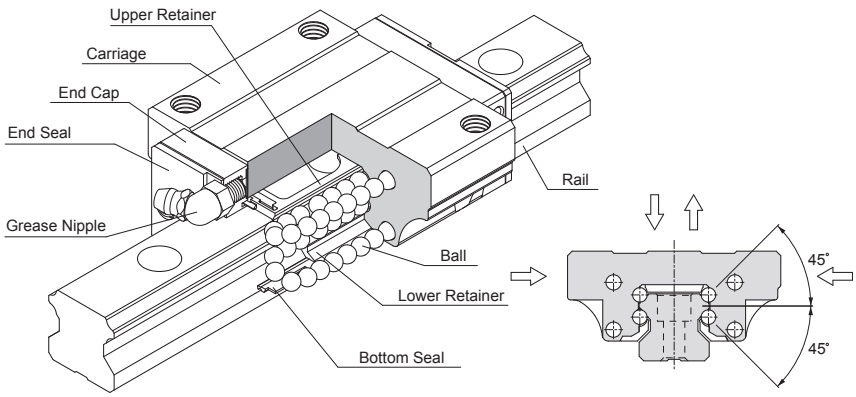
12 Introduction of Each Series

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.

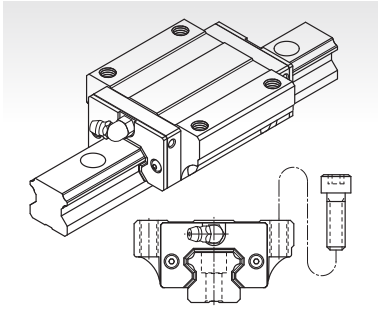
Interchangeability

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

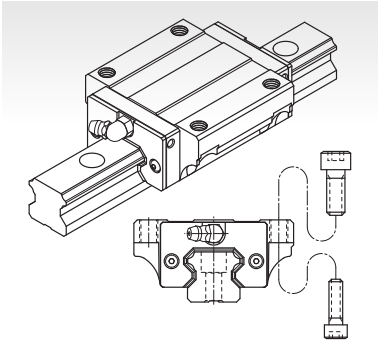
Heavy Load

MSA-A Type



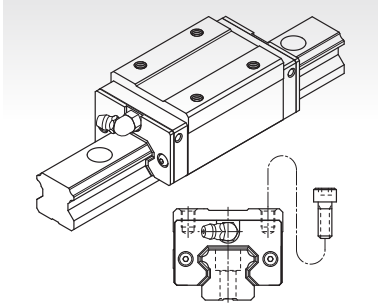
Installed from top side of carriage with the thread length longer than MSA-E type.

MSA-E Type



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

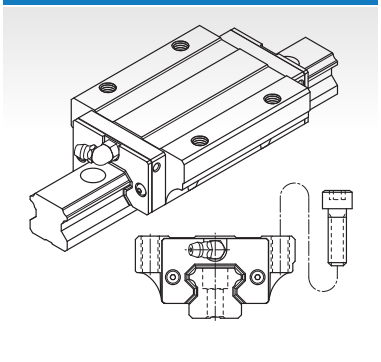
MSA-S Type



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

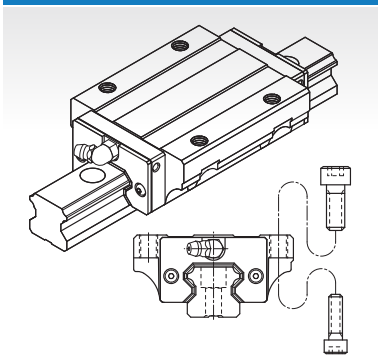
Ultra Heavy Load

MSA-LA Type



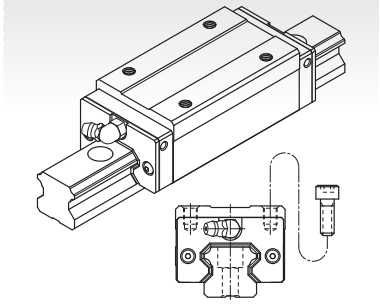
All dimensions are same as MSA-A except the length is longer, which makes it more rigid.

