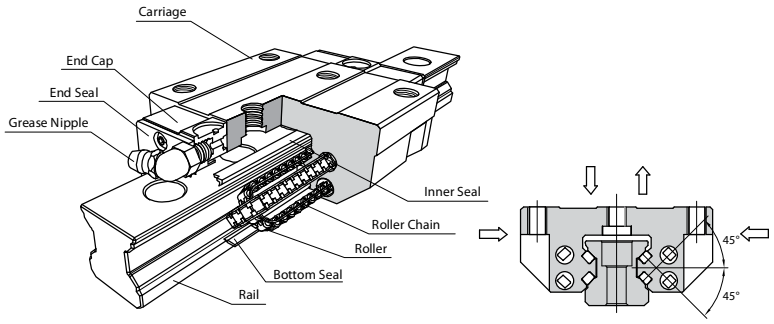
12.6 Roller Chain Type, SMR Series

A. Construction

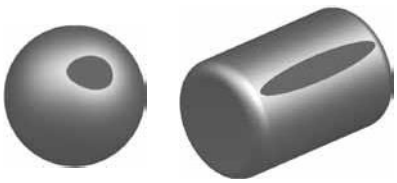


B. Characteristics

The roller chain type linear guideway, SMR series, equip with rollers instead of the ball, and therefore the SMR series can provide higher rigidity and loading than the normal type with the same size. Besides, the patent of roller chain design can make the movement smooth and stability, especially suit for the requests of high accuracy, heavy load and high rigidity.

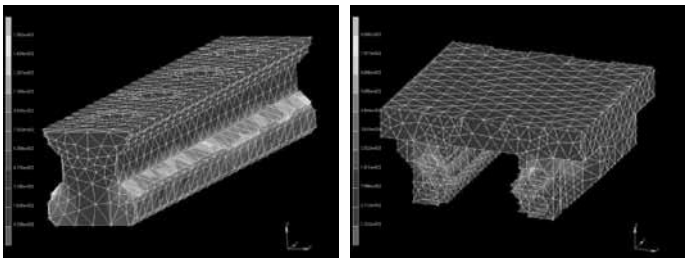
Ultra Heavy Load

SMR linear guideway through rollers have a line contact with carriage and rail. Relative to the general type linear guideway through balls have a point contact; the SMR type linear guideway can offer lower elastic deformation while bearing the same load. Base on the rollers have the same outer diameter with balls, the roller can bear the heavier load. The excellent characteristics of high rigidity and ultra heavy load can suitable for the high accuracy application that heavy load is processed even more.

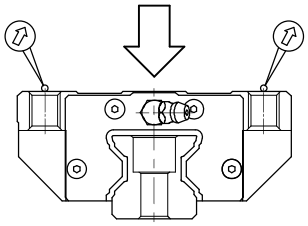


The Optimization Design of Four Directional Load

Through the structure stress analysis of finite element method, SMR series have four trains of rollers are designed to a contact angle of 45° and the section design for high rigidity. Except for bearing heavier loads in radial, reversed radial and lateral directions, a sufficient preload can be achieved to increase rigidity, and this makes it suitable for any kind of installation.



Ultra High Rigidity

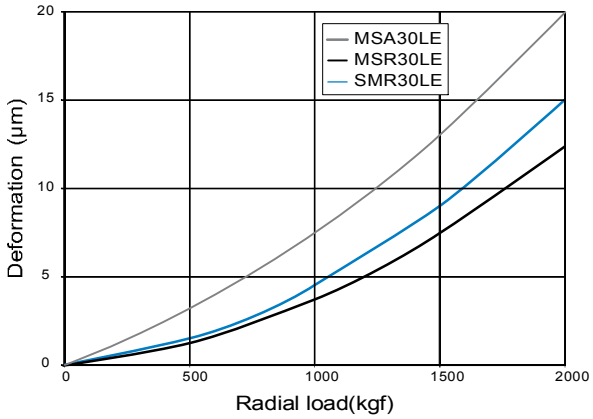


Test data of rigidity

Test samples：Ball type MSA30LE with preload F1

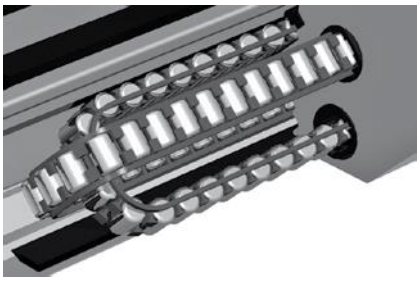
Full roller type MSR30LE with preload F1

Roller chain type SMR30LE with preload F1



Roller Chain Design, Smooth Movement

The concise and smooth design of circulating system with strengthened synthetic resin accessories and cooperating with the roller chain, these can avoid interference between rollers and make the rollers more stability during passing in and out the load district. Besides, the roller chain can keep the roller move in a line and improve the movement most smooth substantially.



