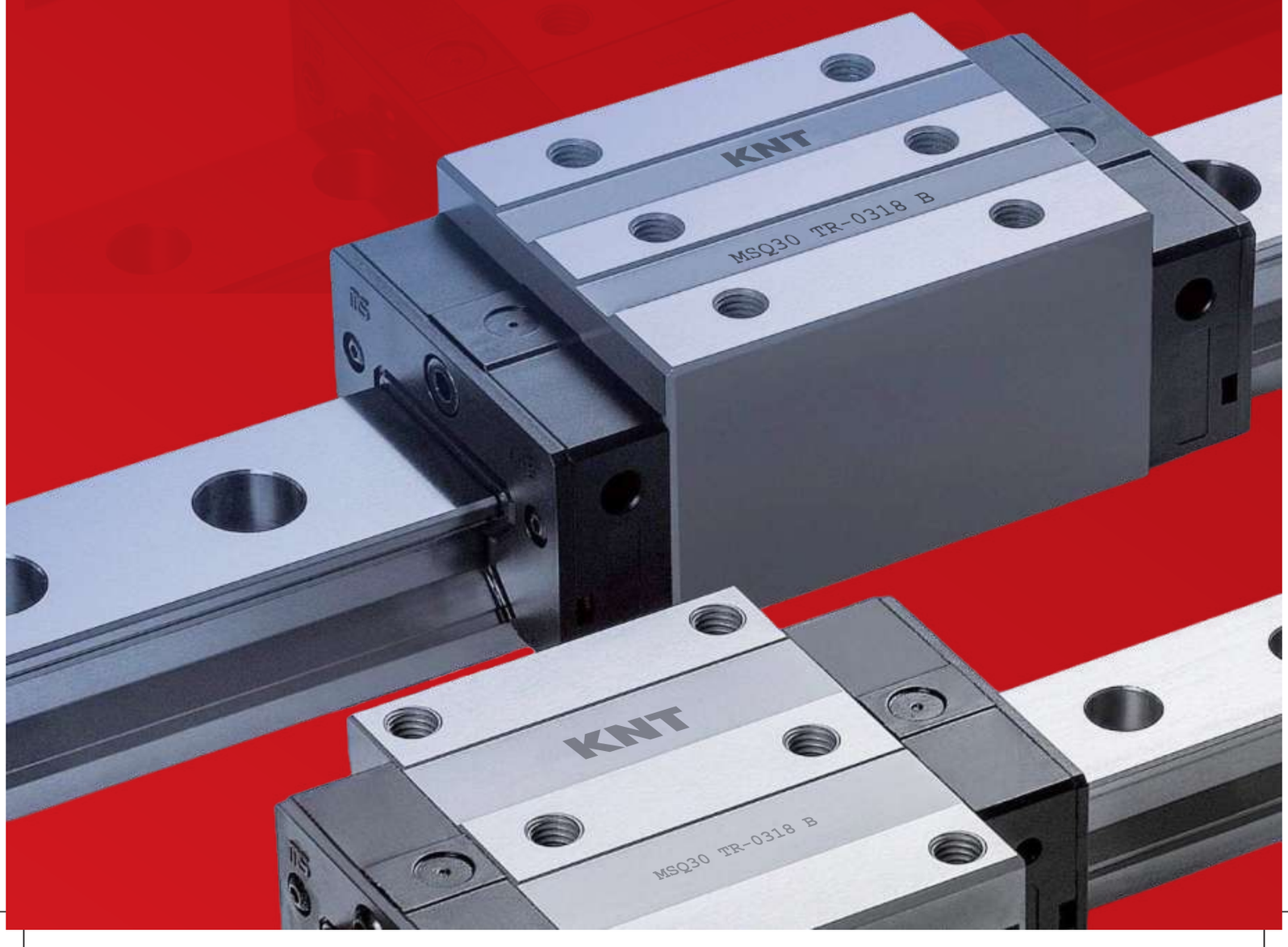
Kanehiro

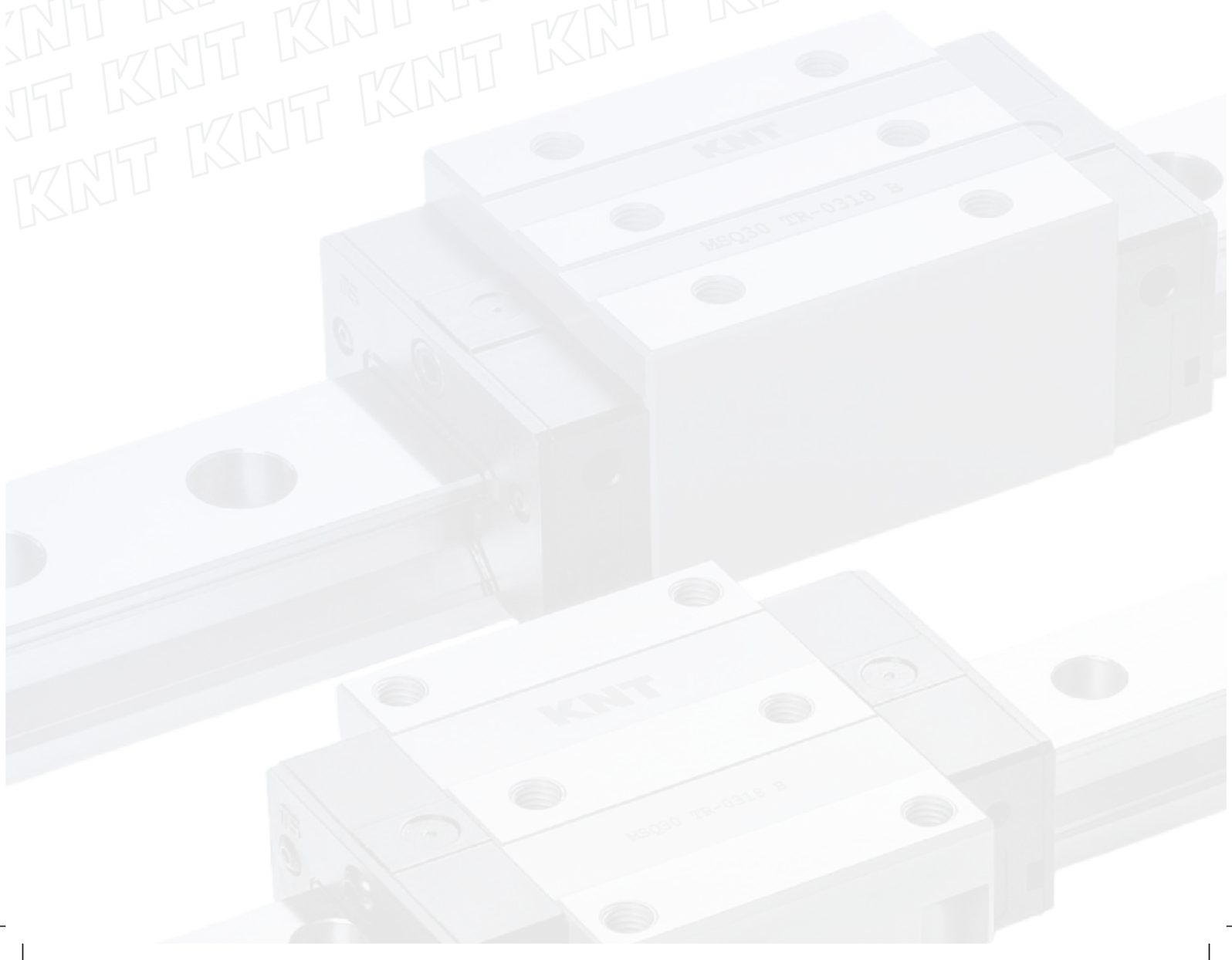
錦弘株式会社
Kanehiro Corporation

KNT

LINEAR GUIDE

TECHNICAL MANUAL




KNT
KNT

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General Information

KNT Linear Guideway series

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Company Profile

Kanehiro Corporation, founded by four Japanese engineers in 2004 with diverse expertise spanning various industries such as plastics, machinery, and healthcare, is dedicated to pioneering new technologies for global dissemination. Among them, Hitoshi Fukushima plays a pivotal role in leading the LM Guide project. With over 40 years of experience in management and a deep understanding of machinery, Fukushima's contributions are invaluable to the design and development of the LM Guide and establish brand KNT which signifies Kanehiro Kinetics.

His extensive knowledge of mechanical dynamics enables him to optimize the functionality of the LM Guide, ensuring it meets stringent quality standards while remaining cost-effective. The KNT LM Guide is renowned for its reliability and durability, capable of enduring extensive usage without compromising performance. Furthermore, its competitive pricing ensures accessibility to a broad spectrum of industries without imposing exorbitant costs.

In essence, Kanehiro Corporation's LM Guide represents a fusion of innovative ideas, superior quality, and affordability, positioning it to have substantial impact on a global scale.

Research and Development

The company's technical team consists of post-doctoral engineers, doctoral engineers, professional post graduate students and young researchers with dozens of independent research and development patents, science and technology achievements industry, innovation never stops.

Basic Information

1.1 Advantages and characteristics of KNT rolling linear guide

Kanehiro Corporation, as a professional manufacturer of linear rolling guide, has established a professional product development and production process design team, and cooperated with the mechanical design, heat treatment, digital design and manufacturing teams of domestic top universities to design and optimize the key performance indicators of linear rolling guide. And a large number of tests have been done for the stiffness characteristics, life, impact resistance, accuracy, motion characteristics and reliability that users are most conceded about, and the data obtained can be used for users' selection.

1.1.1 Rolling linear guide pair has the following functions:

1) The stiffness of the guide rail pair can be adjusted by adjusting the size of the accessories to adapt to different applications;
2) The friction force is small, the dynamic and static friction force difference is small, the motion fluctuation is small, can meet the micron scale feed conditions;
3) With high motion accuracy, high comprehensive accuracy, meet the use of gold cutting machine;
4) It can be used under the conditions of high speed and high acceleration, with the maximum speed up to 120m/min and the maximum acceleration of 1.5-2g
5) Strong impact resistance and strong adaptability to the equipment with impact load;
6) Good precision retention, reliable performance, long service life. If the lubrication of the sliding guide is insufficient, the friction loss of the contact surface will be aggravated. Moreover, adequate lubrication of the sliding guide is not easy, and drilling holes need to be drilled at the appropriate position of the bed for oil supply. The oil nozzle interface is arranged on the slide block of the rolling linear guide pair, which can directly drive the oil into the oil with the oil injector, or change the special oil pipe joint to connect the oil supply pipe, so as to realize the lubrication of the automatic oil supply machine.

1.1.2 Outstanding features.

1. **Low noise:**

   KNT Series In order to achieve low noise, the rolling linear guide adopts the exclusive patent circular channel structure to reduce the contact collision and space during the rolling process, and control the generation of movement noise from the root, so as to achieve excellent low noise performance;

2. **High fluency:**

   KNT Series linear rolling guide pair is equipped with a rolling body guide structure at the end of the slider track and the inlet and outlet of the regress, which ensures the high smooth movement of the slider under the condition of medium and heavy preloading, and meets the requirements of large and heavy-duty CNC equipment,3. Long life span: High quality raw materials from domestic large steel mills, professional heat treatment team and equipment, to ensure the stability and wear resistance of the linear precision of the rolling guide, the slider through carburizing and quenching, on the basis of obtaining the standard surface hardness, the hardness of the core and the composition of the structure are set, improve the deformation resistance of the slider, obtain stable overall stiffness.

3. **Long life span：**

   High quality raw materials from domestic large steel mills, professional heat treatment team and equipment, to ensure the stability and wear resistance of the linear precision of the rolling guide, the slider through carburizing and quenching, on the basis of obtaining the standard surface hardness, the hardness of the core and the composition of the structure are set, improve the deformation resistance of the slider, obtain stable overall stiffness.

1.2 The Principles of Selecting Linear Guideways

Identify the condition

- Type of equipment
- Space limitations
- Accuracy
- Stiffness
- Travel length
- Magnitude and direction of loads
- Moving speed, acceleration
- Duty cycle
- Service life
- Environment

Selection of series

- MSQ series - Grinding, milling, and drilling machine, lathe, machine center
- MSLseries - Automatic equipment, high speed transfer device, semiconductor equipment, wood cutting machine, precision measure equipment
- MSZ series - CNC machining centers, heavy duty cutting machines, CNC grinding machines, injection molding machines, electric discharge machines, wire cutting machines, plano millers

Selection of accuracy

- Classes : C, H, P, SP, UP depends on the accuracy of equipment

Determines the size & the number of blocks

- Dynamic load condition
- If accompanied with a ballscrew, the size should be similar to the diameter of ballscrew. For example, if the diameter of the ballscrew is 25mm, then the model size of linear guideway should be MSQ25

Calculate the max, load of block

- Make reference to load calculation examples, and calculate the max load.
- Be sure that the static safety factor of selected guideway is larger than the rated static safety factor

Choosing preload

- Depends on the stiffness requirement and accuracy of mounting surface

Identify stiffness

- Calculate the deformation (S) by using the table of stiffness values, choosing heavier preload and larger size linear guideways to enhance the stiffness

Calculating service life

- Calculate the life time requirement by using the moving speed and frequency.
- Make reference to the life calculation example

Selection of lubrication

- Grease supplied by grease nipple。Oil supplied by piping joint

Completion of selection

1.3 Rated load rating.

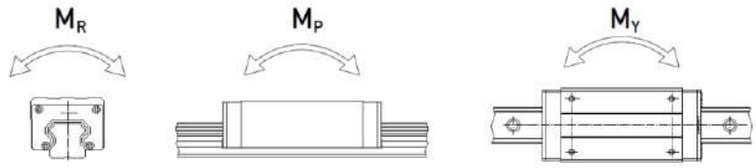
1.3.1 Rolling linear guide pair has the following functions:

1) Definition of basic static load rating (Co)

Localized permanent deformation will be caused between the raceway surface and the rolling elements when a linear guideway is subjected to an excessively large load or an impact load while either at rest or in motion. If the amount of this permanent deformation exceeds a certain limit, it becomes an obstacle to the smooth operation of the linear guideway. Generally, the definition of the basic static load rating is a static load of constant magnitude and direction resulting in a total permanent deformation of 0.0001 times the diameter of the rolling element and the raceway at the contact point subjected to the largest stress. The value is described in the dimension tables for each linear guideway. A designer can select a suitable linear guideway by referring to these tables.The maximum static load applied to a linear quideway must not exceed the basic static load rating□

2) Static permissible moment (Mo)

The static permissible moment refers to a moment in a given direction and magnitude when the largest stress of the rolling elements in an applied system equals the stress induced by the Static Load Rating. The static permissible moment in linear motion systems is defined for three directions: MR, MP and My.



3) Static safety factor

This condition applys when the guideway system is static or under low speed motion. The static safety factor, which depends on environmental and operating conditions, must be taken into consideration. A larger safety factor is especially important for guideways subject to impact loads (See Table 1). The static load can be obtained by using Formula (1).

Load Condition	f_{sL}、f_{sM}
NormalLoad	1.0~3.0
With impacts/vibrations	3.0~5.0

Table-1 Static safety factor

$$f_{sL}=\frac{C_0}{P} \quad or \quad f_{sM}=\frac{M_0}{M} \qquad (1)$$

f_{sL} : Static safety factor for simple load
f_{sM} : Static safety factor for moment
C_o : Static load rating (kN)
M_o : Static permissible moment (kN-mm)
P : Calculated worki g load(kN]
M : Calculated applying moment (kN-mm)

1.3.2 Basic Dynamic Load

1) Dynamic load rating (C)

The basic dynamic load rating is an important factor used for calculation of service life of linear guideway. It is defined as the maximum load when the load that does not change in direction or magnitude and results in a nominal life of 50km of operation for a ball type linear guideway and 100km for a roller type linear guideway. The values for the basic dynamic load rating of each guideway are shown in dimension tables. They can be used to predict the service life for a selected linear guideway

1.4 The Service Life of Linear Guideways

1.4.1 Service Life

When the raceway and the rolling elements of a linear guideway are continuously subjected to repeated stresses, the racewaysurface shows fatigue. Flaking will eventually occur. This is called fatigue flaking. The life of a linear guideway is defined as the total distance traveled until fatigue flaking appears on the surface of the raceway or rolling elements.

1.4.2 Nominal Life (L)

The service life varies greatly even when the linear motion guideways are manufactured in the same way or operated under the same motion conditions. For this reason, nominal life is used as the criteria for predicting the service life of a linear motion guideway. The nominal life is the total distance that 90% of a group of identical linear motion guideways, operated under identical conditions, can travel without flaking. When the basic dynamic rated load is applied to a linear motion guideway, the nominal life is 50km.

1.4.3 Calculation of Nominal Life

The acting load will affect the nominal life of a linear guideway. Based on the selected basic dynamic rated load and the actual load. The nominal life of ball type and roller type linear guideway can be calculated by Formula (2) respectively.

$$L = \left(\frac{C}{P} \right)^3 * 50(km) \qquad (2)$$

L: Nominal life

C: Basic dynamic load rating

P: Actual load

If the environmental factors are taken into consideration, the nominal life is influenced greatly by the motion conditions, the hardness of the raceway, and the temperature of the linear guideway. The relationship between these factors is expressed in Formula (3).

$$L = \left(\frac{f_h f_t C}{f_w P_c} \right)^3 * 50(km) \qquad (3)$$

L: Nominal life

L: Hardness factor

L: Basic dynamic load rating

L: Temperature factor

L: Calculated loadLoad factor

1.4.4 Factors of Normal Life

(1) Hardness factor (f)

In general, the raceway surface in contact with the rolling elements must have the hardness of HRC 58~62 to an appropriate depth. When the specified hardness is not obtained, the permissible load is reduced and the nominal life is decreased. In this situation, the basic dynamic load rating and the basic static load rating must be multiplied by the hardness factor for calculation.

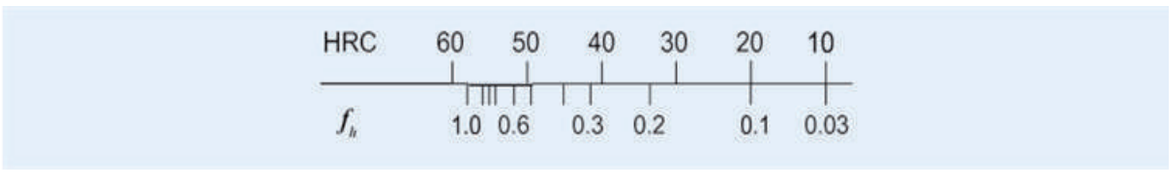


Table 2 Raceway hardness

(2) Temperature factor (f)

Due to the temperature will affect the material of linear guide, therefore the permissible load will be reduced and the nominal service life will be decreased when over 100°C. Therefore, the basic dynamic and static load rating must be multiplied by the temperature factor. As some accessories are plastic which can't resist high temperature, the working environment is recommended to be lower than 100°C.

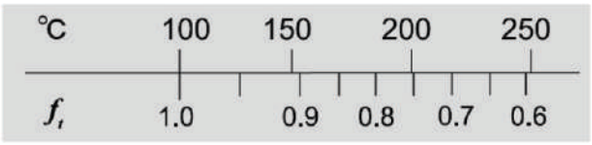


Figure 3 Temperature

(3) Load factor (fw)

The loads acting on a linear guideway include the weight of slide, the inertia load at the times of start and stop, and the moment loads caused by overhanging. These load factors are especially difficult to estimate because of mechanical vibrations and impacts. Therefore, the load on a linear guideway should be divided by the empircal factor.

Loading Condition	Service Speed	f_w
No impacts & vibration	V ≤ 15m/min	1-1.2
Small impacts	15m/min ＜ V ≤ 60m/min	1.2`~1.5
Normal load	60m/min ＜ V ≤ 120m/min	1.5~2.0
With impacts & vibration	V ＞ 120m/min	2.0~3.5

Table 3 Load factor

1.4.5 Calculation of Service Life (L_h)

Transform the nominal life into the service life time by using speed and frequency.

$$L_h = \frac{L*10^3}{V_e*60} = \frac{\left(\frac{C}{P}\right)^3 * 50*10^3}{V_e*60}(hr)$$

L_h: Service life (hr)
L: Nominal life (km)
V_e: Speed (m/min)
C/P: Load factor

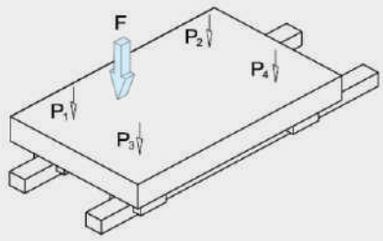
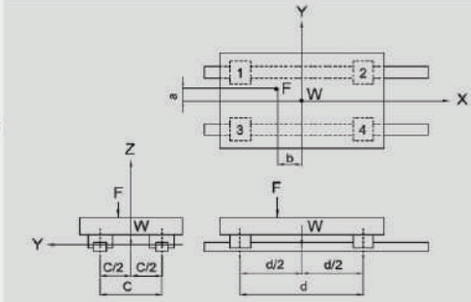
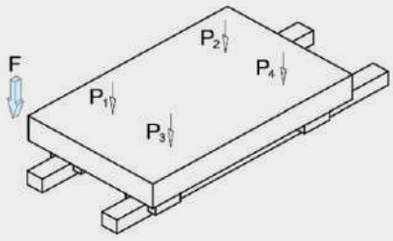
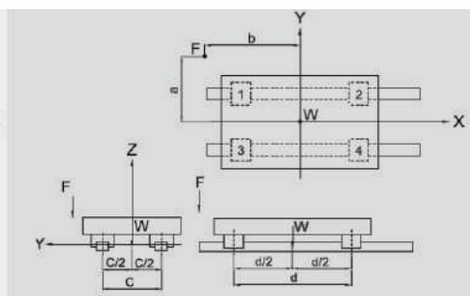
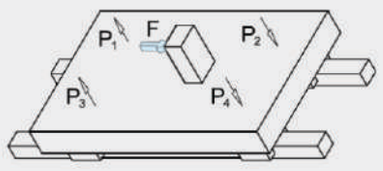
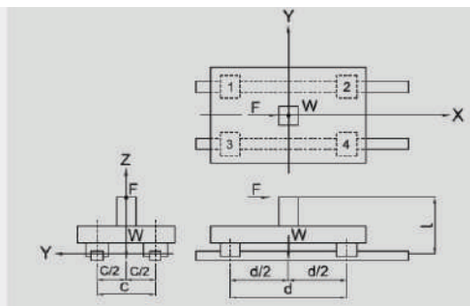
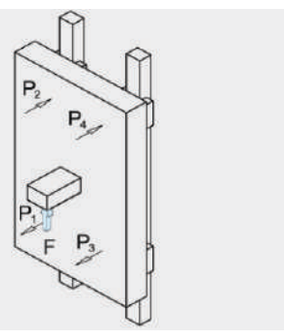
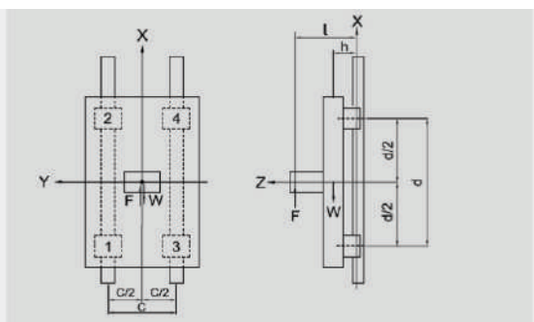
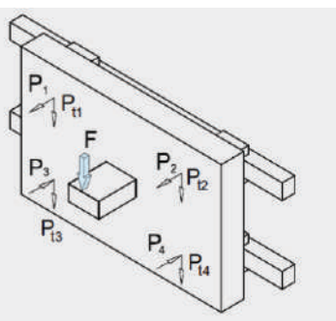
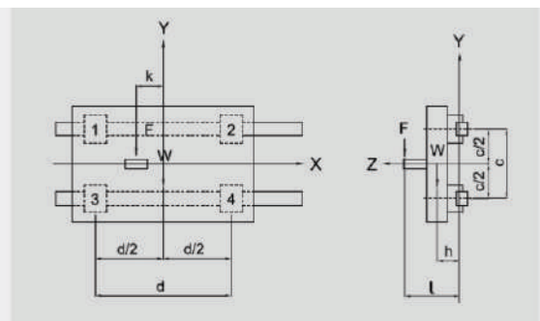
1.5 Applied Loads

1.5.1 Calculation of Load

Several factors affect the calculation of loads acting on a linear guideway (such as the position of the object's center of gravity, the thrust position, and the inertial forces at the time of start and stop). To obtain the correct load value, each load condition should be carefully considered.

