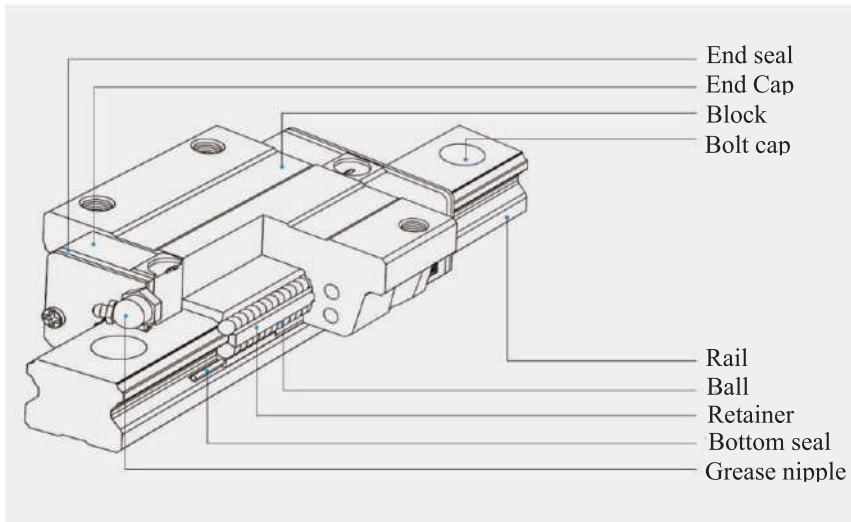


2.3 MSL Series - Low Profile Ball Type Linear Guideway

2.3.1 Features of the MSL Series Linear Guideway

The design of the MSL series offers a low profile, high load capacity, and high rigidity. It also features an equal load rating in all four directions and self-aligning capability to absorb installation-error, allowing for higher accuracies. Additionally, the lower assembly height and the shorter length make the MSL series more suitable for high-speed, automation machines and applications where space is limited. The retainer is designed to hold the balls in the block even when it is removed from the rail.

2.3.2 Construction of MSL Series

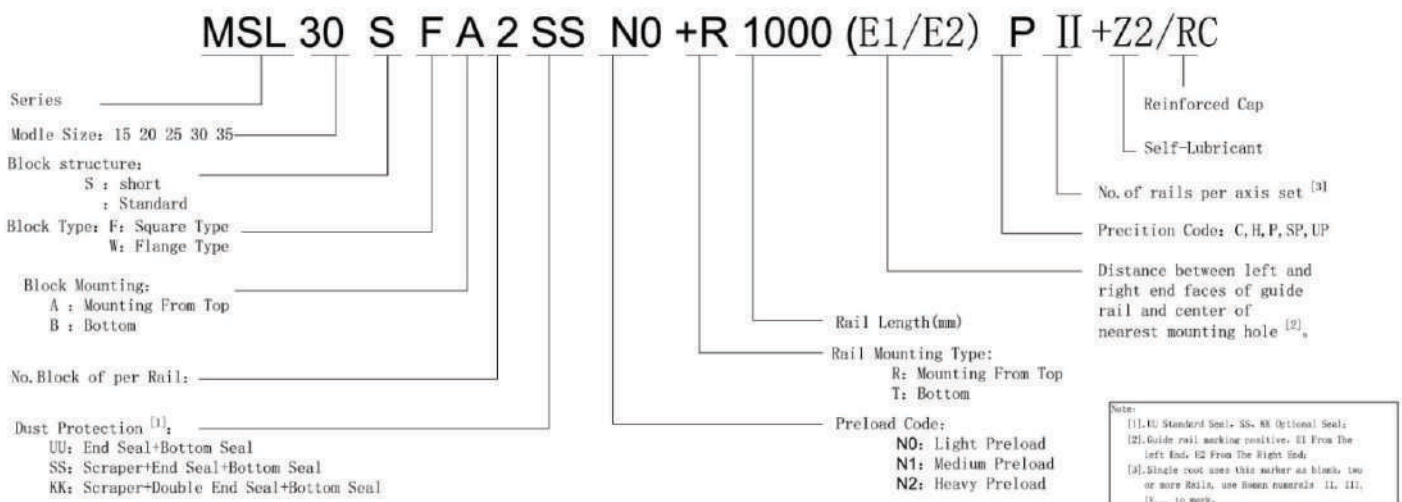


- ▶ Rolling circulation system:
Block, rail, end cap and retainer
- ▶ Lubrication system:
Grease nipple and piping Joint
- ▶ Dust protection system:
End seal, bottom seal, cap and scraper