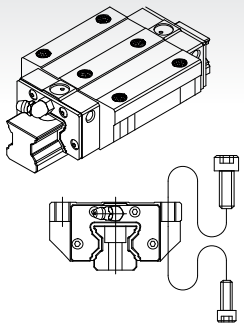
Low Noise, Good Lubricant Effect

The roller chain design avoids interference between rollers, lowers the operating noise, and can keep the lubricant between the rollers and roller chain effectively. Moreover, improve the movement smooth and service life of the whole, can meet high accuracy, high reliability and smooth and stability.

C. Carriage Type

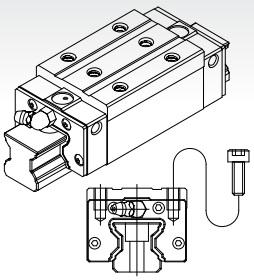
Heavy Load

SMR-E Type



This type offers the installation either from top or bottom side of carriage.

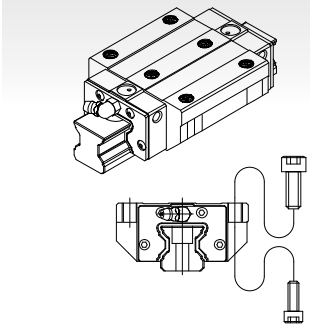
SMR-S Type



Square type with smaller width and can be installed from top side of carriage.

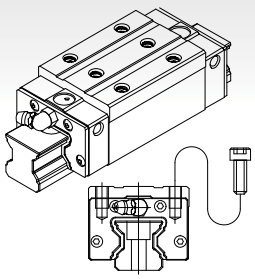
Ultra Heavy Load

SMR-LE Type



All dimensions are same as SMR-E except the length is longer, which makes it more rigid.

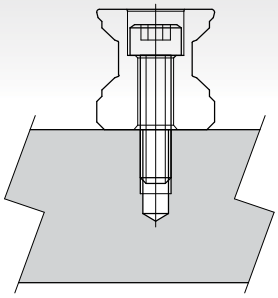
SMR-LS Type



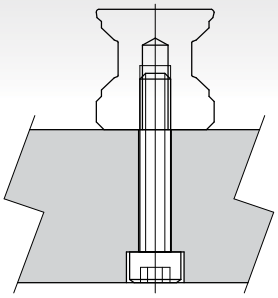
All dimensions are same as SMR-S except the length is longer, which makes it more rigid.

D. Rail Type

Counter bore (R type)



Tapped Hole (T type)



E. Description of Specification

(1) Non-interchangeable Type

SMR 25 E 2 SS F0

Series：SMR

Size：25, 30, 35, 45, 55, 65

Carriage type：(1) Heavy load
E : Flange type, mounting either from top or bottom
S : Square type
(2) Ultra heavy load
LE : Flange type, mounting either from top or bottom
LS : Square type

Number of carriages per rail：1, 2, 3 ...

Dust protection option of carriage：
No symbol, UU, SS, ZZ, DD, KK (refer to chapter 15.1 Dust Proof)

Preload：F0 (Medium preload), F1 (Heavy preload), F2(Ultra Heavy Preload)

Code of special carriage： No symbol, A, B, C, D ...

