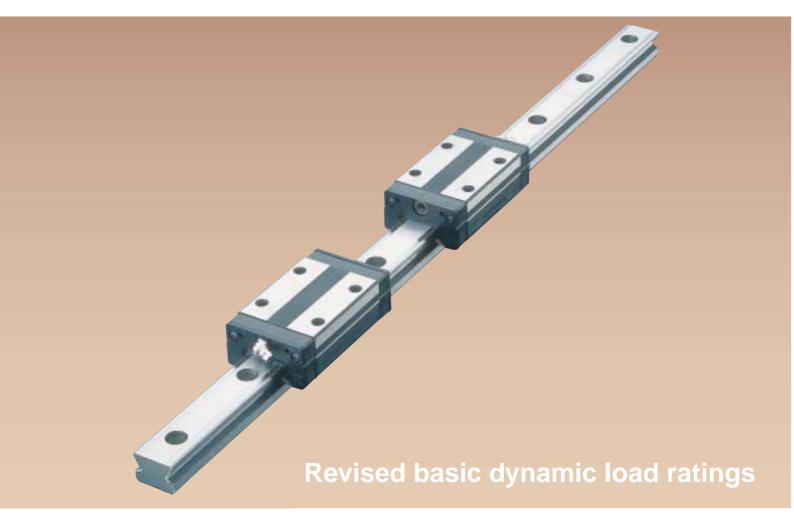




Advantages of Caged Ball™ Technology

High speed performance
Low noise design, long service life
Long-term maintenance-free operation
Reduction in rolling resistance variation

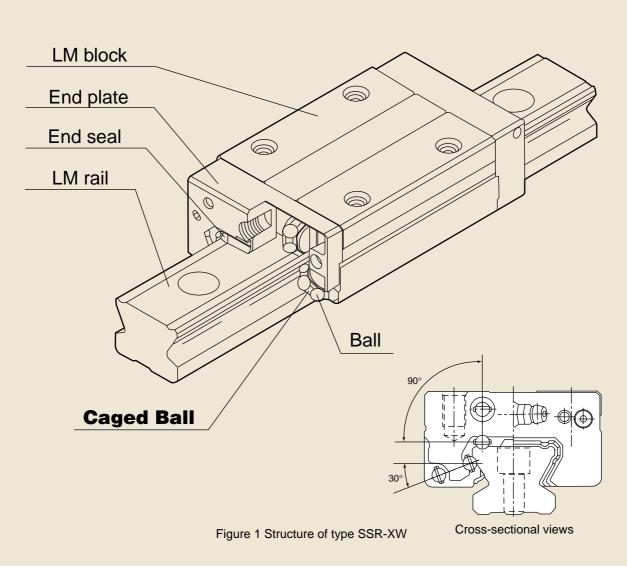






Radial type LM Guide_® with Caged Ball_™ Technology

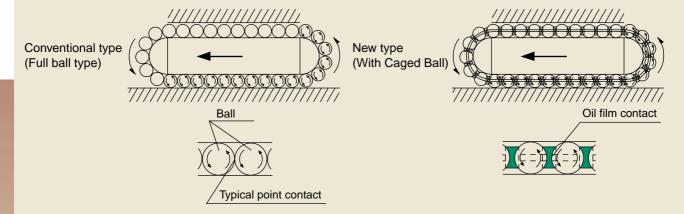




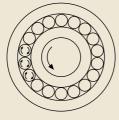
The radial type LM Guide $_{\rm e}$ (linear motion guide) with Caged Ball $_{\rm IM}$ Technology for low noise, long-term maintenance-free, and higher speed operation



Friction of the balls Linear motion guide



■Rotary ball bearing







In the first stage of development (Full ball type)

- Adjacent balls contact each other at a point. As a result, the contact stress is large and the oil film brakes down due to friction
- · The life becomes shorter.

Present bearing (With Caged Ball)

- · The life is extended due to the absence of friction.
- Heat generation during high-speed rotation is limited due to the absence of the friction between adjacent balls.
- The balls do not contact each other. Noise does not arise from the metal to metal contact.
- · Balls move smoothly because they are positioned evenly.
- The lubricating oil retained between the balls provides excellent lubrication and long life.

At the time ball bearings were invented, they had no retainers and caused loud noise. Also, they had short running life and were unable to be operated at high speeds.