MSA-LE Type



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

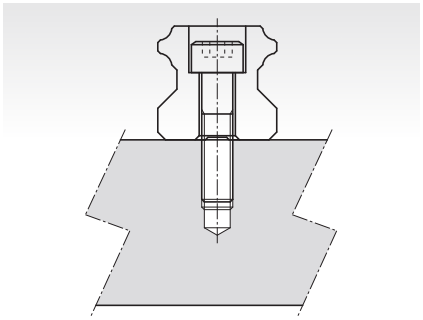
MSA-LS Type



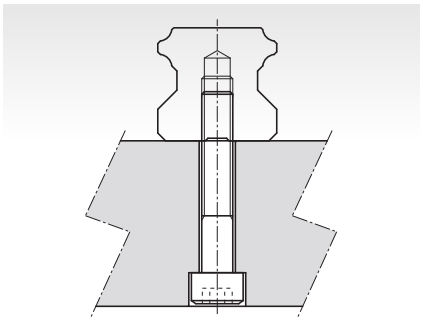
All dimensions are same as MSA-S except the length is longer, which makes it more rigid.

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, HD** (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), **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 ...**

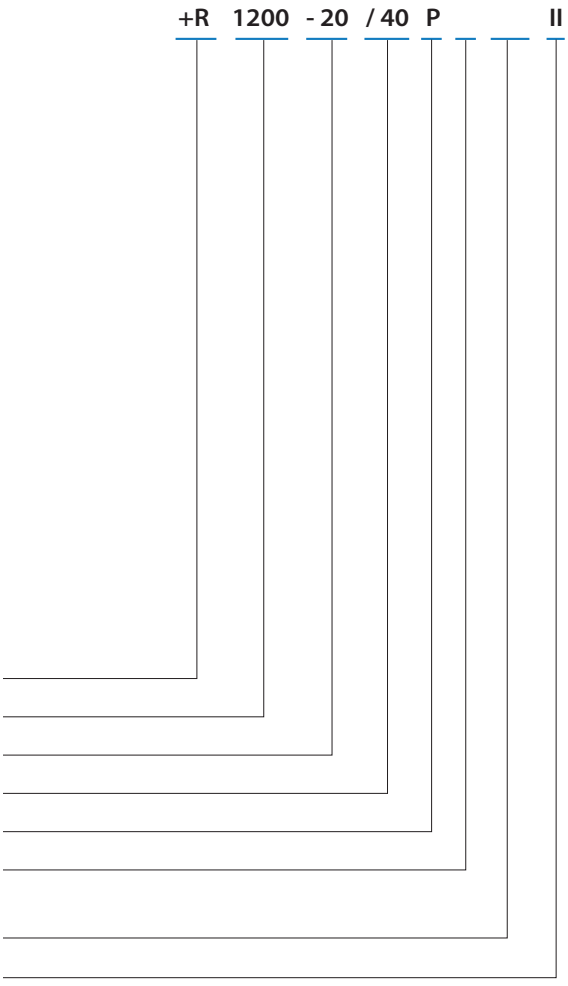
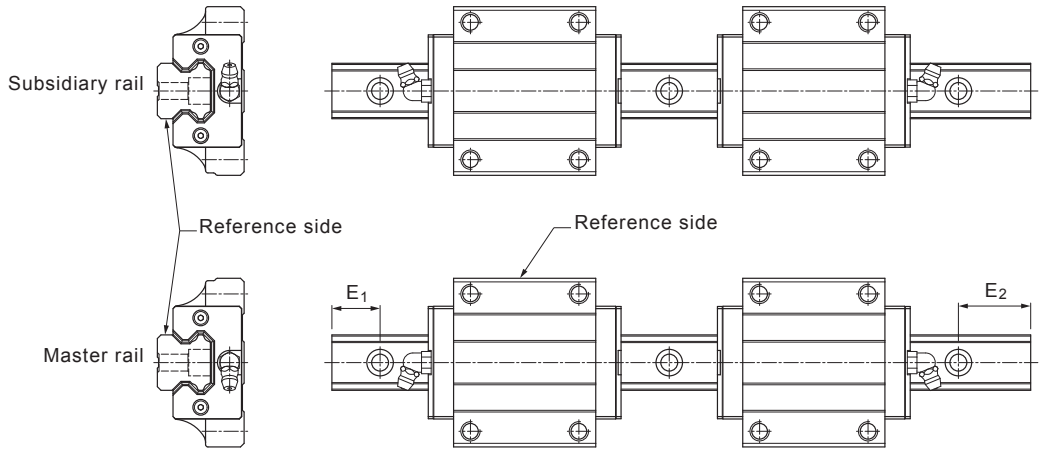

