15 Options

15.1 Dust Proof

A. Code of contamination protection

Code of contamination protection for Carriage

MSA、MSB Series：

Code	Contamination Protection
no symbol	Scraper(both ends)
UU	Bidirectional end seal(both ends)
SS	Bidirectional end seal+Bottom seal
ZZ	SS+Scraper
DD	Double bidirectional end seal+Bottom seal
KK	DD+Scraper
LL	Low frictional end seal
RR	LL+Bottom seal

SME、SMR、MSR Series：

Code	Contamination Protection
no symbol	Scraper(both ends)
UU	Bidirectional end seal(both ends)
SS	Bidirectional end seal+Bottom seal+Inner seal
ZZ	SS+Scraper
DD	Double bidirectional end seal+Bottom seal+Inner seal
KK	DD+Scraper

MSC、MSD Series：

Code	Contamination Protection
LL	Low frictional end seal
RR	LL+Bottom seal

Code of contamination protection for Rail

MSA、MSB、SME、MSR、SMR Series：

Code	Contamination Protection
/CC	Cover strip
/MC	Copper bolt cap
/MD	Stainless bolt cap

Note: There are two metallic bolt caps of copper and stainless that could be supplied by customer's choice.

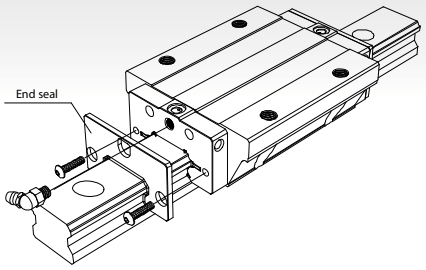
Seal materials choice

Beside the standard seal NBR that FKM (Fluorocarbon Rubber) seal or HNBR (Hyfrogenated Nitrile Butadiene Rubber) seal could be supplied as requirement by customer's choice.

B. Contamination protection

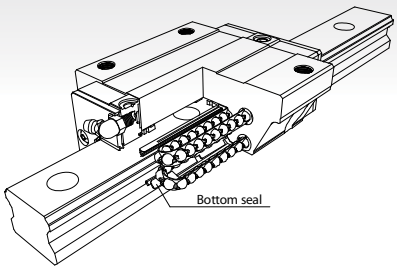
Each series of linear guideway offers various kinds of dust protection accessory to keep the foreign matters from entering into the carriage.

End seal



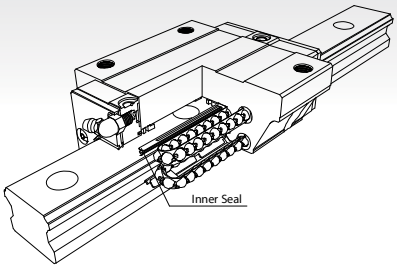
Tow types sealing are available:
1. Bidirectional seal for high dust protection required.
2. Monodirectional seal for low frictional resistance required.

Bottom seal



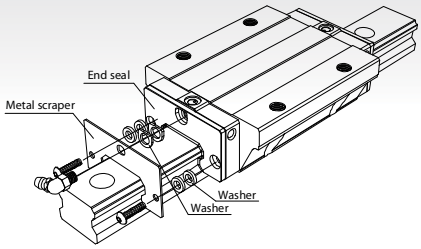
Prevent the inclusion of foreign matters form the bolt hole.

Inner Seal



Preventing the inclusion of foreign matters from bottom of carriage.

Metal scraper



Removing spatters, iron chips , and large foreign matters as well as protecting the end seals.

Types of seal to the carriage overall length,see the table shown as below

MSA Series

Unit: mm

Model No.	no symbol	UU	SS	LL	RR	ZZ	DD	KK
15	1	-	-	-	-	6	5	11
20	1.4	-	-	-	-	7	5.6	12.6
25	1.4	-	-	-	-	7	5.6	12.6
30	1.4	-	-	-	-	7	5.6	12.6
35	0.6	-	-	-	-	7.8	7.2	15
45	0.6	-	-	-	-	7.8	7.2	15
55	-	-	-	-	-	7.8	7.8	15.6
65	-	-	-	-	-	7.8	7.8	15.6

MSB Series

Unit: mm

Model No.	no symbol	UU	SS	LL	RR	ZZ	DD	KK
15	-	-	-	-	-	5	5	10
20	1	-	-	-	-	7	6	13
25	1	-	-	-	-	7	6	13
30	1	-	-	-	-	7	6	13
35	0.6	-	-	-	-	7.8	7.2	15

SME Series

Unit: mm

Model No.	no symbol	UU	SS	ZZ	DD	KK
15	0.4	-	-	6	5.6	11.6
20	1	-	-	7	6	13
25	1	-	-	7	6	13
30	1.4	-	-	7	5.6	12.6
35	1	-	-	7.8	6.8	14.6
45	0.6	-	-	7.8	7.2	15

MSR、SMR Series

Unit: mm

Model No.	no symbol	UU	SS	ZZ	DD	KK
25	2	-	-	6	6	12
30	2	-	-	7	6	13
35	2	-	-	7	6	13
45	1.6	-	-	7	6.4	13.4
55	0.8	-	-	7.8	7.2	15
65	0.8	-	-	7.8	7.8	15.6

Resistance value of seal

MSA series

The maximum resistance value of MSA series with seals type UU when it is applied with grease is shown below.

Unit: N

Model No.	Resistance
15	2
20	3.5
25	4
30	6
35	10
45	12
55	18
65	30

MSB series

The maximum resistance value of MSB series with seals type UU when it is applied with grease is shown below.

Unit: N

Model No.	Resistance
15	2
20	3
25	4
30	5.5
35	9

MSC、MSD series

The maximum resistance value of MSC series with seals type LL when it is applied with grease is shown below.

MSC

Unit: N

Model No.	Resistance
7	0.08
9	0.1
12	0.4
15	0.8

MSD

Unit: N

Model No.	Resistance
7	0.4
9	0.8
12	1.1
15	1.3

MSR、SMR series

The maximum resistance value of MSR and SMR series with seals type UU when it is applied with grease is shown below.

Unit: N

Model No.	Resistance
25	4.5
30	8
35	12
45	18
55	20
65	35

SME series

The maximum resistance value of SME series with seals type UU when it is applied with grease is shown below.

Unit: N

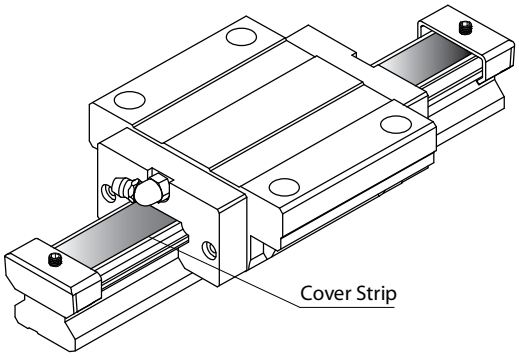
Model No.	Resistance
15	2
20	3.5
25	4
30	6
35	10
45	12

C. Cover Strip

A special designed of cover strip is used to cover the bolt hole to prevent the foreign matters from entering the carriage. Please specify when ordering.

Note:When mounting the cover strip the rail needs to be machined.Indicate that the cover strip is required when ordering the guideway. The cover strip could not increase the height of rail.

MSA、MSB、SME、MSR、SMR series



D. Caps for rail mounting hole

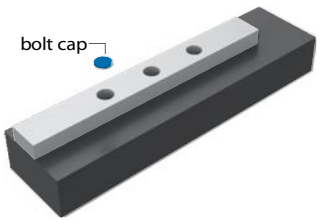
A special designed of cap is used to cover the bolt hole to prevent the foreign matters from entering the carriage. According to difference of application, PMI provide two kind of caps for selection, made by plastic and metal. The metallic cap is for opyion,please specify when ordering. The plastic cap is mounted by using a plastic hammer with a flat pad placed on the top,until the top of cap is flush to the top surface of rail.The dimension of caps for different sizes of rail is shown.

Installation of plastic and metal cap

According to the environmental and operational conditions, choose plastic or metal, plastic and metal model cap size, please refer to Table I Table II.

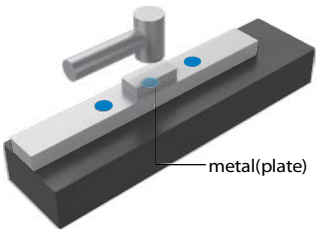
The steps of installing bolt cap with rail by below indicated figures

step.1



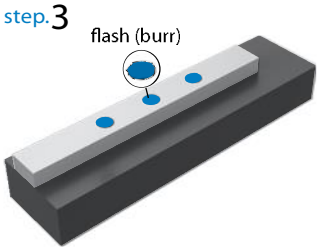
Put the cap into the bolt hole of rail.

step.2



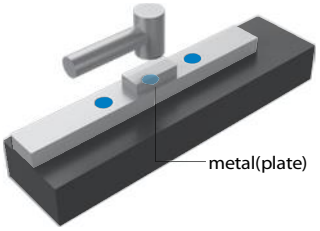
Put the plate on the cap,then pound it into the bolt of rail with rubber hammer vertically.

step.3



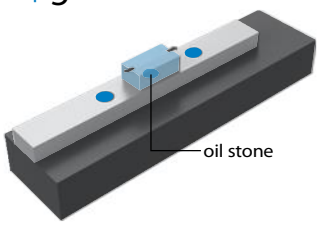
Clear the "shaving " away from the side of bolt hole.

step.4



Continue pounding the cap until the cap is on the same plane with the top surface of rail.

step.5



Use oil stone to polish the surface of caps and mop them with clean bunny cloth. And finally check the installation is good for smoothing by your finger.

Install attention:

Owing to the side of hole is very sharp during installation.Therefore,pay special attention for safety in case of finger and hands be slashed.

Table I

Code of Plastic Cap	Bolt Size	Rail Model				
M3C	M3		MSB15R			
M4C	M4	MSA15R	MSB15U		SME15R	
M5C	M5	MSA20R	MSB20R		SME20R	
M6C	M6	MSA25R	MSB25R MSB30R	MSR25R	SME25R	SMR25R
M8C	M8	MSA30R MSA35R	MSB35R	MSR30R MSR35R	SME30R SME35R	SMR30R SMR35R
M12C	M12	MSA45R		MSR45R	SME45R	SMR45R
M14C	M14	MSA55R		MSR55R		SMR55R
M16C	M16	MSA65R		MSR65R		SMR65R

Table II

Code of Metallic Cap	Bolt Size	Rail Model				
M4MC	M4	MSR15R	MSB15R		SME15R	
M5MC	M5	MSR20R	MSB20R		SME20R	
M6MC	M6	MSR25R	MSB25R MSB30R	MSR25R	SME25R	SMR25R
M8MC	M8	MSR30R MSR35R	MSB35R	MSR30R MSR35R	SME30R SME35R	SMR30R SMR35R
M12MC	M12	MSR45R		MSR45R	SME45R	SMR45R
M14MC	M14	MSR55R		MSR55R		SMR55R
M16MC	M16	MSR65R		MSR65R		SMR65R

15.2 Lubrication

A well lubrication is important for maintaining the function of linear guideway. If the lubrication is not sufficient, the frictional resistance at rolling area will increase and the service life will be shortened as a result of wear of rolling parts.

Two primary lubricants are both grease and oil used for linear motion system, and the lubrication methods are categorized into manual and forced oiling. The selection of lubricant and its method should be based on the consideration of operating speed and environment requirement.

Grease lubrication

The grease feeding interval will be varied with different operating conditions and environments. Under normal operating condition, the grease should be replenished every 100km of travel. The standard grease is lithium-based grease No.2. Moving the carriage back and forth with minimum stroke length of length of 3 carriages after the carriages been greased. To assure the grease is evenly distributed inside of carriage, the mentioned process should be repeated twice at least.

Grease amount to be bed

Model No.	Initial Feeding Amount(cm^3)	Amount for Replenishing(cm^3)
MSA 15	1.1	0.4
MSA 20	2.1	0.7
MSA 25	3.5	1.2
MSA 30	5.8	1.9
MSA 35	8.2	2.7
MSA 45	16.1	5.4
MSA 55	27.1	9.0
MSA 65	51.6	17.2
MSB 15T	0.4	0.1
MSB 20T	0.7	0.2
MSB 25T	1.5	0.5
MSB 30T	2.2	0.7
MSB 35	8.2	2.7
MSR 25	4.5	1.5
MSR 30	7.0	2.3
MSR 35	9.6	3.2
MSR 45	17.1	5.7
MSR 55	26.0	8.7
-	-	-
MSC 7	0.06	0.02
MSC 9	0.16	0.05
MSC 12	0.25	0.08
MSC 15	0.49	0.16
MSD 7	0.19	0.06
MSD 9	0.42	0.14
MSD 12	0.73	0.24
MSD 15	1.51	0.50
SME 15	1.6	0.5
SME 20	2.6	0.9
SME 25	4.1	1.4
SME 30	6.0	2.0
SME 35	9.7	3.2
SME 45	13.2	4.4
SMR 25	5.9	2.0
SMR 30	8.8	2.9
SMR 35	12.6	4.2
SMR 45	21.0	7.0
SMR 55	32.1	10.7
-	-	-

Model No.	Initial Feeding Amount(cm^3)	Amount for Replenishing(cm^3)
-	-	-
MSA 20L	3.1	1.0
MSA 25L	5.1	1.7
MSA 30L	8.2	2.7
MSA 35L	11.8	3.9
MSA 45L	23.0	7.7
MSA 55L	38.8	12.9
MSA 65L	77.8	25.9
MSB 15	1.0	0.3
MSB 20	1.5	0.5
MSB 25	2.8	0.9
MSB 30	4.5	1.5
MSB 35L	11.8	3.9
MSR 25L	5.5	1.8
MSR 30L	8.7	2.9
MSR 35L	12.3	4.1
MSR 45L	22.0	7.3
MSR 55L	34.3	11.4
MSR 65L	64.8	21.6
MSC 7L	0.11	0.04
MSC 9L	0.24	0.08
MSC 12L	0.42	0.14
MSC 15L	0.80	0.27
MSD 7L	0.28	0.09
MSD 9L	0.60	0.20
MSD 12L	1.07	0.36
MSD 15L	2.18	0.73
-	-	-
SME 20L	3.6	1.2
SME 25L	5.2	1.7
SME 30L	8.1	2.7
SME 35L	13.0	4.3
SME 45L	18.5	6.2
SMR 25L	7.2	2.4
SMR 30L	11.0	3.7
SMR 35L	16.0	5.3
SMR 45L	26.5	8.8
SMR 55L	42.6	14.2
SMR 65L	76.1	25.4

Oil lubrication

The recommended viscosity of oil is 30~150 cst, and the recommended feeding rate per hour is shown as table below. The installation other than horizontal may caused the oil unable to reach raceway area, so please specify the installed direction your linear guideway applied. Reference is shown in Section 13.1 Installation Direction of Linear Guideway.

Oil lubrication feeding rate

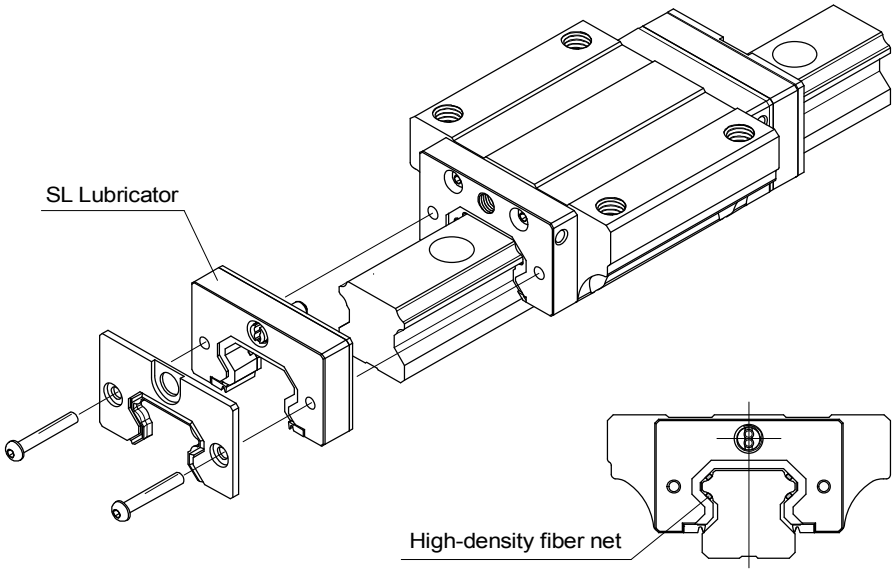
Model No.	Initial Feeding Amount(cm^3)	Feeding Rate (cm^3/hr)
15	0.6	0.2
20	0.6	0.2
25	0.9	0.3
30	0.9	0.3
35	0.9	0.3
45	1.2	0.4
55	1.5	0.5
65	1.8	0.6

Note:

When the operating stroke length less than the sum of length of two carriages, the lubrication fitting should be applied on both ends of carriage for adequacy. Moreover, if the stroke length less than a half of the length of a carriage, the carriage should be moved back and forth up to the length of two carriages while lubricating.

A. SL Lubricator

1.Construction and Characteristics



Characteristics

PMI SL lubricator unit is designed with an oil reservoir which equipped with a high-density fiber net. Through the fiber net the lubricant can be steadily fed onto the surface of raceway to satisfy the required lubricating function.

1. Lengthening the interval between maintenance works

Contrary to the oil losing problem caused from ordinary lubrication, the SL lubricator effectively and evenly distribute needed amount of oil on to ball raceway during the movement. Therefore, the interval between maintenance works can be greatly extended.

2. To avert the pollution

Through the use of SL lubricator, only the needed amount of oil will be fed for the purpose of lubrication, thereby the oil is almost nothing to lose in application. As a result, the environment will not be contaminated by waste oil.

3. Cost reduction

Saving the expense from oil loss and lubricating device.

4. Enables the most suitable oil for the purpose of use to be selected

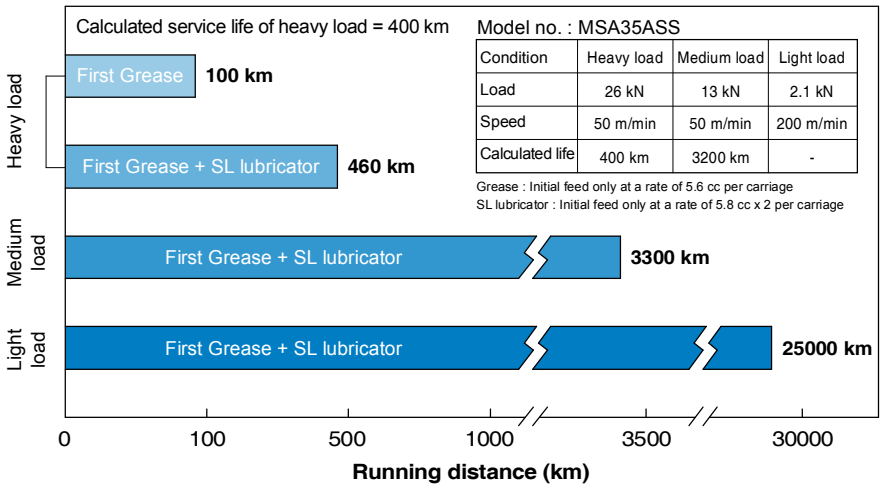
The SL lubricator makes it possible to select the most proper lubricant for your application of linear guideway.

2. Performance

Lengthening the interval between maintenance works

By using the SL lubricator, the interval between maintenance work can be lengthened at all load rating.

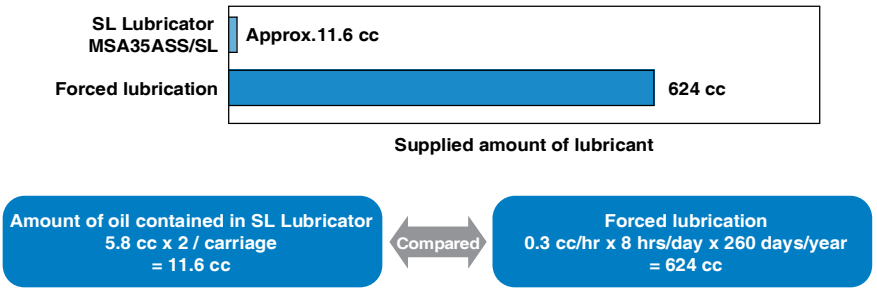
Running Test without Replenishment of Lubricant



Effective use of lubricant

Since only the needed amount of lubricant will be applied to needed location, thereby effective use of lubricant can be achieved and the waste of lubricant can also be avoided.

Annual Lubricant Consumption per Carriage



Amount of oil contained in SL Lubricator
5.8 cc x 2 / carriage
= 11.6 cc

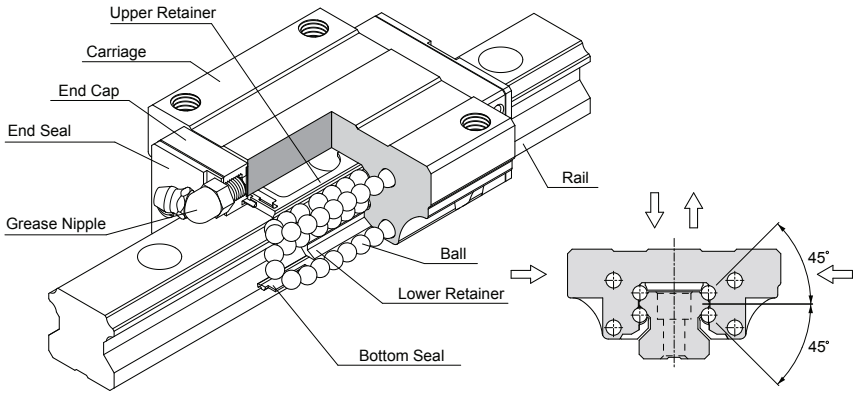
Compared

Forced lubrication
0.3 cc/hr x 8 hrs/day x 260 days/year
= 624 cc

12 Introduction of Each Series

12.1 Heavy Load Type, MSA Series

A. Construction



B. Characteristics

The trains of balls are designed to a contact angle of 45° which enables it to bear an equal load in radial, reversed radial and lateral directions. Therefore, it can be applied in any installation direction. Furthermore, MSA series can achieve a well balanced preload for increasing rigidity in four directions while keeping a low frictional resistance. This is especially suit to high precision and high rigidity required motion.

The patent design of lubrication route makes the lubricant evenly distribute in each circulation loop. Therefore, the optimum lubrication can be achieved in any installation direction, and this promotes the performance in running accuracy, service life, and reliability.

High Rigidity, Four-way Equal Load

The four trains of balls are allocated to a circular contact angle at 45°, thus each train of balls can take up an equal rated load in all four directions. Moreover, a sufficient preload can be achieved to increase rigidity, and this makes it suitable for any kind of installation.

Smooth Movement with Low Noise

The simplified design of circulating system with strengthened synthetic resin accessories makes the movement smooth and quiet.

Self Alignment Capability

The self adjustment is performed spontaneously as the design of face-to-face (DF) circular arc groove. Therefore, the installation error could be compensated even under a preload, and which results in precise and smooth linear motion.

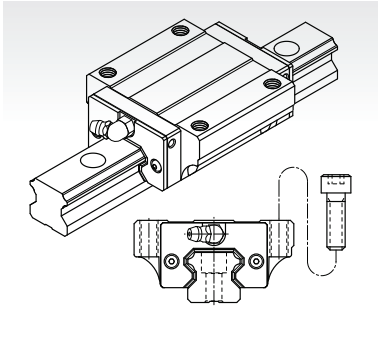
Interchangeability

For interchangeable type of linear guideway, the dimensional tolerances are strictly maintained within a reasonable range, and this has made the random matching of the same size of rails and carriages possible. Therefore, the similar preload and accuracy can be obtained even under the random matching condition. As a result of this advantage, the linear guideway can be stocked as standard parts, the installation and maintenance become more convenient. Moreover, this is also beneficial for shortening the delivery time.

C. Carriage Type

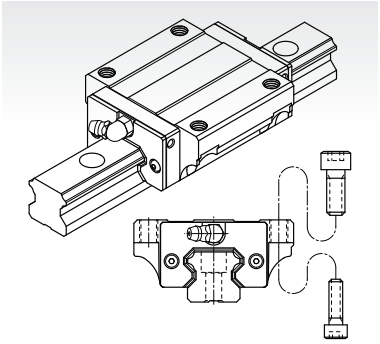
Heavy Load

MSA-A Type



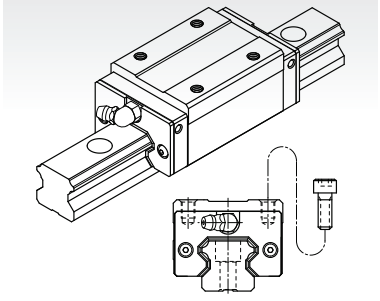
Installed from top side of carriage with the thread length longer than MSA-E type.

MSA-E Type



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

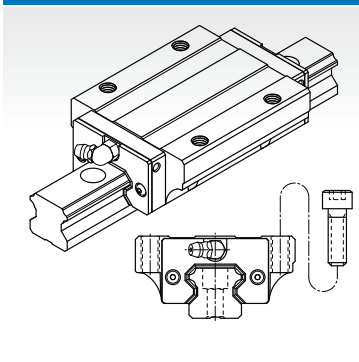
MSA-S Type



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

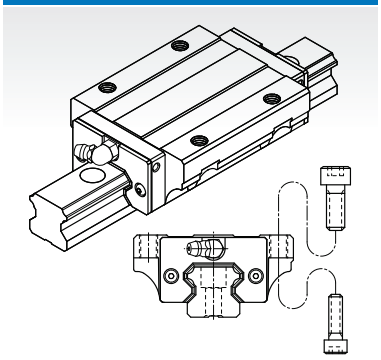
Ultra Heavy Load

MSA-LA Type



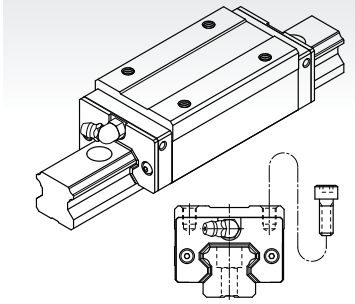
All dimensions are same as MSA-A except the length is longer, which makes it more rigid.

MSA-LE Type



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

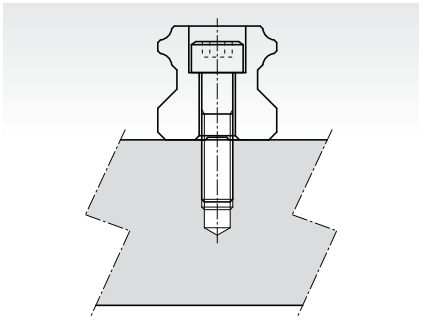
MSA-LS Type



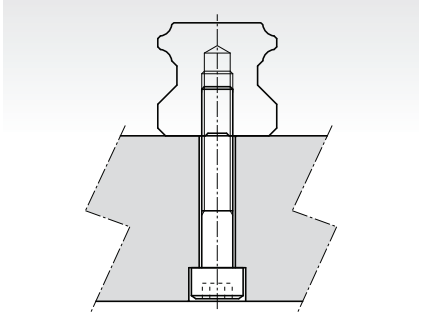
All dimensions are same as MSA-S except the length is longer, which makes it more rigid.