(1) Load on one block

Table-3 Calculation example of loads on block

Patterns	Loads layout	Load on one block
		$P_1=\frac{W}{4}+\frac{F}{4}+\frac{F\cdot a}{2c}+\frac{F\cdot b}{2d}$ $P_2=\frac{W}{4}+\frac{F}{4}+\frac{F\cdot a}{2c}-\frac{F\cdot b}{2d}$ $P_3=\frac{W}{4}+\frac{F}{4}-\frac{F\cdot a}{2c}+\frac{F\cdot b}{2d}$ $P_4=\frac{W}{4}+\frac{F}{4}-\frac{F\cdot a}{2c}-\frac{F\cdot b}{2d}$
		$P_1=\frac{W}{4}+\frac{F}{4}+\frac{F\cdot a}{2c}+\frac{F\cdot b}{2d}$ $P_2=\frac{W}{4}+\frac{F}{4}+\frac{F\cdot a}{2c}-\frac{F\cdot b}{2d}$ $P_3=\frac{W}{4}+\frac{F}{4}-\frac{F\cdot a}{2c}+\frac{F\cdot b}{2d}$ $P_4=\frac{W}{4}+\frac{F}{4}-\frac{F\cdot a}{2c}-\frac{F\cdot b}{2d}$
		$P_1=P_3=\frac{W}{4}-\frac{F\cdot l}{2d}$ $P_2=P_4=\frac{W}{4}+\frac{F\cdot l}{2d}$
		$P_1\sim P_4=-\frac{W\cdot h}{2d}+\frac{F\cdot l}{2d}$
		$P_1\sim P_4=-\frac{W\cdot h}{2c}-\frac{F\cdot l}{2c}$ $P_{t1}=P_{t3}=\frac{W}{4}+\frac{F}{4}+\frac{F\cdot k}{2d}$ $P_{t2}=P_{t4}=\frac{W}{4}+\frac{F}{4}-\frac{F\cdot k}{2d}$

W: Applied weight
l: Distance from external force to driver
c: Rail spacing

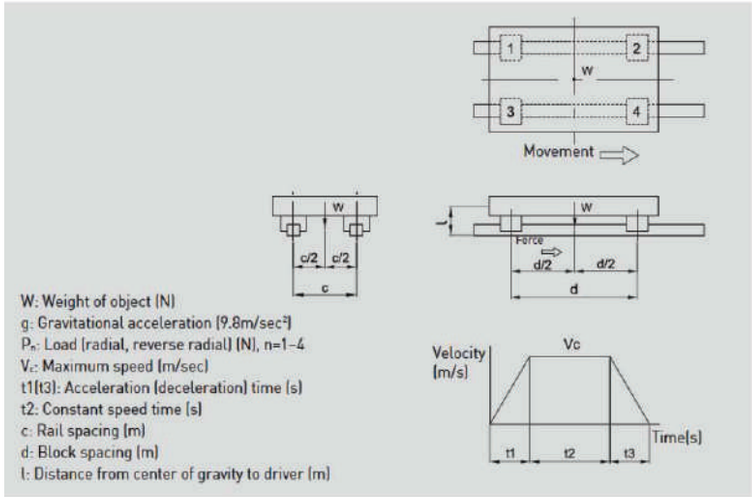
P_n: Load (radial, reverse radial), n=1~4
F: External force
d: Block spacing

a,b,k: Distance from external force to geometric center
P_{tn}: Load (lateral), n=1~4
h: Distance from center of gravity to driver

(2) Loads with inertia forces

Table-4 Calculation Examples for Loads with Inertia Forces

Considering the acceleration and deceleration	Load on one block



W: Weight of object (N)
g: Gravitational acceleration (9.8m/sec²)
P_n: Load (radial, reverse radial) (N), n=1–4
V_c: Maximum speed (m/sec)
t1(t3): Acceleration (deceleration) time (s)
t2: Constant speed time (s)
c: Rail spacing (m)
d: Block spacing (m)
l: Distance from center of gravity to driver (m)

- Constant velocity

$$P_1 \sim P_4 = \frac{W}{4}$$

- Acceleration

$$P_1 = P_3 = \frac{W}{4} + \frac{1}{2} \cdot \frac{W}{g} \cdot \frac{V_c}{t1} \cdot \frac{l}{d}$$

$$P_2 = P_4 = \frac{W}{4} - \frac{1}{2} \cdot \frac{W}{g} \cdot \frac{V_c}{t1} \cdot \frac{l}{d}$$

- Deceleration

$$P_1 = P_3 = \frac{W}{4} - \frac{1}{2} \cdot \frac{W}{g} \cdot \frac{V_c}{t3} \cdot \frac{l}{d}$$

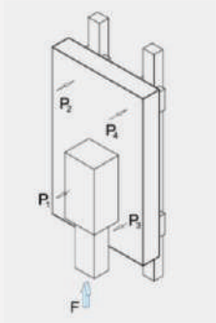
$$P_2 = P_4 = \frac{W}{4} + \frac{1}{2} \cdot \frac{W}{g} \cdot \frac{V_c}{t3} \cdot \frac{l}{d}$$

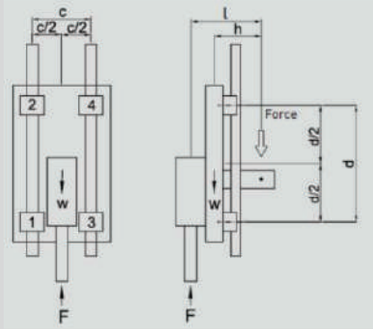
1-5-2 Calculation of The Mean Load for Variable Loading

According to the experience, the type and specifications of the linear rolling guide are selected, and the maximum working load of a single slider is estimated according to the actual use, and the load ratio between the dynamic rated load and the working load is calculated to calculate its service life.

Table 5 Calculation case of life

Specification for linear rolling guide pair	Dimension of device	Operating condition
Type: MSQ 30F	d: 600 mm	• Weight (W):15 kN
C: 38.74 kN	c:400 mm	• Acting force (F) :1kN
N0: 52.19 kN	h: 200 mm	• Temperature: normal temperature
Preload: N0	1:250 mm	• Load status: normal load





◆ Calculation of acting loads

$$P_1 \sim P_2 = +\frac{W \times h}{2d} - \frac{F \times l}{2d} = +\frac{15 \times 200}{2 \times 600} - \frac{1 \times 250}{2 \times 600} = 2.29(kN)$$

$$P_{MAX} = |P_1 \sim P_4| = 2.29(kN)$$

◆ Because preload is N0, $P_C = P_{max}$=2.29(kN)

Note: The larger preload (N1, N2) will increase the rigidity, but decrease the nominal life of guideway.

◆ Calculation for life L

$$L = \left(\frac{f_h \times f_t \times C}{f_w \times P_c} \right)^3 \times 50 = \left(\frac{1 \times 1 \times 38.7}{2 \times 2.29} \right)^3 \times 50 = 30.2(km)$$

1.6 Friction

As mentioned in the preface, a linear guideway allows a type of rolling motion, which is achieved by using balls or rollers. The coefficient of friction for a linear guideway can be as little as 1/50 of a traditional slide. Generally, the coefficient of friction of ball type linear guideway is about 0.004 and roller type is about 0.003.

When a load is 10% or less than the basic static load rate, the most of the resistance comes from the grease viscosity and frictional resistance between balls. In contrast, if the load is more than the basic static load rating, the resistance will mainly come from the load.

$$F = \mu \cdot W + S \tag{5}$$

F: Friction (kN) S: Friction resistance (kN)

μ: Coefficient of friction W: Normal loads (kN)

1.7 Lubrication

Supplying insufficient lubrication to the guideway will greatly reduce the service life due to an increase in rolling friction. The lubricant provides the following functions; Reduces the rolling friction between the contact surfaces to avoid abrasion and surface burning of the guideway. Generates a lubricant film between the rolling surfaces and decreases fatigue. O Anti-corrosion.

1.7.1 Grease

Linear guideway must be lubricated with the lithium soap-based grease before installation. After the linear guideway is installed, we recommend that the guideway be re-lubricated every 100 km. It is possible to carry out the lubrication through the grease nipple. Generally, grease is applied for speeds that do not exceed 60 m/min faster speeds will require high-viscosity oil as a lubricant.

.

$$T = \frac{100 \times 1000}{V_e \times 60}(hr) \tag{6}$$

T: Feeding frequency of oil (hour)

Ve: speed (m/min)

1.7.2 Oil

It is recommended that customers use lubricating oil with a viscous force of about 32-150cst to lubricate the linear rolling guide pair. KNT can be installed according to the needs of customers, customers just connect the tubing to the tubing joint can be used. The loss of lubricating oil is faster than that of lubricating oil, so it is necessary to pay attention to whether the oil supply is sufficient when using. If insufficient lubrication is easy to cause abnormal wear of the linear rolling guide pair and reduce its life, it is suggested that the oil pumping frequency is about 0.3cm3/hr, and the customer can use it according to its use condition.

The lubricating oil is suitable for all kinds of load and speed occasions, but it is not suitable for high temperature lubrication because the lubricating oil is volatile.

1.8 The Butt-joint Rail

Jointed rail should be installed by following the arrow sign and ordinal number which is marked on the surface of each rail. For matched pair, jointed rails, the jointed positions should be staggered. This will avoid accuracy problems due to discrepancies between the 2 rails (see figure).

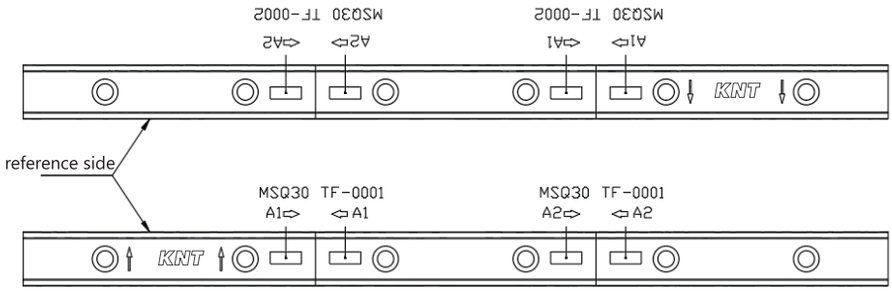


Figure 4 Label of long guide rail interface

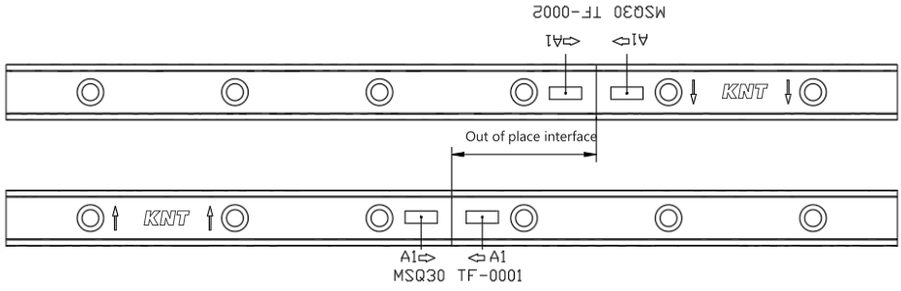


Figure 5 Installation diagram of connecting long linear rolling guide pair

1.9 Installation of linear rolling guide pair

The installation method of linear rolling guide pair must be designed according to the service condition of the machine, such as the degree of vibration and impact force, the required walking accuracy and the machine restrictions.

1.9.1 Reference Guide and non-reference guide

When the non-interchangeable linear rolling guide pair is used, attention should be paid to the distinction between the reference guide and non-reference guide. The precision of the reference guide slide block side datum is higher than that of the non-reference guide slide block, which can be used as the bed mounting support surface. There is "B" in the reference guide rail number, as shown in Figure 7.

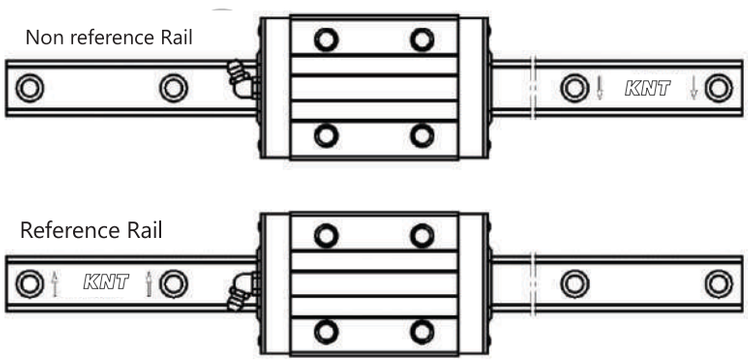


Figure 6 Labels of reference guide rail and non-reference guide rail

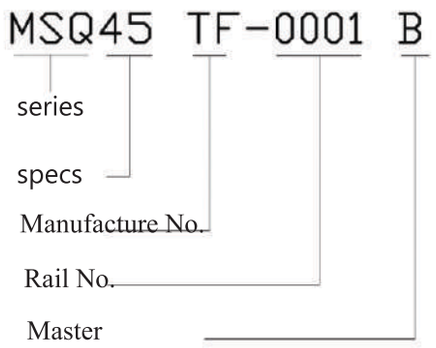
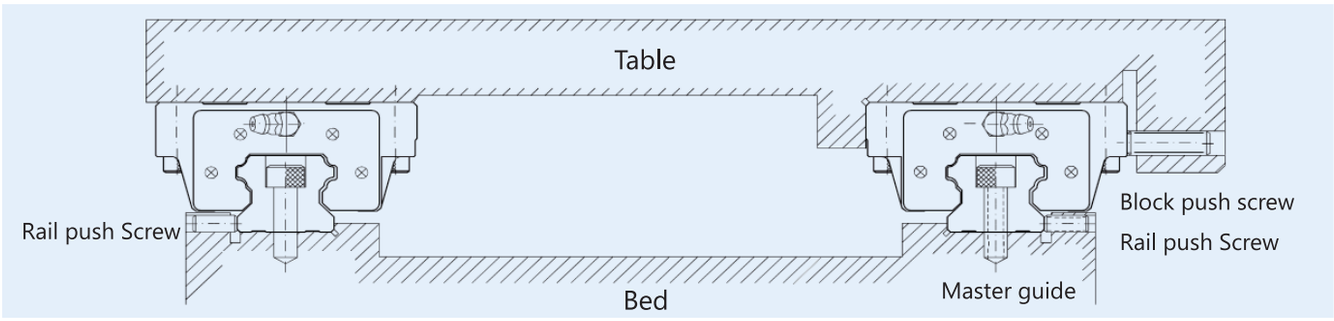


Figure 7 Labels of reference guide rail

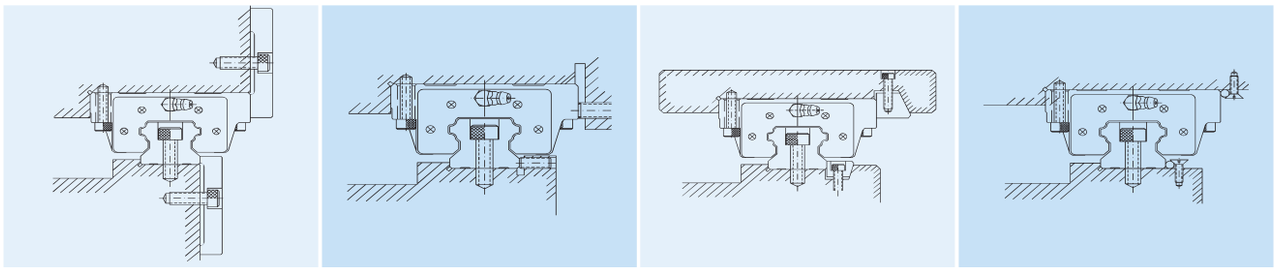
1.9.2 Installation to Achieve High Accuracy and Rigidity

When the non-interchangeable linear rolling guide pair is used, attention should be paid to the distinction between the reference guide and non-reference guide. The precision of the reference guide slide block side datum is higher than that of the non-reference guide slide block, which can be used as the bed mounting support surface. There is "B" in the reference guide rail number, as shown in Figure 7.



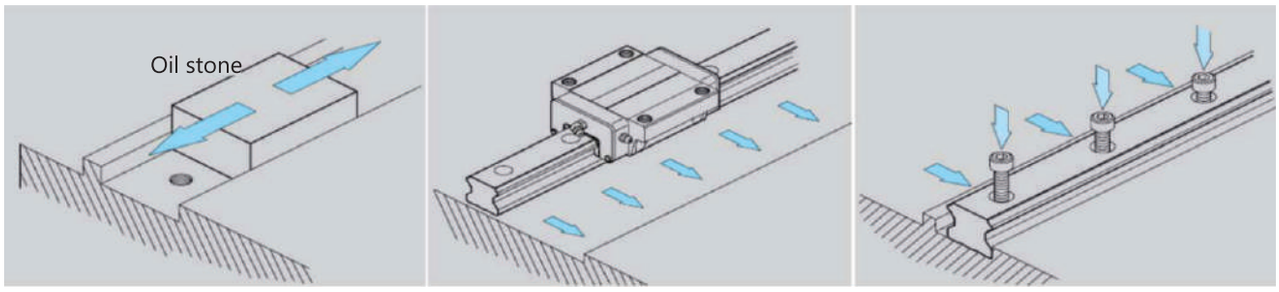
[1] Mounting methods

It is possible that the rails and the blocks will be displaced when the machine is subjected to vibrations and impacts. To eliminate these difficulties and achieve high running accuracy, the following four methods are recommended for fixing.



Mounting with a push plate | Mounting with push screws | Mounting with taper gib | Mounting with needle roller

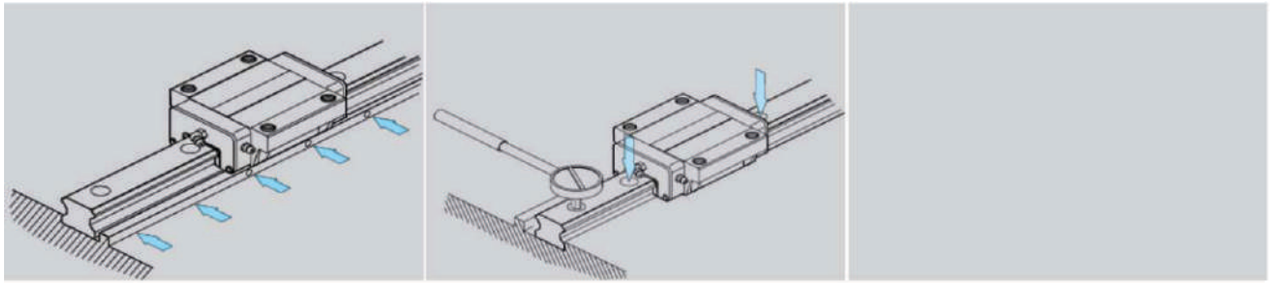
(2) Procedure of rail installation



1. Before starting, remove all dirt from the mounting surface of the machine.

2. Place the linear guideway gently on the bed.Bring the guideway into close contact with the datum plane of the bed.

3. Check for correct thread engagement when inserting a bolt into the mounting hole while the railis being placed on the mounting surface of the bed.

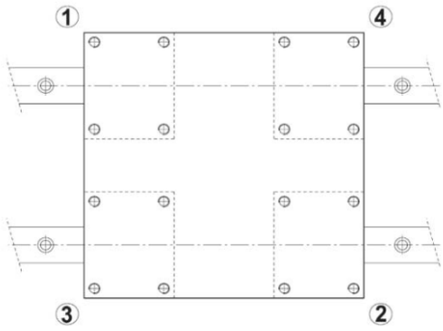


4. Tighten the push screws sequentially to ensure close contact between the rail and the side datum plane.

5. Tighten the mounting bolts with a torque wrench to the specified torque.

6. Install the remaining linear guideway in the same way.

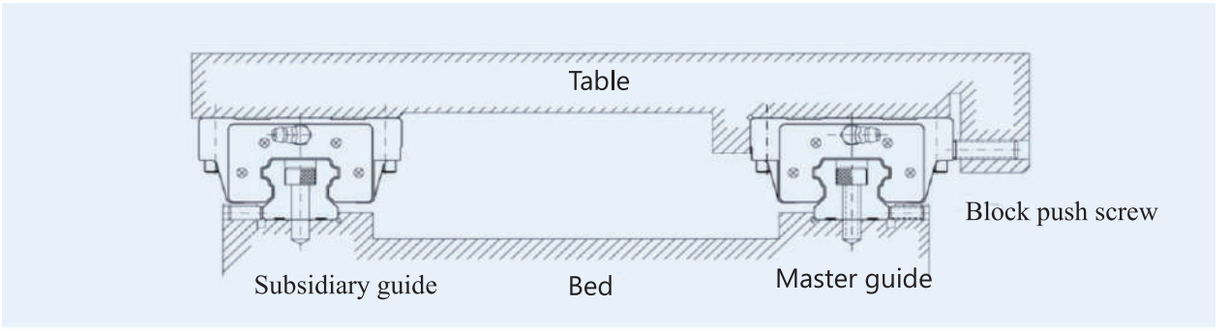
(3) Procedure of block installation



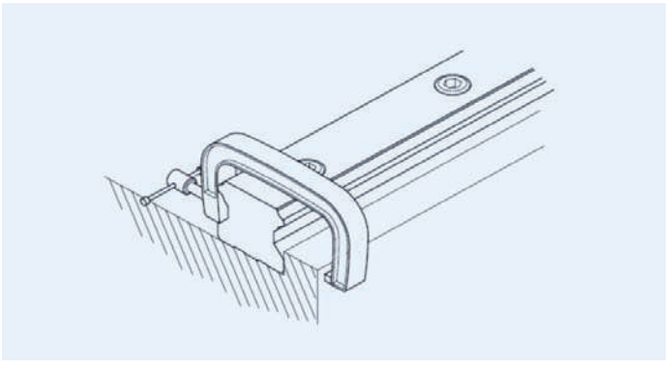
- Place the table gently on the blocks. Next, hand tighten the block mounting bolts temporarily.
- Push the blocks against the datum plane of the table and position the table by tightening the push screws.
- The table can be fixed uniformly by tightening the mounting bolts on master guide side and subsidiary side in 1 to 4 sequences.

1.9.3 Installation of the Master Guide without Push Screws

To ensure parallelism between the subsidiary guide and the master guide without push screws, the following rail installation methods are recommended. The block installation is the same as mentioned previously.



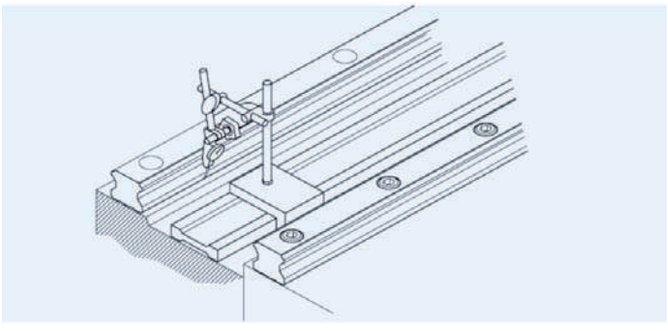
(1) Installation of the rail on the subsidiary guide side



- Using a vice

  Place the rail into the mounting plane of the bed. Tighten the mounting bolts temporarily; then use a vice to push the rail against the side datum plane of the bed. Tighten the mounting bolts in sequence to the specified torque.

(2) Installation of the rail on the subsidiary guide side



- Method with use of a straight edge

  Set a straight edge between the rails parallel to the side datum plane of the rail on the master guide side by using a dial gauge. Use the dial gauge to obtain the straight alignment of the rail on the subsidiary guide side. When the rail on the subsidiary guide side is parallel to the master side, tighten the mounting bolts in sequence from one end of the rail to the other.

(2) Installation of the rail on the subsidiary guide side

The method of installation for the rail on the subsidiary guide side is the same as the case without push screws.

1.9.5 Linear Guideway Mounting Notifications

To ensure parallelism between the subsidiary guide and the master guide without push screws, the following rail installation methods are recommended. The block installation is the same as mentioned previously.

1. KNT guideways are applied with rust-proof oil before shipping. Please clean the oil before moving or running the blocks.
2. Confirm the reference rail and non-reference rail:

   When the non-interchangeable linear guide is used together, pay attention to the difference between the reference rail and non-reference rail. The precision of the reference rail side datum is higher than that of the non-reference rail, which can be used as the bed to install the supporting surface. The benchmark track is marked with a B. Moreover, when using dual-track pairs, install in sequence as instructed by the symbol, as shown in Figure 8. For multi-rail installation, use the same analogy.

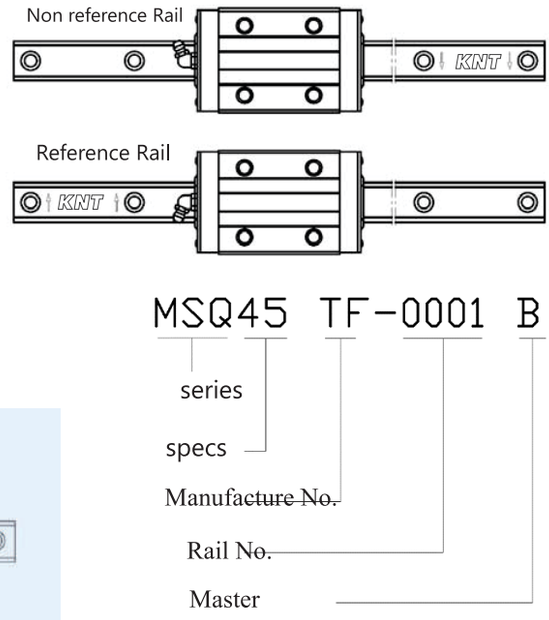


Figure 8

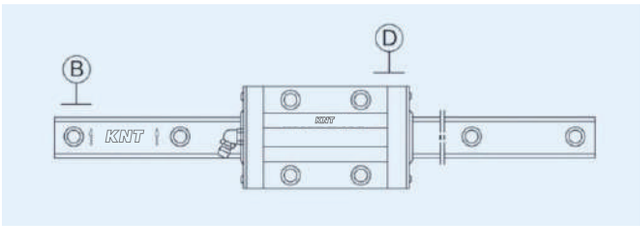


Figure 9

3. Recognition of datum plane: The datum plane (B) of rail is the side indicated by the arrow, which is marked on the top surface of the rail. The datum plane of block is smooth ground surface which shows as D in Figure 9.
4. Butt-joint rail: Butt-joint rail should be installed by following the arrow sign and ordinal number which is marked on the surface of each rail as shown in the figure 10. To avoid accuracy problems due to discrepancies between the 2 rails such as for matched pair, butt-joint rails, the jointed positions should be staggered as shown in figure 11.

