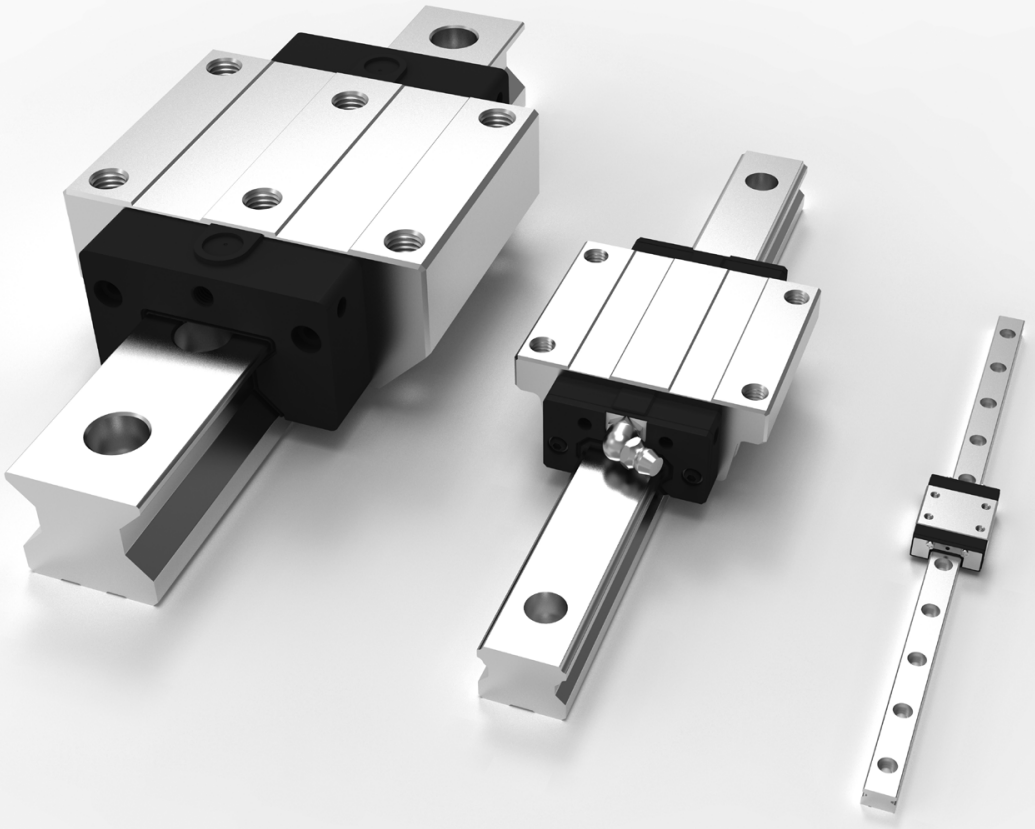
WON



LINEAR MOTION GUIDE

WON

1 WON Linear Motion Guide

1. Features

WON Linear Motion Guide is a linear motion bearing with the structure in which rolling elements such as balls or rollers softly circulate the inner part of a block that can make an infinite linear motion along the raceway surface of a rail.
The device is able to do rolling motion ideally, bearing high load and 4-direction equal load with high rigidity. With its auto-adjusting ability, the linear motion guide is excellent at error-absorbing and improves its precision after assembly. Since it has low frictional force and less abrasion, it is possible to maintain precision long and to drive silently at high-speed running.

2. Strengths

1) Able to make precise positioning

Since there is less difference between static friction and kinetic friction as well as in speed-induced friction fluctuation, it excellently responds even to micro-migration, allowing precise positioning and high-speed running.

2) Able to maintain stable precision for a long time

Less friction coefficient and wear due to ideal rolling motion makes it possible to maintain stable precision for a long time.

3) Able to eliminate clearance or increase rigidity by preloading

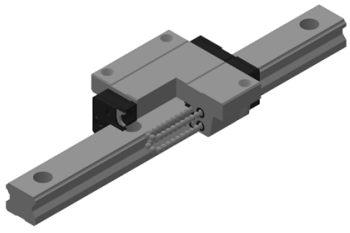
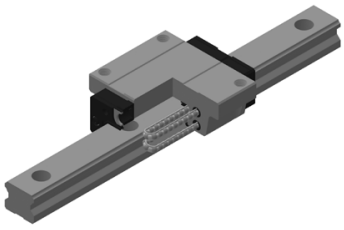
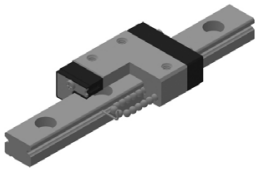
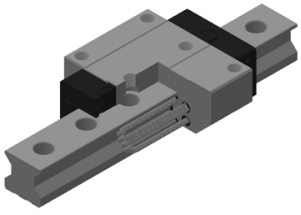
It is possible to eliminate clearance by using rolling elements such as a ball or a roller, or to increase rigidity of Linear Motion Guide by preloading.

4) Simple lubrication

Lubrication is simple, and it is convenient to maintain the device with grease or oil.

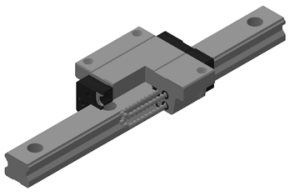
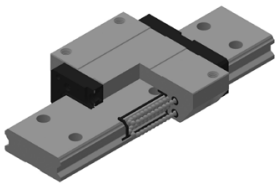
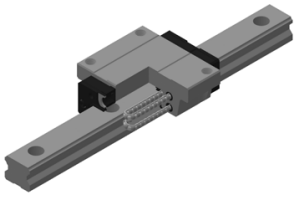
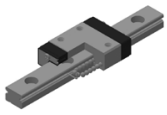
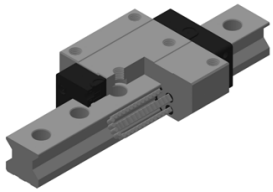
5) Able to make compact equipment and save the cost for operating electricity

The device is able to bear high load with high rigidity and has low friction. Therefore, it is possible to design compact and miniaturized equipment and to save manufacturing costs and energy.

3. Types

WON ST offers various types of linear motion guide from miniature types to general ball linear motion guide to low-noise linear motion guide to ultra-high rigid roller linear motion guide. Since each one supports different shapes and sizes according to service conditions, you can select the optimal linear motion guide suitable for each usage.

Linear Motion Guide		• World standard ball linear motion guide • 4-direction equal load type with 45° contact angle • Great error-absorbing ability with D/F combination • Linear motion with high rigidity and high precision through ideal rolling motion
Wide Linear Motion Guide		• 4-direction equal load type with 45°con-tact angle; a low-centered structure with a wide and short rail; the moment working at a narrow space; usable as an one-axis type where high rigidity is required; a de vice with linear motion
Spacer Chain Linear Motion Guide		• World standard ball linear motion guide • 4-direction equal load type with 45°contact angle • Great error-absorbing ability with D/F com bination • A spacer ball chain based retainer type; a linear motion device generating low noise and low dust
Miniature Linear Motion Guide		• Miniature high-rigidity • Various shapes and sizes • A compact linear motion device with high durability and reliability
Roller Linear Motion Guide		• Roller-enabled ultra-rigid linear motion guide • 4-direction equal load type with 45°contact angle • Able to run reliably for a long time through rolling motion having the wide contact surface • A linear motion device with high rigidity and high precision, and bearing high load

2 Selection of Linear Motion Guide

1. Overview

To select a linear motion guide, it is necessary to identify the details of requirements, prioritize them, and then choose the one that meets the service conditions.

2. Procedure

1 Identify service conditions	equipment, maintenance structure, installation space, assembly status, functional requirements, service conditions
2 Select a type of Linear Motion Guide	Select an appropriate type by considering motion condition, load level, rigidity, friction, and assembly.
3 Select the model number of Linear Motion guide	Determine a model number and a quantity of blocks by considering such factors as assembly space and load.
4 Calculate loads	Calculate the loads of the vertical and horizontal directions and moment, which are imposed on a block.
5 Calculate equivalent load	Convert each load imposed on a block into an equivalent load.
6 Calculate mean load	Convert each load imposed on a block and the variable load during acceleration or deceleration into a mean load
7 Calculate static safety factor	Calculate a static safety factor identified with basic load rating and max. equivalent load. Check if it fits for service conditions.
8 Calculate life	Calculate a rated load and a life span. Check if the calculated life span fits for service conditions.
9 Review preload & clearance	Select the preload and clearance suitable for service conditions.
10 Determine the class of precision	Determine a class of driving precision required by Linear Motion guide
11 Lubrication, dust proof, surface handling	Select the lubricant suitable for the environment using grease, oil, or special grease lubrication. Select a dustproof seal. Determine the surface treatment for rust prevention for generating low dust.
12 Complete selection	Decide the final specifications of Linear Motion guide.

3 Life Calculation

1. Load rating and life

1) Life

If external load is applied to linear motion guide in driving, fatigue fracture occurs due to the stress made as load is repeatedly applied to the raceway surface and rolling elements, and peeling off scale-like flakes (flaking) arises. Life of a linear motion guide refers to a total driving distance until the point that flaking arises due to initial fatigue fracture.

- A linear motion guide can have defects earlier than the time of normal flaking caused by its wear or fatigue in the following cases:

a. Excess load by the imprecise assembly following a difference in temperature or tolerance
b. If a linear motion guide is contaminated with foreign substances
c. Driving with insufficient lubrication
d. Reciprocating motion in a very short distance in the form of vibration or wave during halting or driving
e. Excessive load imposed on a linear motion guide
f. Deformation of plastic end-plate

2) Rating fatigue life L

Generally linear motion guide does not always have an equal life span even though its products are manufactured in the same way, because of the difference in scattering of original fatigue of raw-material. For this reason, the reference value of life of a linear motion guide is defined as the rating fatigue life which is a total driving distance that 90% of linear motion guides in one group with the same specifications can reach without flaking at the time when all in the group run under the same conditions.

When using a ball

$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P_C} \right)^3 \times 50$$

When using a roller

$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P_C} \right)^{\frac{10}{3}} \times 100$$

3) Basic dynamic load rating C

Basic dynamic load rating is a ability of linear motion guide to bear load, which represents an appli cable constant load in direction and magnitude when the rated fatigue life is 50Km. The reference value of basic of WON linear motion guide dynamic load rating is 50Km (ball type) and 100Km (roller type), respectively. It is used for calculating of life a linear motion guide while driving under constant load in magnitude from the center of a block to bottom. Each value of basic dynamic load rating (C) is described in the catalogue

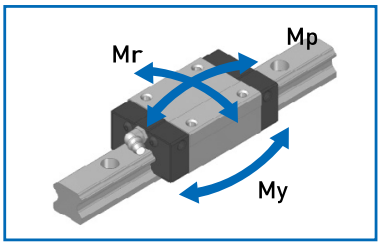
4) Basic static load rating C_0

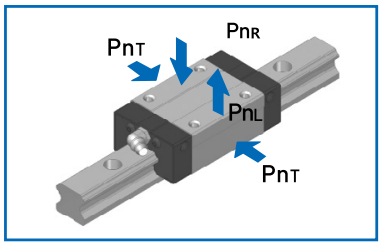
If a linear motion guide is applied by excessive load or instantly by big impact load, partially perma nent deformation occurs between a rolling element and the raceway surface. If deformation reaches to a certain extent, it hinders smooth driving.
Basic static load rating is defined as the constant static load in direction and magnitude when the total permanent deformation of the raceway surface of block and rail and of a rolling element like a ball or a roller is 0.0001 times bigger than the diameter of the rolling element. In a linear motion guide, it refers to the load applied from top to bottom based on the center of a block.
Each value of basic static load rating (C_0) is described in the specification table.

5) Static allowable moment M0

Moment load can be imposed on a linear motion guide. At this time, a ball or a roller both at the ends is most stressed due to the stress distribution of a ball or a roller as a rolling element in the linear motion guide. Static allowable moment (M0) refers to the constant moment load in direction and magnitude when the total permanent deformation of a ball or roller, a rolling element to which the biggest stress is applied, and of the raceway surface of a block or rail is less than 0.0001 of the diameter of the rolling element. Moment values of three directions (Mp, My, Mr) are described in the catalogue. Static allowable moment (M0) and static moment load rating (Mp) can be reviewed with application of safety factor (fs)

Directions of load and moment





$$fs = \frac{Mp}{M0}$$

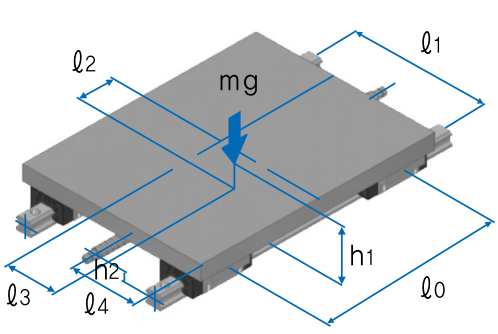
2. Load calculation

A linear motion guide bears basic dynamic load rating (C) and basic static load rating (C0). Neverthe less, it also needs to bear compression load applied from top to down due to inertia force created by the center of gravity, positioning thrust, acceleration, cutting force, and deceleration as well as various loads including tensile load, horizontal load, and moment load, depending on the service conditions. In this case, load of the linear motion guide changes. To select a linear motion guide, it is required to review these conditions and calculate a proper load.

3. Service condition setting

Service conditions necessary for calculating the load and life of a linear motion guide.

① Mass : m(kg)
② Applicable load direction :
③ Point of application : ℓ_2, ℓ_3, h_1(mm)
(center of gravity)
④ Point of thrust : ℓ_4, h_2(mm)
⑤ Composition of linear motion guide : ℓ_0, ℓ_1(mm)
(No. of blocks & rails)
⑥ Velocity diagram Velocity : V(mm/s)
Time constant : tn(s)
Acceleration : αn(mm/s²)
⑦ No. of reciprocating motions per minute : N_1(min⁻¹)
⑧ Stroke : Ls(mm)
⑨ Avg. velocity : Vm(m/s)
⑩ Required life : Lh(h)



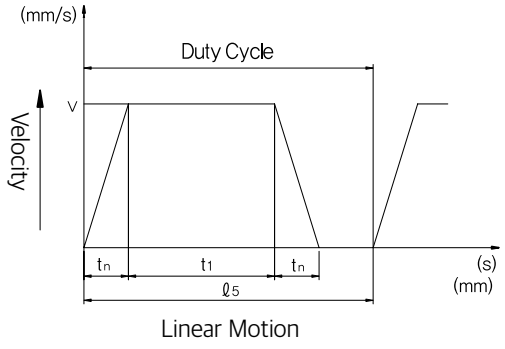
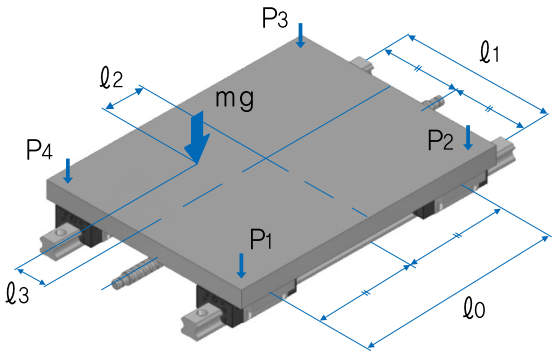
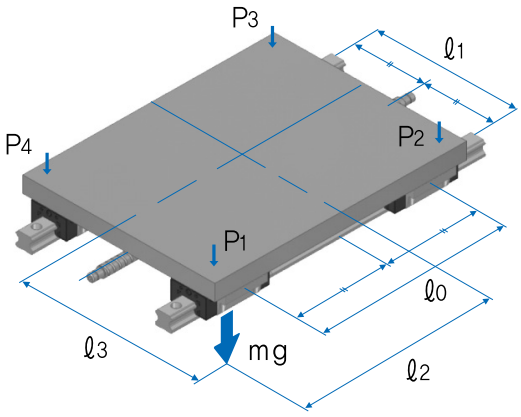


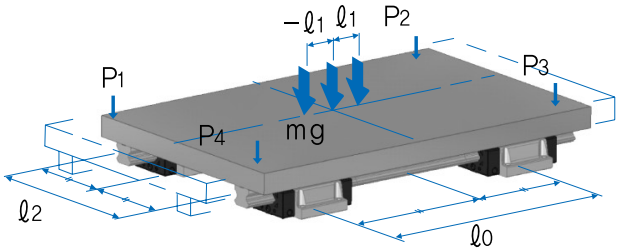
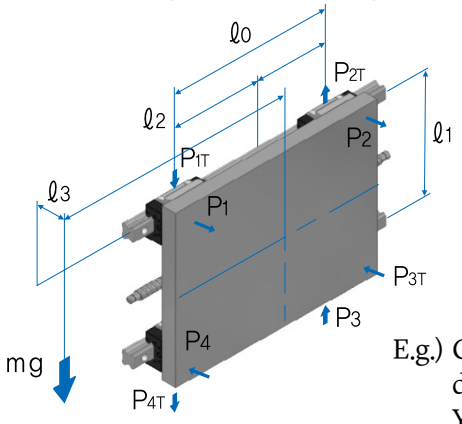
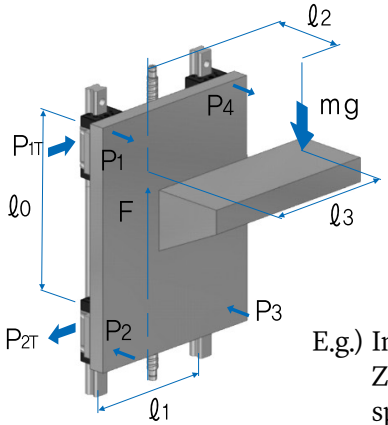
Figure 1. Service Condition

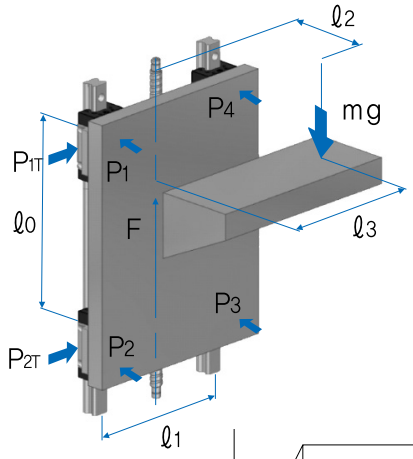
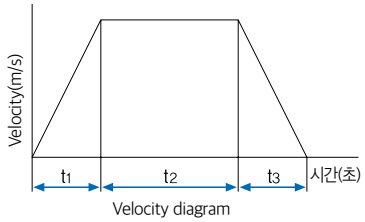
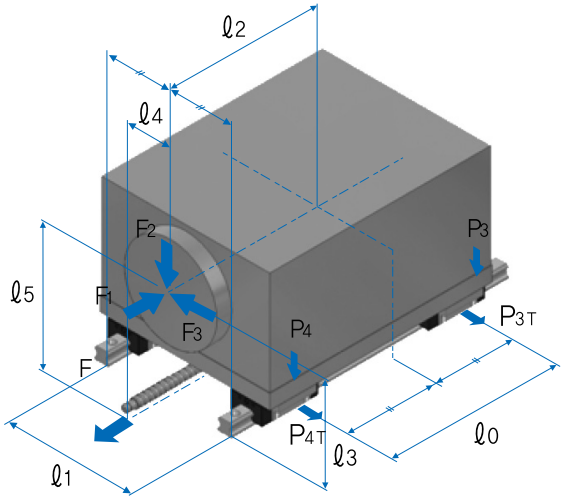
4. Load calculation formula

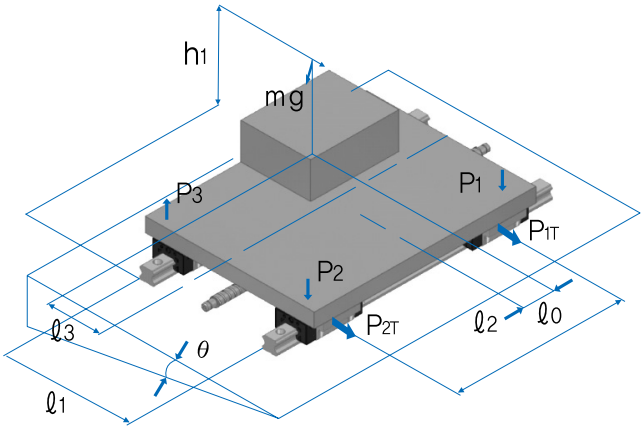
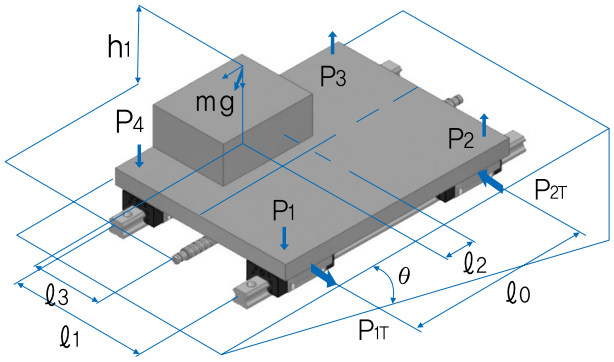
The load applied to a linear motion guide changes depending on external forces such as the center of gravity, position of thrust, acceleration, and cutting resistance. To select a linear motion guide, it is required to calculate the load applied to a block in full consideration of the conditions shown below.

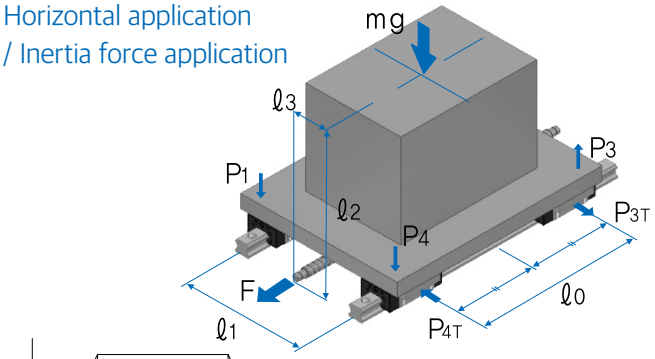
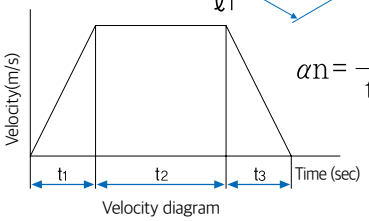
m : Mass	(kg)	g : Acceleration of gravity (g : 9.8m/s²)	(m/s²)
ℓ_n : Mass	(mm)	V : Velocity	(m/s)
F_n : Thrust	(N)	t_n : Time constant	(s)
P_n : Load (vertical, reverse-vertical)	(N)	α_n : Velocity	(m/s²)
P_{nT} : Load (horizontal)	(N)		

Case	Service Conditions	Load Calculation Formula
1	Block move Horizontal / uniform motion / stationary 	$P_1 = \frac{mg}{4} + \frac{mg \cdot \ell_2}{2 \cdot \ell_0} - \frac{mg \cdot \ell_3}{2 \cdot \ell_1}$ $P_2 = \frac{mg}{4} - \frac{mg \cdot \ell_2}{2 \cdot \ell_0} - \frac{mg \cdot \ell_3}{2 \cdot \ell_1}$ $P_3 = \frac{mg}{4} - \frac{mg \cdot \ell_2}{2 \cdot \ell_0} + \frac{mg \cdot \ell_3}{2 \cdot \ell_1}$ $P_4 = \frac{mg}{4} + \frac{mg \cdot \ell_2}{2 \cdot \ell_0} + \frac{mg \cdot \ell_3}{2 \cdot \ell_1}$
2	Block move Overhang-Horizontal / uniform motion / stationary 	$P_1 = \frac{mg}{4} + \frac{mg \cdot \ell_2}{2 \cdot \ell_0} + \frac{mg \cdot \ell_3}{2 \cdot \ell_1}$ $P_2 = \frac{mg}{4} - \frac{mg \cdot \ell_2}{2 \cdot \ell_0} + \frac{mg \cdot \ell_3}{2 \cdot \ell_1}$ $P_3 = \frac{mg}{4} - \frac{mg \cdot \ell_2}{2 \cdot \ell_0} - \frac{mg \cdot \ell_3}{2 \cdot \ell_1}$ $P_4 = \frac{mg}{4} + \frac{mg \cdot \ell_2}{2 \cdot \ell_0} - \frac{mg \cdot \ell_3}{2 \cdot \ell_1}$

Case	Service Conditions	Load Calculation Formula
3	Rail move Horizontal / uniform motion / stationary  E.g.) X or Z axis Loader / unLoader	$P_1 = \frac{mg\cdot\cos\theta}{4} + \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} - \frac{mg\cdot\cos\theta\cdot\ell_3}{2\cdot\ell_1} + \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_1}$ $P_{1T} = \frac{mg\cdot\sin\theta}{4} + \frac{mg\cdot\sin\theta\cdot\ell_2}{2\cdot\ell_0}$ $P_2 = \frac{mg\cdot\cos\theta}{4} - \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} - \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_1} + \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_1}$ $P_{2T} = \frac{mg\cdot\sin\theta}{4} - \frac{mg\cdot\sin\theta\cdot\ell_2}{2\cdot\ell_0}$
4	Block move Wall installation / uniform motion / stationary  E.g.) Gantry-type device Y-axis drive	$P_1 \sim P_4 = \frac{mg\cdot\ell_3}{2\cdot\ell_1}$ $P_{1T} = P_{4T} = \frac{mg}{4} + \frac{mg\cdot\ell_2}{2\cdot\ell_0}$ $P_{2T} = P_{3T} = \frac{mg}{4} - \frac{mg\cdot\ell_2}{2\cdot\ell_0}$
5	Block move Vertical / uniform motion / stationary  E.g.) Industrial robot, Z-axis, Auto-painting spray, Lifter	$P_1 \sim P_4 = \frac{mg\cdot\ell_2}{2\cdot\ell_0}$ $P_{1T} \sim P_{4T} = \frac{mg\cdot\ell_3}{2\cdot\ell_0}$

Case	Service Conditions	Load Calculation Formula
6	Block move Vertical/moment of inertia  $\alpha n = \frac{V}{tn}$  Velocity diagram E.g.) Conveyance robot, LTR robot 2-axis	Acceleration $P_1=P_4=-\frac{m(g-\alpha_1)\ell_2}{2\cdot\ell_0}$ $P_2=P_3=\frac{m(g-\alpha_1)\ell_2}{2\cdot\ell_0}$ $P_{1T}=P_{4T}=\frac{m(g-\alpha_1)\ell_3}{2\cdot\ell_0}$ $P_{2T}=P_{3T}=-\frac{m(g-\alpha_1)\ell_3}{2\cdot\ell_0}$ Constant Velocity $P_1=P_4=-\frac{mg\cdot\ell_2}{2\cdot\ell_0}$ $P_2=P_3=\frac{mg\cdot\ell_2}{2\cdot\ell_0}$ $P_{1T}=P_{4T}=\frac{mg\cdot\ell_3}{2\cdot\ell_0}$ $P_{2T}=P_{3T}=-\frac{mg\cdot\ell_3}{2\cdot\ell_0}$ Deceleration $P_1=P_4=-\frac{m(g-\alpha_3)\ell_2}{2\cdot\ell_0}$ $P_2=P_3=\frac{m(g-\alpha_3)\ell_2}{2\cdot\ell_0}$ $P_{1T}=P_{4T}=\frac{m(g-\alpha_3)\ell_3}{2\cdot\ell_0}$ $P_{2T}=P_{3T}=-\frac{m(g-\alpha_3)\ell_3}{2\cdot\ell_0}$
7	Block move Complex external loads like cutting load  E.g.) Machine tool, CNC lathe, Machining center, NC milling machine	F1 application $P_1=P_4=-\frac{F_1\cdot\ell_5}{2\cdot\ell_0}$ $P_2=P_3=\frac{F_1\cdot\ell_5}{2\cdot\ell_0}$ $P_{1T}=P_{4T}=\frac{F_1\cdot\ell_4}{2\cdot\ell_0}$ $P_{2T}=P_{3T}=-\frac{F_1\cdot\ell_4}{2\cdot\ell_0}$ F2 application $P_1=P_4=\frac{F_2}{4^+}\ \frac{F_2\cdot\ell_2}{2\cdot\ell_0}$ $P_2=P_3=\frac{F_2}{4^-}\ \frac{F_2\cdot\ell_2}{2\cdot\ell_0}$ F3 application $P_1=P_4=-\frac{F_3\cdot\ell_3}{2\cdot\ell_1}$ $P_2=P_3=\frac{F_3\cdot\ell_3}{2\cdot\ell_1}$ $P_{1T}=P_{4T}=\frac{F_3}{4^-}\ \frac{F_3\cdot\ell_2}{2\cdot\ell_0}$ $P_{2T}=P_{3T}=\frac{F_2}{4^-}\ \frac{F_3\cdot\ell_2}{2\cdot\ell_0}$

Case	Service Conditions	Load Calculation Formula
8	Block move Moment load in case of application to side slope / cutting load 	$P_1 = \frac{mg\cdot\cos\theta}{4} + \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} - \frac{mg\cdot\cos\theta\cdot\ell_3}{2\cdot\ell_1} + \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_1}$ $P_{1T} = \frac{mg\cdot\sin\theta}{4} + \frac{mg\cdot\sin\theta\cdot\ell_2}{2\cdot\ell_0}$ $P_2 = \frac{mg\cdot\cos\theta}{4} - \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} - \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_1} + \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_1}$ $P_{2T} = \frac{mg\cdot\sin\theta}{4} - \frac{mg\cdot\sin\theta\cdot\ell_2}{2\cdot\ell_0}$ $P_3 = \frac{mg\cdot\cos\theta}{4} - \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} + \frac{mg\cdot\cos\theta\cdot\ell_3}{2\cdot\ell_1} - \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_1}$ $P_{3T} = \frac{mg\cdot\sin\theta}{4} + \frac{mg\cdot\sin\theta\cdot\ell_2}{2\cdot\ell_0}$ $P_4 = \frac{mg\cdot\cos\theta}{4} + \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} + \frac{mg\cdot\cos\theta\cdot\ell_3}{2\cdot\ell_1} - \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_1}$ $P_{4T} = \frac{mg\cdot\sin\theta}{4} + \frac{mg\cdot\sin\theta\cdot\ell_2}{2\cdot\ell_0}$
9	Block move Moment load in case of application to side slope / cutting load  E.g.) CNC lathe, Tool rest	$P_1 = \frac{mg\cdot\cos\theta}{4} + \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} - \frac{mg\cdot\cos\theta\cdot\ell_3}{2\cdot\ell_1} + \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_0}$ $P_{1T} = \frac{mg\cdot\sin\theta\cdot\ell_3}{2\cdot\ell_0}$ $P_2 = \frac{mg\cdot\cos\theta}{4} - \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} - \frac{mg\cdot\cos\theta\cdot\ell_3}{2\cdot\ell_1} - \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_0}$ $P_{2T} = -\frac{mg\cdot\sin\theta\cdot\ell_3}{2\cdot\ell_0}$ $P_3 = \frac{mg\cdot\cos\theta}{4} - \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} + \frac{mg\cdot\cos\theta\cdot\ell_3}{2\cdot\ell_1} - \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_0}$ $P_{3T} = -\frac{mg\cdot\sin\theta\cdot\ell_3}{2\cdot\ell_0}$ $P_4 = \frac{mg\cdot\cos\theta}{4} + \frac{mg\cdot\cos\theta\cdot\ell_2}{2\cdot\ell_0} + \frac{mg\cdot\cos\theta\cdot\ell_3}{2\cdot\ell_1} + \frac{mg\cdot\sin\theta\cdot h_1}{2\cdot\ell_0}$ $P_{4T} = \frac{mg\cdot\sin\theta\cdot\ell_3}{2\cdot\ell_0}$

Case	Service Conditions	Load Calculation Formula
10	Block move Horizontal application / Inertia force application   $\alpha n = \frac{V}{tn}$ E.g.) Industrial robot carriage, LCD test device	Acceleration $P_1=P_4=\frac{mg}{4}-\frac{m\cdot\alpha_1\cdot\ell_2}{2\cdot\ell_0}$ $P_2=P_3=\frac{mg}{4}+\frac{m\cdot\alpha_1\cdot\ell_2}{2\cdot\ell_0}$ $P_{1T}\sim P_{4T}=\frac{m\cdot\alpha_1\cdot\ell_3}{2\cdot\ell_0}$ Constant velocity $P_1\sim P_4=\frac{mg}{4}$ Deceleration $P_1=P_4=\frac{mg}{4}+\frac{m\cdot\alpha_3\cdot\ell_2}{2\cdot\ell_0}$ $P_2=P_3=\frac{mg}{4}-\frac{m\cdot\alpha_3\cdot\ell_2}{2\cdot\ell_0}$ $P_{1T}\sim P_{4T}=\frac{m\cdot\alpha_3\cdot\ell_3}{2\cdot\ell_0}$

5. Equivalent load calculation

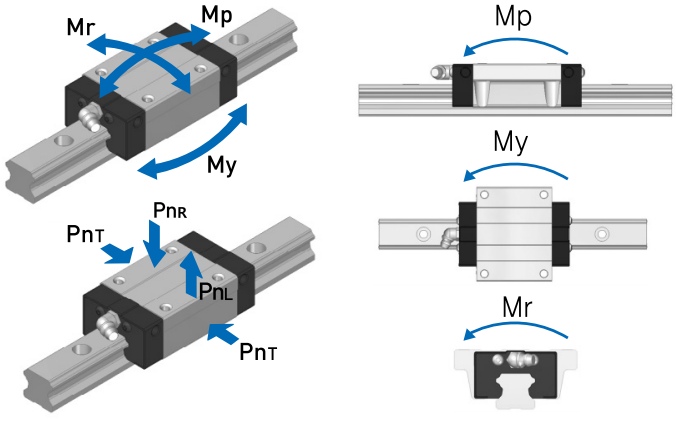
There are diverse kinds of load imposed on a block in a linear motion guide, such as compression load in vertical direction, tensile load, horizontal load, and moment load. There is also complex load of them. Sometimes the magnitude and direction of load change. Since it is difficult to calculate the variable load when calculating the life of the linear motion guide, it is required to use the equivalent load converted into the compression load or tensile load in vertical direction in order to calculate the life or static safety factor.

6. Equivalent load calculation formula

If a linear motion guide bears vertical compression load or tensile load or horizontal load simul taneously, or if the magnitude or direction of load changes, an equivalent load is calculated in the following formula.

P_E(Equivalent load) = P_n+ P_{nT}

P_n : Compression load
P_{nT} : Horizontal load



P_n : Compression load
P_L : Tensile load
P_{nT} : Horizontal load
M_p : Pitching moment
M_y : Yawing moment
M_r : Rolling moment

Figure 2.

7. Static safety factor calculation

Any unexpected big load may be applied to a linear motion guide due to the inertia force caused by vibration impact or quick braking and moment load of mechanical structure. To select a linear motion guide, it is required to take into account static safety factor and prepare for such load. Static safety factor (fs) is the value obtained by dividing basic static load rating by the calculated load. To see the baseline of static safety factor by service condition, please see Table 1-1 and Table 1-2.

Table 1-1. Baseline of static safety factor(fs)

Type of rolling element	Service condition	Static safety factor (fs)
Ball	There are no vibration and impacts.	1.0 ~ 1.5
	High driving performance is needed.	1.5 ~ 2.0
	There are moment load, violation, and impacts.	2.5 ~ 7.0
Roller	There are no vibration and impacts.	2.0 ~ 3.0
	High driving performance is needed.	3.0 ~ 5.0
	There are moment load, violation, and impacts.	4.0 ~ 7.0

Table 1-2.