D. Rail Type

Counter bore (R type)



Tapped Hole (T type)



E. Description of Specification

(1) Non-Interchangeable Type

MSA 25 A 2 SS F0

Series：**MSA**

Size：**15, 20, 25, 30, 35, 45, 55, 65**

Carriage type：(1) Heavy load
A : Flange type, mounting from top
E : Flange type, mounting either from top or bottom
S : Square type
(2) Ultra heavy load
LA : Flange type, mounting from top
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, LL, RR** (refer to chapter 15.1 Dust Proof)

Preload：**FC** (Light preload) , **F0** (Medium preload) , **F1** (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 Fig.12.1)

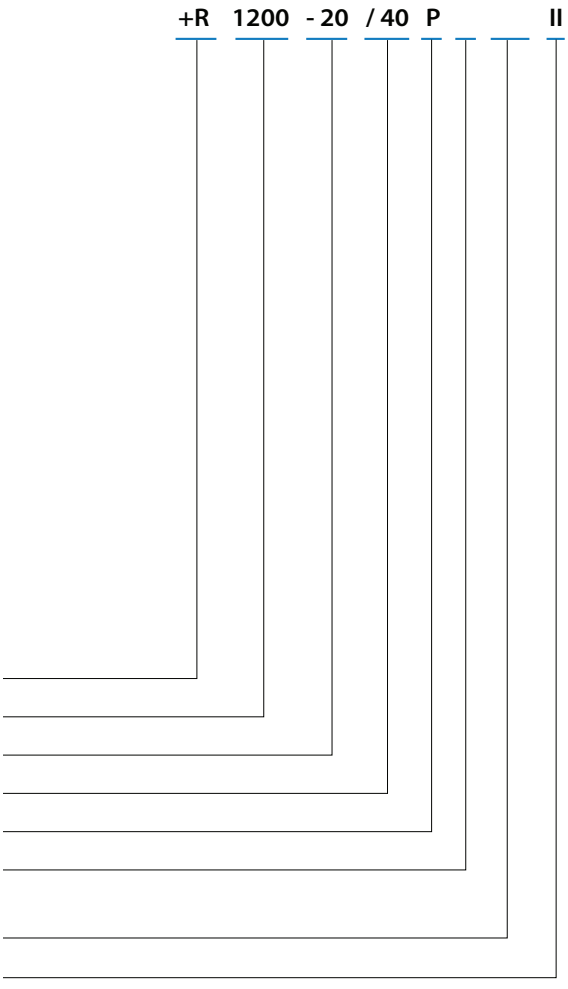
Rail hole pitch to the end side (**E2**, see Fig.12.1)

Accuracy grade：**N, 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 / 40 P II

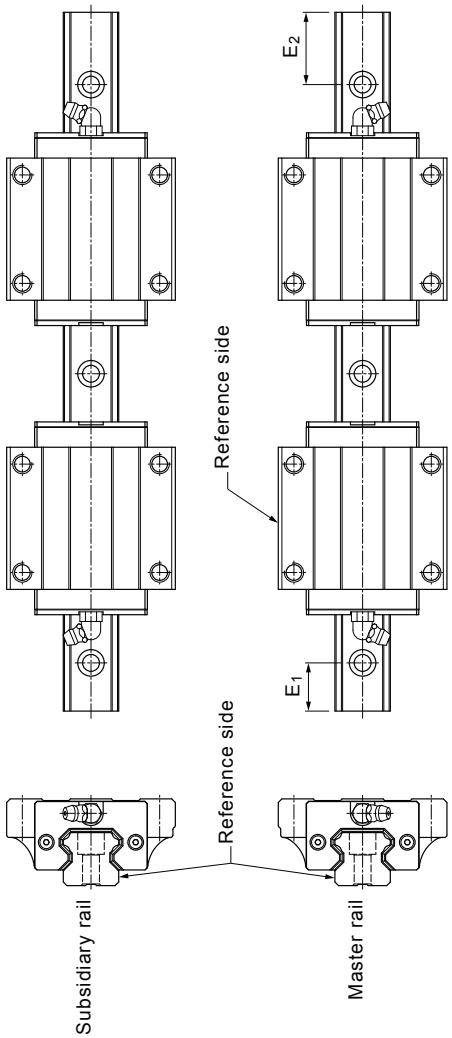

E2
Reference side
E1
Reference side
Subsidiary rail
Master rail

Fig12.1

(2) Interchangeable Type

Code of Carriage

MSA 25 A SS FC N

Series：**MSA**

Size：**15, 20, 25, 30, 35, 45, 55, 65**

Carriage type：(1) Heavy load

A : Flange type, mounting from top

E : Flange type, mounting either from top or bottom

S : Square type

(2) Ultra heavy load

LA : Flange type, mounting from top

LE : Flange type, mounting either from top or bottom

LS : Square type

Dust protection option of carriage：**No symbol, UU, SS, ZZ, DD, KK, LL, RR**

(refer to chapter 15.1 Dust Proof)

Preload：**FC** (Light preload), **F0** (Medium preload)

Accuracy grade：**N, H, P**

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

Code of Rail

MSA 25 R 1200 - 20 / 40 N

Series：**MSA**

Size：**15, 20, 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.12.1)

Rail hole pitch to the end side (**E2**, see Fig.12.1)

Accuracy grade：**N, H, P**

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

Dust protection option of rail：**No symbol, /CC, /MC**

(refer to chapter 15.1 Code of contamination fro Rail)

F. Accuracy Grade

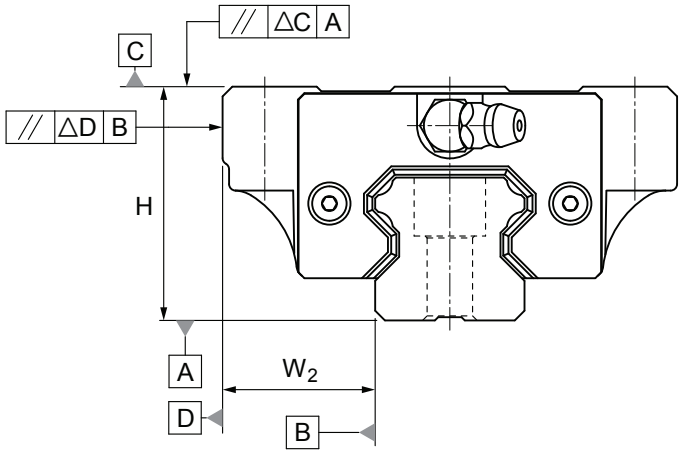


Table 1 Running Parallelism

Rail length (mm)		Running Parallelism Values(μm)				
Above	Or less	N	H	P	SP	UP
0	315	9	6	3	2	1.5
315	400	11	8	4	2	1.5
400	500	13	9	5	2	1.5
500	630	16	11	6	2.5	1.5
630	800	18	12	7	3	2
800	1000	20	14	8	4	2
1000	1250	22	16	10	5	2.5
1250	1600	25	18	11	6	3
1600	2000	28	20	13	7	3.5
2000	2500	30	22	15	8	4
2500	3000	32	24	16	9	4.5
3000	3500	33	25	17	11	5
3500	4000	34	26	18	12	6

A Non-Interchangeable Type

Model No.	Item	Accuracy Grade				
		Normal **N**	High **H**	Precision **P**	Super Precision **SP**	Ulitra Precision **UP**
15 20	Tolerance for height H	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Height difference ΔH	0.02	0.01	0.006	0.004	0.003
	Tolerance for distance W_2	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Difference in distance W_2(ΔW_2)	0.02	0.01	0.006	0.004	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)				
25 30 35	Tolerance for height H	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Height difference ΔH	0.02	0.015	0.007	0.005	0.003
	Tolerance for distance W_2	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Difference in distance W_2(ΔW_2)	0.03	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	±0.1	±0.05	0 -0.05	0 -0.03	0 -0.02
	Height difference ΔH	0.03	0.015	0.007	0.005	0.003
	Tolerance for distance W_2	±0.1	±0.05	0 -0.05	0 -0.03	0 -0.02
	Difference in distance W_2(ΔW_2)	0.03	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	±0.1	±0.07	0 -0.07	0 -0.05	0 -0.03
	Height difference ΔH	0.03	0.02	0.01	0.007	0.005
	Tolerance for distance W_2	±0.1	±0.07	0 -0.07	0 -0.05	0 -0.03
	Difference in distance W_2(ΔW_2)	0.03	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		
		Normal **N**	High **H**	Precision **P**
15 **20**	Tolerance for height H	±0.1	±0.03	0 -0.03
	Height difference ΔH	0.02	0.01	0.006
	Tolerance for distance W_2	±0.1	±0.03	0 -0.03
	Difference in distance $W_2(\Delta W_2)$	0.02	0.01	0.006
	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)		
25 **30** **35**	Tolerance for height H	±0.1	±0.04	0 -0.04
	Height difference ΔH	0.02	0.015	0.007
	Tolerance for distance W_2	±0.1	±0.04	0 -0.04
	Difference in distance $W_2(\Delta W_2)$	0.03	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	±0.1	±0.05	0 -0.05
	Height difference ΔH	0.03	0.015	0.007
	Tolerance for distance W_2	±0.1	±0.05	0 -0.05
	Difference in distance $W_2(\Delta W_2)$	0.03	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	±0.1	±0.07	0 -0.07
	Height difference ΔH	0.03	0.02	0.01
	Tolerance for distance W_2	±0.1	±0.07	0 -0.07
	Difference in distance $W_2(\Delta W_2)$	0.03	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

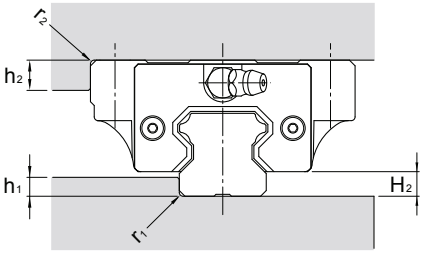
Series	Preload grade		
	Light preload (FC)	Medium preload (F0)	Heavy preload (F1)
MSA15	0~0.02C	0.03~0.05C	-
MSA20			0.05~0.08C
MSA25			
MSA30			
MSA35			
MSA45			
MSA55			
MSA65			
MSA20L	0~0.02C	0.03~0.05C	0.05~0.08C
MSA25L			
MSA30L			
MSA35L			
MSA45L			
MSA55L			
MSA65L			

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

MSA series

Unit: mm



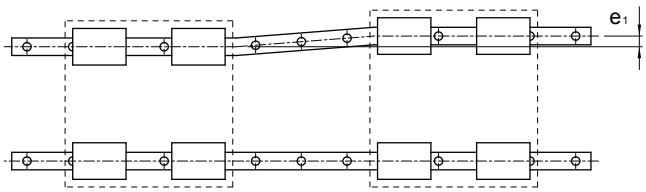
Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
15	0.5	0.5	3	4	4.2
20	0.5	0.5	3.5	5	5
25	1	1	5	5	6.5
30	1	1	5	5	8
35	1	1	6	6	9.5
45	1	1	8	8	10
55	1.5	1.5	10	10	13
65	1.5	1.5	10	10	15

I. Dimensional Tolerance of Mounting Surface

MSA Series

With the self alignment capability, 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.

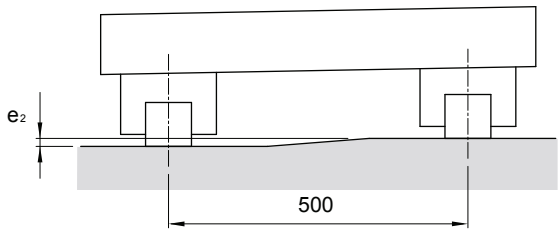
The parallel deviation between two axes (e_1)



Unit: μm

Model No.	Preload Grade		
	FC	F0	F1
15	25	18	-
20	25	20	18
25	30	22	20
30	40	30	27
35	50	35	30
45	60	40	35
55	70	50	45
65	80	60	55

Level difference between two axes (e_2)

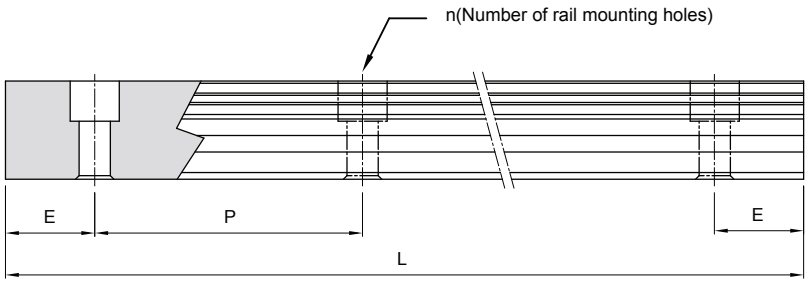


Unit: μm

Model No.	Preload Grade		
	FC	F0	F1
15	130	85	-
20	130	85	50
25	130	85	70
30	170	110	90
35	210	150	120
45	250	170	140
55	300	210	170
65	350	250	200

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

J. Rail Maximum Length and Standrad



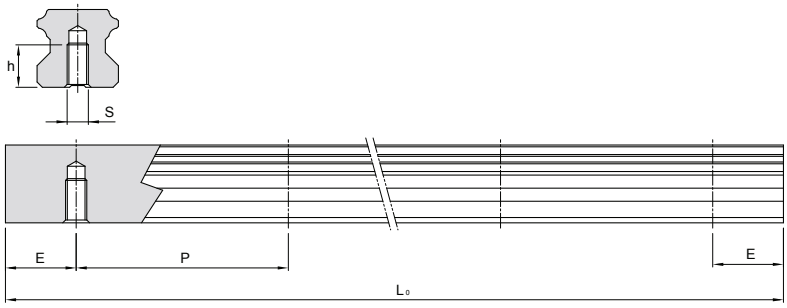
$$L=(n-1)\times P+2\times E$$

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

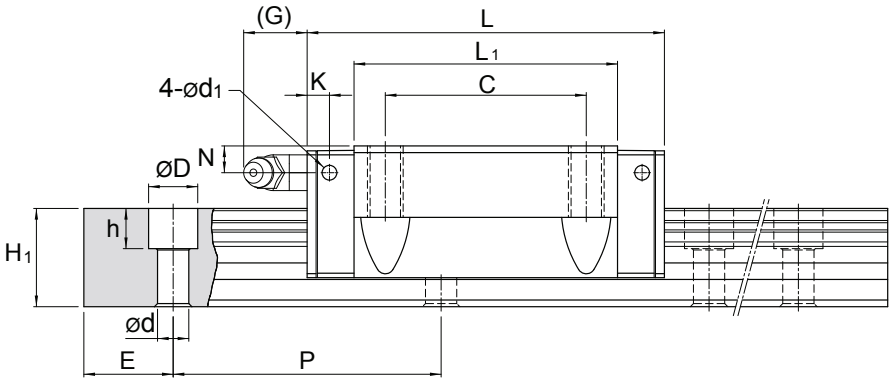
Model No.	Standard Pitch (P)	Standard ($E_{std.}$)	Minimum ($E_{min.}$)	Max (L_0 max.)
MSA 15	60	20	5	4000
MSA 20	60	20	6	4000
MSA 25	60	20	7	4000
MSA 30	80	20	8	4000
MSA 35	80	20	8	4000
MSA 45	105	22.5	11	4000
MSA 55	120	30	13	4000
MSA 65	150	35	14	4000

K. Tapped-hole Rail Dimensions



Rail Model	S	h(mm)
MSA 15 T	M5	8
MSA 20 T	M6	10
MSA 25 T	M6	12
MSA 30 T	M8	15
MSA 35 T	M8	17
MSA 45 T	M12	24
MSA 55 T	M14	24
MSA 65 T	M20	30

Dimensions of MSA-A / MSA-LA



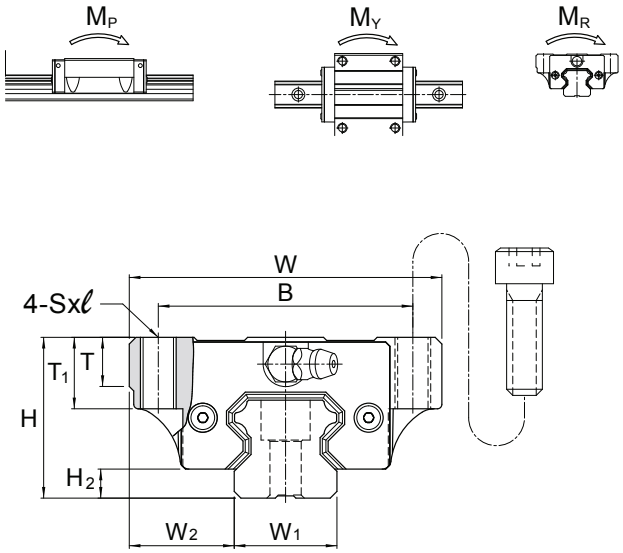
Unit: mm

Model No.	External dimension					Carriage dimension										
	Height H	Width W	Length L	W_2	H_2	B	C	S×ℓ	L_1	T	T_1	N	G	K	d_1	Grease Nipple
MSA 15 A	24	47	56.3	16	4.2	38	30	M5×11	39.3	7	11	4.3	7	3.2	3.3	G-M4
MSA 20 A **MSA 20 LA**	30	63	72.9 88.8	21.5	5	53	40	M6×10	51.3 67.2	7	10	5	12	5.8	3.3	G-M6
MSA 25 A **MSA 25 LA**	36	70	81.6 100.6	23.5	6.5	57	45	M8×16	59 78	11	16	6	12	5.8	3.3	G-M6
MSA 30 A **MSA 30 LA**	42	90	97 119.2	31	8	72	52	M10×18	71.4 93.6	11	18	7	12	6.5	3.3	G-M6
MSA 35 A **MSA 35 LA**	48	100	111.2 136.6	33	9.5	82	62	M10×21	81 106.4	13	21	8	11.5	8.6	3.3	G-M6
MSA 45 A **MSA 45 LA**	60	120	137.7 169.5	37.5	10	100	80	M12×25	102.5 134.3	13	25	10	13.5	10.6	3.3	G-PT1/8

Note: Request for size 55 and 65 MSA-A / MSA-LA carriage, please refer to MSA-E / MSA-LE carriage type.

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is C=1.26 x C_{100}.

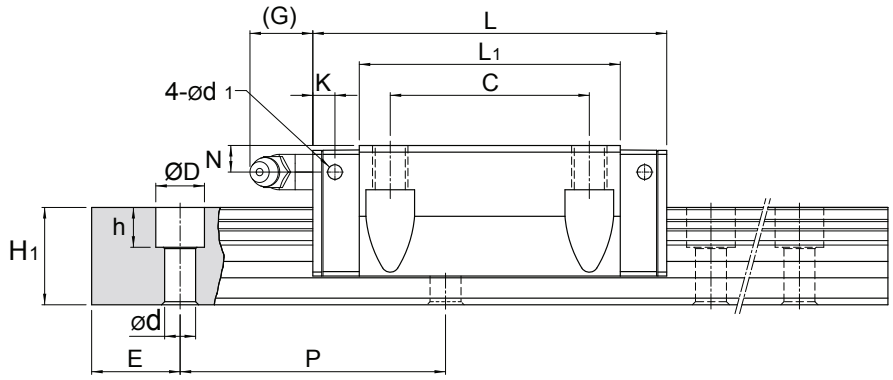
Note*: Single: Single carriage/ Double: Double carriages closely contacting with each other.



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
MSA 15 A	15	15	60	20	7.5×5.3×4.5	11.8	18.9	0.12	0.68	0.12	0.68	0.14	0.18	1.5
MSA 20 A	20	18	60	20	9.5×8.5×6	19.2	29.5	0.23	1.42	0.23	1.42	0.29	0.4	2.4
MSA 20 LA						23.3	39.3	0.39	2.23	0.39	2.23	0.38	0.52	
MSA 25 A	23	22	60	20	11×9×7	28.1	42.4	0.39	2.20	0.39	2.20	0.48	0.62	3.4
MSA 25 LA						34.4	56.6	0.67	3.52	0.67	3.52	0.63	0.82	
MSA 30 A	28	26	80	20	14×12×9	39.2	57.8	0.62	3.67	0.62	3.67	0.79	1.09	4.8
MSA 30 LA						47.9	77.0	1.07	5.81	1.07	5.81	1.05	1.43	
MSA 35 A	34	29	80	20	14×12×9	52.0	75.5	0.93	5.47	0.93	5.47	1.25	1.61	6.6
MSA 35 LA						63.6	100.6	1.60	8.67	1.60	8.67	1.67	2.11	
MSA 45 A	45	38	105	22.5	20×17×14	83.8	117.9	1.81	10.67	1.81	10.67	2.57	2.98	11.5
MSA 45 LA						102.4	157.3	3.13	16.95	3.13	16.95	3.43	3.9	

Dimensions of MSA-E / MSA-LE

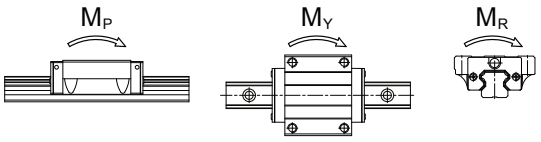


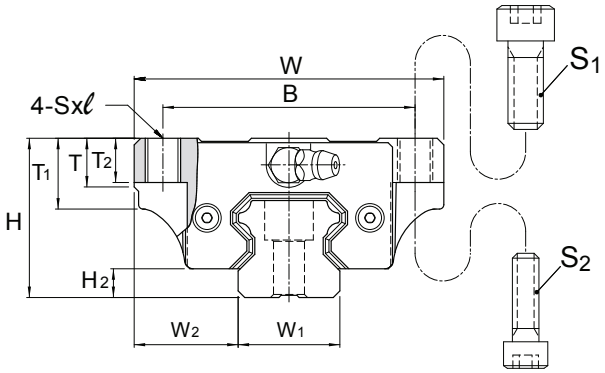
Unit: mm

Model No.	External dimension					Carriage dimension											
	Height H	Width W	Length L	W_2	H_2	B	C	S×ℓ	L_1	T	T_1	T_2	N	G	K	d_1	Grease Nipple
MSA 15 E	24	47	56.3	16	4.2	38	30	M5×7	39.3	7	11	7	4.3	7	3.2	3.3	G-M4
MSA 20 E **MSA 20 LE**	30	63	72.9 88.8	21.5	5	53	40	M6×10	51.3 67.2	7	10	10	5	12	5.8	3.3	G-M6
MSA 25 E **MSA 25 LE**	36	70	81.6 100.6	23.5	6.5	57	45	M8×10	59 78	11	16	10	6	12	5.8	3.3	G-M6
MSA 30 E **MSA 30 LE**	42	90	97 119.2	31	8	72	52	M10×10	71.4 93.6	11	18	10	7	12	6.5	3.3	G-M6
MSA 35 E **MSA 35 LE**	48	100	111.2 136.6	33	9.5	82	62	M10×13	81 106.4	13	21	13	8	11.5	8.6	3.3	G-M6
MSA 45 E **MSA 45 LE**	60	120	137.7 169.5	37.5	10	100	80	M12×15	102.5 134.3	13	25	15	10	13.5	10.6	3.3	G-PT 1/8
MSA 55 E **MSA 55 LE**	70	140	161.5 199.5	43.5	13	116	95	M14×17	119.5 157.5	19	32	17	11	13.5	8.6	3.3	G-PT 1/8
MSA 65 E **MSA 65 LE**	90	170	199 253	53.5	15	142	110	M16×23	149 203	21.5	37	23	19	13.5	8.6	3.3	G-PT 1/8

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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



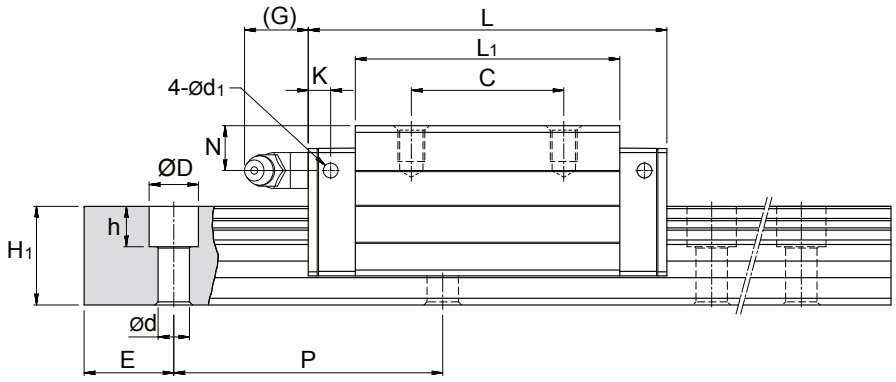


Model No.	Bolt Size	
	S_1	S_2
MSA 15	M5	M4
MSA 20	M6	M5
MSA 25	M8	M6
MSA 30	M10	M8
MSA 35	M10	M8
MSA 45	M12	M10
MSA 55	M14	M12
MSA 65	M16	M14

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
MSA 15 E	15	15	60	20	7.5×5.3×4.5	11.8	18.9	0.12	0.68	0.12	0.68	0.14	0.18	1.5
MSA 20 E	20	18	60	20	9.5×8.5×6	19.2	29.5	0.23	1.42	0.23	1.42	0.29	0.4	2.4
MSA 20 LE						23.3	39.3	0.39	2.23	0.39	2.23	0.38	0.52	
MSA 25 E	23	22	60	20	11×9×7	28.1	42.4	0.39	2.20	0.39	2.20	0.48	0.62	3.4
MSA 25 LE						34.4	56.6	0.67	3.52	0.67	3.52	0.63	0.82	
MSA 30 E	28	26	80	20	14×12×9	39.2	57.8	0.62	3.67	0.62	3.67	0.79	1.09	4.8
MSA 30 LE						47.9	77.0	1.07	5.81	1.07	5.81	1.05	1.43	
MSA 35 E	34	29	80	20	14×12×9	52.0	75.5	0.93	5.47	0.93	5.47	1.25	1.61	6.6
MSA 35 LE						63.6	100.6	1.60	8.67	1.60	8.67	1.67	2.11	
MSA 45 E	45	38	105	22.5	20×17×14	83.8	117.9	1.81	10.67	1.81	10.67	2.57	2.98	11.5
MSA 45 LE						102.4	157.3	3.13	16.95	3.13	16.95	3.43	3.9	
MSA 55 E	53	44	120	30	23×20×16	123.6	169.8	3.13	17.57	3.13	17.57	4.50	4.17	15.5
MSA 55 LE						151.1	226.4	5.40	28.11	5.40	28.11	6.00	5.49	
MSA 65 E	63	53	150	35	26×22×18	198.8	265.3	6.11	33.71	6.11	33.71	8.36	8.73	21.9
MSA 65 LE						253.5	375.9	11.84	57.32	11.84	57.32	11.84	11.89	