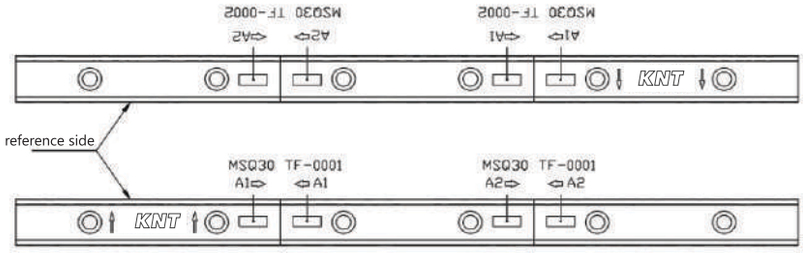


Figure 10

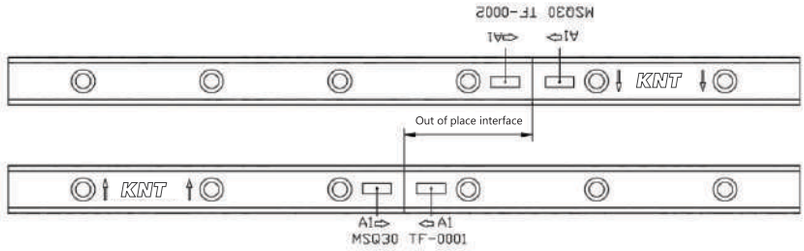
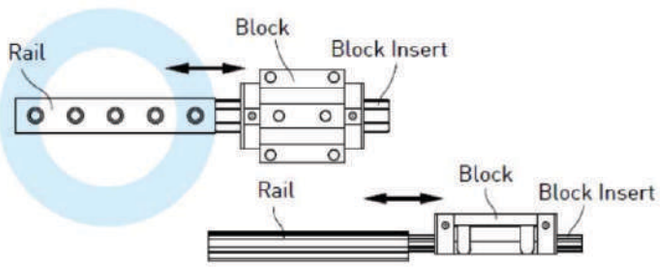


Figure 11

5. Do not remove blocks from rails when assembling the guideways. KNT recommends using block inserts (please see Figure (12) if it is necessary to remove/ mount block from/ onto rail.



6. MS recommends not randomly mixing block units and rails for non-interchangeable type to avoid any installation problem.

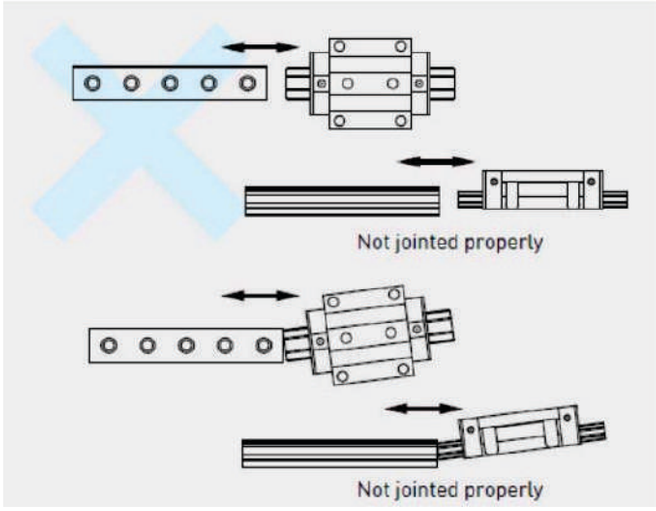


Figure 12

7. To ensure the straightness of rail, please tighten the mounting bolts sequentially with a torque wrench to the specified torque. (Refer to KNT Technical Information).

1.9.6 Maintenance Precautions for Linear guide rails

To ensure parallelism between the subsidiary guide and the master guide without push screws, the following rail installation methods are recommended. The block installation is the same as mentioned previously.

1. Lubricant (lubricating oil or lithium soap-based grease) has been added into the slider for the standard product of the linear rolling guide pair before shipment. After installation and test run, and before formal operation, the slider needs to be lubricated again.
2. The standard products of the linear rolling guide pair are coated with antirust oil around the surface of the guide rail before shipment. If the antirust oil is cleaned before installation, please apply a layer of appropriate lubricating oil around the surface of the guide rail again after the installation of the equipment (please use compatible lubricant);
3. Because the sliding block of the linear rolling guide pair is composed of many plastic parts, please avoid contact with organic solvents or soak these parts when cleaning, so as to avoid product damage;
4. Foreign matter entering the slider is one of the reasons for the failure and damage of the slider, which should be avoided; 5. Do not disassemble the spare parts of the linear rolling guide pair arbitrarily, which may cause foreign bodies to enter the slider or reduce the accuracy.
6. Improper tilting of the linear guide may cause the slider to slide out of the guide because of its dead weight. Please keep the linear guide in a horizontal state when moving the linear guide;
7. The fall or impact of the linear rolling guide pair will damage the normal function. Please avoid improper fall or impact of the linear guide; 8. For use in special environment, please use appropriate surface treatment or contact KNT.

KNT Linear Guideway series.

In order to serve customers and meet their needs for product diversity, besides the MSQ series suitable for the general tool machine industry, the MSL series suitable for the automation industry, the MSZ series suitable for the high-rigidity demand industry and the MSC/MSD series suitable for the micro mechanical semiconductor industry have been developed.

(1）Types & Series

Series	Assembly Height	Load	Square Tap Hole	Flange
MSQ	High	Heavy Load	MSQ-FA	MSQ-WB\WC
		Super Heavy Load	MSQ-FLA	MSQ-WLB\WLC
MSL	Low	Medium Load	MSL-SFA	—
		Heavy Load	MSL-FA	—
MCR	—	Standard	MSC-C	—
		Long	MSC-L	—
MDR	—	Standard	MSD-C	—
		Long	MSD-L	—
MSZ	High	Heavy Load	MSZ-FA	MSZ-WC
		Super Heavy Load	MSZ-FLA	MSZ-WLC

Table 6 Types & Series

(2) Accuracy classes

Series	Assembly Type					Interchangeable Type		
	Normal（C）	High（H）	Precision（P）	Super Precision（SP）	Ultra Precision（UP）	Normal（C）	High（H）	Precision（P）
MSQ	●	●	●	●	●	●	●	●
MSL	●	●	●	●	●	●	●	●
MCR	●	●	●	—	—	●	●	●
MDR	●	●	●	—	—	●	●	●
MSZ	—	●	●	●	●	—	●	●

Table 7 Accuracy Classes

(3) Classification of preload

Series	Non-Interchangeable Type			Interchangeable Type	
	Light preload（N0）	Medium preload（N1）	Heavy preload（N2）	Light preload（N0）	Medium preload（N1）
MSQ	•	•	•	•	•
MSL	•	•	•	•	•
MSZ	•	•	•	•	•
Series	Non-Interchangeable Type			Interchangeable Type	
	clearance（CN）	Light preload（N0）	Medium preload（N1）	Clearance（CN）	Light preload（N0）
MCR	•	•	•	•	•
MDR	•	•	•	•	•

Table 8 Preload

2.1 MSQ series a ball linear guide pair

MSQ series rolling linear guide pair adopts four rows of circular arc track structure, can bear radial, radial and transverse load at the same time, the ability is equivalent, and can maintain the motion accuracy, in use can be based on the different load on the number of sliding seat increase or decrease, to meet the needs of different bearing. The four-direction equal load structure has the function of automatic adjustment, which can absorb the assembly error of the mounting surface and ensure the assembly accuracy. The concept of high speed, high load, high rigidity and high precision has become the development trend of industrial products all over the world in the future. KNT four-column moving linear guide pair is the product developed based on this concept.

2.1.1 Features of MSQ Series

(1) Self-aligning capability

By design, the circular-arc groove has contact points at 45 degrees. MSQ series can absorb most installation errors due to surface irregularities and provide smooth linear motion through the elastic deformation of rolling elements and the shift of contact points. Self-aligning capability, high accuracy and smooth operation can be obtained with an easy installation.

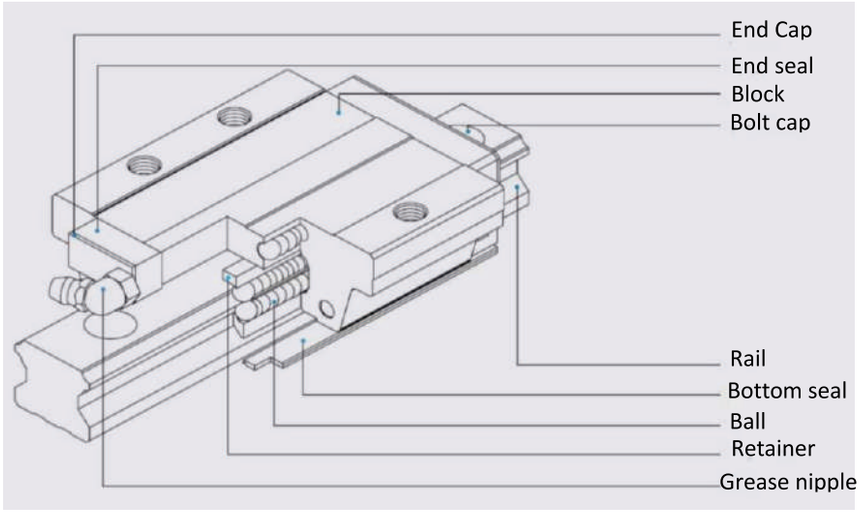
(2) Interchangeability

Because of precision dimensional control, the dimensional tolerance of MSQ series can be kept in a reasonable range, which means that any blocks and any rails in a specific series can be used together while maintaining dimensional tolerance. And a retainer is added to prevent the balls from falling out when the blocks are removed from the rail.

(3) High rigidity in all four directions

Because of the four-row design, the MSQ series linear guideway has equal load ratings in the radial, reverse radial and lateral directions. Furthermore, the circular-arc groove provides a wide-contact width between the balls and the groove raceway allowing large permissible loads and high rigidity.

2.1.2 Construction of MSQ Series

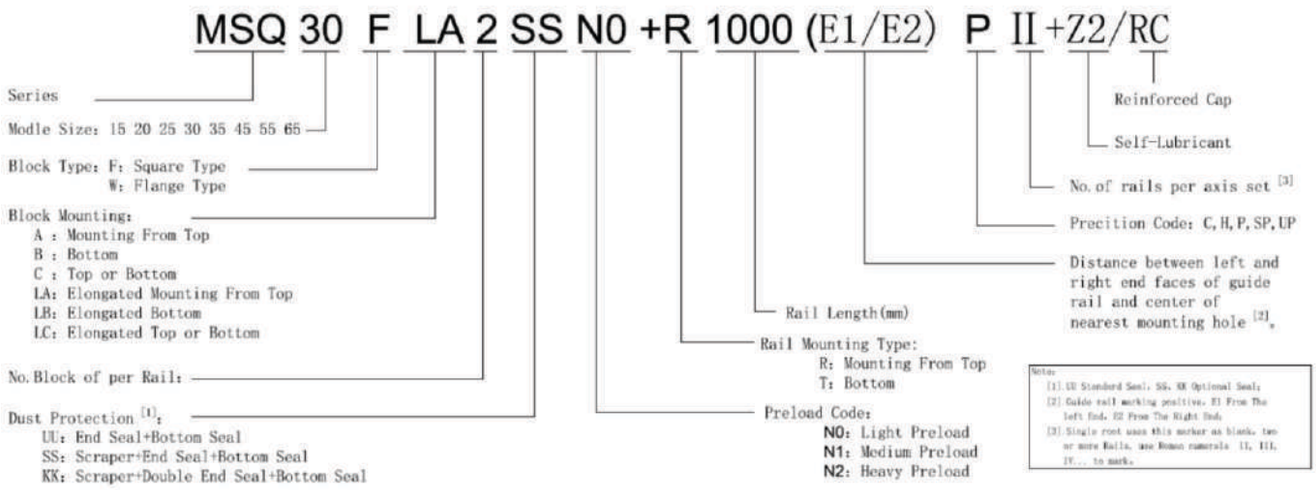


- Rolling circulation system: Block, Rail, End Cap and Retainer
- Lubrication system: Grease Nipple and Piping Joint
- Dust protection system: End seal, Bottom Seal, Bolt Cap, Double Seals and Scraper

2.1.3 Model Number of HG Series

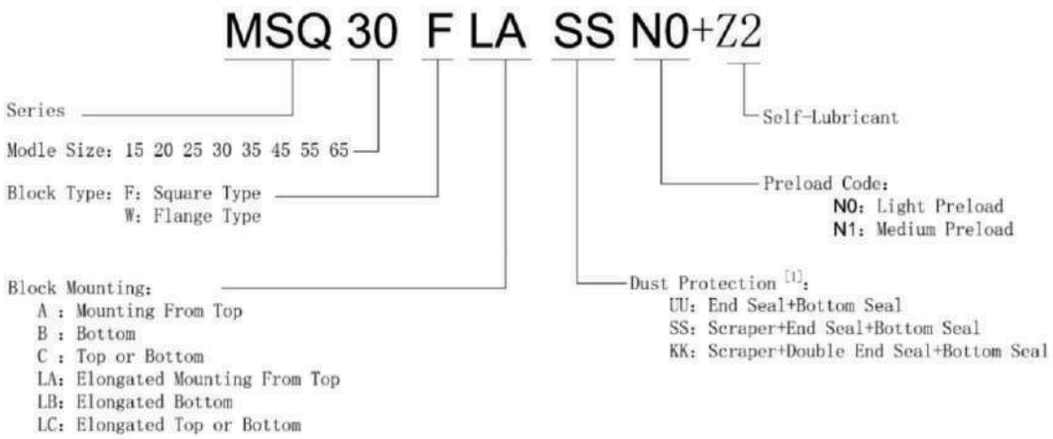
MSQ series guideways can be classified into non-interchangeable and interchangeable types. The sizes are identical. The only difference between the two types is that the interchangeable type of blocks and rails can be freely exchanged and their accuracy can reach up to P class. The model number of MSQ series contains the size, type, accuracy class, preload class, etc.

(1) Non-interchangeable type

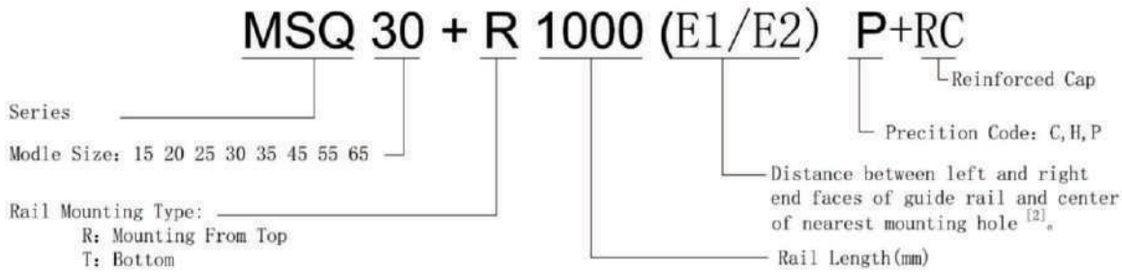


(2) Interchangeable type

● Model Number of MSQ Block

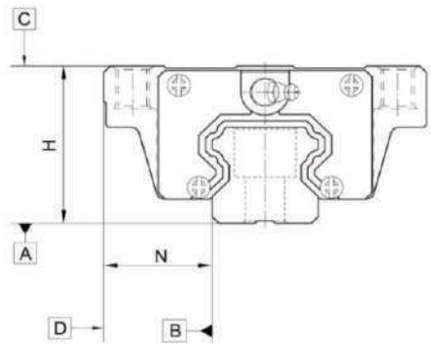


● Model Number of MSQ Rail



2.1.4 Accuracy Classes

The accuracy of MSQ series can be classified into normal (C), high (H), precision (P), super precision (SPI ultra-precision (UP), five classes. Please choose the class by referring the accuracy of applied equipment.



(1) Accuracy of non-interchangeable guideways

unit：mm

Series	MSQ-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 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-1 Accuracy Standards

unit：mm

Series	MSQ-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 -0.04	0 -0.02	0 -0.01
Dimensional tolerance of width N	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
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 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-2 Accuracy Standards

unit：mm

Series	MSQ-45、55				
Accuracy Classes	Normal （C）	High （H）	Precision （P）	Super Precision （SP）	Ultra Precision （UP）
Dimensional tolerance of height H	±0.1	±0.05	0 -0.05	0 -0.03	0 -0.02
Dimensional tolerance of width N	±0.1	±0.05	0 -0.05	0 -0.03	0 -0.02
Variation of height H	0.03	0.015	0.007	0.005	0.003
Variation of width N	0.03	0.02	0.01	0.007	0.005
Running parallelism of block surface C to surface A	See Table 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-3 Accuracy Standards

unit：mm

Series	MSQ-65				
Accuracy Classes	Normal （C）	High （H）	Precision （P）	Super Precision （SP）	Ultra Precision （UP）
Dimensional tolerance of height H	±0.1	±0.07	0 -0.07	0 -0.05	0 -0.03
Dimensional tolerance of width N	±0.1	±0.07	0 -0.07	0 -0.05	0 -0.03
Variation of height H	0.03	0.02	0.01	0.007	0.005
Variation of width N	0.03	0.025	0.015	0.01	0.007
Running parallelism of block surface C to surface A	See Table 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-4 Accuracy Standards

(2) Accuracy of interchangeable guideways

unit：mm

Series	MSQ-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 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-5 Accuracy Standards

unit：mm

Series	MSQ-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 Table2-1-9				
Running parallelism of block surface D to surface B	See Table2-1-9				

Table 2-1-6 Accuracy Standards

unit：mm

Series	MSQ-45、55				
Accuracy Classes	Normal （C）	High （H）	Precision （P）	Super Precision （SP）	Ultra Precision （UP）
Dimensional tolerance of height H	±0.1	±0.05	±0.025		
Dimensional tolerance of width N	±0.1	±0.05	±0.025		
Variation of height H	0.03	0.015	0.007		
Variation of width N	0.03	0.02	0.01		
Running parallelism of block surface C to surface A	See Table 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-7 Accuracy Standards

unit：mm

Series	MSQ-65				
Accuracy Classes	Normal（C）	High（H）	Precision（P）	Super Precision（SP）	Ultra Precision（UP）
Dimensional tolerance of height H	±0.1	±0.07	±0.035		
Dimensional tolerance of width N	±0.1	±0.07	±0.035		
Variation of height H	0.03	0.02	0.01		
Variation of width N	0.03	0.025	0.015		
Running parallelism of block surface C to surface A	See Table 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-8Accuracy Standards

(3) Accuracy of running parallelism

unit：μm

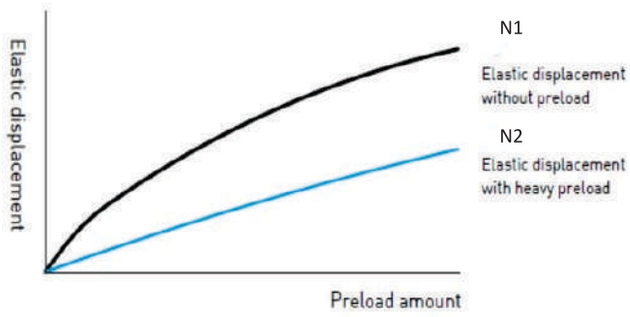
Rail Length（mm）	Accuracy				
	Normal（C）	High（H）	Precision （P）	Super Precision（SP）	Ultra Precision（UP）
0~100	12	7	3	2	2
100~200	14	9	4	2	2
200~300	15	10	5	3	2
300~500	17	12	6	3	2
500~700	20	13	7	4	2
700~900	22	15	8	5	3
900~1100	24	16	9	6	3
1100~1500	26	18	11	7	4
1500~1900	28	20	13	8	4
1900~2500	31	22	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 2-1-9 Accuracy of Running Parallelism

2.1.5 Preload

(1) Definition

A preload can be applied to each guideway. Oversized balls are used. Generally, a linear motion guideway has a negative clearance between groove and balls in order to improve stiffness and maintain high precision. The figure shows the load is multiplied by the preload, the rigidity is doubled and the deflection is reduced by one half. The preload no larger than N1 would be recommended for the model size under MSQ20 to avoid an over-preload affecting the guideway's life.



(2) Preload classes

KNT offers three classes of standard preload for various applications and conditions.

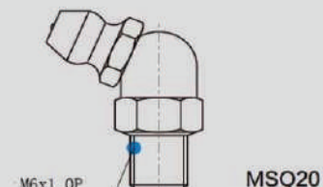
Class	Code	Preload	Condition	Examples of Application
Light Preload	N0	0~0.02C	Certain load direction, low impact, low precision required	Transportation devices, auto-packing machines, X-Y axis for general industrial machines, welding machines," welders
Medium Preload	N1	0.05C~0.07C	High precision required	Machining centers, Z axis for general industrial, machines, EDM, NC lathes, Precision X-Y tables, measuring equipment
Heavy Preload	N2	0.1C~0.12C	High rigidity required, with vibration and impact	Machining centers, grinding machines, NC lathes, horizontal and vertical milling machines, Z axis of machine tools, Heavy cutting machines

Table 2-1-10 Preload classes

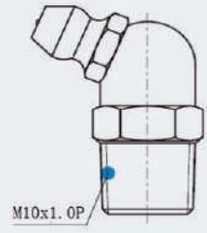
2.1.6 Lubrication

(1) Grease

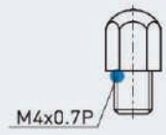
◆ Grease nipple



NO.34320001 MSQ20 MSQ25 MSQ30 MSQ35

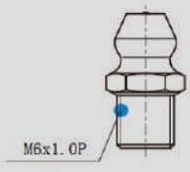


NO.34320003 MSQ45 MSQ55 MSQ65



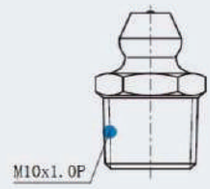
MSQ15

NO.34310002



MSQ20 MSQ25 MSQ30 MSQ35

NO.34310003(OPTION)

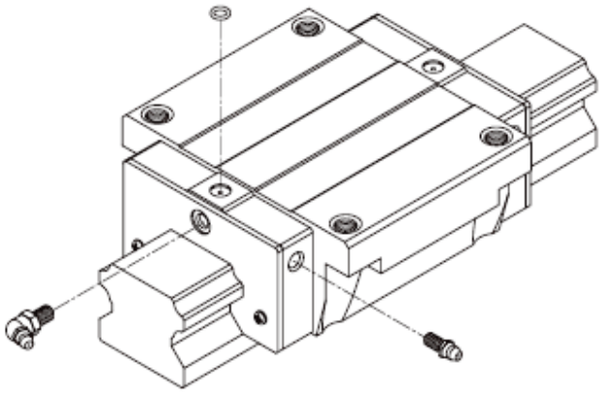


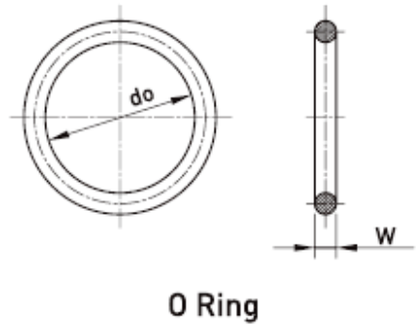
MSQ45 MSQ55 MSQ65

NO.3431000B(OPTION)

◆ Mounting location

The standard location of the grease fitting is at either end of the block, but the nipple can be mounted at either side of the block instead. For side installation, contact KNT to pre-drill the block at the desired location.