If compression load is big	$\frac{f_H \cdot f_T \cdot f_C \cdot C_0}{P_n} \geqq f_S$
If tensile load is big	$\frac{f_H \cdot f_T \cdot f_C \cdot C_0}{P_L} \geqq f_S$
If horizontal load is big	$\frac{f_H \cdot f_T \cdot f_C \cdot C_0}{P_{nT}} \geqq f_S$

f_S : Static safety factor
C_0 : Basic static load rating(vertical) (N)
P_n : Calculated load (vertical) (N)
P_L : Calculated load (reverse-vertical) (N)
P_{nT} : Calculated load (horizontal) (N)

f_H : Hardness factor
f_T : Temperature factor
f_C : Contact factor

8. Mean load calculation

The load applied to a block of a linear motion guide is not constant but differs according to service conditions. Therefore, the load that becomes equal to life under the condition of variable load is used. This is called mean load. If the load applied to the block is changed due to an external condi tion, it is required to calculate a life with the mean load in consideration of the various conditions shown below. If load applied to block varies in different conditions, it is necessary to a life in consid eration of the condition of variable load. Mean load (Pm) refers to constant load that becomes equal to the life under the conditions of variable load when the load applied to a block changes in various conditions while the device is driving.

$$P_m = \sqrt[i]{\frac{1}{L} \cdot \sum_{n=1}^{n} (P_n{}^i \cdot L_n)}$$

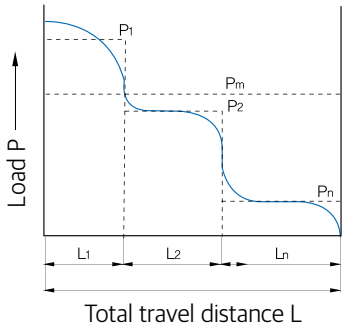
Pm : Mean load (N)
Pn : Variable load (N)
L : Total travel distance (mm)
Ln : Travel distance by loading Pn (mm)
i : Ball - 3, Roller - 10/3

Note) the formula above or formula (1) below is applied to a ball type only.

1) Change in phase

$$P_m = \sqrt[3]{\frac{1}{L}(P_1{}^3 \cdot L_1 + P_2{}^3 \cdot L_2 \cdots + P_n{}^3 \cdot L_n)} \cdots\cdots (1)$$

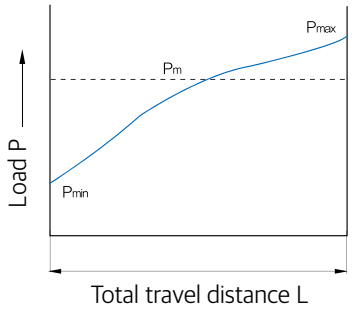
Pm : Mean load (N)
Pn : Variable load (N)
L : Total travel distance (mm)
Ln : Travel distance by loading Pn (mm)



2) Change monotonously

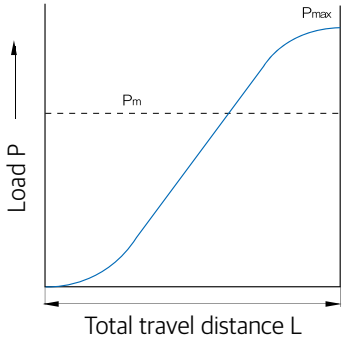
$$P_m \fallingdotseq \frac{1}{3}(P_{min} + 2 \cdot P_{max}) \cdots\cdots (2)$$

Pmin : Minimum load (N)
Pmax : Maximum load (N)

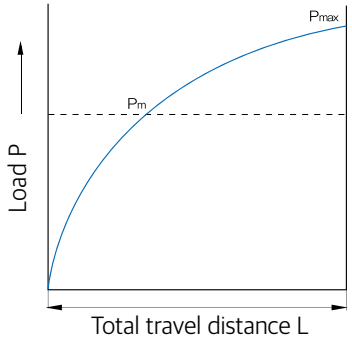


3) Change in a sine curve

a) $P_m \fallingdotseq 0.65 max$ ·····(3)



b) $P_m \fallingdotseq 0.75 max$ ·····(4)



9. Rating life calculation

A rating life needs to be calculated because life of a linear motion guide differs even under the same driving conditions. Rating life of a linear motion guide is a total travel distance that a linear motion guide system composed of a certain number of units can drive without flaking in 90% of the race way surface or rolling element after being run under the same working conditions. If a ball or a roller is used as a rolling element, it is possible to calculate a rating life in the following formula.

The formula to calculate the rating life of a ball-enabled linear motion guide

$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P_C} \right)^3 \times 50$$

L	: Rating life	(km)
C	: Basic dynamic load rating	(N)
P_C	: Calculated load	(N)
f_H	: Hardness factor	See Figure 3
f_T	: Temperature factor	See Figure 4
f_C	: Contact factor	See Table 2
f_W	: Load factor	See Table 3

▶ The formula to calculate the rating life of a roller-enabled linear motion guide

$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P_C} \right)^{\frac{10}{3}} \times 100$$

L	: Rating life	(km)
C	: Basic dynamic load rating	(N)
P_C	: Calculated load	(N)
f_H	: Hardness factor	See Figure 3
f_T	: Temperature factor	See Figure 4
f_C	: Contact factor	See Table 2
f_W	: Load factor	See Table 3

▶ If the length of stroke and the number of reciprocating motions are constant, it is possible to calculate a life time with the use of the rating life (L) in the following formula:

$$L_h = \frac{L \times 10^6}{2 \times \ell_s \times n_1 \times 60}$$

L_h	: Life time	(N)
ℓ_s	: Length of stroke	(mm)
n_1	: No. of reciprocating motions	(min^{-1})

1) Hardness factor (f_H)

To implement the best performance of a lin ear motion guide, it is necessary to maintain appropriately the hardness and depth of the raceway surface of the block and rail that contact a rolling element (ball or roller).
WON linear motion guide has HRC58-64 surface hardness. There is no need to consid er hardness factor. If the hardness is lowered than a baseline, load capacity of a linear moti on guide decreases. In this case, it is necessar y to apply hardness factor to life calculation.

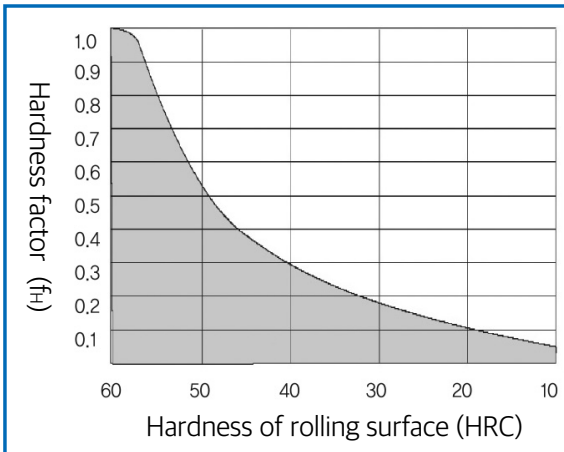


Figure 3. Hardness factor (f_H)

2) Temperature factor (f_T)

If high temperature over 100℃ is applied to a linear motion guide, it is necessary to take into account temperature factor (f_T) at the time when a liner motion guide is selected.
Please make sure to use WON linear motion guide at below 80℃. At over 80℃, please use a high-temp linear motion guide.

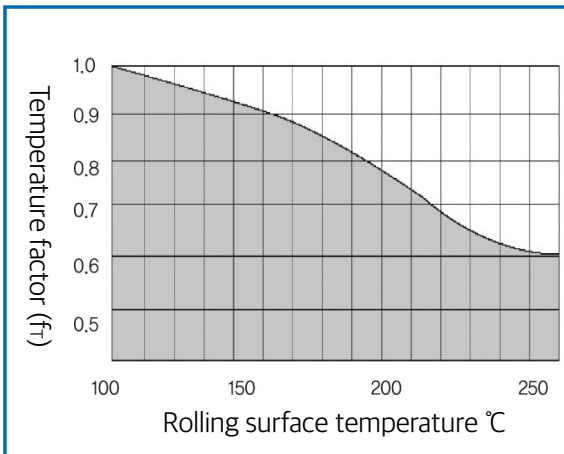


Figure 4. Temperature factor (f_T)

Note) If ambient temperature is over 80℃, it is necessary to use the materials of seal, end plate, and support plate that have specifications for high temperature.

3) Contact factor (f_C)

If over two blocks are closely assembled and mounted, uniform load may not be applied to the blocks due to difference among mounting surfaces. Therefore, it is required to multiply basic static load rating (C) and basic dynamic load rating (C_0) by the contact factor shown in Table 2.

Table 2 .

No. of blocks in close contact	Contact factor (f_C)
2	0.81
3	0.72
4	0.66
5	0.61
Over 6	0.6
Common use	1.0

4) Load factor (f_W)

Generally the static load applied to the block of a linear motion guide can be calculated in formula. However, while a machine is running, the load applied to the block tends to come from vibration or impacts. Therefore, as for the vibration or impact load at high-speed running, it is necessary to consider the load factor (fw) shown in Table 3. Divide the basic dynamic load rating of a linear motion guide by a load factor (fw).

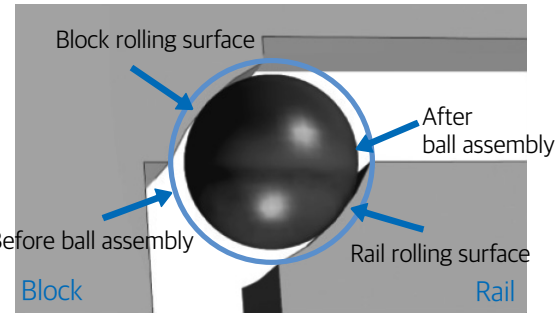
Table 3

External condition	Service Conditions	Load factor
Low	Smooth running at mild speed; no external vibration or impacts	1.0 ~ 1.3
Moderate	Low speed; moderate external vibration or impacts	1.2 ~ 1.5
High	High speed; strong vibration or impacts	1.5 ~ 2.0
Very high	Very high speed; strong vibration and impacts at running	2.0 ~ 4.0

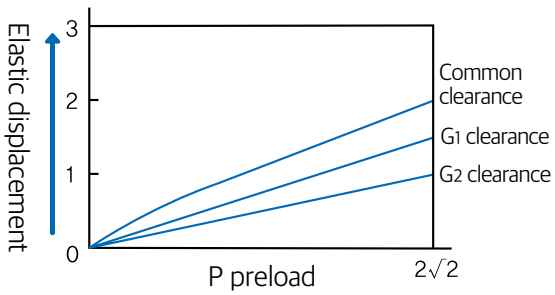
4 Rigidity and Preload

1. Preload

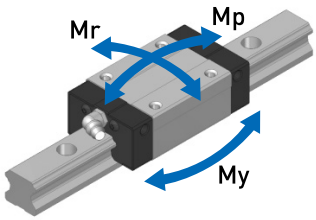
A linear motion guide is preloaded in a way that it improves mechanical precision by eliminating clearance using the rolling element (ball or roller) inserted into the space between a rail and a block or in a way that it applies load to the rolling element in advance by inserting the rolling element larger than the clearance of the raceway between a rail and a block. This process will enhance the rigidity of the linear motion guide and will lessen the displacement level caused by external load.



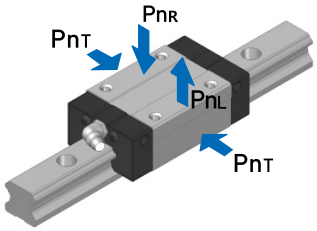
Preload setting



Data of preload and rigidity



Moment rigidity

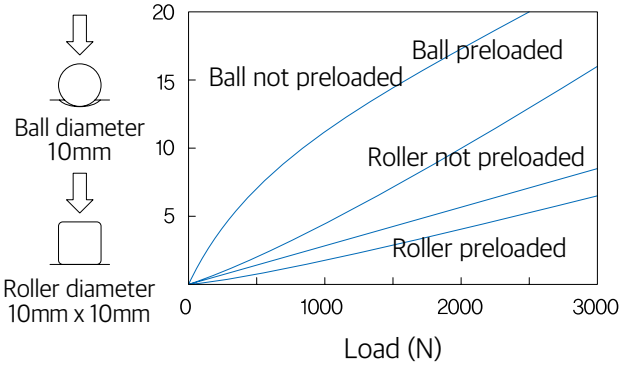


Radial rigidity

2. Radial clearance

Radial clearance refers to a total travel distance in a radial direction from the center of a block of a linear motion guide when mild load is applied to the block up and down from the center part of the rail length after the block is assembled in the rail which is then fixed to base. Radial clearance is usually classified into common clearance (no symbol), G1 clearance (light preload), G2 clearance (heavy load), and Gs clearance (special preload), which is selectable depending on usage. The values are standardized by form.

Preload and elastic displacement



	Type	Preload symbol	preload
H	Moderate	No symbol	0 ~ 0.03 x C
	Light	G1	0.04 ~ 0.08 x C
	Heavy	G2	0.09 ~ 0.13 x C
S	Moderate	No symbol	0 ~ 0.03 x C
	Light	G1	0.03 ~ 0.05 x C
	Heavy	G2	0.06 ~ 0.08 x C
R	Light	G1	Equivalent to 0.03C
	Heavy	G2	Equivalent to 0.08C
	Special	G3	Equivalent to 0.13C

Table 4. Service conditions for radial clearance (preload)

Type	Preload status	Symbol	Service conditions	Use
1. Moderate	Plus-minus clearance	No symbol (1)	· Load is applied in uniform direction and smooth running is needed · There is almost no vibration or im pact and precise running is required.	Welding machine, textile machinery, packaging machinery, various convey ors, medical equipment, woodworking machine, glass cutting machine, take-out robots, ATC, winding machine
2. Light	A small amount of minus clearance	G1 (2)	· There is a little vibration or impact, and moment load · Light load is applied, yet high preci sion is required	Various industrial robots, measuring equipment, inspection equipment, 3D processor, laser processor, PCB drilling machine, various assembling machines, electric spark machine, punching press
3. Heavy	A large amount of minus clearance	G2 (3)	· There are mild impact load, over-hang load and moment load. Rigid ity and high precision are required.	CNC lathe, machining center, milling machine, grinding machine, tapping center, drilling machine, hobbing ma chine, a variety of special equipment
4. Special	A small or large amount of minus clearance	Gs (4)	· Smaller clearance than that of G1 preload; light and precise operation is required. · Larger preload than that of G2; impact load and complex load; high strength and high rigidity are needed.	No preload, ultra-light preload, larg er-than-moderate preload, special preload customized to user condi tions, special processing machine for heavy-duty cutting

Note (1) No clearance or very small clearance.
(2) Very small minus clearance
(3) Quiet large minus clearance to enhance rigidity
(4) Preload below G1 or over G2 to meet service conditions

Table 5. Radial clearance of H, S & HS Series

Unit : μm

Model No.			Symbol		
			Moderate	Light preload	Heavy preload
			No symbol	G_1	G_2
H15	S15	-	-4 ~ +2	-12 ~ -4	-
H20	S20	-	-5 ~ +2	-14 ~ -5	-23 ~ -14
H25	S25	HS25	-6 ~ +3	-16 ~ -6	-26 ~ -16
H30	-	HS30	-7 ~ +4	-19 ~ -7	-31 ~ -19
H35	-	HS35	-8 ~ +4	-22 ~ -8	-35 ~ -22
H45	-	-	-10 ~ +5	-25 ~ -10	-40 ~ -25
H55	-	-	-12 ~ +5	-29 ~ -12	-46 ~ -29

Table 6. Radial clearance of HW Series

Unit : μm

Model No.	Symbol		
	Moderate	Light preload	Heavy preload
	No symbol	G_1	G_2
HB17	-3 ~ 0	-7 ~ -3	-
HB21	-4 ~ +2	-8 ~ -4	-
HB27	-5 ~ +2	-11 ~ -5	-
HB35	-8 ~ +4	-18 ~ -8	-28 ~ -18

Table 7. Radial clearance of M & MB Series

Unit : μm

Model No.		Symbol	
		Moderate	Light preload
		No symbol	G_1
M5	MB5	0 ~ +1.5	-1 ~ 0
M7	MB7	-2 ~ +2	-3 ~ 0
M9	MB9	-2 ~ +2	-4 ~ 0
M12	MB12	-3 ~ +3	-6 ~ 0
M15	MBT13,MB15	-5 ~ +5	-10 ~ 0
M20	-	-7 ~ +7	-14 ~ 0

Table 8. Radial clearance of R Series

Unit : μm

Model No.	Symbol		
	Light preload	Heavy preload	Special preload
	G_1	G_2	G_3
R25	-2 ~ -1	-3 ~ -2	-4 ~ -3
R30	-2 ~ -1	-3 ~ -2	-4 ~ -3
R35	-2 ~ -1	-3 ~ -2	-5 ~ -3

Model No.	Symbol		
	Light preload	Heavy preload	Special preload
	G_1	G_2	G_3
R45	-2 ~ -1	-3 ~ -2	-5 ~ -3
R55	-2 ~ -1	-4 ~ -2	-6 ~ -4
R65	-3 ~ -1	-5 ~ -3	-8 ~ -5

5 Friction

1. Friction

Friction of a linear motion guide resistance is about 1/20-1/40 of an existing sliding guide be cause a rolling element (ball or roller) is assembled in between a rail and a block which is the raceway surface. In addition, the device has low starting torque because the difference between static friction and kinetic friction is very small. low power loss and temperature rise in the part of linear motion are of advantage to speedy operation. high conformability and response make it possible to do high-precise positioning.

2. Friction coefficient

Friction of a linear motion guide resistance relies on the load applied to the linear motion guide, speed, lubrication or form. In the case of light load or speedy motion, lubricant or seal is the main cause of friction resistance. In the case of heavy load or slow motion, the magnitude of load affects friction resistance.

$$F = \mu P$$

F : Friction resistance (N)
μ : Kinetic friction factor
P : Load (N)

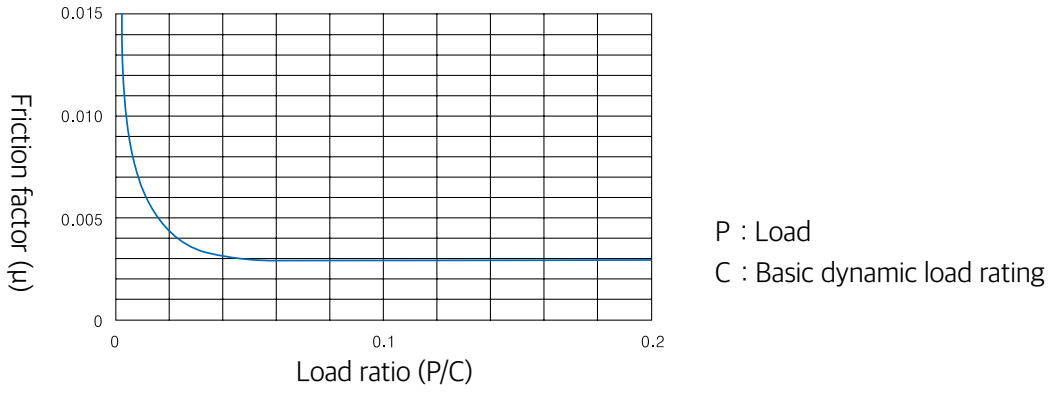


Figure 5. Relation between load ratio and friction factor

Common friction coefficients of various operating systems are shown below in the table, and are applied if there are appropriate lubricant or assembly and normal load.

Type of operating system	Major model number	Friction factor μ
Linear Motion Guide	H, H...S, HB, S, S...S, HS, HS...S, M, MB	0.002 ~ 0.003
	R, RS	0.001 ~ 0.002
Ball Spline	WLS, WSP	0.002 ~ 0.003
Super Ball Bushing / Linear Ball Bushing	SB, SBE, LM, LME	0.001 ~ 0.003
Cross Roller Guideway	WRG	0.001 ~ 0.0025

6 Precision

1. Precision specification

How to measure degree of a linear motion guide of travel is as follows (See Figure 6).
a. Tighten the rail to the mounting surface of the bed with a bolt at the defined torque.
b. Draw a measuring jig right up against the datum plane of the block as shown in the figure.
c. Make a measurement by making the block and measuring jig travelled in the entire section from the starting point to the end point of the rail.
d. The value measured in the above way is an error of parallelism of motion that the block has on the basis of the rail.

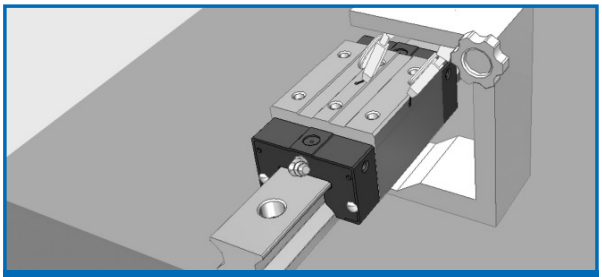


Figure 6. Parallelism of motion

The degree of parallelization between the datum plane of the block and that of rail

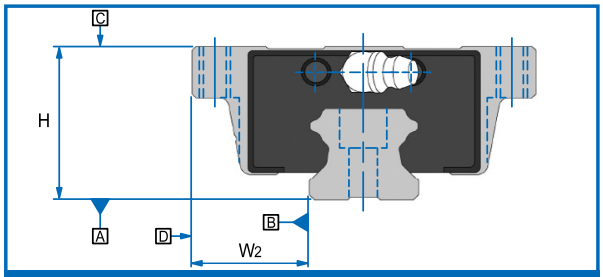


Figure 7. Difference of block

Difference between the blocks installed in the plane

2. Precision design

Table 9. Dimensional tolerance and parallelism of motion

Dimension	Description
Dimensional tolerance of height H	Distance from the base side of rail A to the top side of block C
Difference in height H	Difference in the height of blocks combined from each rail on the same plane
Dimensional tolerance of width W_2	Distance between the datum plane of rail B and the reference side of block D
Difference in width W_2	Difference between the reference side of rail B of the block combined to the rail, and the reference side of block D
Parallelism of motion of C against A	Change in the top side of block C based on the base side of rail A during the motion of the block combined to the rail
Parallelism of motion of D against B	Change in the reference side of block D based on the reference side of rail B during the motion of block combined to the rail

3. Dimension tolerance and difference

Table 10. Precision specification of linear motion guide (H, H...S, HW, S, S...S, HS, HS...S series)

Unit : mm

Dimension	Moderate	High	Precision	Super precision	Ultra precision
	No symbol	H	P	SP	UP
		P6	P5	P4	P3
Dimensional tolerance of height H	±0.080	±0.042	±0.020	±0.010	±0.008
Difference in height H	0.025	0.015	0.007	0.005	0.003
Dimensional tolerance of width W_2	±0.100	±0.050	±0.025	±0.015	±0.010
Difference in width W_2	0.030	0.020	0.010	0.007	0.003
Parallelism of motion of C against A	See Table 11.				
Parallelism of motion of D against B	See Table 11.				

Table 11. Length of rail and parallelism of motion of linear motion guide (H, H...S, HB, S, S...S, HS, HS...S Series) Unit : μm

Length of rail		Parallelism of motion				
Excess	Below	Moderate No symbol	High P6	Precision P5	Super precision P5	Ultra precision P3
-	50	5	3	2	1.5	1
50	80	5	3	2	1.5	1
80	125	5	3	2	1.5	1
125	200	5	3.5	2	1.5	1
200	250	6	4	2.5	1.5	1
250	315	7	4.5	3	1.5	1
315	400	8	5	3.5	2	1.5
400	500	9	6	4.5	2.5	1.5
500	630	11	7	5	3	2
630	800	12	8.5	6	3.5	2
800	1000	13	9	6.5	4	2.5
1000	1250	15	11	7.5	4.5	3
1250	1600	16	12	8	5	4
1600	2000	18	13	8.5	5.5	4.5
2000	2500	20	14	9.5	6	5
2500	3150	21	16	11	6.5	5.5
3150	4000	23	17	12	7.5	6

Table 12. Precision specification of miniature linear motion guide (M, MB Series) Unit : mm

Model No.	Dimension \ Precision spec	Moderate	High	Precision
		No symbol	P6	P5
5	Dimensional tolerance of height H	±0.030	-	±0.015
	Difference in height H	0.015	-	0.005
	Dimensional tolerance of width W2	±0.030	-	±0.015
	Difference in width W2	0.015	-	0.005
	Parallelism of motion of C against A	See Table 13.		
	Parallelism of motion of D against B	See Table 13.		
7	Dimensional tolerance of height H	±0.040	± 0.020	±0.010
9	Difference in height H	0.030	0.015	0.007
12	Dimensional tolerance of width W2	±0.040	± 0.025	±0.015
13	Difference in width W2	0.030	0.020	0.010
15	Parallelism of motion of C against A	See Table 13.		
20	Parallelism of motion of D against B	See Table 13.		

Table 13. Length of rail and parallelism of motion of miniature linear motion guide (M, MB series)

Unit : μm

Length of rail		Parallelism of motion		
Above	Below	Moderate	High	Precision
		No symbol	H	P
			P6	P5
-	40	8	4	1
40	70	10	4	1
70	100	11	4	2
100	130	12	5	2
130	160	13	6	2
160	190	14	7	2
190	220	15	7	3
220	250	16	8	3
250	280	17	8	3
280	310	17	9	3
310	340	18	9	3
340	370	18	10	3
370	400	19	10	3
400	430	20	11	4
430	460	20	12	4
460	490	21	12	4
490	520	21	12	4
520	550	22	12	4
550	580	22	13	4
580	610	22	13	4
610	640	22	13	4
640	670	23	13	4
670	700	23	13	5
700	730	23	14	5
730	760	23	14	5
760	790	23	14	5
790	820	23	14	5

Length of rail		Parallelism of motion		
Above	Below	Moderate	High	Precision
		No symbol	H	P
			P6	P5
820	850	24	14	5
850	880	24	14	5
880	910	24	14	5
910	940	24	14	5
940	970	24	14	5
970	1000	25	14	5
1000	1030	25	16	5
1030	1060	25	16	5
1060	1090	25	16	6
1090	1120	25	16	6
1120	1150	25	16	6
1150	1180	25	17	6
1180	1210	26	17	6
1210	1240	26	17	6
1240	1270	26	17	6
1270	1300	26	17	6
1300	1330	26	17	6
1330	1360	27	17	6
1360	1390	27	18	6
1390	1420	27	18	6
1420	1450	27	18	7
1450	1480	27	18	7
1480	1510	27	18	7
1510	1540	28	19	7
1540	1570	28	19	7
1570	1800	28	19	7

Table 14. Specifications for precision of linear motion guide (R series)

Dimension	High	Precision	Super precision	Ultra precision
	H	P	SP	UP
	P6	P5	P4	P3
Dimensional tolerance of height H	±0.042	±0.020	±0.010	±0.008
Difference in height H	0.015	0.007	0.005	0.003
Dimensional tolerance of width W_2	±0.050	±0.025	±0.015	±0.010
Difference in width W_2	0.020	0.010	0.007	0.003
Parallelism of motion of C against A	See Table 15.			
Parallelism of motion of D against B	See Table 15.			

Table 15. Length of rail and parallelism of motion of linear motion guide (R series)

Unit : μm

Length of rail		Parallelism of motion			
Above	Below	High	Precision	Super precision	Ultra precision
		P6	P5	P4	P3
–	50	3	2	1.5	1
50	80	3	2	1.5	1
80	125	3	2	1.5	1
125	200	3.5	2	1.5	1
200	250	4	2.5	1.5	1
250	315	4.5	3	1.5	1
315	400	5	3.5	2	1.5
400	500	6	4.5	2.5	1.5
500	630	7	5	3	2
630	800	8.5	6	3.5	2
800	1000	9	6.5	4	2.5
1000	1250	11	7.5	4.5	3
1250	1600	12	8	5	4
1600	2000	13	8.5	5.5	4.5
2000	2500	14	9.5	6	5
2500	3150	16	11	6.5	5.5
3150	4000	17	12	7.5	6

4. Selection of precision class

Table 16. For the selection of precision class of linear motion guide by unit, please refer to the table shown below.

Application	Unit	Precision class					Preload		
		Preload type	High	Precision	Super precision	Ultra precision	Preload type	Light preload	Heavy preload
		No symbol	H	P	SP	UP	No symbol	G1	G2
			P6	P5	P4	P3			
Machine Tool	CNC Lathe		●	●	●				●
	Machining center		●	●	●				●
	NC milling machine			●	●				●
	CNC tapping machine		●	●	●				●
	NC boring machine		●	●	●				●
	NC drilling machine		●	●	●				●
	3D engraving machine		●	●	●				●
	Jig boring machine		●	●	●				●
	EDM electric spark machine			●	●	●		●	●
	Grinding machine			●	●	●			●
Semiconductor equipment	Prober equipment					●		●	●
	Wire bonder				●	●		●	●
	Slicing machine				●	●		●	
	Dicing machine				●	●		●	
	IC test handler			●	●			●	
	PCB laser via-hole driller				●			●	
	PCB inspection equipment			●	●			●	
	Laser marker			●				●	
	Chip mounter			●	●			●	
F P D	Mac/Mic inspection equipment				●	●		●	
	Phantom inspection equipment				●	●		●	
	Exposure				●	●		●	
	Laser repair			●	●	●		●	
	Lighting inspection equipment		●	●				●	
	Coater machine			●	●			●	
	Chip bonding machine		●	●				●	
	Dispenser machine		●	●				●	

Application	Unit	Precision class					Preload		
		Preload type	High	Precision	Super precision	Ultra precision	Preload type	Light preload	Heavy preload
		No symbol	H	P	SP	UP	No symbol	G1	G2
			P6	P5	P4	P3			
F P D	Scriber		●	●				●	
	Glass edge grinding machine		●	●				●	
	FPD measuring test equipment			●	●			●	
	Laminating equipment		●	●				●	
	Indentation test equipment								
	Prober equipment								
Industrial machine	Punching press		●					●	
	Tire molder	●						●	
	Tire vulcanizer	●						●	
	Auto-shearing machine	●						●	
	Auto-welding machine	●					●	●	
	Conveyor	●					●		
	Textile machine	●					●		
	Injection molding machine	●					●	●	
Industrial robot	Cartesian coordinated robot	●	●	●				●	
	Gantry robot	●	●					●	
	LTR robot		●	●				●	
	Take-out robot	●						●	
	Cylindrical coordinated robot		●					●	
	Vacuum robot		●	●				●	
	Robot carriage	●							
	Linear actuator		●	●	●		●	●	
Others	Office machine	●					●		
	FA transport equipment	●					●		
	Medical equipment	●					●	●	
	Welding machine	●					●		
	Painting machine	●					●		
	Precision XY table		●	●	●			●	
	UVW stage		●	●				●	
	3D measuring machine			●	●	●		●	

7 Lubrication

1. Purpose

The purpose of lubricating a linear motion guide is to create an oil surface between the raceway surface of rail and block and a rolling element so as to avoid the direct contact of metals, and thereby to reduce friction, wear and heat, preventing the raceway surface and the rolling element from being overheated and melted to be adhered to each other. Moreover, the oil surface created between the raceway surface and a ball decreases load-induced contact stress, so that it can improve the rolling contact fatigue life and prevent rust. A linear motion guide is equipped with a seal. Nevertheless, grease inside the block oozes while the device is in operation. For this reason, it is required to supply a lubricant at a time and interval appropriate to each service condition.

2. Selection of lubricant

To achieve the best performance of a linear motion guide, it is necessary to select the lubricant suitable for service conditions. Lubricants used for a linear motion guide include grease and oil. It is possible to select an appropriate lubricant and lubrication method depending on service conditions, load, operating speed, assembly type, etc.

3. Grease lubrication

Grease is a semisolid lubricant that consists base oil , thickener, and additives.
Generally, when a linear motion guide is lubricated with grease, lithium soap grease is used. In the con dition of high load or the condition of use, the grease mixed with extreme-pressure additive is used. To apply a linear motion guide to a high-vacuum environment or a cleanroom, it of desirable to select a type of grease excellent at low evaporation and low dust generation.

1) Grease refilling

For grease refilling in a linear motion guide, it is necessary to supply a sufficient amount of grease with the use of a grease nipple until remaining grease is discharged. It is appropriate to fill up 50% or so volume block with grease. After refilling, rolling resistance can be increased. In order to reduce the rolling resistance, it is better to take a test run about 20 times prior to the operation.

2) Refill interval

If a travel of linear motion guide exceeds a certain time, its lubricating performance declines. So it is re quired to supply an appropriate amount of grease at a proper time depending on service conditions and environment. Usually, it is necessary to supply grease when travel of the device distance reaches 100km.

4. Oil lubrication

When a linear motion guide is lubricated with oil, it is recommended to use an oil lubricant with high viscosity (68mm^2 /sec) under the condition of high load, and an oil lubricant with low-viscosity (13mm^2 /sec) under the condition of high velocity. As for oil lubrication, the recommended oil supply amount per block is 0.3cm^3 per hour.

Table 17. Inspection and refilling time of lubricant

Type	Checkpoints	Inspection cycle	Refilling time
Grease	• Check if there is any cutting chip, dust, foreign substance • Check if there is any contamination by other substances	3-6 months	• Generally, supply grease 1-2 times every year. • Usually, supply grease more than once every year if travel exceeds 100km/year. • Refill depending on a situation after checking the status of grease.
Oil	Check a lubricant quantity, contamination, and foreign substance	3-6 months	• Refill depending on the results of inspection, and determine an optimal amount depending on volume of the oil tank
	Check an oil level (Supply oil mist)	Before every operation	• Refill appropriately after checking how much oil is consumed. • Define an optimal amount after how much oil is consumed

※ Please DO NOT use any oil that affects synthetic resin, a material of linear motion guide parts.

Table 18. Lubricants used for linear motion guide

Application	Main use	Product name	Manufacturer	Manufacturer	Base oil	Type of thickener
Common use (extreme-pressure additive incl.)	Industrial machine, machine tool	BW EP NO.2	BWC	-20 ~+105	Mineral oil	Lithium
Common use	Machine tool, electric spark machine, industrial robot, etc.	GADUS S2 V220 00	SHELL	-30 ~+110	Mineral oil	Lithium
Clean & low dust generation	Semiconductor, FPD equipment	SNG 5050 DEMNUM	NTG DAIKIN	-40 ~+1200 -50 ~+300	Synthetic oil	Urea
Eco-friendly	Semiconductor AMOLED process equipment, driving gear in vacuum chamber	FOMBLIN Krytox High vacuum grease	AUSIMONT DuPont Dow Corning	-20 ~+250	Synthetic oil	Re-fluoride Ethylene fluorinated
Machine tool	Excellent dust prevention and strong oil film strength Hardly emulsified to clearance, so suitable for machine tools	VACTRA NO.2 SLC DTE Oil	ExxonMobil	-20 ~+100	Oil	Way oil Turbine oil
Special use	Corrosion proofing	6459 Grease	SHELL	-20 ~+100	Mineral oil	Polyurethane

8 Surface Treatment

1. Surface treatment

WON ST uses the following methods for the optimal surface treatment of a linear motion guide in order to prevent rust and improve the quality of its appearance.

2. Types of surface treatment

1) Electrolytic rust-preventive black coating (black Cr plating)

This is an industrial black chrome coating type that is used to improve the corrosion proof at low cost. It can achieve better corrosion proof than martensite stainless steel and be used to enhance appearance and prevent the reflection of light.

2) Industrial hard chrome plating

A hardness of surface is over 850HV, so that its wear proof is excellent and its corrosion proof is comparable with that of martensite stainless steel. WON ST offers such surface treatment types such as alkakine col oring and color alumite treatment at a customer request. To use a linear motion guide after its sur face treatment, it is necessary to set a high safety factor.

3) Fluoride low-temperature Cr plating

It is also called “Raydent.” This is a combined surface treatment type of black Cr coating with special fluoride resin coating that is used in the places requiring high corrosion proof, or in cleanroom that needs to generate low dust.

9 Dust Proof

1. Dust proof

To make use of the characteristics and performance that a linear motion guide has, it is important to protect the device against external foreign substances which are causes of abnormal wear and its shortened life span. If any dust or foreign substance is expected to be mixed in, it is required to use an effective sealing or dust-proofing system.

2. Types of dust proof

WON Linear Motion Guide has basically a seal assembled. If necessary, it I possible to mount a metal scraper on the device before shipment.