Dimensions of MSA-S / MSA-LS

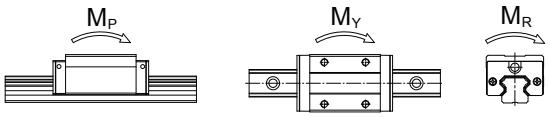


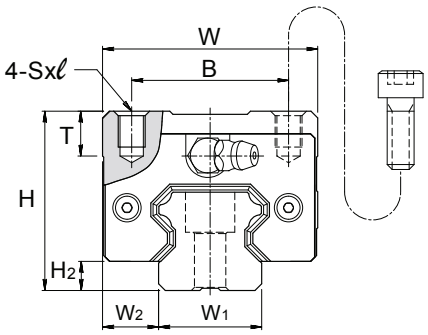
Unit: mm

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	d_1	Grease Nipple
MSA 15 S	28	34	56.3	9.5	4.2	26	26	M4×5	39.3	7.2	8.3	7	3.2	3.3	G-M4
MSA 20 S **MSA 20 LS**	30	44	72.9 88.8	12	5	32	36 50	M5×6	51.3 67.2	8	5	12	5.8	3.3	G-M6
MSA 25 S **MSA 25 LS**	40	48	81.6 100.6	12.5	6.5	35	35 50	M6×8	59 78	10	10	12	5.8	3.3	G-M6
MSA 30 S **MSA 30 LS**	45	60	97 119.2	16	8	40	40 60	M8×10	71.4 93.6	11.7	10	12	6.5	3.3	G-M6
MSA 35 S **MSA 35 LS**	55	70	111.2 136.6	18	9.5	50	50 72	M8×12	81 106.4	12.7	15	11.5	8.6	3.3	G-M6
MSA 45 S **MSA 45 LS**	70	86	137.7 169.5	20.5	10	60	60 80	M10×17	102.5 134.3	16	20	13.5	10.6	3.3	G-PT 1/8
MSA 55 S **MSA 55 LS**	80	100	161.5 199.5	23.5	13	75	75 95	M12×18	119.5 157.5	18	21	13.5	8.6	3.3	G-PT 1/8
MSA 65 S **MSA 65 LS**	90	126	199 253	31.5	15	76	70 120	M16×20	149 203	23	19	13.5	8.6	3.3	G-PT 1/8

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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



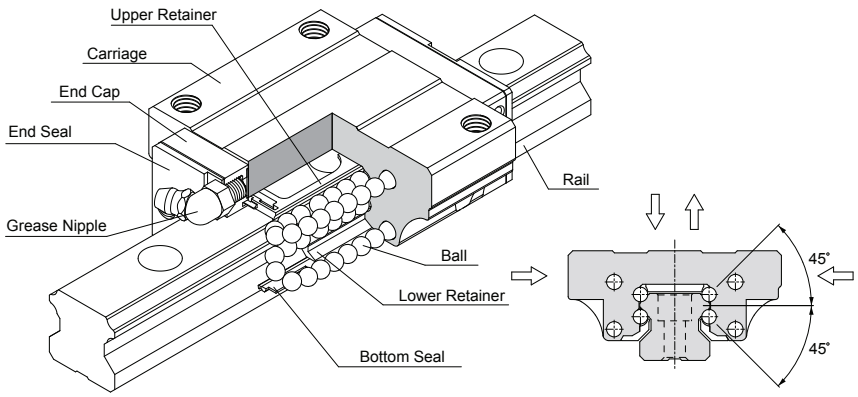


Unit: mm

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		M_Y kN-m		M_R kN-m	Carriage kg	Rail kg/m
								Single*	Double*	Single*	Double*			
MSA 15 S	15	15	60	20	7.5×5.3×4.5	11.8	18.9	0.12	0.68	0.12	0.68	0.14	0.18	1.5
MSA 20 S	20	18	60	20	9.5×8.5×6	19.2	29.5	0.23	1.42	0.23	1.42	0.29	0.3	2.4
MSA 20 LS						23.3	39.3	0.39	2.23	0.39	2.23	0.38	0.39	
MSA 25 S	23	22	60	20	11×9×7	28.1	42.4	0.39	2.20	0.39	2.20	0.48	0.52	3.4
MSA 25 LS						34.4	56.6	0.67	3.52	0.67	3.52	0.63	0.68	
MSA 30 S	28	26	80	20	14×12×9	39.2	57.8	0.62	3.67	0.62	3.67	0.79	0.86	4.8
MSA 30 LS						47.9	77.0	1.07	5.81	1.07	5.81	1.05	1.12	
MSA 35 S	34	29	80	20	14×12×9	52.0	75.5	0.93	5.47	0.93	5.47	1.25	1.45	6.6
MSA 35 LS						63.6	100.6	1.60	8.67	1.60	8.67	1.67	1.9	
MSA 45 S	45	38	105	22.5	20×17×14	83.8	117.9	1.81	10.67	1.81	10.67	2.57	2.83	11.5
MSA 45 LS						102.4	157.3	3.13	16.95	3.13	16.95	3.43	3.7	
MSA 55 S	53	44	120	30	23×20×16	123.6	169.8	3.13	17.57	3.13	17.57	4.50	4.12	15.5
MSA 55 LS						151.1	226.4	5.40	28.11	5.40	28.11	6.00	4.91	
MSA 65 S	63	53	150	35	26×22×18	198.8	265.3	6.11	33.71	6.11	33.71	8.36	6.43	21.9
MSA 65 LS						253.5	375.9	11.84	57.32	11.84	57.32	11.84	8.76	

12.2 Compact Type, MSB Series

A. Construction



B. Characteristics

The trains of balls are designed to a contact angle of 45° which enables it to bear an equal load in radial, reversed radial and lateral directions. Therefore, it can be applied in any installation direction. Furthermore, MSB series can achieve a well balanced preload for increasing rigidity in four directions while keeping a low frictional resistance. This is especially suit to high precision and high rigidity required motion.

The patent design of lubrication route makes the lubricant evenly distribute in each circulation loop. Therefore, the optimum lubrication can be achieved in any installation direction, and this promotes the performance in running accuracy, service life, and reliability.

Compact, Four-way Equal Load

Compact design of the carriage with the four trains of balls are allocated to a circular contact angle at 45°, thus each train of balls can take up an equal rated load in all four directions. Moreover, a sufficient preload can be achieved to increase rigidity, and this makes it suitable for any kind of installation.

Smooth Movement with Low Noise

The simplified design of circulating system with strengthened synthetic resin accessories makes the movement smooth and quiet.

Self Alignment Capability

The self adjustment is performed spontaneously as the design of face-to-face (DF) circular arc groove. Therefore, the installation error could be compensated even under a preload, and which results in precise and smooth linear motion.

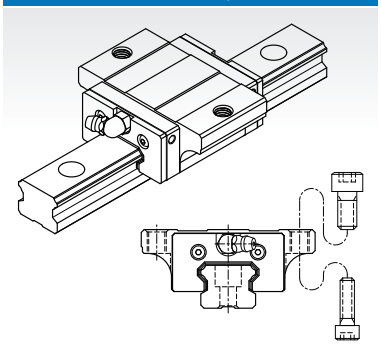
Interchangeability

For interchangeable type of linear guideway, the dimensional tolerances are strictly maintained within a reasonable range, and this has made the random matching of the same size of rails and carriages possible. Therefore, the similar preload and accuracy can be obtained even under the random matching condition. As a result of this advantage, the linear guideway can be stocked as standard parts, the installation and maintenance become more convenient. Moreover, this is also beneficial for shortening the delivery time.

C. Carriage Type

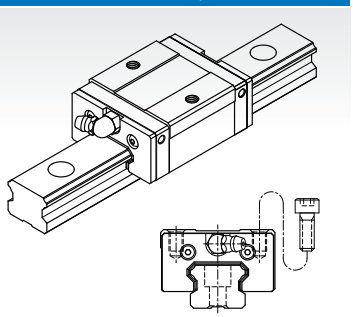
Medium Load

MSB-TE Type



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

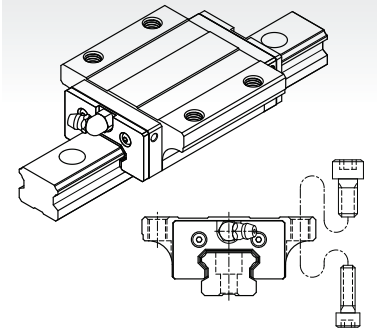
MSB-TS Type



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

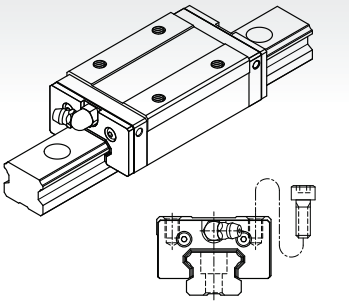
Heavy Load

MSB-E Type



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

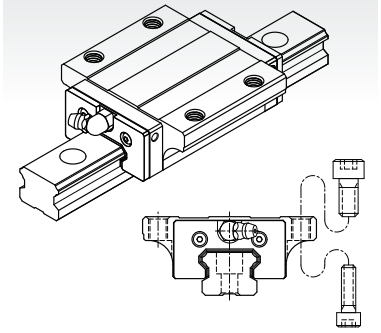
MSB-S Type



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

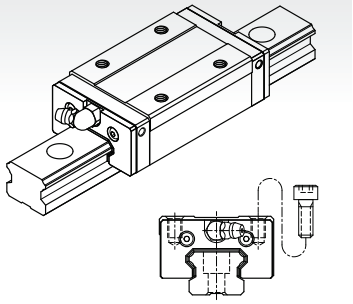
Ultra Heavy Load

MSB-LE Type



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

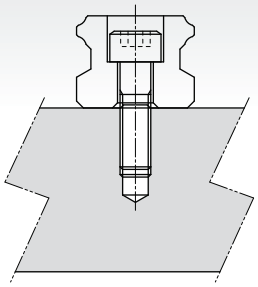
MSB-LS Type



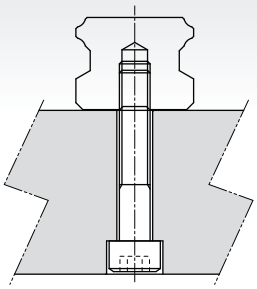
All dimensions are same as MSB-S except the length is longer, which makes it more rigid.

D. Rail type

Counter bore (R, U type)



Tapped Hole (T type)



E. Description of Specification

(1) Non-Interchangeable Type

MSB 25 E 2 SS F0

Series：**MSB**

Size：**15, 20, 25, 30, 35**

Carriage type：(1) Medium load
TE : Flange type, mounting either from top or bottom
TS : Square type
(2) Heavy load
E : Flange type, mounting either from top or bottom
S : Square type
(3)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, LL, RR** (refer to chapter 15.1 Dust Proof)

Preload：**FC** (Light preload) , **F0** (Medium preload) , **F1** (Heavy preload)

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

Rail type：**R** ,**U**[1] (Counter-bore type), **T** (Tapped hole type)

Rail length (mm)

Rail hole pitch from start side (**E1**, see Fig.12.2)

Rail hole pitch to the end side (**E2**, see Fig.12.2)

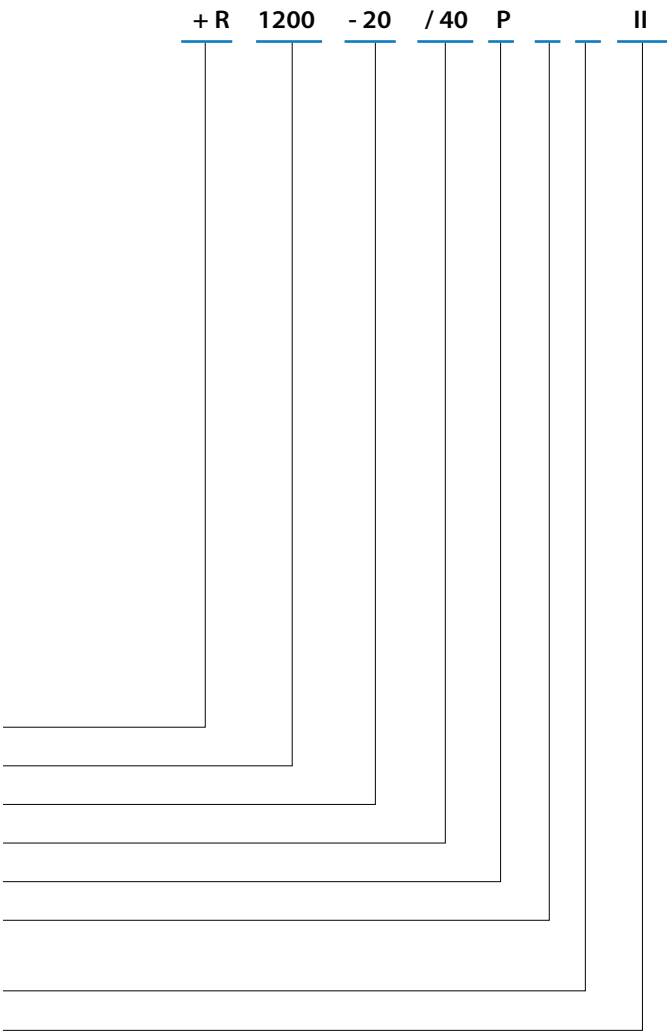
Accuracy grade：**N, H, P, SP, UP**

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 ...**

Notr[1]：U type rail is only applicable for MSB15 with M4 mounting hole.


+ R
1200
- 20
/ 40
P
II

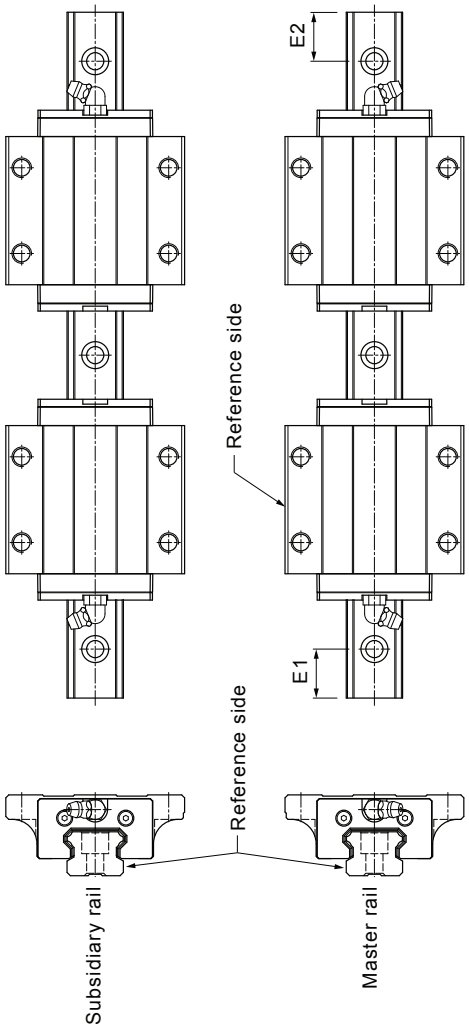

E2
Reference side
E1
Reference side
Subsidiary rail
Master rail

Fig.12.2

(2) Interchangeable Type

Code of Carriage

MSB 25 E SS FC N

Series：**MSB**

Size：**15, 20, 25, 30, 35**

Carriage type：(1) Medium load
TE : Flange type, mounting either from top or bottom
TS : Square type
(2) Heavy load
E : Flange type, mounting either from top or bottom
S : Square type
(3)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, LL, RR (refer to chapter 15.1 Dust Proof)

Preload：**FC** (Light preload) , **F0** (Medium preload)

Accuracy grade：**N, H, P**

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

Code of Rail

MSB 25 R 1200 - 20 / 40 N

Series：**MSB**

Size：**15, 20, 25, 30, 35**

Rail type：**R** ,**U**[1] (Counter-bore type), **T** (Tapped hole type)

Rail length (mm)

Rail hole pitch from start side (**E1**, see Fig.12.2)

Rail hole pitch to the end side (**E2**, see Fig.12.2)

Accuracy grade：**N, 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)

Notr[1]：U type rail is only applicable for MSB15 with M4 mounting hole.

F. Accuracy Grade

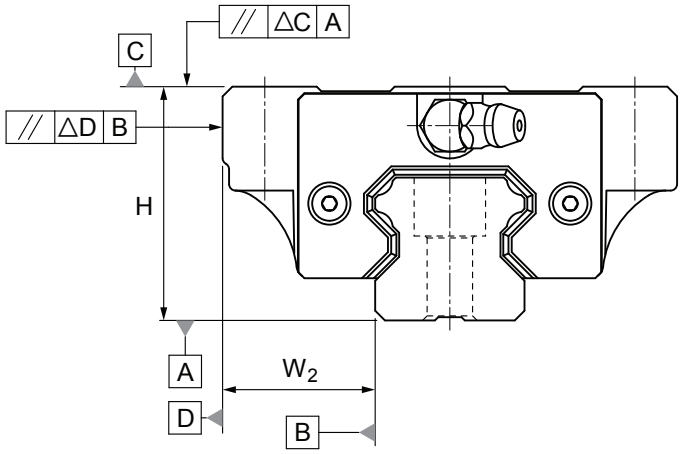


Table 1 Running Parallelism

Rail length (mm)		Running Parallelism Values(μm)				
Above	Or less	N	H	P	SP	UP
0	315	9	6	3	2	1.5
315	400	11	8	4	2	1.5
400	500	13	9	5	2	1.5
500	630	16	11	6	2.5	1.5
630	800	18	12	7	3	2
800	1000	20	14	8	4	2
1000	1250	22	16	10	5	2.5
1250	1600	25	18	11	6	3
1600	2000	28	20	13	7	3.5
2000	2500	30	22	15	8	4
2500	3000	32	24	16	9	4.5
3000	3500	33	25	17	11	5
3500	4000	34	26	18	12	6

A Non-Interchangeable Type

Model No.	Item	Accuracy Grade				
		Normal **N**	High **H**	Precision **P**	Super Precision **SP**	Ulitra Precision **UP**
15 **20**	Tolerance for height H	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Height difference ΔH	0.02	0.01	0.006	0.004	0.003
	Tolerance for distance W_2	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Difference in distance $W_2(\Delta W_2)$	0.02	0.01	0.006	0.004	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)				
25 **30** **35**	Tolerance for height H	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Height difference ΔH	0.02	0.015	0.007	0.005	0.003
	Tolerance for distance W_2	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Difference in distance $W_2(\Delta W_2)$	0.03	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)				

B Interchangeable Type

Model No.	Item	Accuracy Grade		
		Normal **N**	High **H**	Precision **P**
15 **20**	Tolerance for height H	±0.1	±0.03	0 -0.03
	Height difference ΔH	0.02	0.01	0.006
	Tolerance for distance W_2	±0.1	±0.03	0 -0.03
	Difference in distance $W_2(\Delta W_2)$	0.02	0.01	0.006
	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)		
25 **30** **35**	Tolerance for height H	±0.1	±0.04	0 -0.04
	Height difference ΔH	0.02	0.015	0.007
	Tolerance for distance W_2	±0.1	±0.04	0 -0.04
	Difference in distance $W_2(\Delta W_2)$	0.03	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)		

G. Preload Grade

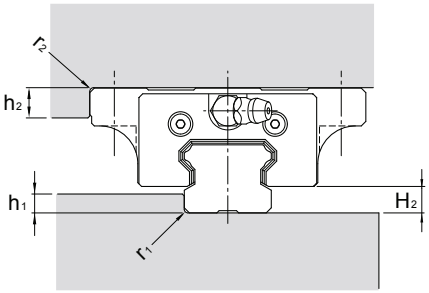
Series	Preload grade		
	Light preload (FC)	Medium preload (F0)	Heavy preload (F1)
MSB15T	0~0.02C	0.03~0.05C	-
MSB20T			0.05~0.08C
MSB25T			
MSB30T			
MSB15	0~0.02C	0.03~0.05C	0.05~0.08C
MSB20			
MSB25			
MSB30			
MSB35			
MSB35L			

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

MSB series

Unit: mm



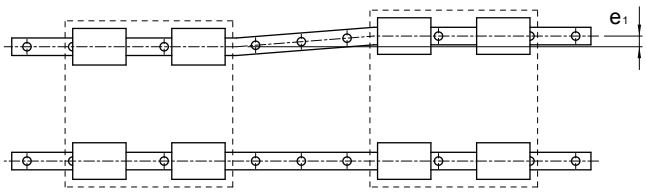
Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
15	0.5	0.5	3	4	4.5
20	0.5	0.5	4	5	6
25	1	1	5	5	7
30	1	1	7	5	9.5
35	1	1	8	6	9.5

I. Dimensional Tolerance of Mounting Surface

MSB Series

With the self alignment capability, 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.

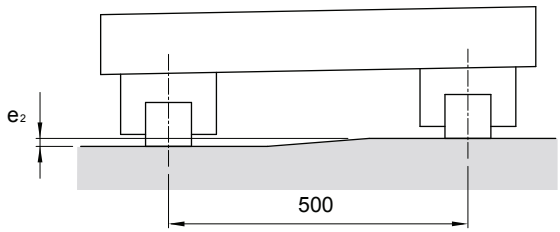
The parallel deviation between two axes (e_1)



Unit: μm

Model No.	Preload Grade		
	FC	F0	F1
15	25	18	-
20	25	20	18
25	30	22	20
30	40	30	27
35	50	35	30

Level difference between two axes (e_2)

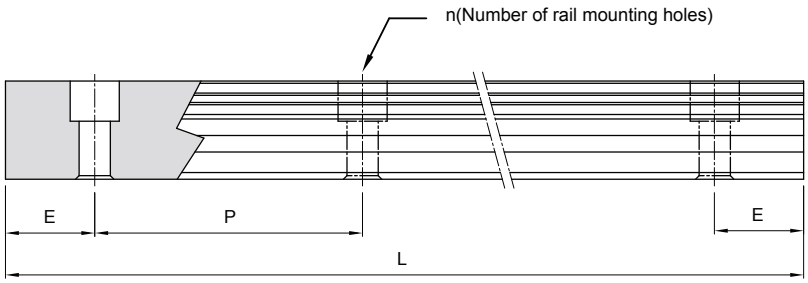


Unit: μm

Model No.	Preload Grade		
	FC	F0	F1
15	130	85	-
20	130	85	50
25	130	85	70
30	170	110	90
35	210	150	120

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

J. Rail Maximum Length and Standrad



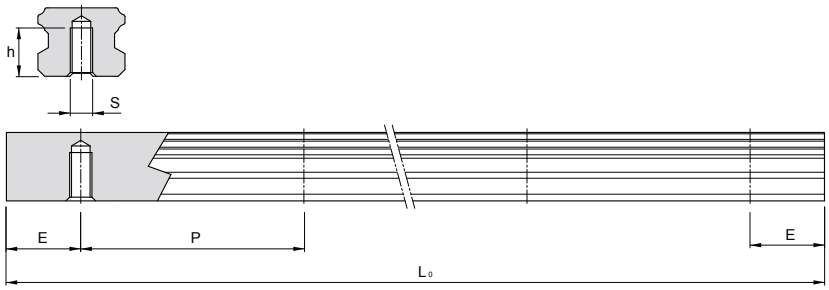
$$L=(n-1)\times P+2\times E$$

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

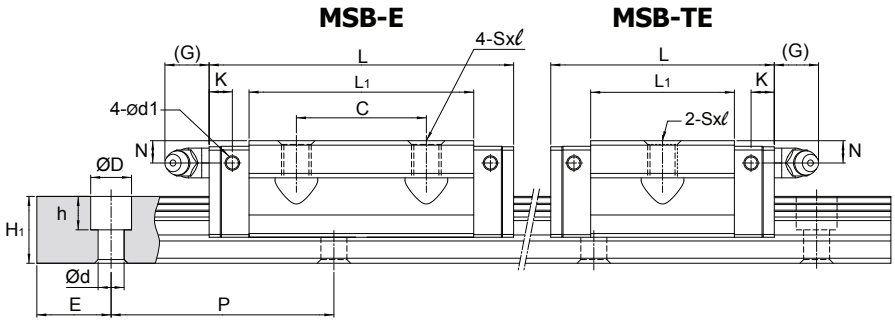
Model No.	Standard Pitch (P)	Standard ($E_{std.}$)	Minimum ($E_{min.}$)	Max (L_0 max.)
MSB 15	60	20	5	4000
MSB 20	60	20	6	4000
MSB 25	60	20	7	4000
MSB 30	80	20	7	4000
MSB 35	80	20	8	4000

K. Tapped-hole Rail Dimensions



Rail Model	S	h(mm)
MSB 15 T	M5	7
MSB 20 T	M6	9
MSB 25 T	M6	10
MSB 30 T	M8	14
MSB 35 T	M8	16

Dimensions of MSB-TE / MSB-E



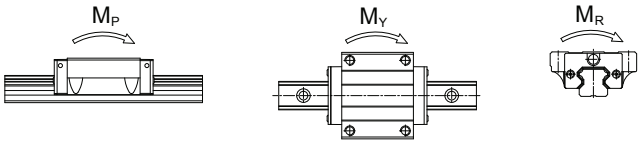
Unit: mm

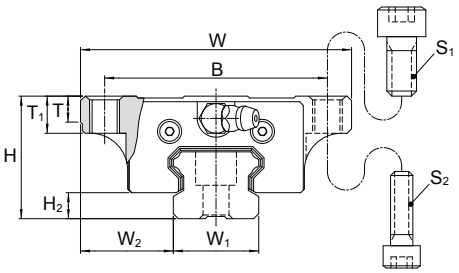
Model No.	External dimension					Carriage dimension										
	Height H	Width W	Length L	W_2	H_2	B	C	S×ℓ	L_1	T	T_1	N	G	K	d_1	Grease Nipple
MSB 15 TE **MSB 15 E**	24	52	40 57	18.5	4.5	41	- 26	M5×7	23.5 40.5	5	7	5.5	5.5	5.1	3.3	G-M4
MSB 20 TE **MSB 20 E**	28	59	48 67	19.5	6	49	- 32	M6×9	29 48	5	9	5.5	12	5.9	3.3	G-M6
MSB 25 TE **MSB 25 E**	33	73	60.2 82	25	7	60	- 35	M8×10	38.7 60.5	7	10	6	12	6.3	3.3	G-M6
MSB 30 TE **MSB 30 E**	42	90	68 96.7	31	9.5	72	- 40	M10×10	43.3 72	7	10	8	12	6.3	3.3	G-M6
MSB 35 TE **MSB 35 E** **MSB 35 LE**	48	100	78 112 137.5	33	9.5	82	- 50 72	M10×13	46 80 105.5	9	13	8.5	12	9.8	3.3	G-M6

Note: Rail mounting holes for M3 (6x4.5x3.5) and M4 (7.5x5.3x4.5) are available for MSB15 rail. The codes of rail type are MSB15R for M3 mounting holes, and MSB15U for M4 mounting holes.