+R 1200 - 20 / 40 P II

Fig12.1


Subsidiary rail
Reference side
Master rail
Reference side
E1
E2

(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, HD**
(refer to chapter 15.1 Dust Proof)

Preload：**FC** (Light preload), **F0** (Medium preload) , **F1** (Heavy preload)
We don't provide **F1** (Heavy preload) to MSA15

Accuracy grade：**N, H, P**

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

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 , /MD**
(refer to chapter 15.1 Code of contamination fro Rail)

F. Accuracy Grade

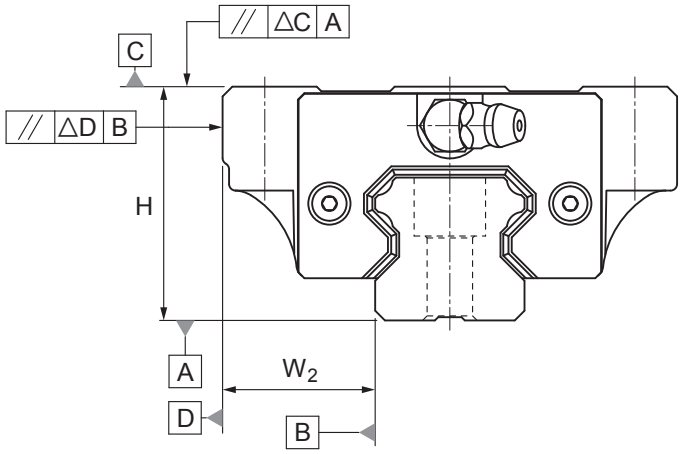


Table 1 Running Parallelism

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 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

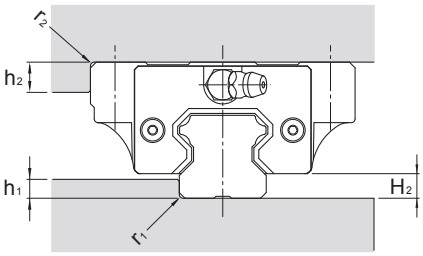
Series	Preload grade		
	Light preload (FC)	Medium preload (F0)	Heavy preload (F1)
MSA15	0~0.02C	0.03~0.05C	-
MSA20			0.05~0.08C
MSA25			
MSA30			
MSA35			
MSA45			
MSA55			
MSA65			
MSA20L	0~0.02C	0.03~0.05C	0.05~0.08C
MSA25L			
MSA30L			
MSA35L			
MSA45L			
MSA55L			
MSA65L			

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



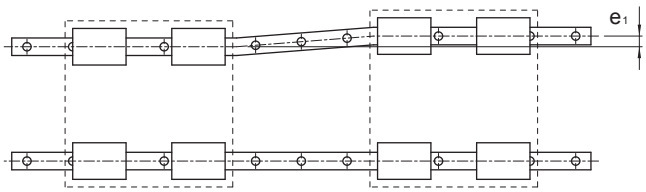
Model No.	r_1 (max.)	r_2 (max.)	h_1	h_2	H_2
15	0.5	0.5	3	4	4.2
20	0.5	0.5	3.5	5	5
25	1	1	5	5	6.5
30	1	1	5	5	8
35	1	1	6	6	9.5
45	1	1	8	8	10
55	1.5	1.5	10	10	13
65	1.5	1.5	10	10	15

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.

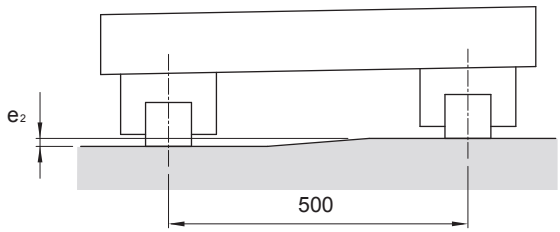
The parallel deviation between two axes (e_1)



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)