20 years later, bearings with retainers were developed. This type was quieter in operation and was capable of high rotational speeds. Although there are less balls, it provided excellent running life and contributes to the major success of the product. The history of the needle bearing revealed how the quality improved through the use of retainers. Balls at their point of contact slip against each other in opposite directions and at twice the speed of each of their rotations, which results in severe wear, louder noise and a shorter running life.

The massive pressures and metal to metal slip between the balls also break down the oil film, normally film breaks down at 3 kg/mm² of surface pressure.

Alternatively, retainers and balls contact each other in larger areas, which prevents the break down of oil and provides for quieter operation, high rotational speeds, and longer running life.

As a result of our long-term experience and new manufacturing technologies, THK has developed a new Caged Ball technology, which made smooth movement possible. Type SSR using Caged Ball technology is equipped with a ball circulating section, and its features are as follows.

Low Noise and Favorable Sound Quality

Since the balls move in an orderly manner due to the presence of the ball cages, the metallic sound produced by collision between adjacent balls is eliminated, thereby resulting in low noise levels and favorable sound quality.

Long service life, long-term maintenance-free operation

Adjacent balls, separated by the ball cage, do not rub against each other and produce friction. As a result, the balls are not subject to wear and tear. In addition, the grease retention has been enhanced, providing long service life, long-term maintenance-free operation.

Excellent high-speed performance

Caged Ball exhibits excellent high-speed performance through reduced heat generation due to lower bearing stress and half ball contact velocity. The life of the balls is also prolonged due to the elimination of the friction and wear between adjacent balls.

Super Smooth movement

Smooth movement with less variation of torque can be obtained as the balls are lined uniformly and circulated.

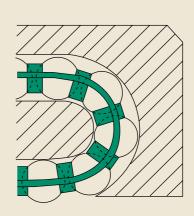
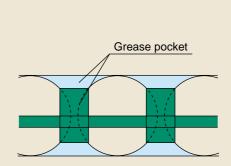
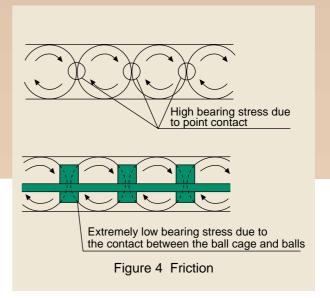


Figure 2 Ball circulating section



The grease circulates with the aid of the ball cage.

Figure 3 Grease pocket



Since the effect of the ball cages eliminates friction between adjacent balls while also enhancing the retention of grease, the basic dynamic load ratings have been revised.

Model number	Basic load rating C kN
SSR15XWY(M)	14.7
SSR20XW(M)	19.6
SSR25XWY(M)	31.5
SSR30XW(M)	46.5
SSR35XW(M)	64.6

Model number	Basic load rating C kN
SR15W(M)	9.51
SR20W(M)	12.5
SR25WY(M)	20.3
SR30W(M)	30
SR35W(M)	41.7

Comparison of basic dynamic load ratings between the SNR type of LM Guide with ball cages and the NR type of packed ball LM Guide.

■Noise level data

Figure 5 compares the data concerning noise level between type SSR and the conventional types. The variable condition for noise comparison is the moving speed in meter per minute. These graphs show that type SSR generates lower noise compared to that of the conventional types.

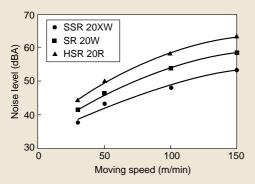


Figure 5 Noise level comparison with respect to the speed (m/min)

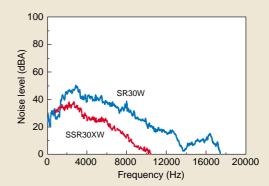


Figure 6 Frequency characteristics (Speed:100m/min)

■Durability test data Achieving 40000 km of running distance with the initial sealed grease!!

:SSR25XWUU Condition 1) Sample type Condition 2) Sample type :SSR25XWUUC1 Speed :300 m/min Speed :300 m/min Stroke :2800 mm Stroke :2800 mm Lubricant :AFA grease Lubricant :AFA grease Initial sealed amount: 2 cm3 Initial sealed amount:2 cm3 Applied load :None Applied load :1 kN :30000 km Travel distance :40000 km Travel distance

■Less fluctuated rolling resistance

Fluctuations of rolling resistance are more conspicuous in the use of the unit at vertical position than at other positions. Fig. 7 presents rolling resistance data of the conventional product, and Fig. 8 presents the same for type SSR25XW. Type SSR provides almost no fluctuations of rolling resistance even at the vertical application and ensures stable, smooth movement compared to the conventional type.