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is C=1.26 x C_{100}.

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



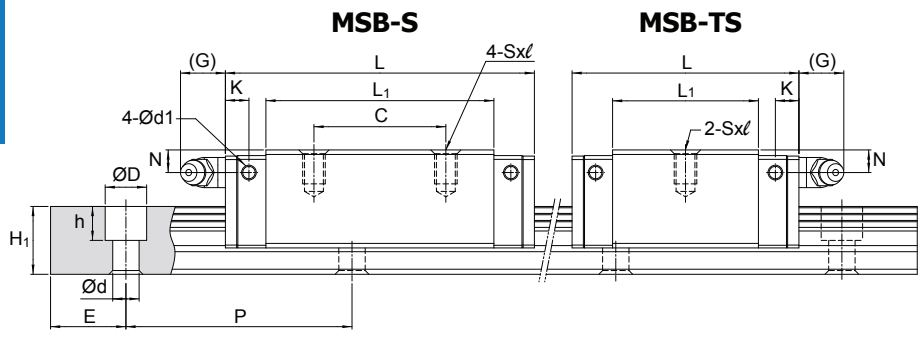


Model No.	Bolt Size	
	S_1	S_2
MSB 15	M5	M4
MSB 20	M6	M5
MSB 25	M8	M6
MSB 30	M10	M8
MSB 35	M10	M8

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
MSB 15 TE MSB 15 E	15	12.5	60	20	6×4.5×3.5 (7.5×5.3×4.5)	6.7 10.0	9.6 16.9	0.04 0.10	0.26 0.61	0.04 0.10	0.26 0.61	0.07 0.13	0.12 0.21	1.2
MSB 20 TE MSB 20 E	20	15	60	20	9.5×8.5×6	9.7 13.9	14.2 23.6	0.07 0.18	0.44 0.97	0.07 0.18	0.44 0.97	0.14 0.24	0.20 0.34	2
MSB 25 TE MSB 25 E	23	18	60	20	11×9×7	15.6 22.3	22.1 36.9	0.13 0.35	0.91 1.87	0.13 0.35	0.91 1.87	0.26 0.43	0.39 0.60	3
MSB 30 TE MSB 30 E	28	23	80	20	11×9×7	23.1 32.9	31.8 53.1	0.23 0.60	1.39 3.15	0.23 0.60	1.39 3.15	0.45 0.74	0.65 1.08	4.4
MSB 35 TE MSB 35 E MSB 35 LE	34	27.5	80	20	14×12×9	35.7 52.0 63.6	44.0 75.5 100.6	0.34 0.93 1.60	2.81 5.47 8.67	0.34 0.93 1.60	2.81 5.47 8.67	0.75 1.28 1.67	0.91 1.61 1.80	6.2 6.6

Dimensions of MSB-TS / MSB-S



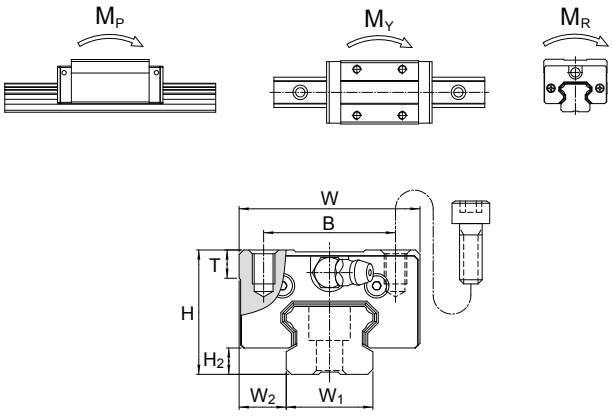
Unit: mm

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	d_1	Grease Nipple
MSB 15 TS **MSB 15 S**	24	34	40 57	9.5	4.5	26	- 26	M4×6	23.5 40.5	6	5.5	5.5	5.1	3.3	G-M4
MSB 20 TS **MSB 20 S**	28	42	48 67	11	6	32	- 32	M5×7	29 48	6	5.5	12	5.9	3.3	G-M6
MSB 25 TS **MSB 25 S**	33	48	60.2 82	12.5	7	35	- 35	M6×9	38.7 60.5	8	6	12	6.3	3.3	G-M6
MSB 30 TS **MSB 30 S**	42	60	68 96.7	16	9.5	40	- 40	M8×12	43.3 72	8	8	12	6.3	3.3	G-M6
MSB 35 TS **MSB 35 S** **MSB 35 LS**	48	70	78 112 137.5	18	9.5	50	- 50 72	M8×12	46 80 105.5	12.5	8.5	11.5	9.8	3.3	G-M6

Note: Rail mounting holes for M3 (6x4.5x3.5) and M4 (7.5x5.3x4.5) are available for MSB15 rail. The codes of rail type are MSB15R for M3 mounting holes, and MSB15U for M4 mounting holes.

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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

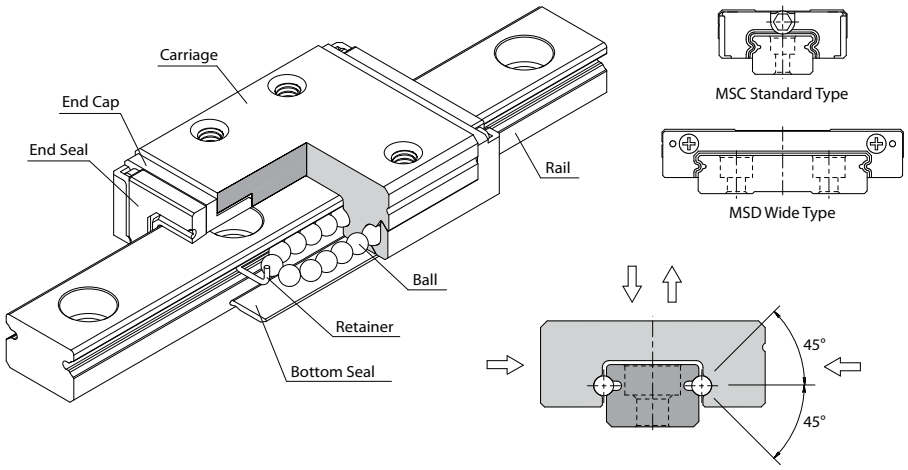


Unit: mm

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
MSB 15 TS	15	12.5	60	20	6×4.5×3.5	6.7	9.6	0.04	0.26	0.04	0.26	0.07	0.09	1.2
MSB 15 S					(7.5×5.3×4.5)	10.0	16.9	0.10	0.61	0.10	0.61	0.13	0.16	
MSB 20 TS	20	15	60	20	9.5×8.5×6	9.7	14.2	0.07	0.44	0.07	0.44	0.14	0.16	2
MSB 20 S						13.9	23.6	0.18	0.97	0.18	0.97	0.24	0.26	
MSB 25 TS	23	18	60	20	11×9×7	15.6	22.1	0.13	0.91	0.13	0.91	0.26	0.29	3
MSB 25 S						22.3	36.9	0.35	1.87	0.35	1.87	0.43	0.45	
MSB 30 TS	28	23	80	20	11×9×7	23.1	31.8	0.23	1.39	0.23	1.39	0.45	0.52	4.4
MSB 30 S						32.9	53.1	0.60	3.15	0.60	3.15	0.74	0.82	
MSB 35 TS	34	27.5	80	20	14×12×9	35.7	44.0	0.34	2.81	0.34	2.81	0.75	0.81	6.2
MSB 35 S						52.0	75.5	0.93	5.47	0.93	5.47	1.28	1.13	
MSB 35 LS						63.6	100.6	1.60	8.67	1.60	8.67	1.67	1.49	

12.4 Miniature Type, MSC 、MSD Stainless Steel Series

A. Construction



B. Characteristics

MSC st ows with Gothic-arch groove and designed to contact angle of 45° which enables it to bear an equal load in radial, reversed radial and lateral directions. Furthermore, ultra compact and low friction resistance design is suit to compact equipment. The lubrication route makes the lubricant evenly distribute in each circulation loop. Therefore,the optimum lubrication can be achieved in any installation direction, and this promotes the performance in running accuracy, service life, and reliability.

Four-way Equal Load

The two trains of balls are allocated to a Gothic-arch groove contact angle at 45°, thus each train of balls can takeup an equal rated load in all four directions.

Ultra Compact

The ultra compact design is suit to the compact application with limited in space.

Ball Retainer

Design with ball retainer can prevent ball form dropping.

Smooth Movement with Low Noise

The simplified design of circulating system with strengthened synthetic resin accessories makes the movement smooth and quiet.

Interchangeability

For interchangeable type of linear guideway, the dimensional tolerances are strictly maintained within a reasonable range, and this has made the random matching of the same size of rails and carriages possible. Therefore, the similar preload and accuracy can be obtained even under the random matching condition. As a result of this advantage, the linear guideway can be stocked as standard parts, the installation and maintenance become more convenient. Moreover, this is also beneficial for shortening the delivery time.

C. Description of Specification

(1) Non-interchangeable Type

MSC 7 M 2 LL F0

Series：**MSC, MSD**

Size：**7, 9, 12, 15**

Carriage type：**M**: Standard type (Stainless)
LM: Heavy load type (Stainless)

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

Dust protection option of carriage：**LL, RR** (refer to chapter 15.1 Dust Proof)

Preload：**FZ** (Clearance), **FC** (Light preload), **F0** (Medium preload)

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

Rail type：**R** (Counter bore type)

Rail length (mm)

Rail hole pitch from start side (**E1**, see Fig.12.4)

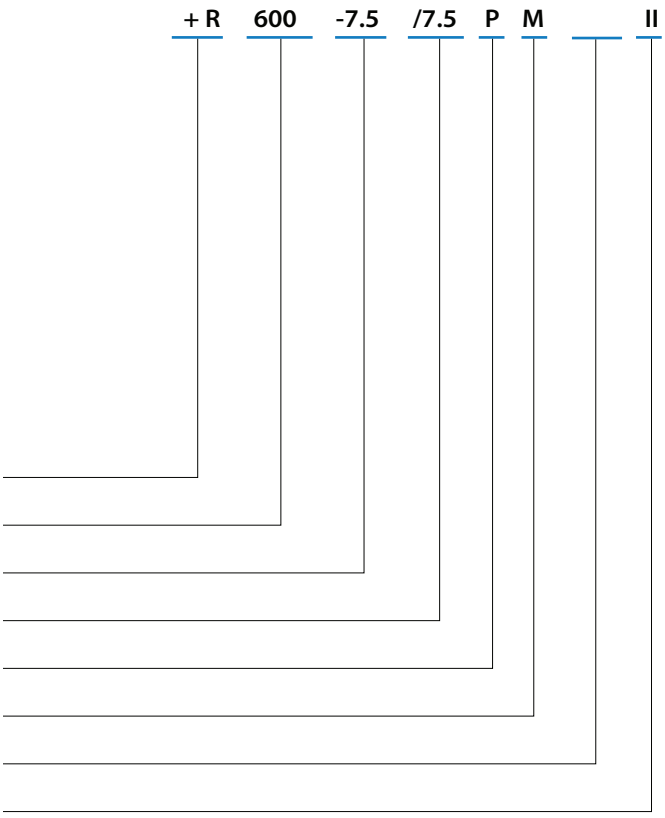
Rail hole pitch to the end side (**E2**, see Fig.12.4)

Accuracy grade：**N, H, P**

Stainless steel

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

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


+ R
600
-7.5
/7.5
P
M
II

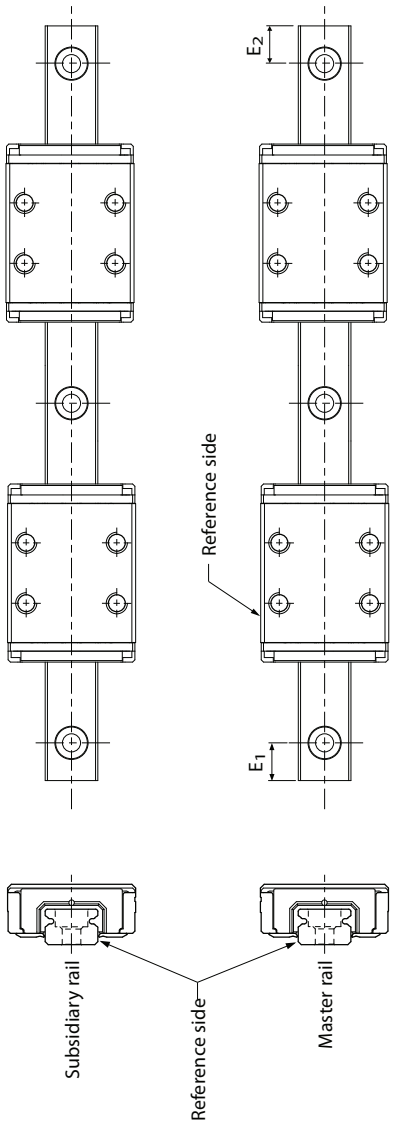

E2
Reference side
E1
Subsidiary rail
Reference side
Master rail

Fig 12.4

(2) Interchangeable Type

Code of Carriage

MSC 7 M LL FZ N

Series：**MSC, MSD**

Size：**7, 9, 12, 15**

Carriage type：**M**: Standard type (Stainless)
LM: Heavy load type (Stainless)

Dust protection option of carriage：**LL, RR** (refer to chapter 15.1 Dust Proof)

Preload：**FZ** (Clearance)

Accuracy grade：**N, H**

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

Code of Rail

MSC 7 R 600 - 7.5 /7.5 N M

Series：**MSC, MSD**

Size：**7, 9, 12, 15**

Rail type：**R** (Counter bore type)

Rail length (mm)

Rail hole pitch from start side (**E1**, see Fig.12.4)

Rail hole pitch to the end side (**E2**, see Fig.12.4)

Accuracy grade：**N, H**

Stainless steel

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

F. Accuracy Grade

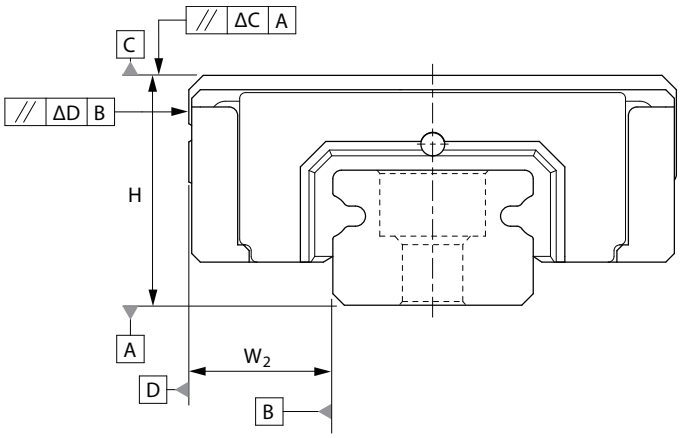


Table 1 Running Parallelism

Rail length (mm)		Running Parallelism Values(μm)		
Above	Or less	N	H	P
-	40	8	4	1
40	70	10	4	1
70	100	11	4	2
100	130	12	5	2
130	160	13	6	2
160	190	14	7	2
190	220	15	7	3
220	250	16	8	3
250	280	17	8	3

Rail length (mm)		Running Parallelism Values(μm)		
Above	Or less	N	H	P
280	310	17	9	3
310	340	18	9	3
340	370	18	10	3
370	400	19	10	3
400	430	20	11	4
430	460	20	12	4
460	490	21	12	4
490	520	21	12	4
520	550	22	12	4
550	580	22	13	4
580	610	22	13	4
610	640	22	13	4
640	670	23	13	4
670	700	23	13	5
700	730	23	14	5
730	760	23	14	5
760	790	23	14	5
790	820	23	14	5
820	850	24	14	5
850	880	24	15	5
880	910	24	15	5
910	940	24	15	5
940	970	24	15	5
970	1000	25	16	5

A Non-Interchangeable Type

Model No.	Item	Accuracy Grade		
		Normal **N**	High **H**	Precision **P**
7 **9** **12** **15**	Tolerance for height H	±0.04	±0.02	±0.01
	Height difference ΔH	0.03	0.015	0.007
	Tolerance for distance W_2	±0.04	±0.025	±0.015
	Difference in distance W_2(ΔW_2)	0.03	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)		

B Interchangeable Type

Model No.	Item		Accuracy Grade	
			Normal **N**	High **H**
7 9 12 15	Tolerance for height H		±0.04	±0.02
	Tolerance for distance W_2		±0.04	±0.025
	Paired single-rail	Height difference (ΔH)	0.03	0.015
		Difference in distance W_2(ΔW_2)	0.03	0.02
	Paired multiple-rail height difference (ΔH)		0.07	0.04
	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

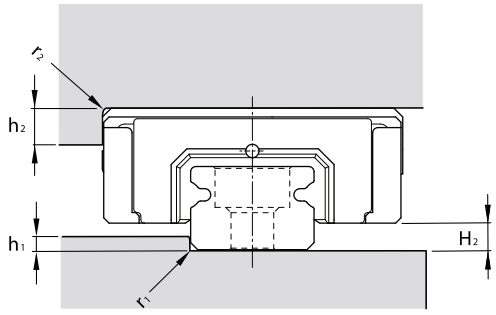
Series	Preload grade		
	Clearance（FZ）	Light preload (FC)	Medium preload (F0)
MSC7	Clearance 4~10μm	0	0.01~0.02C
MSC9			
MSC12			
MSC15			
MSC7L	Clearance 4~10μm	0	0.01~0.02C
MSC9L			
MSC12L			
MSC15L			
MSD7	Clearance 4~10μm	0	0.01~0.02C
MSD9			
MSD12			
MSD15			
MSD7L	Clearance 4~10μm	0	0.01~0.02C
MSD9L			
MSD12L			
MSD15L			

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

MSC series

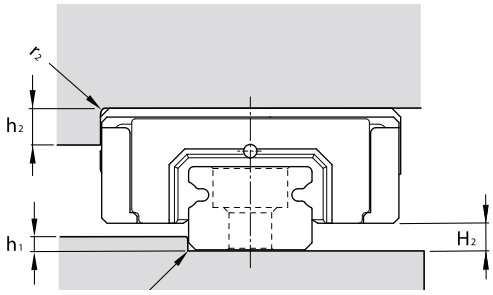
Unit: mm



Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
7	0.2	0.2	1.0	3	1.5
9	0.2	0.3	1.7	3	2.2
12	0.3	0.4	2.5	4	3
15	0.5	0.5	3.5	5	4

MSD series

Unit: mm



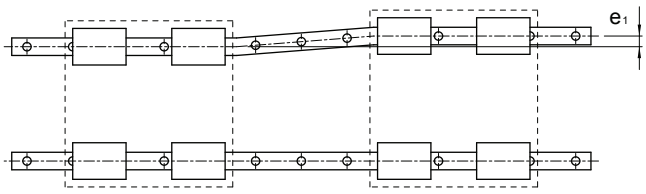
Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
7	0.2	0.2	1.5	3	2
9	0.2	0.3	3.2	3	3.7
12	0.3	0.4	3.5	4	4
15	0.5	0.5	3.5	5	4

I. Dimensional Tolerance of Mounting Surface

MSC、MSD Series

The tolerances of parallelism between two axes are shown as below.

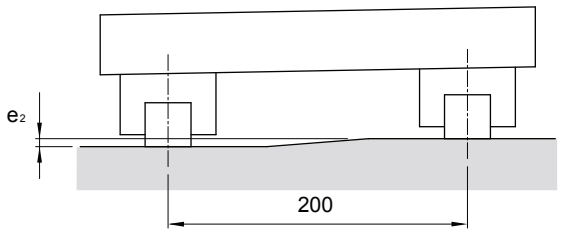
The parallel deviation between two axes (e_1)



Unit: μm

Model No.	Preload Grade		
	FZ	FC	F0
MSC 7 MSD7	12	3	3
MSC 9 MSD9	15	4	3
MSC 12 MSD12	20	9	5
MSC 15 MSD15	25	10	6

Level difference between two axes (e_2)

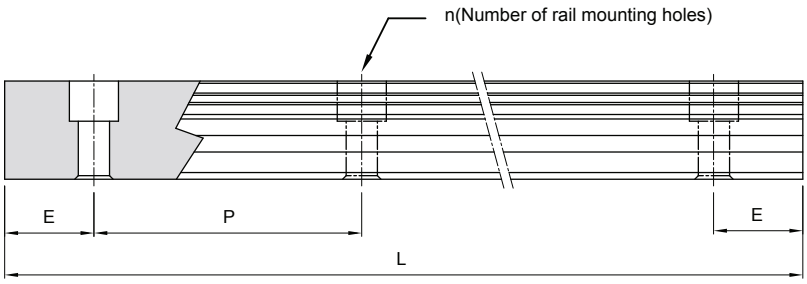


Unit: μm

Model No.	Preload Grade		
	FZ	FC	F0
MSC 7 MSD7	25	25	6
MSC 9 MSD9	35	35	6
MSC 12 MSD12	50	50	12
MSC 15 MSD15	60	60	20

Note: The permissible values in table are applicable when the span is 200mm wide.

J. Rail Maximum Length and Standrad



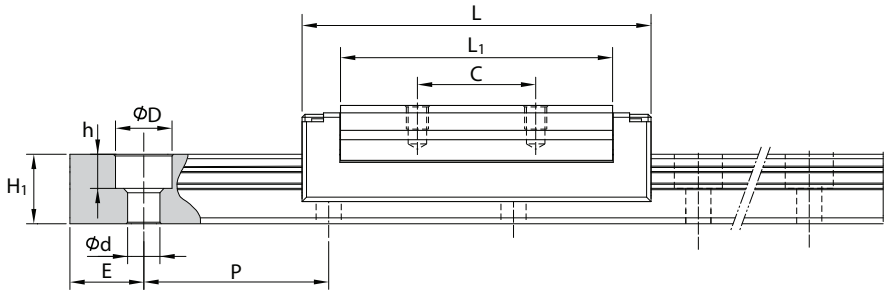
$L=(n-1)\times P+2\times E$

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: μm

Model No.		Standard Pitch (P)	Standard ($E_{std.}$)	Standard (maximum) (L_0 max.)
MSC	7	15	5	1000
	9	20	7.5	1000 (2000)
	12	25	10	1000 (2000)
	15	40	15	1000 (2000)
MSD	7	30	10	1000 (2000)
	9	30	10	1000 (2000)
	12	40	15	1000 (2000)
	15	40	15	1000 (2000)

Dimensions of MSC-M / MSC-LM

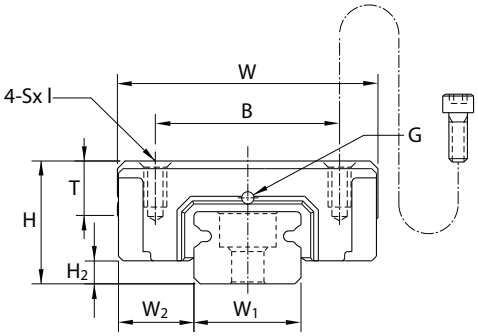


Unit: mm

Model No.	External dimension					Carriage dimension					
	Height H	Width W	Length L	W_2	H_2	B	C	S×ℓ	L_1	T	G
MSC 7 M MSC 7 LM	8	17	23.6 33.1	5	1.5	12	8 13	M2×2.5	18.4 27.9	3.5	Ø0.8
MSC 9 M MSC 9 LM	10	20	31.1 41.3	5.5	2.2	15	10 16	M3×3	25.8 36	4.5	Ø1
MSC 12 M MSC 12 LM	13	27	34.6 47.6	7.5	3	20	15 20	M3×3.6	28 41	6	Ø1.5
MSC 15 M MSC 15 LM	16	32	43.5 60.5	8.5	4	25	20 25	M3×4.2	36.1 53.1	7	G-M3

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is C=1.26 x C_{100}.

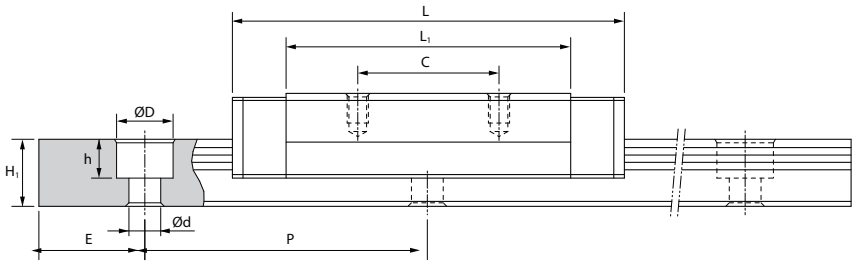
Note*: Single: Single carriage/ Double: Double carriages closely contacting with each other.



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 N-m Single*	M_P N-m Double*	M_Y N-m Single*	M_Y N-m Double*	M_R N-m	Carriage kg	Rail kg/m
MSC 7 M	7 0 -0.05	4.7	15	5	4.2×2.3×2.4	0.94	1.28	2.6	15.33	2.6	15.33	4.7	13	0.22
MSC 7 LM						1.36	2.24	7.4	37.92	7.4	37.92	8.3	18	
MSC 9 M	9 0 -0.05	5.5	20	7.5	6×3.3×3.5	1.71	2.24	6.1	33.46	6.1	33.46	10.8	29	0.33
MSC 9 LM						2.52	3.92	17.4	84.63	17.4	84.63	18.8	39	
MSC 12 M	12 0 -0.05	7.5	25	10	6×4.5×3.5	2.62	3.52	11.4	63.96	11.4	63.96	22.2	40	0.63
MSC 12 LM						3.77	5.72	28.3	141.52	28.3	141.52	36.0	60	
MSC 15 M	15 0 -0.05	9.5	40	15	6×4.5×3.5	4.52	5.70	24.7	132.17	24.7	132.17	44.4	71	1.02
MSC 15 LM						6.47	9.26	61.0	295.87	61.0	295.87	72.2	100	

Dimensions of MSD-M / MSD-LM

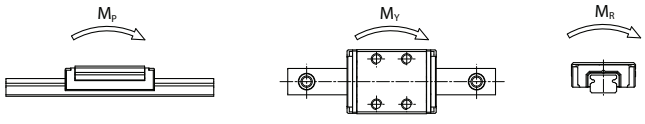


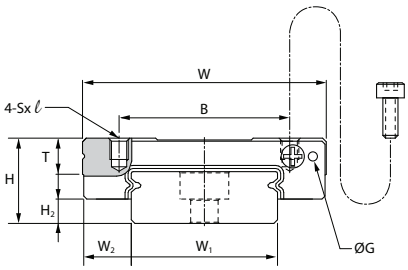
Unit: mm

Model No.	External dimension					Carriage dimension					
	Height H	Width W	Length L	W_2	H_2	B	C	S×ℓ	L_1	T	G
MSD 7 M MSD 7 LM	9	25	30.8 40.5	5.5	2	19	10 19	M3×3	20.6 30.3	3.9	Ø1.5
MSD 9 M MSD 9 LM	12	30	38.7 50.7	6	3.7	21 23	12 24	M3×3	27.1 39.1	5	Ø1.5
MSD 12 M MSD 12 LM	14	40	44.5 60	8	4	28	15 28	M3×4	31.0 46.5	6	Ø1.5
MSD 15 M MSD 15 LM	16	60	55.5 74.5	9	4	45	20 35	M4×4.5	40.3 59.3	7	Ø1.5

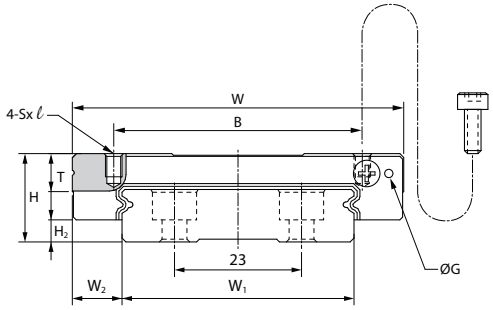
Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C100 for 100 km is C=1.26 x C100.