1) Exclusive seal

In order to protect the inside of a bearing against foreign substances, an end seal and a side seal are installed on the both ends and bottom of a block, and an inner seal is mounted on the inside of the block.

2) Metal scraper

A metal scraper is installed outside an end seal, so that it is effective at protecting a device against foreign substances, such as hot spatter or slag generated in a welding process.

10 Measures for Use in Special Environments

WON Linear Motion Guide is useful in various special applications if being used appropriately in accord ance with such service conditions as material, surface treatment, dust proof, and grease.

Table 19.

Application	Conditions of use	Measures	
Clean (Clean room) -Semiconductor, FPD, medical equipment-	• If used in a clean environment, it is required to minimize dust or particles generated in a linear motion guide, as most as possible.	Lubricant	• For a clean environment • Use the grease that generates low dust
		Rust prevention	• Black Cr coating • Fluoride low-temperature colorimet ric Cr plating (Raydent treatment) • Use high-corrosion resistant stainless steel as a material
Vacuum -Semiconductor, FPD deposition equipment -	• If used in a vacuum environment that needs to maintain vacuum status, it is required to control the out gas discharged by a linear motion guide as most as possible. • Excellent rust prevention is required, since rust-prone parts cannot be used in this environment.	Lubricant	• Use the grease for a vacuum en vironment.
		Rust prevention (Out Gas)	• Use high-corrosion resistant stainless steel as a material • Use a self-oiling agent with special coatings like fluoroplastic coatin • Use ceramic as a material
High-temperature environment	• If used in a higher temperature environment than general one, where heat proof of a ma terial is important, it is re quired to use metals for plastic synthetic resin parts	Lubricant	• Use the grease for high-temperature.
		Material	• Use an end seal, side seal+ double seal. • Use a double seal. • Use a special seal for high temperature
Dust	• If used in an environment where there are a lot of cutting chips, wood dust, and dust, it is required to take dust proof measures to protect the block against foreign substances.	Seal	• Use a plastic synthetic resin cap • Use a metal cap • Use a metal scraper
		Cap	• Use a plastic synthetic resin cap. • Use a metal cap • Use a seal plate
		Holding door	• Use an exclusive holding door • Use an sealing and all-in-one holding door
Spatter	• If exposed to a spot welding or arc welding environment, it is required to take measures to prevent hot spatters from being fixed onto a rail	Spatter	• Fluoride black Cr coating
		Seal	• Use a metal scraper
		Dust resistance	• Use a metal cap • Use a seal plate

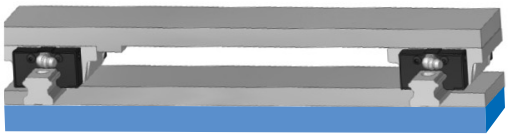
11 Placement and Installation

1. Placement and structure

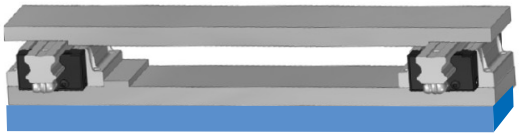
To mount a linear motion guide on equipment, it is required to understand the overall structure of the equipment first, and then check the sizes of the base and a transfer table. To determine the optimal in stallation of a linear motion guide, it is necessary to take into account mounting directions such as placing vertically, in slope, or in the back, load, and the life span required.

Installation layout of linear motion guide (examples)

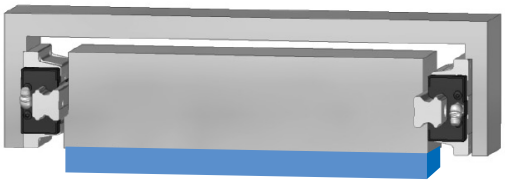
(1) Assembly of the top side of block, block transfer



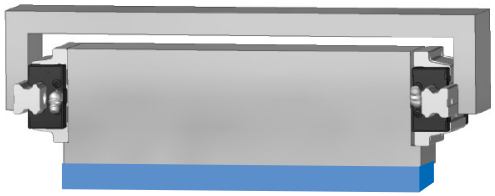
(2) Assembly of the back side of block, rail transfer



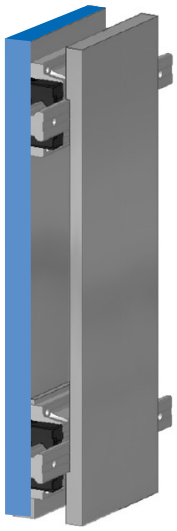
(3) Assembly of the flank of rail, block transfer



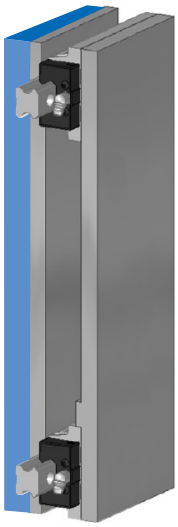
(4) Assembly of the flank of block, rail transfer



(5) Assembly of the wall side of block, rail transfer

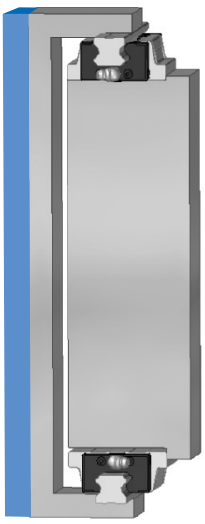


(6) Assembly of the wall side of rail, block transfer



(7) Symmetrical assembly of the top and bottom of block, block transfer

(8) Symmetrical assembly of the top and bottom of block, rail transfer



2. Mounting and fixation

In the structure affected by both vibration and impact, in the place that has complex load or moment load, it is required to fix a linear motion guide in a different way from a general one.

This is a widely used method. Push a pressure plate from the flank after slightly protruding a block and a rail. In this case, it is required to prevent the corners of the rail and block from being in contact with each other.

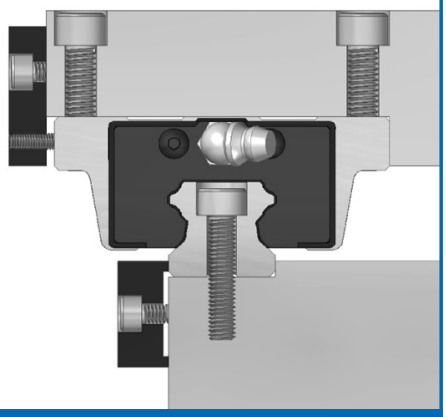


Figure 8. Pushing a pressure plate from the flank

This is a way of fastening a tapered fixture with a bolt. Even slightly bolting up generates big force in a horizontal direction. If it is bolted up too much, deformation may occur in rail, for instance, which needs to be taken a caution.

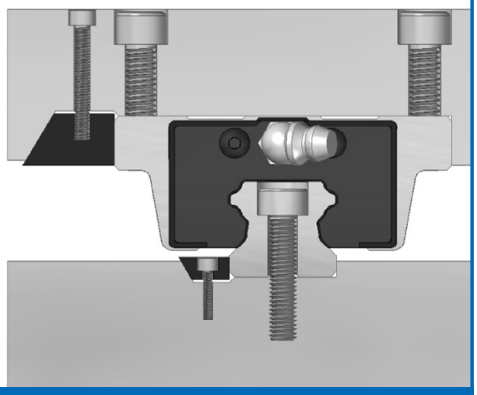


Figure 9. Pushing a tapered plate

You must be required to use miniature bolts due to the spatial constraint when a rail is pushed by a bolt. It is favorable to use as many bolts for pushing as possible.

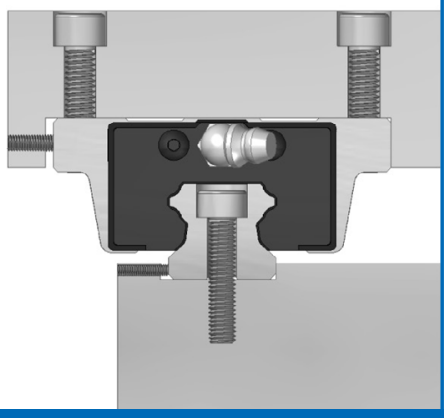


Figure 10. Pushing a bolt from the flank

This is a way of pushing a needle roller with the head of a countersunk screw. It is careful to push it to fit the screw.

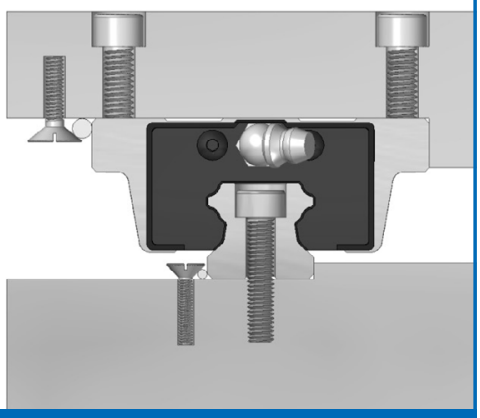


Figure 11. Pushing a roller

3. Design of the mounting surface for installation

Design and management of the mounting surface

The precision of mounting surface of a linear motion guide and an error in installation cause unexpected load and stress to the device, negatively influencing the travel and life of the device. So, it is required to take caution to prevent the harmful effects.

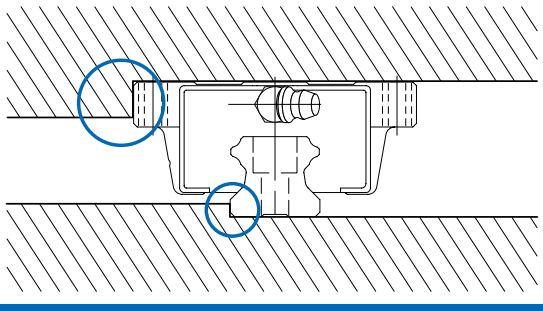


Figure 12. Shape of edges

Management of the vertical angle of the datum plane for installation

If the vertical angle of the installation surface of a rail or block and of its datum plane is inaccurate, it might not be assembled precisely. So, it is required to review an error of vertical angel in design.

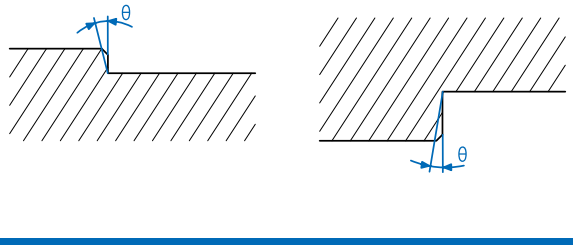


Figure 13.

Management of the datum plane for assembly

In designing a linear motion guide, it is important to manage the height and thickness of its assembly datum plane. If the height is too high or low, a rail or a block may fail to be assembled precisely due to its surface attachment; the application of eccentric load, horizontal load and moment load may loosen the strength of joint and cause poor assembly. In this case, precision fails to meet the requirements in de sign. So, attention must be paid.

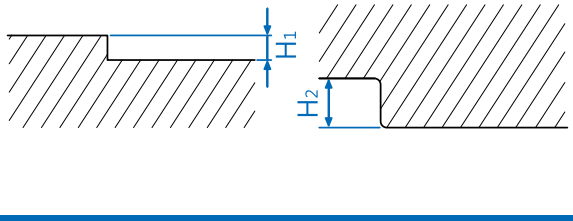


Figure 14. Vertical angle of contact datum plane

Management of the shape of contact corner

If the right-angled corner of a rail or block installed to the mounting surface of a linear motion guide is processed in R-shape and R value is bigger than the dimension of the surface of the rail or block, it is possible to cause a failure of precise assembly to the datum plane. So, attention must be paid.

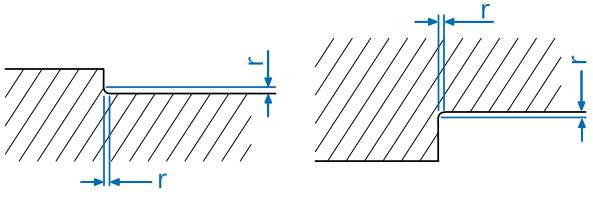


Figure 14. Vertical angle of contact datum plane

Management of the dimensional tolerance between datum plane and bolt in design

If the dimensional tolerance between the contact datum plane of a rail or block of a linear motion guide and a mounting hole is too big, precise assembly fails. So, attention must be paid. Generally the dimensional tolerance is ±0.1mm as a reference value. If the dis tance tolerance between the assembly datum plane of rail or block and the assembly bolt hole is too wide or narrow, precise assembly may fail. So, it is required to set the tolerance to W3±0.1mm in design.

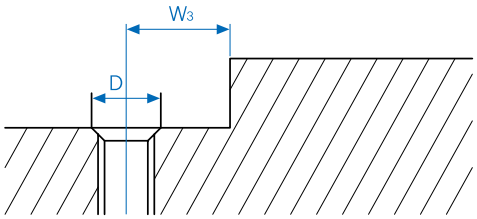
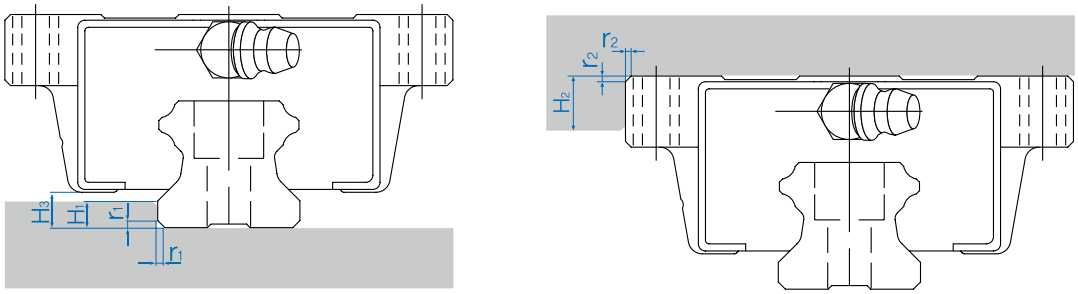


Figure 16. Dimensional tolerance between contact datum plane and mounting hole



Assembly of rail datum plane

Assembly of block datum plane

Figure 17. Height of the raised spot of mounting surface and radius of the corner R

- Make a datum plane that can contact the flank in order to secure the assembly convenience or precise position and the assembly surface of a rail or block in the installation process of a linear motion guide.
- The height of the raised spot of contact datum plane or the radius of corner depend on the specifications of a linear motion guide. So please see the table shown below.
- To prevent the raised spot from being deformed by the pressing force from above or pushing force from side, secure sufficient thickness in design.

H, H...S, HB, S, S...S, HS, HS...S Series

Unit : mm

Model No.	Radius of corner of the installation to rail r_1(max.)	Radius of corner of the installation to block r_2(max.)	Height of raised spot of the installation to rail H_1	Height of raised spot of the installation to block H_2	H_3
15	0.5	0.5	3	4	4.7
20	0.5	0.5	3.5	5	6
25	1	1	5	5	7
30	1	1	5	5	7.5
35	1	1	6	6	9
45	1	1	8	8	10
55	1.5	1.5	10	10	13

HB Series

Unit : mm

Model No.	Radius of corner of the installation to rail r_1(max.)	Radius of corner of the installation to block r_2(max.)	Height of raised spot of the installation to rail H_1	Height of raised spot of the installation to block H_2	H_3
17	0.4	0.4	2	4	2.5
21	0.4	0.4	2.5	5	3.3
27	0.4	0.4	2.5	5	3.5
35	0.8	0.8	3.5	5	4

S, S...S Series

Unit : mm

Model No.	Radius of corner of the installation to rail r_1(max.)	Radius of corner of the installation to block r_2(max.)	Height of raised spot of the installation to rail H_1	Height of raised spot of the installation to block H_2	H_3
15	0.5	0.1	2.5	4	4.5
20	0.5	1	4	5	6
25	1	1	5	5	7

M, MB Series

Unit : mm

Model No.	Radius of corner of the installation to rail r_1(max.)	Radius of corner of the installation to block r_2(max.)	Height of raised spot of the installation to rail H_1	Height of raised spot of the installation to block H_2	H_3
5	0.2	0.2	0.8	2	1
7	0.2	0.2	1.2	2.5	1.5
9	0.2	0.2	1.5	3	2
12	0.2	0.2	2.5	4	3
13	0.2	0.2		4.5	4
15	0.2	0.2	3	4.5	4
20	0.2	0.2	4	5	5

R Series

Unit : mm

Model No.	Radius of corner of the installation to rail r_1(max.)	Radius of corner of the installation to block r_2(max.)	Height of raised spot of the installation to rail H_1	Height of raised spot of the installation to block H_2	H_3
25	1	1	4	5	6.5
30	1	1	4.5	5	7
35	1	1	5	6	7
45	1.5	1.5	6	8	9.5
55	1.5	1.5	8	10	10
65	1.5	2	9	10	13

4. Error tolerance of the mounting surface for installation

1) Auto-adjusting and error-absorbing abilities

A linear motion guide has an excellent auto-adjusting ability. Therefore, even though the structure with rail assembly is slightly deformed processing error may occur a little, the straightness or parallelism of a table after assembly is better than the precision in processing before assembly, and quite linear running is available.

2) Error tolerance of the degree of parallelization when using 2-axis assembly (P_1)

The error tolerance of the degree of parallelization when a 2-axis assembly is used is shown below

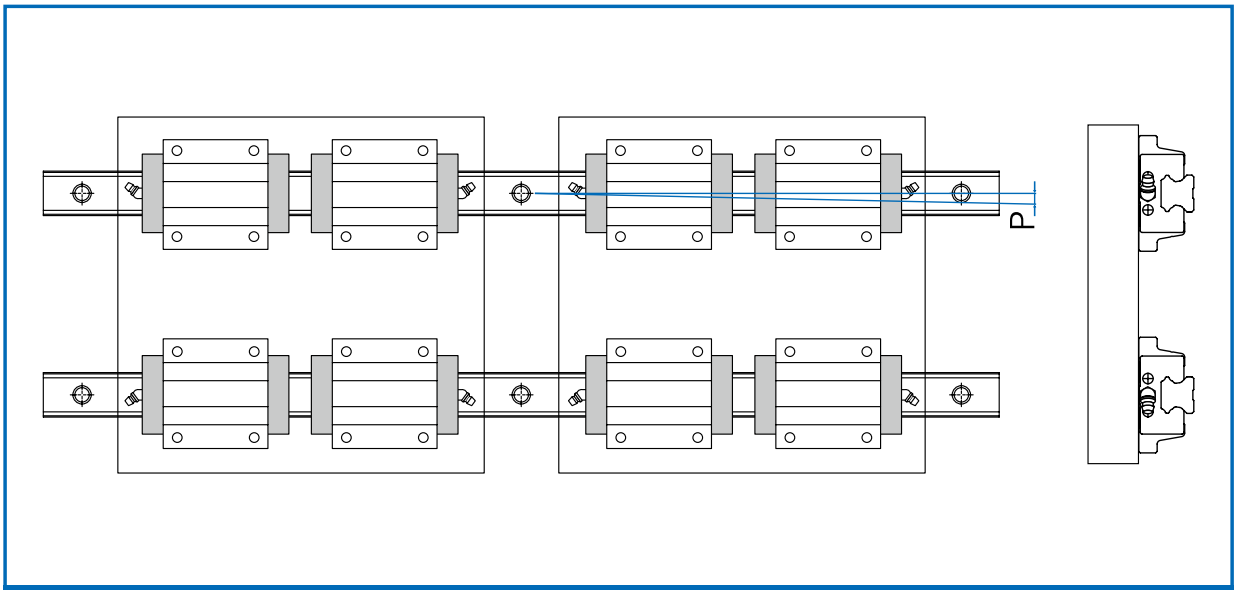


Figure 18. Error tolerance of the degree of parallelization (P)

H, H...S, HS, HS...S Series

Unit : μm

Model No.	Common clearance	G_1 clearance	G_2 clearance
15	25	18	-
20	25	20	18
25	30	22	20
30	40	30	27
35	50	35	30
45	60	40	35
55	70	50	45

HB Series

Unit : μm

Model No.	Common clearance	G_1 clearance	G_2 clearance
17	20	15	-
21	25	18	-
27	25	20	-
35	30	22	20

S, S...S Series

Unit : μm

Model No.	Common clearance	G_1 clearance	G_2 clearance
15	25	18	-
20	25	20	18
25	30	22	20

M, MB Series

Unit : μm

Model No.	Common clearance	G_1 clearance
5	2	-
7	3	-
9	4	3
12	9	5
13	10	6
15	10	6
20	13	8

R Series

Unit : μm

Model No.	G_2 clearance	G_3 clearance
25	7	5
30	9	6
35	10	7
45	12	9
55	16	11
65	22	16

3) Error tolerance of height in 2-axis assembly (P_2)

If an error of height in installation is too big, block distortion occurs and its rigidity may be weakened due to block distortion and changes in the raceway groove of the block and rail block and in the contact angle of a ball or roller as a rolling element.

The error tolerance of height level (x) when a 2-axis linear motion guide is used is as follows.

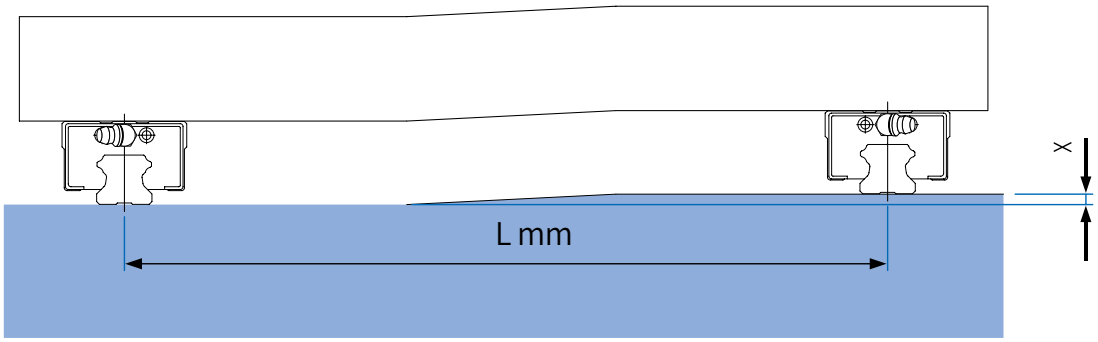


Figure 19. Error tolerance of height level in 2-axis (X)

H, H...S, S, S...S, HS, HS...S Series

Unit : μm

Model No.	Common clearance	G_1 clearance	G_2 clearance
15	0.26L	0.17L	-
20	0.26L	0.17L	0.10L
25	0.26L	0.17L	0.14L
30	0.34L	0.22L	0.18L
35	0.42L	0.30L	0.24L
45	0.50L	0.34L	0.28L
55	0.60L	0.42L	0.34L

HB Series

Unit : μm

Model No.	Common clearance	G_1 clearance	G_2 clearance
17	0.13L	0.04L	-
21	0.26L	0.17L	-
27	0.26L	0.17L	-
35	0.26L	0.17L	0.14L

M, MB Series

Unit : μm

Model No.	Common clearance	G_1 clearance
5	0.04L	-
7	0.05L	-
9	0.07L	0.01L
12	0.10L	0.02L
13	0.12L	0.04L
15	0.12L	0.04L
20	0.14L	0.06L

R Series

Unit : μm

Model No.	G_2 clearance	G_3 clearance
25, 30, 35, 45, 55, 65	0.17L	0.12L

5. Description of the datum plane for installation

The datum plane of WON ST Linear Motion Guide is the ground surface on the opposite side of WON mark shown in the block.

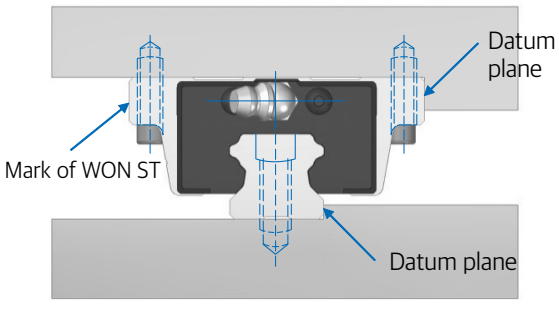


Figure 20. Linear motion guide on the reference axis

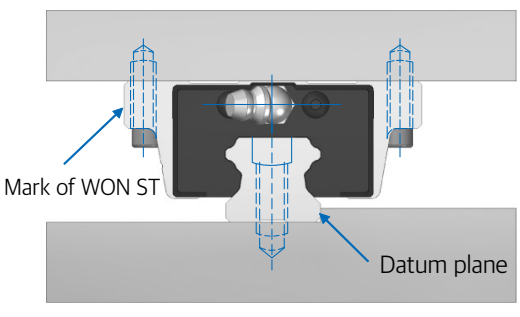
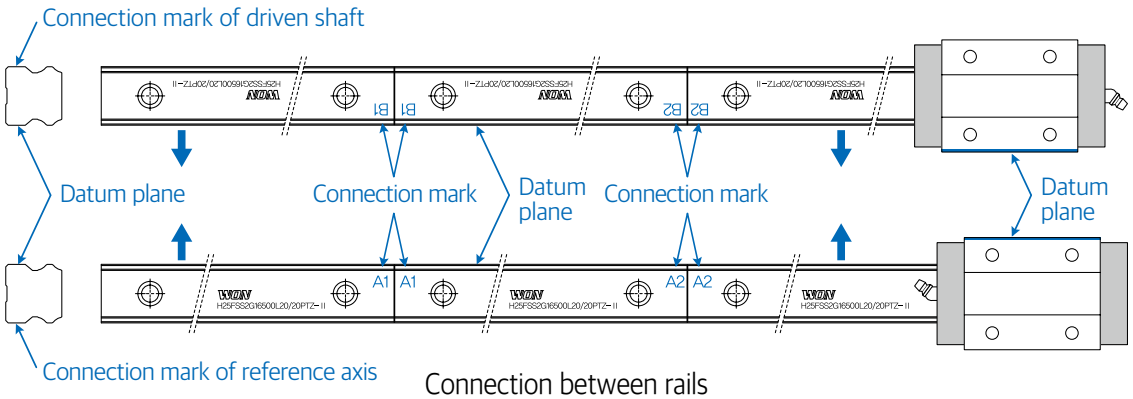


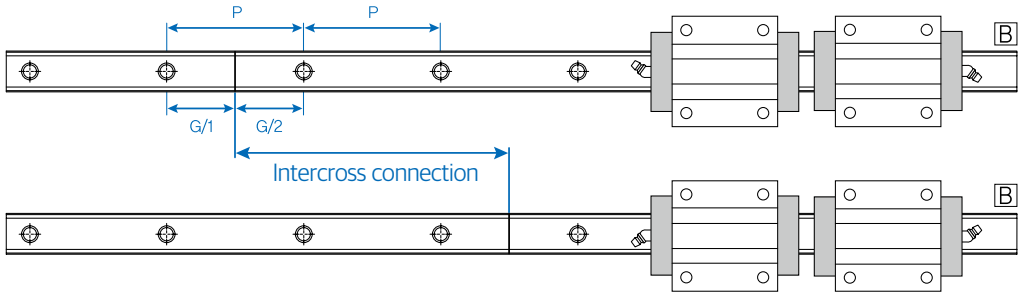
Figure 21. Linear motion guide on the driven shaft

6. Rail connection

If it is necessary to use a longer rail than the one supplied, it is possible to connect rails for the purpose of use. The mark on the rail indicates the point where rails should be linked. If a block passes through the connecting points simultaneously, that may affect travel of the unit or cause a delicate hitch. To solve this problem, it is recommended to make the connecting points intercrossed.



Connection between rails

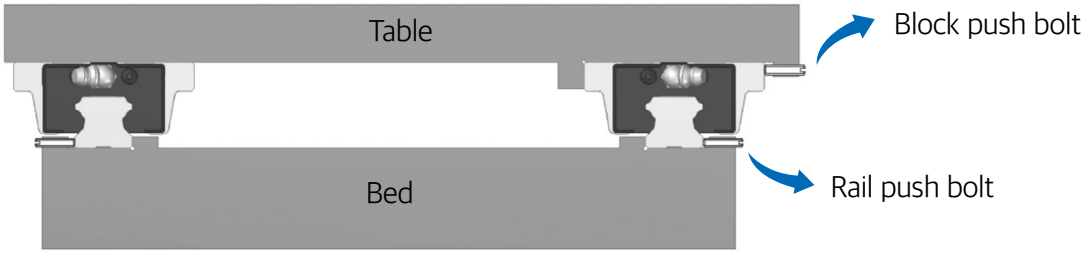


Intercross connection

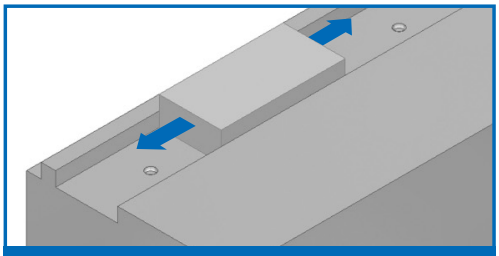
Figure 22. Rail connection

7. Installation

1) Installation of linear motion guide in the equipment exposed to vibration and impacts

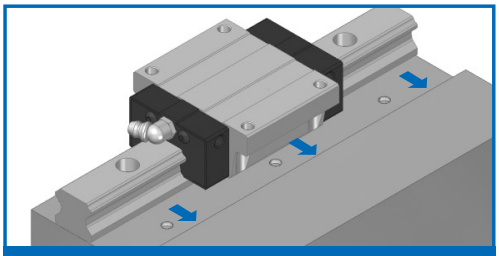


① Install a rail



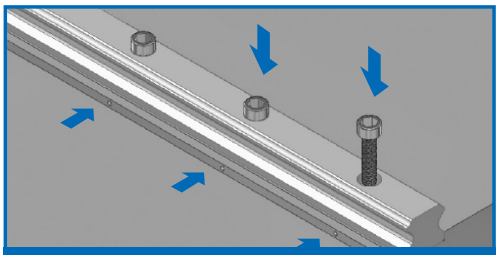
Step 1: Check the installation surface for a rail.

Prior to installation, remove burr, dust, and dust prevention oil completely.



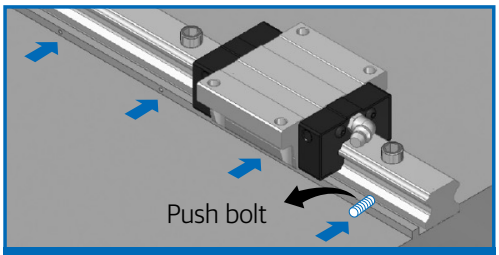
Step 2: Draw a rail tightly to the datum plane

Gently place a linear motion guide on the bed, and push it in the opposite direction of datum plan of the bed.



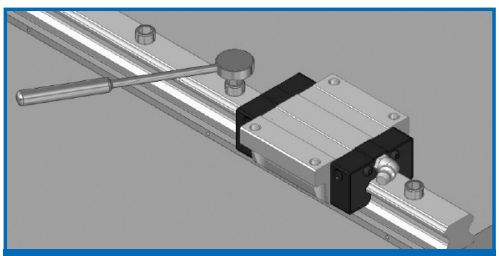
Step 3: Fasten bolts temporarily

Check the status of bolts and fasten every bolt temporarily.



Step 4: Fasten push bolts

Fix push bolts to make sure that the rail is in parallel with the datum plane of the bed.



Step 5

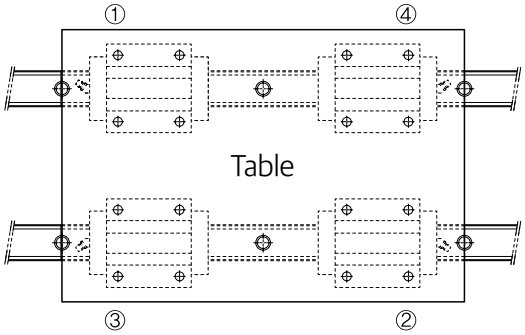
- Step 5: Fasten all bolts with a torque wrench.

  Fasten all bolts at the recommended torque. Fasten the bolt in the center first and then continue fastening each bolt toward both ends in order to maintain precision of the rail in the assembly process.

- Step 6: Assemble an auxiliary axis.

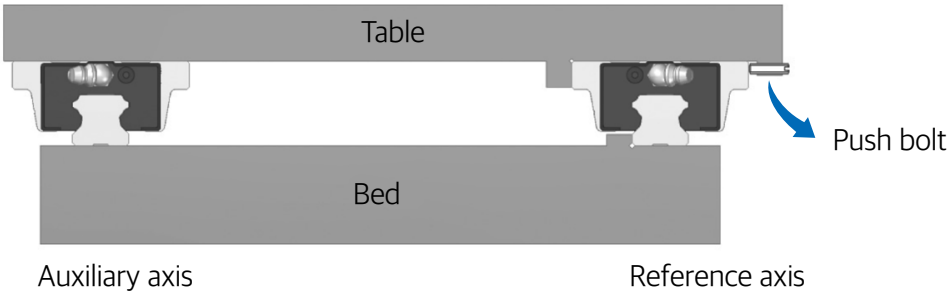
  Repeat the above procedure for the installation of an auxiliary axis.

② Install a block

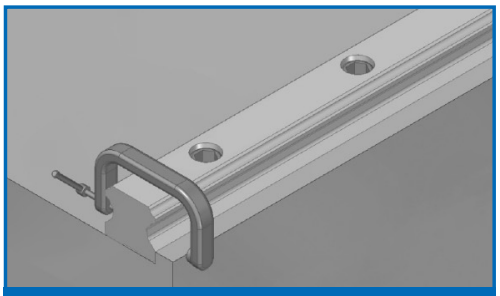


- Step 1: Assembly bolts temporarily
  Place a table on the block and fasten all bolts temporarily.
- Step 2: Fasten bolts tightly
  Fix the main rail block to the opposite side of datum plane of the table with the use of a push bolt, and adjust position of the table.
- Step 3: Fix and fasten assembly bolts
  Completely fasten all bolts on the datum plane and subsidiary side in the order of ① to ④.

2) Installation of linear motion guide without a push bolt



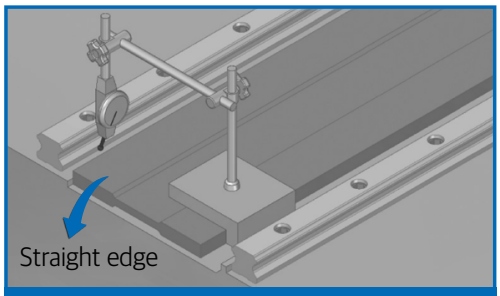
① Install a master rail



Use a vise

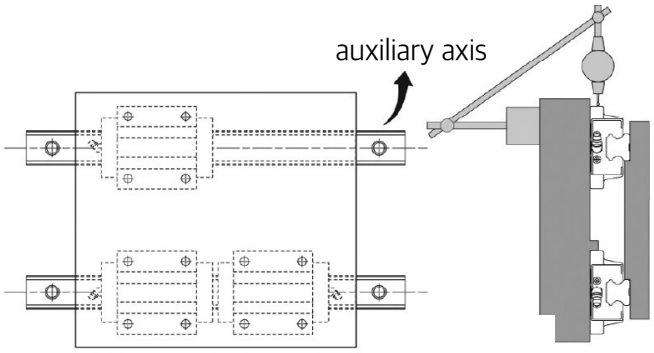
Fasten bolts temporarily and push a master rail toward the datum plane using a C-vise. Fasten the bolts sequentially at the pre scribed torque.