Size	O-Ring		Lube hole at top: max.permissible depth for piercing T（mm）
	do（mm）	W（mm）	
MSQ15	2.5±0.15	1.5±0.15	3.75
MSQ20	4.5±0.15	1.5±0.15	5.7
MSQ25	4.5±0.15	1.5±0.15	5.8
MSQ30	4.5±0.15	1.5±0.15	6.3
MSQ35	4.5±0.15	1.5±0.15	8.8
MSQ45	4.5±0.15	1.5±0.15	8.2
MSQ55	4.5±0.15	1.5±0.15	11.8
MSQ65	4.5±0.15	1.5±0.15	10.8

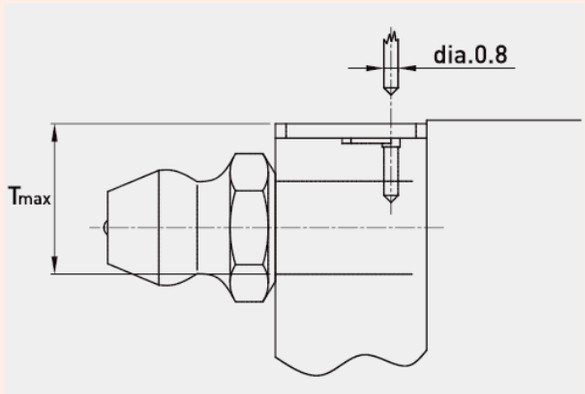


Table 2-1-11 O-Ring size and max. permissible depth for piercing

◆ The lubricant amount for a block filled with grease

size	Heavy Load	Super Heavy Load	size	Heavy Load	Super Heavy Load
MSQ15	1	-	MSQ35	10	12
MSQ20	2	3	MSQ45	17	21
MSQ25	5	6	MSQ55	26	33
MSQ30	7	8	MSQ65	50	61

Table 2-1-12 The lubricant Amount for a Block Filled with Grease

◆ Frequency of replenishment

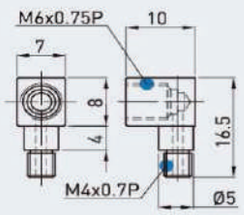
Check the grease every 100 km, or every 3-6 months.

(2) Oil

The recommended viscosity of oil is about 30-150cSt. If customers need to use oil-type lubrication, please inform us.

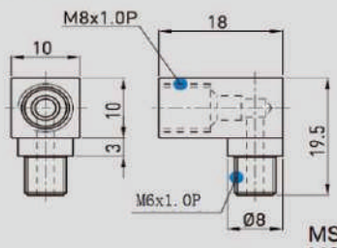
◆ Types of oil piping joint

LF-64



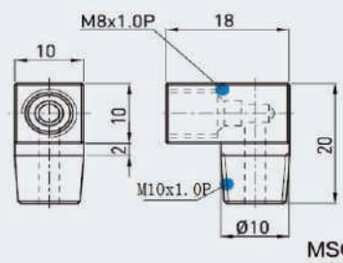
NO.97000EA1 MSQ15

LF-76



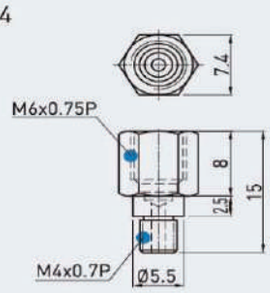
NO.970002A1 MSQ20 MSQ25 MSQ30 MSQ35

LF-78



NO.970006A1 MSQ45 MSQ55 MSQ65

SF-64



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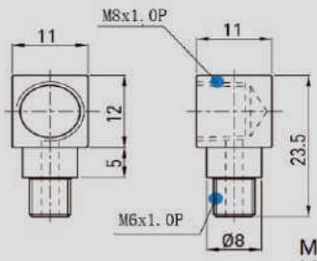
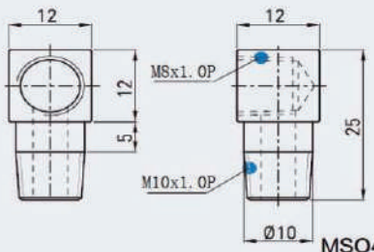
LF-86



NO.970004A1 MSQ20 MSQ25 MSQ30 MSQ35

LF-88



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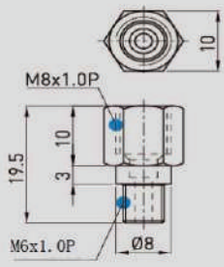
SF-76



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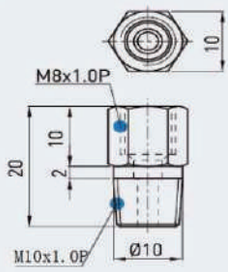
SF-78



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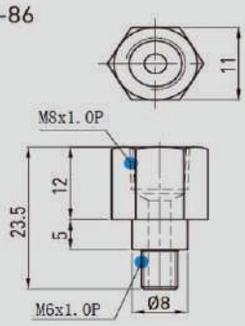
SF-86



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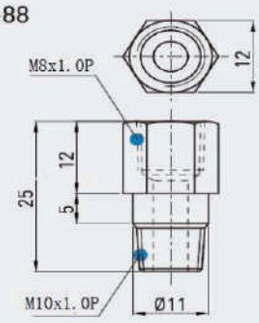
SF-88



NO.970007A1 MSQ45 MSQ55 MSQ65

◆ Oil refilling rate

unit： （cm^3/hr）

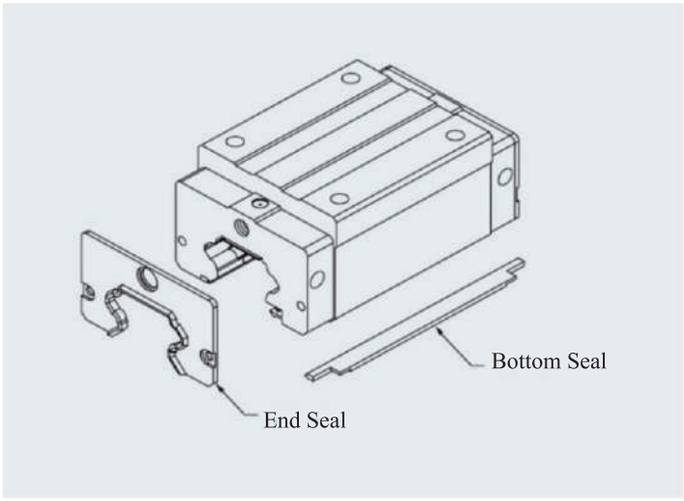
Size	Refilling rate	Size	Refilling rate
MSQ15	0.2	MSQ35	0.3
MSQ20	0.2	MSQ45	0.4
MSQ25	0.3	MSQ55	0.5
MSQ30	0.3	MSQ65	0.6

Table 2-1-13 Oil refilling rate

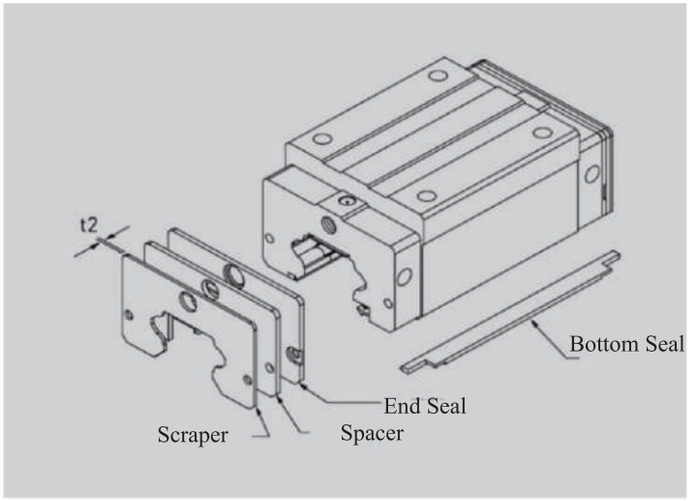
2-1-7 Dust Proof Accessories

(1) Codes of standard dust proof accessories

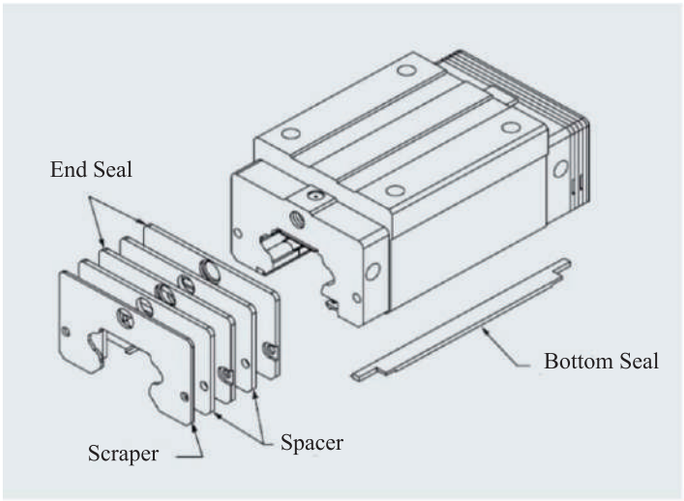
If the following accessories are needed, please add the code followed by the model number.



UU：End Seal+Bottom Seal



SS：Scraper+End Seal+Bottom Seal



KK：Scraper+Double End Seal+Bottom Seal

(2) Function of dust proof accessories

◆ End seal and bottom seal.

To prevent life reduction caused by iron chips or dust entering the block.

◆ Double seals

Enhances the wiping effect, foreign matter can be completely wiped off.

unit：mm

Size	Thickness	Size	Thickness
MSQ15	3	MSQ35	3.5
MSQ20	3.5	MSQ45	4.5
MSQ25	3.5	MSQ55	4.5
MSQ30	3.5	MSQ65	6

Table 2-1-14 Dimensions of end seal

◆ Scraper

The scraper removes high-temperature iron chips and larger foreign objects.

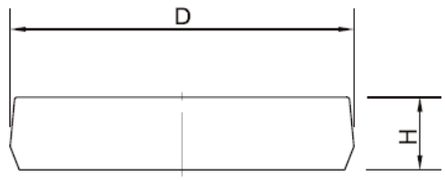
unit：mm

Size	Thickness	Size	Thickness
MSQ15	1.5	MSQ35	1.5
MSQ20	1.5	MSQ45	1.5
MSQ25	1.5	MSQ55	1.5
MSQ30	1.5	MSQ65	1.5

Table 2-1-15 Dimensions of scraper

◆ Bolt caps for rail mounting holes

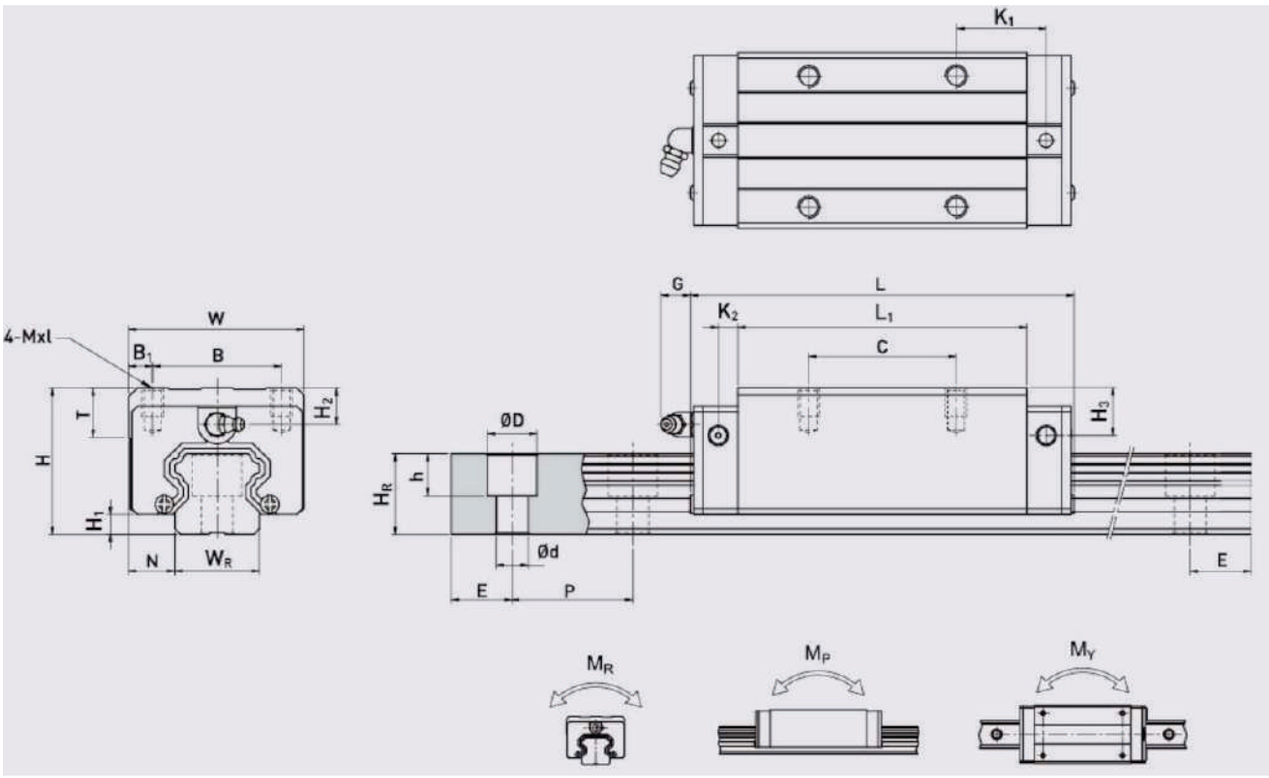
Caps are used to cover the mounting holes to prevent chips or other foreign objects from collecting in the holes. The caps will be enclosed in each rail package.



Rail size	Bolt size	Diameter(D)	Thickness(H)	Rail size	Bolt size	Diameter(D)	Thickness(H)
MSQ-R15	M4	7.65	1.1	MSQ-R35	M8	14.2	3.5
MSQ-R20	M5	9.65	2.5	MSQ-R45	M12	20.25	4.5
MSQ-R25	M6	11.15	2.5	MSQ-R55	M14	23.25	5.0
MSQ-R30	M8	14.2	3.5	MSQ-R65	M16	26.35	5.0

2-1-8 Dimensions for MSQ Series

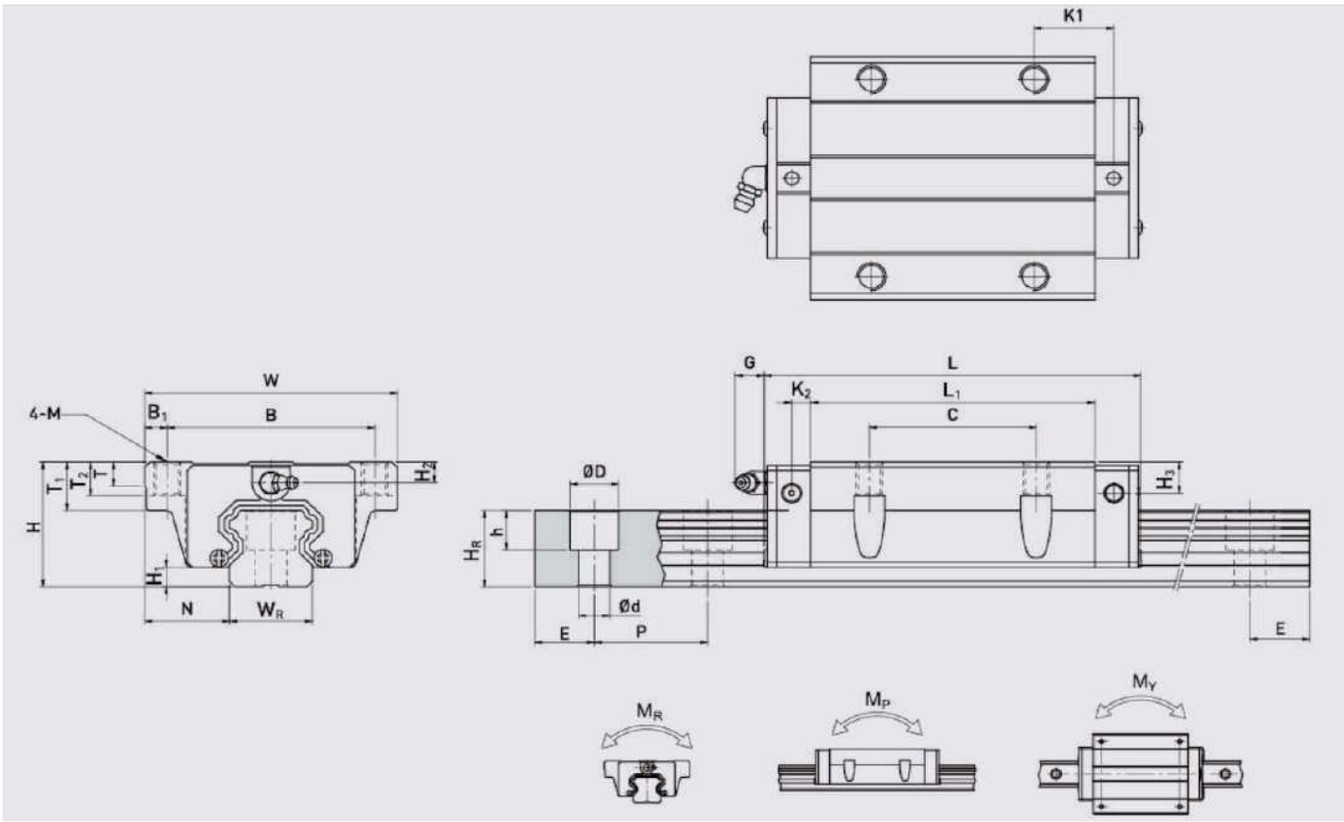
(1) MSQ-FA/FLA



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	H1	N	W	B	B1	C	L1	L	K1	K2	G	MxI	T	H2	H3	WR	HR	D	h	d	P	E	(mm)	C(KN)	Co(KN)	MR KN-m	MP KN-m	MY KN-m	Block Kg	Rail Kg/m
MSQ15FA	28	4.3	9.5	34	26	4	26	39.4	61.4	10	4.85	5.3	M4x5	6	7.95	7.7	15	15	7.5	5.3	4.5	60	20	M4x16	14.7	23.47	0.12	0.10	0.10	0.18	1.4
MSQ20FA	30	4.6	12	44	32	6	36	50.5	77.5	12.25	6	12	M5x6	8	6	6	20	17.5	9.5	8.5	6	60	20	M5x16	27.1	36.68	0.27	0.20	0.20	0.30	2.21
MSQ20FLA							50	65.2	92.2	12.6															32.7	47.96	0.35	0.35	0.35	0.39	
MSQ25FA	40	5.5	12.5	48	35	6.5	35	58	84	15.7	6	12	M6x8	8	10	9	23	22	11	9	7	60	20	M6x20	34.9	52.82	0.42	0.33	0.33	0.51	3.21
MSQ25FLA							50	78.6	104.6	18.5															42.2	69.07	0.56	0.57	0.57	0.69	
MSQ30FA	45	6	16	60	40	10	40	70	97.4	20.25	6	12	M8x10	8.5	9.5	13.8	28	26	14	12	9	80	20	M8x25	48.5	71.87	0.66	0.53	0.53	0.88	4.47
MSQ30FLA							60	93	120.4	21.75															58.6	93.99	0.88	0.92	0.92	1.16	
MSQ35FA	55	7.5	18	70	50	10	50	80	112.4	20.6	7	12	M8x12	10.2	16	19.6	34	29	14	12	9	80	20	M8x25	64.6	93.88	1.16	0.81	0.81	1.45	6.30
MSQ35FLA							72	105.8	138.2	22.5															77.9	122.77	1.54	1.40	1.40	1.92	
MSQ45FA	70	9.5	20.5	86	60	13	60	97	139.4	23	10	12.9	M10x17	16	18.5	30.5	45	38	20	17	14	105	22.5	M12x35	103.8	146.71	1.98	1.55	1.55	2.73	10.41
MSQ45FLA							80	128.8	171.2	28.9															125.3	191.85	2.63	2.68	2.68	3.61	
MSQ55FA	80	13	23.5	100	75	12.5	75	117.7	166.7	27.35	11	12.9	M12x18	17.5	22	29	53	44	23	20	16	120	30	M14x45	153.2	211.23	3.69	2.64	2.64	4.17	15.08
MSQ55FLA							95	155.8	204.8	36.4															184.9	276.23	4.88	4.57	4.57	5.49	
MSQ65FA	90	15	31.5	126	76	25	70	144.2	200.2	43.1	14	12.9	M16x20	25	15	15	63	53	26	22	18	150	35	M16x50	213.2	287.48	6.65	4.27	4.27	7.00	21.18
MSQ65FLA							120	203.6	259.6	47.8															277.8	420.17	9.38	7.38	7.38	9.82	

Note:1kgf=9.81N

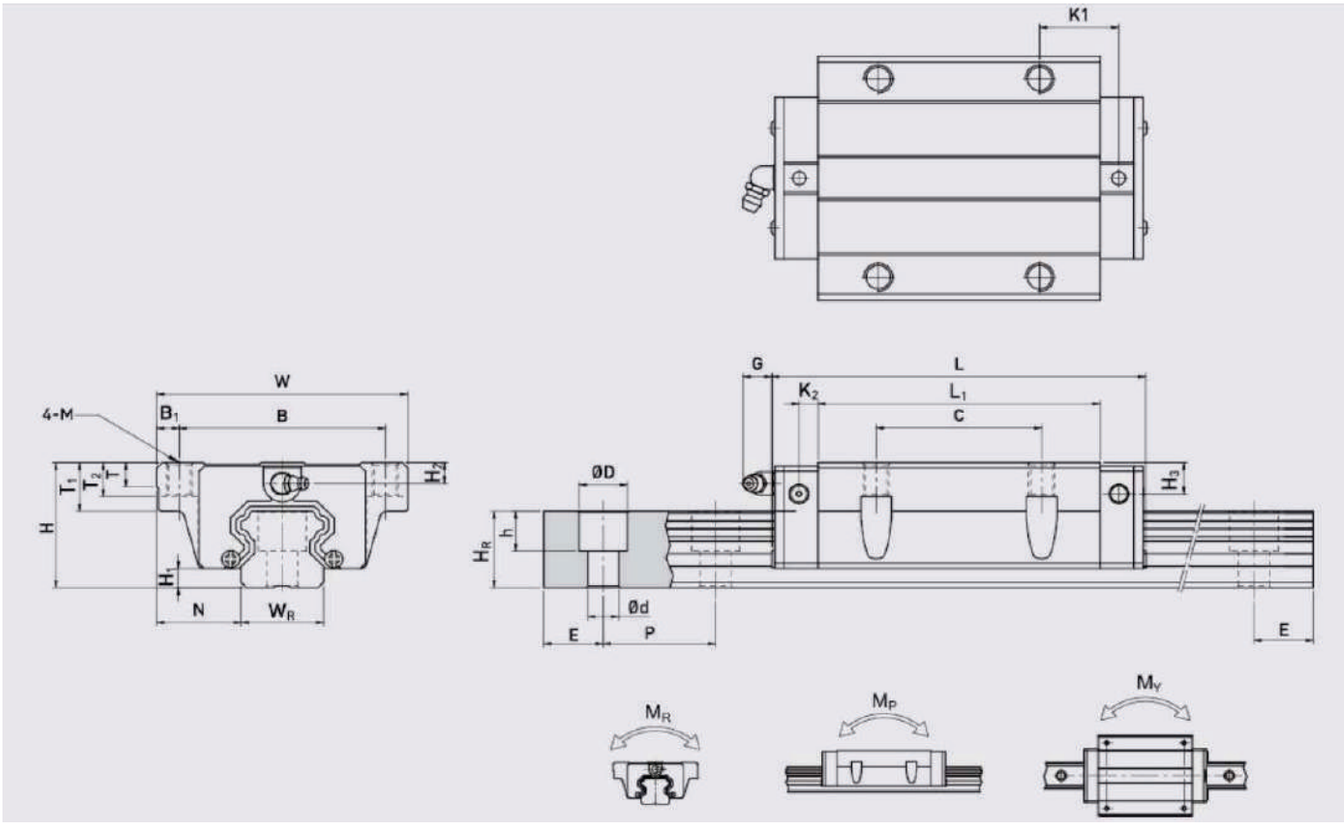
(2) MSQ-WB / WLB



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	T_2	H_2	H_3	W_R	H_R	D	h	d	P	E	(mm)	C(KN)	C_0(KN)	KN-m	KN-m	KN-m	Kg	Kg/m
MSQ15WB	24	4.3	16	47	38	4.5	30	39.4	61.4	8	4.85	5.3	Ø4.5	6	8.9	6.95	3.95	3.7	15	15	7.5	5.3	4.5	60	20	M4x16	14.7	23.47	0.12	0.10	0.10	0.17	1.45
MSQ20WB	30	4.6	21.5	63	53	5	40	50.5	77.5	10.25	6	12	Ø6	8	10	9.5	6	6	20	17.5	9.5	8.5	6	60	20	M5x16	27.1	36.68	0.27	0.20	0.20	0.40	2.21
MSQ20WLB								65.2	92.2	17.6																	32.7	47.96	0.35	0.35	0.35	0.52	
MSQ25WB	36	5.5	23.5	70	57	6.5	45	58	84	10.7	6	12	Ø7	8	14	10	6	5	23	22	11	9	7	60	20	M6x20	34.9	52.82	0.42	0.33	0.33	0.59	3.21
MSQ25WLB								78.6	104.6	21																	42.2	69.07	0.56	0.57	0.57	0.80	
MSQ30WB	42	6	31	90	72	9	52	70	97.4	14.25	6	12	Ø9	8.5	16	10	6.5	10.8	28	26	14	12	9	80	20	M8x25	48.5	71.87	0.66	0.53	0.53	1.09	4.47
MSQ30WLB								93	120.4	25.75																	58.6	93.99	0.88	0.92	0.92	1.44	
MSQ35WB	48	7.5	33	100	82	9	62	80	112.4	14.6	7	12	Ø9	10.1	18	13	9	12.6	34	29	14	12	9	80	20	M8x25	64.6	93.88	1.16	0.81	0.81	1.56	6.30
MSQ35WLB								105.8	138.2	27.5																	77.9	122.77	1.54	1.40	1.40	2.06	
MSQ45WB	60	9.5	37.5	120	100	10	80	97	139.4	13	10	12.9	Ø11	15.1	22	15	8.5	20.5	45	38	20	17	14	105	22.5	M12x35	103.8	146.71	1.98	1.55	1.55	2.79	10.41
MSQ45WLB								128.8	171.2	28.9																	125.3	191.85	2.63	2.68	2.68	3.69	
MSQ55WB	70	13	43.5	140	116	12	95	117.7	166.7	17.35	11	12.9	Ø14	17.5	26.5	17	12	19	53	44	23	20	16	120	30	M14x45	153.2	211.23	3.69	2.64	2.64	4.52	15.08
MSQ55WLB								155.8	204.8	36.4																	184.9	276.23	4.88	4.57	4.57	5.96	
MSQ65WB	90	15	53.5	170	142	14	110	144.2	200.2	23.1	14	12.9	Ø16	25	37.5	23	15	15	63	53	26	22	18	150	35	M16x50	213.2	287.48	6.65	4.27	4.27	9.17	21.18
MSQ65WLB								203.6	259.6	52.8																	277.8	420.17	9.38	7.38	7.38	12.89	