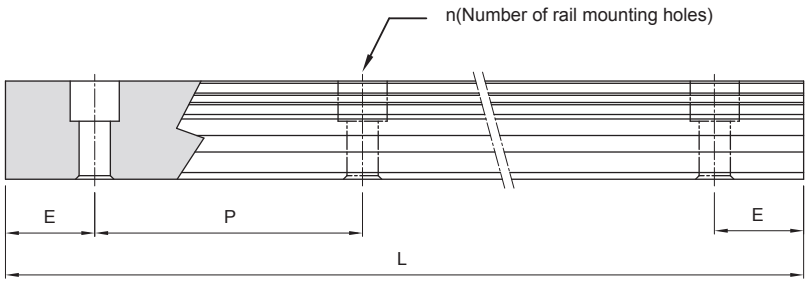


Unit: μm

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



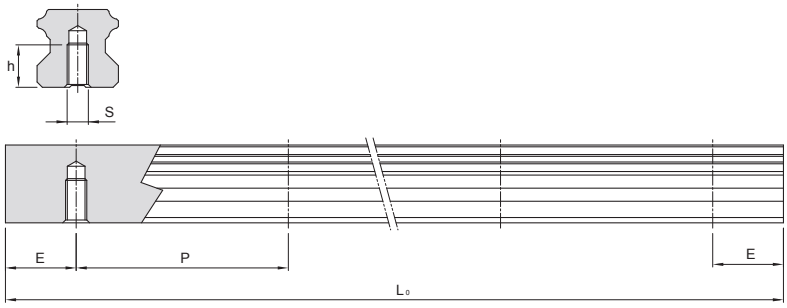
$$L=(n-1)\times P+2\times E$$

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

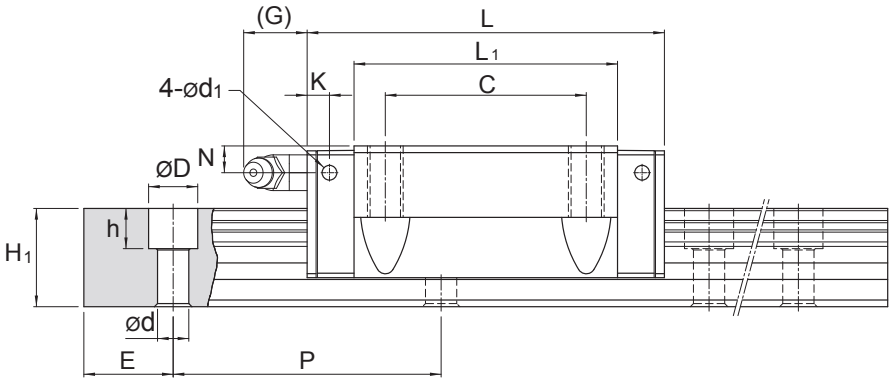
Model No.	Standard Pitch (P)	Standard ($E_{std.}$)	Minimum ($E_{min.}$)	Max (L_0 max.)
MSA 15	60	20	5	4000
MSA 20	60	20	6	4000
MSA 25	60	20	7	4000
MSA 30	80	20	8	4000
MSA 35	80	20	8	4000
MSA 45	105	22.5	11	4000
MSA 55	120	30	13	4000
MSA 65	150	35	14	4000

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



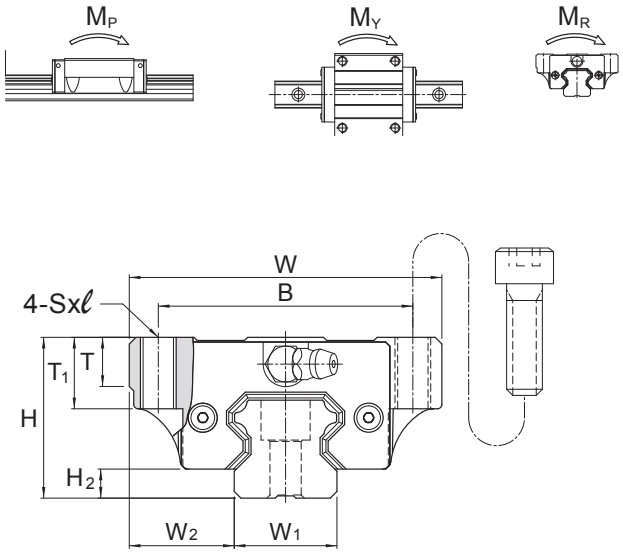
Unit: mm

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	5.7	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	6.8	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}.