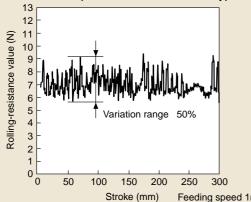
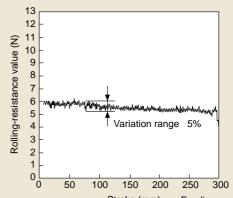


Figure 7 Rolling resistance in use at vertical position (Conventional type)

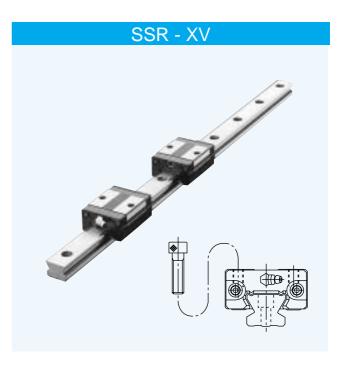


Stroke (mm) Feeding speed 1m/min Figure 8 Rolling resistance in use at vertical position (SSR25XW)

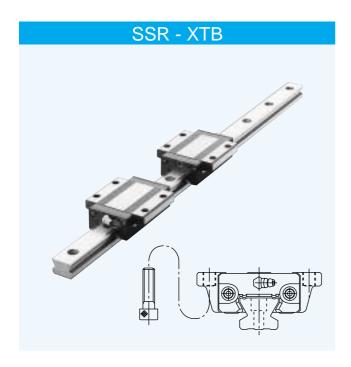
Types and features



Type SSR-XW has low profile, so it is compact and strong for radial load.



Type SSR-XV is similar to type SSR-XW except that the LM block is shorter. This saves space for mounting.



Since the LM block can be installed from underneath, it is useful for when through holes for mounting bolts are not available on top table.

Load ratings and life

Types SSR can support loads in the radial, reverse radial and lateral directions.

The basic load ratings listed in the dimension tables show the load ratings in the radial direction.

Life calculation

The following equation gives the life of types SNR/SNS.

$$L = \left(\frac{f_t \cdot f_c}{f_w} \cdot \frac{C}{P_c}\right)^3 \cdot 50$$

L: Rated life (km)

(Total distance of travel reached without flaking by 90% of a group of the same linear motion system that are operated independently under the same conditions)

C: Basic dynamic load rating (N)

(The basic dynamic load rating (C) refers to the load that does not vary in direction or magnitude such that the rated service life L is equal to 50 Km when a group of identical LM Guides are individually operated under the same conditions.)

Pc:Design load (N)

ft :Temperature factor

(See General Catalog.)

fc :Contact factor

(See General Catalog.)

fw:Load factor

(See General Catalog.)

Given rated life(L) calculated by the above equation and assuming that the length of stroke and the reciprocating rate are constant, the life in terms of time can be calculated by using the following equation.

$$Lh = \frac{L \times 10^3}{2 \times \ell \text{ s} \times n_1 \times 60}$$

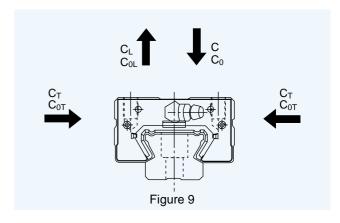
Lh:Life in terms of time (hr)

ls :Stroke length (m)

n₁: Number of reciprocating motions per minute (min⁻¹)

Load ratings in various directions

Load ratings



Type SSR can support loads in the radial, reverse radial and lateral directions. The basic load ratings show the load ratings in the radial direction in Figure 9, and they are listed in the dimension tables. The reverse radial and lateral load ratings are obtained from the Table 1.

Table 1 Load ratings of type SSR in various directions

Direction	Basic dynamic load rating	Basic static load rating
Radial	С	C _o
Reverse radial	C _L =0.50C	C _{0L} =0.50C ₀
Lateral	C _T =0.53C	C _{0T} =0.43C ₀

Equivalent load

When the LM block of type SSR is subjected to reverse radial and lateral loads simultaneously, the equivalent load can be calculated by using the following equation.