Note:1kgf=9.81N

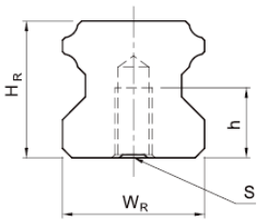
(3) MSQ-WC/WLC

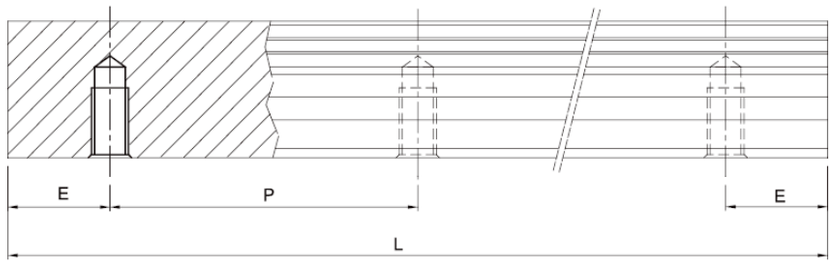


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)															Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic load Rating	Basic Static load Rating	Static Rated Moment			Weight	
																													M_R	M_P	M_Y	Block	Rail
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	K_2	G	M	T	T_1	T_2	H_2	H_3	W_R	H_R	D	h	d	P	E	(mm)	C(KN)	C_0(KN)	KN-m	KN-m	KN-m	Kg	Kg/m
MSQ15C	24	4.3	16	47	38	4.5	30	39.4	61.4	8	4.85	5.3	M5	6	8.9	6.95	3.95	3.7	15	15	7.5	5.3	4.5	60	20	M4x16	14.7	23.47	0.12	0.10	0.10	0.17	1.45
MSQ20WC	30	4.6	21.5	63	53	5	40	50.5	77.5	10.25	6	12	M6	8	10	9.5	6	6	20	17.5	9.5	8.5	6	60	20	M5x16	27.1	36.68	0.27	0.20	0.20	0.40	2.21
MSQ20WLC								65.2	92.2	17.6																	32.7	47.96	0.35	0.35	0.35	0.52	
MSQ25WC	36	5.5	23.5	70	57	6.5	45	58	84	10.7	6	12	M8	8	14	10	6	5	23	22	11	9	7	60	20	M6x20	34.9	52.82	0.42	0.33	0.33	0.59	3.21
MSQ25WLC								78.6	104.6	21																	42.2	69.07	0.56	0.57	0.57	0.80	
MSQ30WC	42	6	31	90	72	9	52	70	97.4	14.25	6	12	M10	8.5	16	10	6.5	10.8	28	26	14	12	9	80	20	M8x25	48.5	71.87	0.66	0.53	0.53	1.09	4.47
MSQ30WLC								93	120.4	25.75																	58.6	93.99	0.88	0.92	0.92	1.44	
MSQ35WC	48	7.5	33	100	82	9	62	80	112.4	14.6	7	12	M10	10.1	18	13	9	12.6	34	29	14	12	9	80	20	M8x25	64.6	93.88	1.16	0.81	0.81	1.56	6.30
MSQ35WLC								105.8	138.2	27.5																	77.9	122.77	1.54	1.40	1.40	2.06	
MSQ45WC	60	9.5	37.5	120	100	10	80	97	139.4	13	10	12.9	M12	15.1	22	15	8.5	20.5	45	38	20	17	14	105	22.5	M12x35	103.8	146.71	1.98	1.55	1.55	2.79	10.41
MSQ45WLC								128.8	171.2	28.9																	125.3	191.85	2.63	2.68	2.68	3.69	
MSQ55WC	70	13	43.5	140	116	12	95	117.7	166.7	17.35	11	12.9	M14	17.5	26.5	17	12	19	53	44	23	20	16	120	30	M14x45	153.2	211.23	3.69	2.64	2.64	4.52	15.08
MSQ55WLC								155.8	204.8	36.4																	184.9	276.23	4.88	4.57	4.57	5.96	
MSQ65WC	90	15	53.5	170	142	14	110	144.2	200.2	23.1	14	12.9	M16	25	37.5	23	15	15	63	53	26	22	18	150	35	M16x50	213.2	287.48	6.65	4.27	4.27	9.17	21.18
MSQ65WLC								203.6	259.6	52.8																	277.8	420.17	9.38	7.38	7.38	12.89	

Note:1kgf=9.81N

(4) Dimensions for MSQ-T (Rail Mounting from Bottom)





Model No.	Dimensions of Rail (mm)						Weight
	WR	HR	S	h	P	E	（kg/m）
MSQ-T15	15	15	M5X0.8P	8	60	20	1.48
MSQ-T20	20	17.5	M6X1P	10	60	20	2.29
MSQ-T25	23	22	M6X1P	12	60	20	3.35
MSQ-T30	28	26	M8X1.25P	15	80	20	4.67
MSQ-T35	34	29	M8X1.25P	17	80	20	6.51
MSQ-T45	45	38	M12X1.75P	24	105	22.5	10.87
MSQ-T55	53	44	M14X2P	24	120	30	15.67
MSQ-T65	63	53	M20X2.5P	30	150	35	21.73

2.2 MSZ Series - High Rigidity Roller Type Linear Guideway

2.1.1 MSZ series roller type rolling linear guide pair features

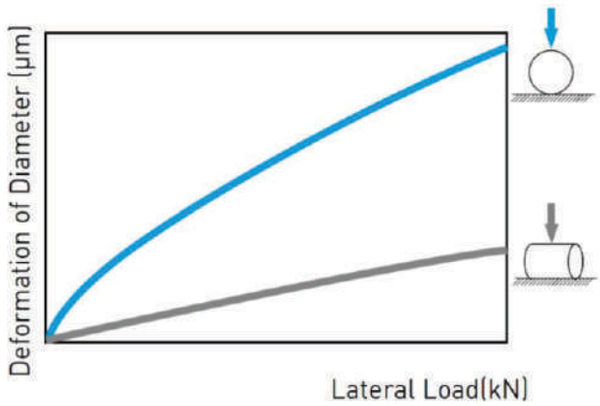
MSZ series roller type rolling linear guide pair replace the steel ball with the roller rolling body, designed for the realization of ultra-rigid and overweight load capacity. Through the line contact mode between the rolling body and the guide and the slide block, the rolling body can only form a small amount of elastic deformation when bearing high load. The design of 45° contact Angle makes the whole reach four directions of high rigidity and high load capacity characteristic table Now. Through the realization of ultra-high rigidity, the machining accuracy can be greatly improved to meet the requirements of high precision; Due to the characteristic of heavy load, the service life of linear rolling guide pair is extended. Very suitable for high speed automation industry machinery and high rigidity requirements of the equipment use.

(1) Optimal design

FEM analysis was performed to determine the optimal structure of the block and the rail. The unique design of the circulation path allows the MSZ series linear guideway to offer smoother linear motion.

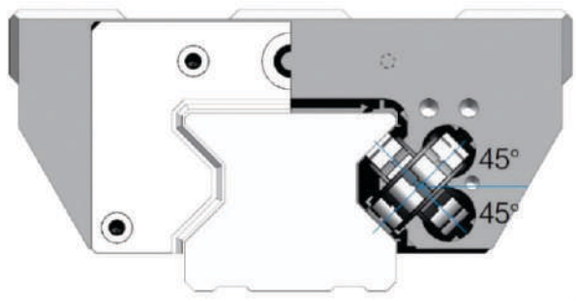
(2) Super high rigidity

The MSZ series is a type of linear guideway that uses rollers as the rolling elements. Rollers have a greater contact area than balls so that the roller guideway features higher load capacity and greater rigidity. The figure shows the rigidity of a roller and a ball with equal volume.



(3) Super high load capacity

With the four rows of rollers arranged at a contact angle of 45-degrees, the MSZ series linear guideway has equal load ratings in the radial, reverse radial and lateral directions. The MSZ series has a higher load capacity in a smaller size than conventional, ball-type linear guideways.



(4) Operating life increased

Compare with the ball element, the contact pressure of rolling element is distributed on the line region. Therefore, stress concentration was reduced significantly and the MSZ series offers longer running life. The nominal life of MSZ series can be calculated by using Formula.

The acting load will affect the nominal life of a linear guideway. Based on the selected basic dynamic rated load and the actual load. The nominal life of ball type and roller type linear guideway can be calculated by Formula (7) respectively.

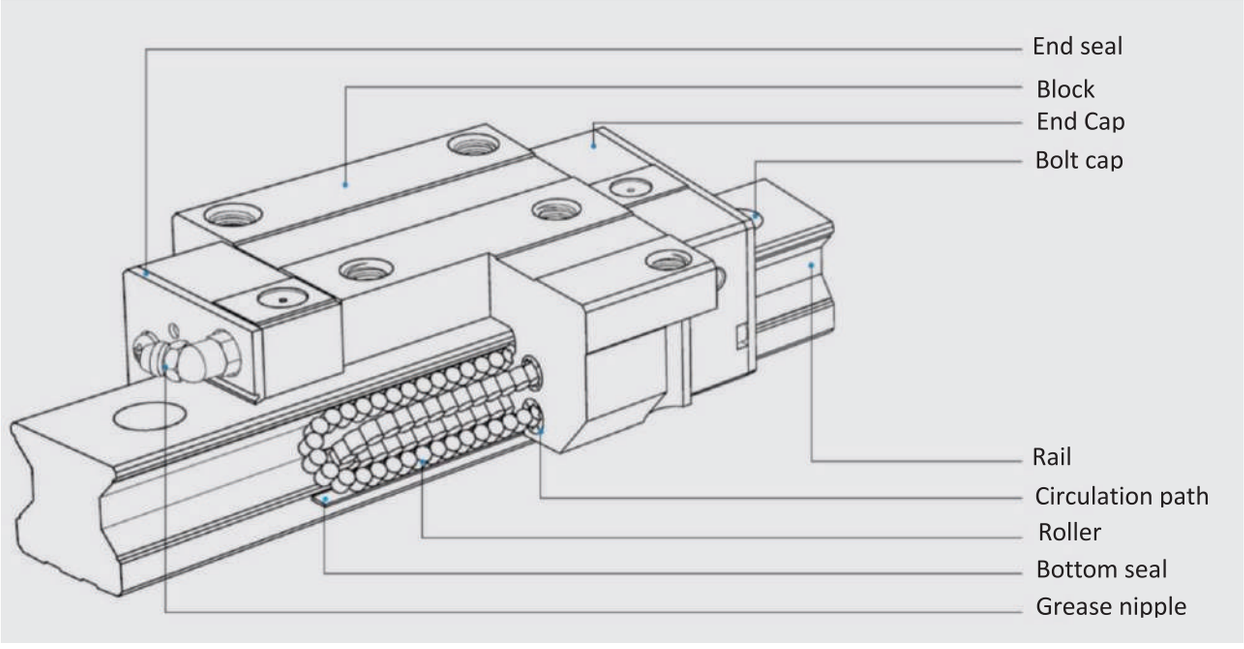
$$L = \left(\frac{C}{P}\right)^{\frac{10}{3}} \times 100km \qquad (7)$$

If the environmental factors are taken into consideration, the nominal life is influenced greatly by the motion conditions, the hardness of the raceway, and the temperature of the linear guideway. The relationship between these factors is expressed in Formula (8).

$$L = \left(\frac{f_h \times f_t \times C}{f_w P} \right)^{\frac{10}{3}} \times 100km \qquad (8)$$

L: Nominal life
C: Basic dynamic load rating
P: Actual load
f_n: Hardness factor
f_t: Temperature factor
f_w: Load factor

2.2.2 Construction of MSZ Series

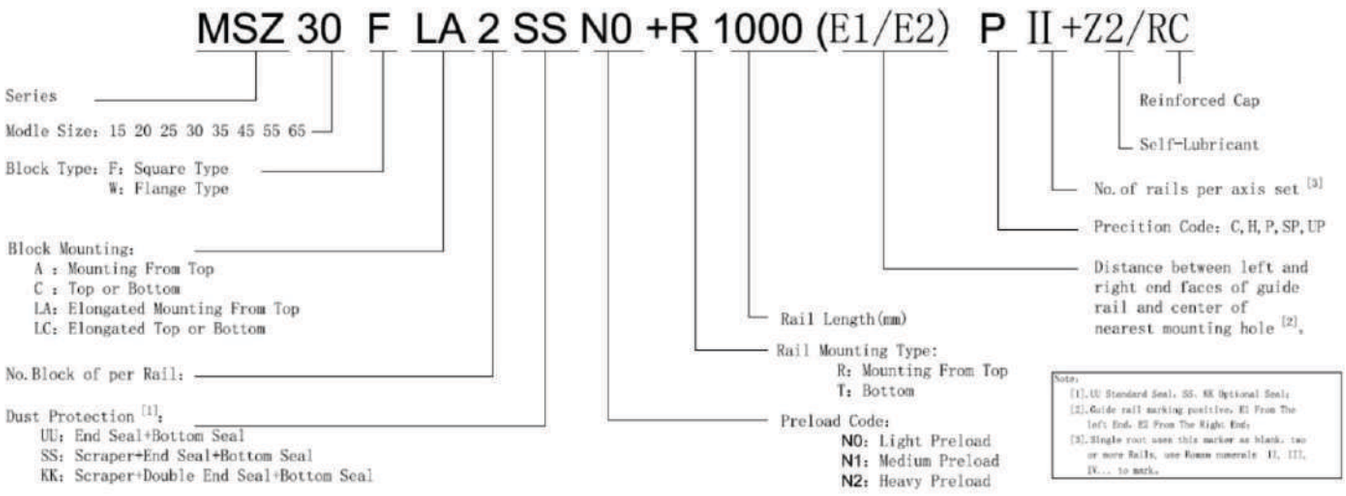


- Rolling circulation system: Block, Rail, End cap. Circulation path, rollers
- Lubrication system: Grease nipple and piping joint
- Dust protection system: End seal, Bottom seal, Cap, Double seals, and Scraper

2.2.3 Model Number of MSZ series

MSZ 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 RG series identifies the size, type, accuracy class, preload class, etc

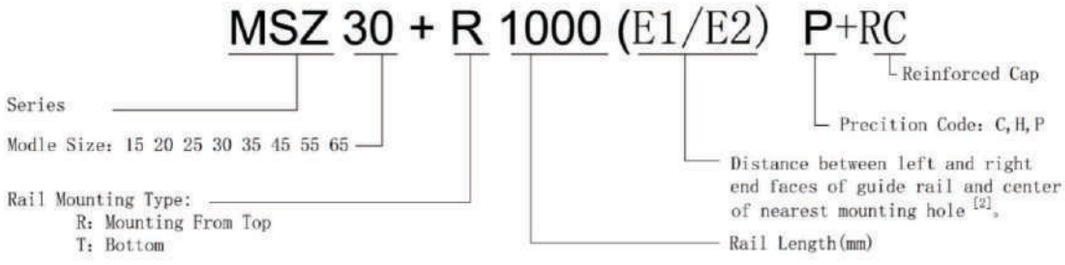
(1) Non-interchangeable type



(2) Interchangeable type

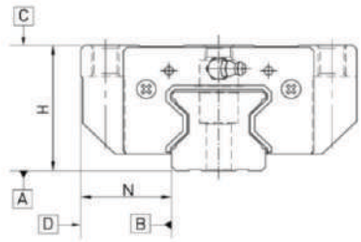
◆ Model Number of MSZ Block

◆ Model Number of MSZ Rail



2.2.4 Accuracy Classes

The accuracy of MSZ series can be classified into normal (C), high (H), precision (P), super precision (SPI ultra-precision (UP), five classes. Please choose the class by referring the accuracy of applied equipment.



(1) Accuracy of non-interchangeable guideways

unit：mm

Series	MSZ-15、20			
Accuracy Classes	High(H)	Precision (P)	Super Precision (SP)	Ultra Precision(UP)
Dimensional tolerance of height H	±0.03	0 -0.03	0 -0.015	0 -0.008
Dimensional tolerance of width N	±0.03	0 -0.03	0 -0.015	0 -0.008
Variation of height H	0.01	0.006	0.004	0.003
Variation of width N	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	See Table 2-2-9			
Running parallelism of block surface D to surface B	See Table 2-2-9			

Table 2-2-1 Accuracy Standards

unit：mm

Series	MSZ-25、30、35			
Accuracy Classes	High(H)	Precision (P)	Super Precision (SP)	Ultra Precision(UP)
Dimensional tolerance of height H	±0.04	0 -0.04	0 -0.02	0 -0.01
Dimensional tolerance of width N	±0.04	0 -0.04	0 -0.02	0 -0.01
Variation of height H	0.015	0.007	0.005	0.003
Variation of width N	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	See Table 2-2-9			
Running parallelism of block surface D to surface B	See Table 2-2-9			

Table 2-2-2 Accuracy Standards

unit：mm

Series	MSZ-45、55			
Accuracy Classes	High(H)	Precision (P)	Super Precision(SP)	Ultra Precision(UP)
Dimensional tolerance of height H	±0.05	0 -0.05	0 -0.03	0 -0.02
Dimensional tolerance of width N	±0.05	0 -0.05	0 -0.03	0 -0.02
Variation of height H	0.015	0.007	0.005	0.003
Variation of width N	0.02	0.01	0.007	0.005
Running parallelism of block surface C to surface A	See Table 2-2-9			
Running parallelism of block surface D to surface B	See Table 2-2-9			

Table 2-2-3 Accuracy Standards

unit：mm

Series	MSZ-65			
Accuracy Classes	High(H)	Precision (P)	Super Precision(SP)	Ultra Precision(UP)
Dimensional tolerance of height H	±0.07	0 -0.07	0 -0.05	0 -0.03
Dimensional tolerance of width N	±0.07	0 -0.07	0 -0.05	0 -0.03
Variation of height H	0.02	0.01	0.007	0.005
Variation of width N	0.025	0.015	0.01	0.007
Running parallelism of block surface C to surface A	See Table 2-2-9			
Running parallelism of block surface D to surface B	See Table 2-2-9			

Table 2-2-4 Accuracy Standards

(2) Accuracy of interchangeable guideways

unit：mm

Series	MSZ-15、20			
Accuracy Classes	High(H)	Precision (P)	Super Precision(SP)	Ultra Precision(UP)
Dimensional tolerance of height H	±0.03	±0.015		
Dimensional tolerance of width N	±0.03	±0.015		
Variation of height H	0.01	0.006		
Variation of width N	0.01	0.006		
Running parallelism of block surface C to surface A	See Table 2-2-9			
Running parallelism of block surface D to surface B	See Table 2-2-9			

Table 2-2-5 Accuracy Standards

unit：mm

Series	MSZ-25、30、35			
Accuracy Classes	High(H)	Precision (P)	Super Precision(SP)	Ultra Precision(UP)
Dimensional tolerance of height H	±0.04	±0.02		
Dimensional tolerance of width N	±0.04	±0.02		
Variation of height H	0.015	0.007		
Variation of width N	0.015	0.007		
Running parallelism of block surface C to surface A	See Table 2-2-9			
Running parallelism of block surface D to surface B	See Table 2-2-9			

Table 2-2-6 Accuracy Standards

unit：mm

Series	MSZ-45、55			
Accuracy Classes	High(H)	Precision (P)	Super Precision(SP)	Ultra Precision(UP)
Dimensional tolerance of height H	±0.05	±0.025		
Dimensional tolerance of width N	±0.05	±0.025		
Variation of height H	0.015	0.007		
Variation of width N	0.02	0.01		
Running parallelism of block surface C to surface A	See Table 2-2-9			
Running parallelism of block surface D to surface B	See Table 2-2-9			

Table 2-2-7 Accuracy Standards

unit：mm

Series	MSZ-65			
Accuracy Classes	High(H)	Precision (P)	Super Precision(SP)	Ultra Precision(UP)
Dimensional tolerance of height H	±0.07	±0.035		
Dimensional tolerance of width N	±0.07	±0.035		
Variation of height H	0.02	0.01		
Variation of width N	0.025	0.015		
Running parallelism of block surface C to surface A	See Table 2-2-9			
Running parallelism of block surface D to surface B	See Table 2-2-9			

Table 2-2-8Accuracy Standards

(3) Accuracy of running parallelism

unit：μm

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

Table 2-2-9 Accuracy of Running Parallelism

2.2.5 Preload

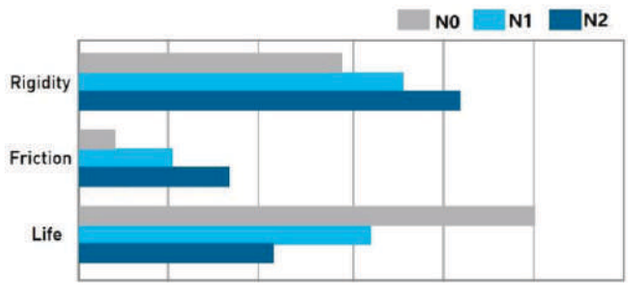
A preload can be applied to each guideway using oversized rollers. Generally, a linear motion guideway has negative clearance between the raceway and rollers to improve stiffness and maintain high precision. The RG series linear guideway offers three standard preloads for various applications and conditions.

Class	Code	Preload	Condition
Light Preload	N0	0.02C~0.04C	Certain load direction, low impact, low precision required
Medium Preload	N1	0.07C~0.09C	High rigidity required; high precision required
Heavy Preload	N2	0.12C~0.14C	Super high rigidity required, with vibration and impact

Table 2-2-10 Preload Class

Note: C in the table stands for rated dynamic load

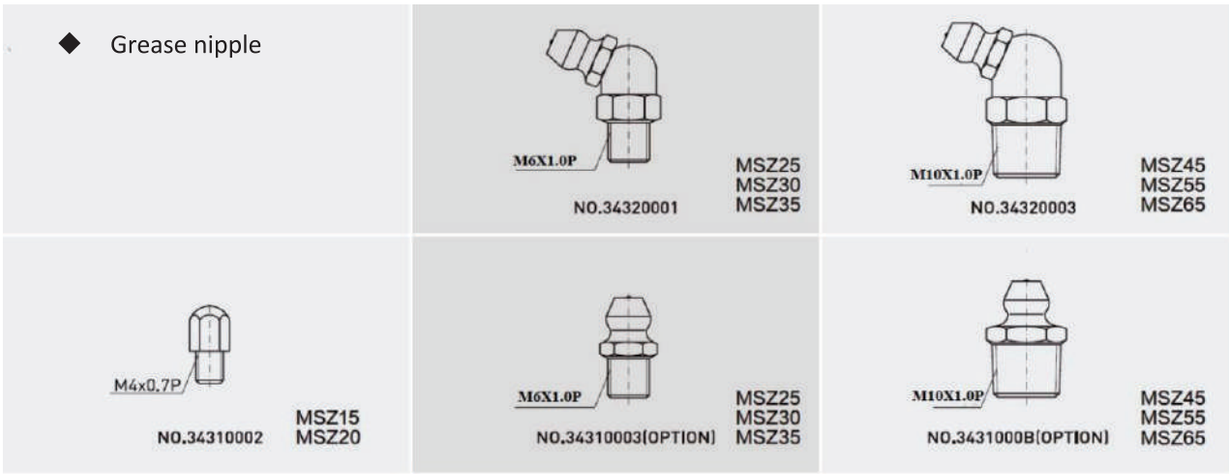
The figure shows the relationship between the rigidity, friction and nominal life. A preload no larger than N1 would be recommended for smaller model sizes to avoid over-preload affecting the life of the guideway.