② Install an auxiliary rail



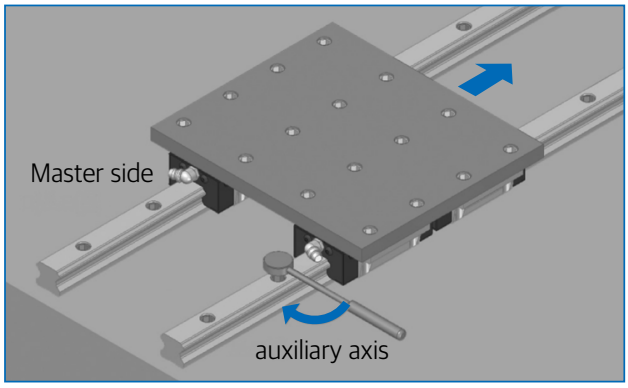
Straight edge

Place a straight edge in between two rails, and make it in parallel with the master rail fixed temporarily. Check the degree of par allelism with a dial gauge, and adjust the rail if needed. And then, fasten bolts in order



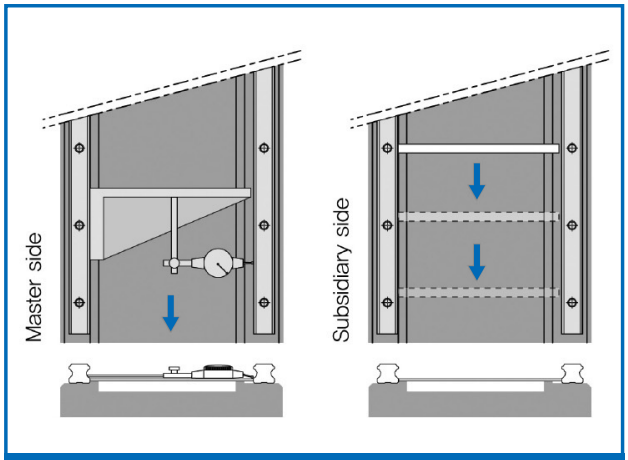
• Assembly using a table

1. Fix two blocks on the datum plane and one block on the auxiliary axis to a table.
2. Fix another auxiliary block and rail to the ta ble and bed temporarily.
3. Place a dial gauge on the table and make sure that a prober of the gauge contacts the auxiliary axis of the block.
4. Separate the table from the end of the rail, and check parallelization between the block and the auxiliary rail.
5. Fasten bolts in order.



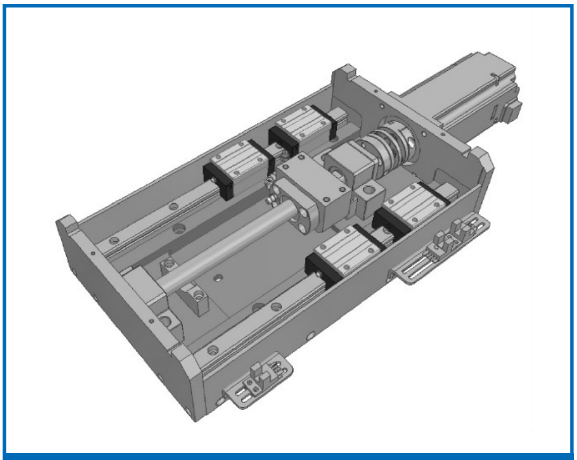
• Assembly using a rail on the reference axis

1. Fix two blocks on the datum plane and one block on the auxiliary axis to a table.
2. Fix another auxiliary block and rail to the ta ble and bed temporarily.
3. Separate the table from one rail and make adjustment in the way of parallelization with the auxiliary rail in consideration of rolling resistance in movement.
4. Fasten bolts in order.



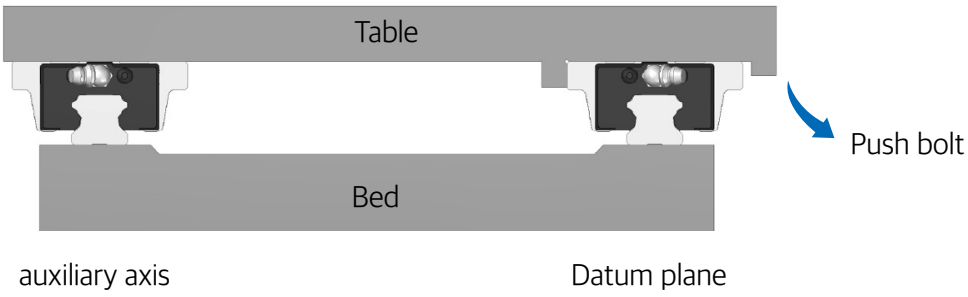
Assembly using a jig

Move the postiion of a block sequentially at the end of the master rail every bolt pitch, and adjust paral-lelization between the datum plane of the master rail and the master plane of the auxiliary rail with the use of a special jig. Fasten bolts in order.

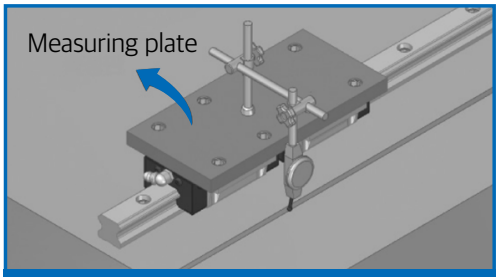


Completion of the installation

3) Installation of a block without the datum plane for a reference rail

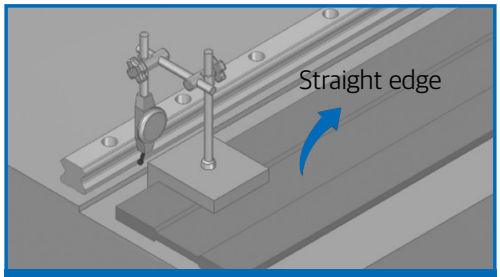


① Install a reference rail



Use a temporary datum plane

Fix two blocks together onto the meas uring plate and install a temporary datum plane near the rail mounting on the bed. Check the degree of parallelism of the rail, and fasten bolts in order.



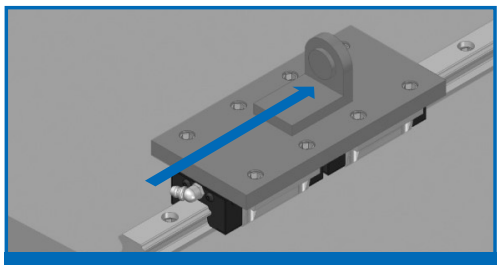
Use a straight edge

Fix a rail to the bed temporarily. Adjust it to be in straight life with the use of a dial gauge. Fasten bolts in order.

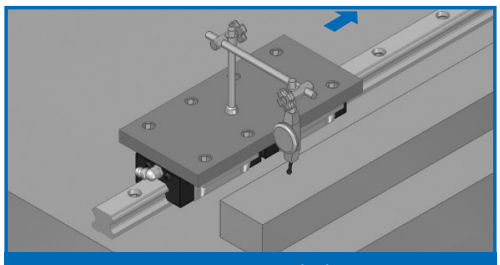
② Apply the same method when installing an auxiliary block and rail.

4) Measure precision after installation

It is possible to check the precision of travel by fixing two blocks onto the measuring plate. To meas ure precision, either use a straight edge and check a measurement with a dial gauge, or use a laser interferometer.



Measure using a laser interferometer



Measure using a dial gauge with the use of a straight edge

8. Torque used for fastening bolts in assembly

1) Select the optimal torque for bolts

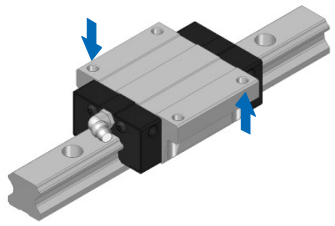
To assemble a rail of a linear motion guide, it is required to apply bolt torque appropriately in consider ation of the material of the mounting surface or bolts. Inaccurate bolt torque may affect the mounting precision of the rail. So please use a torque wrench.

2) Recommended torque by the material of the mounting base

Unit : N·m

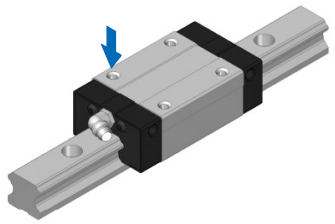
Bolt specification	Torque value (Unit : N·m)		
	Steel	Casting	Aluminum
M3	2	1.3	1
M4	4	2.7	2
M5	8.8	5.9	4.4
M6	13.7	9.2	6.8
M8	30	20	15
M10	68	45	33
M12	120	78	58
M14	157	105	78
M16	196	131	98
M20	382	255	191

9. Bolt fastening direction by linear motion guide type



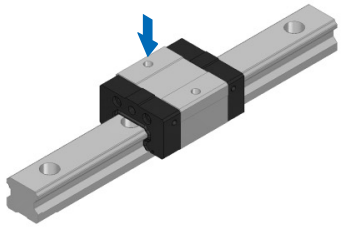
H-FN, H-FL, H-FNA, H-FLA, HB-F, H-FN...S, H-FL...S, H-FNA...S, H-FLA...S

Since the flange of a block is tap-processed and the counter bore is processed in the bottom, it is possible to tighten bolts in the up and down direction as indicated by the arrows.
But, to fasten bolts from bottom to top, it is recommended to use one size smaller.



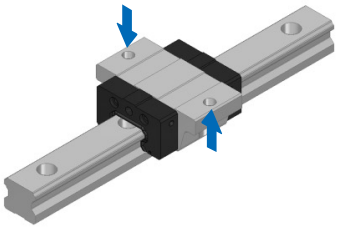
H-RN, H-RL, HB-R, H-RN...S, H-RL...S

Since the square body of the block is tap-processed, it is used at the time when bolts need to be fastened from top to bottom as indicated by the arrow



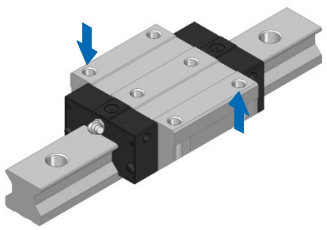
S-RC, S-RN, S-RC...S, S-RN...S

Since the square body of the block is tap-processed, it is used at the time when bolts need to be fastened from top to bottom as indicated by the arrow



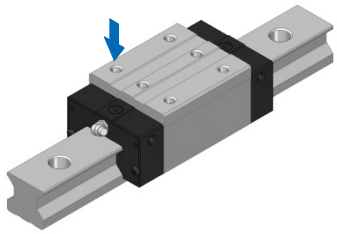
S-FC, S-FN, S-FC...S, S-FN...S

Since the flange of a block is tap-processed and the counter bore is processed in the bottom, it is possible to tighten bolts in the up and down direction as indicated by the arrows.
But, to fasten bolts from bottom to top, it is recommended to use one size smaller.



R-FN, R-FL

Since the flange of a block is tap-processed and the counter bore is processed in the bottom, it is possible to tighten bolts in the up and down direction as indicated by the arrows.
But, to fasten bolts from bottom to top, it is recommended to use one size smaller.



R-RN, R-RL, RS-RN, RS-RL

Since the square body of the block is tap-processed, it is used at the time when bolts need to be fastened from top to bottom as indicated by the arrow.

12 Types of Linear Motion Guide

1. Linear Motion Guide H Series

1) Structure of H Series

WON Linear Motion Guide H Series has a four-row circular arc-groove structure in the raceway groove of a rail or block. In addition, it has a 4-direction equal load type in which it can bear equal load rating for vertical compression load, tensile load, and horizontal load as its ball as a rolling element is combined at 45 degree. Therefore, the model reduces friction resistance and ensures smooth motion and long life. By imposing preload on the balls, it is possible to enhance the rigidity of a linear motion guide and to minimize its deformation for external load.

2) Features of H Series

a. High quality, high precision, and elimination of labor.
b. High rigidity and high precision for implementing stable travel precision for a long time.
c. Excellent wear resistance and friction resistance that ensure a long life.
d. The face-to-face duplex structure just like the D/F combination of ball bearing, excellent at auto-adjusting and error-absorbing.
e. Various specifications for easy design.
f. Easy to use due to high compatibility of rail and block.

2. Spacer Chain Linear Motion Guide H...SSeries

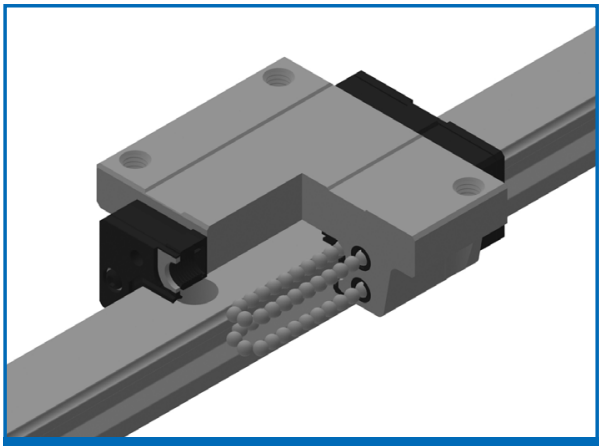
1) Structure of H...S Series

Like H Series, Linear Motion Guide H...S Series has the 4-direction equal load type and auto-adjusting face-to-face D/F structure. It uses a ball as a rolling element and has a spacer between balls to prevent them from colliding each other in rolling motion. Since it makes less noise and more stable circulating motion than a full-ball type, it is possible to implement quiet running at high speed. In addition, the spacer can serve as a pocket of a lubricant.

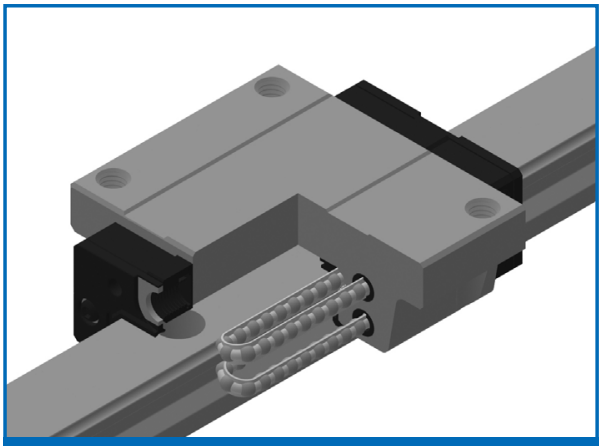
2) Features of H...S Series

a. As a spacer-incorporated type that improves frictional properties and prevents the collision of balls, the model not only allows stable circulating motion and smooth running but also reduces noise. By attach ing a special lubricating seal for a longer life span, it is possible to be free of maintenance.
b. Since a resin spacer is applied to the model, it is possible to prevent the collision of balls and the loss of oil film, and to generate less particles and dust.
c. High quality, high precision, and elimination of labor.
d. High rigidity and high precision for implementing stable travel precision for a long time.
e. Excellent wear resistance and friction resistance that ensure a long life.
f. The face-to-face duplex structure just like the D/F combination of ball bearing, excellent at auto-adjusting and error-absorbing.
g. Various specifications for easy design.
h. Easy to use due to high compatibility of rail and block.

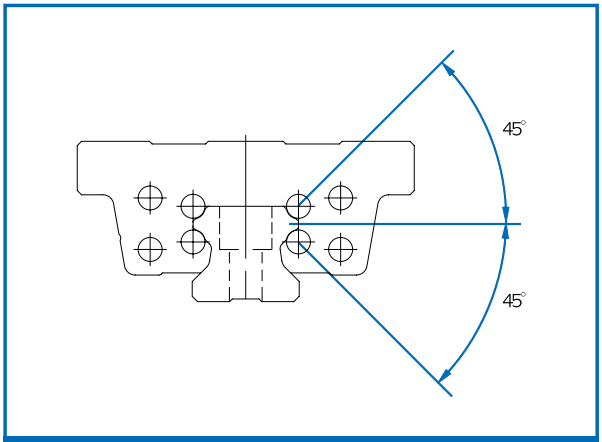
Linear Motion Guide H Series, H...S Series



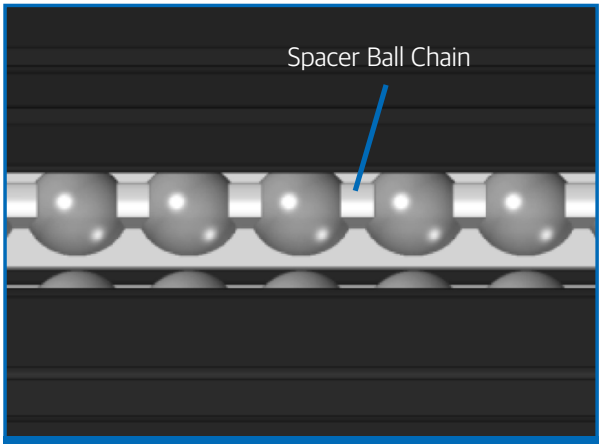
H Series (Full-ball Type)



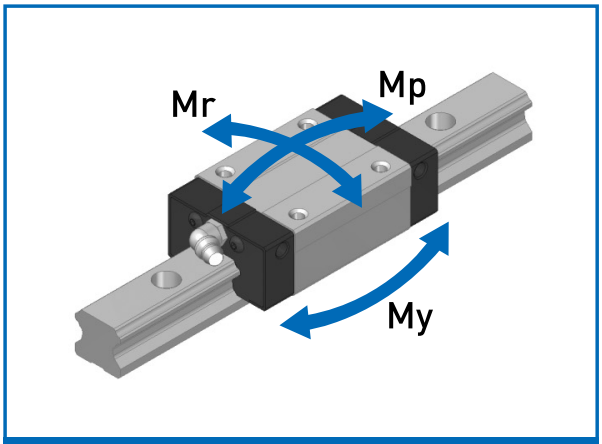
H...S Series (Spacer Chain Type)



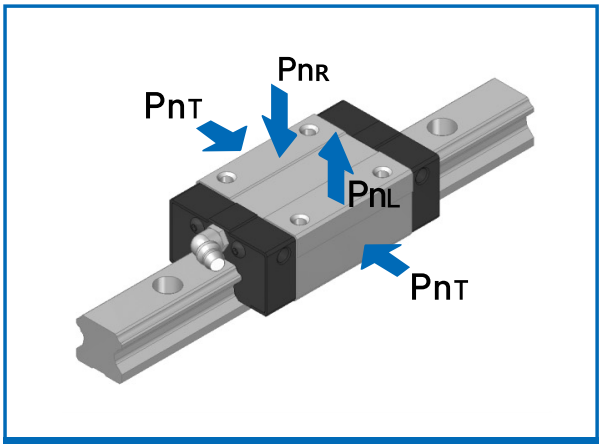
Cross Section



Details of Spacer of H...S Series

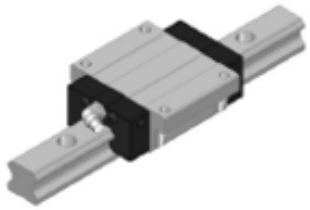
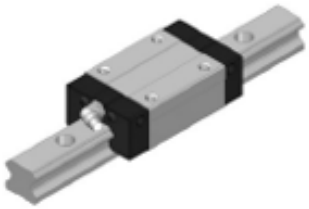
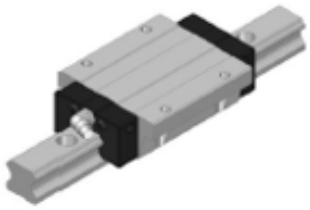
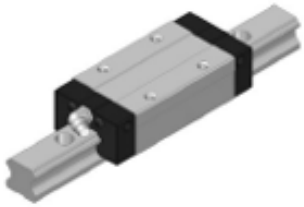
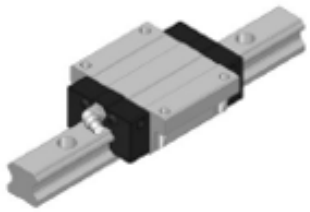
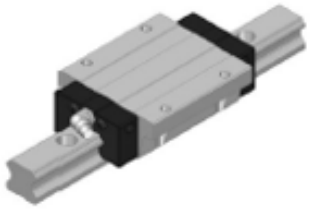


Moment Rigidity

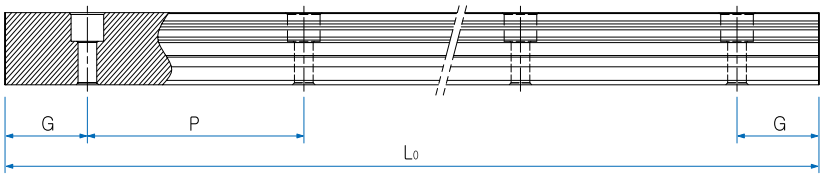


Radial Rigidity

Types and Features

Type	Shape & Feature	Type	Shape & Feature
H-FN H-FN...S	 • A general type with tap-machined on the block flange and can be mounted in both up and down directions.	H-RN H-RN...S	 • A compact type with tap-machined on top and minimal block width(W).
H-FL H-FL...S	 • The same cross section as in H-FN series; increased the rated load by lengthening the length(L1) of the block.	H-RL H-RL...S	 • The same cross section as in H-RN series; increased the rated load by lengthening the length(L1) of the block.
H-FNA H-FNA...S	 • A advantage type downward bolting by reducing the thickness of the flange over the H-FN series		• The model number with ...S is the spacer ball chain type
H-FLA H-FLA...S	 • The same cross section as in H-FNA series; increased the rated load by lengthening the length(L1) of the block		

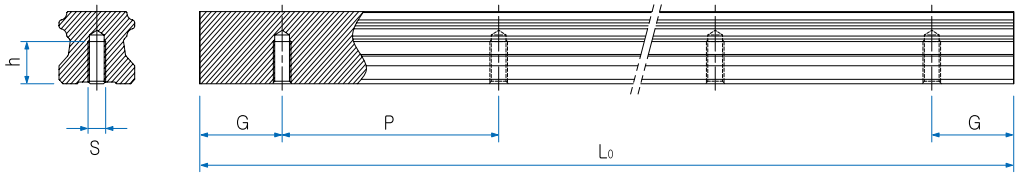
Standard and maximum lengths of a rail



Unit : mm

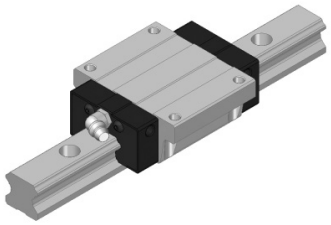
Model No.	H15	H20	H25	H30	H35	H45	H55
Standard length	160	160	220	280	440	570	780
	220	220	280	360	520	675	900
	280	280	340	440	600	780	100
	⋮	340	400	520	680	885	⋮
	1360	⋮	460	600	760	⋮	2820
	1480	1960	⋮	⋮	⋮	2880	2940
	1600	2080	2200	2520	2680	2985	3060
		2200	2320	2680	2840	3090	
			2440	2840	3000		
				3000			
Standard pitch P	60	60	60	80	80	105	120
G	20	20	20	20	20	22.5	30
Max. length	4000						

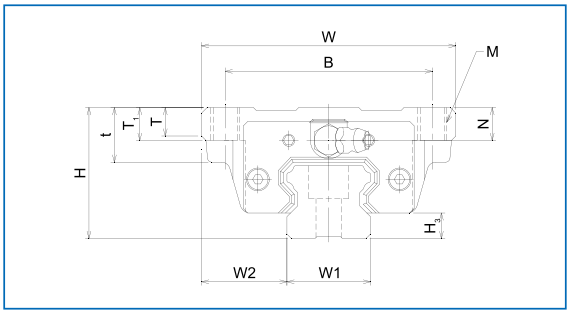
Standard tap hole type of a rail



Model No.	S	h(mm)
H15	M5	8
H20	M6	10
H25	M6	12
H30	M8	15
H35	M8	17
H45	M12	24
H55	M14	24

H-FN Series, H-FL...S Series





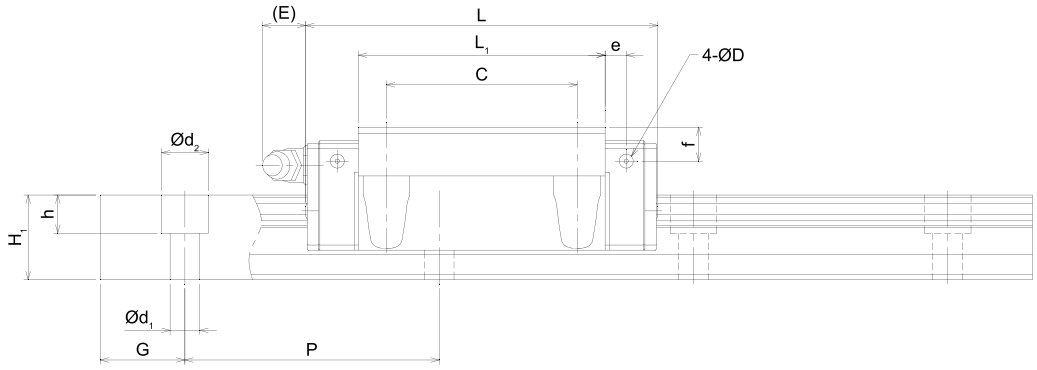
Model No.	External dimensions			Dimensions of block													H3
	Height H	Width W	Length L	B	C	M	L1	t	T	T1	N	E	f	e	D	Grease nipple	
H 15FN	24	47	56.5	38	30	M5	40.8	-	7	11	6	4.7	3.7	3.25	3.3	A-M5	4.5
H 15FL	24	47	64.8	38	30	M5	49.1	-	7	11	6	4.7	3.7	3.25	3.3	A-M5	4.5
H 20FN	30	63	73.2	53	40	M6	53.1	-	9.2	10	7.5	10.7	6.7	4.25	3.3	B-M6F	6.0
H 20FL	30	63	89.1	53	40	M6	69	-	9.2	10	7.5	10.7	6.7	4.25	3.3	B-M6F	6.0
H 25FN	36	70	83.2	57	45	M8	58.3	-	11.5	16	9	10.2	8	5	3.3	B-M6F	7.0
H 25FL	36	70	103.1	57	45	M8	78.2	-	11.5	16	9	10.2	8	5	3.3	B-M6F	7.0
H 30FN	42	90	99.3	72	52	M10	70.8	-	9.5	18	7.3	9.8	5	5.8	5.2	B-M6F	7.5
H 30FL	42	90	121.5	72	52	M10	93	-	9.5	18	7.3	9.8	5	5.8	5.2	B-M6F	7.5
H 35FN	48	100	111.8	82	62	M10	80.8	-	12.5	21	8	9.7	6.5	6.5	5.2	B-M6F	9.0
H 35FL	48	100	137.2	82	62	M10	106.2	-	12.5	21	8	9.7	6.5	6.5	5.2	B-M6F	9.0
H 45FN	60	120	139.0	100	80	M12	101.9	25	13	15	10	16	8	8	3.3	B-PT1/8	10.0
H 45FL	60	120	170.8	100	80	M12	133.7	25	13	15	10	16	8	8	3.3	B-PT1/8	10.0
H 55FN	70	140	163.0	116	95	M14	117.5	29	19	17	11	16	8	9	3.3	B-PT1/8	13.0
H 55FL	70	140	201.1	116	95	M14	155.6	29	19	17	11	16	8	9	3.3	B-PT1/8	13.0

Composition of Model Name & Number

H35		FN		SS	2	G2		–	1000L		20/20		P		–	2
1	2	3	4	5	6	7	8		9	10	11	12	13	14		15

1. Model No. of Linear Motion Guide
2. Material of block : No symbol-Standard material / M-Stainless
3. Type of block : RN-Rectangular standard type / RL-Rectangular long type/ FN-Flange standard type / FL-Flange long type
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
8. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
9. Length of rail
10. Material of rail : No symbol-Standard material / M-Stainless
11. Size of G value: standard G value has no symbol
12. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
13. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
14. No symbol-Standard rail / E-special rail specification
15. Number of axes used in the same plane

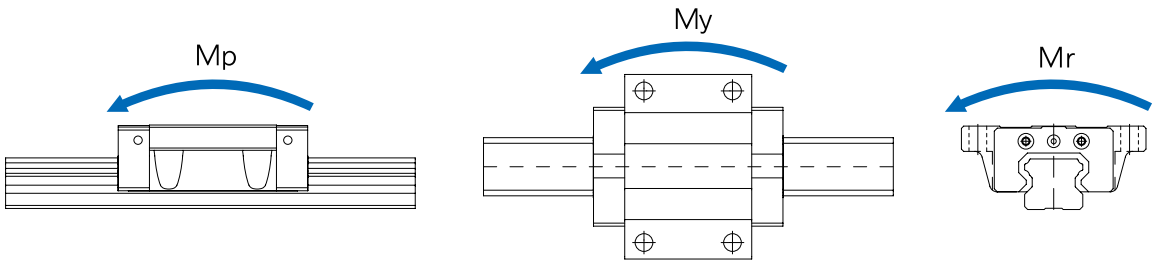
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 49. (*4) See Selection of Precision Class at page 20.



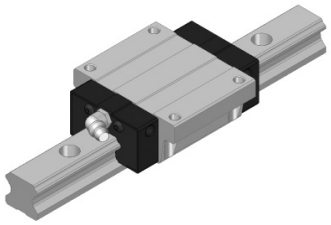
Unit : mm

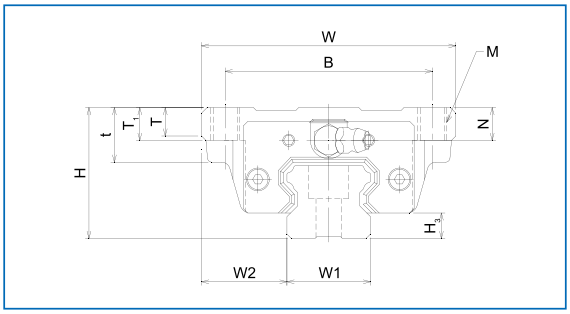
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1 x d2 x h	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	16	13	20	60	4.5x7.5x5.3	12.6	16.2	0.115	0.552	0.115	0.552	0.129	0.19	1.3
15	16	13	20	60	4.5x7.5x5.3	14.3	19.3	0.165	0.769	0.165	0.769	0.154	0.24	1.3
20	21.5	16.5	20	60	6x9.5x8.5	18.3	23.9	0.221	1.049	0.221	1.049	0.251	0.41	2.2
20	21.5	16.5	20	60	6x9.5x8.5	21.8	30.7	0.370	1.692	0.370	1.692	0.322	0.54	2.2
23	23.5	20	20	60	7x11x9	27.0	33.1	0.337	1.636	0.337	1.636	0.398	0.61	3.0
23	23.5	20	20	60	7x11x9	32.8	43.6	0.596	2.760	0.596	2.760	0.525	0.82	3.0
28	31	26	20	80	9x14x12	50.4	57.1	0.711	3.384	0.711	3.384	0.828	1.1	4.85
28	31	26	20	80	9x14x12	60.3	73.6	1.203	5.506	1.203	5.506	1.067	1.3	4.85
34	33	29	20	80	9x14x12	67.0	74.6	1.062	5.012	1.062	5.012	1.298	1.6	6.58
34	33	29	20	80	9x14x12	80.2	96.2	1.797	8.172	1.797	8.172	1.674	2.01	6.58
45	37.5	38	22.5	105	14x20x17	108.5	116.4	2.860	9.912	2.860	9.912	2.275	2.83	11.03
45	37.5	38	22.5	105	14x20x17	129.7	150.1	4.533	16.161	4.533	16.161	2.935	3.70	11.03
53	43.5	44	30	120	16x23x20	155.9	161.5	4.654	16.016	4.654	16.016	3.779	4.36	15.26
53	43.5	44	30	120	16x23x20	187.5	210.1	7.468	26.493	7.468	26.493	4.916	5.76	15.26

1N≒0.102kgf



H-FNASeries, H-FLA Series



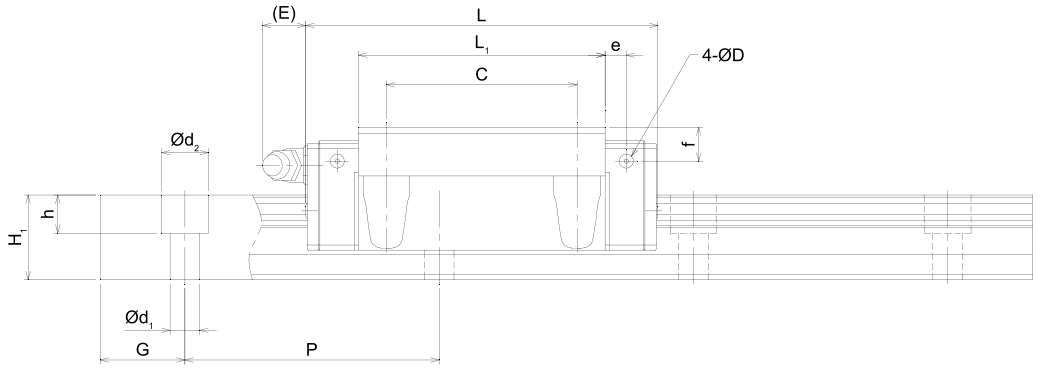


Model No.	External dimensions			Dimensions of block													H3
	Height H	Width W	Length L	B	C	M	L1	t	T	T1	N	E	f	e	D	Grease nipple	
H 15FNA	24	47	56.5	38	30	M5	40.8	-	7	7	6	4.7	3.7	3.25	3.3	A-M5	4.5
H 15FLA	24	47	64.8	38	30	M5	49.1	-	7	7	6	4.7	3.7	3.25	3.3	A-M5	4.5
H 25FNA	36	70	83.2	57	45	M8	58.3	-	11.5	10	9	10.2	8	5	3.3	B-M6F	7.0
H 25FLA	36	70	103.1	57	45	M8	78.2	-	11.5	10	9	10.2	8	5	3.3	B-M6F	7.0
H 30FNA	42	90	99.3	72	52	M10	70.8	-	9.5	10	7.3	9.8	5	5.8	5.2	B-M6F	7.5
H 30FLA	42	90	121.5	72	52	M10	93	-	9.5	10	7.3	9.8	5	5.8	5.2	B-M6F	7.5
H 35FNA	48	100	111.8	82	62	M10	80.8	-	12.5	13	8	9.7	6.5	6.5	5.2	B-M6F	9.0
H 35FLA	48	100	137.2	82	62	M10	106.2	-	12.5	13	8	9.7	6.5	6.5	5.2	B-M6F	9.0

Composition of Model Name & Number

H35		FNA		SS	2	G2		–	1000L		20/20		P		–	2
1	2	3	4	5	6	7	8		9	10	11	12	13	14		15

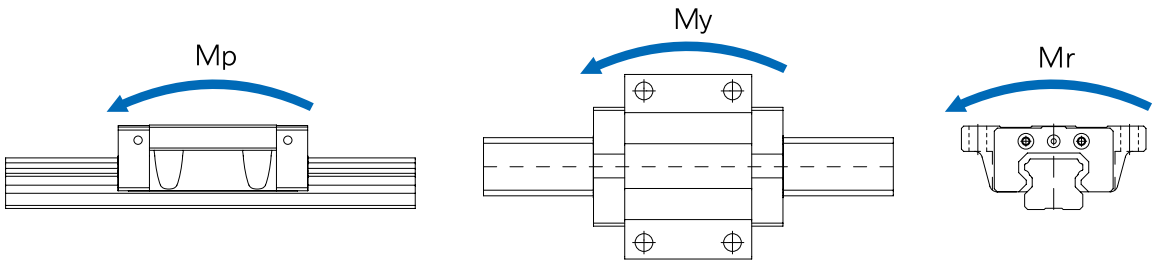
1. Model No. of Linear Motion Guide
2. Material of block
3. Type of block
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
8. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
9. Length of rail
10. Material of rail : No symbol-Standard material / M-Stainless
11. Size of G value: standard G value has no symbol
12. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
13. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
14. No symbol-Standard rail / E-special rail specification
15. Number of axes used in the same plane