2.3.3 Model Number of MSL Series

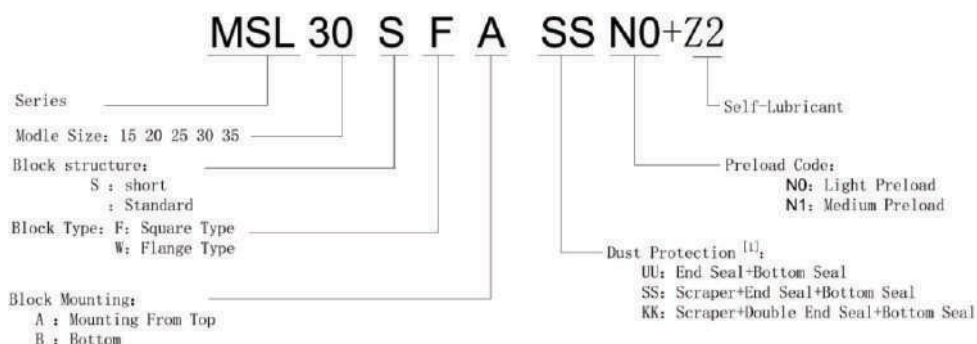
MSL series linear guideways are classified into non-interchangeable and interchangeable types. The sizes of these two types are the same as one another. The main difference is that the interchangeable type of blocks and rails can be freely exchanged and they can maintain P-class accuracy. Because of strict dimensional control, the interchangeable type linear guideways are a wise choice for customers when rails do not need to be matched for an axis. The model number of the MSL series identifies the size, type, accuracy class, preload class, etc.

(1) Non-interchangeable type

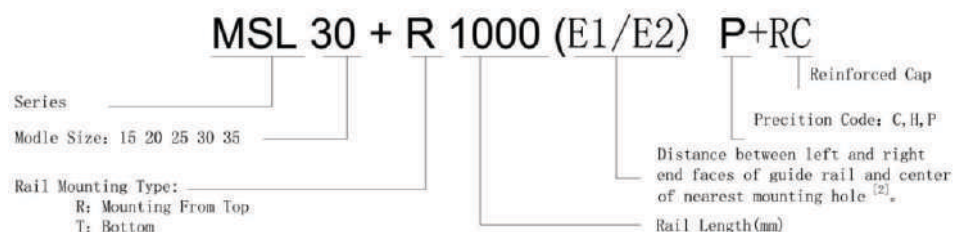


(2) Interchangeable type

• Model Number of MSL Block

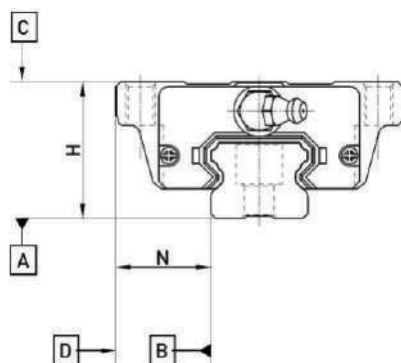


• Model Number of MSL Rail



2.3.4 Accuracy

The accuracy of the MSL series can be classified into five classes: normal(C), high(H), precision(P), super precision (SP), and ultra-precision (UP). Choose the class by referencing the accuracy of selected equipment.



(1) Accuracy of non-interchangeable guideways

unit: mm

Series	MSL-15、20				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
Dimensional tolerance of width N	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
Variation of height H	0.02	0.01	0.006	0.004	0.003
Variation of width N	0.02	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	See Table 2-3-5				
Running parallelism of block surface D to surface B	See Table 2-3-5				

Table 2-3-1 Accuracy Standards

unit: mm

Series	MSL-25、30、35				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	±0.1	±0.04	$\begin{smallmatrix} 0 \\ -0.04 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.02 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.01 \end{smallmatrix}$
Dimensional tolerance of width N	±0.1	±0.04	$\begin{smallmatrix} 0 \\ -0.04 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.02 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.01 \end{smallmatrix}$
Variation of height H	0.02	0.015	0.007	0.005	0.003
Variation of width N	0.03	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	See Table 2-3-5				
Running parallelism of block surface D to surface B	See Table 2-3-5				

Table 2-3-2 Accuracy Standards

(2) Accuracy of interchangeable guideways

unit: mm

Series	MSL-15、20				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	±0.1	±0.03	±0.015		
Dimensional tolerance of width N	±0.1	±0.03	±0.015		
Variation of height H	0.02	0.01	0.006		
Variation of width N	0.02	0.01	0.006		
Running parallelism of block surface C to surface A	See Table 2-3-5				
Running parallelism of block surface D to surface B	See Table 2-3-5				

