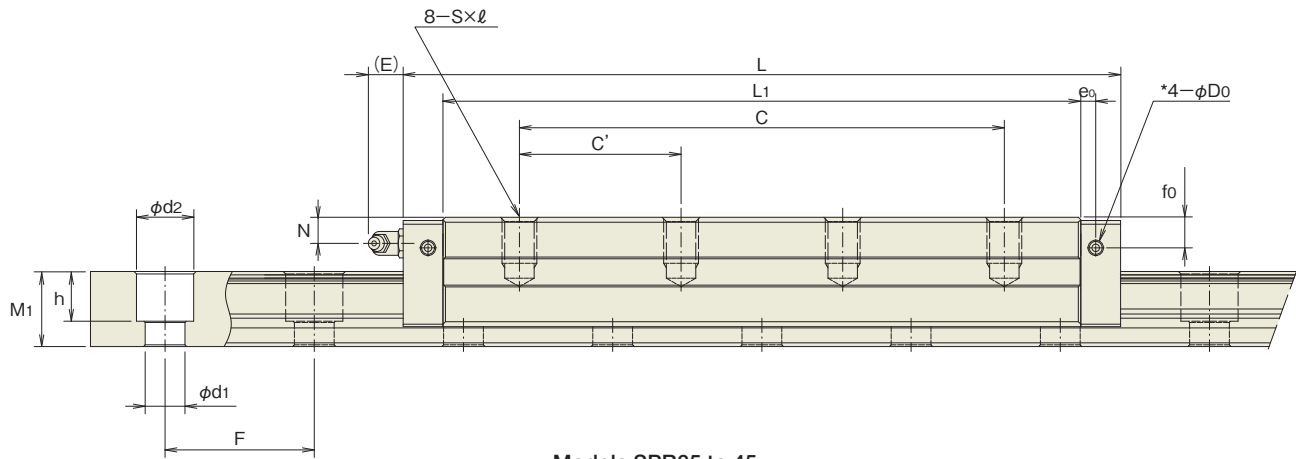
SPR25	LR	2	QZ	UU	C0	+1000L	UP	-II
Model number			With QZ Lubricator	Contamination protection accessory symbol (see page 16)		LM rail length (in mm)		Symbol for No. of rails used on the same plane
		No. of LM blocks used on the same rail			Radial clearance symbol (see page 7)			
	Type of LM block							Accuracy symbol (see page 6)

Note) This model number consists of a set of LM blocks and LM rails. (At least two sets are required when using two rails in parallel.)

Those models equipped with QZ Lubricator cannot have a grease nipple. When desiring a grease nipple for a model attached with QZ, contact THK.



Models SPR15,20



Models SPR25 to 45

Unit: mm

H ₃	LM rail dimensions						Basic load rating		Static permissible moment [kN-m] ^{*2}					Mass	
	Width		Height	Pitch	Mounting hole	Length	C	C ₀	M _A		M _B		M _C	LM block	LM rail
	W ₁ 0 -0.05	W ₂	M ₁	F	d ₁ ×d ₂ ×h	Max ^{*1}	[kN]	[kN]	1 block	Double blocks	1 block	Double blocks	1 block	[kg]	[kg/m]
4	25	12.5	14	30	6×9.5×8.5	3000	22.5	58.2	0.814	3.65	0.401	1.8	0.454	0.6	2.5
4	30	15	16	30	7×11×9	3000	36.8	92.4	1.56	7.05	0.77	3.48	0.84	1.0	3.4
4.5	35	18.5	18.2	40	9×14×12	3000	59.9	156	3.22	14.5	1.69	7.59	1.72	1.5	4.1
5	45	22.5	21.4	52.5	11×17.5×14	3090	83.2	212	5.08	22.7	2.66	11.9	3.02	2.7	6.9
6	50	25	25	52.5	14×20×17	3090	111	278	7.56	33.6	3.96	17.6	4.37	4.0	9.0
8	60	30	30.2	60	16×23×20	3060	178	434	13.8	64.4	7.73	33.7	8.05	7.0	11.6

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

*2 Static permissible moment: 1 block: static permissible moment value with 1 LM block

Double blocks: static permissible moment value with 2 blocks closely contacting with each other

*3 For Model SPR/SPS, balls will fall out of the LM block if it is remove from the LM rail. Please take precautions to prevent the blocks from overrunning the rail.

Note 1) These are pilot holes for when desiring a grease nipple for a model attached with LaCS or QZ Lubricator.

The pilot holes are not drilled through in order to prevent foreign material from entering the LM block.

When desiring a grease nipple mounting, contact THK.

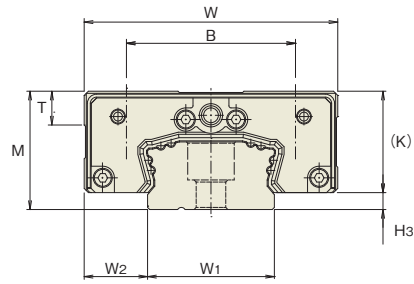
Note 2) Lubrication

For Model SPR/SPS, Lithium soap group grease No. 2 (AFB-LF grease) is contained as standard.