PF=X-PI+Y-PT

PE : Equivalent load (N)

· Reverse radial

Lateral

PL : Reverse radial load(N)

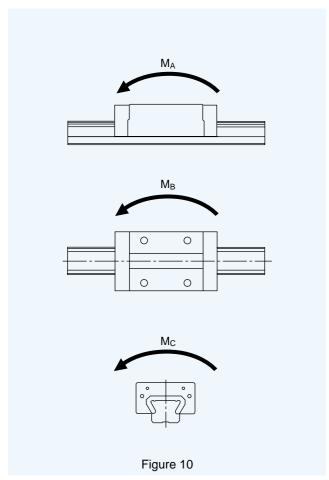
PT : Lateral load(N)

X, Y: Equivalent factors (Table 2)

Table 2 Equivalent factors of type SSR

P _E	Х	Υ
Reverse radial equivalent load	1	1.155
Lateral equivalent load	0.866	1

Permissible moment load



Type SSR can take moment load in all three directions with only one LM block. Table 3 lists the values for the permissible moment load with one LM block and two blocks tandem (except Mc) in three directions, MA, MB and Mc.

Table 3 Static permissible moment of type SSR Unit: kN·m

Direction	N		M	M _C			
Model No.	One block	Two blocks tandem	One block	Two blocks tandem	One block		
SSR 15 XV	0.02	0.13	0.02	0.11	0.04		
SSR 15 XW/XTB	0.05	0.28	0.04	0.24	0.07		
SSR 20 XV	0.03	0.19	0.02	0.16	0.07		
SSR 20 XW/XTB	0.07	0.43	0.06	0.37	0.12		
SSR 25 XV	0.05	0.37	0.04	0.32	0.12		
SSR 25 XW/XTB	0.15	0.84	0.12	0.73	0.21		
SSR 30 XW	0.25	1.41	0.21	1.22	0.36		
SSR 35 XW	0.40	2.19	0.34	1.89	0.60		

Accuracy standard

The accuracy of type SSR is classified into normal, high, precision, super precision, and ultra precision grade as shown in Table 4.

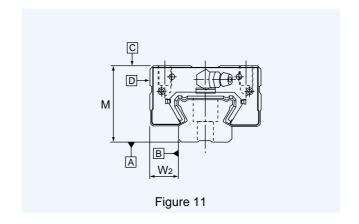


Table 4 Accuracy standard

Unit: mm

Model	Accuracy grade	Normal	High	Precision	Super-precision	Ultra-precision			
number	Item	No symbol	Н	Р	SP	UP			
	Tolerance of height M	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008			
	Difference of height M	0.02	0.01	0.006	0.004	0.003			
	Tolerance of width W2	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008			
SSR 20X	Difference of width W2	0.02	0.01	0.006	0.004	0.003			
	Running parallelism of LM block surface with respect to surface A	C (Pofor to Figure 12)							
	Running parallelism of LM block surface Dwith respect to surface B	D (Defer to Figure 12)							
	Tolerance of height M	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01			
	Difference of height M	0.02	0.015	0.007	0.005	0.003			
SSR 25X	Tolerance of width W2	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01			
SSR 30X SSR 35X	Difference of width W2	0.03	0.015	0.007	0.005	0.003			
	Running parallelism of LM block surface with respect to surface A	C (Pofor to Figure 12)							
	Running parallelism of LM block surface with respect to surface	l	D (Refer to Figure 12)						

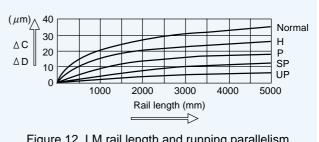


Figure 12 LM rail length and running parallelism

Radial clearance

Table 5 lists the radial clearance of type SSR.

Table 5 Radial clearance of type SSR

Unit: μ m

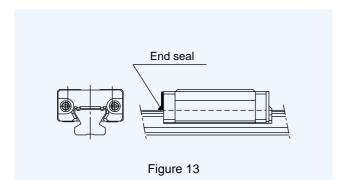
Symbol	Normal	Light preload
Model number	No symbol	C1
SSR 15 X	- 4 ~ + 2	− 10 ~ − 4
SSR 20 X	−5~+2	- 12 ~ - 5
SSR 25 X	-6~+3	− 15 ~ − 6
SSR 30 X	−7~+4	- 18 ~ - 7
SSR 35 X	-8~+4	- 20 ~ - 8

Contamination protection

Type SSR is provided with end seals and side seals as a standard feature for contamination protection.

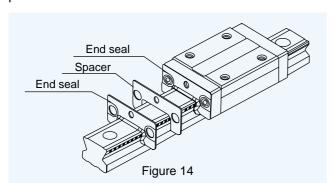
End seals

They are provided as a standard feature.