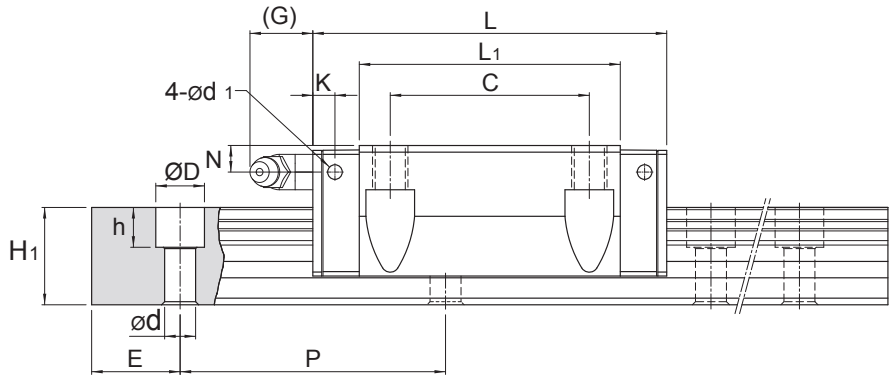
Note*: Single: Single carriage/ Double: Double carriages closely contacting with each other.



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

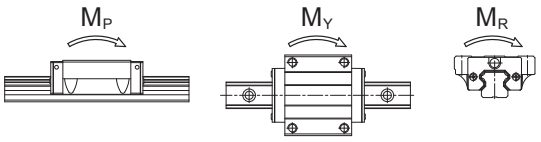


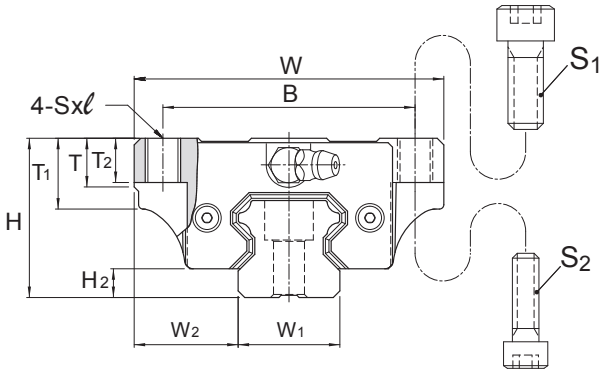
Unit: mm

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	5.7	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	6.8	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	8.9	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	37.5	23	19	13.5	8.9	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.



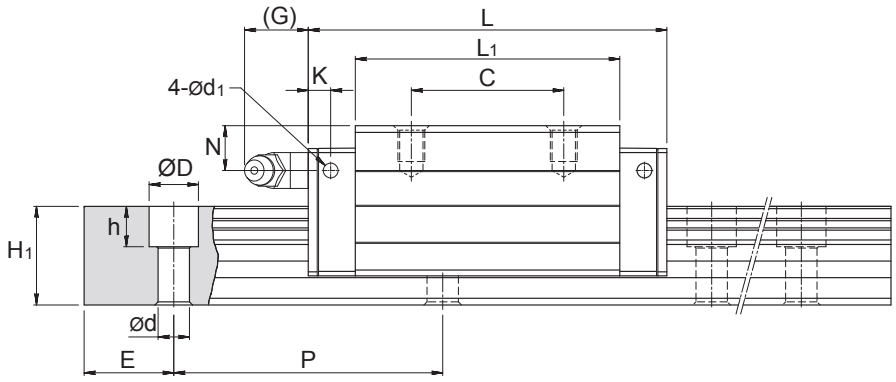


Model No.	Bolt Size	
	S_1	S_2
MSA 15	M5	M4
MSA 20	M6	M5
MSA 25	M8	M6
MSA 30	M10	M8
MSA 35	M10	M8
MSA 45	M12	M10
MSA 55	M14	M12
MSA 65	M16	M14

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

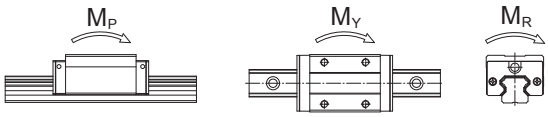


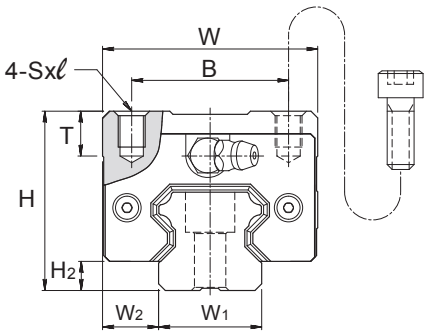
Unit: mm

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	5.7	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	6.8	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	8.9	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	8.9	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	