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





MSD 7、9、12



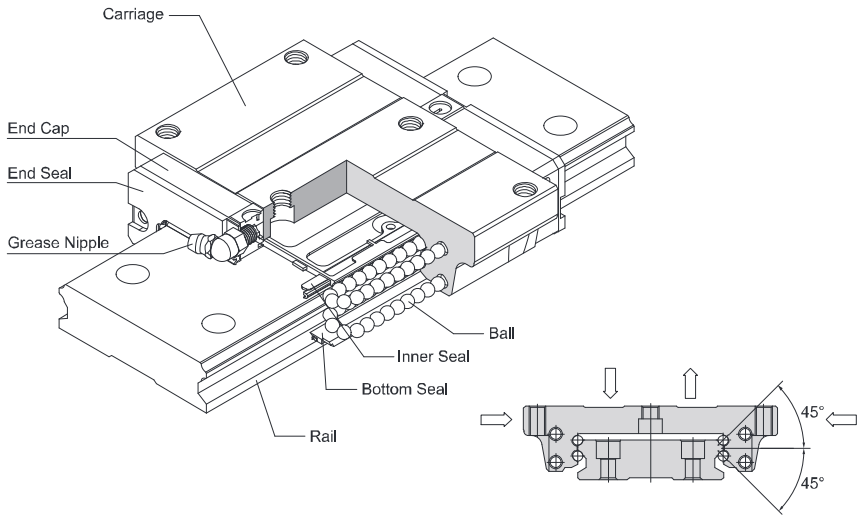
MSD 15

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 N-m Single*	M_P N-m Double*	M_Y N-m Single*	M_Y N-m Double*	M_R N-m	Carriage kg	Rail kg/m
MSD 7 M	14 0 -0.05	5.2	30	10	6×3.2×3.5	1.51	2.46	6.6	39.0	6.6	39.0	17.7	23	0.55
MSD 7 LM						2.04	3.79	17.5	84.0	17.5	84.0	27.3	31	
MSD 9 M	18 0 -0.05	7	30	10	6×4.5×3.5	2.79	4.37	15.6	90.3	15.6	90.3	40.7	41	0.96
MSD 9 LM						3.64	6.39	33.8	175.2	33.8	175.2	59.5	57	
MSD 12 M	24 0 -0.05	8.5	40	15	8×4.5×4.5	4.05	6.20	26.3	151.5	26.3	151.5	76.3	70	1.55
MSD 12 LM						5.28	9.06	57.0	294.4	57.0	294.4	116.6	101	
MSD 15 M	42 0 -0.05	9.5	40	15	8×4.5×4.5	7.08	10.18	62.5	301.4	62.5	301.4	216.9	150	2.99
MSD 15 LM						9.40	15.26	135.2	616.1	135.2	616.1	325.3	126	

12.7 Wide Rail Type, MSG Series

A. Construction



B. Characteristics

The trains of balls are designed to a contact angle of 45° which enables it to bear an equal load in radial, reversed radial and lateral directions. Therefore, it can be applied in any installation direction. Furthermore, MSG series can achieve a well balanced preload for increasing rigidity in four directions while keeping a low frictional resistance. This is especially suit to high precision and high rigidity required motion. By design,the ability to use a single rail and to have the low profile with a low center of gravity is ideal where space is limited and high moments are required.

The patent design of lubrication route makes the lubricant evenly distribute in each circulation loop. Therefore, the optimum lubrication can be achieved in any installation direction, and this promotes the performance in running accuracy, service life, and reliability.

High Rigidity, Four-way Equal Load

The four trains of balls are allocated to a circular contact angle at 45°, thus each train of balls can take up an equal rated load in all four directions. Moreover, a sufficient preload can be achieved to increase rigidity, and this makes it suitable for any kind of installation.

Smooth Movement with Low Noise

The simplified design of circulating system with strengthened synthetic resin accessories makes the movement smooth and quiet.

Self Alignment Capability

The self adjustment is performed spontaneously as the design of face-to-face (DF) circular arc groove. Therefore, the installation error could be compensated even under a preload, and which results in precise and smooth linear motion.

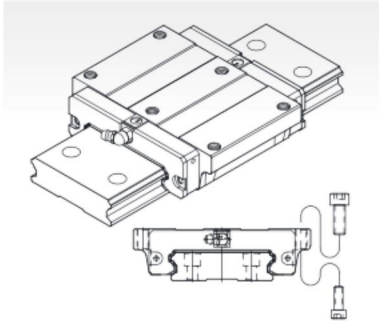
Interchangeability

For interchangeable type of linear guideway, the dimensional tolerances are strictly maintained within a reasonable range, and this has made the random matching of the same size of rails and carriages possible. Therefore, the similar preload and accuracy can be obtained even under the random matching condition. As a result of this advantage, the linear guideway can be stocked as standard parts, the installation and maintenance become more convenient. Moreover, this is also beneficial for shortening the delivery time.

C. Carriage Type

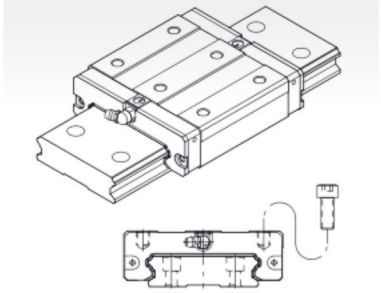
wide rail type

MSG-E Type



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

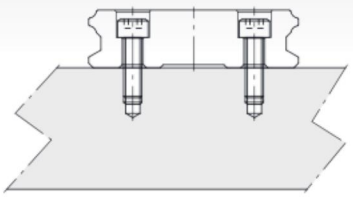
MSG-S Type



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

D. Rail Type

Counter bore (R type)



E. Description of Specification

(1) Non-Interchangeable Type

MSG 27 E 2 SS F0

Series：**MSG**

Size：**21, 27, 35**

Carriage type：(1) Wide rail type
E：Flange type,mounting either from top or bottom
S：Square type

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

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

Preload：**FC** (Light preload) , **F0** (Medium preload) , **F1** (Heavy preload)

Code of special carriage：**No symbol, A, B, ...**

Rail type：**R** (Counter-bore type)

Rail length (mm)

Rail hole pitch from start side (**E1**, see Fig.12.7)

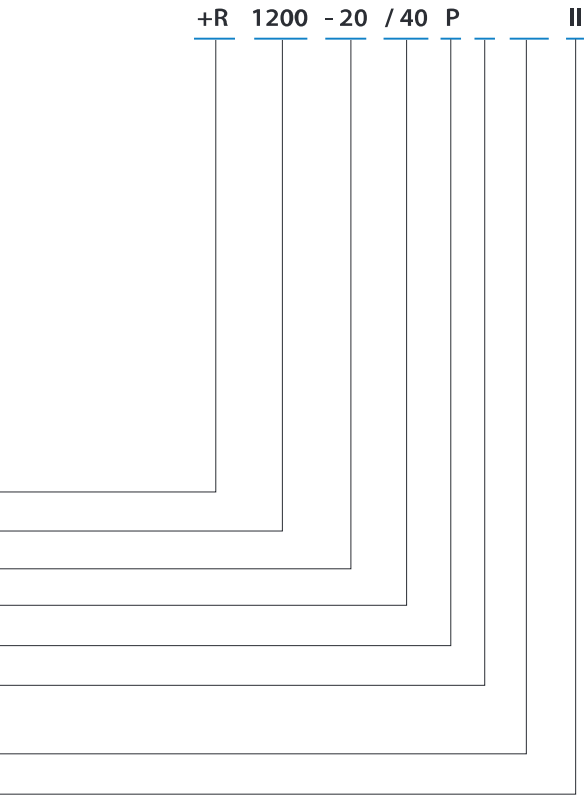
Rail hole pitch to the end side (**E2**, see Fig.12.7)

Accuracy grade：**N, 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 /40 P II

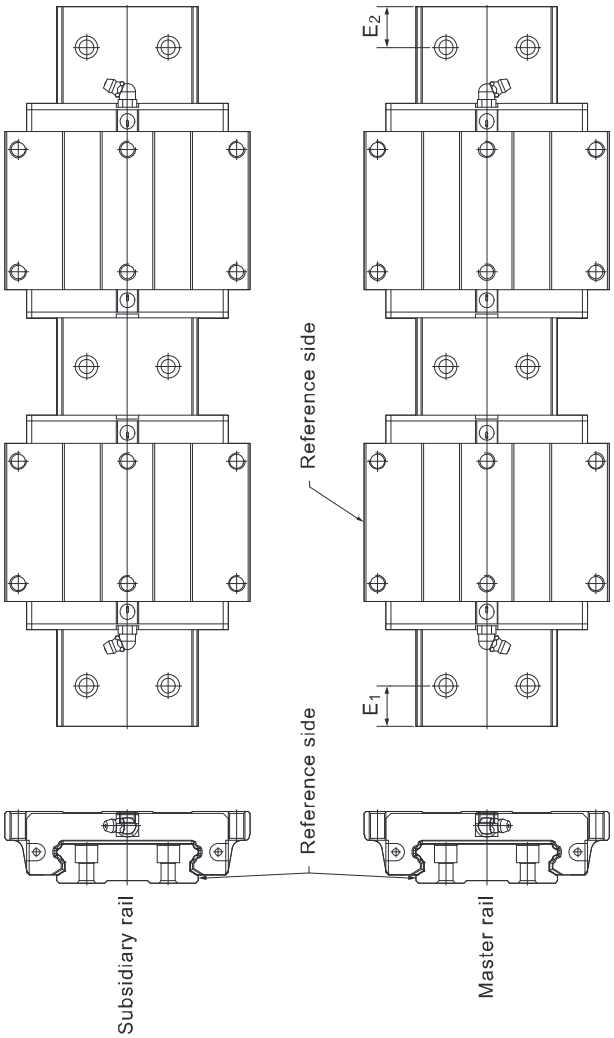

E2
Reference side
E1
Reference side
Subsidiary rail
Master rail

Fig12.7

(2) Interchangeable Type

Code of Carriage

MSG 27 E SS FC N

Series：**MSG**

Size：**21 27 35**

Carriage type：(1) Wide rail type
E：Flange type,mounting either from top or bottom
S：Square type

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

Preload：**FC** (Light preload), **F0** (Medium preload)

Accuracy grade：**N, H, P**

Code of special carriage：**No symbol, A, B, ...**

Code of Rail

MSG 27 R 1200 -20 /40 N

Series：**MSG**

Size：**21 27 35**

Rail type：**R** (Counter-bore type)

Rail length (mm)

Rail hole pitch from start side (**E1**, see Fig.12.7)

Rail hole pitch to the end side (**E2**, see Fig.12.7)

Accuracy grade：**N, H, P**

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

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

F. Accuracy Grade

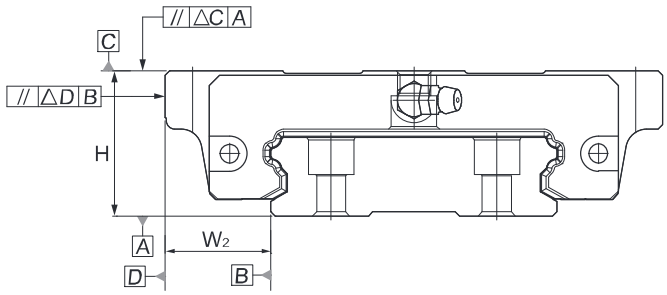


Table 1 Running Parallelism

Rail length (mm)		Running Parallelism Values(μm)				
Above	Or less	N	H	P	SP	UP
0	315	9	6	3	2	1.5
315	400	11	8	4	2	1.5
400	500	13	9	5	2	1.5
500	630	16	11	6	2.5	1.5
630	800	18	12	7	3	2
800	1000	20	14	8	4	2
1000	1250	22	16	10	5	2.5
1250	1600	25	18	11	6	3
1600	2000	28	20	13	7	3.5
2000	2500	30	22	15	8	4
2500	3000	32	24	16	9	4.5
3000	3500	33	25	17	11	5
3500	4000	34	26	18	12	6

A Non-Interchangeable Type

Model No.	Item	Accuracy Grade				
		Normal **N**	High **H**	Precision **P**	Super Precision **SP**	Ulitra Precision **UP**
21	Tolerance for height H	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Height difference ΔH	0.02	0.01	0.006	0.004	0.003
	Tolerance for distance W_2	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Difference in distance W_2(ΔW_2)	0.02	0.01	0.006	0.004	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)				
27 35	Tolerance for height H	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Height difference ΔH	0.02	0.015	0.007	0.005	0.003
	Tolerance for distance W_2	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Difference in distance W_2(ΔW_2)	0.03	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)				

B Interchangeable Type

Model No.	Item	Accuracy Grade		
		Normal **N**	High **H**	Precision **P**
21	Tolerance for height H	±0.1	±0.03	0 -0.03
	Height difference ΔH	0.02	0.01	0.006
	Tolerance for distance W_2	±0.1	±0.03	0 -0.03
	Difference in distance $W_2(\Delta W_2)$	0.02	0.01	0.006
	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)		
27 35	Tolerance for height H	±0.1	±0.04	0 -0.04
	Height difference ΔH	0.02	0.015	0.007
	Tolerance for distance W_2	±0.1	±0.04	0 -0.04
	Difference in distance $W_2(\Delta W_2)$	0.03	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)		

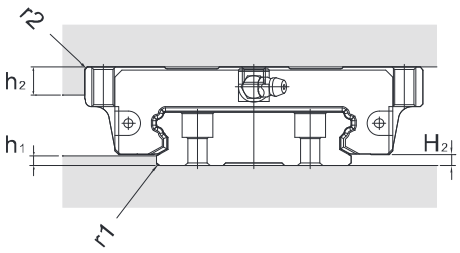
G. Preload Grade

Series	Preload grade		
	Light preload (FC)	Medium preload (F0)	Heavy preload (F1)
MSG21	0~0.02C	0.03~0.05C	0.05~0.08C
MSG27			
MSG35			

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

MSG series



Unit: mm

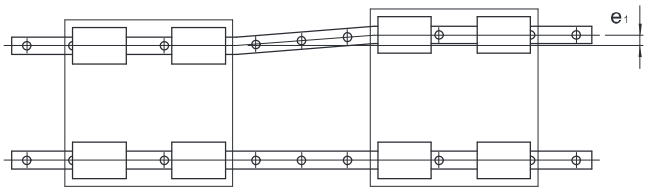
Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
21	0.4	0.4	2.5	5	3
27	0.4	0.4	2.5	7	3
35	0.8	0.8	3.5	10	4

I. Dimensional Tolerance of Mounting Surface

MSG Series

With the self alignment capability, 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.

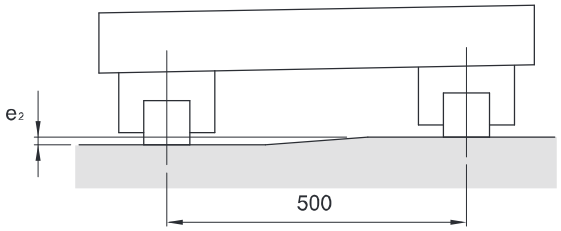
The parallel deviation between two axes (e_1)



Unit: μm

Model No.	Preload Grade		
	FC	F0	F1
21	-	25	18
27	-	25	20
35	30	22	20

Level difference between two axes (e_2)

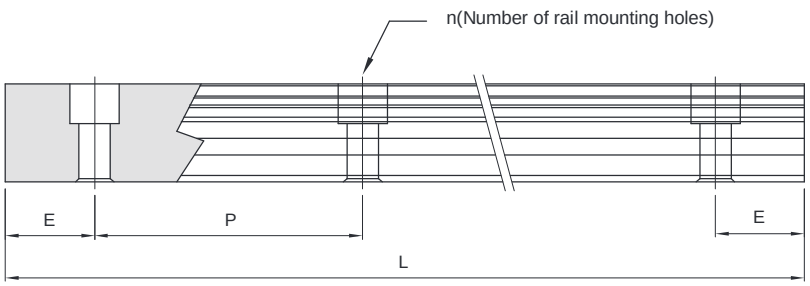


Unit: μm

Model No.	Preload Grade		
	FC	F0	F1
21	130	85	-
27	130	85	-
35	130	85	70

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

J. Rail Maximum Length and Standrad



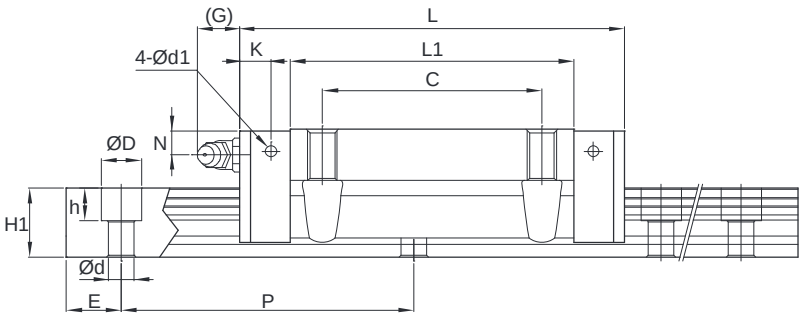
$L=(n-1)\times P+2\times E$

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.)
MSG 21	50	15	5	3000
MSG 27	60	20	5	3000
MSG 35	80	20	7	3000

Dimensions of MSG-E

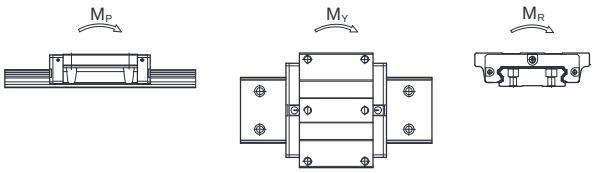


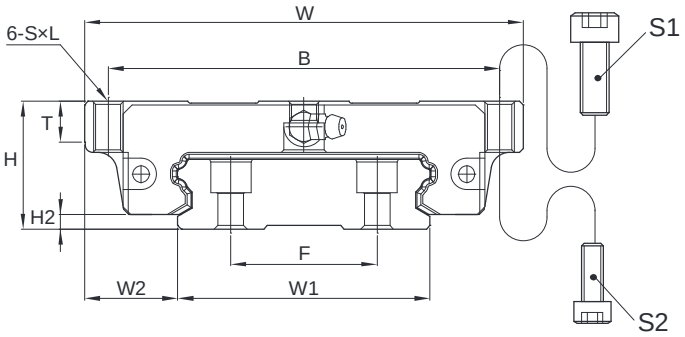
Unit: mm

Model No.	External dimension					Carriage dimension									
	Height H	Width W	Length L	W_2	H_2	B	C	F	S×ℓ	L_1	T	N	G	K	d_1	Grease Nipple
MSG21 E	21	68	59	15.5	3	60	29	22	M5x8	40	6	5	12	5.5	2.5	G-M6
MSG27 E	27	80	72.2	19	3	70	40	24	M6x10	51.8	8	6	12	6.2	3.3	G-M6
MSG35 E	35	120	105.2	25.5	4	107	60	40	M8x14	77.6	11.42	7	12	8.55	3.3	G-M6

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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



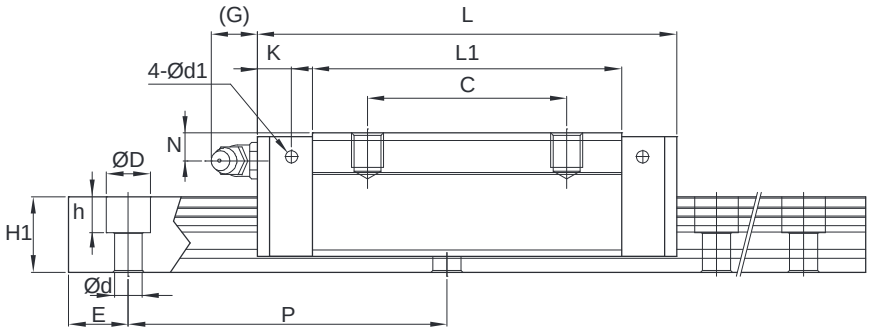


Model No.	Bolt Size	
	S_1	S_2
MSG 21	M5	M4
MSG 27	M6	M5
MSG 35	M8	M6

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		M_Y kN-m		M_R kN-m	Carriage kg	Rail kg/m
								Single*	Double*	Single*	Double*			
MSG21 E	37	11	50	15	7.5×5.3×4.5	7	12.1	0.08	0.46	0.08	0.46	0.22	0.25	2.86
MSG27 E	42	15	60	20	7.5×5.3×4.5	12.4	20.2	0.15	0.87	0.15	0.87	0.42	0.31	4.49
MSG35 E	69	19	80	20	11×9×7	30.7	48.6	0.65	3.6	0.65	3.6	1.67	0.99	9.4

Dimensions of MSG-S

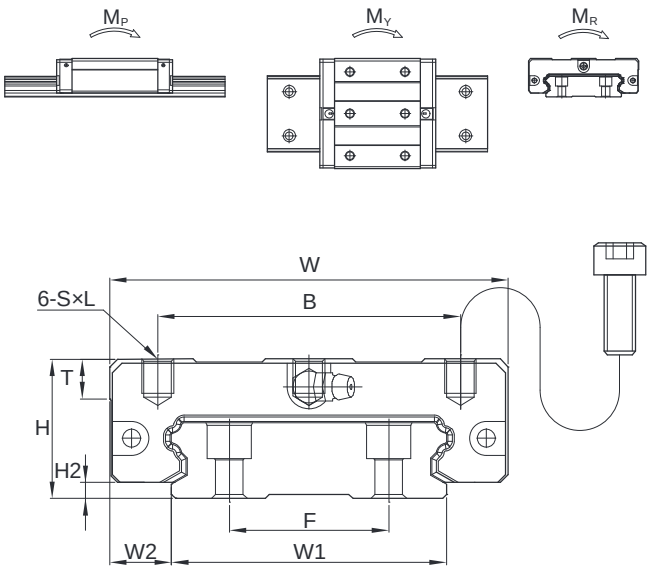


Unit: mm

Model No.	External dimension					Carriage dimension										
	Height H	Width W	Length L	W_2	H_2	B	C	F	S×ℓ	L_1	T	N	G	K	d_1	Grease Nipple
MSG21 S	21	54	59	8.5	3	31	19	22	M5×6	40	8	5	12	5.5	2.5	G-M6
MSG27 S	27	62	72.2	10	3	46	32	24	M6×6	51.8	10	6	12	6.2	3.3	G-M6
MSG35 S	35	100	105.2	15.5	4	76	50	40	M8×8	77.6	10	7	12	8.55	3.3	G-M6

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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

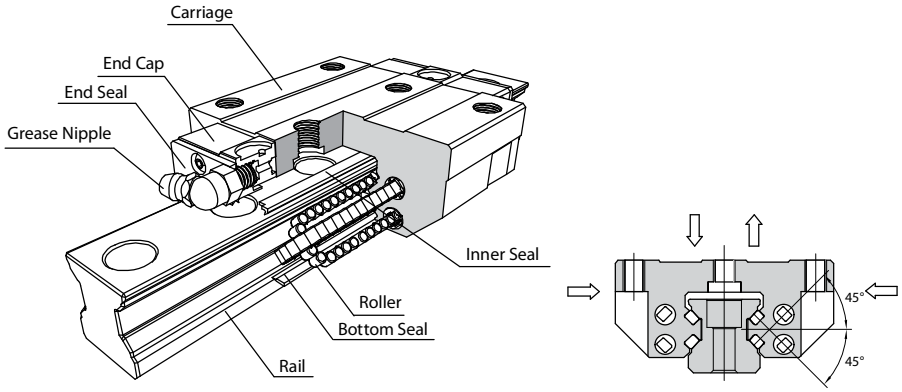


Unit: mm

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		M_Y kN-m		M_R kN-m	Carriage kg	Rail kg/m
								Single*	Double*	Single*	Double*			
MSG21 S	37	11	50	15	7.5×5.3×4.5	7	12.1	0.08	0.46	0.08	0.46	0.22	0.25	2.86
MSG27 S	42	15	60	20	7.5×5.3×4.5	12.4	20.2	0.15	0.87	0.15	0.87	0.42	0.31	4.49
MSG35 S	69	19	80	20	11×9×7	30.7	48.6	0.65	3.6	0.65	3.6	1.67	0.99	9.4

12.3 Full Roller Type, MSR Series

A. Construction

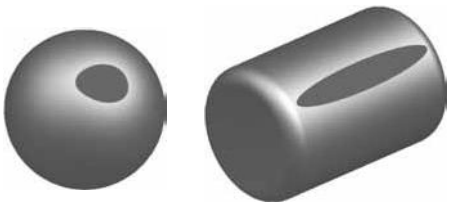


B. Characteristics

The full roller type linear guideway, MSR series, equip with rollers instead of the ball, and therefore the MSR series can provide higher rigidity and loading than the normal type with the same size. Especially suit for the requests of high accuracy, heavy load and high rigidity.

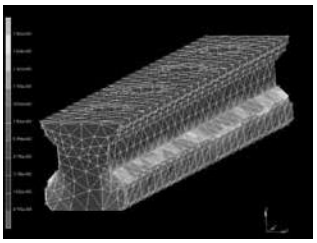
Ultra Heavy Load

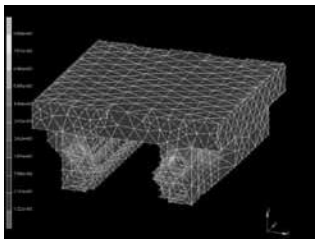
MSR linear guideway through rollers have a line contact with carriage and rail. Relative to the general type linear guideway through balls have a point contact; the MSR type linear guideway can offer lower elastic deformation while bearing the same load. Base on the rollers have the same outer diameter 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.