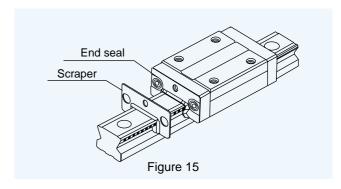
Double seals

Double seals are available for better contamination protection.



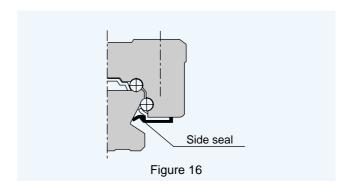
Scrapers

Scrapers for eliminating relatively large foreign matter such as welding spatter are available.



Side seals

To prevent the contamination from under the LM block, side seals are available.



Symbols for contamination protection system

When contamination protection is required, specify according to the code shown in Table 6.

Some model numbers are not applicable. Please be sure to refer to Table 7.

Even with applicable models, the entire block length may vary according to the type used. Add the increased dimensions to the corresponding "L" value shown in the dimension tables.

Table 6

Protection system	Symbol
With end seal (on both ends)	υυ
With end seals, side seals	SS
With end seals, side seals, and scrapers	ZZ
With double seals, side seals	DD
With double seals, side seals, and scrapers	KK

Seal Resistance

Regarding to type SSR with "SS" seals (end seals and side seals on both ends), Table 7 shows the value of maximum seal resistance for one LM block when lubricant is applied.

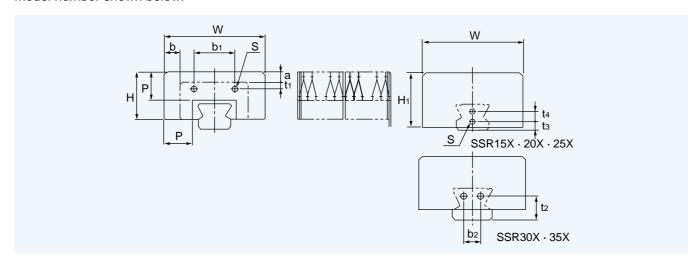
Table 7 Maximum seal resistance of type SSR

Unit: N

Model number	Seal resistance
SSR 15 X	2
SSR 20 X	2.6
SSR 25 X	3.5
SSR 30 X	4.9
SSR 35 X	6.3

Special bellows: type JSSR-X

The dimensions of type JSSR-X, the special bellows for type SSR, are shown below. Please specify the model number shown below.



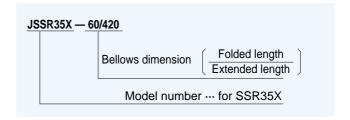
Unit: mm

		Main dimensions							А						
Model number	W	Н	H ₁	Р	b ₁	t ₁	b ₂	t ₂	t ₃	t ₄	Mounting bolt	а	b	Lmax Lmin	Applicable types
JSSR15X	51	24	26	15	20.5	4.7			8	_	M3×0.5× 5 ℓ	5	8.5	5	SSR 15X
JSSR20X	58	26	30	15	25	4.2	_	_	6	6	M3×0.5× 5 ℓ	4	8	5	SSR 20X
JSSR25X	71	33	38	20	29	5	_	_	6	7	M3×0.5× 5 ℓ	7	11.5	7	SSR 25X
JSSR30X	76	37.5	37.5	20	35	9	12	17	_	_	M3×0.5× 5 ℓ	3	8	7	SSR 30X
JSSR35X	84	39	39	20	44	7	14	20	_	_	M3×0.5× 5 ℓ	2	7	7	SSR 35X

Note 1: The expansion rate differs (A minus 1.5 as guide line) when units other than those intended for hori zontal position, such as usage at vertical or wall-hung position, are used. When ordering, please specify the position of intended use.

Note 2: If bellows are attached to both ends of LM block, a grease fitting cannot be attached. Please contact THK about this.

Model number coding



Note: The bellows length is calculated as follows:

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

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

Shoulder height and bottom corner of installation surfaces

Normally, a shoulder is provided on the installation surface for the LM block and/or the rail to enable easy assembling and accurate alignment.

For block installation, it is necessary to limit the height of shoulder less than H2 (Table 8) or to clear D (Table 8) protruded resin mold.

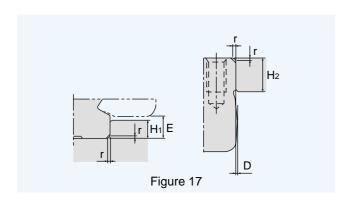
For rail installation, shoulder height H1 should be less than E (Table 8).

Also, for both block and rail installation, the bottom corner of shoulder should have relief or radius less than r (Table 8).