Rail type：R (Counter-bore type), T (Tapped hole type)

Rail length (mm)

Rail hole pitch from start side (E1, see Fig12.6)

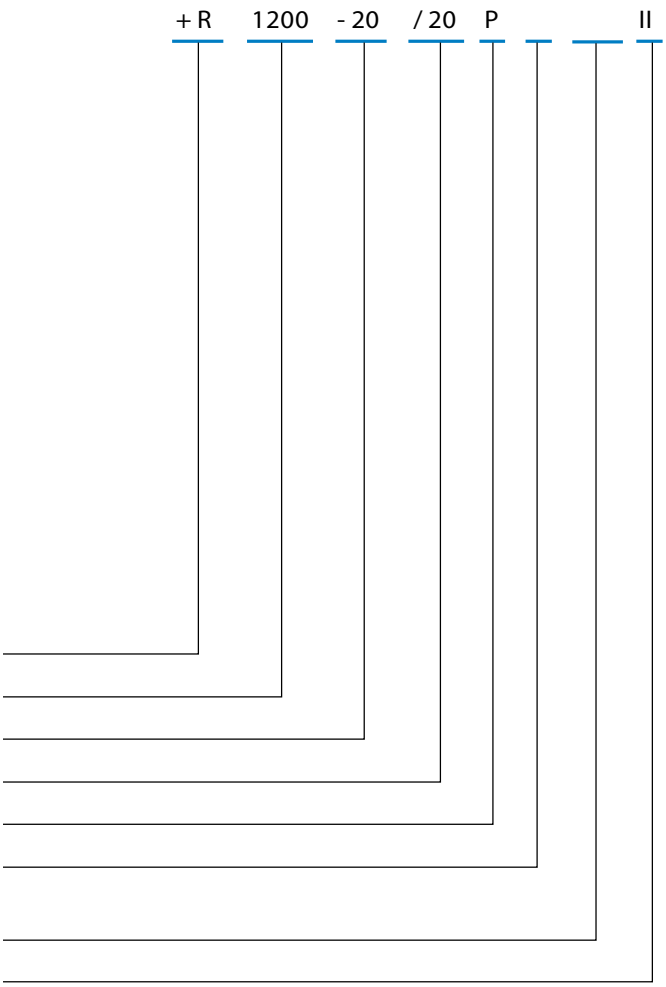
Rail hole pitch to the end side (E2, see Fig12.6)

Accuracy grade：H, P, SP, UP

Code of special rail：No symbol, A, B ...

Dust protection option of rail：No symbol, /CC, /MC, /MD ...
(refer to chapter 15.1 Code of contamination fro Rail)

Number of rails per axis：No symbol , II, III, IV ...


+ R
1200
- 20
/ 20
P
II

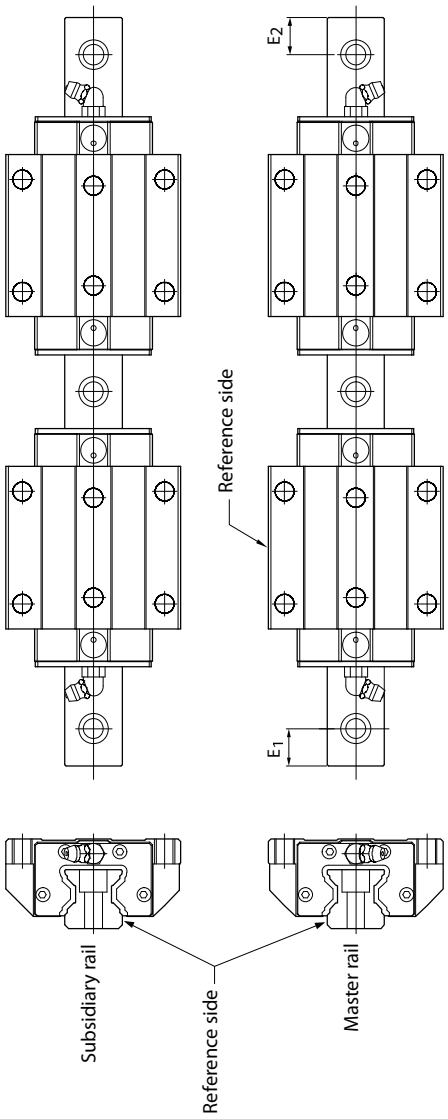

E2
Reference side
E1
Subsidiary rail
Reference side
Master rail

Fig.12.6

(2) Interchangeable Type

Code of Carriage

SMR 25 E SS F0 H

Series：SMR
Size：25, 30, 35, 45, 55, 65
Carriage type：(1) Heavy load
E：Flange type, mounting either from top or bottom
S：Square type
(2) Ultra heavy load
LE：Flange type, mounting either from top or bottom
LS：Square type
Dust protection option of carriage：No symbol, UU, SS, ZZ, DD, KK (refer to chapter 15.1 Dust Proof)
Preload：F0 (Medium preload), F1 (Heavy preload)
Accuracy grade：H, P
Code of special carriage：No symbol, A, B, ...