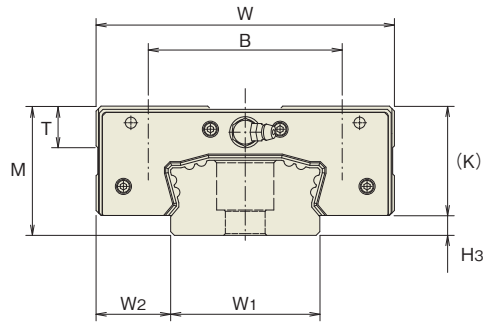
When desiring another grease or model without grease contained, contact THK.

When desiring lubrication or automatic greasing, be sure to contact THK.

Model SPS-LR



Models SPR15,20



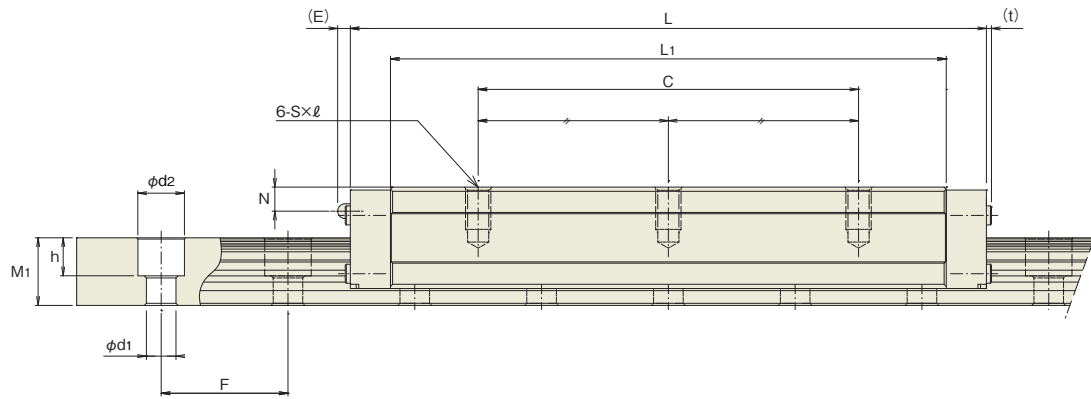
Models SPR25 to 45

Model No.	Outer dimensions			LM block dimensions													
	Height M	Width W	Length L	t	Mounting hole				L ₁	T	K	N	f _o	E	e _o	D _o	Grease nipple
					B	C'	C	S×ℓ									
SPS15LR	25	50	121.5	0.8	34	—	70	M5×8	106.5	7	21	5.5	—	3.3	—	—	PB107
SPS20LR	28	60	150.5	1.2	40	—	90	M6×10	131.5	8	24	5.7	—	3	—	—	PB107
SPS25LR	31	72	180.1	—	47	40	120	M8×10.5	158.1	10	26.5	6.3	9.2	12	4.5	3.9	B-M6F
SPS30LR	38	90	207.8	—	58	45	135	M10×14	182.6	12	33	8.0	10.9	12	4.5	3.9	B-M6F
SPS35LR	44	100	235.5	—	66	50	150	M12×16	208.3	14	38	9.5	12.4	12	6	5.2	B-M6F
SPS45LR	52	120	288.5	—	78	65	195	M14×18.5	256.5	16	44	10.5	12.3	16	6	5.2	B-PT1/8

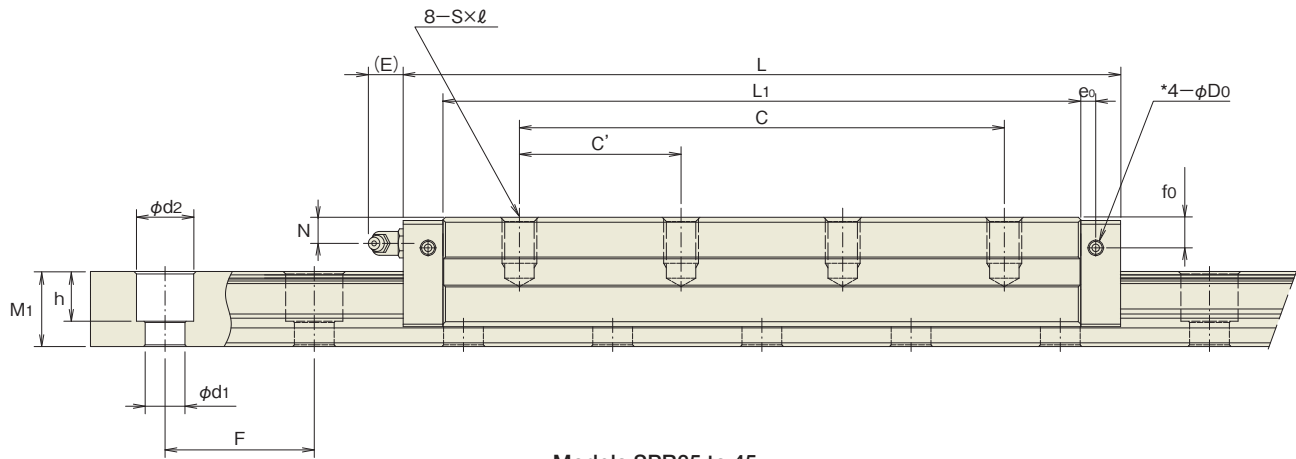
Model number coding	SPS25	LR	2	QZ	UU	C0	+1000L	UP	-II
	Model number			With QZ Lubricator	Contamination protection accessory symbol (see page 16)		LM rail length (in mm)		Symbol for No. of rails used on the same plane
			No. of LM blocks used on the same rail			Radial clearance symbol (see page 7)			
		Type of LM block						Accuracy symbol (see page 6)	