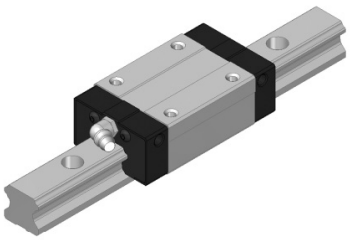
Unit : mm

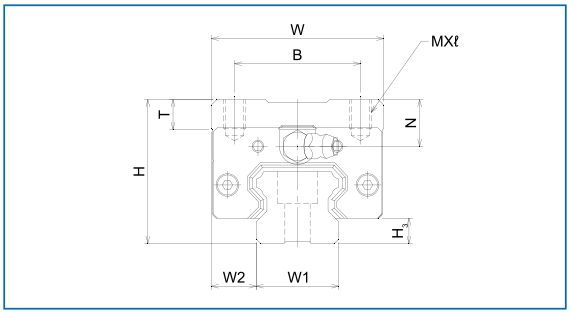
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1 x d2 x h	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	16	13	20	60	4.5x7.5x5.3	12.6	16.2	0.115	0.552	0.115	0.552	0.129	0.19	1.3
15	16	13	20	60	4.5x7.5x5.3	14.3	19.3	0.165	0.769	0.165	0.769	0.154	0.24	1.3
23	23.5	20	20	60	7x11x9	27.0	33.1	0.337	1.636	0.337	1.636	0.398	0.61	3.0
23	23.5	20	20	60	7x11x9	32.8	43.6	0.596	2.760	0.596	2.760	0.525	0.82	3.0
28	31	26	20	80	9x14x12	50.4	57.1	0.711	3.384	0.711	3.384	0.828	1.1	4.85
28	31	26	20	80	9x14x12	60.3	73.6	1.203	5.506	1.203	5.506	1.067	1.3	4.85
34	33	29	20	80	9x14x12	67.0	74.6	1.062	5.012	1.062	5.012	1.298	1.6	6.58
34	33	29	20	80	9x14x12	80.2	96.2	1.797	8.172	1.797	8.172	1.674	2.01	6.58

1N≒0.102kgf



H-RN Series, H-RL Series





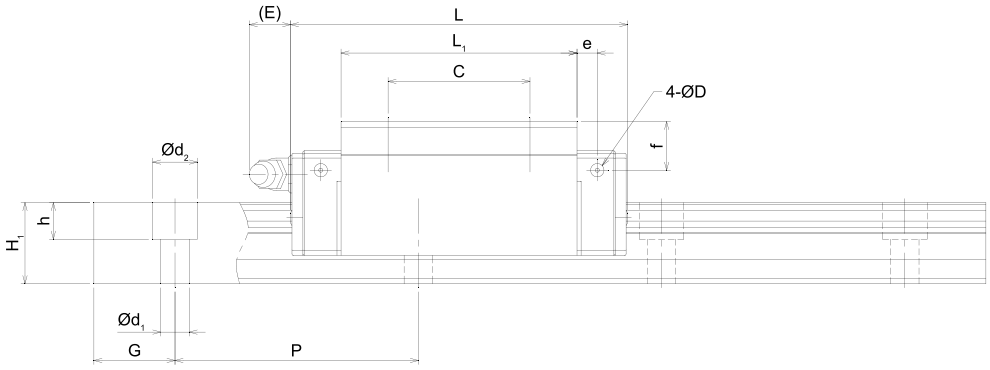
Model No.	External dimensions			Dimensions of block											H3
	Height H	Width W	Length L	B	C	M x ℓ	L1	T	N	E	f	e	D	Grease nipple	
H15RN	28	34	56.5	26	26	M4 x 5	40.8	6	10	4.7	7.7	3.25	3.3	A-M5	4.5
H15RL	28	34	64.8	26	26	M4 x 5	49.1	6	10	4.7	7.7	3.25	3.3	A-M5	4.5
H20RN	30	44	73.2	32	36	M5 x 6	53.1	8	7.5	10.7	6.7	4.25	3.3	B-M6F	6.0
H20RL	30	44	89.1	32	50	M5 x 6	69	8	7.5	10.7	6.7	4.25	3.3	B-M6F	6.0
H25RN	40	48	83.2	35	35	M6 x 8	58.3	8	13	10.2	12	5	3.3	B-M6F	7.0
H25RL	40	48	103.1	35	50	M6 x 8	78.2	8	13	10.2	12	5	3.3	B-M6F	7.0
H30RN	45	60	99.3	40	40	M8 x 10	70.8	8	10.3	9.8	8	5.8	5.2	B-M6F	7.5
H30RL	45	60	121.5	40	60	M8 x 10	93	8	10.3	9.8	8	5.8	5.2	B-M6F	7.5
H35RN	55	70	111.8	50	50	M8 x 12	80.8	10	15	9.7	13.5	6.5	5.2	B-M6F	9.0
H35RL	55	70	137.2	50	72	M8 x 12	106.2	10	15	9.7	13.5	6.5	5.2	B-M6F	9.0
H45RN	70	86	139.0	60	60	M10 x 17	101.9	15	20	16	18	8	3.3	B-PT1/8	10.0
H45RL	70	86	170.8	60	80	M10 x 17	133.7	15	20	16	18	8	3.3	B-PT1/8	10.0
H55RN	80	100	163.0	75	75	M12 x 18	117.5	18	21	16	18	9	3.3	B-PT1/8	13.0
H55RL	80	100	201.1	75	95	M12 x 18	155.6	18	21	16	18	9	3.3	B-PT1/8	13.0

Composition of Model Name & Number

H35		RN		SS	2	G2		–	1000L		20/20		P		–	2
1	2	3	4	5	6	7	8		9	10	11	12	13	14		15

1. Model No. of Linear Motion Guide
2. Material of block : No symbol-Standard material / M-Stainless
3. Type of block : RN-Rectangular standard type / RL-Rectangular long type/ FN-Flange standard type / FL-Flange long type
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
8. Material of end plate : No symbol – Standard material / I – Stainless / N – Aluminum
9. Length of rail
10. Material of rail : No symbol-Standard material / M-Stainless
11. Size of G value: standard G value has no symbol
12. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
13. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
14. No symbol-Standard rail / E-special rail specification
15. Number of axes used in the same plane

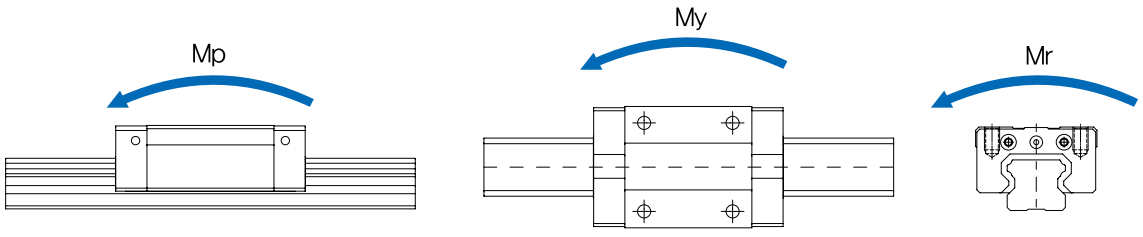
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 49. (*4) See Selection of Precision Class at page 20.



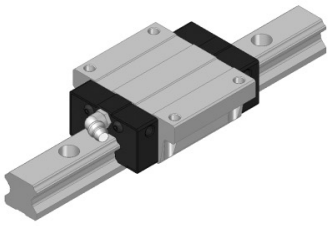
Unit : mm

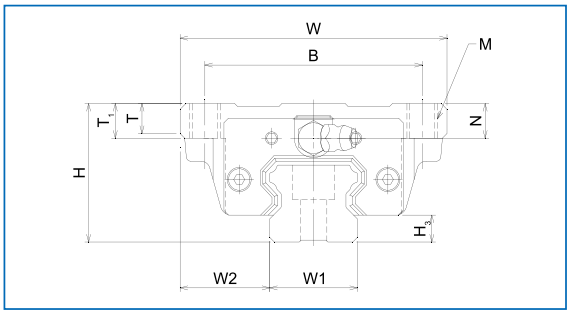
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1 x d2 x h	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	9.5	13	20	60	4.5x7.5x5.3	12.6	16.2	0.115	0.552	0.115	0.552	0.129	0.18	1.3
15	9.5	13	20	60	4.5xx7.5x5.3	14.3	19.3	0.165	0.769	0.165	0.769	0.154	0.23	1.3
20	12	16.5	20	60	6x9.5x8.5	18.3	23.9	0.221	1.049	0.221	1.049	0.251	0.31	2.2
20	12	16.5	20	60	6x9.5x8.5	21.8	30.7	0.370	1.692	0.370	1.692	0.322	0.41	2.2
23	12.5	20	20	60	7x11x9	27.0	33.1	0.337	1.636	0.337	1.636	0.398	0.53	3.0
23	12.5	20	20	60	7x11x9	32.8	43.6	0.596	2.760	0.596	2.760	0.525	0.71	3.0
28	16	26	20	80	9x14x12	50.4	57.1	0.711	3.384	0.711	3.384	0.828	0.9	4.85
28	16	26	20	80	9x14x12	60.3	73.6	1.203	5.506	1.203	5.506	1.067	1.1	4.85
34	18	29	20	80	9x14x12	67.0	74.6	1.062	5.012	1.062	5.012	1.298	1.5	6.58
34	18	29	20	80	9x14x12	80.2	96.2	1.797	8.172	1.797	8.172	1.674	2.01	6.58
45	20.5	38	22.5	105	14x20x17	108.5	116.4	2.860	9.912	2.860	9.912	2.275	2.89	11.03
45	20.5	38	22.5	105	14x20x17	129.7	150.1	4.533	16.161	4.533	16.161	2.935	3.74	11.03
53	23.5	44	30	120	16x23x20	155.9	161.5	4.654	16.016	4.654	16.016	3.779	4.28	15.26
53	23.5	44	30	120	16x23x20	187.5	210.1	7.468	26.493	7.468	26.493	4.916	5.59	15.26

1N≒0.102kgf



H-FN...S Series, H-FL...S Series





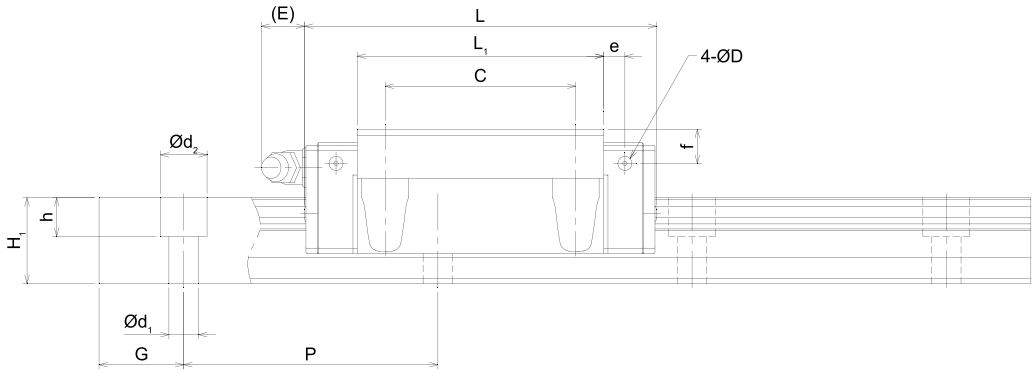
Model No.	External dimensions			Dimensions of block												H_3
	Height H	Width W	Length L	B	C	M	L_1	T	T_1	N	E	f	e	D	Grease nipple	
H15FN...S	24	47	56.5	38	30	M5	40.8	7	11	6.0	4.7	3.7	3.25	3.3	A-M5	4.5
H15FL...S	24	47	64.8	38	30	M5	49.1	7	11	6.0	4.7	3.7	3.25	3.3	A-M5	4.5
H20FN...S	30	63	73.2	53	40	M6	53.1	9.2	10	7.5	10.7	6.7	4.25	3.3	B-M6F	6.0
H20FL...S	30	63	89.1	53	40	M6	69.0	9.2	10	7.5	10.7	6.7	4.25	3.3	B-M6F	6.0
H25FN...S	36	70	83.2	57	45	M8	58.3	11.5	16	9.0	10.2	8	5	3.3	B-M6F	7.0
H25FL...S	36	70	103.1	57	45	M8	78.2	11.5	16	9.0	10.2	8	5	3.3	B-M6F	7.0
H30FN...S	42	90	99.3	72	52	M10	70.8	9.5	18	7.3	9.8	5	5.8	5.2	B-M6F	7.5
H30FL...S	42	90	121.5	72	52	M10	93.0	9.5	18	7.3	9.8	5	5.8	5.2	B-M6F	7.5
H35FN...S	48	100	111.8	82	62	M10	80.8	12.5	21	8.0	9.7	6.5	6.5	5.2	B-M6F	9.0
H35FL...S	48	100	137.2	82	62	M10	106.2	12.5	21	8.0	9.7	6.5	6.5	5.2	B-M6F	9.0

Composition of Model Name & Number

H35	☐	FN	☐	SS	2	S	G_2	☐	–	1000L	☐	20/20	☐	P	☐	–	2
1	2	3	4	5	6	7	8	9		10	11	12	13	14	15		16

1. Model No.
2. Material of block : No symbol-Standard material / M-Stainless
3. Type of block : RN-Rectangular standard type / RL-Rectangular long type/ FN-Flange standard type / FL-Flange long type
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LFseal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. S-Spacer chain type
8. Symbol of clearance : No symbol-Normal preload / G_1-Light preload / G_2-Heavy preload / Gs-Special preload (*2)
9. Material of end plate : No symbol – Standard material / I – Stainless / N – Aluminum
10. Length of rail
11. Material of rail : No symbol-Standard material / M-Stainless
12. Size of G value: standard G value has no symbol
13. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
14. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
15. No symbol-Standard rail / E-special rail specification
16. Number of axes used in the same plane

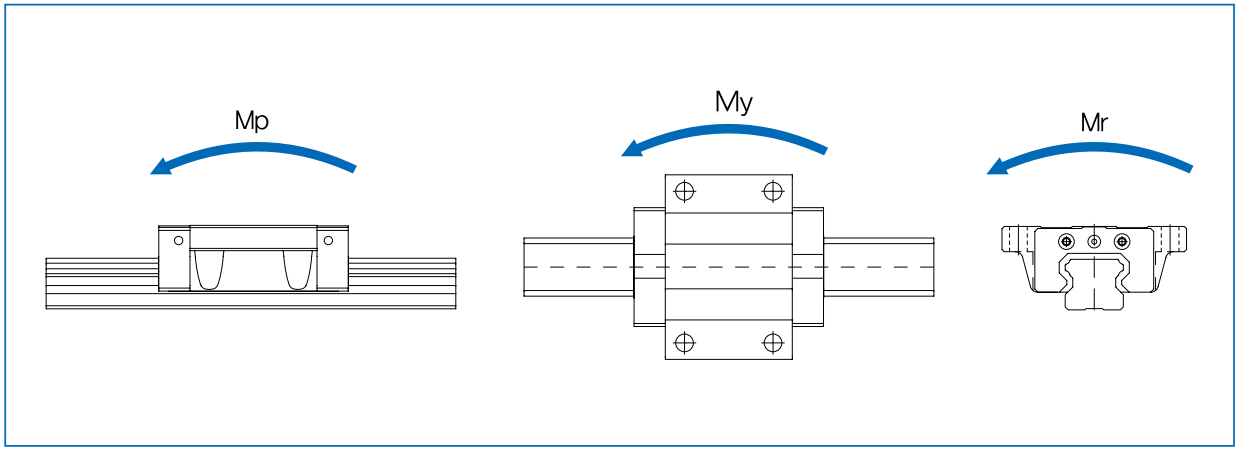
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 49. (*4) See Selection of Precision Class at page 20.



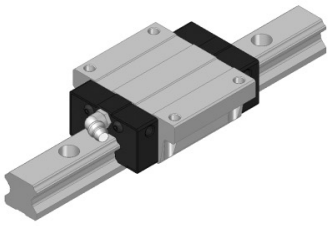
Unit : mm

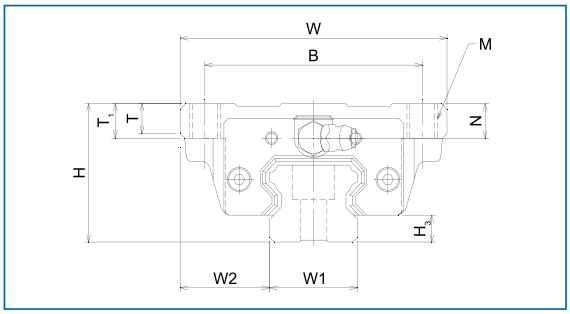
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	16	13	20	60	4.5x7.5x5.3	12.1	16.2	0.115	0.552	0.115	0.552	0.129	0.19	1.3
15	16	13	20	60	4.5x7.5x5.3	13.7	19.3	0.165	0.769	0.165	0.769	0.154	0.24	1.3
20	21.5	16.5	20	60	6x9.5x8.5	17.6	23.9	0.221	1.049	0.221	1.049	0.251	0.41	2.2
20	21.5	16.5	20	60	6x9.5x8.5	21.1	30.7	0.370	1.692	0.370	1.692	0.322	0.54	2.2
23	23.5	20	20	60	7x11x9	25.8	33.1	0.337	1.636	0.337	1.636	0.398	0.61	3.0
23	23.5	20	20	60	7x11x9	31.7	43.6	0.596	2.760	0.596	2.760	0.525	0.82	3.0
28	31	26	20	80	9x14x12	48	57.1	0.711	3.384	0.711	3.384	0.828	1.1	4.85
28	31	26	20	80	9x14x12	58	73.6	1.203	5.506	1.203	5.506	1.067	1.3	4.85
34	33	29	20	80	9x14x12	63.7	74.6	1.062	5.012	1.062	5.012	1.298	1.6	6.58
34	33	29	20	80	9x14x12	77.1	96.2	1.797	8.172	1.797	8.172	1.674	2.01	6.58

1N≒0.102kgf



H-FNA...S Series, H-FLA...S Series





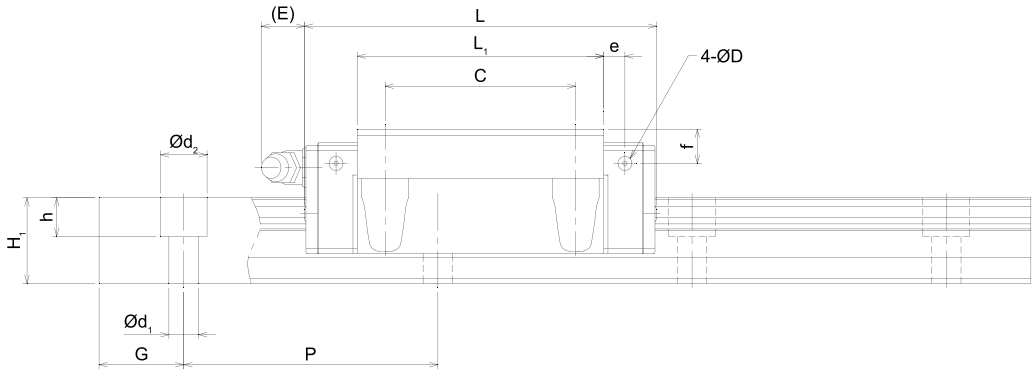
Model No.	External dimensions			Dimensions of block												H_3
	Height H	Width W	Length L	B	C	M	L_1	T	T_1	N	E	f	e	D	Grease nipple	
H15FNA...S	24	47	56.5	38	30	M5	40.8	7	7	6.0	4.7	3.7	3.25	3.3	A-M5	4.5
H15FLA...S	24	47	64.8	38	30	M5	49.1	7	7	6.0	4.7	3.7	3.25	3.3	A-M5	4.5
H25FNA...S	36	70	83.2	57	45	M8	58.3	11.5	10	9.0	10.2	8	5	3.3	B-M6F	7.0
H25FLA...S	36	70	103.1	57	45	M8	78.2	11.5	10	9.0	10.2	8	5	3.3	B-M6F	7.0
H30FNA...S	42	90	99.3	72	52	M10	70.8	9.5	10	7.3	9.8	5	5.8	5.2	B-M6F	7.5
H30FLA...S	42	90	121.5	72	52	M10	93.0	9.5	10	7.3	9.8	5	5.8	5.2	B-M6F	7.5
H35FNA...S	48	100	111.8	82	62	M10	80.8	12.5	13	8.0	9.7	6.5	6.5	5.2	B-M6F	9.0
H35FLA...S	48	100	137.2	82	62	M10	106.2	12.5	13	8.0	9.7	6.5	6.5	5.2	B-M6F	9.0

Composition of Model Name & Number

H35	□	FNA	□	SS	2	S	G_2	□	–	1000L	□	20/20	□	P	□	–	2
1	2	3	4	5	6	7	8	9		10	11	12	13	14	15		16

1. Model No.
2. Material of block
3. Type of block
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LFseal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. S-Spacer chain type
8. Symbol of clearance : No symbol-Normal preload / G_1-Light preload / G_2-Heavy preload / Gs-Special preload (*2)
9. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
10. Length of rail
11. Material of rail : No symbol-Standard material / M-Stainless
12. Size of G value: standard G value has no symbol
13. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
14. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
15. No symbol-Standard rail / E-special rail specification
16. Number of axes used in the same plane

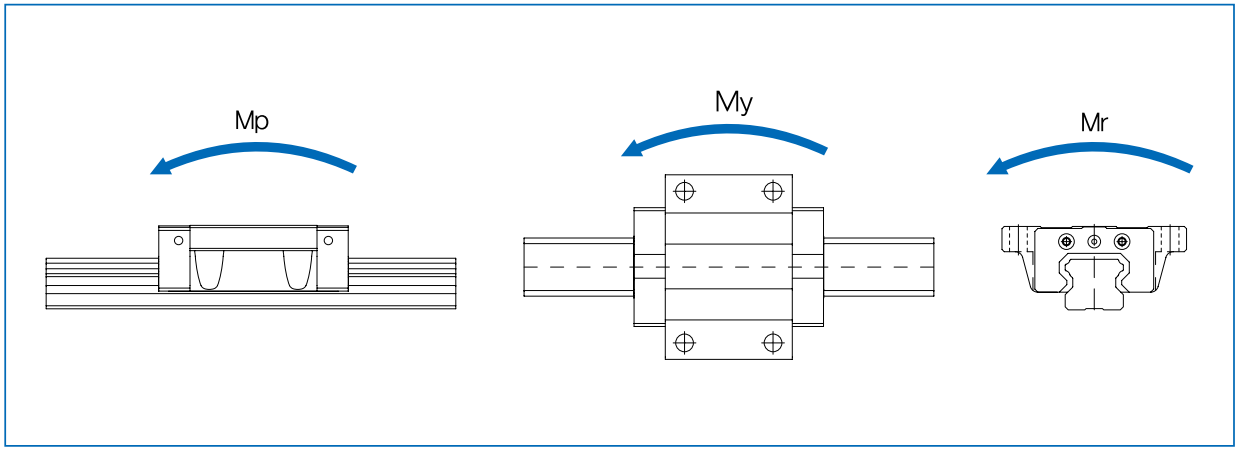
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 49. (*4) See Selection of Precision Class at page 20.



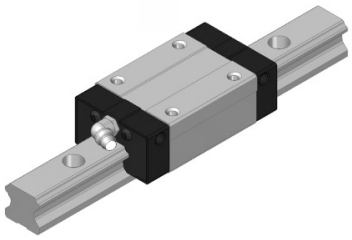
Unit : mm

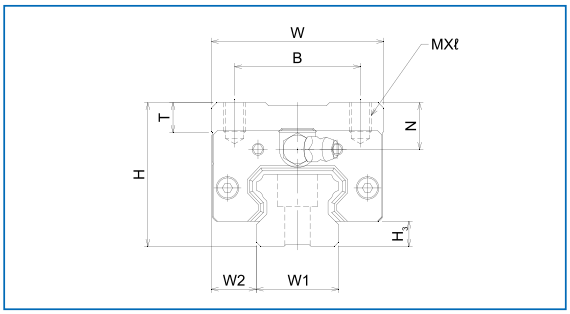
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	16	13	20	60	4.5x7.5x5.3	12.1	16.2	0.115	0.552	0.115	0.552	0.129	0.19	1.3
15	16	13	20	60	4.5x7.5x5.3	13.7	19.3	0.165	0.769	0.165	0.769	0.154	0.24	1.3
23	23.5	20	20	60	7x11x9	25.8	33.1	0.337	1.636	0.337	1.636	0.398	0.61	3.0
23	23.5	20	20	60	7x11x9	31.7	43.6	0.596	2.760	0.596	2.760	0.525	0.82	3.0
28	31	26	20	80	9x14x12	48	57.1	0.711	3.384	0.711	3.384	0.828	1.1	4.85
28	31	26	20	80	9x14x12	58	73.6	1.203	5.506	1.203	5.506	1.067	1.3	4.85
34	33	29	20	80	9x14x12	63.7	74.6	1.062	5.012	1.062	5.012	1.298	1.6	6.58
34	33	29	20	80	9x14x12	77.1	96.2	1.797	8.172	1.797	8.172	1.674	2.01	6.58

1N≒0.102kgf



H-RN...S Series, H-RL...S Series





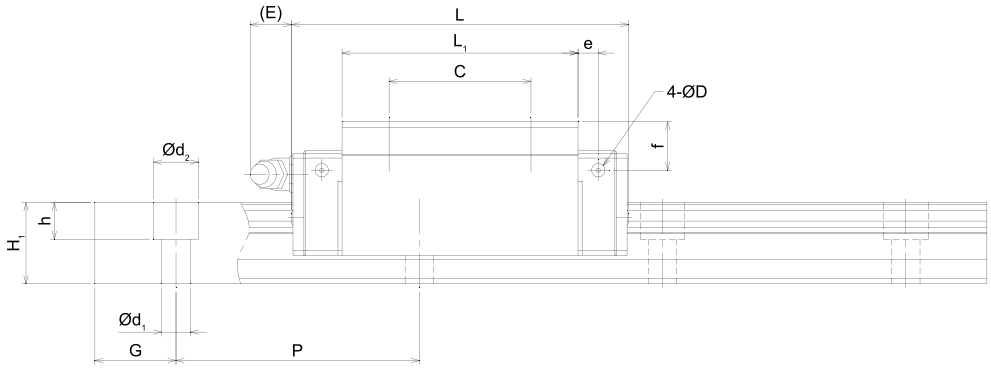
Model No.	External dimensions			Dimensions of block											H3
	Height H	Width W	Length L	B	C	M×ℓ	L1	T	N	E	f	e	D	Grease nipple	
H 15RN...S	28	34	56.5	26	26	M4 x 5	40.8	6	10	4.7	7.7	3.25	3.3	A-M5	4.5
H 15RL...S	28	34	64.8	26	26	M4 x 5	49.1	6	10	4.7	7.7	3.25	3.3	A-M5	4.5
H 20RN...S	30	44	73.2	32	36	M5 x 6	53.1	8	7.5	10.7	6.7	4.25	3.3	B-M6F	6.0
H 20RL...S	30	44	89.1	32	50	M5 x 6	69	8	7.5	10.7	6.7	4.25	3.3	B-M6F	6.0
H 25RN...S	40	48	83.2	35	35	M6 x 8	58.3	8	13	10.2	12	5	3.3	B-M6F	7.0
H 25RL...S	40	48	103.1	35	50	M6 x 8	78.2	8	13	10.2	12	5	3.3	B-M6F	7.0
H 30RN...S	45	60	99.3	40	40	M8 x 10	70.8	8	10.3	9.8	8	5.8	5.2	B-M6F	7.5
H 30RL...S	45	60	121.5	40	60	M8 x 10	93	8	10.3	9.8	8	5.8	5.2	B-M6F	7.5
H 35RN...S	55	70	111.8	50	50	M8 x 12	80.8	10	15	9.7	13.5	6.5	5.2	B-M6F	9.0
H 35RL...S	55	70	137.2	50	72	M8 x 12	106.2	10	15	9.7	13.5	6.5	5.2	B-M6F	9.0

Composition of Model Name & Number

H35		RN		SS	2	S	G2		–	1000L		20/20		P		–	2
1	2	3	4	5	6	7	8	9		10	11	12	13	14	15		16

1. Model No.
2. Material of block : No symbol-Standard material / M-Stainless
3. Type of block : RN-Rectangular standard type / RL-Rectangular long type/ FN-Flange standard type / FL-Flange long type
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. S-Spacer chain type
8. Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
9. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
10. Length of rail
11. Material of rail : No symbol-Standard material / M-Stainless
12. Size of G value: standard G value has no symbol
13. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
14. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
15. No symbol-Standard rail / E-special rail specification
16. Number of axes used in the same plane

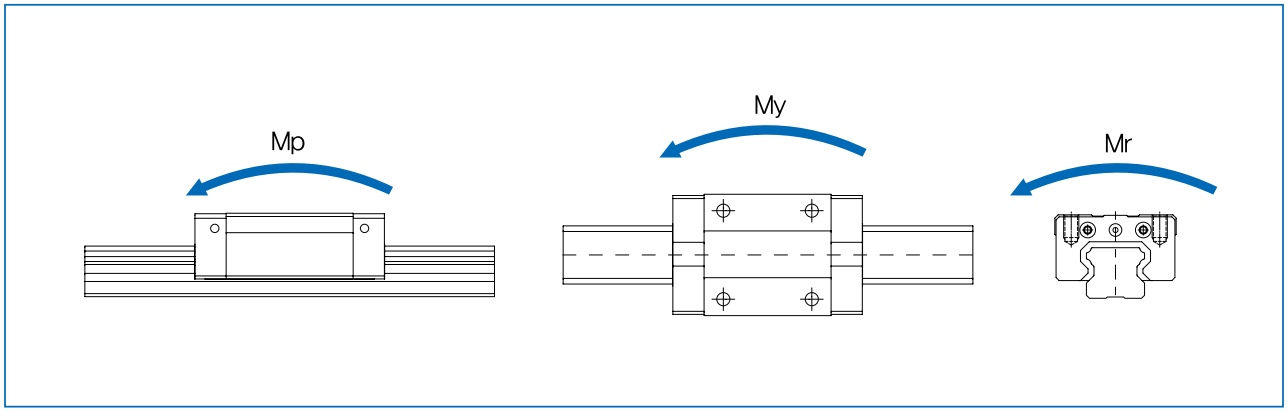
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 49. (*4) See Selection of Precision Class at page 20.



Unit : mm

Dimensions of rail						Basic load rating		Static allowance moment kN · m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	9.5	13	20	60	4.5x7.5x5.3	12.1	16.2	0.115	0.552	0.115	0.552	0.129	0.18	1.3
15	9.5	13	20	60	4.5x7.5x5.3	13.7	19.3	0.165	0.769	0.165	0.769	0.154	0.23	1.3
20	12	16.5	20	60	6x9.5x8.5	17.6	23.9	0.221	1.049	0.221	1.049	0.251	0.31	2.2
20	12	16.5	20	60	6x9.5x8.5	21.1	30.7	0.370	1.692	0.370	1.692	0.322	0.41	2.2
23	12.5	20	20	60	7x11x9	25.8	33.1	0.337	1.636	0.337	1.636	0.398	0.53	3.0
23	12.5	20	20	60	7x11x9	31.7	43.6	0.596	2.760	0.596	2.760	0.525	0.71	3.0
28	16	26	20	80	9x14x12	48	57.1	0.711	3.384	0.711	3.384	0.828	0.9	4.85
28	16	26	20	80	9x14x12	58	73.6	1.203	5.506	1.203	5.506	1.067	1.1	4.85
34	18	29	20	80	9x14x12	63.7	74.6	1.062	5.012	1.062	5.012	1.298	1.5	6.58
34	18	29	20	80	9x14x12	77.1	96.2	1.797	8.172	1.797	8.172	1.674	2.01	6.58

1N≒0.102kgf



3. Wide Linear Motion Guide HB Series

1) Structure of HB Series

WON Wide Linear Motion Guide HB Series has a four-row circular arc-groove structure in the raceway groove of a rail or block. In addition, it has a 4-direction equal load type in which it can bear equal load rating for vertical compression load, tensile load, and horizontal load as its ball as a rolling element is combined at 45 degree. Therefore, the model reduces friction resistance and ensures smooth motion and long life. Since the model has a wide and short rail, moment works only with one shaft in a narrow space. It is applicable to place that requires high rigidity.

2) Features of HB Series

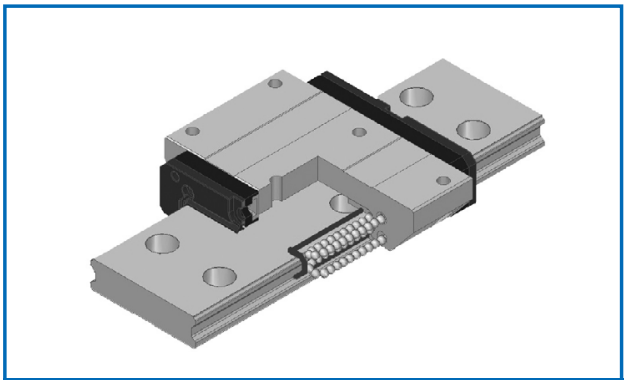
a. High quality, high precision, and elimination of labor.

b. High rigidity and high precision for implementing stable travel precision for a long time.

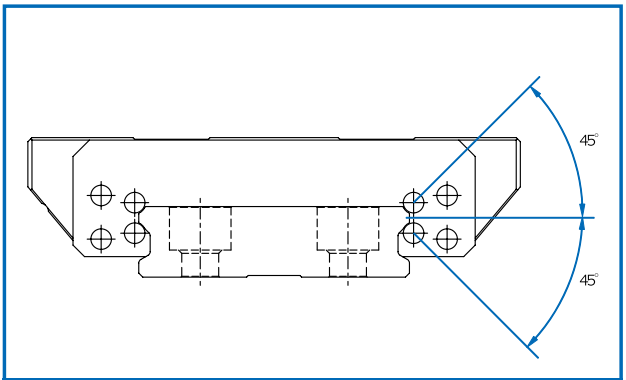
c. Excellent wear resistance and friction resistance that ensure a long life.

d. The face-to-face duplex structure just like the D/F combination of ball bearing, excellent at auto-adjusting and error-absorbing.