Table 8 Height and radius of bottom corner

Unit: mm

Model number	Radius of bottom corner r (maximum)	Shoulder height accommodating LM rail H ₁	Shoulder maximum height accommodating LM block H ₂	E	D
SSR15X	0.5	3.8	5.5	4.5	0.3
SSR20X	0.5	5	7.5	6	0.3
SSR25X	1.0	5.5	8	6.8	0.4
SSR30X	1.0	8	11.5	9.5	0.4
SSR35X	1.0	9	16	11.5	0.4



- ●Since special resin is used, do not use LM block at 80°C or higher.
- •LM block is a precision resin component, so it may be damaged if dropped. Please be careful when handling.

Standard and maximum lengths of LM rails

Table 9 lists the standard and maximum LM rail lengths of type SSR. if a rail is longer the corresponding maximum length is specified, the rail will be in two or more sections. If a special length is required, dimension G listed in the table is recommended. If the dimension G is too long, it makes

the rail ends insecure which may adversely affect accuracy. When two or more rails are to be connected, be sure to inform THK of the overall LM rail length. The rails will be machined simultaneously in order to give precise joints.

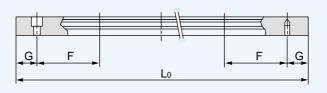


Table 9 Standard and maximum LM rail lengths for type SSR

Unit: mm

Model number	SSR 15 X	SSR 20 X	SSR 25 X	SSR 30 X	SSR 35 X
Standard LM rail length (L ₀)	160 220 280 340 400 460 520 580 640 700 760 820 940 1000 1060 1120 1180 1240 1300 1360 1420 1480 1540	220 280 340 400 460 520 580 640 700 760 820 940 1000 1060 1120 1180 1240 1300 1360 1420 1480 1540 1600 1660 1720 1780 1780 1840 1900 1960 2020 2080 2140	220 280 340 400 460 520 580 640 700 760 820 940 1000 1060 1120 1240 1300 1360 1420 1480 1540 1600 1660 1720 1780 1840 1900 1960 2020 2080 2140 2200 2260 2320 2380 2440	280 360 440 520 600 680 760 840 920 1000 1080 1160 1240 1320 1400 1480 1640 1720 1800 1880 1960 2040 2120 22200 2280 2360 2440 2520 2600 2680 2760 2840 2920	280 360 440 520 600 680 760 840 920 1000 1080 1160 1240 1320 1400 1480 1640 1720 1800 1880 1960 2040 2120 2200 2280 2360 2440 2520 2600 2680 2760 2840 2920
F	60	60	60	80	80
G	20	20	20	20	20
Maximum length	2500 (1240)	3000 (1480)	3000 (2020)	3000 (2520)	3000

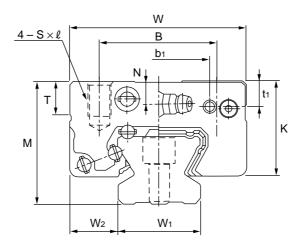
Note 1: If a single-piece LM rail exceeding the corresponding maximum length listed in Table 9 is desired, please contact THK. Note 2: In case of stainless steel type, standard length and maximum length will be different. Please contact THK.

Type SSR-XW

Type SSR-XWM

Standard type

Stainless steel type

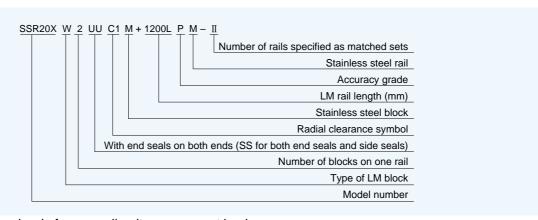


	Outline dimensions			LM block dimensions												
Model number	Height M	Width W	Length	В	С	$S\! imes\!\ell$	L ₁	Т	K	N	Е	N ₁	e ₁	b ₁	t₁	d
SSR 15 XWY SSR 15 XWMY	24	34	57	26	26	M4×0.7×7	39.9	7	19.5	4.5	5.5	2.7	4	20.5	4.7	3
SSR 20 XW SSR 20 XWM	28	42	66.5	32	32	M5×0.8×8	46.6	8.5	22	5.5	12	2.8	4.8	25	4.2	3
SSR 25 XWY SSR 25 XWMY	33	48	83	35	35	M6×9	59.8	9	26.2	6	12	3.3	4.6	29	5	3
SSR 30 XW SSR 30 XWM	42	60	97	40	40	M8×12	70.7	11.5	32.5	8	12	4.5	5.6	35	9	4
SSR 35 XW	48	70	111	50	50	M8×12	80.5	16	36.5	8.5	12	4.7	6.5	44	7	4

Note: Symbol M specifies the use of stainless steel for LM block, rail, and the balls. This provides superior corrosion resistance and environmental performance.