Table 2-3-3 Accuracy Standards

unit: mm

Series	MSL-25、30、35				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	±0.1	±0.04	±0.02		
Dimensional tolerance of width N	±0.1	±0.04	±0.02		
Variation of height H	0.02	0.015	0.007		
Variation of width N	0.03	0.015	0.007		
Running parallelism of block surface C to surface A	See Table 2-3-5				
Running parallelism of block surface D to surface B	See Table 2-3-5				

Table 2-3-4 Accuracy Standards

(3) Accuracy of running parallelism

unit: μm

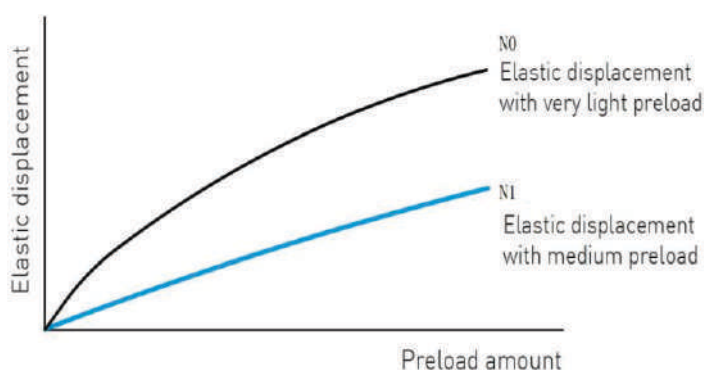
Rail Length (mm)	Accuracy				
	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
0~100	12	7	3	2	2
100~200	14	9	4	2	2
200~300	15	10	5	3	2
300~500	17	12	6	3	2
500~700	20	13	7	4	2
700~900	22	15	8	5	3
900~1100	24	16	9	6	3
1100~1500	26	18	11	7	4
1500~1900	28	20	13	8	4
1900~2500	31	22	15	10	5
2500~3100	33	25	18	11	6
3100~3600	36	27	20	14	7
3600~4000	37	28	21	15	7
4000~4500	39	30	22	15	9
4500~5000	41	31	23	16	10
5000~5500	43	32	24	16	11
5500~6000	44	33	24	17	12

Table 2-3-5 Accuracy of Running Parallelism

2.3.5 Preload

(1) Definition

A preload can be applied to each guideway. Generally, a linear motion guideway has a negative clearance between the groove and balls in order to improve stiffness and maintain high precision. The figure shows that adding a preload can improve stiffness of the linear guideway. A preload no greater than N1 would be recommended for model sizes smaller than MSL25. This will avoid an over-loaded condition that would affect guideway life.



(2) Preload classes

MS offers three standard preloads for various applications and conditions.

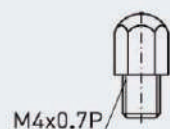
Class	Code	Preload	Condition
Very Light Preload	N0	0 C~0.02C	Certain load direction, low impact, low precision required
Light Preload	N1	0.03C~0.05C	low load and high precision required
Medium Preload	N2	0.06C~0.08C	High rigidity required, with vibration and impact

Table 2-3-6 Preload Classes

2.3.6 Lubrication

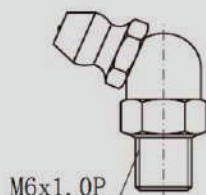
(1) Grease

◆ Grease nipple



NO.34310002

MSL15



M6x1.0P

NO.34320001

MSL25
MSL25
MSL30
MSL35



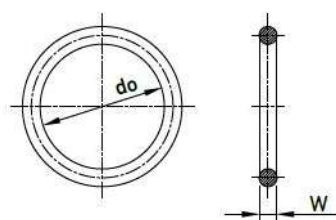
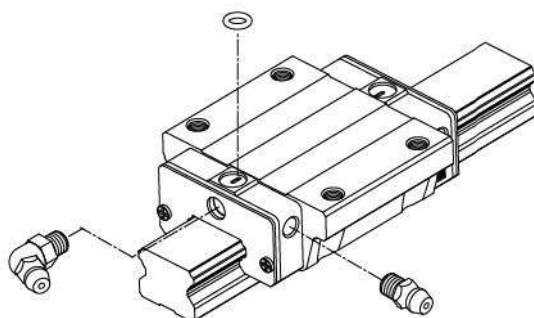
M6x1.0P

NO.34310003(OPTION)

MSL25
MSL25
MSL30
MSL35

◆ Mounting location

The standard location of the grease fitting is at both ends of the block, the nipple may be mounted in the side or top of the block. For lateral installation, we recommend that the nipple be mounted to the non-reference side, otherwise please contact us. When lubricating from above, in the recess for the O-ring, a smaller, preformed recess can be found. Preheat the 0.8 mm diameter metal tip. Carefully open the small recess with the metal tip and pierce through it. Insert a round sealing ring into the recess. (The round sealing ring is not supplied with the block) Do not open the small recess with a drill bit this may introduce the danger of contamination. It is possible to carry out the lubrication by using the oil-piping joint.