Note) This model number consists of a set of LM blocks and LM rails. (Two sets are required when using two rails in parallel.)

Those models equipped with QZ Lubricator cannot have a grease nipple. When desiring a grease nipple for a model attached with QZ, contact THK.



Models SPR15,20



Models SPR25 to 45

Unit: mm

H ₃	LM rail dimensions						Basic load rating		Static permissible moment [kN-m] ^{*2}					Mass	
	Width		Height	Pitch	Mounting hole	Length	C	C ₀	M _A		M _B		M _C	LM block	LM rail
	W ₁ 0 -0.05	W ₂	M ₁	F	d ₁ ×d ₂ ×h	Max ^{*1}	[kN]	[kN]	1 block	Double blocks	1 block	Double blocks	1 block	[kg]	[kg/m]
4	25	12.5	14	30	6×9.5×8.5	3000	15.9	41.2	0.728	3.26	0.728	3.26	0.389	0.6	2.5
4	30	15	16	30	7×11×9	3000	26	65.3	1.4	9.08	1.4	9.08	0.72	1.0	3.4
4.5	35	18.5	18.2	40	9×14×12	3000	42.4	110	2.91	13.1	2.91	13.1	1.38	1.5	4.1
5	45	22.5	21.4	52.5	11×17.5×14	3090	58.8	150	4.59	20.6	4.59	20.6	2.44	2.7	6.9
6	50	25	25	52.5	14×20×17	3090	78.2	196	6.83	30.4	6.83	30.4	3.52	4.0	9.0
8	60	30	30.2	60	16×23×20	3060	126	307	13.2	58.2	13.2	58.2	6.46	7.0	11.6

^{*1} The maximum length under "Length" indicates the standard maximum length of an LM rail.

^{*2} Static permissible moment: 1 block: static permissible moment value with 1 LM block

Double blocks: static permissible moment value with 2 blocks closely contacting with each other

^{*3} For Model SPR/SPS, balls will fall out of the LM block if it is removed from the LM rail. Please take precautions to prevent the blocks from overrunning the rail.

Note 1) These are pilot holes for when desiring a grease nipple for a model attached with LaCS or QZ Lubricator.

The pilot holes are not drilled through in order to prevent foreign material from entering the LM block.

When desiring a grease nipple mounting, contact THK.

Note 2) Lubrication

For Model SPR/SPS, Lithium soap group grease No. 2 (AFB-LF grease) is contained as standard.

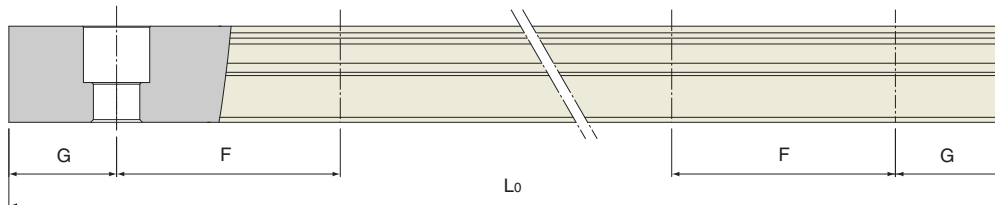
When desiring another grease or model without grease contained, contact THK.

When desiring lubrication or automatic greasing, be sure to contact THK.

Standard/Maximum Length of the LM Rail

Table1 shows the standard LM rail lengths and the maximum lengths of models SPR/SPS variations.

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 causing an adverse impact to accuracy.