2.2.6 Lubrication

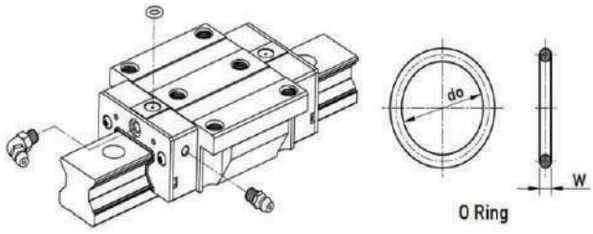
(1) Grease

◆ Grease nipple



Mounting location

The standard location of the grease fitting is at both ends of the block, but the nipple can be mounted in the side or the top of block. For lateral installation, we recommend that the nipple be mounted at the non-reference side, otherwise please contact us. It is possible to carry out the lubrication by using an oil-piping joint. The figure shows the locations of the grease fitting.



size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do（mm）	W（mm）	T（mm）
MSZ15	2.5±0.15	1.5±0.15	3.45
MSZ20	2.5±0.15	1.5±0.15	4
MSZ25	7.5±0.15	1.5±0.15	5.8
MSZ30	7.5±0.15	1.5±0.15	6.2
MSZ35	7.5±0.15	1.5±0.15	8.65
MSZ45	7.5±0.15	1.5±0.15	9.5
MSZ55	7.5±0.15	1.5±0.15	11.6
MSZ65	7.5±0.15	1.5±0.15	14.5

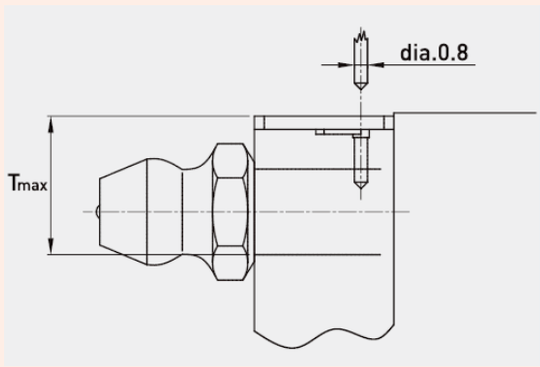


Table 2-2-11 O-Ring size and max. permissible depth for piercing

▶ The oil amount for a block filled with grease

unit：（cm^3）

Size	Heavy Load	Super Heavy Load	Size	Heavy Load	Super Heavy Load
MSZ15	3	-	MSZ35	12	14
MSZ20	5	6	MSZ45	19	23
MSZ25	7	8	MSZ55	28	35
MSZ30	9	10	MSZ65	52	63

Table 2-2-12 The oil amount for a block filled with grease

▶ Frequency of replenishment

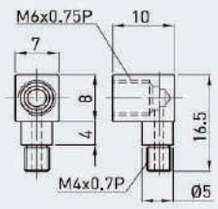
Check the grease every 100 km, or every 3-6 months.

(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

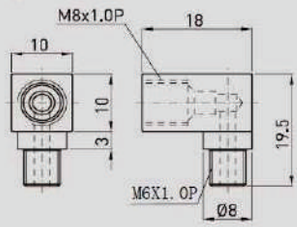
LF-64



NO.97000EA1

MSZ15
MSZ20

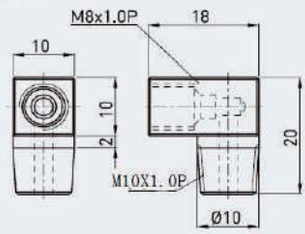
LF-76



NO.970002A1

MSZ25
MSZ30
MSZ35

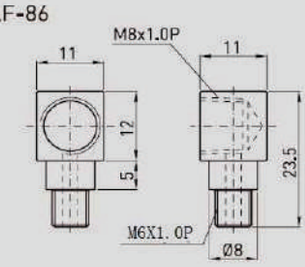
LF-78



NO.970006A1

MSZ45
MSZ55
MSZ65

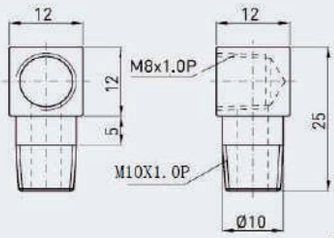
LF-86



NO.970004A1

MSZ25
MSZ30
MSZ35

LF-88



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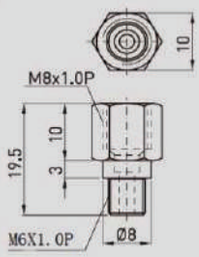
MSZ45
MSZ55
MSZ65

SF-76



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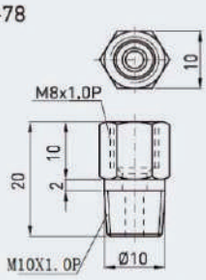
MSZ25
MSZ30
MSZ35

SF-78



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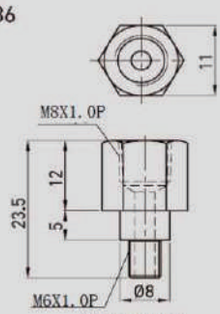
MSZ45
MSZ55
MSZ65

SF-86



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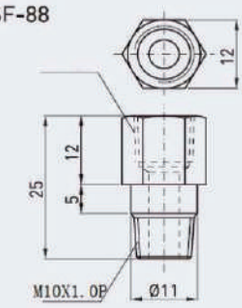
MSZ25
MSZ30
MSZ35

SF-88



NO.970007A1

MSZ45
MSZ55
MSZ65

◆ Oil feeding rate

unit： （cm^3/hr）

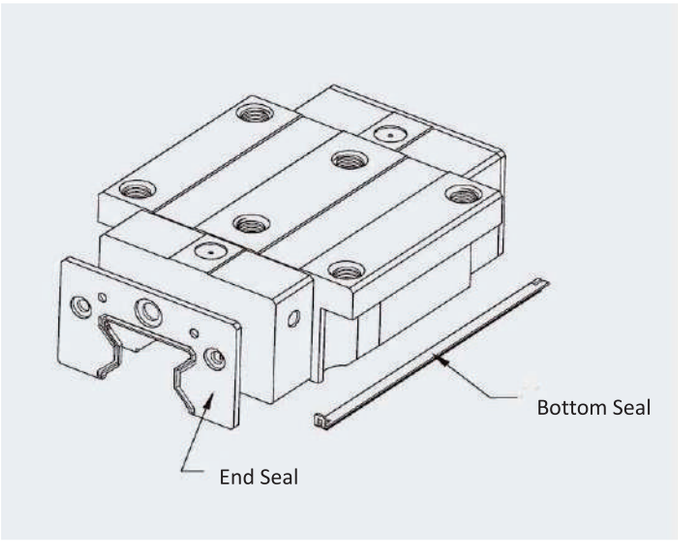
Size	Feed rate	Size	Feed rate
MSZ15	0.14	MSZ35	0.23
MSZ20	0.14	MSZ45	0.3
MSZ25	0.167	MSZ55	0.367
MSZ30	0.2	MSZ65	0.433

Table 2-2-13 oil feed rate

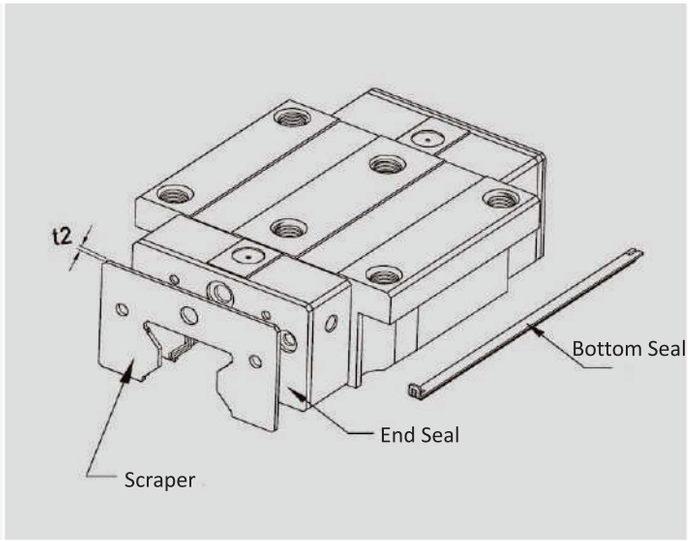
2.2.7 Dust Proof Accessories

(1) Codes of accessories

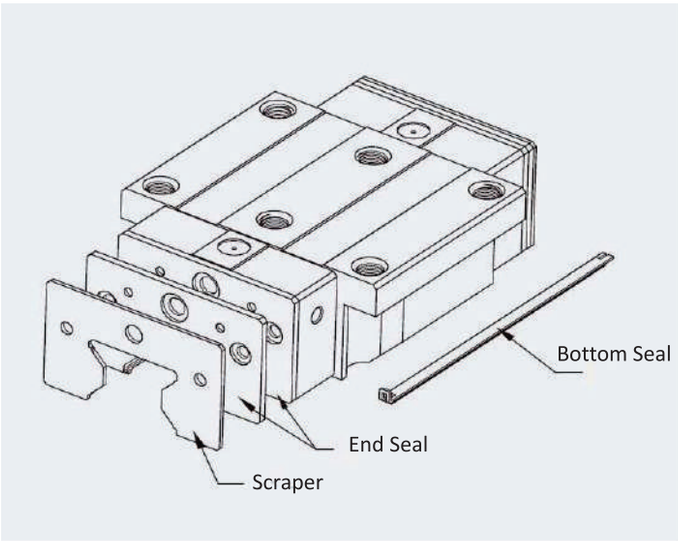
If the following accessories are needed, please add the code followed by the model number.



UU：End Seal+Bottom Seal



SS：Scraper+End Seal+Bottom Seal



KK：Scraper+Double End Seal+Bottom Seal

(2) End seal and bottom seal

To prevent life reduction caused by iron chips or dust entering the block.

(3) Double seals

Enhances the wiping effect, foreign matter can be completely wiped off.

unit：mm

Size	Thickness(t1)	Size	Thickness(t1)
MSZ15	2.2	MSZ35	2.5
MSZ20	2.2	MSZ45	3.6
MSZ25	2.2	MSZ55	3.6
MSZ30	2.4	MSZ65	4.4

Table 2-2-14 Dimensions of end seal

(4) Scraper

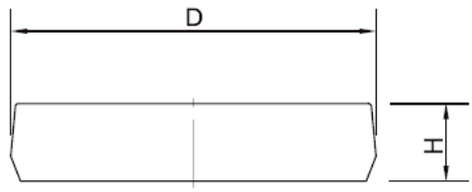
The scraper removes high-temperature iron chips and larger foreign objects.

unit：mm

Size	Thickness(t1)	Size	Thickness(t1)
MSZ15	1.5	MSZ35	1.5
MSZ20	1.5	MSZ45	1.5
MSZ25	1.5	MSZ55	1.5
MSZ30	1.5	MSZ65	1.5

Table 2-2-15 Dimensions of scraper

(5) Bolt caps for rail mounting holesCaps are used to cover the mounting holes to prevent chips or other foreign objects from collecting in the holes. The caps will be enclosed in each rail package.



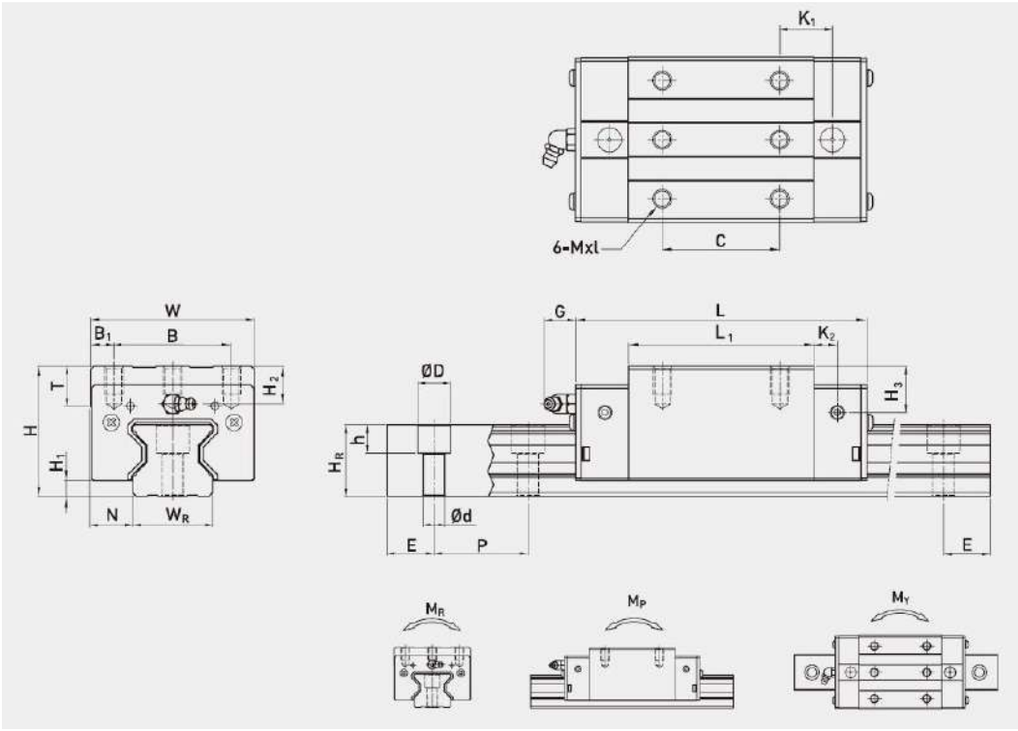
unit：mm

Rail size	Bolt size	Diameter(D)	Thickness(H)	Rail size	Bolt size	Diameter(D)	Thickness(H)
MSZ-R15	M4	7.65	1.1	MSZ-R35	M8	14.2	3.5
MSZ-R20	M5	9.65	2.5	MSZ-R45	M12	20.25	4.5
MSZ-R25	M6	11.15	2.5	MSZ-R55	M14	23.25	5.0
MSZ-R30	M8	14.2	3.5	MSZ-R65	M16	26.35	5.0

Table 2-2-16 Dimensions of Bolt Caps for Rail Mounting Holes

2.2.8 Dimensions for MSZ series

(1) MSZ-FA/FLA

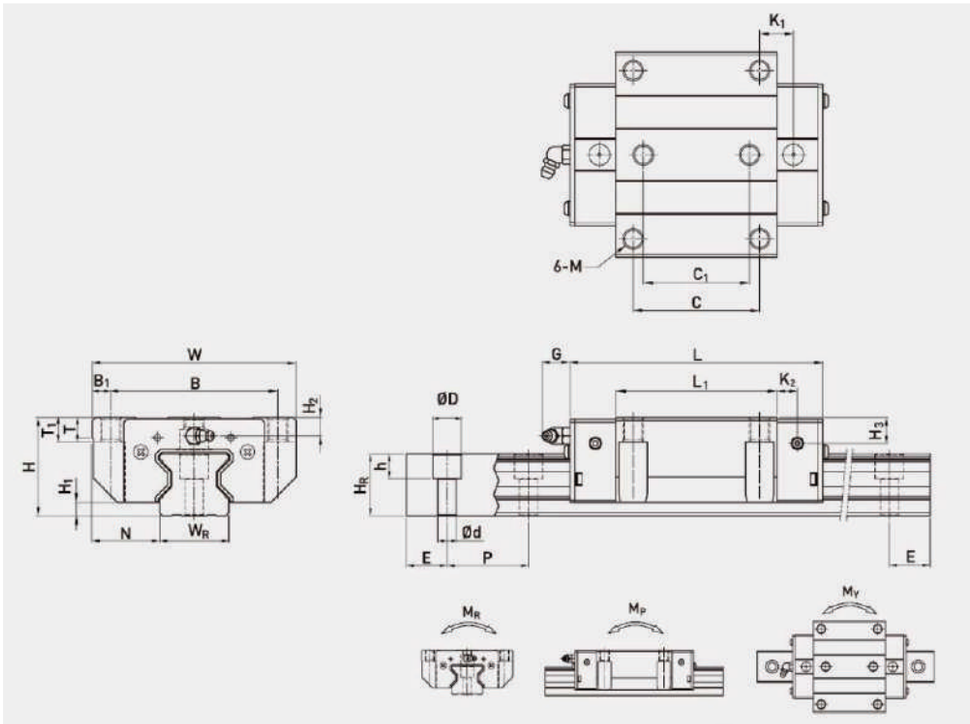


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)													Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic load Rating	Basic Static load Rating	Static Rated Moment			Weight	
	H	H1	N	W	B	B1	C	L1	L	K1	K2	G	MxI	T	H2	H3	WR	HR	D	h	d	P	E	(mm)	C(KN)	Co(KN)	MR KN-m	MP KN-m	MY KN-m	Block Kg	Rail Kg/m
MSZ15FA	28	4	9.5	34	26	4	26	45	68	13.4	4.7	5.3	M4x8	6	7.6	10.1	15	16.5	7.5	5.7	4.5	30	20	M4x16	11.3	24	0.311	0.173	0.173	0.20	1.8
MSZ20FA	34	5	12	44	32	6	36	57.5	86	15.8	6	5.3	M5x8	8	8.3	8.3	20	21	9.5	8.5	6	30	20	M5x20	21.3	46.7	0.647	0.46	0.46	0.40	2.76
MSZ20FLA							50	77.5	106	18.8															26.9	63	0.872	0.837	0.837	0.53	
MSZ25FA	40	5.5	12.5	48	35	6.5	35	64.5	97.9	20.75	7.25	12	M6x8	9.5	10.2	10	23	23.6	11	9	7	30	20	M6x20	27.7	57.1	0.758	0.605	0.605	0.61	3.08
MSZ25FLA							50	81	114.4	21.5															33.9	73.4	0.975	0.991	0.991	0.75	
MSZ30FA	45	6	16	60	40	10	40	71	109.8	23.5	8	12	M8x10	9.5	9.5	10.3	28	28	14	12	9	40	20	M8x25	39.1	82.1	1.445	1.06	1.06	0.90	4.41
MSZ30FLA							60	93	131.8	24.5															48.1	105	1.846	1.712	1.712	1.16	
MSZ35FA	55	6.5	18	70	50	10	50	79	124	22.5	10	12	M8x12	12	16	19.6	34	30.2	14	12	9	40	20	M8x25	57.9	105.2	2.17	1.44	1.44	1.57	6.06
MSZ35FLA							72	106.5	151.5	25.25															73.1	142	2.93	2.6	2.6	2.06	
MSZ45FA	70	8	20.5	86	60	13	60	106	153.2	31	10	12.9	M10x17	16	20	24	45	38	20	17	14	52.5	22.5	M12x35	92.6	178.8	4.52	3.05	3.05	3.18	9.97
MSZ45FLA							80	139.8	187	37.9															116	230.9	6.33	5.47	5.47	4.13	
MSZ55FA	80	10	23.5	100	75	12.5	75	125.5	183.7	37.75	12.5	12.9	M12x18	17.5	22	27.5	53	44	23	20	16	60	30	M14x45	130.5	252	8.01	5.4	5.4	4.89	13.98
MSZ55FLA							95	173.8	232	51.9															167.8	348	11.15	10.25	10.25	6.68	
MSZ65FA	90	12	31.5	126	76	25	70	160	232	60.8	15.8	12.9	M16x20	25	15	15	63	53	26	22	18	75	35	M16x50	213	411.6	16.20	11.59	11.59	8.89	20.22
MSZ65FLA							120	223	295	67.3															275.3	572.7	22.55	22.17	22.17	12.13	

★Note：1.1kgf=9.81N

2. The rated load in the table is the theoretical calculated value of C100R. If the value of C50R is needed, it can be obtained by the formula C50R=1.23XC100R。

(2) MSZ-WC/WLC

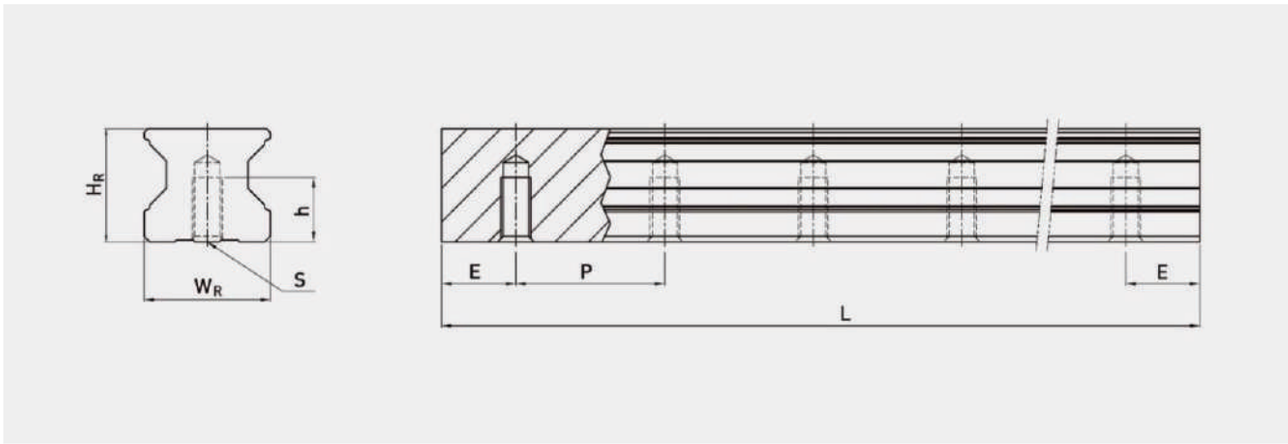


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)															Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic load Rating	Basic Static load Rating	Static Rated Moment			Weight	
	H	H1	N	W	B	B1	C	C1	L1	L	K1	K2	G	M	T	T1	H2	H3	WR	HR	D	h	d	P	E	(mm)	C(KN)	C0(KN)	MR KN-m	MP KN-m	MY KN-m	Block Kg	Rail Kg/m
MSZ15WC	24	4	16	47	38	4.5	30	26	45	68	11.4	4.7	5.3	M5	6	6.95	3.6	6.1	15	16.5	7.5	5.7	4.5	30	20	M4x16	24	0.311	0.311	0.173	0.173	0.22	1.8
MSZ20WC	30	5	21.5	63	53	5	40	35	57.5	86	13.8	6	5.3	M6	8	10	4.3	4.3	20	21	9.5	8.5	6	30	20	M5x20	46.7	0.647	0.647	0.46	0.46	0.47	2.76
MSZ20WLC									77.5	106	23.8																26.9	63	63	0.872	0.837	0.837	
MSZ25WC	36	5.5	23.5	70	57	6.5	45	40	64.5	97.9	15.75	7.25	12	M8	9.5	10	6.2	6	23	23.6	11	9	7	30	20	M6x20	57.1	0.758	0.758	0.605	0.605	0.72	3.08
MSZ25WLC									81	114.4	24																33.9	73.4	73.4	0.975	0.991	0.991	
MSZ30WC	42	6	31	90	72	9	52	44	71	109.8	17.5	8	12	M10	9.5	10	6.5	7.3	28	28	14	12	9	40	20	M8x25	82.1	1.445	1.445	1.06	1.06	1.16	4.41
MSZ30WLC									93	131.8	28.5																48.1	105	105	1.846	1.712	1.712	
MSZ35WC	48	6.5	33	100	82	9	62	52	79	124	16.5	10	12	M10	12	13	9	12.6	34	30.2	14	12	9	40	20	M8x25	105.2	2.17	2.17	1.44	1.44	1.75	6.06
MSZ35WLC									106.5	151.5	30.25																73.1	142	142	2.93	2.6	2.6	
MSZ45WC	60	8	37.5	120	100	10	80	60	106	153.2	21	10	12.9	M12	14	15	10	14	45	38	20	17	14	52.5	22.5	M12x35	178.8	4.52	4.52	3.05	3.05	3.43	9.97
MSZ45WLC									139.8	187	37.9																116	230.9	230.9	6.33	5.47	5.47	
MSZ55WC	70	10	43.5	140	116	12	95	70	125.5	183.7	27.75	12.5	12.9	M14	16	17	12	17.5	53	44	23	20	16	60	30	M14x45	252	8.01	8.01	5.4	5.4	5.43	13.98
MSZ55WLC									173.8	232	51.9																167.8	348	348	11.15	10.25	10.25	
MSZ65WC	90	12	53.5	170	142	14	110	82	160	232	40.8	15.8	12.9	M16	22	23	15	15	63	53	26	22	18	75	35	M16x50	411.6	16.20	16.20	11.59	11.59	11.63	20.22
MSZ65WLC									223	295	72.3																275.3	572.7	572.7	22.55	22.17	22.17	

★Note：1. 1kgf=9.81N

2. The rated load in the table is the theoretical calculated value of C100R. If the value of C50R is needed, it can be obtained by the formula C50R=1.23XC100R。

(3) Dimensions for MSZ-T (Rail Mounting from Bottom)