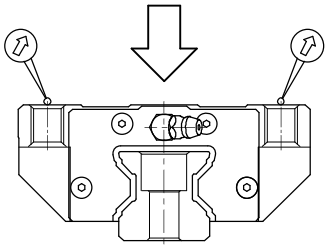
The Optimization Design of Four Directional Load

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.



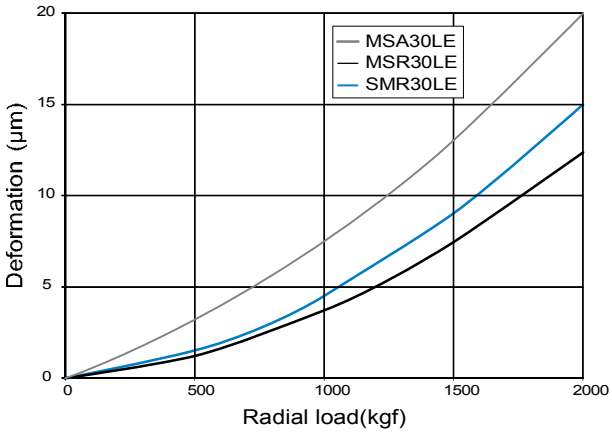


Ultra High Rigidity



Test data of rigidity

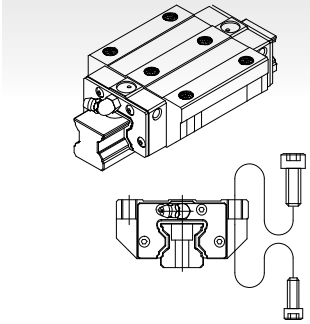
Test samples：Ball type MSA30LE with preload F1
Full roller type MSR30LE with preload F1
Roller chain type SMR30LE with preload F1



C. Carriage Type

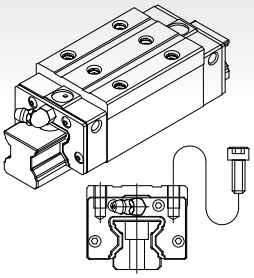
Heavy Load

MSR-E Type



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

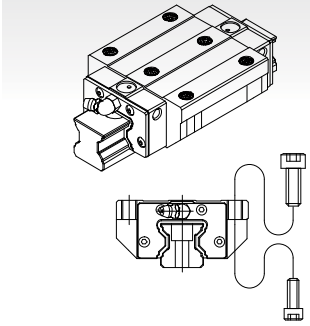
MSR-S Type



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

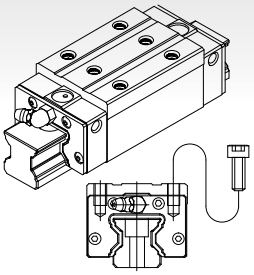
Ultra Heavy Load

MSR-LE Type



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

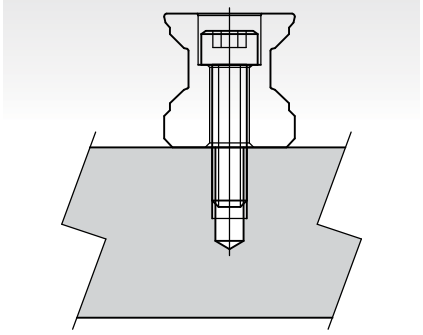
MSR-LS Type



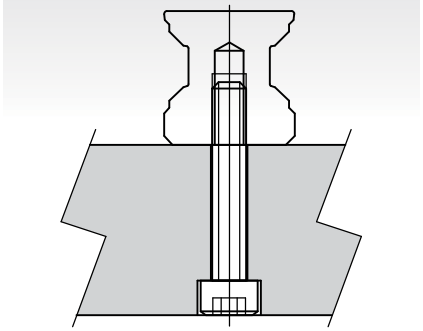
All dimensions are same as MSR-S except the length is longer, which makes it more rigid.

D. Rail Type

Counter bore (R type)

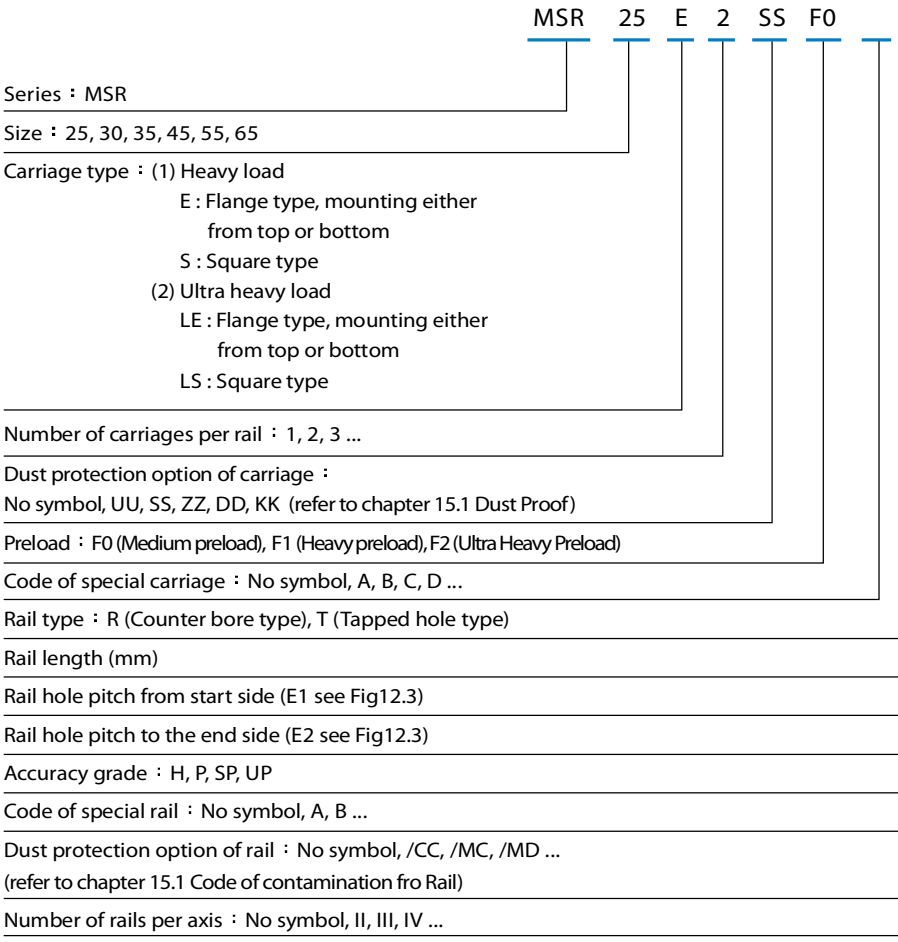


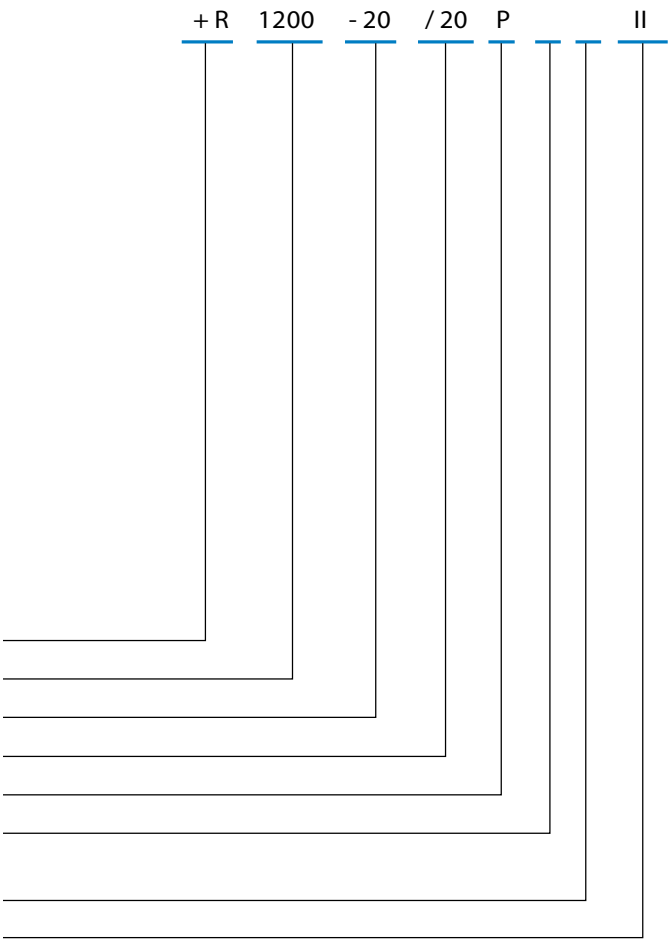
Tapped Hole (T type)



E. Description of Specification

(1) Non-interchangeable Type




+ R
1200
- 20
/ 20
P
II

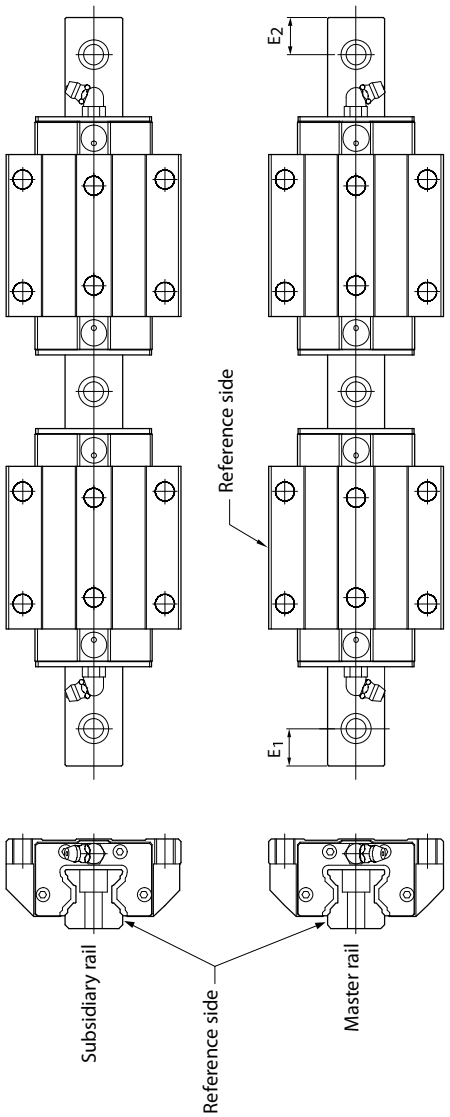

E2
Reference side
E1
Subsidiary rail
Reference side
Master rail

Fig. 12.3

(2) Interchangeable Type

Code of Carriage

MSR 25 E SS F0 H

Series：MSR
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

MSR 25 R 1200 -20 /20 H

Series：MSR
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.12.3)
Rail hole pitch to the end side (E2, see Fig.12.3)
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

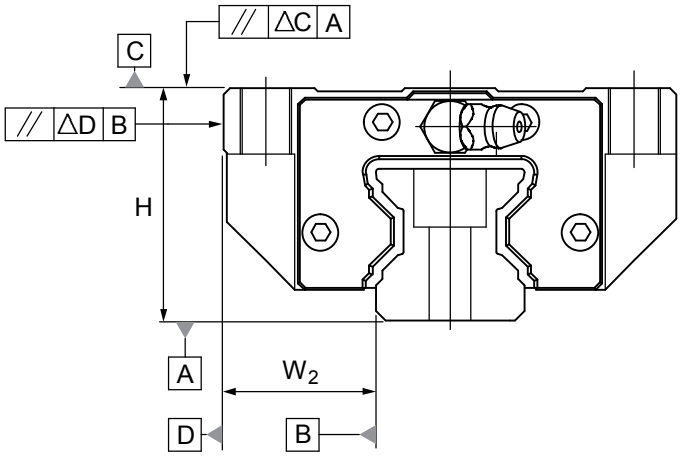


Table 1 Running Parallelism

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

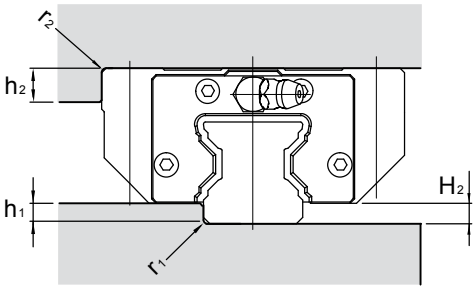
Series	Preload grade		
	Medium preload (F0)	Heavy preload(F1)	Ultra heavy preload(F2)
MSR25	0.04~0.06C	0.07~0.09C	0.12~0.14C
MSR30			
MSR35			
MSR45			
MSR55			
MSR25L	0.04~0.06C	0.07~0.09C	0.12~0.14C
MSR30L			
MSR35L			
MSR45L			
MSR55L			
MSR65L			

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

MSR series

Unit: mm



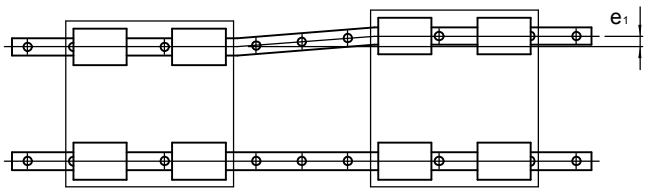
Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
25	0.5	0.5	4	8	4.8
30	0.5	0.5	5	8	6
35	1	1	5.5	10	6.5
45	1	1	6	12	8.1
55	1	1	8	15	10
65	1	1	10	15	12

I. Dimensional Tolerance of Mounting Surface

MSR Series

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.

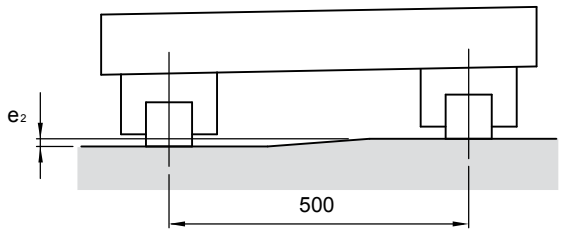
The parallel deviation between two axes (e_1)



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)

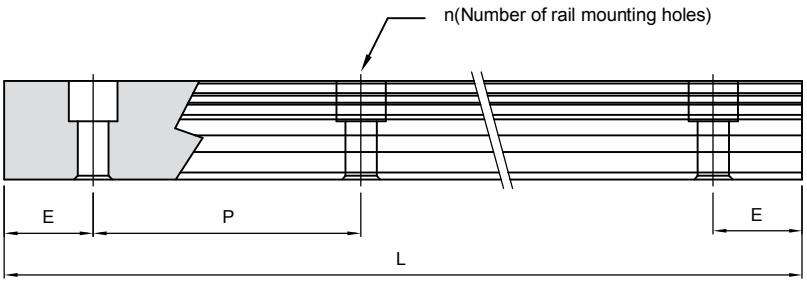


Unit: μm

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



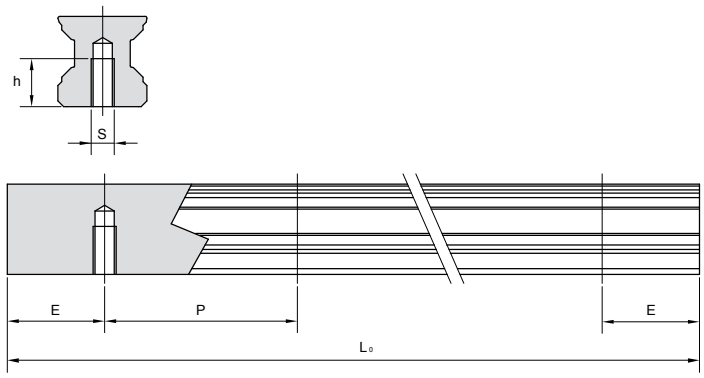
$$L=(n-1)\times P+2\times E$$

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

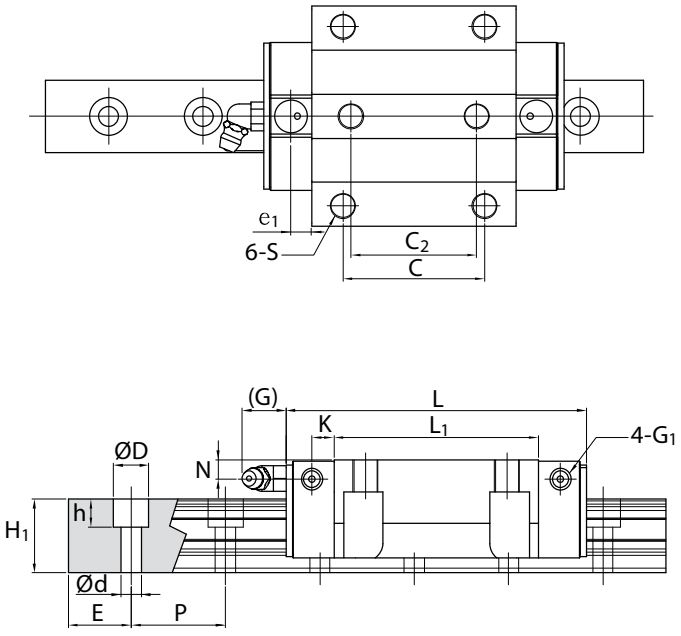
Model No.	Standard Pitch (P)	Standard ($E_{std.}$)	Minimum ($E_{min.}$)	Max (L_0 max.)
MSR 25	30	20	7	4000
MSR 30	40	20	8	4000
MSR 35	40	20	8	4000
MSR 45	52.5	22.5	11	4000
MSR 55	60	30	13	4000
MSR 65	75	35	14	4000

K. Tapped-hole Rail Dimensions



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

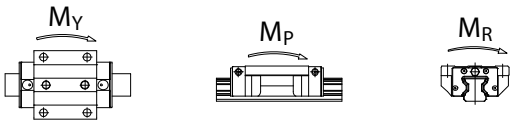
Dimensions of MSR-E / MSR-LE

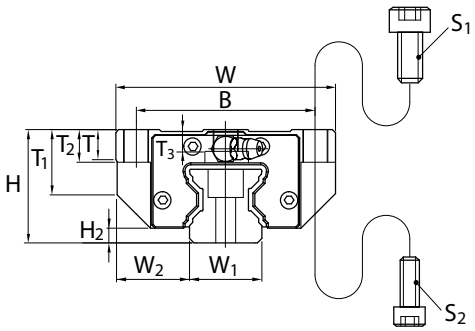


Unit: mm

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
MSR 25 E MSR 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
MSR 30 E MSR 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
MSR 35 E MSR 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
MSR 45 E MSR 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
MSR 55 E MSR 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
MSR 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.



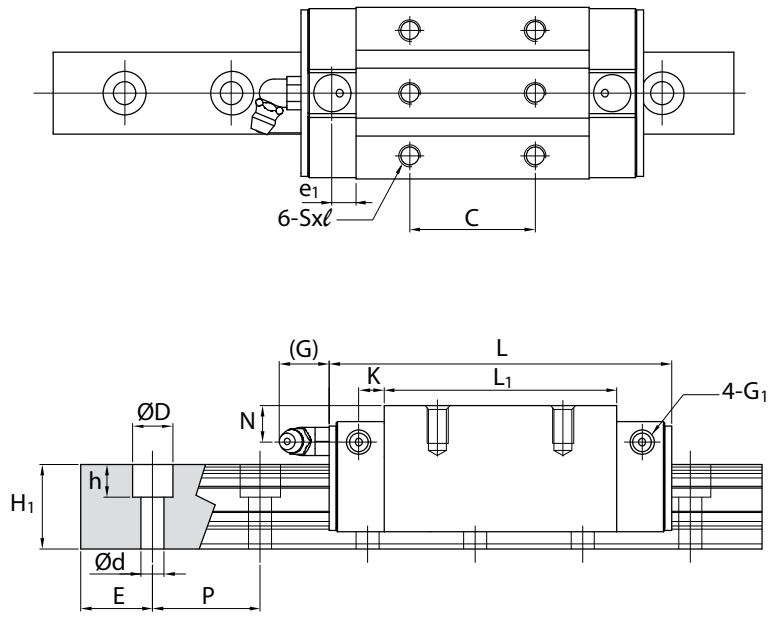


Model No.	Bolt Size	
	S_1	S_2
MSR 25	M8	M6
MSR 30	M10	M8
MSR 35	M10	M8
MSR 45	M12	M10
MSR 55	M14	M12
MSR 65	M16	M14

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
MSR 25 E	23	23.5	30	20	11×9×7	29.6	63.8	0.65	3.82	0.65	3.82	0.73	0.75	3.5
MSR 25 LE						36.3	82.9	1.08	5.94	1.08	5.94	0.95	0.95	
MSR 30 E	28	27.5	40	20	14×12×9	42.8	91.9	1.09	6.38	1.09	6.38	1.27	1.4	5
MSR 30 LE						54.0	124.0	1.96	10.60	1.96	10.60	1.75	1.72	
MSR 35 E	34	30.5	40	20	14×12×9	57.9	123.5	1.59	9.56	1.59	9.56	2.09	1.95	7
MSR 35 LE						73.9	169.0	2.94	16.18	2.94	16.18	2.85	2.45	
MSR 45 E	45	37	52.5	22.5	20×17×14	92.8	193.8	3.28	18.76	3.28	18.76	4.40	3.9	11.2
MSR 45 LE						117.2	261.6	5.90	31.32	5.90	31.32	5.94	4.5	
MSR 55 E	53	43	60	30	23×20×16	132.8	270.0	5.49	31.18	5.49	31.18	7.33	6	15.6
MSR 55 LE						172.5	378.0	10.60	55.58	10.60	55.58	10.28	7.9	
MSR 65 LE	63	52	75	35	26×22×18	277.0	624.0	22.50	117.87	22.50	117.87	20.02	17.6	22.4

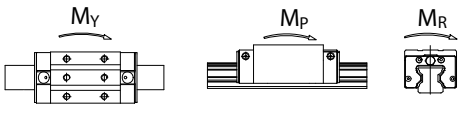
Dimensions of MSR-S / MSR-LS

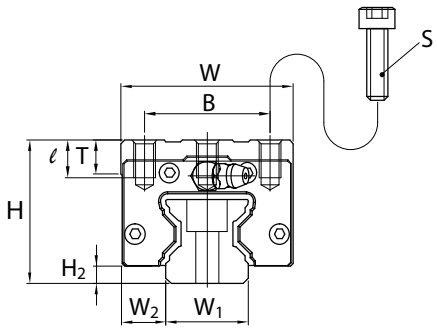


Unit: mm

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
MSR 25 S MSR 25 LS	40	48	97.5 115.5	12.5	4.8	35	35 50	M6	9	65.5 83.5	9.5	10	12	6.6	6.5	M6	G-M6
MSR 30 S MSR 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
MSR 35 S MSR 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
MSR 45 S MSR 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
MSR 55 S MSR 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
MSR 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.



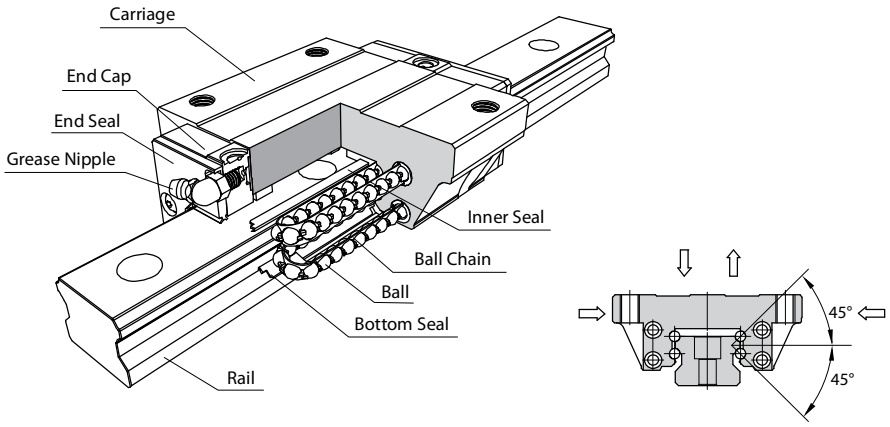


Unit: mm

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
MSR 25 S	23	23.5	30	20	11×9×7	29.6	63.8	0.65	3.82	0.65	3.82	0.73	0.65	3.5
MSR 25 LS						36.3	82.9	1.08	5.94	1.08	5.94	0.95	0.85	
MSR 30 S	28	27.5	40	20	14×12×9	42.8	91.9	1.09	6.38	1.09	6.38	1.27	1	5
MSR 30 LS						54.0	124.0	1.96	10.60	1.96	10.60	1.72	1.22	
MSR 35 S	34	30.5	40	20	14×12×9	57.9	123.5	1.59	9.56	1.59	9.56	2.09	1.65	7
MSR 35 LS						73.9	169.0	2.94	16.18	2.94	16.18	2.85	2.15	
MSR 45 S	45	37	52.5	22.5	20×17×14	92.8	193.8	3.28	18.76	3.28	18.76	4.40	3.2	11.2
MSR 45 LS						117.2	261.6	5.90	31.32	5.90	31.32	5.94	4.1	
MSR 55 S	53	43	60	30	23×20×16	132.8	270.0	5.49	31.18	5.49	31.18	7.33	5.1	15.6
MSR 55 LS						172.5	378.0	10.60	55.58	10.60	55.58	10.26	7	
MSR 65 LS	63	52	75	35	26×22×18	277.0	624.0	22.50	117.87	22.50	117.87	20.02	13.3	22.4

12.5 Ball Chain Type, SME Series

A. Construction



B. Characteristics

The ball chain type linear guideway, SME series, equip with the patent of ball chain design can make the movement smooth and stability, especially suit for the requests of high speed, high accuracy.

The Optimization Design of Four Directional Load

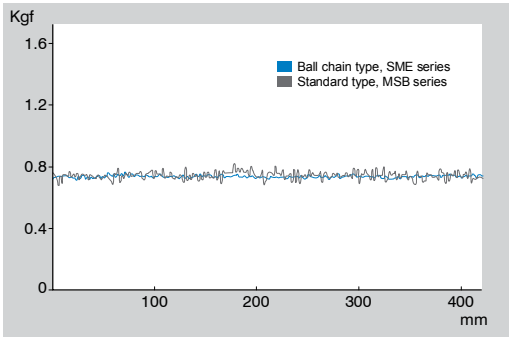
Through the structure stress analysis, SME series have four trains of balls are designed to a circular contact angle of 45° and the section design for high rigidity. Except for bearing heavier loads in radial, reversed radial and lateral directions, a sufficient preload can be achieved to increase rigidity,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

Self Alignment Capability

The self adjustment is performed spontaneously as the design of face-face (DF) circular arc groove. Therefore, the installation error could be compensated even under a preload, and which results in precise and smooth linear motion.