Standard Length and Maximum Length of the LM Rail for Models SPR/SPS

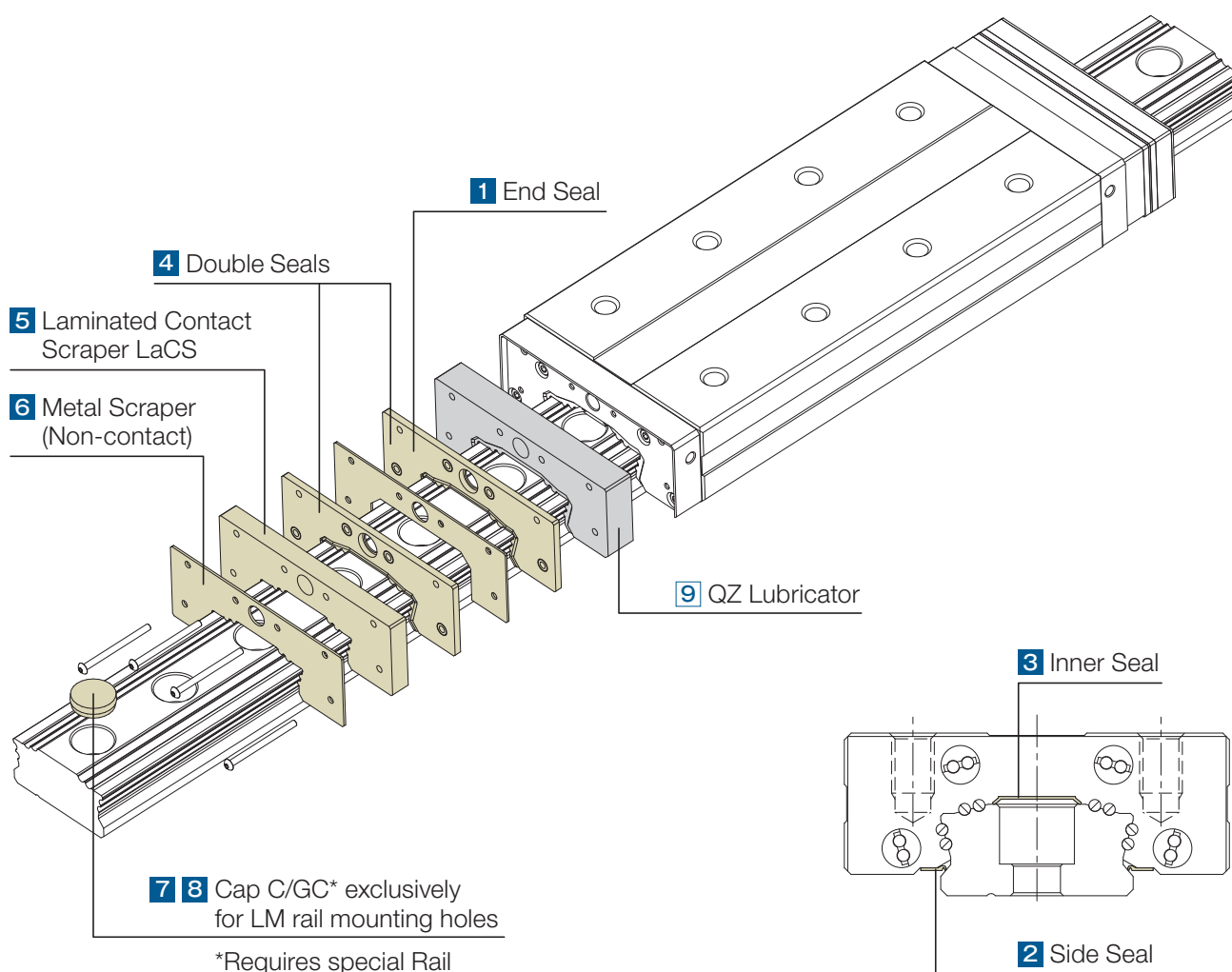
Unit: mm

Model No.	SPR/SPS15	SPR/SPS20	SPR/SPS 25	SPR/SPS 30	SPR/SPS 35	SPR/SPS 45
LM rail standard length (L ₀)	160	220	280	570	570	780
	220	280	360	675	675	900
	280	340	440	780	780	1020
	340	400	520	885	885	1140
	400	460	600	990	990	1260
	460	520	680	1095	1095	1380
	520	580	760	1200	1200	1500
	580	640	840	1305	1305	1620
	640	700	920	1410	1410	1740
	700	760	1000	1515	1515	1860
	760	820	1080	1620	1620	1980
	820	940	1160	1725	1725	2100
	940	1000	1240	1830	1830	2220
	1000	1060	1320	1935	1935	2340
	1060	1120	1400	2040	2040	2460
	1120	1180	1480	2145	2145	2580
	1180	1240	1560	2250	2250	2700
	1240	1360	1640	2355	2355	2820
	1360	1480	1720	2460	2460	2940
	1480	1600	1800	2565	2565	3060
	1600	1720	1880	2670	2670	
		1840	1960	2775	2775	
		1960	2040	2880	2880	
		2080	2200	2985	2985	
		2200	2360	3090	3090	
			2520			
			2680			
Standard pitch F	30	30	40	52.5	52.5	60
G	20	20	20	22.5	22.5	30
Max length	3000	3000	2680	3090	3090	3060

Note: Due to the design of Model SPR/SPS, jointed rails are not possible.

SPR/SPS Options

For models SPR/SPS, contamination protection and lubrication accessories are available. Make a selection according to the application and the installation site.



Contamination Protection Accessories

Foreign materials entering the LM Guide is likely to shorten the service life by inducing premature wear or causing stuck balls. Therefore, it is necessary to prevent foreign materials from entering. When possible entrance of foreign materials is predicted, it is important to select an effective sealing device or dust-prevention device that meets the working conditions.