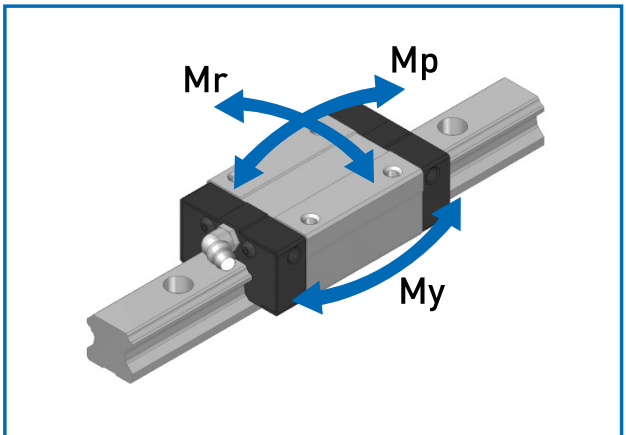
e. A higher quantity of balls than that of H Series; higher rigidity and wider rail; sufficient moment working only with one shaft



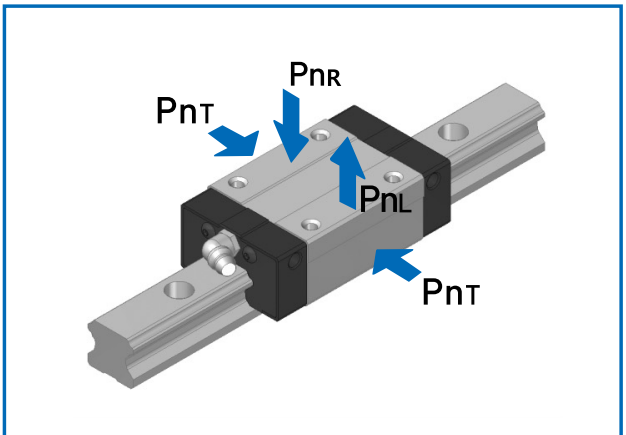
HB Series



Cross Section

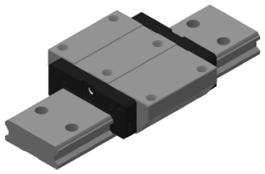
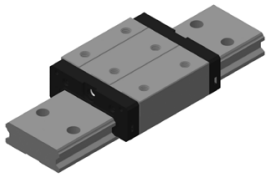


Moment Rigidity

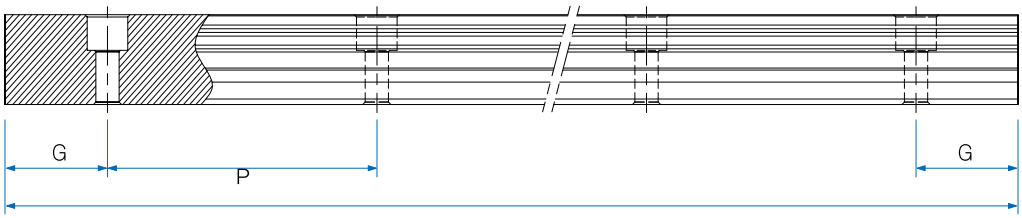


Radial Rigidity

Types and Features

Category	Type	Shape & Feature		
Flange type	HB-F		• A general type with the tap-proce ssed flange of a block, supporting installation from bottom to top and from top to bottom • 4-direction equal load type with high rigidity and high load	Electric spark machine Loader CNC lathe Industrial robot Semiconductor display manufacturing equipment Measuring equipmentWafer transfer equipment Construction equipment Railway vehicle
Compact type	HB-R		• A compact type with the tap-proc essed top of a block and without flange • 4-direction equal load type with high rigidity and high load	

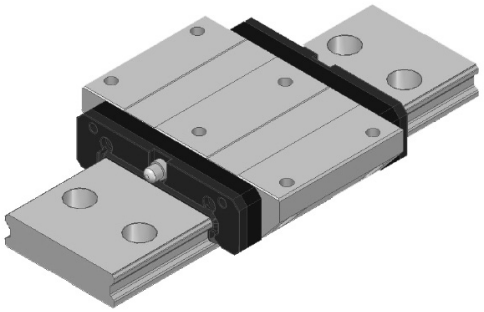
Standard and maximum lengths of rail

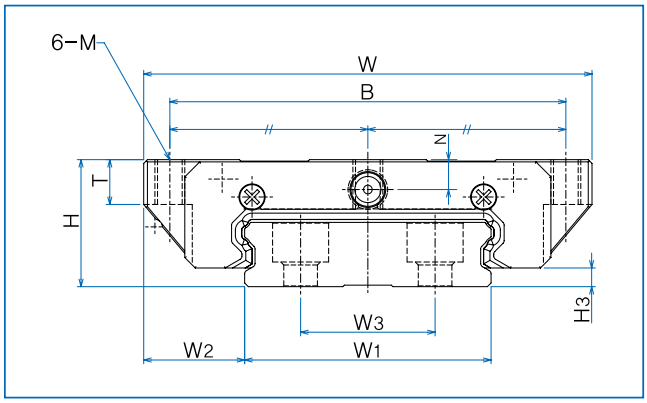


Unit : mm

Model No.	HB17	HB21	HB27	HB35
Standard length	110	130	160	280
	230	230	280	440
	350	380	400	680
	470	480	640	840
	550	530	880	1000
	⋮	⋮	⋮	⋮
	1990	1930	3820	3800
		1980	3880	3960
			3940	
Standard pitch P	40	50	60	80
G	15	15	20	20
Max. length	2000		4000	

HB-F Series





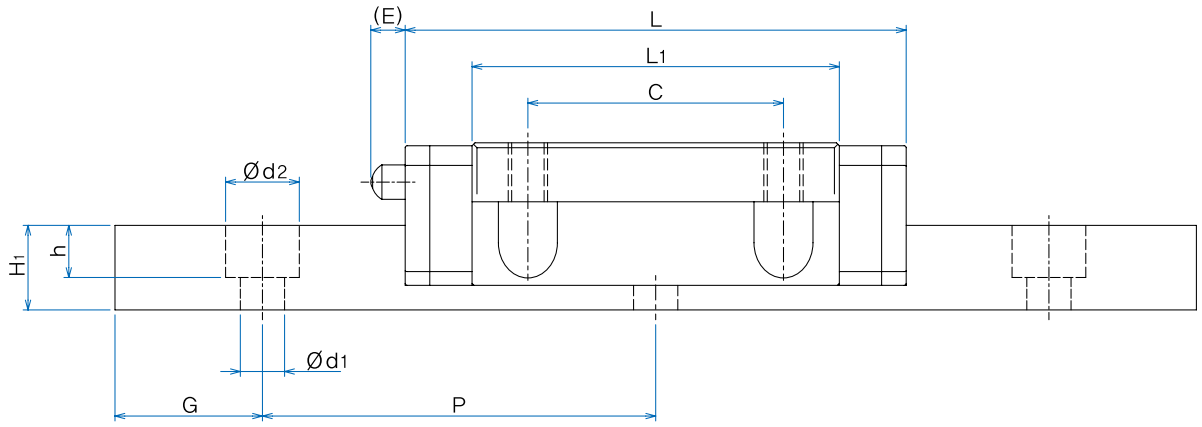
Model No.	External dimensions			Dimensions of block								H_3
	Height H	Width W	Length L	B	C	M	L_1	T	N	E	Grease nipple	
HB17F	17	60	51	53	26	M4	37.4	6	4	3.5	A-Ø3	2.5
HB21F	21	68	59	60	29	M5	45.4	8	5	3.5	A-Ø3	3.3
HB27F	27	80	72.5	70	40	M6	54.7	10	6	10.3	B-M6F	3.5
HB35F	35	120	105.3	107	60	M8	82.1	14	7.6	10.3	B-M6F	4

Composition of Model Name & Number

HB17	F		UU	2		G_2	—	1000L	20/20		P		—	2
1	2	3	4	5	6	7		8	9	10	11	12		13

1. Model No.
2. Type of block : F-Flange standard type / R-Rectangular standard type
3. No symbol-Standard block / E-Special block specification
4. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+ Inside seal / ZZ-End seal+ Inside seal+ Metal scraper/ UULF -End seal+ LF seal / SSLF-End seal+ Inside seal+ LF seal / ZZLF-End seal+ Inside seal+ Metal scraper + LF seal (*1)
5. Number of blocks assembled in one shaft
6. No symbol-Full ball type
7. Symbol of clearance : No symbol-Normal preload / G_1-Light preload / G_2-Heavy preload / G_S-Special preload (*2)
8. Length of rail
9. Size of G value: standard G value has no symbol
10. No symbol-Rail counterbore type (top assembly)
11. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*3)
12. No symbol-Standard rail / E-special rail specification
13. Number of axes used in the same plane

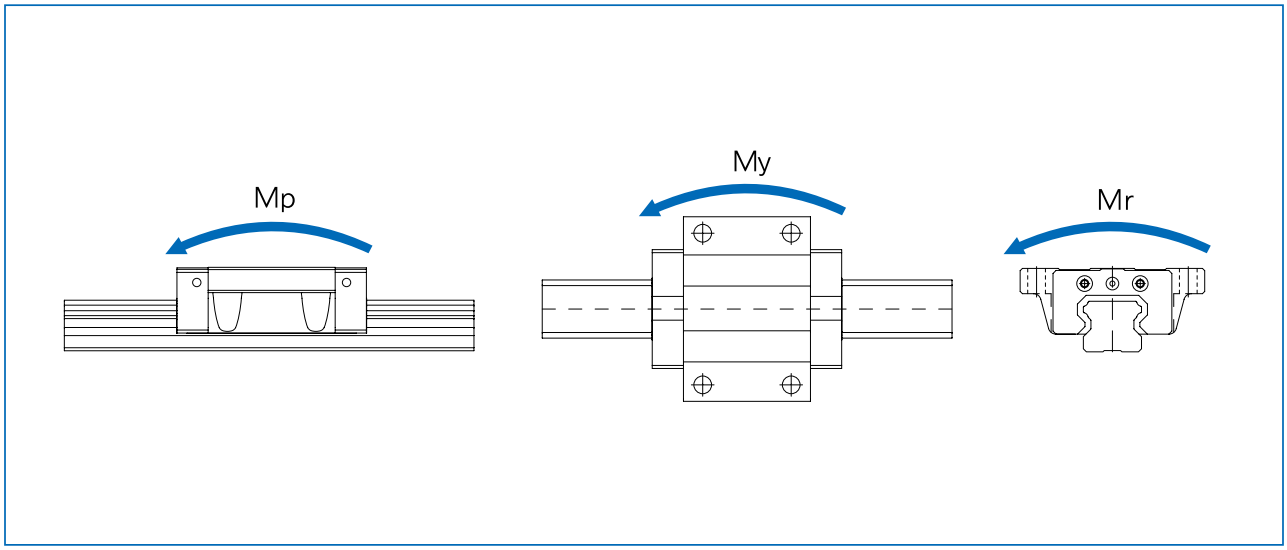
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Selection of Precision Class at page 20.



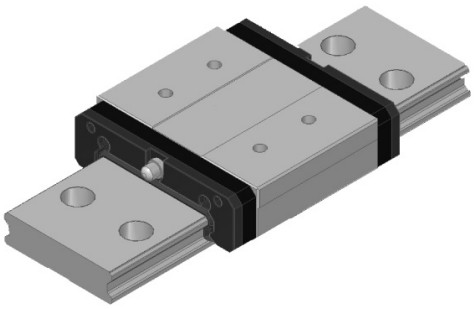
Unit : mm

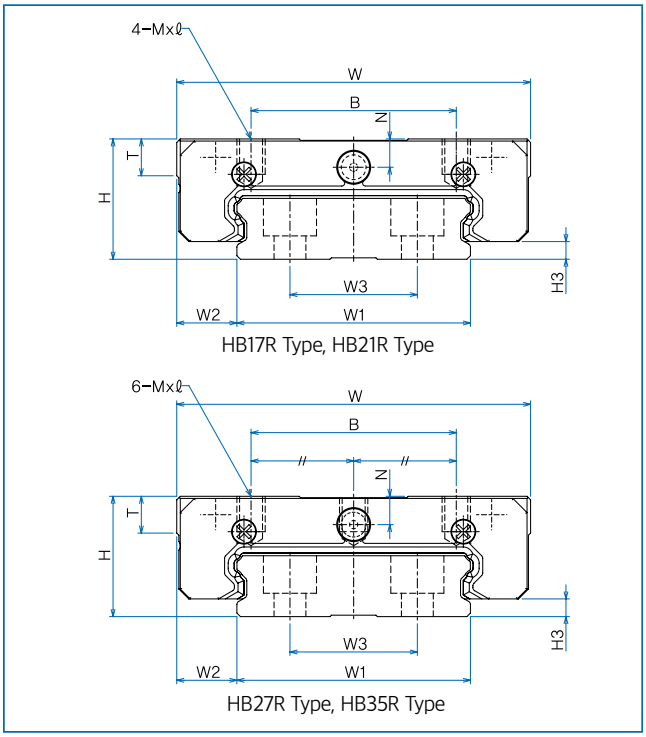
Dimensions of rail							Basic load rating		Static allowance moment kN·m					Mass	
Width W1 0 -0.05	W2	W3	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
									1 block	Double blocks	1 block	Double blocks	1 block		
33	13.5	18	8.6	15	40	4.5x7.5x5.3	7.3	12.2	0.081	0.381	0.081	0.381	0.205	0.15	1.9
37	15.5	22	11	15	50	4.5x7.5x5.3	8.4	14.8	0.119	0.547	0.119	0.547	0.278	0.24	2.9
42	19	24	15	20	60	4.5x7.5x5.3	15.3	24.8	0.239	1.114	0.239	1.114	0.527	0.47	4.5
69	25.5	40	19	20	80	7x11x9	33.9	53.2	0.773	3.528	0.773	3.528	1.851	1.40	9.6

1N≒0.102kgf



HB-R Series





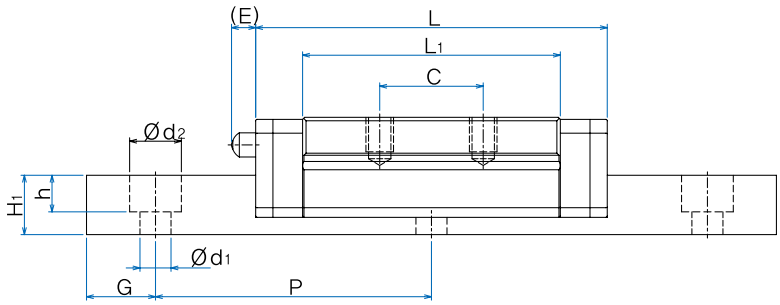
Model No.	External dimensions			Dimensions of block								H_3
	Height H	Width W	Length L	B	C	M X ℓ	L_1	T	N	E	Grease nipple	
HB17R	17	50	51	29	15	M4 X 5	37.4	5.2	4	3.5	A-Ø3	2.5
HB21R	21	54	59	31	19	M5 X 6	45.4	8	5	3.5	A-Ø3	3.3
HB27R	27	62	72.5	46	32	M6 X 6	54.7	10	6	10.3	B-M6F	3.5
HB35R	35	100	105.3	76	50	M8 X 8	82.1	14	7.6	10.3	B-M6F	4

Composition of Model Name & Number

HB17	R		UU	2		G_2	—	1000L	20/20		P		—	2
1	2	3	4	5	6	7		8	9	10	11	12		13

1. Model No.
2. Type of block : F-Flange standard type / R-Rectangular standard type
3. No symbol-Standard block / E-Special block specification
4. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+ Inside seal / ZZ-End seal+ Inside seal+ Metal scraper / UULF -End seal+ LF seal / SSLF-End seal+ Inside seal+ LF seal / ZZLF-End seal+ Inside seal+ Metal scraper+ LF seal (*1)
5. Number of blocks assembled in one shaft
6. No symbol-Full ball type
7. Symbol of clearance : No symbol-Normal preload / G_1-Light preload / G_2-Heavy preload / Gs-Special preload (*2)
8. Length of rail
9. Size of G value: standard G value has no symbol
10. No symbol-Rail counterbore type (top assembly)
11. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*3)
12. No symbol-Standard rail / E-special rail specification
13. Number of axes used in the same plane

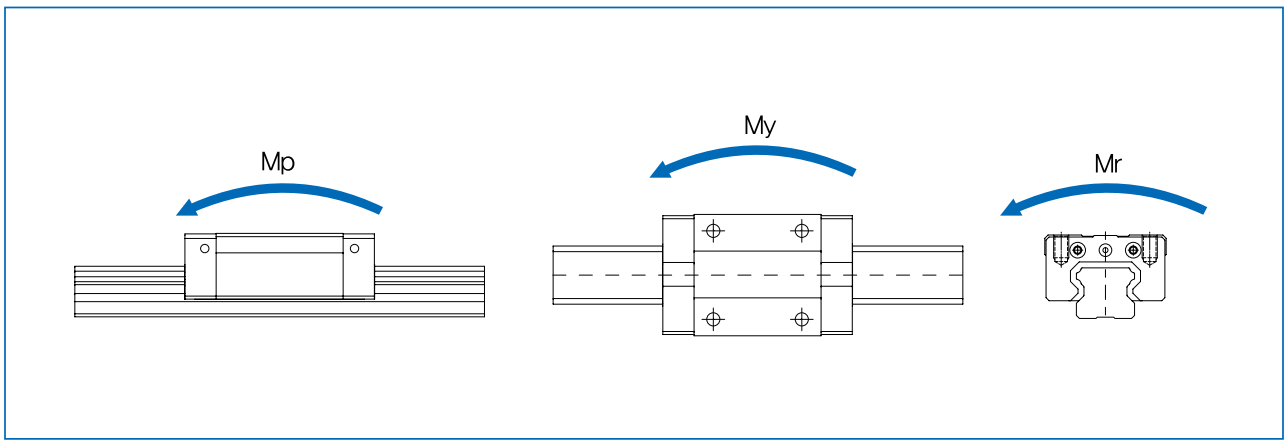
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Selection of Precision Class at page 20.



Unit : mm

Dimensions of rail							Basic load rating		Static allowance moment kN·m					Mass	
Width W1 0 -0.05	W2	W3	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
									1 block	Double blocks	1 block	Double blocks	1 block		
33	8.5	18	8.6	15	40	4.5x7.5x5.3	7.3	12.2	0.081	0.381	0.081	0.381	0.205	0.13	1.9
37	8.5	22	11	15	50	4.5x7.5x5.3	8.4	14.8	0.119	0.547	0.119	0.547	0.278	0.19	2.9
42	10	24	15	20	60	4.5x7.5x5.3	15.3	24.8	0.239	1.114	0.239	1.114	0.527	0.36	4.5
69	15.5	40	19	20	80	7x11x9	33.9	53.2	0.773	3.528	0.773	3.528	1.851	1.20	9.6

1N≒0.102kgf



4. Slim Linear Motion Guide S Series

1) Structure of S Series

Linear Motion Guide S Series has a four-row circular arc-groove structure and a 4-direction equal load type. It also has an auto-adjusting face-to-face D/F structure. Using a ball as a rolling element, the model is a slim-type guide with a low sectional height, high rigidity and less noise.

2) Features of S Series

a. High quality, high precision, and elimination of labor.
b. High rigidity and high precision for implementing stable travel precision for a long time.
c. Excellent wear resistance and friction resistance that ensure a long life.
d. The face-to-face duplex structure just like the D/F combination of ball bearing, excellent at auto-ad justing and error-absorbing.
e. Various specifications for easy design.
f. Easy to use due to high compatibility of rail and block.
g. 4-direction equal load and high-rigidity structure.
h. A slim shape suitable for horizontal motion, ensuring stable running.

5. Slim Spacer Chain Linear Motion Guide S...S Series

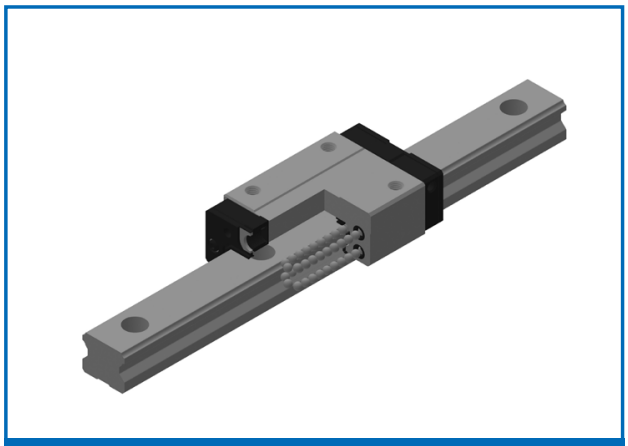
1) Structure of S...S Series

Like S Series, Linear Motion Guide S...S Series has the 4-direction equal load type and auto-adjusting face-to-face D/F structure. It uses a ball as a rolling element and has a spacer between balls to prevent them from colliding each other in rolling motion. Since it makes less noise and more stable circulating motion than a full-ball type, it is possible to implement quiet running at high speed. In addition, the spacer can serve as a pocket of a lubricant.

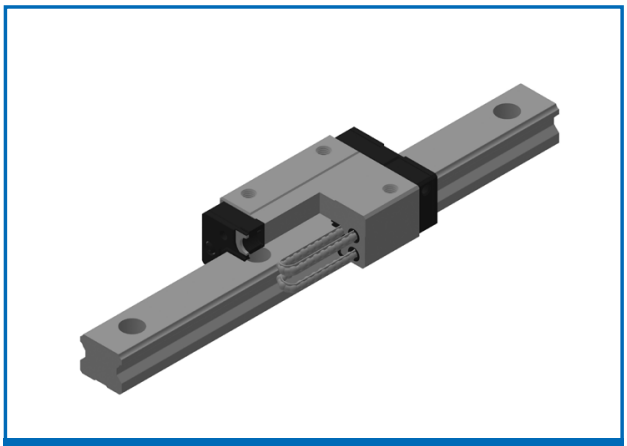
2) Features of S...S Series

a. As a spacer-incorporated type that improves frictional properties and prevents the collision of balls, the model not only allows stable circulating motion and smooth running but also reduces noise.
b. Since a resin spacer is applied to the model, it is possible to prevent the collision of balls and the loss of oil film, and to generate less particles and dust.
c. High quality, high precision, and elimination of labor.
d. High rigidity and high precision for implementing stable travel precision for a long time.
e. Excellent wear resistance and friction resistance that ensure a long life.
f. The face-to-face duplex structure just like the D/F combination of ball bearing, excellent at auto-ad justing and error-absorbing.
g. Various specifications for easy design.
h. Easy to use due to high compatibility of rail and block.

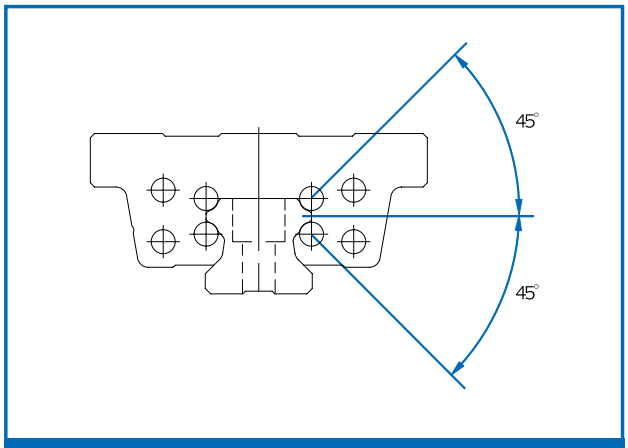
Slim Linear Motion Guide S, S...S Series



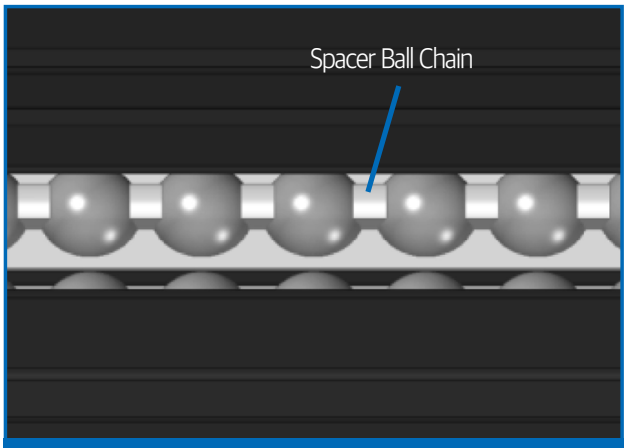
S Series (Full-ball Type)



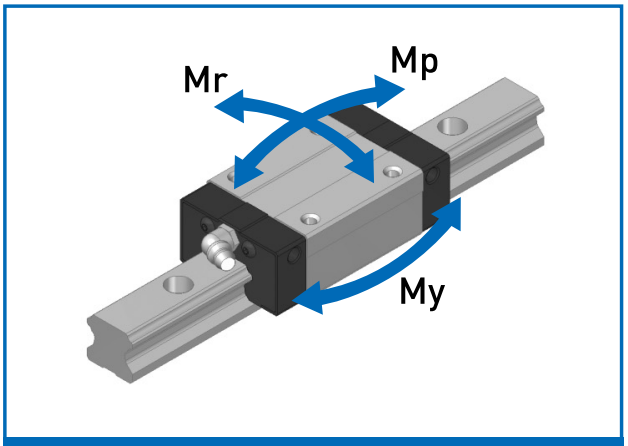
S...S Series (Spacer Chain Type)



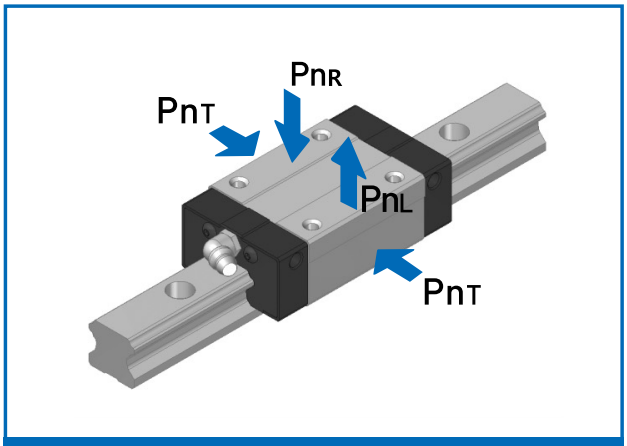
Cross Section



Details of spacer of S...S Series

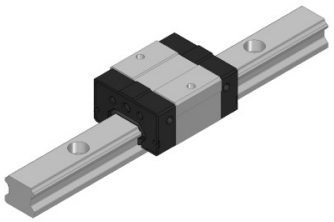
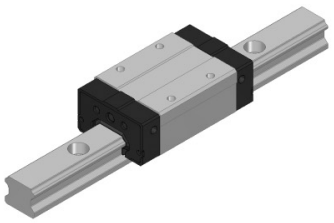
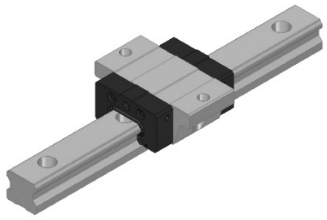
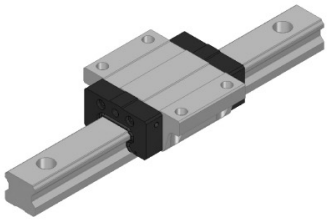


Moment Rigidity

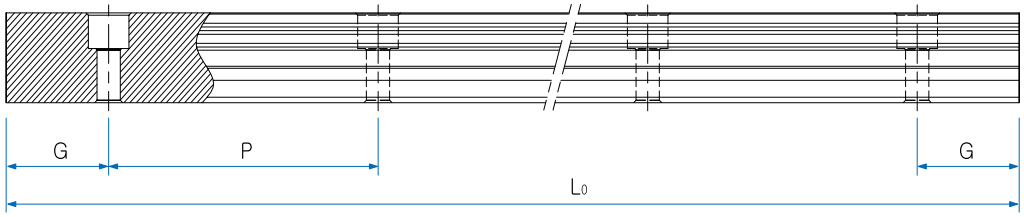


Radial Rigidity

Types and Features

Category	Type	Shape & Feature		
Compact type	S-RC S-RC...S		• A slim type with the tap-processed top of a block, minimizing the width(W) and height(H) of a block • 4-row circular structure and 4-direction equal load type with 45° contact angle S Series are types with a spacer retainer helping to reduce ball-to-ball friction and generate less noise and dust	Cartesian coordinated robot Linear actuator Automation system Semiconductor & display manufacturing system LED inspection equipment Dispenser equipment Medical Equipment High-speed transport system Woodworking machine Take-out robot Small machine tool Laser processor Precision measurement equipment
	S-RN S-RN...S		• The same cross section as in S-RC Series; a slim type with the increased load rating by enlarging the entire length (L1) of a block • 4-row circular structure and 4-direction equal load type with 45° contact angle S Series are types with a spacer retainer helping to reduce ball-to-ball friction and generate less noise and dust	
Flange type	S-FC S-FC...S		• A slim type with the tap-processed top of a block, minimizing the width(W) and height(H) of a block • 4-row circular structure and 4-direction equal load type with 45° contact angle S Series are types with a spacer retainer helping to reduce ball-to-ball friction and generate less noise and dust	
	S-FN S-FN...S		• The same cross section as in S-RC Series; a slim type with the increased load rating by enlarging the entire length (L1) of a block • 4-row circular structure and 4-direction equal load type with 45° contact angle S Series are types with a spacer retainer helping to reduce ball-to-ball friction and generate less noise and dust	

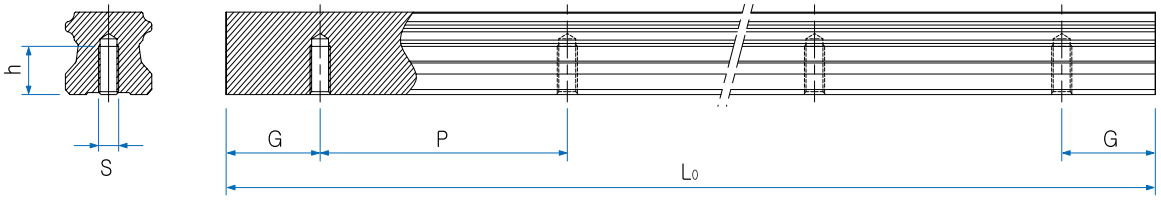
Standard and maximum lengths of rail



Unit : mm

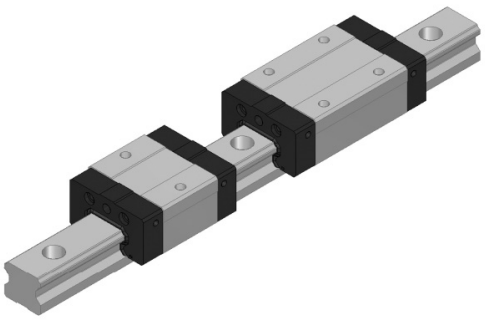
Model No.	S15	S20	S25
Standard length	160	160	220
	220	220	280
	280	280	340
	⋮	340	400
	1360	⋮	460
	1480	1960	⋮
	1600	2080	2200
		2200	2320
			2440
Standard pitch P	60	60	60
G	20	20	20
Max. length	4000		

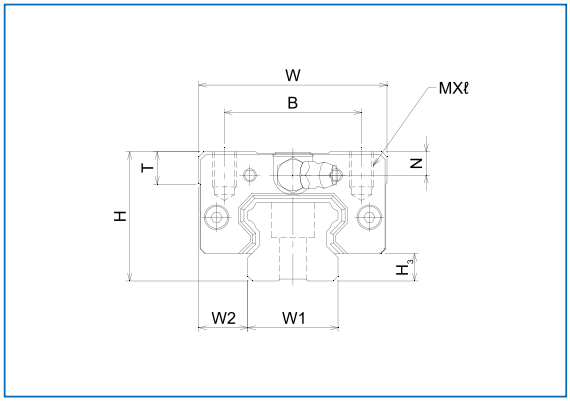
Standard tap hole type of rail



Model No.	S	h(mm)
S15	M5	8
S20	M6	10
S25	M6	12

S-RC Series, S-RN Series





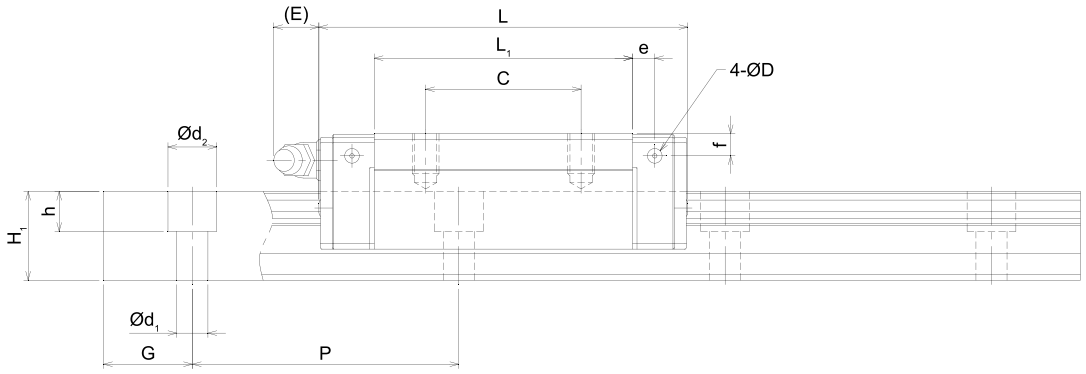
Model No.	External dimensions			Dimensions of block											H_3
	Height H	Width W	Length L	B	C	M×ℓ	L_1	T	N	E	f	e	D	Grease nipple	
S15RC	24	34	39.8	26	-	M4x6	24.0	6	6	4.7	3.7	3.25	3.3	A-M5	4.5
S15RN			56.5		26		40.8								
S20RC	28	42	47.8	32	-	M5x7	27.6	7.5	5.5	10.7	4.7	4.25	3.3	B-M6F	6
S20RN			66.8		32		46.7								
S25RC	33	48	59.4	35	-	M6x8	34.4	8	6	10.2	5	5	3.3	B-M6F	7
S25RN			83.2		35		58.2								

Composition of Model Name & Number

S15		RC		SS	2	G_2		–	1000L		20/20		P		–	2
1	2	3	4	5	6	7	8		9	10	11	12	13	14		15

1. Model No.
2. Material of block : No symbol-Standard material / M-Stainless
3. Type of block : RC-Rectangular short type / RN-Rectangular standard type / FC-Flange short type/ FN-Flange standard type
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. Symbol of clearance : No symbol-Normal preload / G_1-Light preload / G_2-Heavy preload / G_s-Special preload (*2)
8. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
9. Length of rail
10. Material of rail : No symbol-Standard material / M-Stainless
11. Size of G value: standard G value has no symbol
12. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
13. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
14. No symbol-Standard rail / E-special rail specification
15. Number of axes used in the same plane

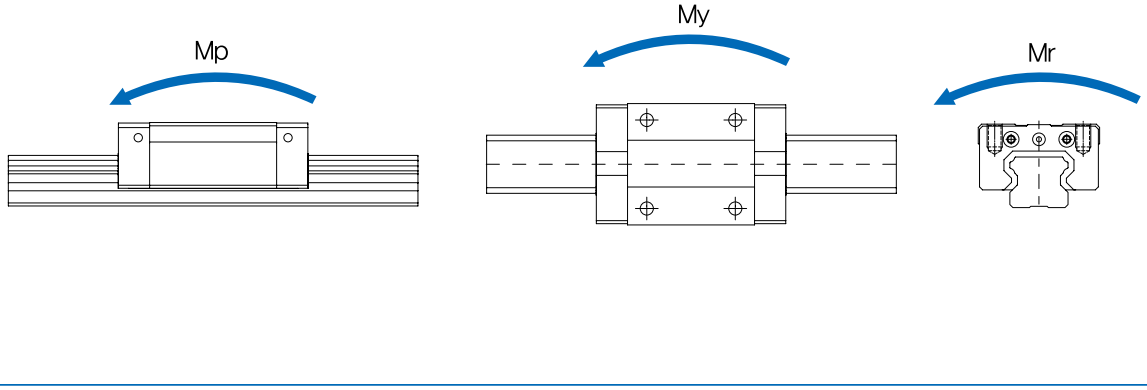
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 67. (*4) See Selection of Precision Class at page 20.