O Ring

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do (mm)	W (mm)	T _{MAX} (mm)
MSL15	2.5±0.15	1.5±0.15	6.9
MSL20	4.5±0.15	1.5±0.15	8.4
MSL25	4.5±0.15	1.5±0.15	10.4
MSL30	4.5±0.15	1.5±0.15	10.4
MSL35	4.5±0.15	1.5±0.15	10.8

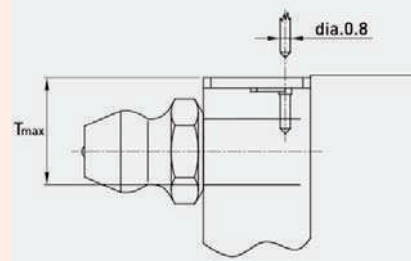


Table 2-3-7 O-Ring size and max. permissible depth for piercing

◆ The oil amount for a block filled with grease

Size	Light Preload	Medium Preload	Size	Light Preload	Medium Preload
MSL15	0.8	1.4	MSL30	3.7	6.3
MSL20	1.5	2.4	MSL35	5.6	6.6
MSL25	2.8	4.6			

Table 2-2-8 The oil amount for a block filled with grease

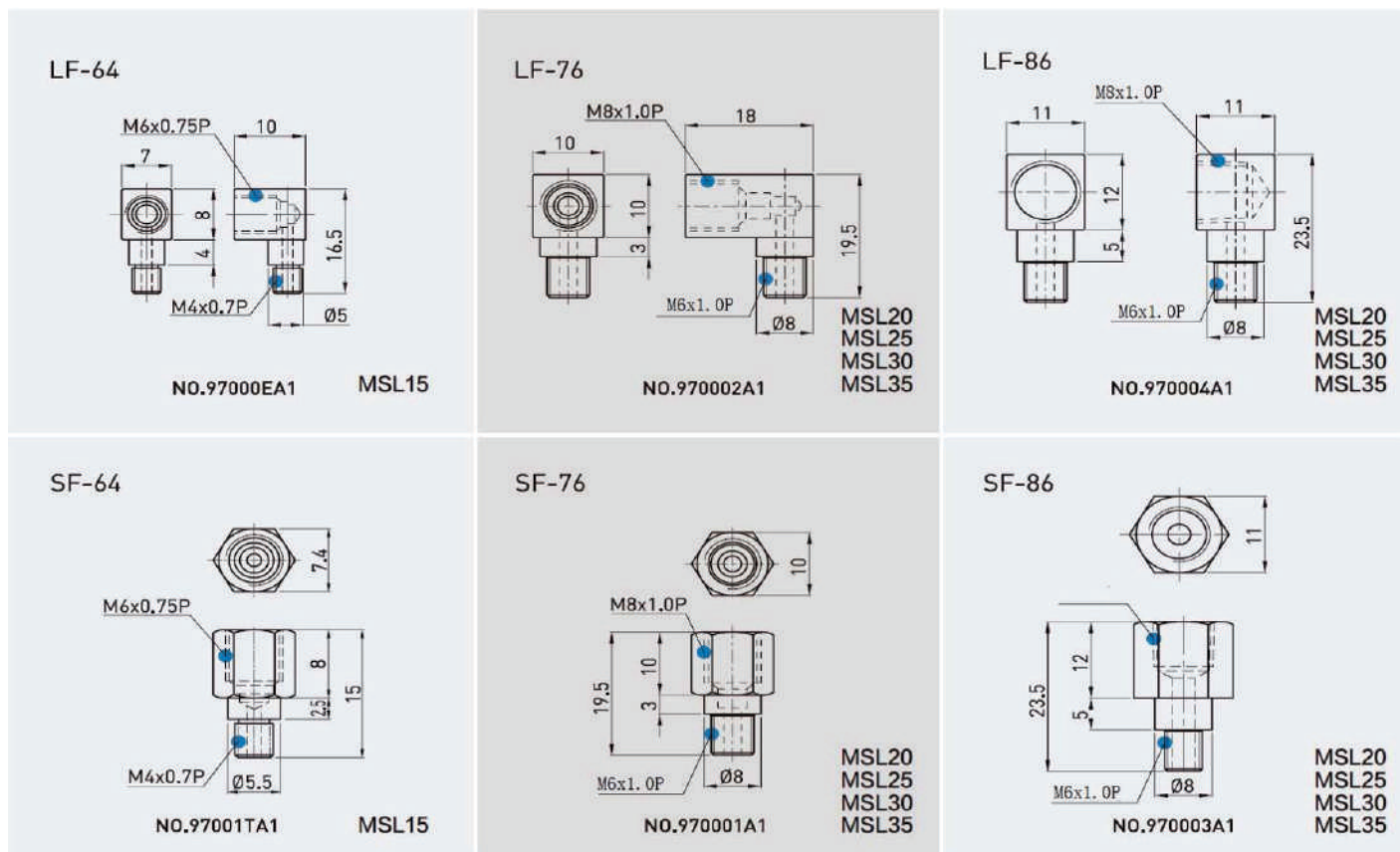
◆ Frequency of replenishment