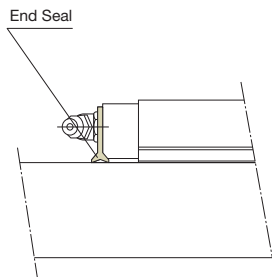
1 to 4 Seals

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

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

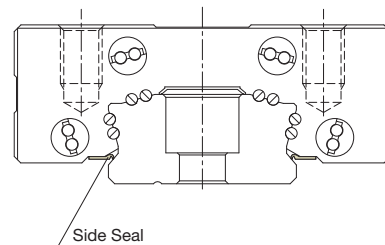
1 End Seal

A general seal attached to both ends of the LM block intended for normal service environment (atmospheric/normal temperature) or normal contaminated environment (dust/cutting chips). This seal is intended to remove dust from the upper and side surfaces of the LM rail. In addition to dust protection, the seal also retains the lubricant inside the LM block.



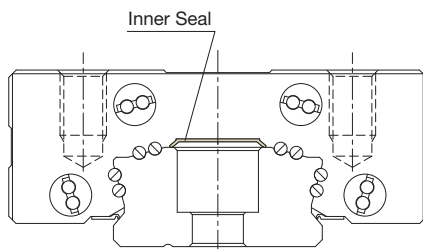
2 Side Seal

A general seal attached to the bottom of the LM block intended for normal service environment (atmospheric/normal temperature) or normal contaminated environment (dust/cutting chips). This seal is intended to prevent dust from entering from the bottom of the LM block and is an effective dust prevention component in environments with an inverted mounting position or with airborne dust.



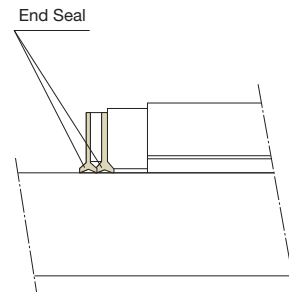
3 Inner Seal

A general seal attached near the ball raceways inside the LM block intended to protect against contamination (dust/cutting chips) that could not be removed by the end seals, such as that which had settled in the LM rail mounting holes. C cap and GC cap can also provide additional contamination protection for the LM rail mounting holes.



4 Double Seals

A double-layered end seal attached to both ends of the LM block intended for locations exposed to a greater degree of contamination (dust/cutting chips).
Note that the overall length of the LM block is slightly extended. For the overall length of the LM block, see the corresponding specification table.



● Seal resistance value

See the values in Table 1 for the maximum resistance value of the seals per LM block with a lubricant applied.

Table 1 Maximum Seal Resistance Value of Seals

Unit: N

Model No.	UU	SS
SPR/SPS15	2	6
SPR/SPS20	2	6
SPR/SPS25	3	7
SPR/SPS30	5	11
SPR/SPS35	8	16
SPR/SPS45	10	20

5 Laminated Contact Scraper LaCS®

A laminated seal attached to both ends of the LM block intended for harsh environment, such as the presence of coolant or minute foreign material.

Note that the overall length of the LM block is slightly extended. For the overall length of the LM block, see the corresponding specification table.

Features

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

Basic Specifications of LaCS

- Service temperature range of LaCS: -20°C to +80°C
- Resistance of LaCS (for Reference): indicated in table 2

*Note that LaCS is not sold alone.

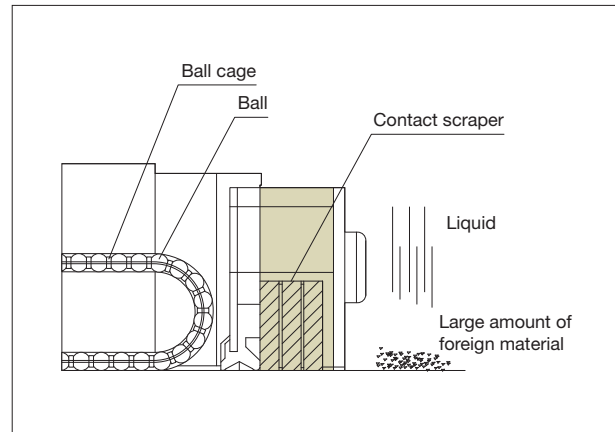


Table 2 Resistance of LaCS

Unit: N

Model No.	Maximum resistance
SPR/SPS25	13.0
SPR/SPS30	20.2
SPR/SPS35	22.9
SPR/SPS45	27.4

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.

6 Metal Scraper (Non-contact)

A metallic, non-contact scraper attached to both ends of the LM block intended for an environment where material may adhere to LM rails. In addition to removing larger debris, the scraper also protects the end seals from damage.

Note that the overall length of the LM block is slightly extended.

For the overall length of the LM block, see the corresponding specification table.