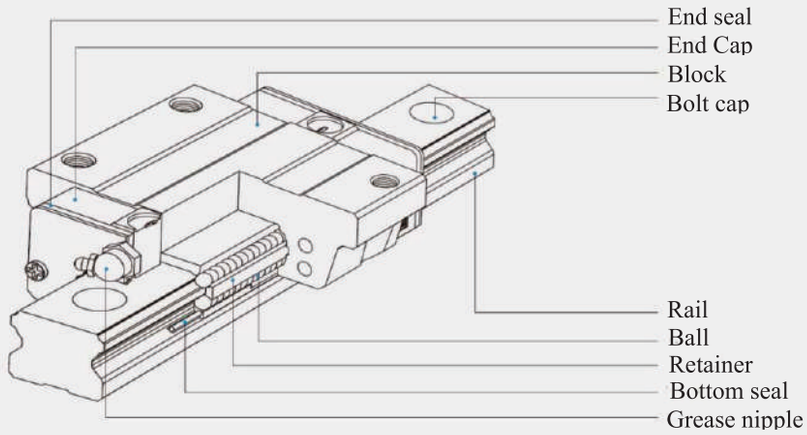
Model No.	Dimensions of Rail (mm)						Weight
	W_R	H_R	S	h	P	E	(kg/m)
MSZ-T15	15	16.5	M5X0.8P	8	30	20	1.86
MSZ-T20	20	21	M6X1P	10	30	20	2.76
MSZ-T25	23	23.6	M6X1P	12	30	20	3.36
MSZ-T30	28	28	M8X1.25P	15	40	20	4.82
MSZ-T35	34	30.2	M8X1.25P	17	40	20	6.48
MSZ-T45	45	38	M12X1.75P	24	52.5	22.5	10.83
MSZ-T55	53	44	M14X2P	24	60	30	15.15
MSZ-T65	63	53	M20X2.5P	30	75	35	21.24

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

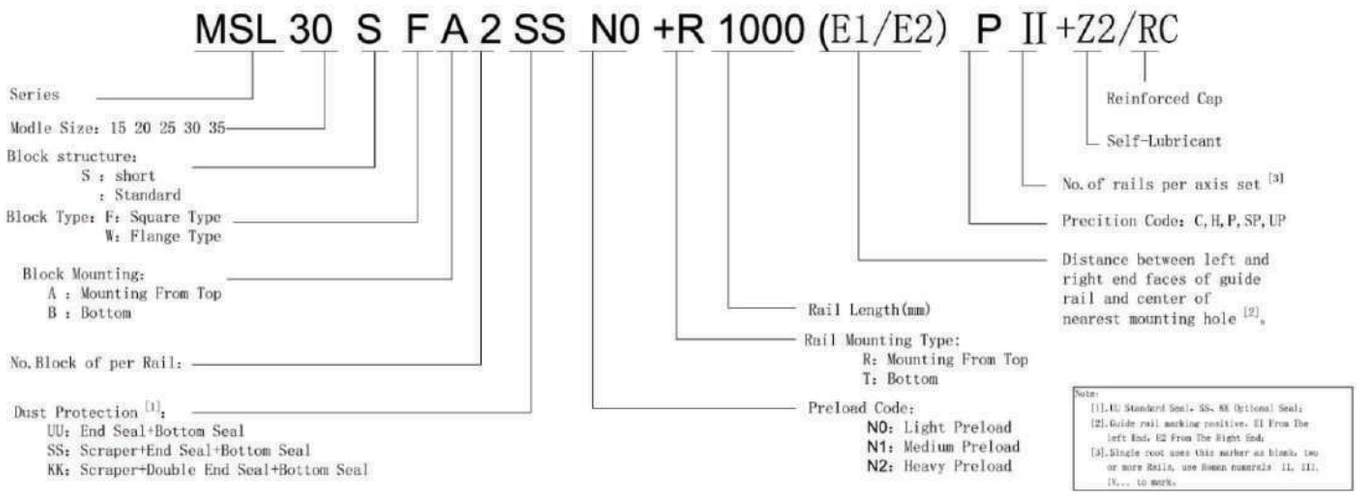


- Rolling circulation system:
  Block, rail, end cap and retainer
- Lubrication system:
  Grease nipple and piping Joint
- Dust protection system:
  End seal, bottom seal, cap and scraper

2.3.3 Model Number of MSL Series

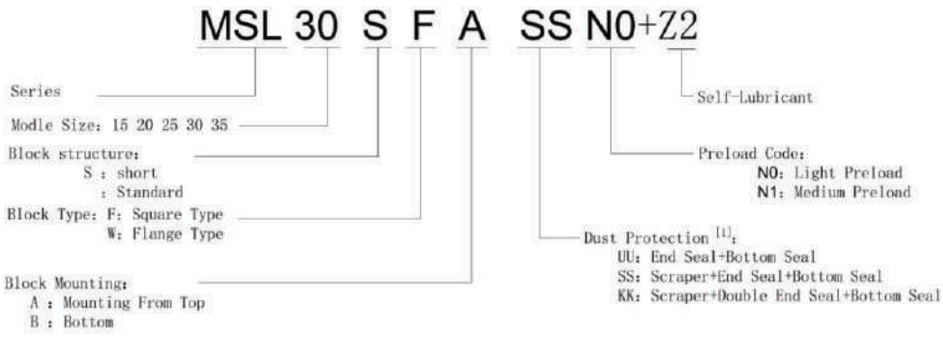
MSL series linear guideways are classified into non-interchangeable and interchangeable types. The sizes of these two types are the same as one another. The main difference is that the interchangeable type of blocks and rails can be freely exchanged and they can maintain P-class accuracy. Because of 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

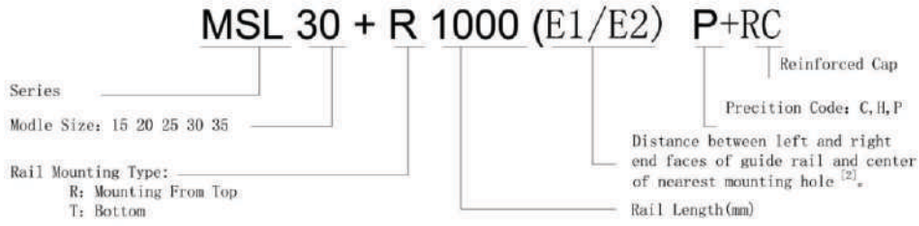


(2) Interchangeable type

- Model Number of MSL Block

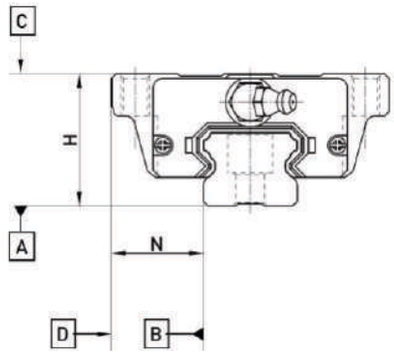


- Model Number of MSL Rail



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	0 -0.04	0 -0.02	0 -0.01
Dimensional tolerance of width N	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
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 2-3-4Accuracy Standards

(3) Accuracy of running parallelism

unit：μm

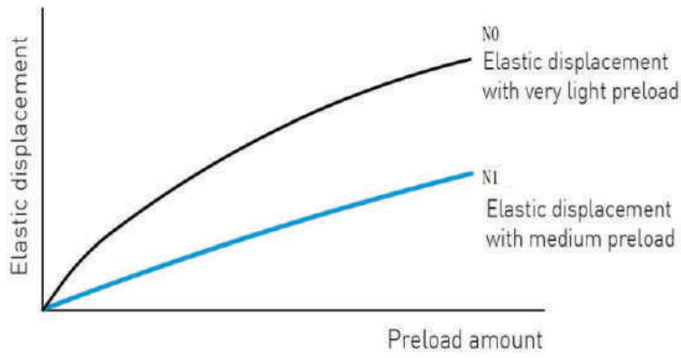
Rail Length（mm）	Accuracy				
	Normal（C）	High（H）	Precision （P）	Super Precision（SP）	Ultra Precision（UP）
0~100	12	7	3	2	2
100~200	14	9	4	2	2
200~300	15	10	5	3	2
300~500	17	12	6	3	2
500~700	20	13	7	4	2
700~900	22	15	8	5	3
900~1100	24	16	9	6	3
1100~1500	26	18	11	7	4
1500~1900	28	20	13	8	4
1900~2500	31	22	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.

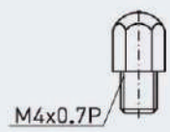
Class	Code	Preload	Condition
Very Light Preload	N0	0 C~0.02C	Certain load direction, low impact, low precision required
Light Preload	N1	0.03C~0.05C	low load and high precision required
Medium Preload	N2	0.06C~0.08C	High rigidity required, with vibration and impact

Table 2-3-6 Preload Classes

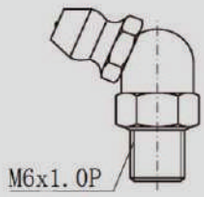
2.3.6 Lubrication

(1) Grease

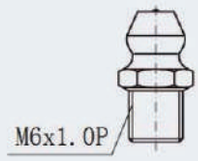
◆ Grease nipple



NO.34310002 MSL15



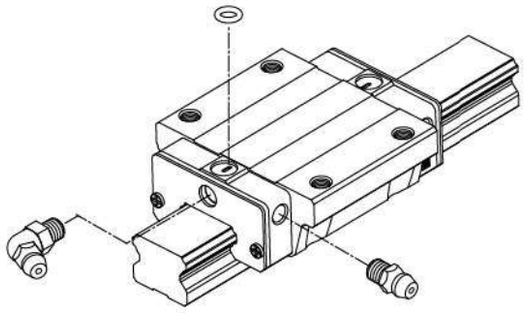
NO.34320001 MSL25 MSL25 MSL30 MSL35

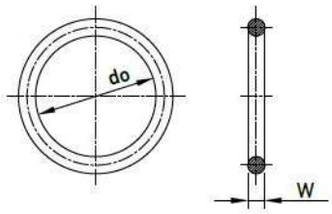


NO.34310003(OPTION) MSL25 MSL25 MSL30 MSL35

◆ 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

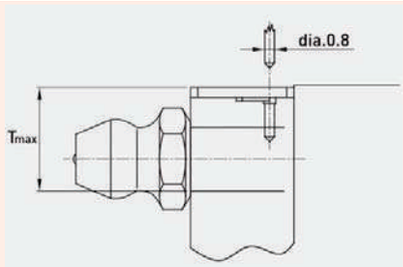


Table 2-3-7 O-Ring size and max. permissible depth for piercing

◆ 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

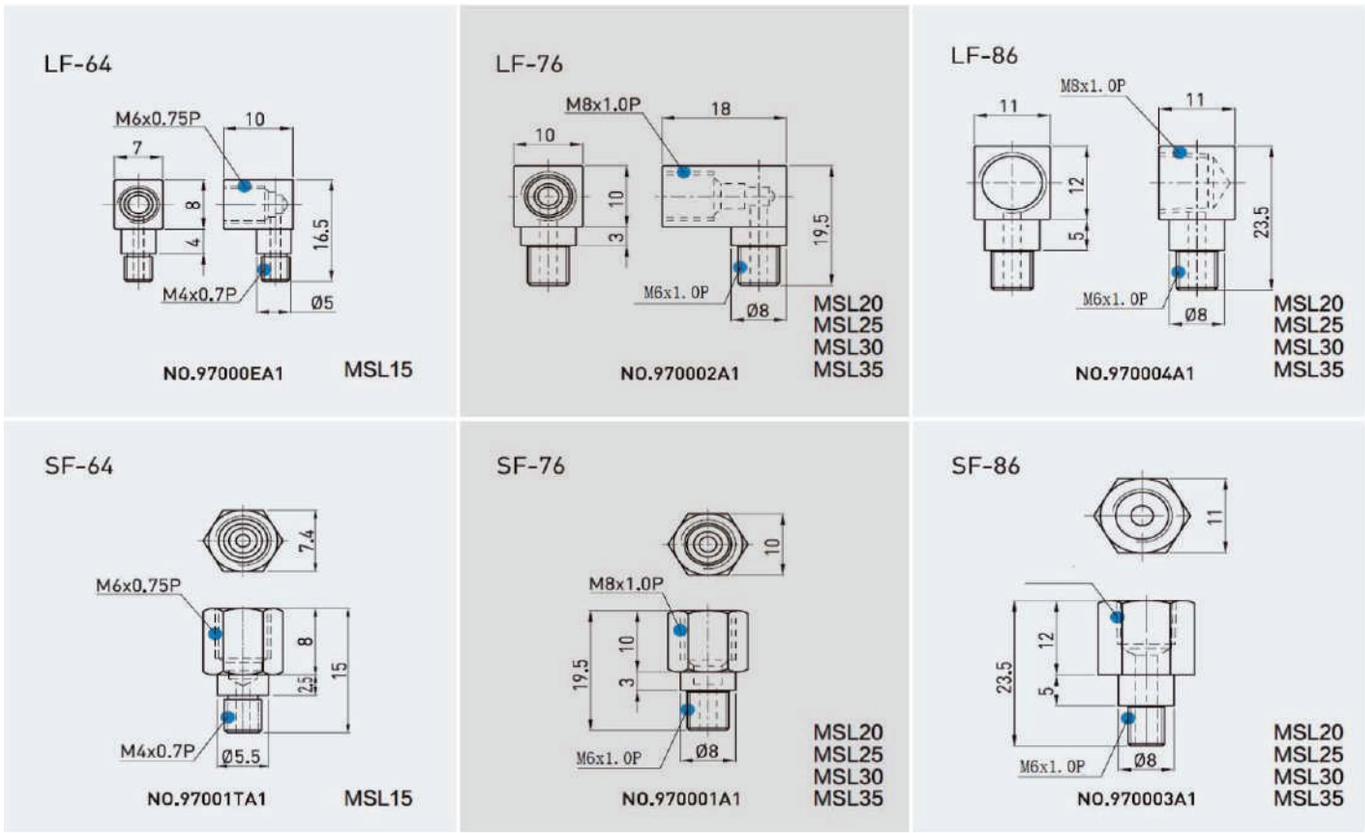
◆ Frequency of replenishment

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: （cm^3/hr）

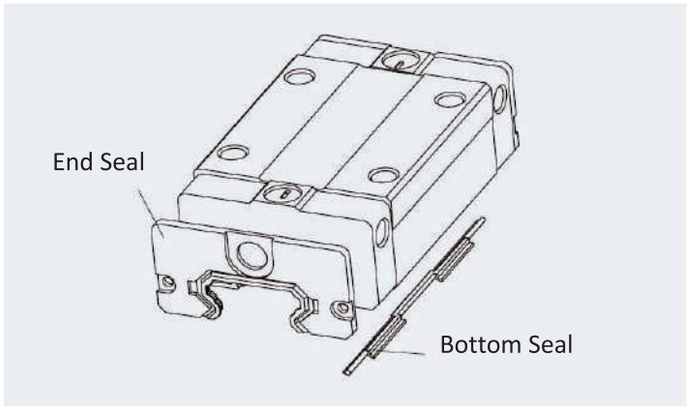
Size	Feed Rate	Size	Feed Rate
MSL15	0.1	MSL30	0.2
MSL20	0.133	MSL35	0.233
MSL25	0.167		

Table 2-3-9 oil feed rate

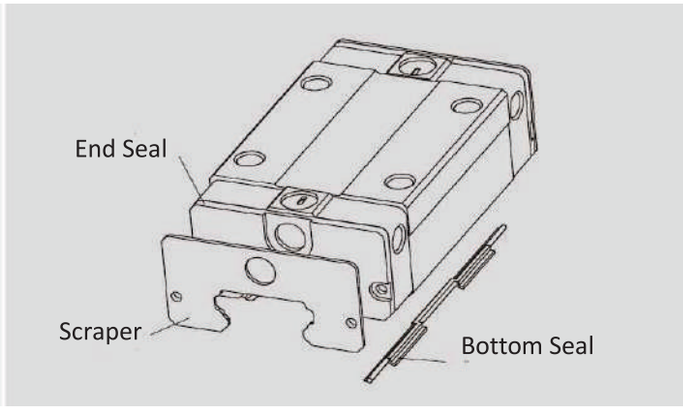
2.3.7 Dust Protection Equipment

(1) Codes of equipment

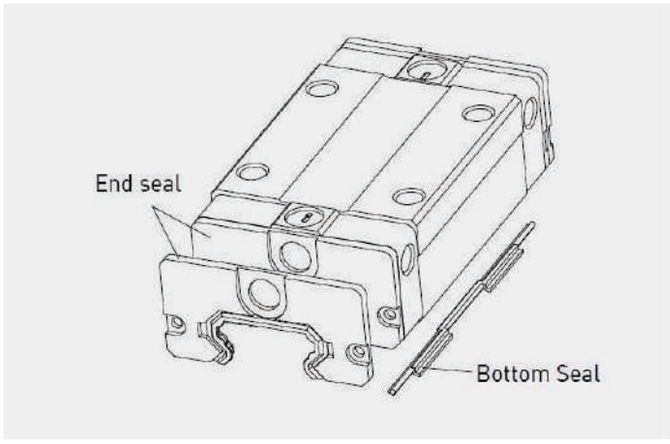
If the following equipment is needed, please indicate the code followed by the model number.



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.

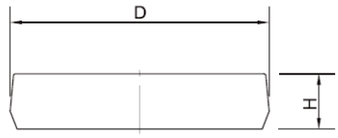
unit：mm

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

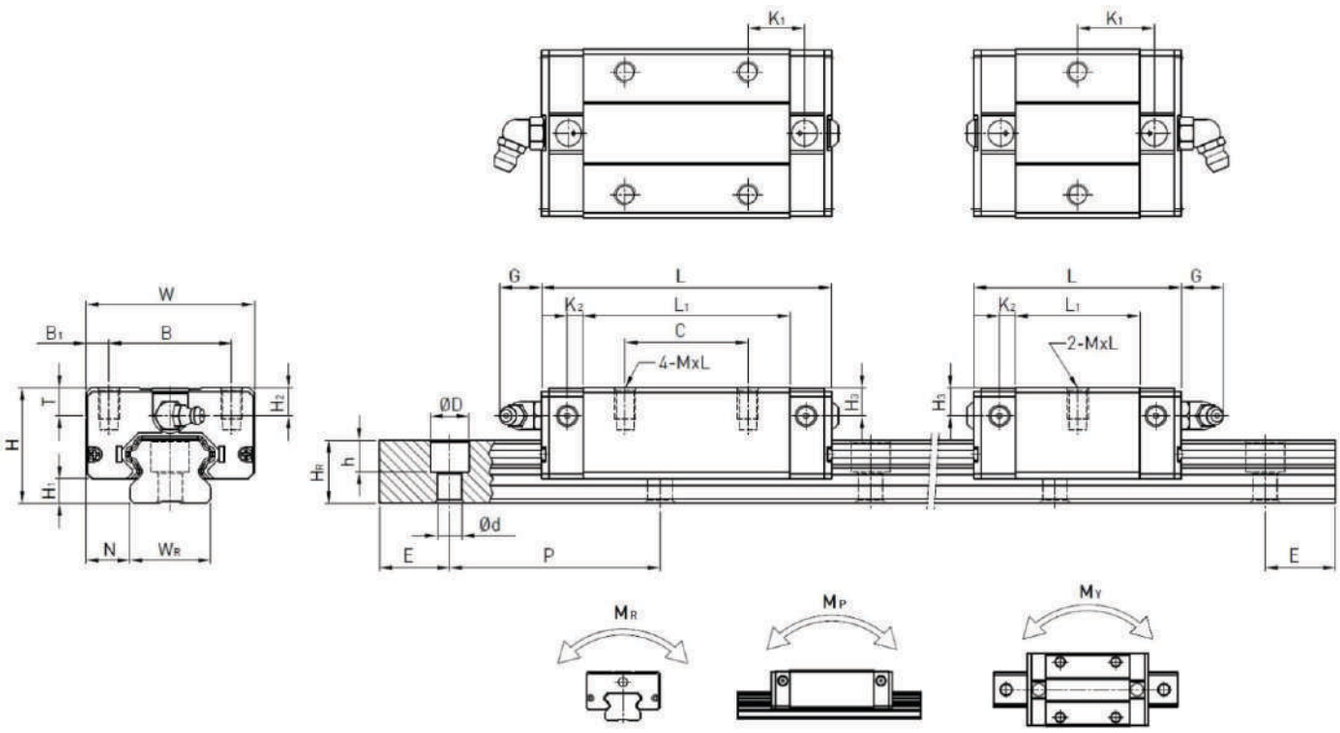


Rail size	Bolt size	Diameter(D)	Thickness(H)	Rail size	Bolt size	Diameter(D)	Thickness(H)
MSL-R15	M4	7.65	1.1	MSL-R30	M8	14.2	3.5
MSL-R20	M5	9.65	2.5	MSL-R35	M8	14.2	3.5
MSL-R25	M6	11.15	2.5				

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

2.3.8 Dimensions for MSL Series.

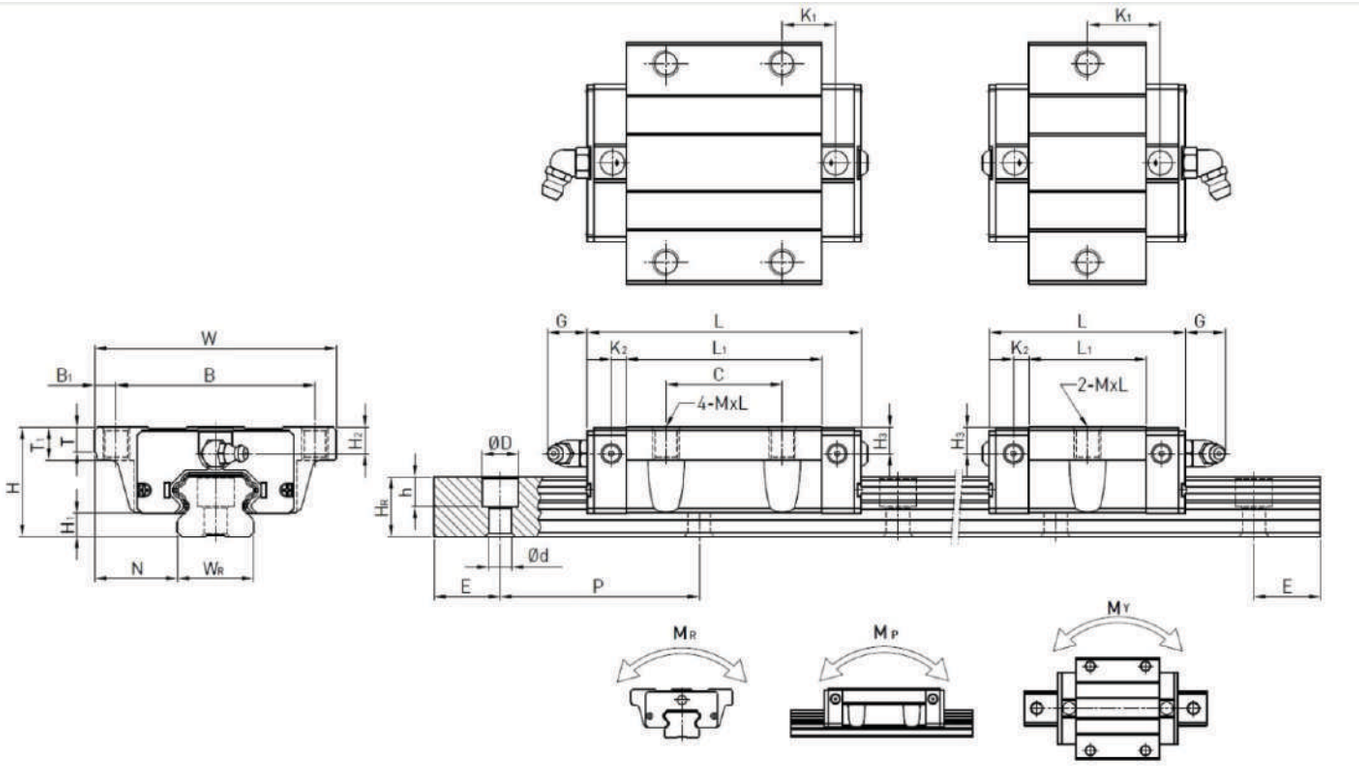
(1) MSL-SFA/FA



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	H1	N	W	B	B1	C	L1	L	K1	K2	G	Mxl	T	H2	H3	WR	HR	D	h	d	P	E	(mm)	C(KN)	Co(KN)	MR	MP	MY	Block	Rail
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

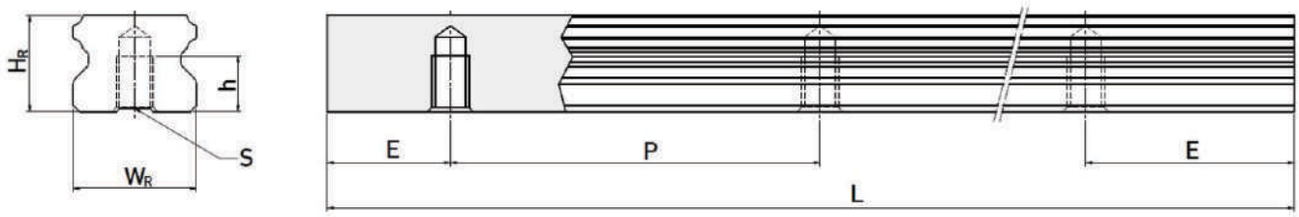
(2) MSL-SWB/WB



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	
																														Block	Rail
	H	H1	N	W	B	B1	C	L1	L	K1	K2	G	M	T	T1	H2	H3	WR	HR	D	h	d	P	E	(mm)	C (KN)	C0 (KN)	MR KN-m	MP KN-m	MY KN-m	Kg	Kg/m
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																7.83	16.19	0.13	0.10	0.10	0.21	
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