Ball Chain Design, Smooth Movement

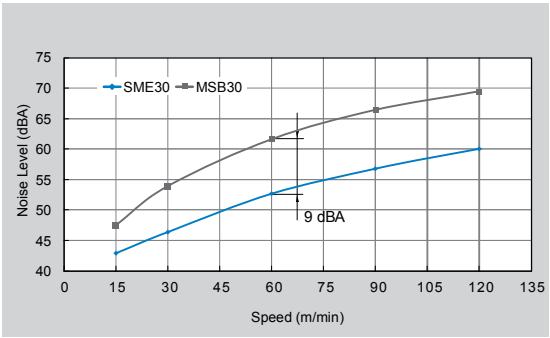
The concise and smooth design of circulating system with strengthened synthetic resin accessories and cooperating with the ball chain, these can avoid interference between balls and make the balls more stability during passing in and out the load district. Besides, the ball chain can keep the ball move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



Rolling resistance test

Low Noise, Good Lubricant Effect

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

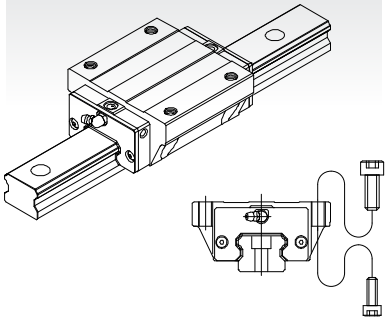


Noise level comparison test

C. Carriage Type

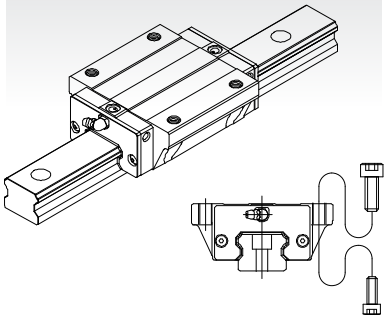
Heavy Load

SME-EA Type



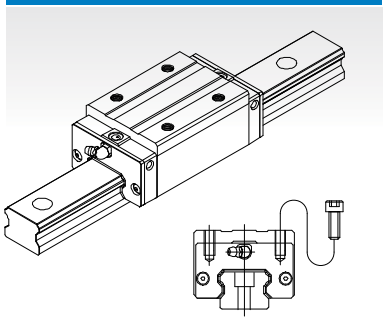
This type offers the installation either from top or bottom side of carriage.

SME-EB Type



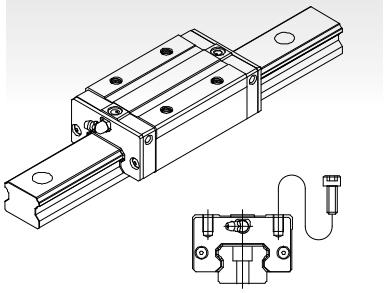
All dimensions are same as SME-EA except the mounting hole dimensions of carriage are different and the height is lower, which do not change the basic loading rating.

SME-SA Type



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

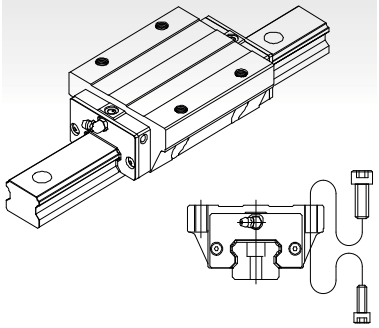
SME-SB / SME-SV Type



All dimensions are same as SME-SA except the mounting hole dimensions of carriage are different and the height is lower, which do not change the basic loading rating.

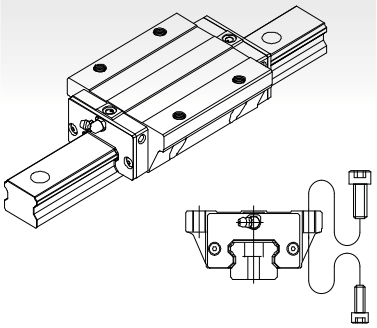
Ultra Heavy Load

SME-LEA Type



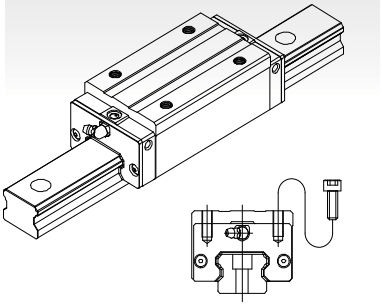
All dimensions are same as SME-EA except the length is longer, which makes it more rigid.

SME-LEB Type



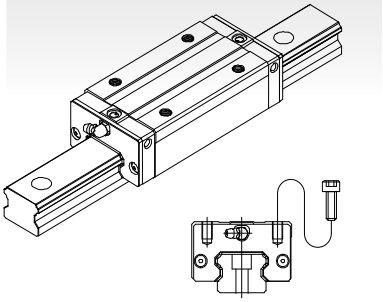
All dimensions are same as SME-EB except the length is longer, which makes it more rigid.

SME-LSA Type



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

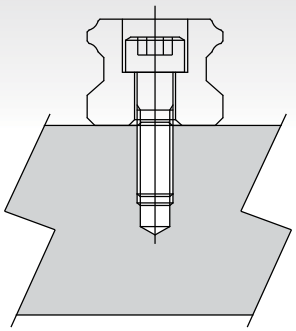
SME-LSB / SME-LSV Type



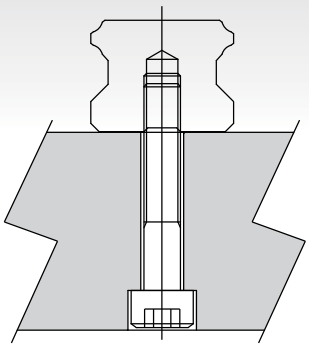
All dimensions are same as SME-SB and SME-SV except the length is longer, which makes it more rigid.

D. Rail Type

Counter bore(R type)



Tapped-Hole(T type)



E. Description of Specification

(1) Non-interchangeable Type

SME 25 EA 2 SS F0

Series：SME

Size：15, 20, 25, 30, 35, 45

Carriage type：(1) Heavy load
EA：Flange type, mounting either from top or bottom
EB：Compact flange type, mounting either from top or bottom
SA：Square type
SB/SV：Compact square type
(2) Ultra heavy load
LEA：Flange type, mounting either from top or bottom
LEB：Compact flange type, mounting either from top or bottom
LSA：Square type
LSB/LSV：Compact 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：
FC (Light Preload), F0 (Medium preload), F1 (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 Fig.12.5)

Rail hole pitch to the end side (E2, see Fig.12.5)

Accuracy grade：N, 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 1000 -20 /20 P II

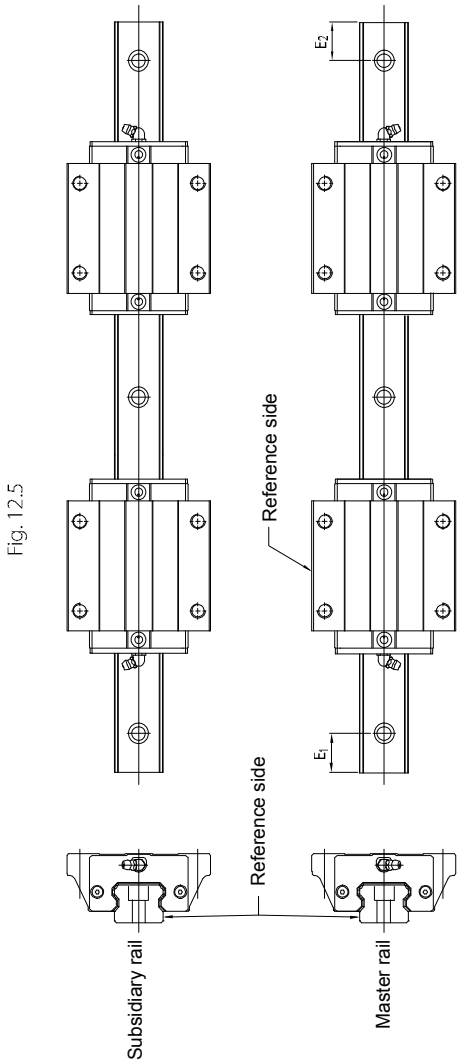

E2
Reference side
E1
Reference side
Subsidiary rail
Master rail

Fig. 12.5

(2) Interchangeable Type

Code of Carriage

SME 25 EA SS FC H

Series：SME

Size：15, 20, 25, 30, 35, 45

Carriage type：(1) Heavy load
- EA：Flange type, mounting either from top or bottom
- EB：Compact flange type, mounting either from top or bottom
- SA：Square type
- SB/SV：Compact square type

(2) Ultra heavy load
- LEA：Flange type, mounting either from top or bottom
- LEB：Compact flange type, mounting either from top or bottom
- LSA：Square type
- LSB/LSV：Compact square type

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

Preload：FC (Light Preload), F0 (Medium preload)

Accuracy grade：N, H, P

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

Code of Rail

SME 25 R 1000 -20 /20 H

Series：SME

Size：15, 20, 25, 30, 35, 45

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

Rail length (mm)

Rail hole pitch from start side (E1, see Fig.12.5)

Rail hole pitch to the end side (E2, see Fig.12.5)

Accuracy grade：N, 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

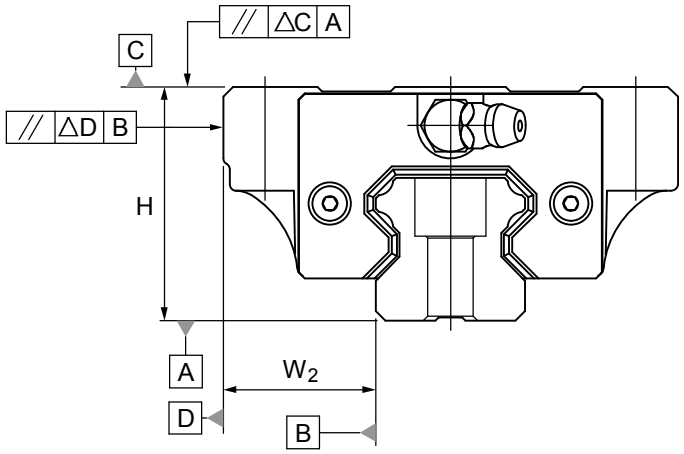


Table 1 Running Parallelism

Rail length (mm)		Running Parallelism Values(μm)				
Above	Or less	N	H	P	SP	UP
0	315	9	6	3	2	1.5
315	400	11	8	4	2	1.5
400	500	13	9	5	2	1.5
500	630	16	11	6	2.5	1.5
630	800	18	12	7	3	2
800	1000	20	14	8	4	2
1000	1250	22	16	10	5	2.5
1250	1600	25	18	11	6	3
1600	2000	28	20	13	7	3.5
2000	2500	30	22	15	8	4
2500	3000	32	24	16	9	4.5
3000	3500	33	25	17	11	5
3500	4000	34	26	18	12	6

A Non-Interchangeable Type

Model No.	Item	Accuracy Grade				
		Normal N	High H	Precision P	Super Precision SP	Ulitra Precision UP
15 20	Tolerance for height H	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Height difference ΔH	0.02	0.01	0.006	0.004	0.003
	Tolerance for distance W_2	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Difference in distance W_2(ΔW_2)	0.02	0.01	0.006	0.004	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)				
25 30 35	Tolerance for height H	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Height difference ΔH	0.02	0.015	0.007	0.005	0.003
	Tolerance for distance W_2	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Difference in distance W_2(ΔW_2)	0.03	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	Tolerance for height H	±0.1	±0.05	0 -0.05	0 -0.03	0 -0.02
	Height difference ΔH	0.03	0.015	0.007	0.005	0.003
	Tolerance for distance W_2	±0.1	±0.05	0 -0.05	0 -0.03	0 -0.02
	Difference in distance W_2(ΔW_2)	0.03	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)				

B Interchangeable Type

Model No.	Item	Accuracy Grade		
		Normal N	High H	Precision P
15 20	Tolerance for height H	±0.1	±0.03	0 -0.03
	Height difference ΔH	0.02	0.01	0.006
	Tolerance for distance W_2	±0.1	±0.03	0 -0.03
	Difference in distance W_2(ΔW_2)	0.02	0.01	0.006
	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)		
25 30 35	Tolerance for height H	±0.1	±0.04	0 -0.04
	Height difference ΔH	0.02	0.015	0.007
	Tolerance for distance W_2	±0.1	±0.04	0 -0.04
	Difference in distance W_2(ΔW_2)	0.03	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	Tolerance for height H	±0.1	±0.05	0 -0.05
	Height difference ΔH	0.03	0.015	0.007
	Tolerance for distance W_2	±0.1	±0.05	0 -0.05
	Difference in distance W_2(ΔW_2)	0.03	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)		

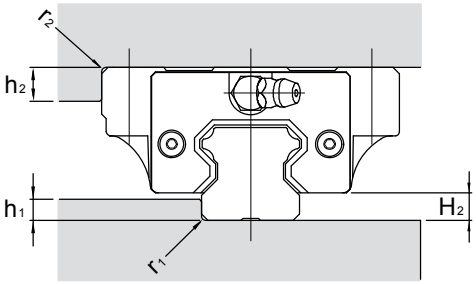
G. Preload Grade

Series	Preload grade		
	Light preload (FC)	Medium preload (F0)	Heavy preload (F1)
SME15	0.01~0.03C	0.04~0.06C	-
SME20			0.07~0.09C
SME25			
SME30			
SME35			
SME45			
SME15L	0.01~0.03C	0.04~0.06C	0.07~0.09C
SME20L			
SME25L			
SME30L			
SME35L			
SME45L			

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



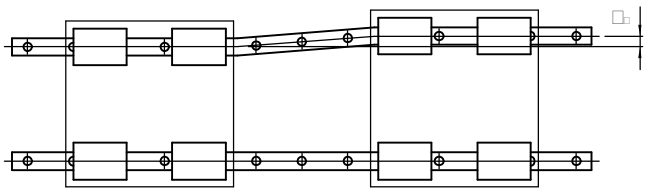
Unit: mm

Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
15	0.5	0.5	2.5	5	3.5
20	0.5	0.5	3.5	5	4.7
25	1	1	5	6	5.8
30	1	1	5	7	7.5
35	1	1	6	8	8
45	1	1	8	8	10

I. Dimensional Tolerance of Mounting Surface

SME with the self alignment capability, 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.

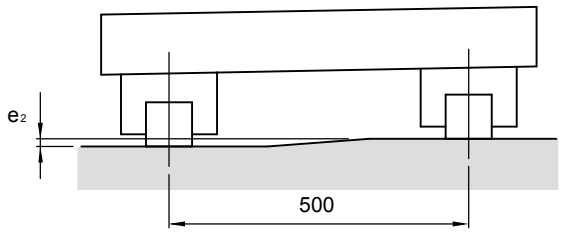
The parallel deviation between two axes (e_1)



Unit: μm

Model No.	Preload Grade		
	FC	F0	F1
15	25	18	-
20	25	20	18
25	30	22	20
30	40	30	27
35	50	35	30
45	60	40	35

Level difference between two axes (e_2)

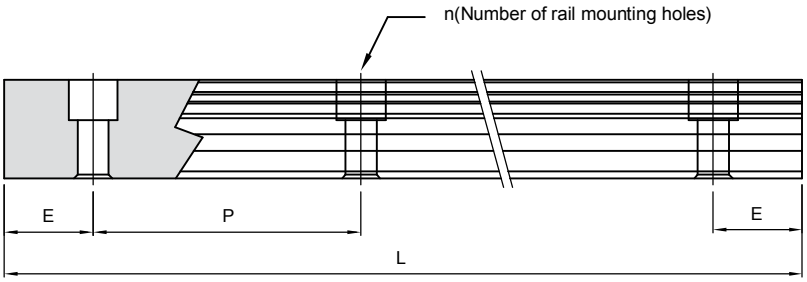


Unit: μm

Model No.	Preload Grade		
	FC	F0	F1
15	130	85	-
20	130	85	50
25	130	85	70
30	170	110	90
35	210	150	120
45	250	170	140

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

J. Rail Maximum Length and Standrad



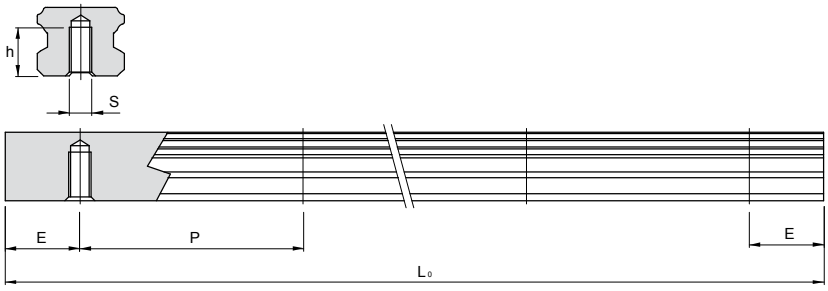
$$L=(n-1)\times P+2\times E$$

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

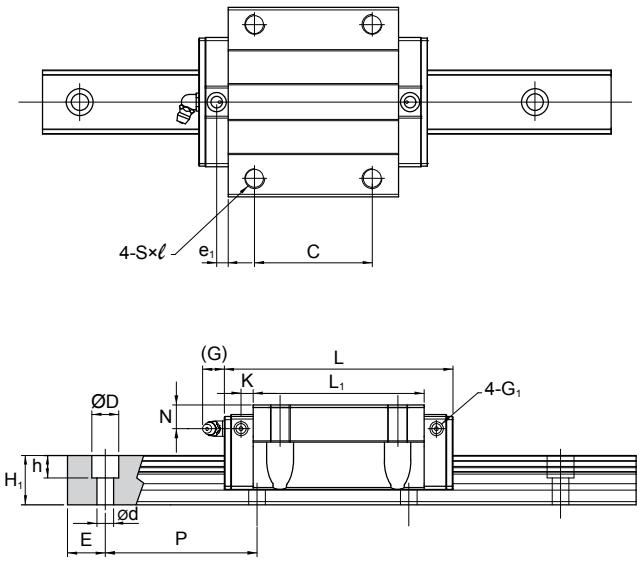
Model No.	Standard Pitch (P)	Standard ($E_{std.}$)	Minimum ($E_{min.}$)	Max (L_0 max.)
SME 15	60	20	5	4000
SME 20	60	20	6	4000
SME 25	60	20	7	4000
SME 30	80	20	8	4000
SME 35	80	20	8	4000
SME 45	105	22.5	11	4000

K. Tapped-hole Rail Dimensions



Rail Model	S	h(mm)
SME 15 T	M5	8
SME 20 T	M6	10
SME 25 T	M6	12
SME 30 T	M8	15
SME 35 T	M8	17
SME 45 T	M12	24

Dimensions of SME-EA / SME-LEA

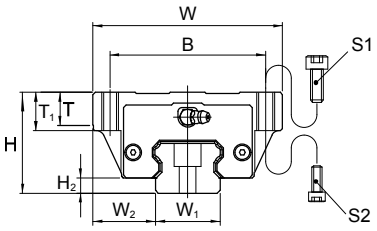


Unit: mm

Model No.	External dimension					Carriage dimension											
	Height H	Width W	Length L	W_2	H_2	B	C	S×ℓ	L_1	T	T_1	N	G	K	e_1	G_1	Grease Nipple
SME 15 EA SME 15 LEA	24	47	64.4 79.4	16	3.5	38	30	M5×8	48 63	5.5	8	5	5.5	2.7	-	M4	G-M4
SME 20 EA SME 20 LEA	30	63	78.5 97.5	21.5	4.7	53	40	M6×10	58.3 77.3	7	10	8	12	3.7	-	M4	G-M6
SME 25 EA SME 25 LEA	36	70	92 109	23.5	5.8	57	45	M8×13	71 88	7	13	10	12	4.7	-	M4	G-M6
SME 30 EA SME 30 LEA	42	90	107.6 132.6	31	7.5	72	52	M10×15	80 105	12	15	8	12	4.5	5.4	M6	G-M6
SME 35 EA SME 35 LEA	48	100	120.6 150.6	33	8	82	62	M10×15	90 120	12	15	8	12	5.4	6	M6	G-M6
SME 45 EA SME 45 LEA	60	120	140 174.5	37.5	10	100	80	M12×18	106 140.5	12	18	10	13.5	8.5	6.1	M6	G-PT 1/8

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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

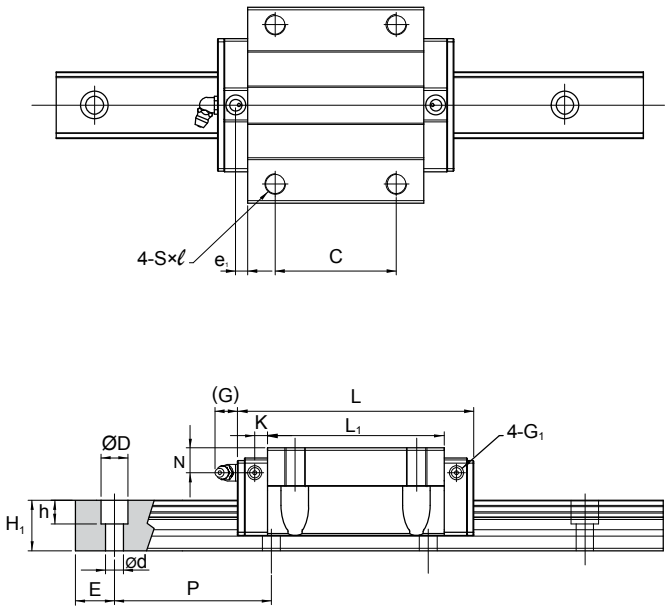


Model No.	Bolt Size	
	S_1	S_2
SME 15	M5	M4
SME 20	M6	M5
SME 25	M8	M6
SME 30	M10	M8
SME 35	M10	M8
SME 45	M12	M10

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
SME 15 EA	15	13	60	20	7.5×5.8×4.5	12.5	20.2	0.14	0.69	0.14	0.69	0.16	0.22	1.4
SME 15 LEA						15.4	27.5	0.25	1.15	0.25	1.15	0.21	0.29	
SME 20 EA	20	15.5	60	20	9.5×8.5×6	20.4	32.1	0.27	1.34	0.27	1.34	0.33	0.42	2.3
SME 20 LEA						25.3	43.6	0.49	2.24	0.49	2.24	0.44	0.62	
SME 25 EA	23	18	60	20	11×9×7	28.3	44.3	0.45	2.14	0.45	2.14	0.52	0.67	3.2
SME 25 LEA						33.0	56.1	0.71	3.20	0.71	3.20	0.66	0.89	
SME 30 EA	28	23	80	20	14×12×9	39.4	59.5	0.68	3.37	0.68	3.37	0.83	1.18	4.5
SME 30 LEA						47.0	76.5	1.11	5.32	1.11	5.32	1.07	154	
SME 35 EA	34	26	80	20	14×12×9	54.7	81.0	1.07	5.25	1.07	5.25	1.41	1.74	6.2
SME 35 LEA						67.6	109.9	1.92	8.75	1.92	8.75	1.91	2.28	
SME 45 EA	45	32	105	22.5	20×17×14	72.7	105.8	1.61	7.82	1.61	7.82	2.41	3.22	10.5
SME 45 LEA						90.0	143.6	2.88	13.08	2.88	13.08	3.27	4.21	

Dimensions of SME-EB / SME-LEB

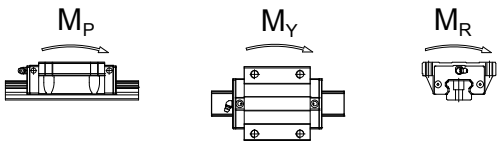


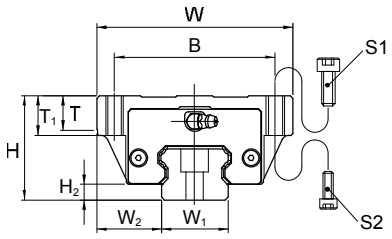
Unit: mm

Model No.	External dimension					Carriage dimension											
	Height H	Width W	Length L	W_2	H_2	B	C	S×ℓ	L_1	T	T_1	N	G	K	e_1	G_1	Grease Nipple
SME 15 EB SME 15 LEB	24	52	64.4 79.4	18.5	3.5	41	26 36	M5×8	48 63	5.5	8	5	5.5	2.7	-	M4	G-M4
SME 20 EB SME 20 LEB	28	59	78.5 97.5	19.5	4.7	49	32 45	M6×8	58.3 77.3	7.0	8	6.0	12	3.7	-	M4	G-M6
SME 25 EB SME 25 LEB	33	73	92 109	25	5.8	60	35 50	M8×10	71 88	7.0	10	7.0	12	4.7	-	M4	G-M6

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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



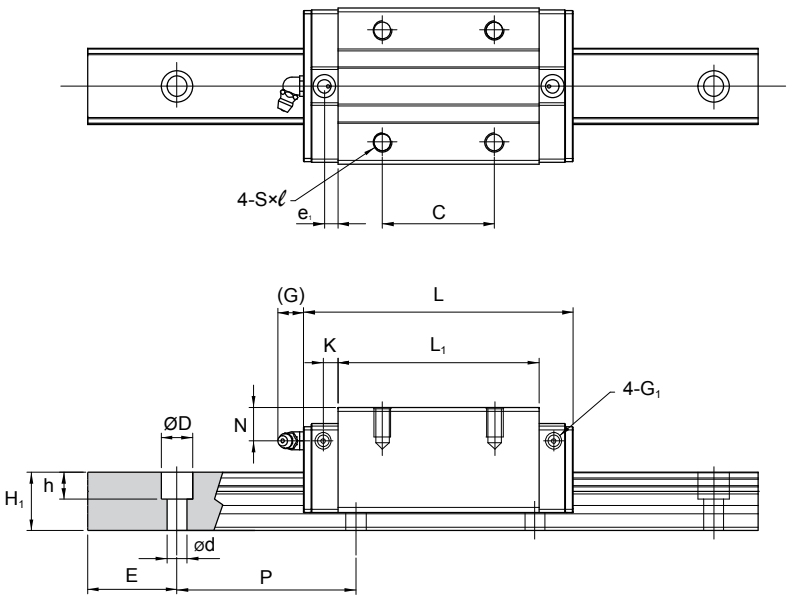


Model No.	Bolt Size	
	S_1	S_2
SME 15	M5	M4
SME 20	M6	M5
SME 25	M8	M6

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
SME 15 EB	15	13	60	20	7.5×5.8×4.5	12.5	20.2	0.14	0.69	0.14	0.69	0.16	0.21	1.4
SME 15 LEB						15.4	27.5	0.25	1.15	0.25	1.15	0.21	0.27	
SME 20 EB	20	15.5	60	20	9.5×8.5×6	20.4	32.1	0.27	1.34	0.27	1.34	0.33	0.39	2.3
SME 20 LEB						25.3	43.6	0.49	2.24	0.49	2.24	0.44	0.55	
SME 25 EB	23	18	60	20	11×9×7	28.3	44.3	0.45	2.14	0.45	2.14	0.52	0.42	3.2
SME 25 LEB						33.0	56.1	0.71	3.20	0.71	3.20	0.66	0.65	