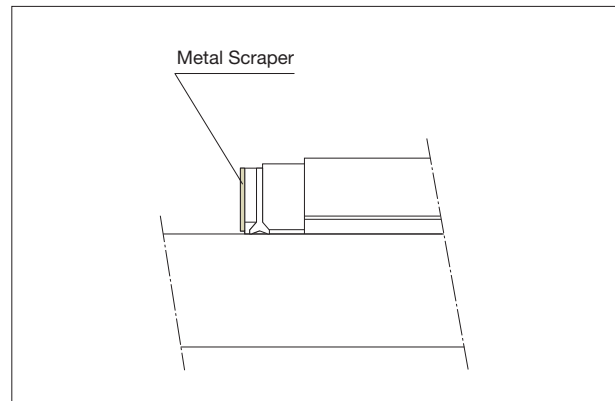


Table 3 Symbols of Contamination Protection Accessories for Models SPR/SPS

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 the incremental dimension for mounting the grease nipple, contact THK.

Table 4 Overall LM Block Length (Dimension L) of Models SPR/SPS with a Contamination Protection Accessory Attached

Unit: mm

Model No.	SS (UU)	DD	ZZ	KK	SSHH	DDHH	ZZHH	KKHH
SPR/SPS15	123.1	126.5	127.9	131.3	—	—	—	—
SPR/SPS20	152.9	156.9	158.1	162.1	—	—	—	—
SPR/SPS25	180.1	187.5	185.8	193.2	200.4	207.8	202.8	210.2
SPR/SPS30	207.8	216.2	214.3	222.7	231.1	239.5	234.3	242.7
SPR/SPS35	235.5	243.9	242	250.4	258.8	267.2	262	270.4
SPR/SPS45	288.5	297.9	295	304.4	311.8	321.2	315	324.4

7 Dedicated Cap C for LM Rail Mounting Holes (C cap)

A special resin cap designed to cover the mounting holes in LM rails, preventing contamination from settling and entering the LM block from below. Combining with seals will dramatically improve the contamination protection performance for LM guide.

Since the dedicated Cap C for LM rail mounting holes uses a special synthetic resin with high oil resistance and high wear resistance, it is highly durable. When placing an order, specify the respective Cap C model number from the table below. The cap can also be made of other material (e.g., metal). For details, contact THK.

Model No.	C cap Model No.	Bolt used	Main dimensions [mm]	
			D	H
SPR/SPS15	C5	M5	9.8	2.4
SPR/SPS20	C6	M6	11.6	2.7
SPR/SPS25	C8	M8	14.4	3.7
SPR/SPS30	C10	M10	18.0	3.7
SPR/SPS35	C12	M12	20.5	4.7
SPR/SPS45	C14	M14	23.5	5.7

8 Dedicated Cap GC for LM Rail Mounting Holes (GC Cap)

A special metal cap designed to cover the mounting holes in LM rails, preventing contamination from settling and entering the LM block from below. The Cap GC is intended for harsh environments and eliminates gaps around the mounting holes. Combining with seals will dramatically improve the contamination protection performance for LM guide. Cap GC is compliant with RoHS directives.

Model No.	GC cap Model No.	Bolt used	Main dimensions [mm]	
			D	H
SPR/SPS15	GC5	M5	9.86	2.5
SPR/SPS20	GC6	M6	11.36	2.5
SPR/SPS25	GC8	M8	14.36	3.5
SPR/SPS30	GC10	M10	17.86	3.5
SPR/SPS35	GC12	M12	20.36	4.6
SPR/SPS45	GC14	M14	23.36	5.0

If designating an LM Guide model attached with Cap GC, observe the following example of model number coding.

Model number coding

SPR25 LR 2 QZ KKH C0 + 1200L UP -II GC

With Cap GC

* Add the symbol (GC) to the end of the model number.

Note1) LM Guides with Cap GC are special rails.

Note2) They cannot be mounted on stainless steel LM rails or LM rails that have undergone surface treatment.

Note3) If this product will be used in special environments, such as in a vacuum or at very low or high temperatures, contact THK.

Note4) Cap GC are not sold individually. They are sold as a set with LM Guides.

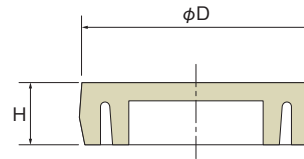
Note5) The openings of LM rail mounting holes are not chamfered. Take care not to injure your hands while working.

Note6) After fitting Cap GC, the upper surface of the LM rail must be flattened and cleaned (wiped).

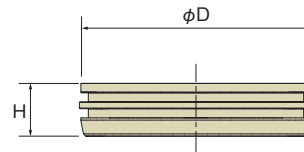
Dedicated Bellows

For details of the dedicated bellows, contact THK.

7 Cap C

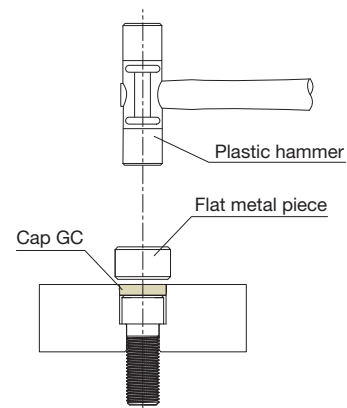


8 Cap GC



Mounting method for Cap C/GC

The procedure for inserting a Cap C/GC into a mounting hole consists of using a flat aligning fitting to gradually punch the cap into the hole until it is level with the upper surface of the LM rail, as shown in the figure. Fit Cap C/GC without removing the LM block from the LM rail.