Code of Rail

SMR 25 R 1200 -20 /20 H

Series：SMR
Size：25, 30, 35, 45, 55, 65
Rail type：R (Counter-bore type), T (Tapped hole type)
Rail length (mm)
Rail hole pitch from start side (E1, see Fig.12.6)
Rail hole pitch to the end side (E2, see Fig.12.6)
Accuracy grade：H, P
Code of special rail：No symbol, A, B ...
Dust protection option of rail：No symbol, /CC, /MC, /MD ...
(refer to chapter 15.1 Code of contamination fro Rail

F. Accuracy Grade

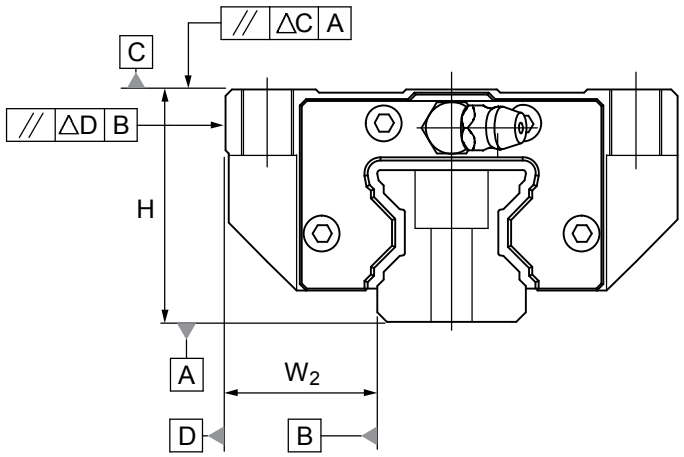


Table 1 Running Parallelism

Rail length (mm)		Running Parallelism Values(μm)			
Above	Or less	H	P	SP	UP
0	315	6	3	2	1.5
315	400	8	4	2	1.5
400	500	9	5	2	1.5
500	630	11	6	2.5	1.5
630	800	12	7	3	2
800	1000	14	8	4	2
1000	1250	16	10	5	2.5
1250	1600	18	11	6	3
1600	2000	20	13	7	3.5
2000	2500	22	15	8	4
2500	3000	24	16	9	4.5
3000	3500	25	17	11	5
3500	4000	26	18	12	6

A Non-Interchangeable Type

Model No.	Item	Accuracy Grade			
		High H	Precision P	Super Precision SP	Ulitra Precision UP
25 30 35	Tolerance for height H	±0.04	0 -0.04	0 -0.02	0 -0.01
	Height difference ΔH	0.015	0.007	0.005	0.003
	Tolerance for distance W_2	±0.04	0 -0.04	0 -0.02	0 -0.01
	Difference in distance W_2(ΔW_2)	0.015	0.007	0.005	0.003
	Running parallelism of surface C with surface A	ΔC (see the table 1)			
	Running parallelism of surface D with surface B	ΔD (see the table 1)			
45 55	Tolerance for height H	±0.05	0 -0.05	0 -0.03	0 -0.02
	Height difference ΔH	0.015	0.007	0.005	0.003
	Tolerance for distance W_2	±0.05	0 -0.05	0 -0.03	0 -0.02
	Difference in distance W_2(ΔW_2)	0.02	0.01	0.007	0.005
	Running parallelism of surface C with surface A	ΔC (see the table 1)			
	Running parallelism of surface D with surface B	ΔD (see the table 1)			
65	Tolerance for height H	±0.07	0 -0.07	0 -0.05	0 -0.03
	Height difference ΔH	0.02	0.01	0.007	0.005
	Tolerance for distance W_2	±0.07	0 -0.07	0 -0.05	0 -0.03
	Difference in distance W_2(ΔW_2)	0.025	0.015	0.01	0.007
	Running parallelism of surface C with surface A	ΔC (see the table 1)			
	Running parallelism of surface D with surface B	ΔD (see the table 1)			