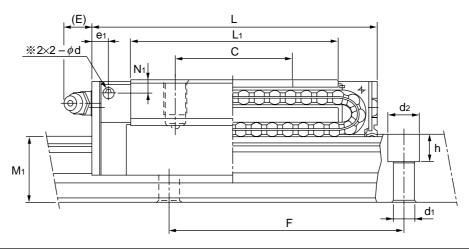
•See page 7 for static permissible moment MA, MB, Mc.

Model number coding



Note: This model number is for one rail unit on a one set basis.

(When two rails are to be specified as matched sets, at least two rail and block assemblies are necessary.)



Unit: mm

			LM rail di	mensions	Basic lo	ad rating	Mass		
Grease fitting	Width W ₁ ±0.05	W_2	Height M₁	Pitch F	d₁×d₂×h	C kN	C _o kN	LM block kg	LM rail kg/m
PB1021B	15	9.5	12.5	60	4.5×7.5×5.3	14.7	16.5	0.15	1.2
B-M6F	20	11	15.5	60	6×9.5×8.5	19.6	23.4	0.25	2.1
B-M6F	23	12.5	18	60	7×11×9	31.5	36.4	0.4	2.7
B-M6F	28	16	23	80	7×11×9	46.5	52.7	0.8	4.3
B-M6F	34	18	27.5	80	9×14×12	64.6	71.6	1.1	6.4

•See page 12 for the standard LM rail lengths.

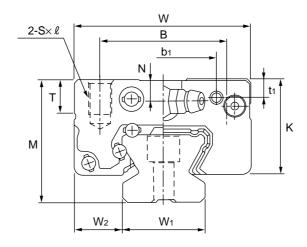
Note: Holes on the sides of the LM block for lubrication nipples are not made all the way through, to prevent foreign materials from entering. Please contact '대비생 when using lubrication nipples.

Type SSR-XV

Type SSR-XVM

Standard type

Stainless steel type

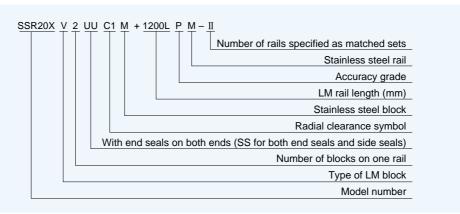


	Outline dimensions			LM block dimensions											
Model number	Height M	Width W	Length L	В	${\sf S} \! \times \ell$	L ₁	Т	К	N	E	N ₁	e ₁	b ₁	t ₁	d
SSR 15 XVY SSR 15 XVMY	24	34	41	26	M4×0.7×7	23.3	7	19.5	4.5	5.5	2.7	4	20.5	4.7	3
SSR 20 XV SSR 20 XVM	28	42	47.7	32	M5×0.8×8	27.8	8.5	22	5.5	12	2.8	4.8	25	4.2	3
SSR 25 XVY SSR 25 XVMY	33	48	60	35	M6×9	36.8	9	26.2	6	12	3.3	4.6	29	5	3

Note: Symbol M specifies the use of stainless steel for LM block, rail, and the balls. This provides superior corrosion resistance and environmental performance.

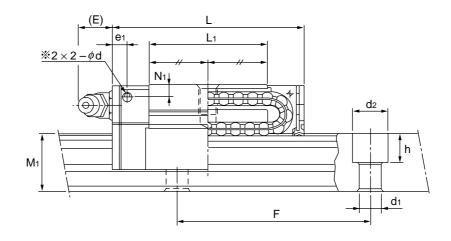
•See page 7 for static permissible moment MA, MB, Mc.

Model number coding



Note: This model number is for one rail unit on a one set basis.

(When two rails are to be specified as matched sets, at least two rail and block assemblies are necessary.)