Lubrication Accessories

9 QZ Lubricator

A lubricator attached to both ends of the LM block, the QZ Lubricator feeds the right amount of lubricant to the raceway of the LM rail. This ensures a continuous oil film to be formed between the balls and the raceway, drastically extending the lubrication and maintenance intervals. Note that the overall length of the LM block is slightly extended.

For the overall length of the LM block, see the corresponding specification table.

Features

- Since it supplements an oil loss, the lubrication maintenance interval can be significantly extended.
- Eco-friendly lubrication system that does not contaminate the surrounding area since it feeds the right amount of lubricant directly to the ball raceway.
- The user can select a type of lubricant that meets the intended use.

Significantly Extended Maintenance Interval

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

*Note that the QZ Lubricator is not sold alone.

9 QZ Lubricator

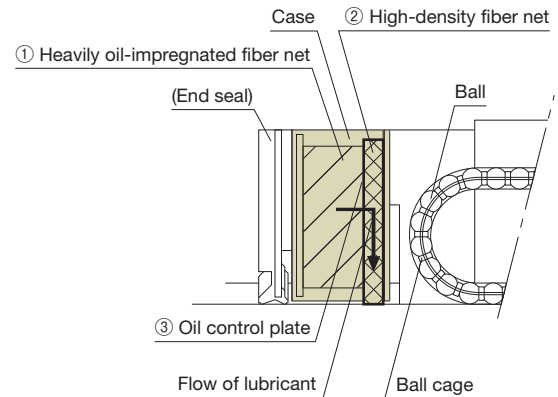


Table 5 Parts Symbols for Models SPR/SPS with the QZ Lubricator Attached

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
QZSSH	With end seal + side seal + inner seal + LaCS + QZ Lubricator
QZDDH	With double seals + side seal + inner seal + LaCS + QZ Lubricator
QZZZH	With end seal + side seal + inner seal + metal scraper + LaCS + QZ Lubricator
QZKKH	With double seals + side seal + inner seal + metal scraper + LaCS + QZ Lubricator

For the incremental dimension for mounting the grease nipple, contact THK.

Table 6 Overall LM Block Length (Dimension L) of Models SPR/SPS with the QZ Lubricator Attached

Model No.	QZUU (SS)	QZDD	QZZZ	QZKK	QZSSH	QZDDH	QZZZH	QZKKH
SPR/SPS15	144.1	147.5	148.9	152.3	—	—	—	—
SPR/SPS20	173.9	177.9	179.1	183.1	—	—	—	—
SPR/SPS25	202.1	209.5	207.8	215.2	222.4	229.8	224.8	232.2
SPR/SPS30	229.8	238.2	236.3	244.7	253.1	261.5	256.3	264.7
SPR/SPS35	267.5	275.9	274	282.4	290.8	299.2	294	302.4
SPR/SPS45	320.5	329.9	327	336.4	343.8	353.2	347	356.4

Unit: mm

Precautions on Use

● Handling

- (1) Most models of this product are heavy articles (20 kg or heavier). Please use at least two people to move any heavy object, or use a dolly or another conveyance. Otherwise, it may cause injury or damage the unit.
- (2) Do not disassemble the parts. Otherwise, it may reduce functionality.
- (3) Tilting an LM block or LM rail may cause them to fall by their own weight.
- (4) Take care not to drop or strike the LM Guide. Otherwise, it may cause injury or damage the unit. If the product is dropped or impacted, functionality may be reduced even if there is no surface damage.
- (5) Do not remove the LM block from the LM rail during setup.
- (6) Do not insert fingers into the mounting holes on the LM rail, as they could get caught between the rail and the LM block, resulting in injury.
- (7) To ensure personal safety, wear gloves and protective footwear when handling this product.

● Precautions on Use

- (1) Prevent foreign material, such as cutting chips or coolant, from entering the product. This may also cause damage to the product.
- (2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
- (3) Do not use the product at temperature of 80°C or higher. Unless the unit is specially designed to be heat-resistant, exposure to such temperatures may deform or damage plastic and rubber parts.
- (4) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
- (5) Micro-strokes can inhibit the formation of a film of oil between the raceways and the ball, resulting in fretting. So use grease with high fretting resistance. THK recommends periodically making stroke movement of about the length of the LM block to help ensure that a film forms on the raceways and balls.
- (6) Do not forcibly drive a pin, key, or other positioning device into this product. This may generate indentations on the raceway, leading to loss of functionality.
- (7) If, for operational reasons, it becomes absolutely necessary to remove the LM block from the LM rail and reattach it, a special mounting jig must be used for this purpose. (The removing/mounting jig is not provided as standard. When desiring to use it, contact THK.)
- (8) Position the mounting jig so that one end abuts the end of the LM rail. When the rail and the jig are exactly aligned, the LM block can be loaded onto the rail.
- (9) Take care to keep the LM block straight. Loading the block at an angle can introduce foreign material, damage internal components, or cause balls to fall out.
- (10) The LM block must contain all its internal rolling elements (balls) when mounted on the LM rail. Using a block with any balls removed may result in premature damage.
- (11) Please contact THK if any balls fall out of the LM block, do not use the Block if any balls are missing.
- (12) If the endplate is damaged due to an accident, etc., balls may fall out or the LM block may become detached from the LM rail and drop. If the LM Guide will be used hanging upside down, take preventive measures such as adding a safety mechanism to prevent falls.
- (13) If the rigidity of the mounting parts are insufficient and the mounting accuracy is not so good, an unexpected load will be applied to the LM block, which may cause damage at an early stage. Accordingly, give sufficient consideration to the rigidity/accuracy of the housing and the base.
- (14) When removing the LM block from the LM rail and then replacing the block, an LM block mounting/removing jig that facilitates such installation is available. Contact THK for details.