B Interchangeable Type

Model No.	Item	Accuracy Grade	
		High H	Precision P
25 30 35	Tolerance for height H	±0.04	0 -0.04
	Height difference ΔH	0.015	0.007
	Tolerance for distance W_2	±0.04	0 -0.04
	Difference in distance W_2(ΔW_2)	0.015	0.007
	Running parallelism of surface C with surface A	ΔC (see the table 1)	
	Running parallelism of surface D with surface B	ΔD (see the table 1)	
45 55	Tolerance for height H	±0.05	0 -0.05
	Height difference ΔH	0.015	0.007
	Tolerance for distance W_2	±0.05	0 -0.05
	Difference in distance W_2(ΔW_2)	0.02	0.01
	Running parallelism of surface C with surface A	ΔC (see the table 1)	
	Running parallelism of surface D with surface B	ΔD (see the table 1)	
65	Tolerance for height H	±0.07	0 -0.07
	Height difference ΔH	0.02	0.01
	Tolerance for distance W_2	±0.07	0 -0.07
	Difference in distance W_2(ΔW_2)	0.025	0.015
	Running parallelism of surface C with surface A	ΔC (see the table 1)	
	Running parallelism of surface D with surface B	ΔD (see the table 1)	

G. Preload Grade

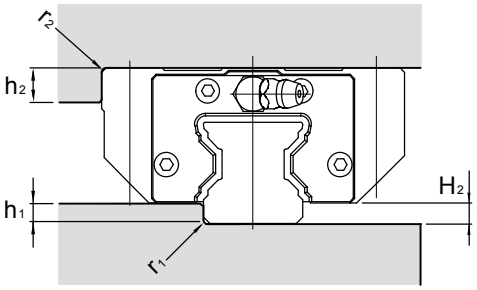
Series	Preload grade		
	Medium preload (F0)	Heavy preload (F1)	Ultra Heavy Preload (F2)
SMR25	0.04~0.06C	0.07~0.09C	0.12~0.14C
SMR30			
SMR35			
SMR45			
SMR55			
SMR25L	0.04~0.06C	0.07~0.09C	0.12~0.14C
SMR30L			
SMR35L			
SMR45L			
SMR55L			
SMR65L			

Note: C is basic dynamic load rating in above table. Refer to the specification of products, please.

H. The Shoulder Height and Corner Radius for Installation

SME series

Unit: mm

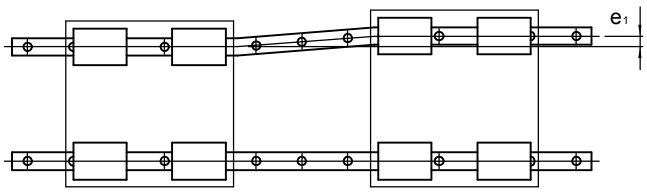


Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
25	0.5	0.5	4	8	4.8
30	0.5	0.5	5	8	6
35	1	1	5.5	10	6.5
45	1	1	6	12	8.1
55	1	1	8	15	10
65	1	1	10	15	12

I. Dimensional Tolerance of Mounting Surface

SMR with the high rigidity, the minor dimensional error in mounting surface could be compensated and achieves smooth linear motion. The tolerances of parallelism between two axes are shown as below.

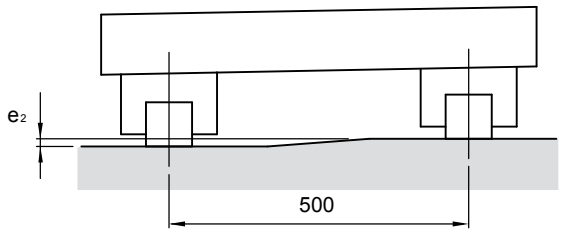
The parallel deviation between two axes (e_1)



Unit: μm

Model No.	Preload Grade		
	F0	F1	F2
25	9	7	5
30	11	8	6
35	14	10	7
45	17	13	9
55	21	14	11
65	27	18	14

Level difference between two axes (e_2)



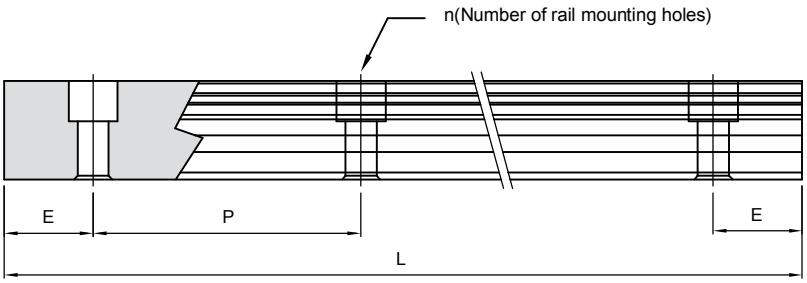
Unit: μm

Unit: μm

Model No.	Preload Grade		
	F0	F1	F2
25	150	105	55
30			
35			
45			
55			
65			

Note: The permissible values in table are applicable when the span is 500mm wide.