Check the grease every 100 km, or every 3-6 months.

(2) Oil

The recommended viscosity of oil is about 32-150cSt. If you need to use oil-type lubrication, please inform us.

◆ Types of oil piping joint



◆ Oil feeding rate

Unit: (cm³/hr)

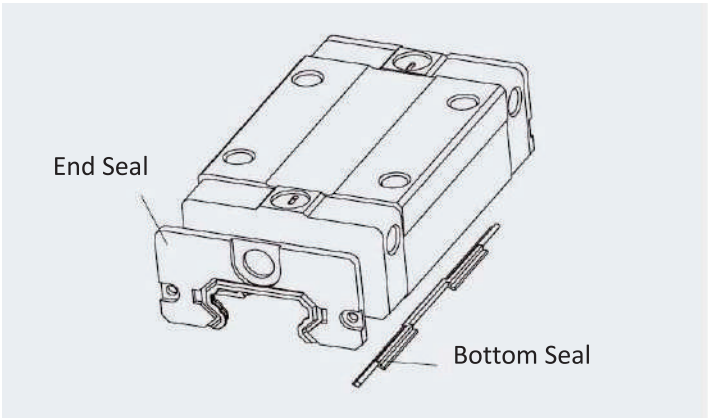
Size	Feed Rate	Size	Feed Rate
MSL15	0.1	MSL30	0.2
MSL20	0.133	MSL35	0.233
MSL25	0.167		

Table 2-3-9 oil feed rate

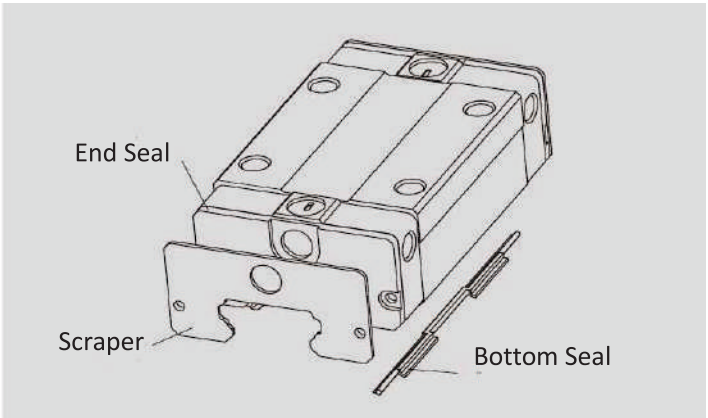
2.3.7 Dust Protection Equipment

(1) Codes of equipment

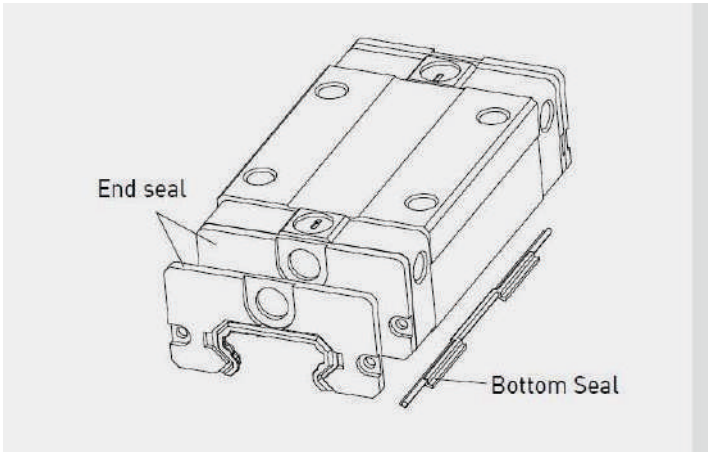
If the following equipment is needed, please indicate the code followed by the model number.