● Lubrication

- (1) Thoroughly wipe off anti-rust oil and feed lubricant before using the product.
- (2) Do not use a mix of lubricants with different physical properties. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
- (3) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.
- (4) To lubricate a product that has no grease nipple or oil hole, apply lubricant directly to the raceway surface and execute a few preliminary strokes to ensure that the interior is fully lubricated.
- (5) Lubricant viscosity can vary depending on the temperature. Take note that the slide resistance and torque of the LM Guide also changes as the consistency of grease changes.
- (6) After lubrication, the slide resistance and torque of the LM Guide may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
- (7) Excess lubricant may spatter immediately after lubrication. If necessary, wipe off any spattered grease.
- (8) The properties of grease deteriorate and its lubrication performance drops over time. Grease must be checked and added properly according to the use frequency of the machine.
- (9) Although the lubrication interval may vary according to use conditions and the service environment, lubrication should be performed approximately every 100 km in travel distance (three to six months). Set the final lubrication interval/amount based on the actual machine.
- (10) If the installation direction is other than horizontal use, the lubricant may not reach the raceway completely.
- (11) When adopting oil lubrication, the lubricant may not be distributed throughout the LM block depending on the installation direction of the block. Contact THK in advance for details.

● Storage

When storing the LM Guide, enclose it in a package designated by THK and store it in a room in a horizontal orientation while avoiding high temperature, low temperature and high humidity.

After the product has been in storage for an extended period of time, lubricant inside may have deteriorated, so add new lubricant before use.

● Disposal

Dispose of the product properly as industrial waste.

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Technical Support Site

The THK Technical Support Site lets you access product information and technical support online. You will also find a search feature for locating desired products and a calculation feature for calculating service life. 2D-CAD and 3D-CAD data are also downloadable.

<http://www.thk.com/> or

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Search

Top page of the Global site



<http://www.thk.com/>

Technical Support Site



<https://tech.thk.com/>

Product Information

Search by model number or description.
Also contains detailed product specifications according to model number.

Technical Information

Contains technical information, from application examples to research papers.
(* To use this service, you must log in first.)

Technical Calculation

Rated life (life time) can be calculated simply by entering model number, application criteria, etc.
(* To use this service, you must log in first.)

CAD Data

You can acquire 2D-CAD data (DXF files) on approximately 4,000 items, or 3D-CAD data according to specifications from rail lengths to installation of option items.
(* To use this service, you must log in first.)

Catalog Information

Order any of a variety of catalogs. You can also view in PDF format.
(* To use this service, you must log in first.)

FAQ

Contains frequently asked questions.

Linear Motion System DVD Catalog

Linear Motion System DVD Catalog is also available. Please contact THK, distributors or other purchasable contacts in your area for a request.

Please choose your preferred language.



Displays product information.

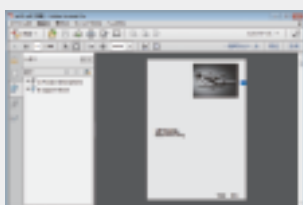
Enables you to use 2-D CAD data (DXF files).

Enables you to use 3-D CAD data.



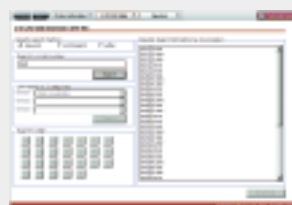
Product information (PDF file)

Contains catalog PDF data for new products and mechatronic products, in addition to the product information contained in the General Catalog.



2-D CAD data (DXF file)

You can use 2-D CAD data (DXF files) for approximately 4,000 products.



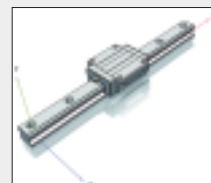
3-D CAD data generation program

This function enables you to use 3-D CAD data.



Selectable options and specifications

By combining product model numbers and options, you can generate 3-D CAD data tailored to your specifications.



3-D CAD and 2-D CAD data

You can then quickly and easily import the generated 3-D CAD data into your 3-D CAD software. 2-D CAD data can also be generated with this program.



CAD type	Formats supported
3-D CAD	DXF 3D / IGES / SAT / STEP Solidworks 2013, 2014, 2015, Macro 3D
2-D CAD	DXF Version 2004-2015

THK Caged Ball LM Guide SPR/SPS

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