J. Rail Maximum Length and Standrad



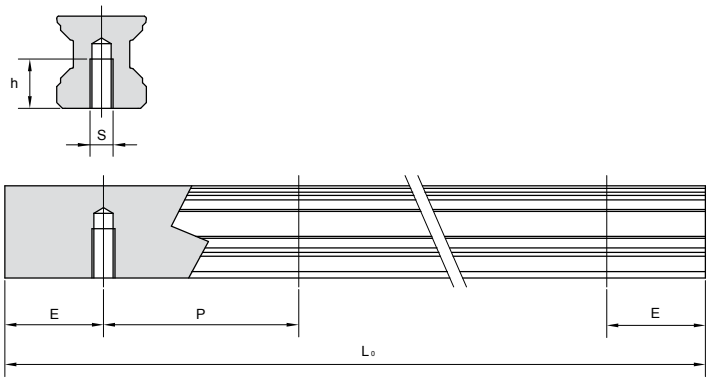
$$L=(n-1)\times P+2\times E$$

L: Total Length of rail *(mm)*
n: Nuber of mounting holes
P: Distance between any two holes *(mm)*
E: Distance from the center of the last hole to the edge *(mm)*

Unit: mm

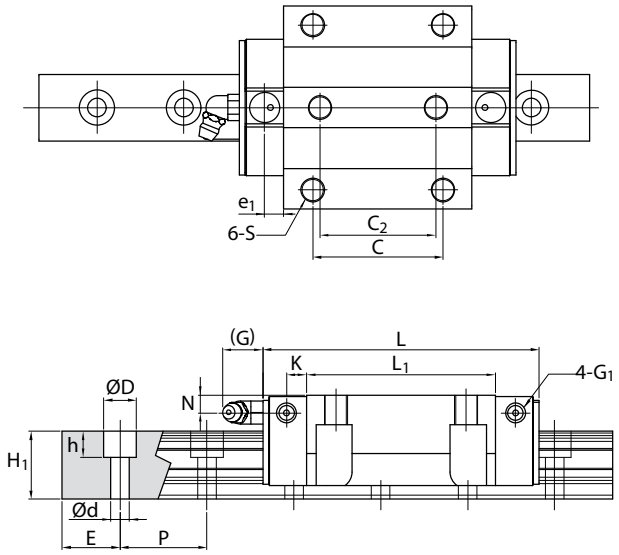
Model No.	Standard Pitch (P)	Standard ($E_{std.}$)	Minimum ($E_{min.}$)	Max (L_0 max.)
SMR 25	30	20	7	4000
SMR 30	40	20	8	4000
SMR 35	40	20	8	4000
SMR 45	52.5	22.5	11	4000
SMR 55	60	30	13	4000
SMR 65	75	35	14	4000

K. Tapped-hole Rail Dimensions



Rail Model	S	h(mm)
SMR 25 T	M6	12
SMR 30 T	M8	15
SMR 35 T	M8	17
SMR 45 T	M12	24
SMR 55 T	M14	24
SMR 65 T	M20	30