(3) Dimensions for MSLR-T (rail mounting from bottom)



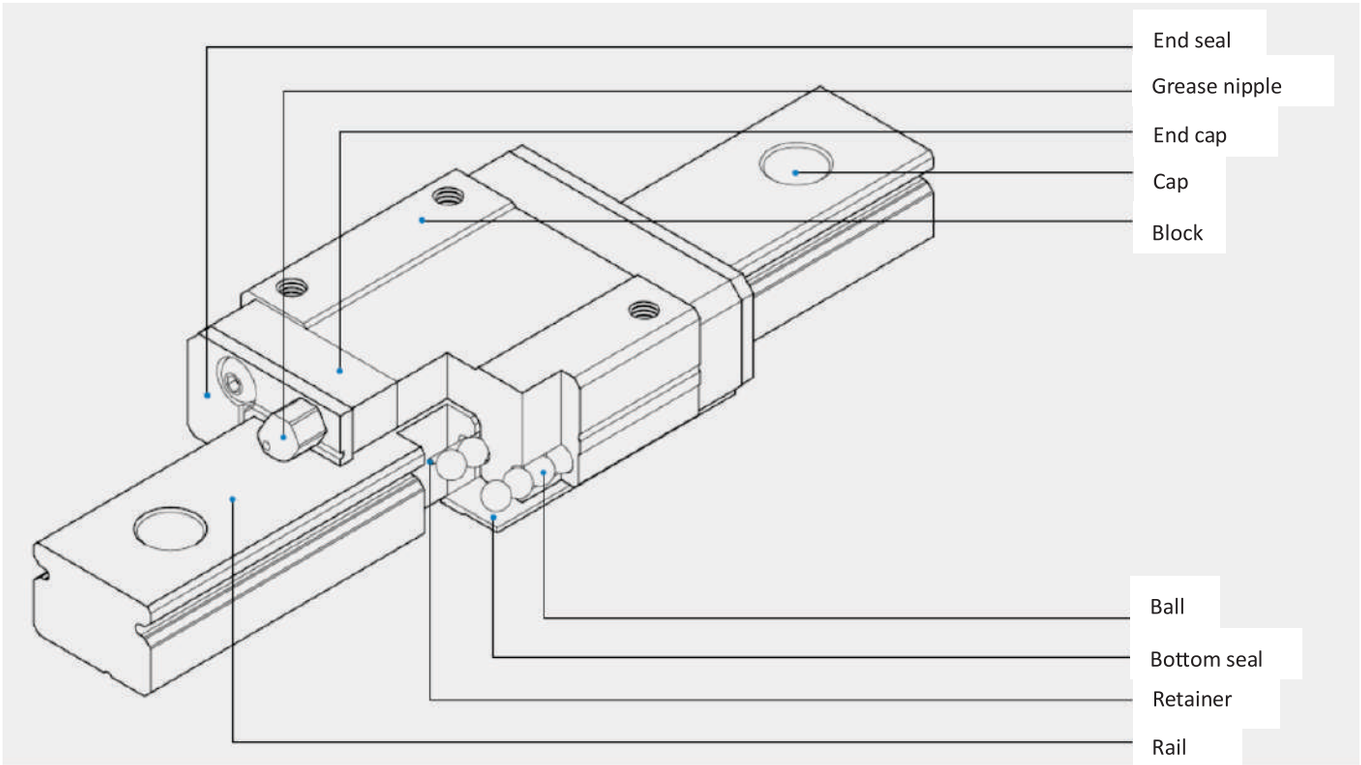
Model No.	Dimensions of Rail (mm)						Weight
	W_R	H_R	S	h	p	E	（kg/m）
MSL-T15	15	16.5	M5X0.8P	8	30	20	1.86
MSL-T20	20	21	M6X1P	10	30	20	2.76
MSL-T25	23	23.6	M6X1P	12	30	20	3.36
MSL-T30	28	28	M8X1.25P	15	40	20	4.82
MSL-T35	34	30.2	M8X1.25P	17	40	20	6.48

2.4 MSC/MSD Seris—Microminiature ball rolling linear guide pair

2.4.1 Features of MSC Series

1. Tiny and light weight, suitable for miniature equipment.
2. Gothic arch contact design can sustain loads from all directions and offer high rigidity and high accuracy
3. Specification with ball retainers would avoid ball falling when the blocks are removed from rails.

2.4.2 Construction of MSC Series



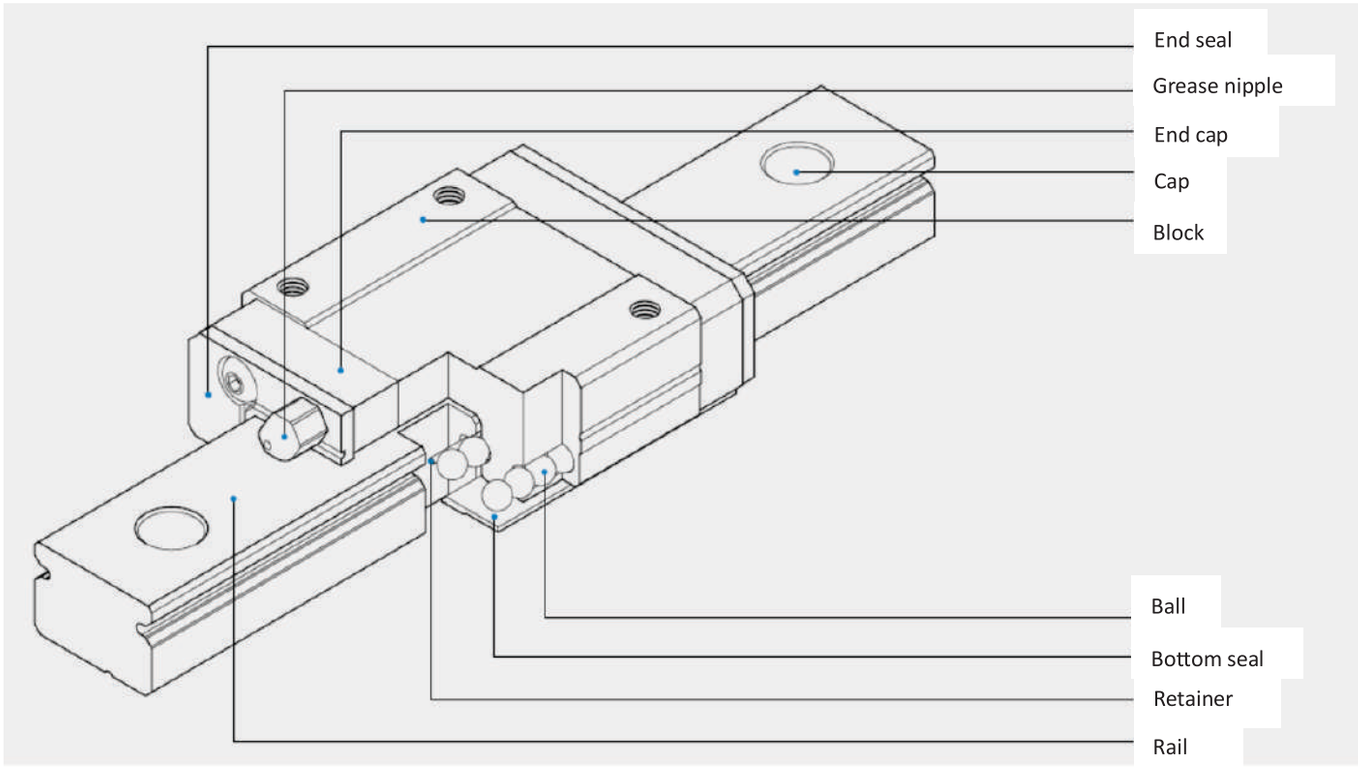
Rolling circulation system: Block, rail, ball, end cap and retainer;

Lubrication system: Grease nipple is available for MSC15, lubricated by grease gun. MSC7, 9, 12 are lubricated by the hole at the side of the end cap.

Dust protection system: End seal、bottom seal (optional size 9,12,15), cap (size12,15)

2.4.3 Features of MSD Series

1. The enlarged width design increases the capacity of moment loading
2. Gothic arch contact design has high rigidity characteristic in all directions.
3. Specification with ball retainers would avoid ball falling when the blocks are removed from rails.

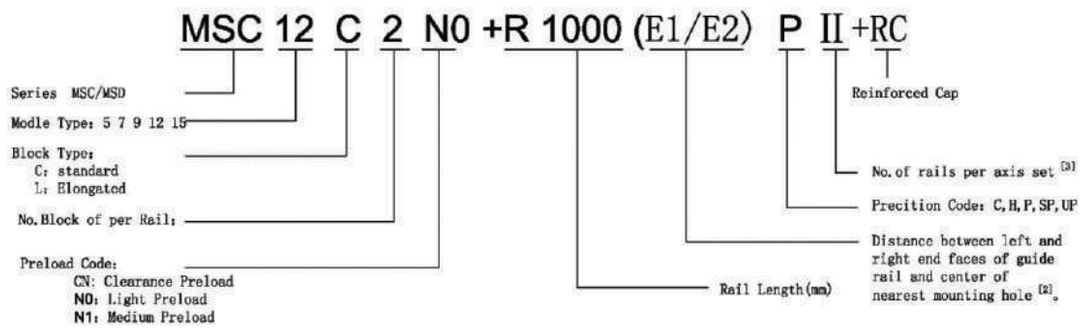


Rolling circulation system: Block, rail, ball, end cap and retainer;

Lubrication system: Grease nipple is available for MSC15, lubricated by grease gun. MSC7, 9, 12 are lubricated by the hole at the side of the end cap.

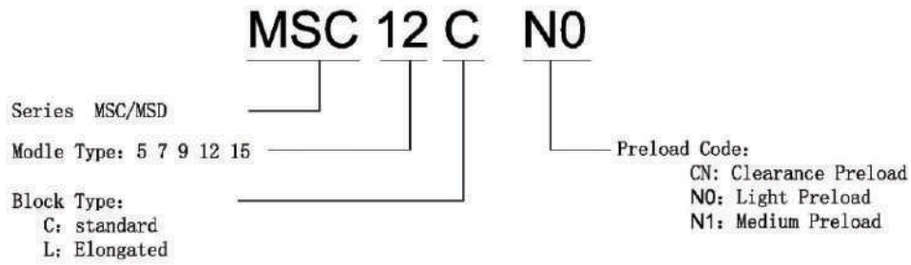
Dust protection system: End seal、bottom seal (optional size 9,12,15), cap (size12,15)

（1）Non-interchangeable type

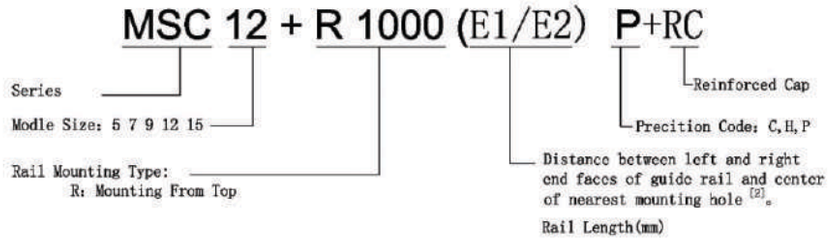


(2) Interchangeable type

- Interchangeable Block



- Interchangeable Rail

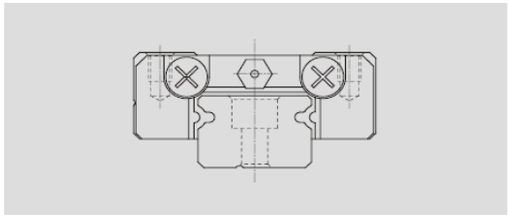
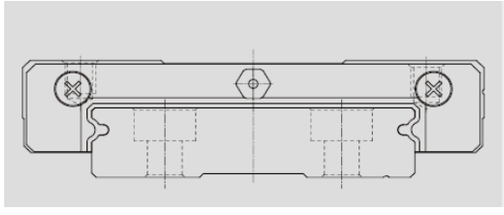


2.4.5 MSC/MSD Types

(1) Block types

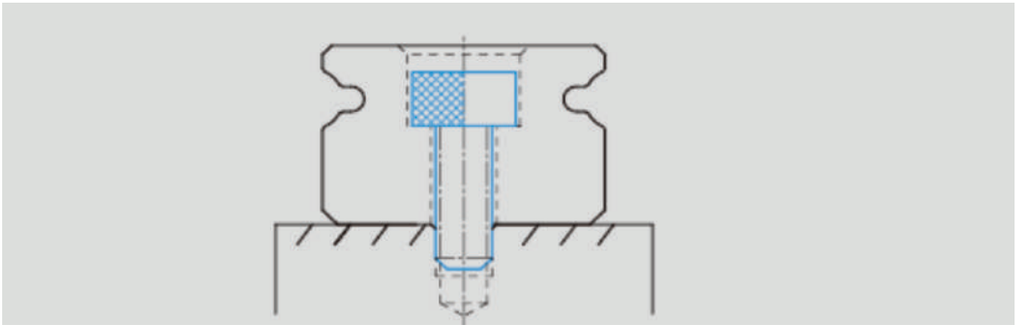
MS offers two types of linear guideways, flange and square types.

Table 2-4-1Block Types

Type	Model	Shape	Height(mm)	Rail Length(mm)	Main Applications
Standard	MSC-C MSC-L		8~16	100~2000	✓ Printer ✓ Robotics ✓ Precision measure equipment ✓ Semiconductor equipment
Wide	MSD-C MSD-L		9~16	100~2000	

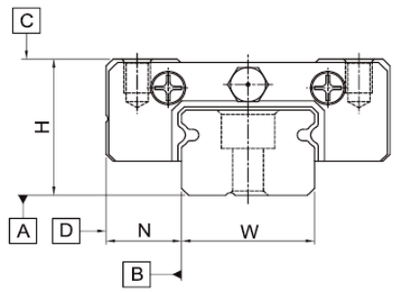
(2) Rail types

MS offers locking screw hole guide rail, easy to install and use, as shown in the figure.



2.4.6 Accuracy Classes

The accuracy of MSC/MSD series can be classified into three classes: normal (C), high (H), precision (P). Choices for different accuracy classes are available according to various requirements.



(1) Accuracy of non-interchangeable guideways

Table 2-4-2 Accuracy Standard of Non-interchangeable Type Unit：mm

Accuracy Classes	Normal（C）	High（H）	Precision （P）
Dimensional tolerance of height H	±0.04	±0.02	±0.01
Dimensional tolerance of width N	±0.04	±0.025	±0.015
Variation of height H	0.03	0.015	0.007
Variation of width N	0.03	0.02	0.01
Running parallelism of block surface C to surface A	See Table2-4-4		
Running parallelism of block surface D to surface B	See Table2-4-4		

(2) Accuracy of interchangeable guideways

Table 2-4-3 Accuracy Standard of Interchangeable Type Unit：mm

Accuracy Classes	Normal（C）	High（H）	Precision （P）
Dimensional tolerance of height H	±0.04	±0.02	±0.01
Dimensional tolerance of width N	±0.04	±0.025	±0.015
Variation of height H	0.03	0.02	0.01
Variation of width N	0.07	0.04	0.02
Running parallelism of block surface C to surface A	See Table2-4-4		
Running parallelism of block surface D to surface B	See Table2-4-4		

(3) Accuracy of running parallelism

The running parallelism C to A and D to B are related to the rail length.

Table 2-4-4 Accuracy of Running Parallelism Unit：μm

Rail lenght（mm）	Accuracy		
	Normal（C）	High（H）	Precision （P）
0~50	12	6	2
50~80	13	7	3
80~125	14	8	3.5
125~200	15	9	4
200~250	16	10	5
250~315	17	11	5
315~400	18	11	6
400~500	19	12	6
500~630	20	13	7
630~800	22	14	8
800~1000	23	16	9

2.4.7 Preload

MSC/MSD series provides three different preload levels for various applications.

Table 2-4-5 Preload Classes

Class	Code	Preload	Accuracy
Light Clearance	CN	Clearance 4-10um	C
Very Light Preload	N0	0	C~P
Light Preload	N1	0.02C	C~P

Note：” C” in column preload means basic dynamic load rating.

2.4.8 Dust Proof Accessories

End seals on both sides of the block can prevent dust from entering the block and maintain the accuracy and service life of a linear guideway. Specifications 5, 7 slides to the bottom bearing surface clearance (H1) is small, does not provide side sealing, but specifications 9, 12 and 15 provide side sealing options. When the customer selects the side seal, it is necessary to pay attention to the clearance of the slider (H1 becomes smaller, when the side bearing surface is used, the height of the side bearing surface shall not be greater than the clearance value (H1), so as to avoid the interference of the slider to the side bearing surface during operation

.

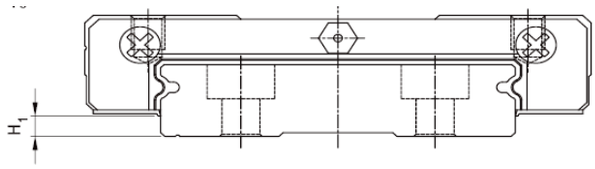


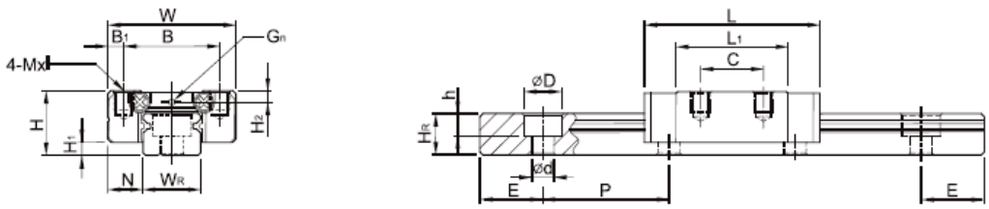
Table 2-4-6

Size	Bottom	H_1（mm）	Size	Bottom	H_1（mm）
MSC7	-	-	MSD7	-	-
MSC 9	●	1	MSD9	●	1.9
MSC 12	●	2	MSD12	●	2.4
MSC 15	●	3	MSD15	●	2.4

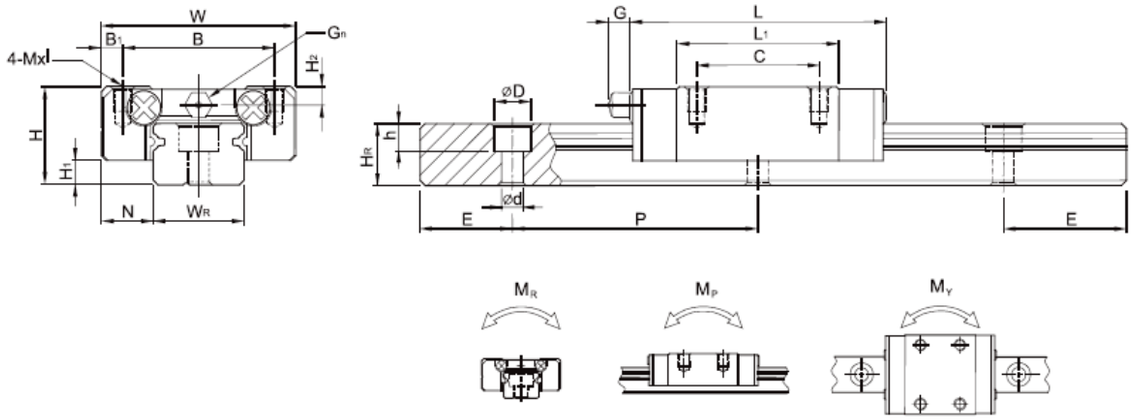
2.4.9 Dimensions for MSC/MSD Series

(1) MSC-C/ L

MSC7、9、12



MSC 15

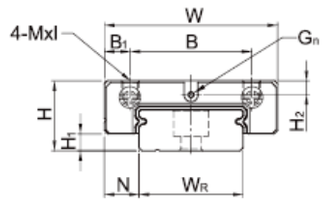


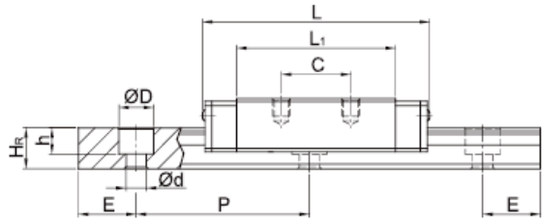
Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)										Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	L_1	L	G	G_n	Mxl	H_2	Wr	H_r	D	h	d	P	E	(mm)	C (KN)	C_0 (KN)	Mr	Mp	My	Block	Rail
MSC7C	8	1.5	5	17	12	2.5	8	13.5	22.5	-	Ø1.2	M2*2.5	1.5	7	4.8	4.2	2.3	2.4	15	5	M2*6	0.98	1.24	4.70	2.84	2.84	0.010	0.22
MSC7L							13	21.8	30.8													1.37	1.96	7.64	4.80	4.80	0.015	
MSC9C	10	2	5.5	20	15	2.5	10	18.9	28.9	-	Ø1.4	M3*3	1.8	9	6.5	6	3.5	3.5	20	7.5	M3*8	1.86	2.55	11.76	7.35	7.35	0.016	0.38
MSC9L							16	29.9	39.9													2.55	4.02	19.60	18.62	18.62	0.026	
MSC12C	13	3	7.5	27	20	3.5	15	21.7	34.7	-	Ø2	M3*3.5	2.5	12	8	6	4.5	3.5	25	10	M3*8	2.84	3.92	25.48	13.72	13.72	0.034	0.65
MSC12L							20	32.4	45.4													3.72	5.88	38.22	36.26	36.26	0.054	
MSC15C	16	4	8.5	32	25	3.5	20	26.7	42.1	4.5	M3	M3*4	3	15	10	6	4.5	3.5	40	15	M3*10	4.61	5.59	45.08	21.56	21.56	0.059	1.06
MSC15L							25	43.4	58.8													6.37	9.11	73.50	57.82	57.82	0.092	

Note：1kgf=9.81N

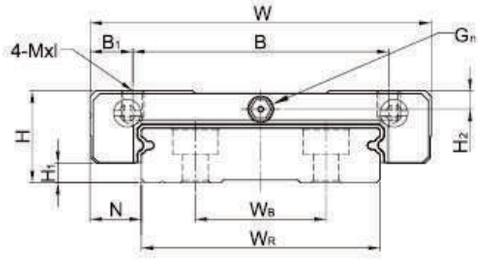
（2）MSD-C/ L

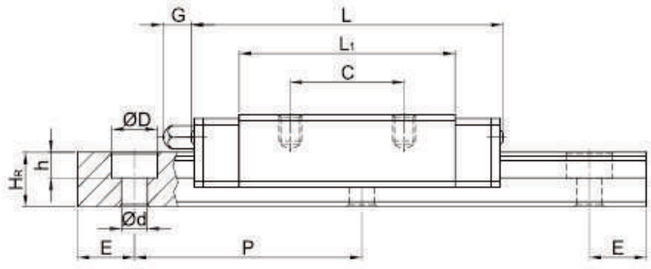
MSD7、9、12

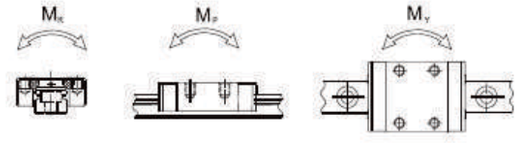




MSD 15







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	L1	L	G	G_n	MxI	H_2	W_r	W_b	H_r	D	h	d	P	E	（mm）	C（KN）	C_0（KN）	Mr	Mp	My	Block	Rail
MSD7C	9	1.9	5.5	25	19	3	10	21	31.2	-	Ø1.2	M3*3	1.85	14	-	5.2	6	3.2	3.5	30	10	M3*6	1.37	2.06	15.70	7.14	7.14	0.020	0.51
MSD7L							19	30.8	41														1.77	3.14	23.45	15.53	15.53	0.029	
MSD9C	12	2.9	6	30	21	4.5	12	27.5	39.3	-	Ø1.2	M3*3	2.4	18	-	7	6	4.5	3.5	30	10	M3*8	2.75	4.12	40.12	18.96	18.96	0.040	0.91
MSD9L					23	3.5	24	38.5	50.7														3.43	5.89	54.54	34.00	34.00	0.057	
MSD12C	14	3.4	8	40	28	6	15	31.3	46.1	-	Ø1.2	M3*3.6	2.8	24	-	8.5	8	4.5	4.5	40	15	M4*8	3.92	5.59	70.34	27.80	27.80	0.071	1.49
MSD12L							28	45.6	60.4														5.10	8.24	102.70	57.37	57.37	0.103	
MSD15C	16	3.4	9	60	45	7.5	20	38	54.8	5.2	M3	M4*4.2	3.2	42	23	9.5	8	4.5	4.5	40	15	M4*10	6.77	9.22	199.34	56.66	56.66	0.143	2.86
MSD15L							35	57	73.8														8.93	13.38	299.01	122.60	122.60	0.215	

Note：1kgf=9.81N

Kanehiro

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