Dimensions of SME-SA / SME-LSA

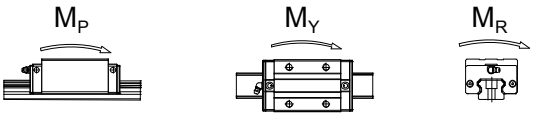


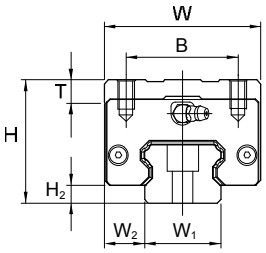
Unit: mm

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
SME 15 SA SME 15 LSA	28	34	64.4 79.4	9.5	3.5	26	26	M4×7.5	48 63	6	9	5.5	2.7	-	M4	G-M4
SME 20 SA SME 20 LSA	30	44	78.5 97.5	12	4.7	32	36 50	M5×7	58.3 77.3	6	8	12	3.7	-	M4	G-M6
SME 25 SA SME 25 LSA	40	48	92 109	12.5	5.8	35	35 50	M6×12	71 88	8	14	12	4.7	-	M4	G-M6
SME 30 SA SME 30 LSA	45	60	107.6 132.6	16	7.5	40	40 60	M8×12	80 105	8	11	12	4.5	5.4	M6	G-M6
SME 35 SA SME 35 LSA	55	70	120.6 150.6	18	8	50	50 72	M8×14	90 120	11	15	12	5.4	6	M6	G-M6
SME 45 SA SME 45 LSA	70	86	140 174.5	20.5	10	60	60 80	M10×20	106 140.5	16	20	13.5	8.5	6.1	M6	G-PT 1/8

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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

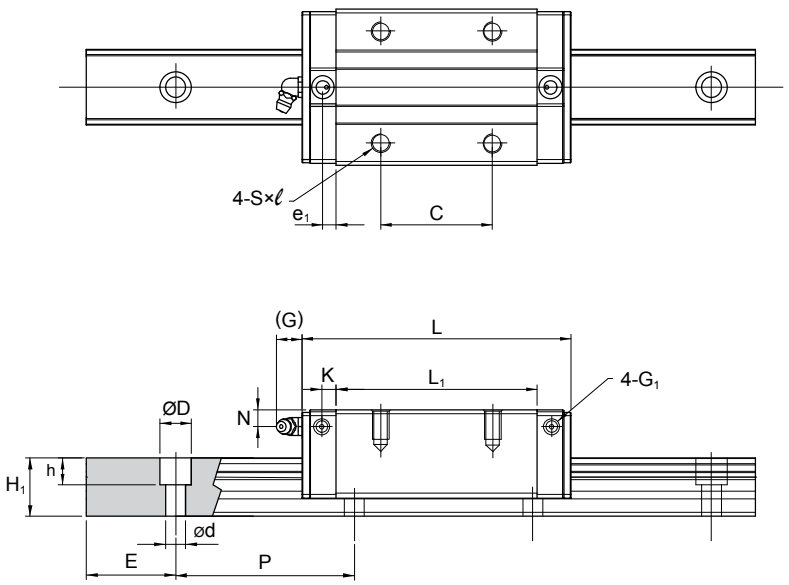




Unit: mm

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
SME 15 SA	15	13	60	20	7.5×5.8×4.5	12.5	20.2	0.14	0.69	0.14	0.69	0.16	0.22	1.4
SME 15 LSA						15.4	27.5	0.25	1.15	0.25	1.15	0.21	0.25	
SME 20 SA	20	15.5	60	20	9.5×8.5×6	20.4	32.1	0.27	1.34	0.27	1.34	0.33	0.30	2.3
SME 20 LSA						25.3	43.6	0.49	2.24	0.49	2.24	0.44	0.39	
SME 25 SA	23	18	60	20	11×9×7	28.3	44.3	0.45	2.14	0.45	2.14	0.52	0.56	3.2
SME 25 LSA						33.0	56.1	0.71	3.20	0.71	3.20	0.66	0.73	
SME 30 SA	28	23	80	20	14×12×9	39.4	59.5	0.68	3.37	0.68	3.37	0.83	0.93	4.5
SME 30 LSA						47.0	76.5	1.11	5.32	1.11	5.32	1.07	1.21	
SME 35 SA	34	26	80	20	14×12×9	54.7	81.0	1.07	5.25	1.07	5.25	1.41	1.57	6.2
SME 35 LSA						67.6	109.9	1.92	8.75	1.92	8.75	1.91	2.05	
SME 45 SA	45	32	105	22.5	20×17×14	72.7	105.8	1.61	7.82	1.61	7.82	2.41	3.06	10.5
SME 45 LSA						90.0	143.6	2.88	13.08	2.88	13.08	3.27	4.00	

Dimensions of SME-SB / SME-LSB

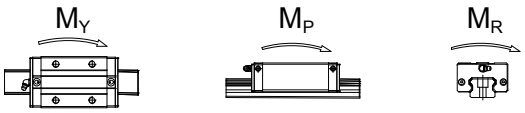


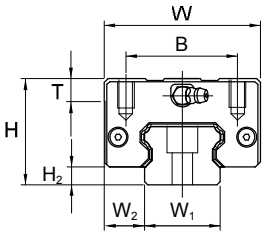
Unit: mm

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
SME 15 SB SME 15 LSB	24	34	64.4 79.4	9.5	3.5	26	26 34	M4×5	48 63	6	5	5.5	2.7	-	M4	G-M4
SME 20 SB SME 20 LSB	28	42	78.5 97.5	11	4.7	32	32 45	M5×5.5	58.3 77.3	6	6	12	3.7	-	M4	G-M6
SME 25 SB SME 25 LSB	33	48	92 109	12.5	5.8	35	35 50	M6×7	71 88	8	7	12	4.7	-	M4	G-M6
SME 25 SV SME 25 LSV	36	48	92 109	12.5	5.8	35	35 50	M6×9	71 88	8	10	12	4.7	-	M4	G-M6
SME 30 SB SME 30 LSB	42	60	107.6 132.6	16	7.5	40	40 60	M8×10	80 105	8	8	12	4.5	5.4	M6	G-M6
SME 35 SB SME 35 LSB	48	70	120.6 150.6	18	8	50	50 72	M8×11	90 120	11	8	12	5.4	6	M6	G-M6
SME 45 SB SME 45 LSB	60	86	140 174.5	20.5	10	60	60 80	M10×16	106 140.5	16	10	13.5	8.5	6.1	M6	G-PT 1/8

Note: The basic dynamic load rating C of ball type is based on the 50 km for nomonal life. The conversion between C for 50 km and C_{100} for 100 km is $C=1.26 \times C_{100}$.

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



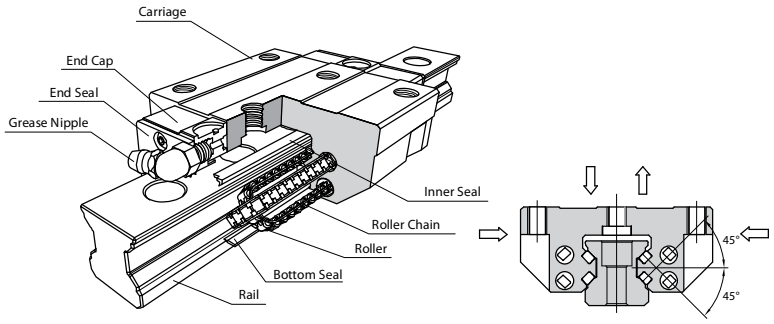


Unit: mm

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
SME 15 SB	15	13	60	20	7.5×5.8×4.5	12.5	20.2	0.14	0.69	0.14	0.69	0.16	0.19	1.4
SME 15 LSB						15.4	27.5	0.25	1.15	0.25	1.15	0.21	0.22	
SME 20 SB	20	15.5	60	20	9.5×8.5×6	20.4	32.1	0.27	1.34	0.27	1.34	0.33	0.26	2.3
SME 20 LSB						25.3	43.6	0.49	2.24	0.49	2.24	0.44	0.35	
SME 25 SB	23	18	60	20	11×9×7	28.3	44.3	0.45	2.14	0.45	2.14	0.52	0.31	3.2
SME 25 LSB						33.0	56.1	0.71	3.20	0.71	3.20	0.66	0.49	
SME 25 SV	23	18	60	20	11×9×7	28.3	44.3	0.45	2.14	0.45	2.14	0.52	0.44	3.2
SME 25 LSV						33.0	56.1	0.71	3.20	0.71	3.20	0.66	0.62	
SME 30 SB	28	23	80	20	14×12×9	39.4	59.5	0.68	3.37	0.68	3.37	0.83	0.85	4.5
SME 30 LSB						47.0	76.5	1.11	5.32	1.11	5.32	1.07	1.10	
SME 35 SB	34	26	80	20	14×12×9	54.7	81.0	1.07	5.25	1.07	5.25	1.41	1.22	6.2
SME 35 LSB						67.6	109.9	1.92	8.75	1.92	8.75	1.91	1.61	
SME 45 SB	45	32	105	22.5	20×17×14	72.7	105.8	1.61	7.82	1.61	7.82	2.41	2.86	10.5
SME 45 LSB						90.0	143.6	2.88	13.08	2.88	13.08	3.27	3.57	

12.6 Roller Chain Type, SMR Series

A. Construction

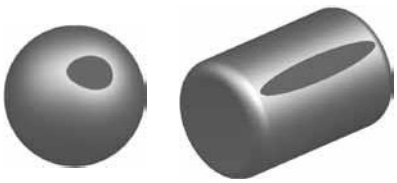


B. Characteristics

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.

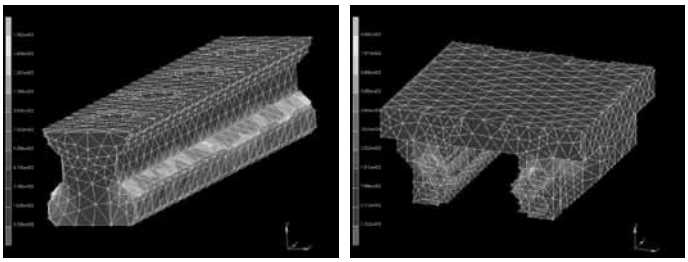
Ultra Heavy Load

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.

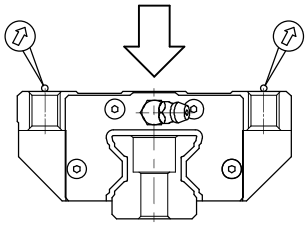


The Optimization Design of Four Directional Load

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

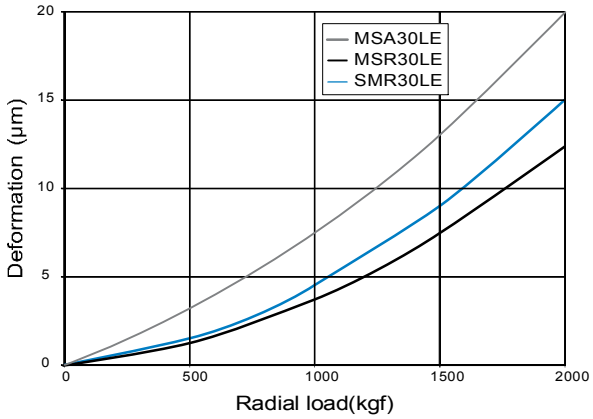


Test data of rigidity

Test samples：Ball type MSA30LE with preload F1

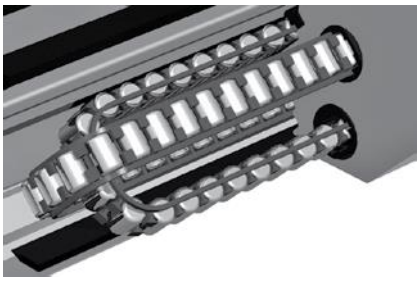
Full roller type MSR30LE with preload F1

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.



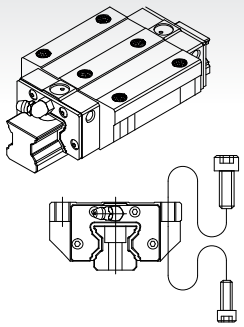
Low Noise, Good Lubricant Effect

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

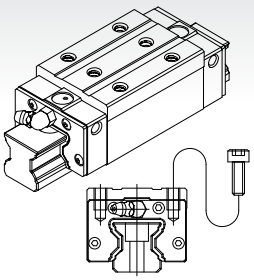
Heavy Load

SMR-E Type



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

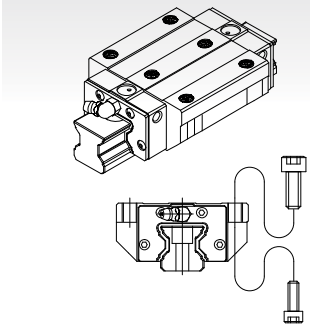
SMR-S Type



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

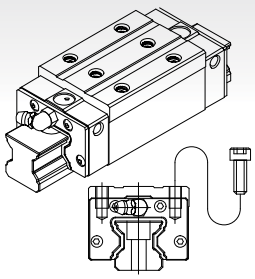
Ultra Heavy Load

SMR-LE Type



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

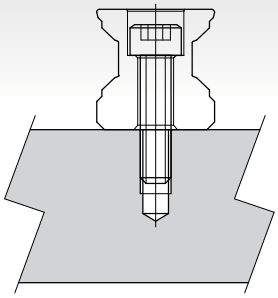
SMR-LS Type



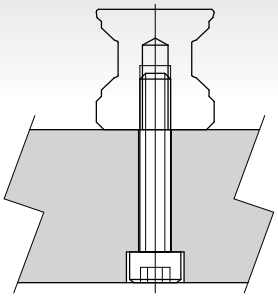
All dimensions are same as SMR-S except the length is longer, which makes it more rigid.

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)

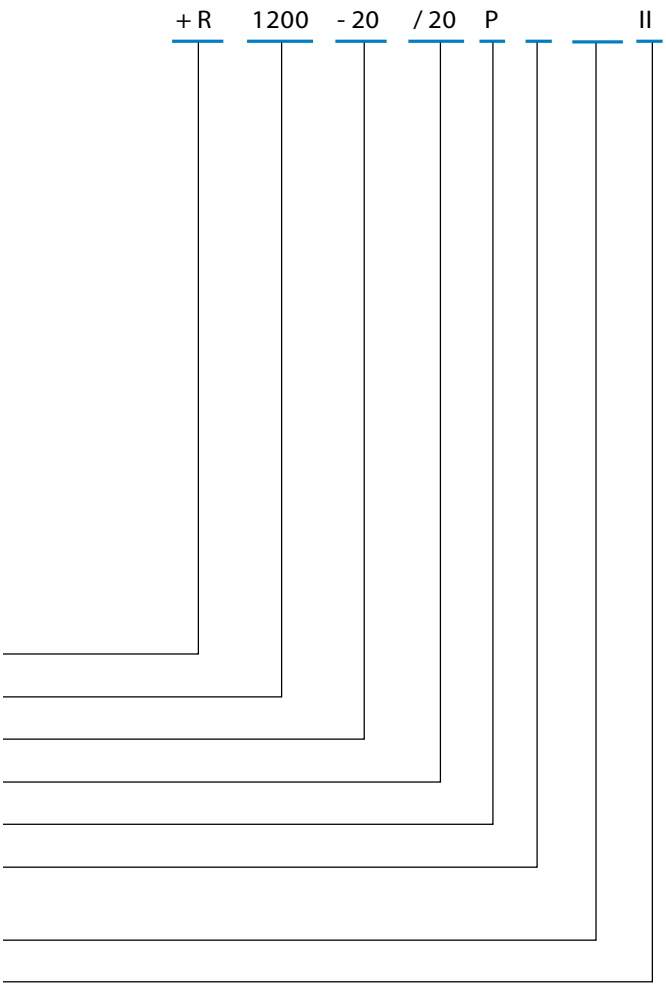
Rail hole pitch to the end side (E2, see Fig12.6)

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

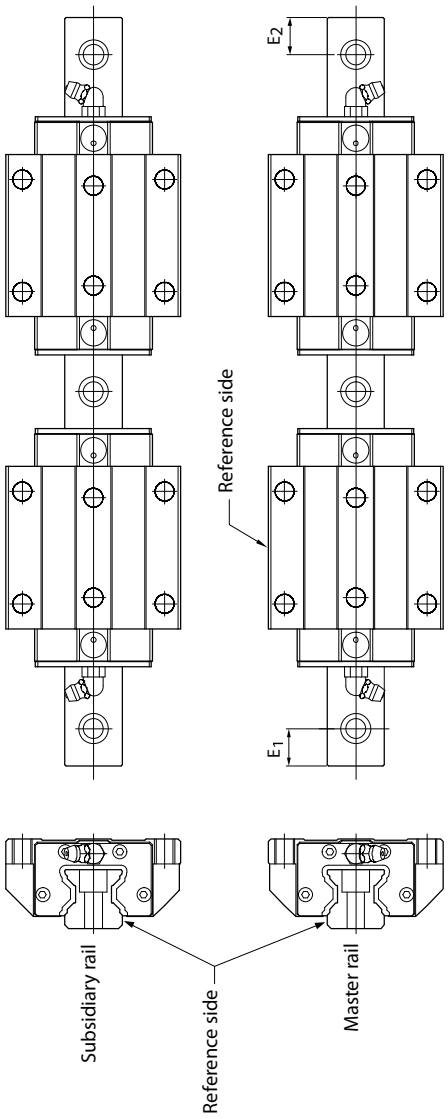

E2
Reference side
E1
Subsidiary rail
Reference side
Master rail

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

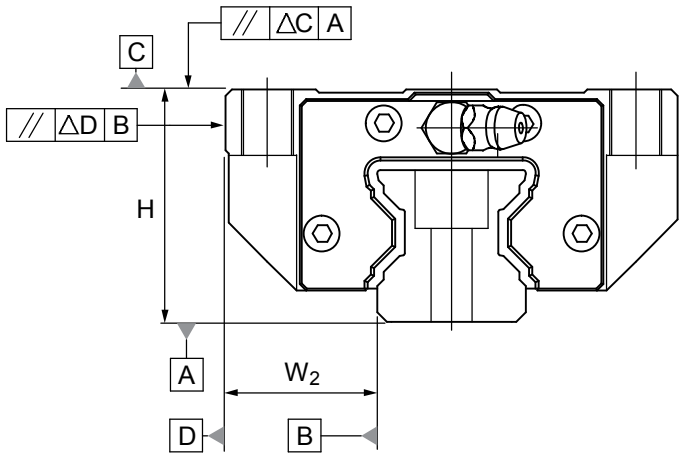


Table 1 Running Parallelism

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

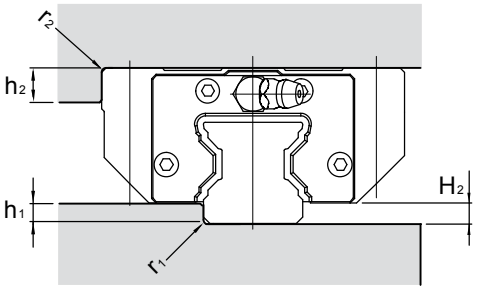
Series	Preload grade		
	Medium preload (F0)	Heavy preload (F1)	Ultra Heavy Preload (F2)
SMR25	0.04~0.06C	0.07~0.09C	0.12~0.14C
SMR30			
SMR35			
SMR45			
SMR55			
SMR25L	0.04~0.06C	0.07~0.09C	0.12~0.14C
SMR30L			
SMR35L			
SMR45L			
SMR55L			
SMR65L			

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

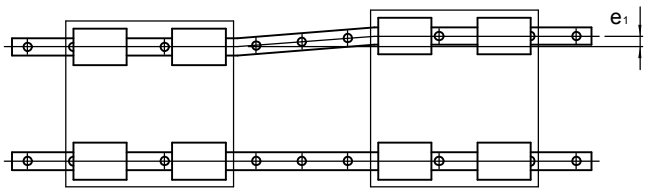


Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
25	0.5	0.5	4	8	4.8
30	0.5	0.5	5	8	6
35	1	1	5.5	10	6.5
45	1	1	6	12	8.1
55	1	1	8	15	10
65	1	1	10	15	12

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.

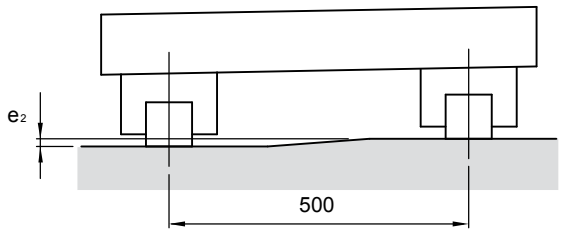
The parallel deviation between two axes (e_1)



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)



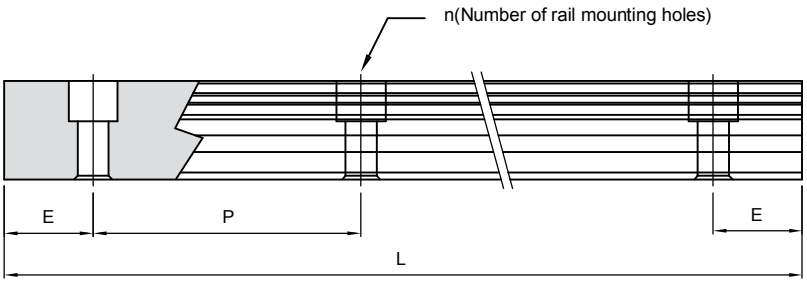
Unit: μm

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



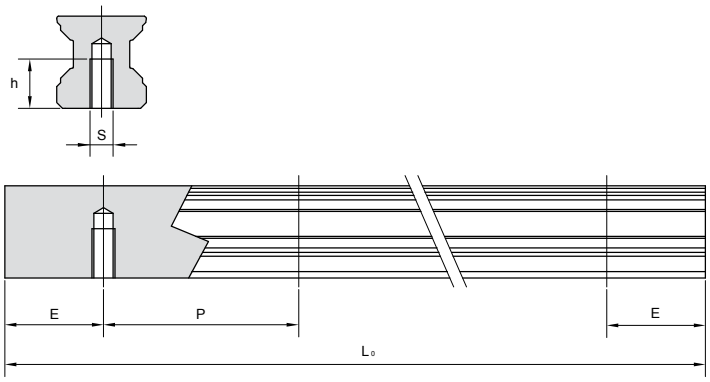
$$L=(n-1)\times P+2\times E$$

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

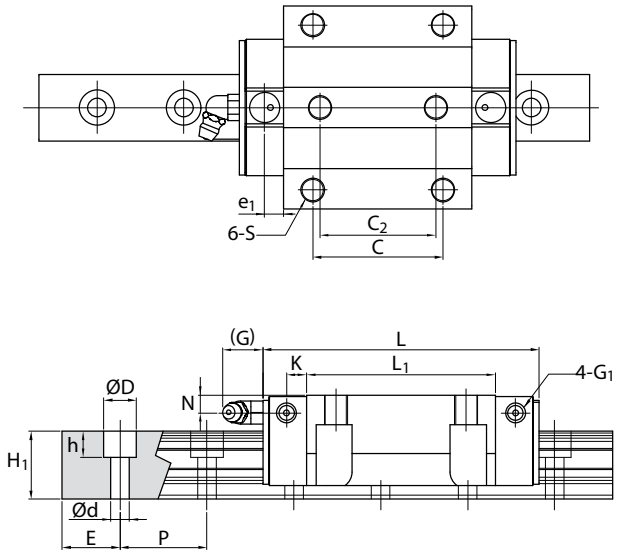
Model No.	Standard Pitch (P)	Standard ($E_{std.}$)	Minimum ($E_{min.}$)	Max (L_0 max.)
SMR 25	30	20	7	4000
SMR 30	40	20	8	4000
SMR 35	40	20	8	4000
SMR 45	52.5	22.5	11	4000
SMR 55	60	30	13	4000
SMR 65	75	35	14	4000

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

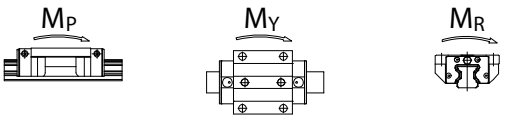
Dimensions of SMR-E / SMR-LE

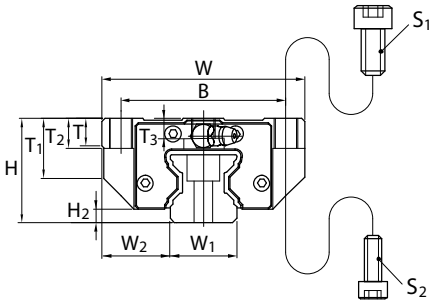


Unit: mm

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.



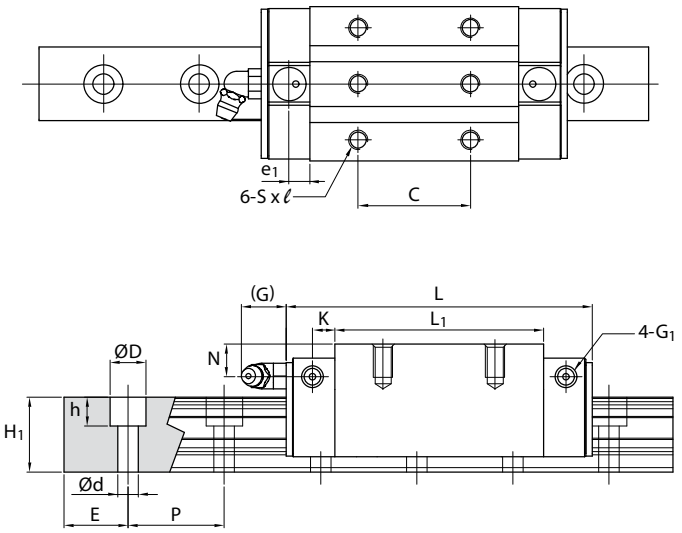


Model No.	Bolt Size	
	S_1	S_2
SMR 25	M8	M6
SMR 30	M10	M8
SMR 35	M10	M8
SMR 45	M12	M10
SMR 55	M14	M12
SMR 65	M16	M14

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

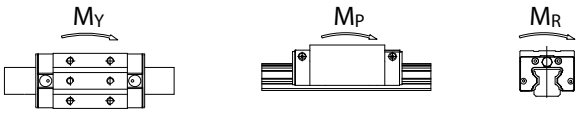
Dimensions of SMR-S / SMR-LS

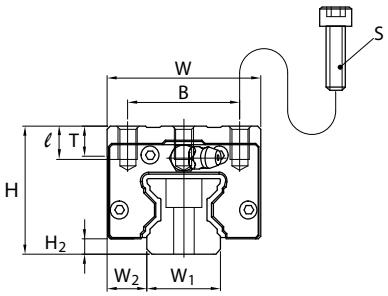


Unit: mm

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