UU: End Seal+Bottom Seal



SS: Scraper+End Seal+Bottom Seal



KK: Double End Seal+Bottom Seal

(2) End seal and bottom seal

Protects against contaminants entering the block. Reduces potential for groove damage resulting in a reduction of life ratings.

(3) Double seals

Removing foreign matters from the rail to prevent contaminants from entering the block.

unit: mm

Size	Thickness	Size	Thickness
MSL15	2	MSL30	2
MSL20	2	MSL35	2
MSL25	2		

Table 2-3-10 Dimensions of end seal

(4) Scraper

Clears larger contaminants, such as weld spatter and metal cuttings, from the rail. Metal scraper protects end seals from excessive damage.

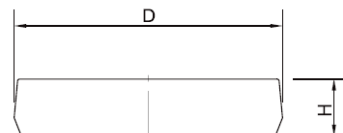
unit: mm

size	Thickness	size	Thickness
MSL15	0.8	MSL30	1
MSL20	0.8	MSL35	1.5
MSL25	1		

Table 2-3-11 Dimensions of Scraper

(5) Bolt caps for rail mounting holes

Rail mounting hole caps prevent foreign matter from accumulating in the mounting holes. Caps are included with the rail package

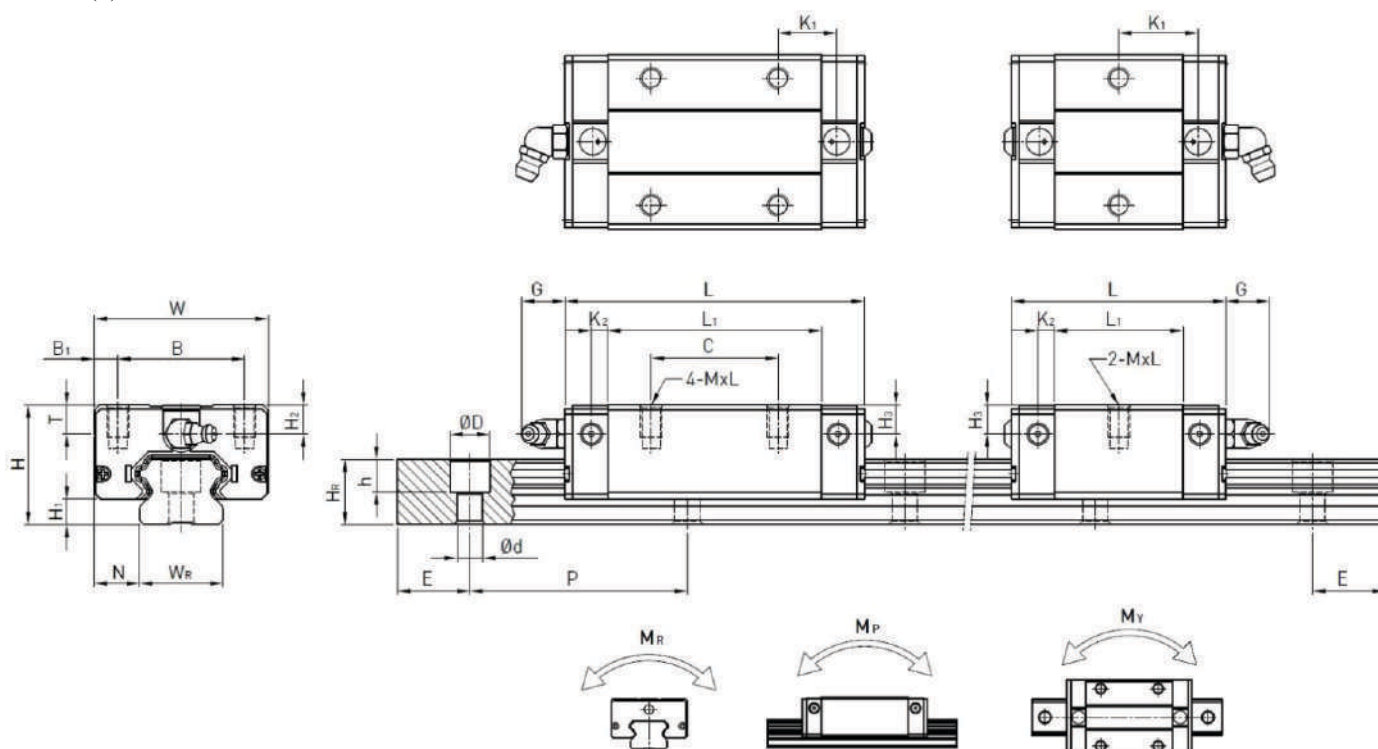


Rail size	Bolt size	Diameter(D)	Thickness(H)	Rail size	Bolt size	Diameter(D)	Thickness(H)
MSL-R15	M4	7.65	1.1	MSL-R30	M8	14.2	3.5
MSL-R20	M5	9.65	2.5	MSL-R35	M8	14.2	3.5
MSL-R25	M6	11.15	2.5				