Unit; mm

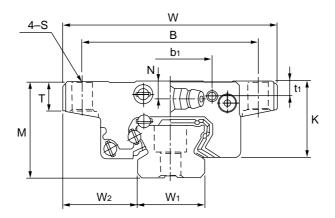
			Basic lo	ad rating	Mass				
Grease fitting	Width W ₁ ±0.05	W ₂	Height M ₁	Pitch F	d ₁ ×d ₂ ×h	C kN	C _o kN	LM block kg	LM rail kg/m
PB1021B	15	9.5	12.5	60	4.5×7.5×5.3	9.10	9.7	0.08	1.2
B-M6F	20	11	15.5	60	6×9.5×8.5	13.4	14.4	0.14	2.1
B-M6F	23	12.5	18	60	7×11×9	21.7	22.5	0.23	2.7

●See page 12 for the standard LM rail lengths.

Note: Holes on the sides of the LM block for lubrication nipples are not made all the way through to prevent foreign materials from entering. Please contact ™HK when using lubrication nipples.

Type SSR-XTB

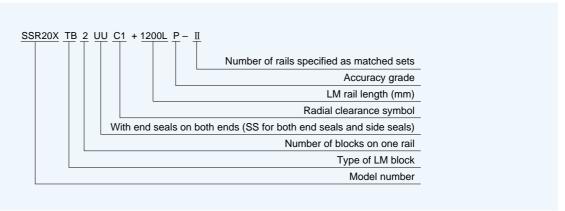
Standard type



	Outline dimensions			LM block dimensions												
Model number	Height M	Width W	Length L	В	С	S	L₁	Т	К	N	E	N ₁	e ₁	b ₁	t ₁	d
SSR 15 XTBY	24	52	57	41	26	4.5	39.9	7	20	4.5	5.5	2.7	4	20.5	4.7	3
SSR 20 XTB	28	59	66.5	49	32	5.5	46.6	9	22	5.5	12	2.8	4.8	25	4.2	3
SSR 25 XTBY	33	73	83	60	35	7	59.8	10	26.2	6	12	3.3	4.6	29	5	3

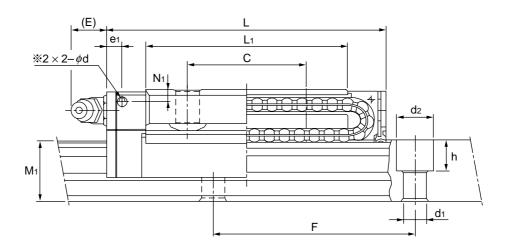
Note: ●See page 7 for static permissible moment MA, MB, Mc.

Model number coding



Note: This model number is for one rail unit on a one set basis.

(When two rails are to be specified as matched sets, at least two rail and block assemblies are necessary.)



Unit: mm

			LM rail di	mensions	Basic loa	ad rating	Mass		
Grease fitting	Width W ₁	W ₂	Height M₁	Pitch F	$d_1 \times d_2 \times h$	C kN	C₀ kN	LM block kg	LM rail kg/m
	±0.05								
PB1021B	15	18.5	12.5	60	4.5×7.5×5.3	14.7	16.5	0.19	1.2
B-M6F	20	19.5	15.5	60	6×9.5×8.5	19.6	23.4	0.31	2.1
B-M6F	23	25	18	60	7×11×9	31.5	36.4	0.53	2.7

•See page 12 for the standard LM rail lengths.

Note: Holes on the sides of the LM block for lubrication nipples are not made all the way through to prevent foreign materials from entering. Please contact THK when using lubrication nipples.

Radial type LM Guide® with Caged Ball™ Technology SSR

Notes on use

*Precautions in handling the LM block

The LM block includes precision mold resin. When it is dropped or struck, it may be damaged. Please take great care in handling the LM block.

*Using holes on the sides of the LM block for lubrication nipples

When it is necessary to use holes on the sides of the LM block for attachment of lubrication nipples, please contact 玩版. 玩版 will install nipples on the LM block. (Holes are not made all the way through to prevent foreign materials from entering.)

These holes are for lubrication nipples only. Use of these holes for other purpose may break end plate.

*Reinstalling the LM block

When the LM block is removed from the LM rail and then reinstalled, please insert it very carefully and correctly.

**For reinstallation, we recommend that a special insertion jig is to be used. Please contact 证识 upon the use of jig.

*Coolant

When the LM block is used in an environment in which some coolant may enter the LM block, some types of coolant may adversely affect the functions of the LM block. Please contact 证出 when selecting a coolant.

*Operating temperature range

The LM block is made from special resin. Do not use it above 80°C.

*Lubrication

Ordinary grease may not be utilized when the system is used in a special environment such as an area subject to extremes of temperature or continuous vibration, a clean room, or a vacuum environment. If the system is to be used in a special environment, please contact 证法.

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*Specifications are subject to change without notice.

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