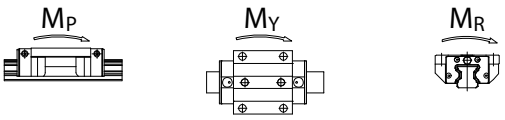
Dimensions of SMR-E / SMR-LE

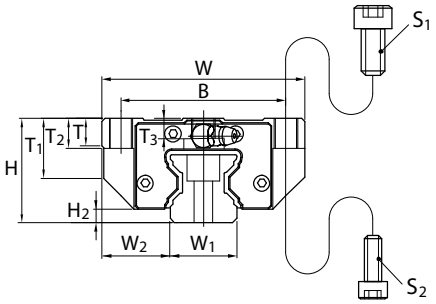


Unit: mm

Model No.	External dimension					Carriage dimension														
	Height H	Width W	Length L	W_2	H_2	B	C	C_2	S	L_1	T	T_1	T_2	T_3	N	G	K	e_1	G_1	Grease Nipple
SMR 25 E SMR 25 LE	36	70	97.5 115.5	23.5	4.8	57	45	40	M8	65.5 83.5	9.5	20.2	10	5.8	6	12	6.6	6.5	M6	G-M6
SMR 30 E SMR 30 LE	42	90	112.4 135.2	31	6	72	52	44	M10	75.9 98.7	10	21.6	13	6.7	7	12	8	7	M6	G-M6
SMR 35 E SMR 35 LE	48	100	125.3 153.5	33	6.5	82	62	52	M10	82.3 110.5	12	27.5	15	9.5	8	12	8	7	M6	G-M6
SMR 45 E SMR 45 LE	60	120	154.2 189.4	37.5	8	100	80	60	M12	106.5 141.7	14.5	35.5	15	12.5	10	13.5	10	10	M6	G-PT 1/8
SMR 55 E SMR 55 LE	70	140	185.4 235.4	43.5	10	116	95	70	M14	129.5 179.5	17.5	41	18	15.5	11	13.5	12	7.95	M6	G-PT 1/8
SMR 65 LE	90	170	302	53.5	12	142	110	82	M16	230	19.5	56	20	26	16.5	13.5	15	15	M6	G-PT 1/8

Note*: Single: Single carriage/ Double: Double carriages closely contacting with each other.



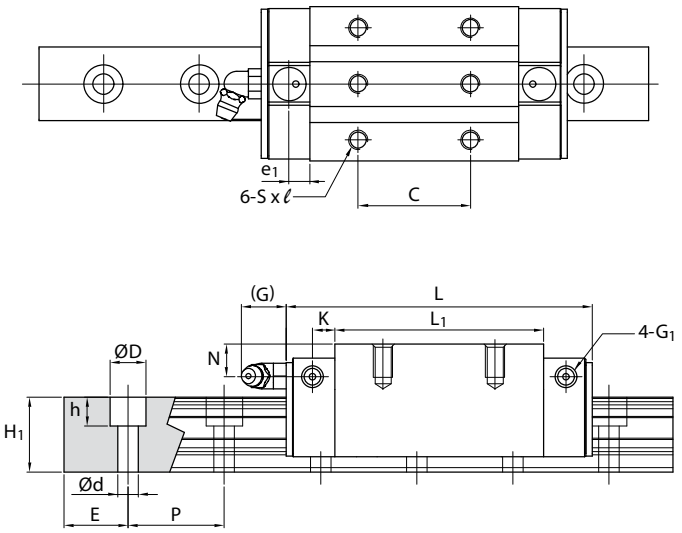


Model No.	Bolt Size	
	S_1	S_2
SMR 25	M8	M6
SMR 30	M10	M8
SMR 35	M10	M8
SMR 45	M12	M10
SMR 55	M14	M12
SMR 65	M16	M14

Unit: mm

Model No.	Rail dimension					Basic load rating		Static moment rating					Weight	
	Width W_1	Height H_1	Pitch P	E std.	D × h × d	Dynamic C kN	Static C_o kN	M_P kN-m Single*	M_P kN-m Double*	M_Y kN-m Single*	M_Y kN-m Double*	M_R kN-m	Carriage kg	Rail kg/m
SMR 25 E	23	23.5	30	20	11×9×7	27.4	57.4	0.63	3.63	0.63	3.63	0.66	0.75	3.5
SMR 25 LE						33.1	73.3	1.01	5.49	1.01	5.49	0.84	0.95	
SMR 30 E	28	27.5	40	20	14×12×9	39.5	82.7	1.01	5.90	1.01	5.90	1.15	1.4	5
SMR 30 LE						49.4	110.3	1.78	9.60	1.78	9.60	1.53	1.72	
SMR 35 E	34	30.5	40	20	14×12×9	55.6	117.0	1.63	9.59	1.63	9.59	1.98	1.95	7
SMR 35 LE						69.6	156.0	2.86	15.57	2.86	15.57	2.63	2.45	
SMR 45 E	45	37	52.5	22.5	20×17×14	89.3	184.1	3.27	18.48	3.27	18.48	4.18	3.9	11.2
SMR 45 LE						110.6	242.2	5.6	29.56	5.6	29.56	5.5	4.5	
SMR 55 E	53	43	60	30	23×20×16	127.8	256.5	5.51	30.89	5.51	30.89	6.96	6	15.6
SMR 55 LE						163.2	351.0	10.16	53.02	10.16	53.02	9.52	7.9	
SMR 65 LE	63	52	75	35	26×22×18	263.5	583.7	21.49	111.99	21.49	111.99	18.73	17.6	22.4