Table 2-3-12 Dimensions of Bolt Caps for Rail Mounting Holes

2.3.8 Dimensions for MSL Series.

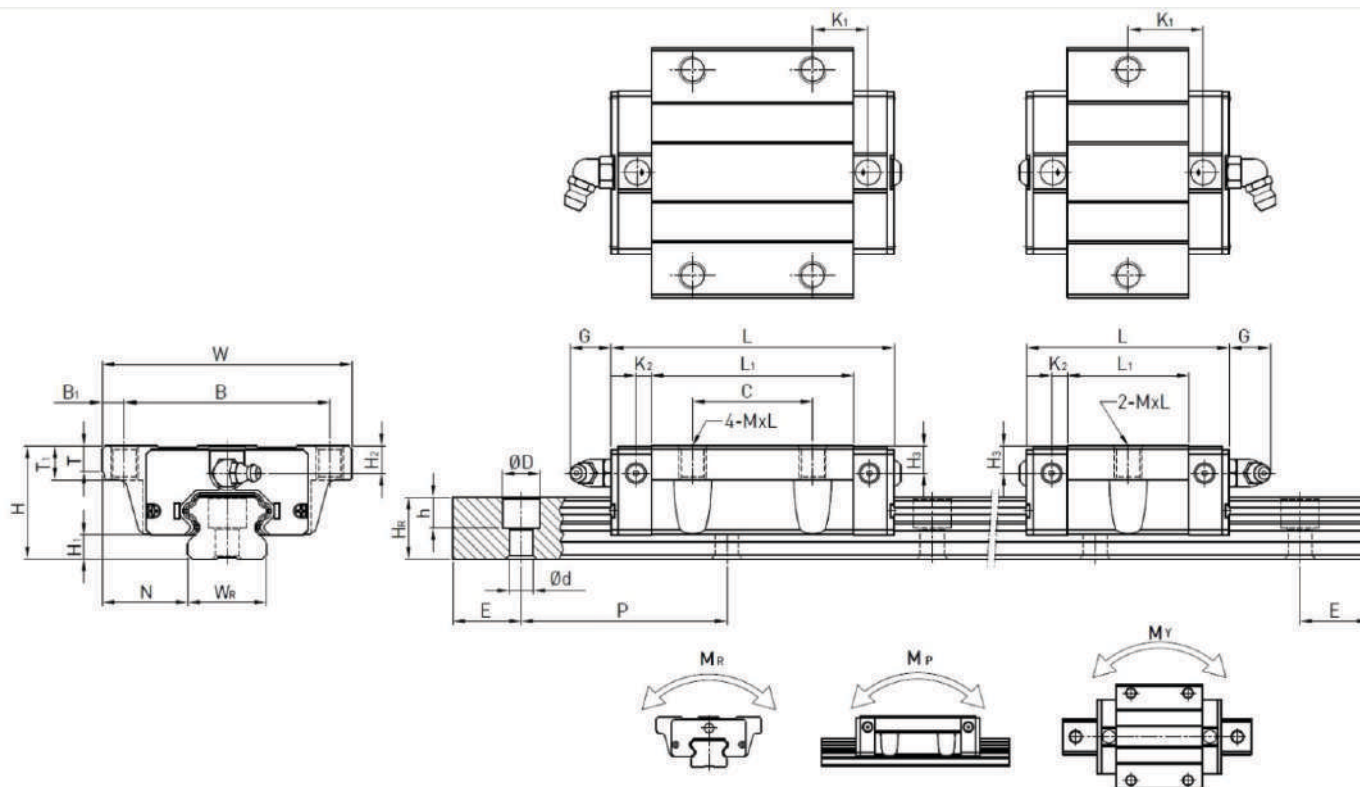
(1) MSL-SFA/FA



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)															Dimensions of Rail (mm)										Mounting Bolt for Rail	Basic Dynamic load Rating	Basic Static load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	MxL	T	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)	C(KN)	C ₀ (KN)	K _{N-m}	K _{N-m}				K _{N-m}	Kg	Kg/m		
MSL15SFA	24	4.5	9.5	34	26	4	-	23.1	40.1	14.8	3.5	5.7	M4x6	6	5.5	6	15	12.5	6	4.5	3.5	60	20	M3x16	5.35	9.40	0.08	0.04	0.04	0.09	1.25					
MSL15FA							26	39.8	56.8	10.15															7.83	16.19	0.13	0.10	0.10	0.15						
MSL20SFA	28	6	11	42	32	5	-	29	50	18.75	4.15	12	M5x7	7.5	6	6	20	15.5	9.5	8.5	6	60	20	M5x16	7.23	12.74	0.13	0.06	0.06	0.15	2.08					
MSL20FA							32	48.1	69.1	12.3															10.31	21.13	0.22	0.16	0.16	0.24						
MSL25SFA	33	7	12.5	48	35	6.5	-	35.5	59.1	21.9	4.55	12	M6x9	8	8	8	23	18	11	9	7	60	20	M6x20	11.40	19.50	0.23	0.12	0.12	0.25	2.67					
MSL25FA							35	59	82.6	16.15															16.27	32.40	0.38	0.32	0.32	0.41						
MSL30SFA	42	10	16	60	40	10	-	41.5	69.5	26.75	6	12	M8x12	9	8	9	28	23	11	9	7	80	20	M6x25	16.42	28.10	0.40	0.21	0.21	0.45	4.35					
MSL30FA							40	70.1	98.1	21.05															23.70	47.46	0.68	0.55	0.55	0.76						
MSL35SFA	48	11	18	70	50	10	-	45	75	28.5	7	12	M8x12	10	8.5	8.5	34	27.5	14	12	9	80	20	M8x25	22.66	37.38	0.56	0.31	0.31	0.74	6.14					
MSL35FA							50	78	108	20															33.35	64.84	0.98	0.69	0.69	1.10						