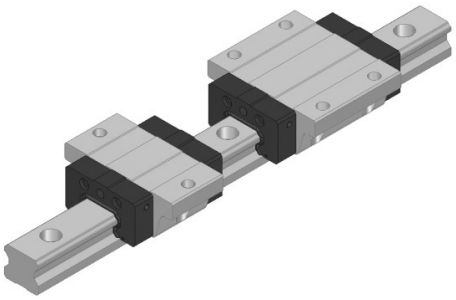
Unit : mm

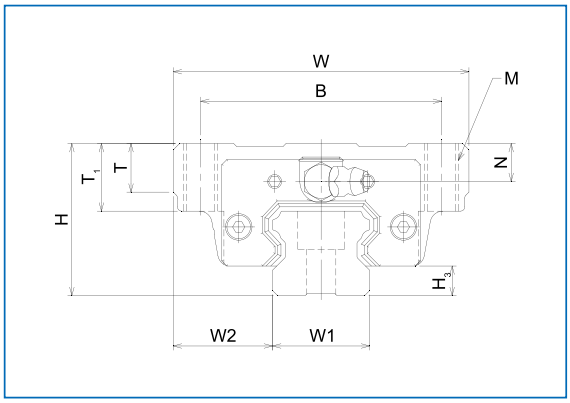
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W_1 ±0.05	W_2	Height H_1	G	Pitch P	d_1x$d_2$xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	9.5	13	20	60	4.5x7.5x5.3	9.0	10	0.042	0.224	0.042	0.224	0.079	0.096	1.3
						12.6	16.2	0.115	0.552	0.115	0.552	0.129	0.156	
20	11	16.5	20	60	6x9.5x8.5	12.0	13.1	0.063	0.342	0.063	0.342	0.137	0.153	2.2
						16.8	21.2	0.173	0.838	0.173	0.838	0.223	0.246	
23	12.5	20	20	60	7x11x9	19.2	20.4	0.123	0.670	0.123	0.670	0.246	0.254	3.0
						27.0	33.1	0.337	1.636	0.337	1.636	0.398	0.413	

1N≒0.102kgf



S-FC Series, S-FN Series





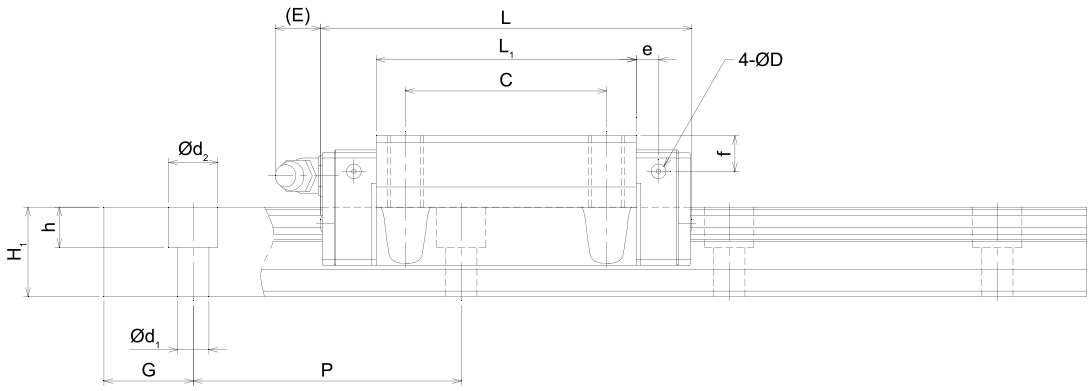
Model No.	External dimensions			Dimensions of block												H3
	Height H	Width W	Length L	B	C	M	L1	T	T1	N	E	f	e	D	Grease nipple	
S15FC	24	52	39.8	41	-	M5	24.0	6	7	6	4.7	3.7	3.25	3.3	A-M5	4.5
S15FN			56.5		26		40.8									
S20FC	28	59	47.8	49	-	M6	27.6	8	9	5.5	10.7	4.7	4.25	3.3	B-M6F	6
S20FN			66.8		32		46.7									
S25FC	33	73	59.4	60	-	M8	34.4	9	10	6	10.2	5	5	3.3	B-M6F	7
S25FN			83.2		35		58.2									

Composition of Model Name & Number

S15		FC		SS	2	G2		–	1000L		20/20		P		–	2
1	2	3	4	5	6	7	8		9	10	11	12	13	14		15

1. Model No.
2. Material of block : No symbol-Standard material / M-Stainless
3. Type of block : RC-Rectangular short type / RN-Rectangular standard type / FC-Flange short type/ FN-Flange standard type
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
8. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
9. Length of rail
10. Material of rail : No symbol-Standard material / M-Stainless
11. Size of G value: standard G value has no symbol
12. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
13. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
14. No symbol-Standard rail / E-special rail specification
15. Number of axes used in the same plane

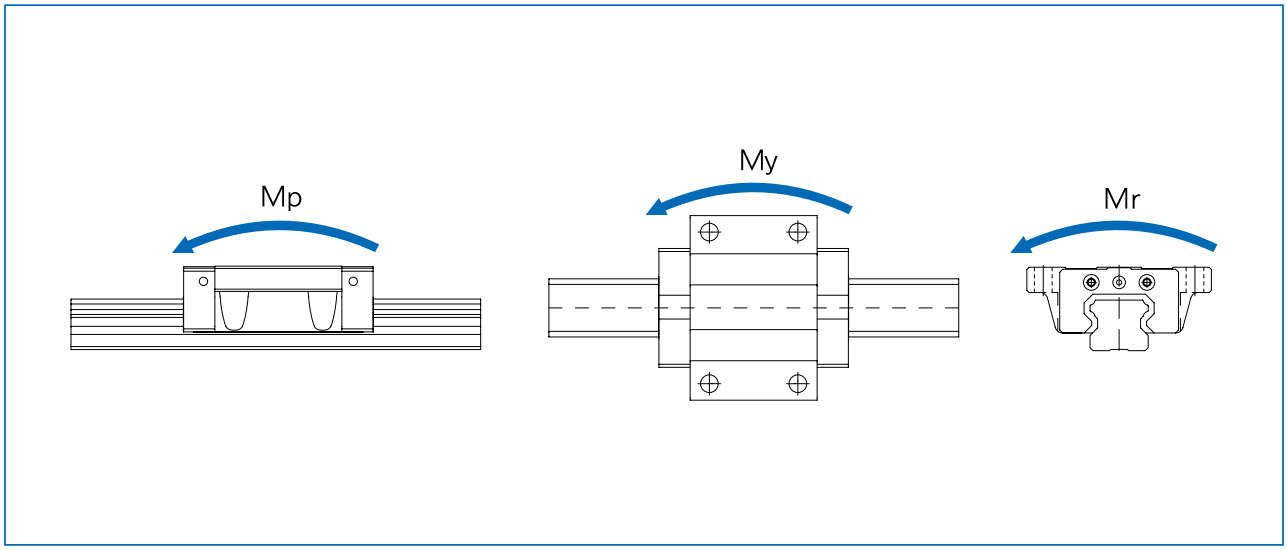
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 67. (*4) See Selection of Precision Class at page 20.



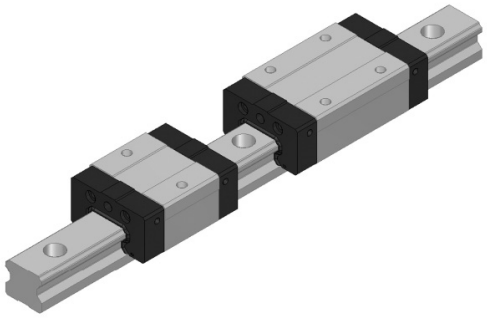
Unit : mm

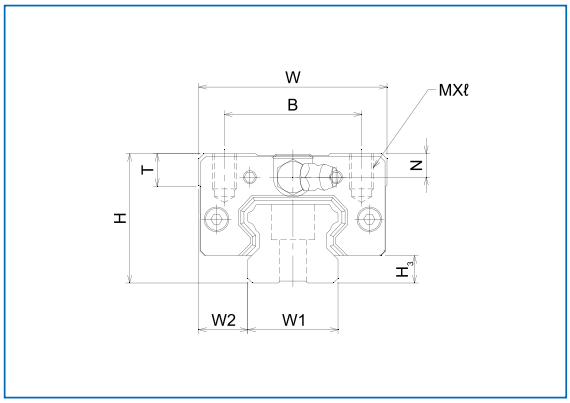
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	18.5	13	20	60	4.5x7.5x5.3	9.0	10	0.042	0.224	0.042	0.224	0.079	0.125	1.3
						12.6	16.2	0.115	0.552	0.115	0.552	0.129	0.203	
20	19.5	16.5	20	60	6x9.5x8.5	12.0	13.1	0.063	0.342	0.063	0.342	0.137	0.187	2.2
						16.8	21.2	0.173	0.838	0.173	0.838	0.223	0.301	
23	25.0	20	20	60	7x11x9	19.2	20.4	0.123	0.670	0.123	0.670	0.246	0.320	3.0
						27.0	33.1	0.337	1.636	0.337	0.163	0.398	0.527	

1N≒0.102kgf



S-RC...S Series, S-RN...S Series





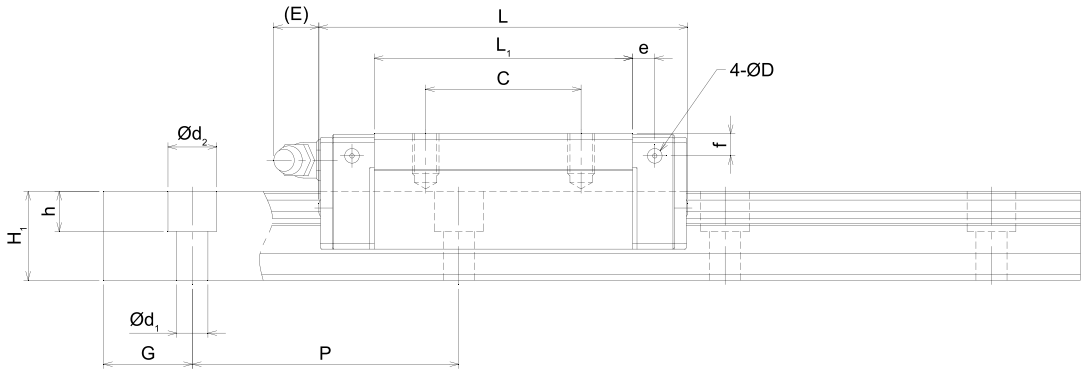
Model No.	External dimensions			Dimensions of block											H_3
	Height H	Width W	Length L	B	C	M×ℓ	L_1	T	N	E	f	e	D	Grease nipple	
S15RC...S	24	34	39.8	26	-	M4x6	24.0	6	6	4.7	3.7	3.25	3.3	A-M5	4.5
S15RN...S			56.5		26		40.8								
S20RC...S	28	42	47.8	32	-	M5x7	27.6	7.5	5.5	10.7	4.7	4.25	3.3	B-M6F	6
S20RN...S			66.8		32		46.7								
S25RC...S	33	48	59.4	35	-	M6x8	34.4	8	6	10.2	5	5	3.3	B-M6F	7
S25RN...S			83.2		35		58.2								

Composition of Model Name & Number

S15		RN		SS	2	S	G_2		–	1000L		20/20		P		–	2
1	2	3	4	5	6	7	8	9		10	11	12	13	14	15		16

1. Model No.
2. Material of block : No symbol-Standard material / M-Stainless
3. Type of block : RC-Rectangular short type / RN-Rectangular standard type / FC-Flange short type/ FN-Flange standard type
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaft
7. S-Spacer chain type
8. Symbol of clearance : No symbol-Normal preload / G_1-Light preload / G_2-Heavy preload / Gs-Special preload (*2)
9. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
10. Length of rail
11. Material of rail : No symbol-Standard material / M-Stainless
12. Size of G value: standard G value has no symbol
13. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
14. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
15. No symbol-Standard rail / E-special rail specification
16. Number of axes used in the same plane

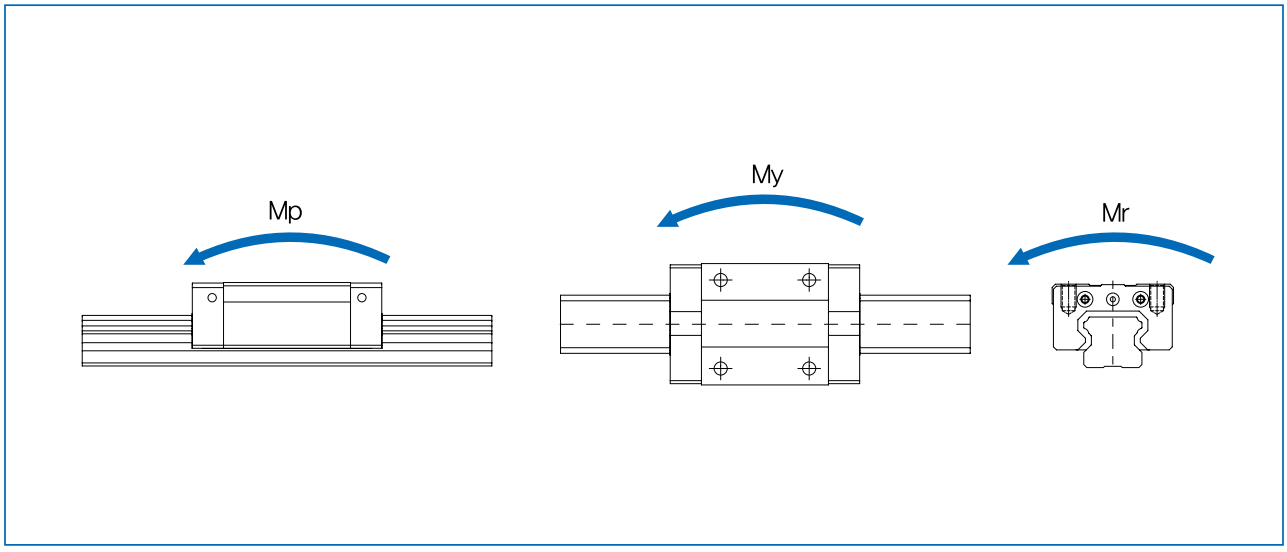
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 67. (*4) See Selection of Precision Class at page 20.



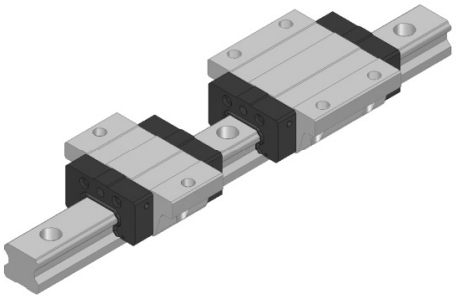
Unit : mm

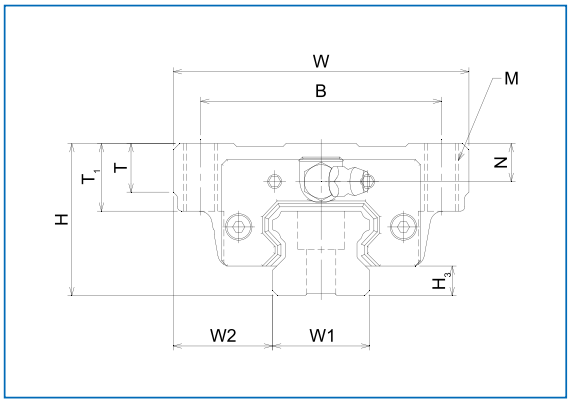
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
WIDTH W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	9.5	13	20	60	4.5x7.5x5.3	8.3	10	0.042	0.224	0.042	0.224	0.079	0.096	1.3
						12.1	16.2	0.115	0.552	0.115	0.552	0.129	0.156	
20	11	16.5	20	60	6x9.5x8.5	11.1	13.1	0.063	0.342	0.063	0.342	0.137	0.153	2.2
						16.1	21.2	0.173	0.838	0.173	0.838	0.223	0.246	
23	12.5	20	20	60	7x11x9	17.9	20.4	0.123	0.670	0.123	0.670	0.246	0.254	3.0
						25.8	33.1	0.337	1.636	0.337	1.636	0.398	0.413	

1N≒0.102kgf



S-FC...SSeries, S-FN...SSeries





Model No.	External dimensions			Dimensions of block												H3
	Height H	Width W	Length L	B	C	M	L1	T	T1	N	E	f	e	D	Grease nipple	
S15FC...S	24	52	39.8	41	-	M5	24.0	6	7	6	4.7	3.7	3.25	3.3	A-M5	4.5
S15FN...S			56.5		26		40.8									
S20FC...S	28	59	47.8	49	-	M6	27.6	8	9	5.5	10.7	4.7	4.25	3.3	B-M6F	6
S20FN...S			66.8		32		46.7									
S25FC...S	33	73	59.4	60	-	M8	34.4	9	10	6	10.2	5	5	3.3	B-M6F	7
S25FN...S			83.2		35		58.2									

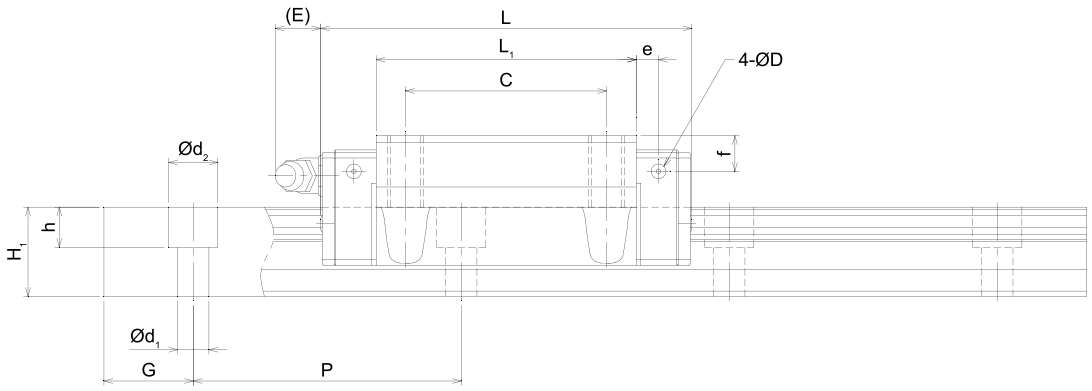
Composition of Model Name & Number

S15 ☐ FC ☐ SS 2 S G2 ☐ – 1000L ☐ 20/20 ☐ P ☐ – 2

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1. Model No.
2. Material of block : No symbol-Standard material / M-Stainless
3. Type of block : RC-Rectangular short type / RN-Rectangular standard type / FC-Flange short type/ FN-Flange standard type
4. No symbol-Standard block / E-Special block specification
5. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
6. Number of blocks assembled in one shaftled in one shaft
7. S-Spacer chain type
8. Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
9. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
10. Length of rail
11. Material of rail : No symbol-Standard material / M-Stainless
12. Size of G value: standard G value has no symbol
13. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
14. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
15. No symbol-Standard rail / E-special rail specification
16. Number of axes used in the same plane

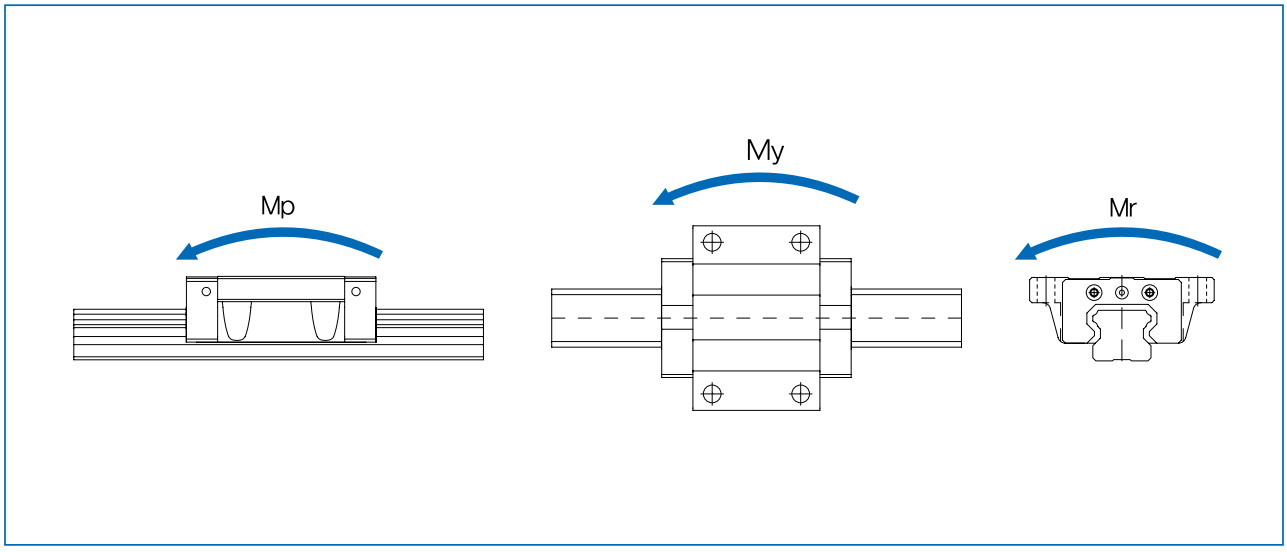
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 67. (*4) See Selection of Precision Class at page 20.



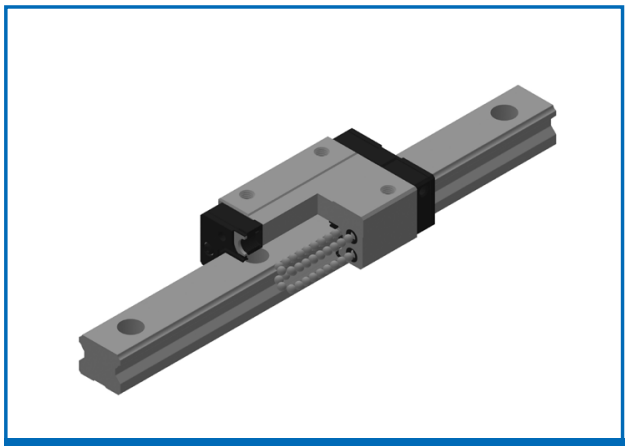
Unit : mm

Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
WIDTH W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
15	18.5	13	20	60	4.5x7.5x5.3	8.3	10	0.042	0.224	0.042	0.224	0.079	0.125	1.3
						12.1	16.2	0.115	0.552	0.115	0.552	0.129	0.203	
20	19.5	16.5	20	60	6x9.5x8.5	11.1	13.1	0.063	0.342	0.063	0.342	0.137	0.187	2.2
						16.1	21.2	0.173	0.838	0.173	0.838	0.223	0.301	
23	25.0	20	20	60	7x11x9	17.9	20.4	0.123	0.670	0.123	0.670	0.246	0.320	3.0
						25.8	33.1	0.337	1.636	0.337	1.636	0.398	0.527	

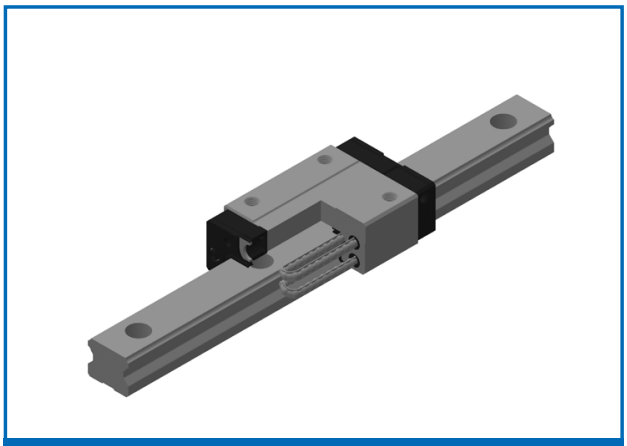
1N≒0.102kgf



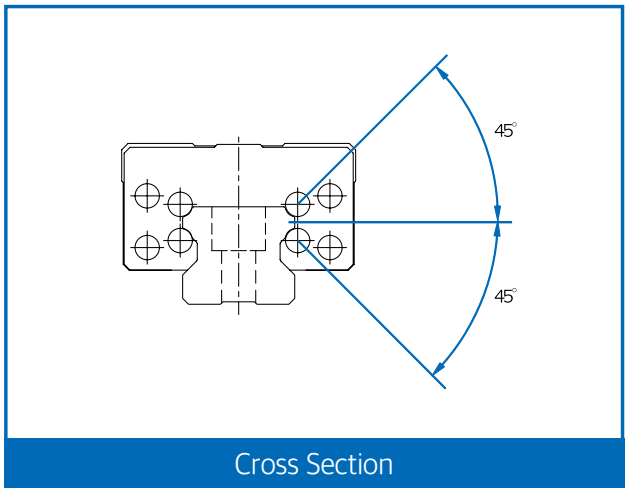
6. Slim Linear Motion Guide HS, HS…S Series



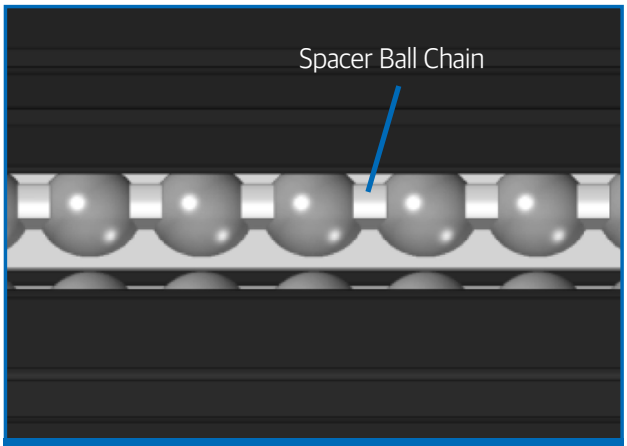
HS Series (Full Ball Type)



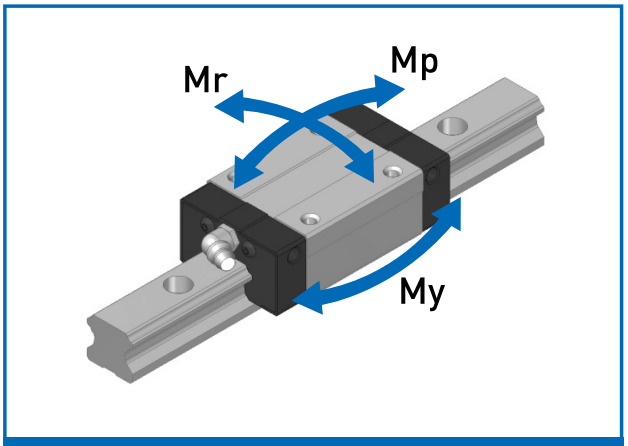
HS…S Series (Spacer Chain Type)



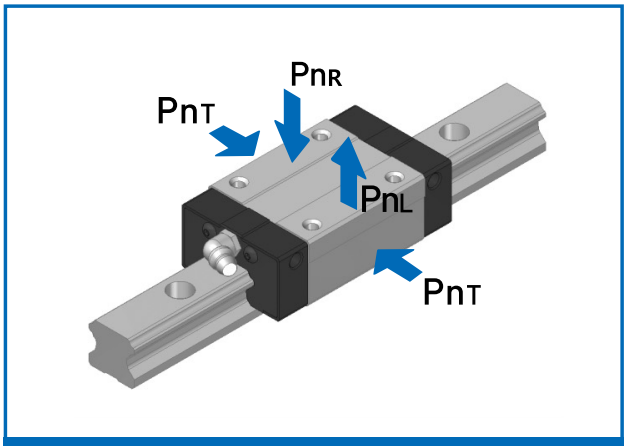
Cross Section



Details of spacer of HS-S Series

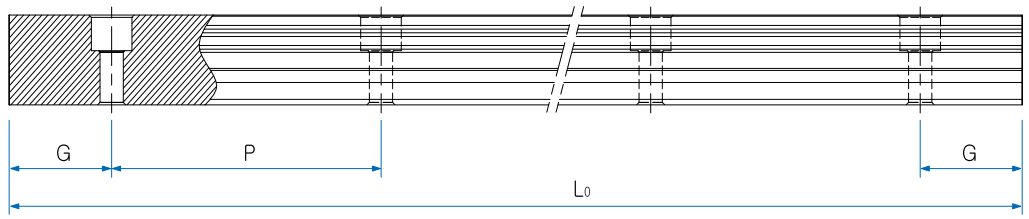


Moment Rigidity



Radial Rigidity

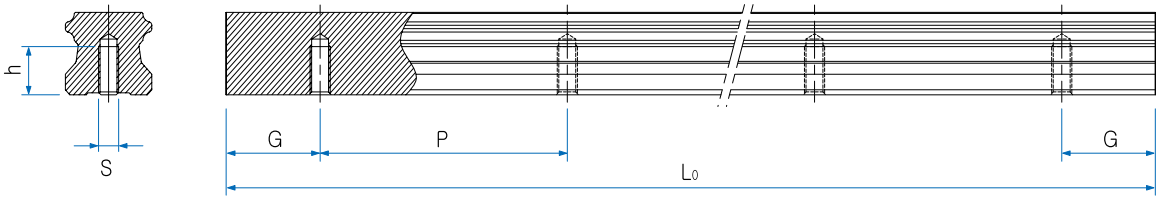
Standard and maximum lengths of rail



Unit : mm

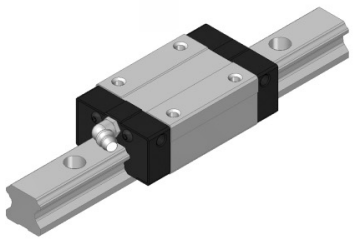
Model No.	HS25	HS30	HS35	HS45	HS55
Standard length	220	280	440	570	780
	340	360	520	675	900
	400	440	600	780	1020
	⋮	520	760	885	⋮
	2200	⋮	840	⋮	2820
	2320	2520	⋮	2880	2940
	2440	2680	2840	2985	3060
		2840	2920	3090	
			3000		
Standard pitch P	60	80	80	10.5	120
G	20	20	20	22.5	30
Max. length	4000				

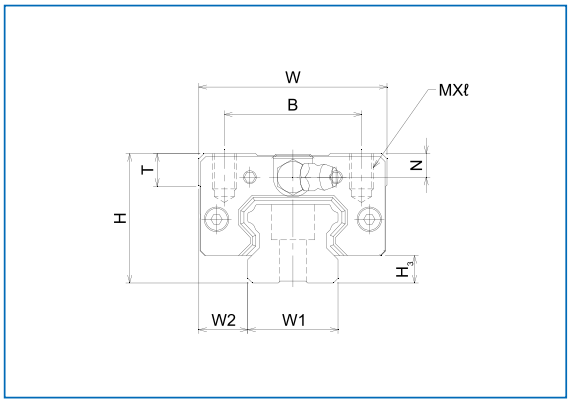
Standard tap hole type of rail



Model No.	S	h(mm)
HS25	M6	12
HS30	M8	15
HS35	M8	17
HS45	M12	24
HS55	M14	24

HS-RN Series, HS-RL Series





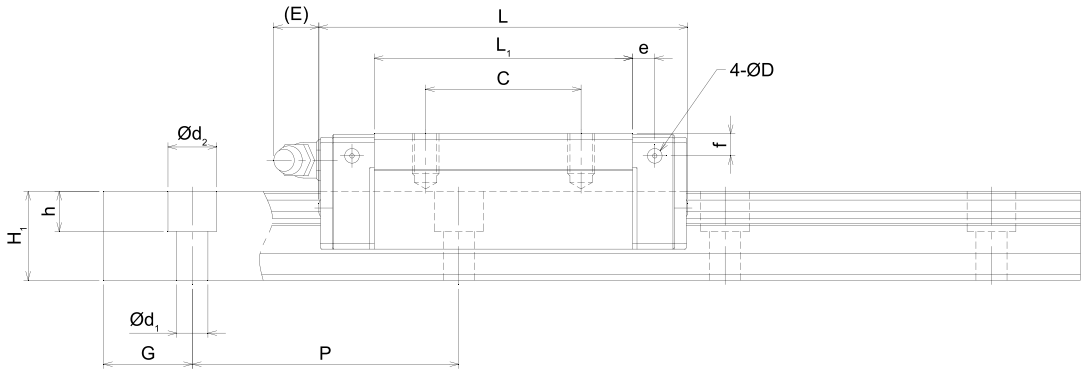
Model No.	External dimensions			Dimensions of block											H3
	Height H	Width W	Length L	B	C	M×ℓ	L1	T	N	E	f	e	D	Grease nipple	
HS25RN	36	48	83.2	35	35	M6x6.5	58.3	8	9	10.2	8	5	3.3	B-M6F	7
HS25RL			103.1		50		78.2								
HS30RN	42	60	99.3	40	40	M8x8	70.8	8	8.2	9.8	5.9	5.8	5.2	B-M6F	7
HS30RL			121.5		60		93								
HS35RN	48	70	111.8	50	50	M8x10	80.8	15	10	9.7	8.5	6.5	5.2	B-M6F	7.5
HS35RL			137.2		72		106.2								

Composition of Model Name & Number

HS35	RN		SS	2	G2		—	1000L		20/20		P		—	2
1	2	3	4	5	6	7		8	9	10	11	12	13		14

1. Model No.
2. Type of block :RN-Rectangular standard type
3. No symbol-Standard block / E-Special block specification
4. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
5. Number of blocks assembled in one shaft
6. Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
7. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
8. Length of rail
9. Material of rail : No symbol-Standard material / M-Stainless
10. Size of G value: standard G value has no symbol
11. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
12. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
13. No symbol-Standard rail / E-special rail specification
14. Number of axes used in the same plane

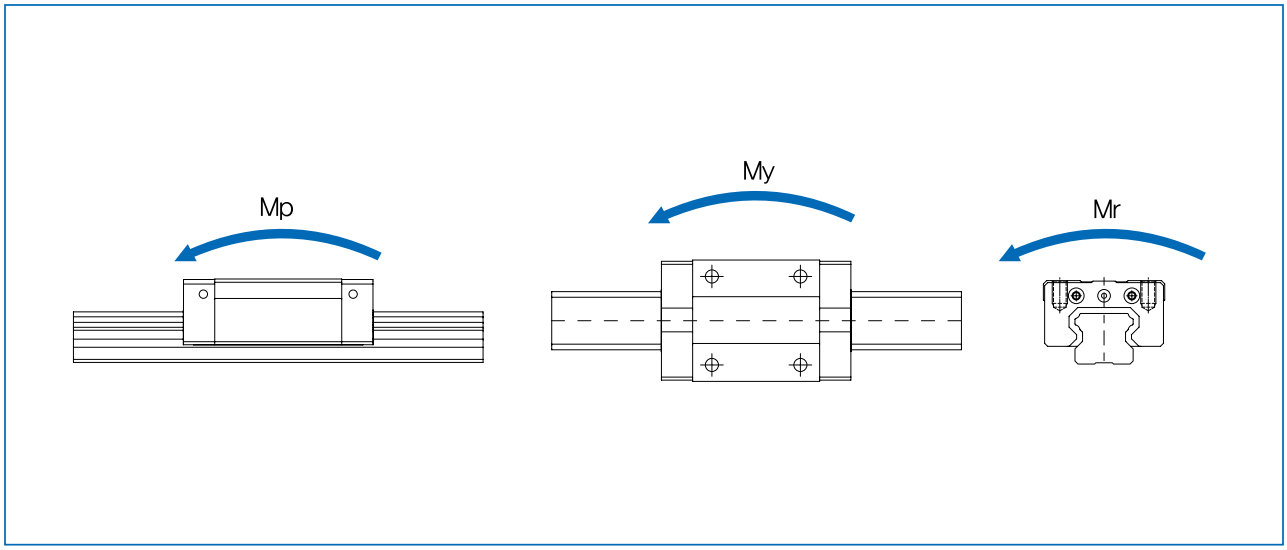
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 77. (*4) See Selection of Precision Class at page 20.