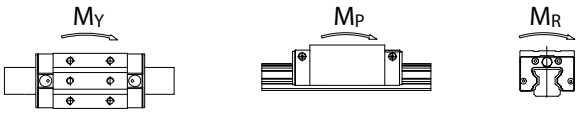
Dimensions of SMR-S / SMR-LS

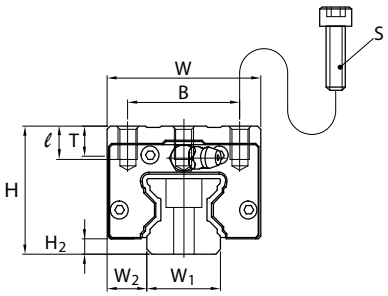


Unit: mm

Model No.	External dimension					Carriage dimension											
	Height H	Width W	Length L	W_2	H_2	B	C	S	ℓ	L_1	T	N	G	K	e_1	G_1	Grease Nipple
SMR 25 S SMR 25 LS	40	48	97.5 115.5	12.5	4.8	35	35 50	M6	10.5	65.5 83.5	9.5	10	12	6.6	6.5	M6	G-M6
SMR 30 S SMR 30 LS	45	60	112.4 135.2	16	6	40	40 60	M8	12	75.9 98.7	10	10	12	8	7	M6	G-M6
SMR 35 S SMR 35 LS	55	70	125.3 153.5	18	6.5	50	50 72	M8	14	82.3 110.5	12	15	12	8	7	M6	G-M6
SMR 45 S SMR 45 LS	70	86	154.2 189.4	20.5	8	60	60 80	M10	19	106.5 141.7	17	20	13.5	10	10	M6	G-PT 1/8
SMR 55 S SMR 55 LS	80	100	185.4 235.4	23.5	10	75	75 95	M12	19	129.5 179.5	18	21	13.5	12	7.95	M6	G-PT 1/8
SMR 65 LS	90	126	302	31.5	12	76	120	M16	20	230	19.5	16.5	13.5	15	15	M6	G-PT 1/8

Note*: Single: Single carriage/ Double: Double carriages closely contacting with each other.





Unit: mm

Model No.	Rail dimension					Basic load rating		Static moment rating					Weight	
	Width W_1	Height H_1	Pitch P	E std.	D × h × d	Dynamic C kN	Static C_o kN	M_P kN-m Single*	M_P kN-m Double*	M_Y kN-m Single*	M_Y kN-m Double*	M_R kN-m	Carriage kg	Rail kg/m
SMR 25 S	23	23.5	30	20	11×9×7	27.4	57.4	0.63	3.63	0.63	3.63	0.66	0.65	3.5
SMR 25 LS						33.1	73.3	1.01	5.49	1.01	5.49	0.84	0.85	
SMR 30 S	28	27.5	40	20	14×12×9	39.5	82.7	1.01	5.90	1.01	5.90	1.15	1	5
SMR 30 LS						49.4	110.3	1.78	9.60	1.78	9.60	1.53	1.22	
SMR 35 S	34	30.5	40	20	14×12×9	55.6	117.0	1.63	9.59	1.63	9.59	1.98	1.65	7
SMR 35 LS						69.6	156.0	2.86	15.57	2.86	15.57	2.63	2.15	
SMR 45 S	45	37	52.5	22.5	20×17×14	89.3	184.1	3.27	18.48	3.27	18.48	4.18	3.2	11.2
SMR 45 LS						110.6	242.2	5.6	29.56	5.6	29.56	5.5	4.1	
SMR 55 S	53	43	60	30	23×20×16	127.8	256.5	5.51	30.89	5.51	30.89	6.96	5.1	15.6
SMR 55 LS						163.2	351.0	10.16	53.02	10.16	53.02	9.52	7	
SMR 65 LS	63	52	75	35	26×22×18	263.5	583.7	21.43	111.99	21.43	111.99	18.73	13.3	22.4