★Note: 1kgf=9.81N

(2) MSL-SWB/WB



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)																	Dimensions of Rail (mm)						Mounting Bolt for Rail	Basic Dynamic load Rating	Basic Static load Rating	Static Rated Moment			Weight	
																														M _R	M _P	M _Y	Block	Rail
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	M	T	T ₁	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)	C (kN)				G ₀ (kN)	kN-m	kN-m	kN-m	Kg
MSL15SWB	24	4.5	18.5	52	41	5.5	-	23.1	40.1	14.8	3.5	5.7	Ø4.5	5	7	5.5	6	15	12.5	6	4.5	3.5	60	20	M3x16	5.35	9.40	0.08	0.04	0.04	0.12	1.25		
MSL15WB							26	39.8	56.8	10.15																26	39.8	56.8	10.15	7.83	16.19		0.13	0.10
MSL20SWB	28	6	19.5	59	49	5	-	29	50	18.75	4.15	12	Ø6	7	9	6	6	20	15.5	9.5	8.5	6	60	20	M5x16	7.23	12.74	0.13	0.06	0.06	0.19	2.08		
MSL20WB							32	48.1	69.1	12.3																10.31	21.13	0.22	0.16	0.16	0.32			
MSL25SWB	33	7	25	73	60	6.5	-	35.5	59.1	21.9	4.55	12	Ø7	7.5	10	8	8	23	18	11	9	7	60	20	M6x20	11.40	19.50	0.23	0.12	0.12	0.35	2.67		
MSL25WB							35	59	82.6	16.15																16.27	32.40	0.38	0.32	0.32	0.59			
MSL30SWB	42	10	31	90	72	9	-	41.5	69.5	26.75	6	12	Ø9	7	10	8	9	28	23	11	9	7	80	20	M6x25	16.42	28.10	0.40	0.21	0.21	0.62	4.35		
MSL30WB							40	70.1	98.1	21.05																23.70	47.46	0.68	0.55	0.55	1.04			
MSL35SWB	48	11	33	100	82	9	-	45	75	28.5	7	12	Ø9	10	13	8.5	8.5	34	27.5	14	12	9	80	20	M8x25	22.66	37.38	0.56	0.31	0.31	0.84	6.14		
MSL35WB							50	78	108	20																33.35	64.84	0.98	0.69	0.69	1.45			

★Note: 1kgf=9.81N