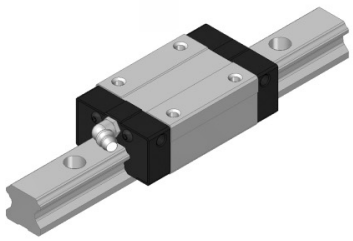
Unit : mm

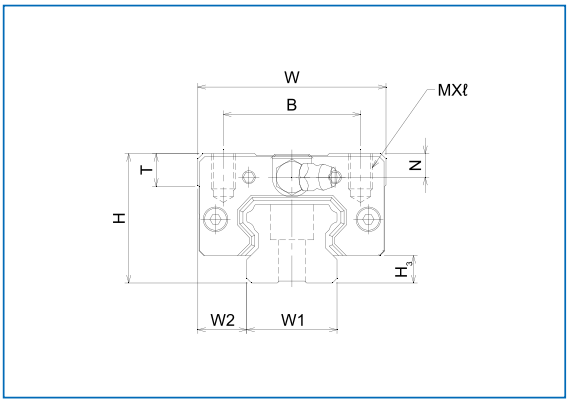
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
23	12.5	20	20	60	7x11x9	27.0	33.1	0.337	1.636	0.337	1.636	0.398	0.53	3.0
						32.8	43.6	0.596	2.760	0.596	2.760	0.525	0.71	
28	16	25.1	20	80	9x14x14.1	50.4	57.1	0.711	3.384	0.711	3.384	0.828	0.9	4.85
						60.3	73.6	1.203	5.506	1.203	5.506	1.067	1.1	
34	18	27	20	80	9x14x13	67.0	74.6	1.062	5.012	1.062	5.012	1.298	1.5	6.58
						80.2	96.2	1.797	8.172	1.797	8.172	1.674	2.01	

1N≒0.102kgf



HS-RN...S Series, HS-RL...S Series





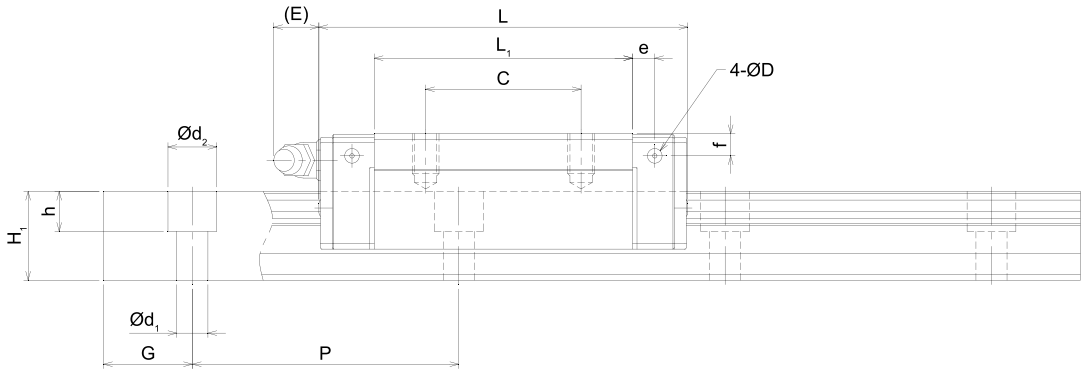
Model No.	External dimensions			Dimensions of block											H_3
	Height H	Width W	Length L	B	C	M×ℓ	L_1	T	N	E	f	e	D	Grease nipple	
HS25RN...S	36	48	83.2	35	35	M6x6.5	58.3	8	9	10.2	8	5	3.3	B-M6F	7
HS25RL...S			103.1		50		78.2								
HS30RN...S	42	60	99.3	40	40	M8x8	70.8	8	8.2	9.8	5.9	5.8	5.2	B-M6F	7
HS30RL...S			121.5		60		93								
HS35RN...S	48	70	111.8	50	50	M8x10	80.8	15	10	9.7	8.5	6.5	5.2	B-M6F	7.5
HS35RL...S			137.2		72		106.2								

Composition of Model Name & Number

HS35	RL		SS	2	S	G_2		—	1000L		20/20		P		—	2
1	2	3	4	5	6	7	8		9	10	11	12	13	14		15

1. Model No.
2. Type of block : RN-Rectangular standard type
3. No symbol-Standard block / E-Special block specification
4. Type of seal : No symbol-No seal / UU-End seal / SS-End seal+Side seal+Inner seal / DD-Double seal+Side seal+Inner seal / ZZ-End seal+Side seal+Inner seal+Metal scraper / KK-Double seal+Side seal+Inner seal+Metal scraper / UULF-End seal+LF seal / SSLF-End seal+Side seal+Inner seal+LF seal / DDLF-Double seal+Side seal+Inner seal+LF seal / ZZLF-End seal+Side seal+Inner seal+Metal scraper+LF seal / KKLF-Double seal+Side seal+Inner seal+Metal scraper+LF seal (*1)
5. Number of blocks assembled in one shaft
6. No symbol-Full ball type / S-Spacer chain type
7. Symbol of clearance : No symbol-Normal preload / G_1-Light preload / G_2-Heavy preload / Gs-Special preload (*2)
8. Material of end plate : No symbol - Standard material / I - Stainless / N - Aluminum
9. Length of rail
10. Material of rail : No symbol-Standard material / M-Stainless
11. Size of G value: standard G value has no symbol
12. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*3)
13. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
14. No symbol-Standard rail / E-special rail specification
15. Number of axes used in the same plane

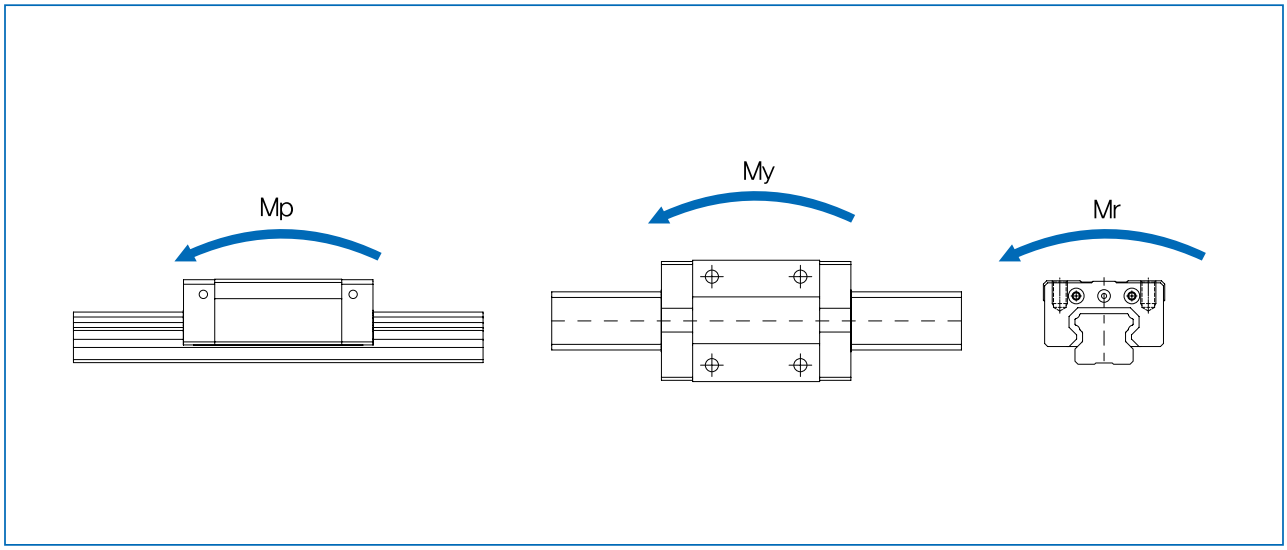
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3) See Standard Tap Hole Type of Rail at page 77. (*4) See Selection of Precision Class at page 20.



Unit : mm

Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W_1 ±0.05	W_2	Height H_1	G	Pitch P	d_1x$d_2$xh	C kN	C_0 kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
23	12.5	20	20	60	7x11x9	25.8	33.1	0.337	1.636	0.337	1.636	0.398	0.53	3.0
						31.7	43.6	0.596	2.760	0.596	2.760	0.525	0.71	
28	16	25.1	20	80	9x14x14.1	48.0	57.1	0.711	3.384	0.711	3.384	0.828	0.9	4.85
						58.0	73.6	1.203	5.506	1.203	5.506	1.067	1.1	
34	18	27	20	80	9x14x13	63.7	74.6	1.062	5.012	1.062	5.012	1.298	1.5	6.58
						77.1	96.2	1.797	8.172	1.797	8.172	1.674	2.01	

1N≒0.102kgf



7. Miniature Linear Motion Guide M Series

1) Structure of M Series

WON Miniature Linear Motion Guide M Series has a shape of a gothic-arch groove in the raceway of a rail and a block and a 4-direction equal type structure with 2-row 4-point contact balls at 45 degree. This model, though small-sized, supports stable travel and high rigidity for variable load or complex load under which a direction or size changes.

2) Features of M Series

a. A compact and highly-rigid 4-direction equal load type.
b. A variety of specifications in consideration of space and load rating in order for easy design.
c. It is convenient to maintain balls at the time of block-rail assembly, for a block has the wire to prevent ball separation built in.
d. This model made of stainless steel is resistant for rust. Therefore, it is suitable in a rust-resistive envi ronment or the cleanroom that inhibits generation of particles.

8. Wide Miniature Linear Motion Guide MB Series

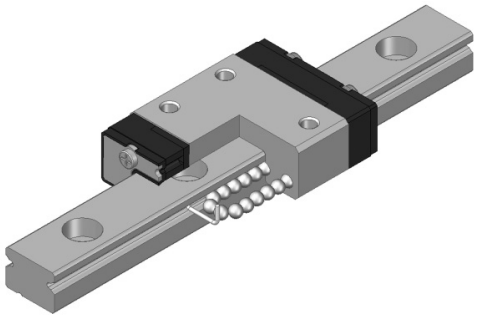
1) Structure of MB Series

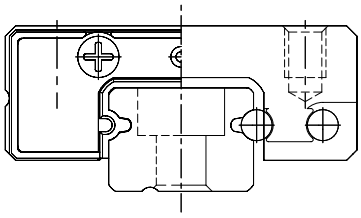
Like M Series, WON Miniature Linear Motion Guide MB Series has the 4-direction equal load type. As its rail and block get widened, the model improves basic load rating and moment load compared to M Series.

2) Features of MB Series

a. Wide block and rail, an increased number of effective balls, and improved load rating and moment load.
b. Wider than a general type of miniature linear motion guide, increased rigidity, and very favorable in the use of one axis.
c. A compact and highly-rigid 4-direction equal load type.
d. A variety of specifications in consideration of space and load rating in order for easy design.
e. It is convenient to maintain balls during block-rail assembly, for a block has the wire to prevent ball separation.
f. This model made of stainless steel is resistant for rust. Therefore, it is suitable in a rust-resistive envi ronment or the cleanroom that inhibits generation of particles. (The bearing steel materials for MB 12 and MB 15 are reserved.)

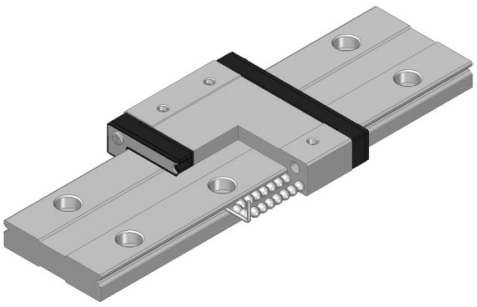
Miniature Linear Motion Guide M, MB Series

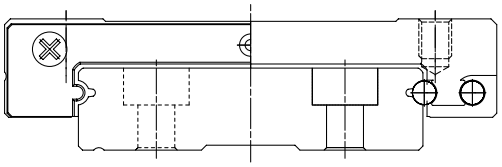




Standard M Series

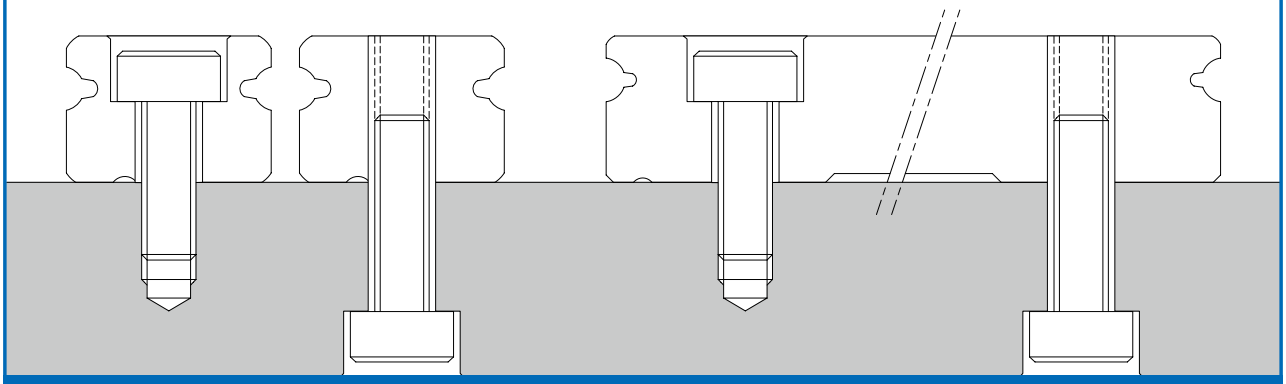
Standard type





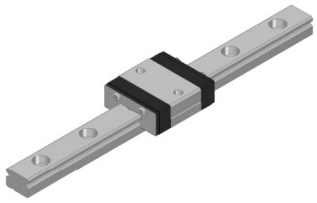
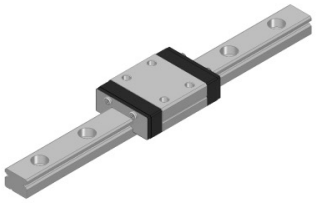
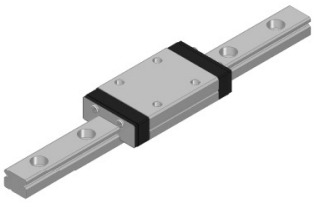
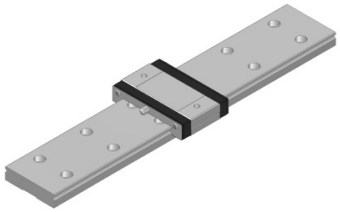
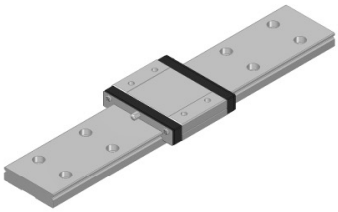
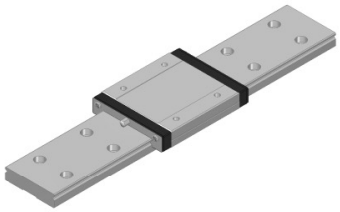
Wide MB Series

Wide type

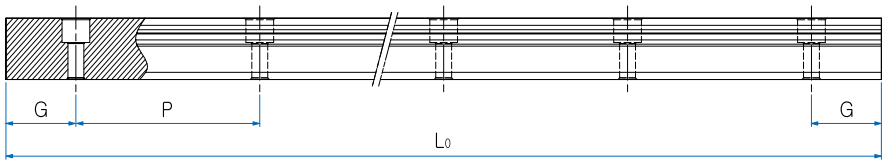


Bolt fastening

Types and Features

Category	Type	Shape & Feature		
Compact type	M-C		Standard Type of Miniature Linear Motion Guide The bearing steel materials for M12 and M15 (MT12, MT15) are available	Semiconductor inspection equipment Semiconductor assembly equipment Display inspection Head-axis LED inspection equipment Pneumatic machinery Table cylinder Automation machinery Medical equipment Smart actuator Cartesian coordinated robot UVW stage
	M-N			
	M-L			
Flange type	MB-C MBT-C		Wider block (W) and longer total length (L_1) than M Series; highly-rig id and wide type with improved load rating and allowance moment The bearing steel materials for MB12 and MB15 (MBT12, MBT15) are ava ilable	
	MB-N MBT-N			
	MB-L MBT-L			

Standard and maximum lengths of rail

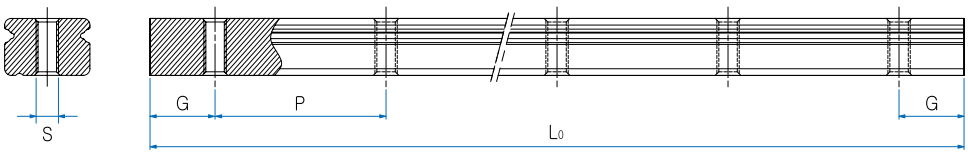


Unit : mm

Model No.	M5	M7	M9	M12	MT12	M15	MT15	M20
Standard type	40	40	55	70	70	70	70	220
	55	55	75	95	95	110	110	280
	70	70	95	120	120	150	150	340
	⋮	⋮	115	145	145	190	190	460
	100	100	⋮	170	170	230	230	⋮
	130	130	275	⋮	⋮	⋮	⋮	1120
	160	160	375	570	570	670	670	1240
			495	695	695	870	870	1360
				820	820	1070	1070	
Standard maximum length	1000	1000	995	995	1995	1990	1990	1960
Standard pitch P	15	15	20	25	25	40	40	60
G	5	5	7.5	10	10	15	15	20
Maximum length	1000				2000			

Model No.	MB5	MB7	MB9	MB12	MBT12	MBT13	MB15	MBT15
Standard type	50	50	50	70	70	110	110	110
	70	80	80	110	110	150	150	150
	90	110	110	150	150	190	190	190
	⋮	⋮	140	190	190	230	230	230
	130	260	⋮	230	230	270	270	270
	150	290	500	⋮	⋮	⋮	⋮	⋮
	170	350	710	590	590	750	750	750
			860	750	750	790	790	790
				910	910	910	910	910
Standard maximum length	990	980	2000	1990	1990	1990	1990	1990
Standard pitch P	20	30	30	40	40	40	40	40
G	5	10	10	15	15	15	15	15
Maximum length	1000		2000					

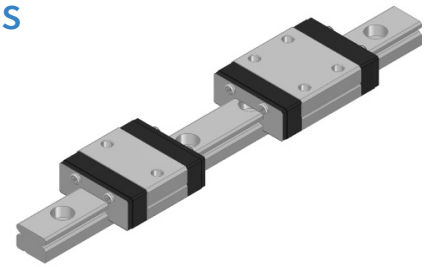
Standard tap hole type of rail

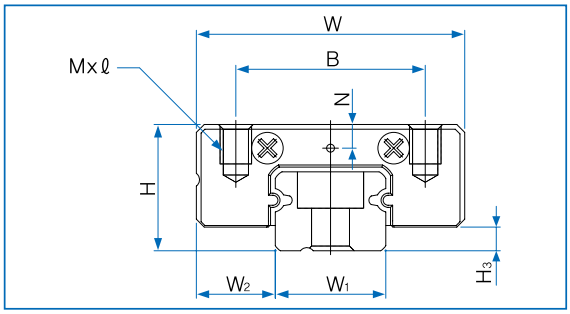


Model No.	S(Penetrated)
M5	M2.6
M7	M3
M9	M4
M12 / MT12	M4
M15 / MT15	M4
M20	M6

Model No.	S(Penetrated)
MB5	M3
MB7	M4
MB9	M4
MB12 / MBT12	M5
MBT13	M5
MB15 / MBT15	M5

M Series





Model No.	External dimensions			Dimensions of block							H3
	Height H	Width W	Length L	B	C	M x ℓ	L1	N	E	Grease nipple	
M 5C	6	12	17	8	–	M2 x 1.5	9.4	1.2	–	–	1
M 5N			20				12.4				
M 5NA				–	7	M2.6 x 1.5					
M 7C	8	17	19.8	12	–	M2 x 2.5	9.6	1.5	–	–	1.5
M 7N			24.3		8		14.1				
M 7L			31.8		13		21.6				
M 7LA			31.0		12		20.8				
M 9C	10	20	22.4	15	–	M3 x 3	11.8	2.2	–	–	2
M 9N			31.3		10		20.7				
M 9L			41.4		16		30.8				
M 9LA					15						
M 12C	13	27	26.4	20	–	M3 x 3.5	12.8	2.7	–	–	3
M 12N			34.9		15		21.3				
M 12L			45.4		20		31.8				
M 15C	16	32	34.4	25	–	M3 x 4	17.7	3.1	3.3	A=M3	4
M 15N			44.4		20		27.7				
M 15L			59.4		25		42.7				
M 20C	20	40	39.8	30	–	M4 x 6	22.2	4.2	3.3	A=M3	5
M 20N			51.8		25		34.2				
M 20L			69.8		30		52.2				

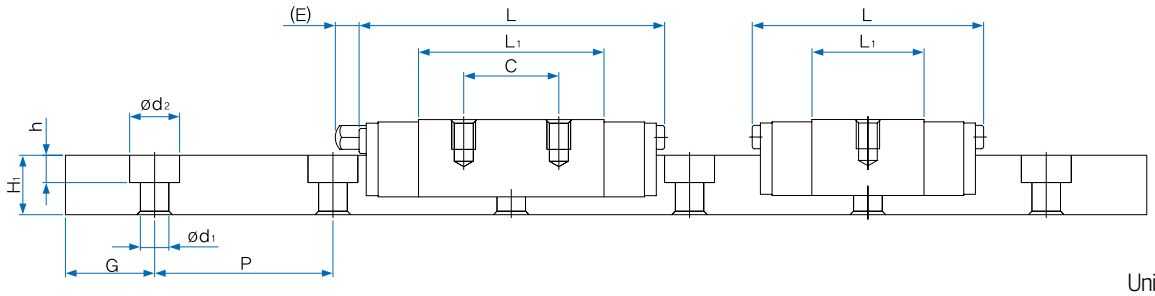
※ The carbon steel materials based rails for M12 and M15 (MT12, MT15) are reserved.

Composition of Model Name & Number

M12		N		UU	2	G1		—	1000L		20/20		P		—	2
1	2	3	4	5	6	7	8		9	10	11	12	13	14		15

1. Model No.
2. Material of block : No symbo-Stainless / T-Carbon steel (*1)
3. Type of block : C-Short type/ N-Standard type / L-Long type
4. No symbol-Standard block / E-Special block specificatio
5. Type of seal: UU-End seal / UULF-End seal+ LF seal (*2)
6. Number of blocks combined in one axis
7. Symbol of clearance: No symbol-Normal preload / G1-Light preload (*3)
8. Material of end plate: No symbol-Standard material / I - Stainless / N - Aluminum
9. Length of rail
10. Material of rail: No symbol-Stainless / T-Carbon steel
11. Size of G value: Standard G value has no symbol
12. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*4)
13. Symbol of precision: No symbol-Moderate / H-High / P-Precision (*5)
14. No symbol-Standard rail /E-Special rail specification
15. Number of axes used in the same plane

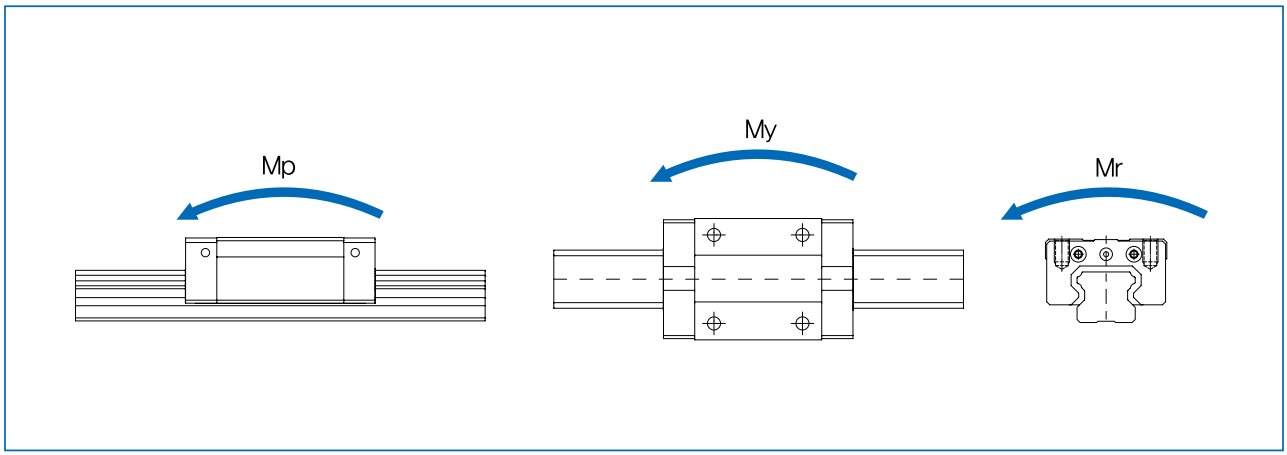
(*1) The material of carbon steel is confined to M12-M20
(*2) See Symbol List of Optional parts at page 101
(*3) See Radial Clearance at page 18
(*4) See Standard Tap Hole Type of Rail at page 85
(*5) See Selection of Precision Class at page 22



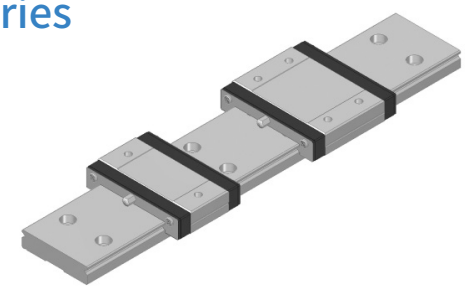
Unit : mm

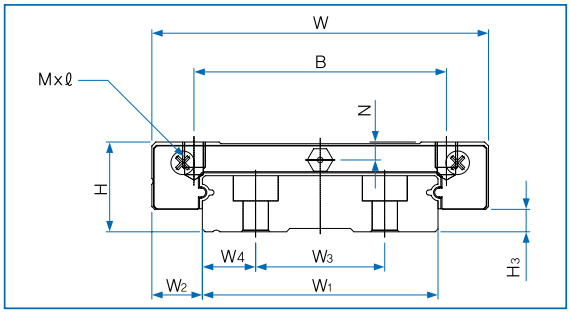
Dimensions of rail						Basic load rating		Static allowance moment N·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C N	Co N	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
5 0 -0.02	3.5	3.7	5	15	2.4x3.6x0.8	516	757	1.3	7.1	1.3	7.1	2.01	3.1	139
						631	1,009	2.2	11.6	2.2	11.6	2.67	4.0	
7 0 -0.02	5	5	5	15	2.4x4.2x2.3	901	1,136	1.9	11.8	1.9	11.8	4.14	6.4	253
						1,197	1,703	4.2	23.1	4.2	23.1	6.22	9.0	
						1,631	2,650	10.1	50.0	10.1	50.0	9.67	12.6	
						1,549	2,460							
9 0 -0.02	5.5	6	7.5	20	3.5x6x3.5	1,180	1,485	3.1	17.9	3.1	17.9	6.90	9.9	391
						1,721	2,545	9.3	46.6	9.3	46.6	11.84	17.1	
						2,375	4,030	21.9	102.8	21.9	102.8	18.74	25.2	
12 0 -0.025	7.5	8	10	25	3.5x6.5x4.5	2,175	2,385	5.4	32.9	5.4	32.9	14.79	19.8	679
						3,023	3,816	14.4	75.8	14.4	75.8	23.66	31.5	
						4,246	6,200	34.8	169.1	34.8	169.1	38.44	45.9	
15 0 -0.025	8.5	10	15	40	3.5x6.5x4.5	3,418	3,895	12.2	71.6	12.2	71.6	29.99	37.8	1071
						4,540	5,842	28.6	148.7	28.6	148.7	44.99	57.6	
						6,492	9,737	73.5	351.2	73.5	351.2	74.98	85.5	
20 0 -0.03	10	11	20	60	6x9.5x5.5	4,512	5,299	20.7	115.9	20.7	115.9	54.05	80.1	1572
						6,191	8,328	50.2	252.7	50.2	252.7	84.94	119.7	
						8,396	12,870	118.6	554.4	118.6	554.4	131.27	176.4	

1N≒0.102kgf



MB Series





Model No.	External dimensions			Dimensions of block							H_3
	Height H	Width W	Length L	B	C	M×ℓ	L_1	N	E	Grease nipple	
MB 5C	6.5	17	21	13	–	M2.5 x 1.5	13.4	1.4	–	–	1.3
MB 5N			25		–		17.4				
MB 7C	9	25	24	19	–	M3 x 3	12.6	1.7	–	–	2
MB 7N			33		10		21.6				
MB 7L			43.5		19		32.1				
MB 9C	12	30	28.1	21	–	M3 x 3	16.5	3.2	–	–	3
MB 9N			40.2		12		28.6				
MB 9L			52	23	24		40.4				
MB 12C	14	40	31.1	28	–	M3 x 3.5	17.5	3	–	–	4
MB 12N			44.5		15		30.9				
MB 12L			59.7		28		46.1				
MBT 13C	15	50	35.3	35	–	M4 x 4.5	18.7	3.1	3.3	A–M3	3
MBT 13N			49.2		18		32.6				
MBT 13L			68.6		35		52				
MB 15C	16	60	42.8	45	–	M4 x 4.5	25.2	3.5	3.3	A–M3	4
MB 15N			56.6		20		39				
MB 15L			75.8		35		58.2				

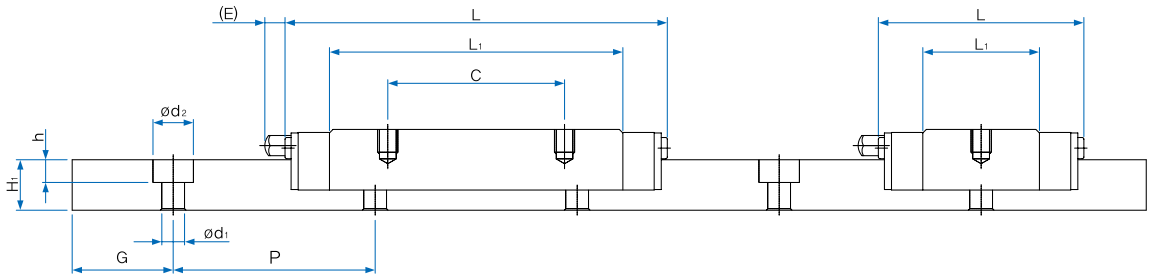
※The carbon steel materials based rails for MB12 and MB15 (MBT12, MBT15) are reserved.
※As for MBT13, only carbon steel is prepared

Composition of Model Name & Number

MB12		N		UU	2	G_1		—	1000L		20/20		P		—	2
1	2	3	4	5	6	7	8		9	10	11	12	13	14		15

1. Model No.
2. Material of block : No symbo-Stainless / T-Carbon steel (*1)
3. Type of block : C-Short type/ N-Standard type / L-Long type
4. No symbol-Standard block /E-Special block specificatio
5. Type of seal: UU-End seal / UULF-End seal+ LF seal (*2)
6. Number of blocks combined in one axis
7. Symbol of clearance: No symbol-Normal preload / G_1-Light preload (*3)
8. Material of end plate: No symbol-Standard material / I - Stainless / N - Aluminum
9. Length of rail
10. Material of rail: No symbol-Stainless / T-Carbon steel
11. Size of G value: Standard G value has no symbol
12. No symbol-Rail counterbore type (top assembly) / A-Rail tap hole type (bottom assembly) (*4)
13. Symbol of precision: No symbol-Moderate / H-High / P-Precision (*5)
14. No symbol-Standard rail / E-Special rail specification
15. Number of axes used in the same plane

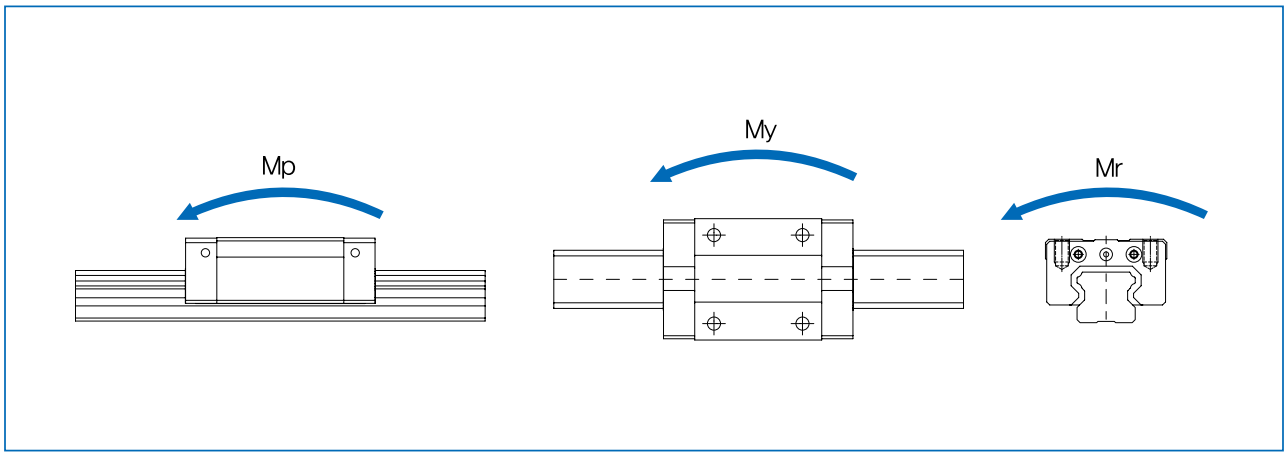
(*1) The material of carbon steel is confined to MB12-MB15
(*2) See Symbol List of Optional parts at page 101
(*3) See Radial Clearance at page 18
(*4) See Standard Tap Hole Type of Rail at page 85
(*5) See Selection of Precision Class at page 22



Unit : mm

Dimensions of rail								Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	W3	W4	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
										1 block	Double blocks	1 block	Double blocks	1 block		
10 0 -0.025	3.5	–	–	4	5	20	2.9x4.8x1.6	668	1,094	2.6	13.3	2.6	13.3	5.63	5.3	299
								806	1,430	4.4	21.4	4.4	21.4	7.36	6.8	
14 0 -0.05	5.5	–	–	5.5	10	30	3.5x6x3.2	1,102	1,514	3.4	19.5	3.4	19.5	10.83	11.7	560
								1,631	2,650	10.1	51.1	10.1	51.1	18.95	18.9	
								2,166	3,975	22.5	106.1	22.5	106.1	28.42	27.9	
18 0 -0.05	6	–	–	7	10	30	3.5x6x4.5	1,515	2,121	6.2	33.4	6.2	33.4	19.41	23.4	912
								2,197	3,606	18.2	87.6	18.2	87.6	33.00	39.6	
								2,878	5,303	37.8	172.9	37.8	172.9	48.52	54.9	
24 0 -0.05	8	–	–	8.5	15	40	4.5x8x4.5	2,753	3,339	10.3	57.3	10.3	57.3	40.73	40.5	1369
								4,015	5,723	31.2	152.2	31.2	152.2	69.83	68.4	
								5,539	9,062	73.8	338.7	73.8	338.7	110.56	99.9	
30 0 -0.05	10	–	–	9	15	40	4.5x8x4.5	3,694	4,351	14.3	82.8	14.3	82.8	66.1	60.0	2086
								5,457	7,599	43.7	219.3	43.7	219.3	115.5	103.8	
								7,576	12,142	111.5	517.4	111.5	517.4	184.6	165.5	
42 0 -0.05	9	23	9.5	9.5	15	40	4.5x8x4.5	4,954	6,056	26.9	145.3	26.9	145.3	128.40	85.5	2886
								6,579	9,085	62.5	306.5	62.5	306.5	192.60	126.0	
								9,076	14,384	147.8	680.6	147.8	680.6	304.94	183.6	

1N≒0.102kgf



9. Roller Linear Motion Guide R Series

1) Structure of R Series

WON Linear Motion Guide R Series uses the roller in the raceway surface of a rail and a block as a rolling element, and its four-row cylindrical roller has the contact angle of 45° which makes it possible to bears vertical tensile compression load and horizontal load equally. In the model, a roller, a rolling element, has less elastic displacement than a ball so that its displacement by external load is low. Due to the wide area of contact between the raceway surface and a roller, it can bear high load with high rigidity. Therefore, the model has a long life span, and excellent impact resistance and wear resistance. In addition, since it has less friction resistance, it supports smooth motion and quiet running. By imposing appropriate preload on a roller according to use conditions, it is possible to enhance more rigidity of a linear motion guide.

2) Features of R Series

a. High quality, high precision, and elimination of labor

b. High rigidity and high precision for implementing stable travel precision for a long time

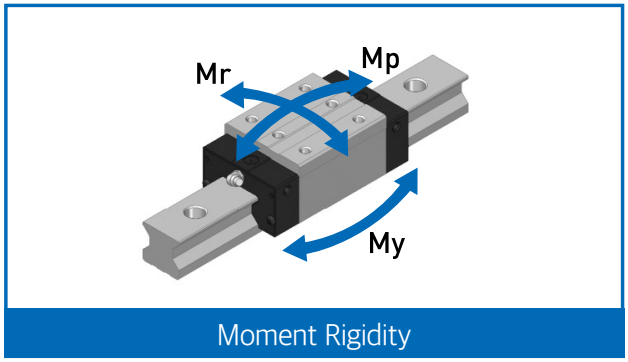
c. Excellent wear resistance and friction resistance that ensure a long life

d. High rigidity and high load capacity, compared to ball type devices with the same model number

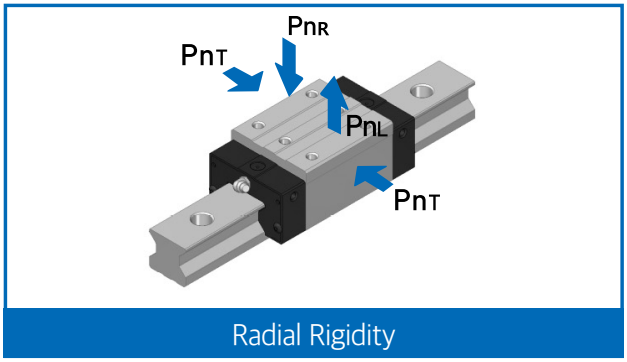
e. Low displacement for impact load or variable load, compared to ball type linear motion guides; excellent vibration resistance with a short vibration decay time for natural frequency

f. High basic load rating, compared to ball type linear motion guides with the same specification, makes it possible to support a compact design through the use of a smaller model number than that of a ball type device. In case of the same model number, it is possible to have a longer life span due to high load rating.

g. A variety of specifications for easy design

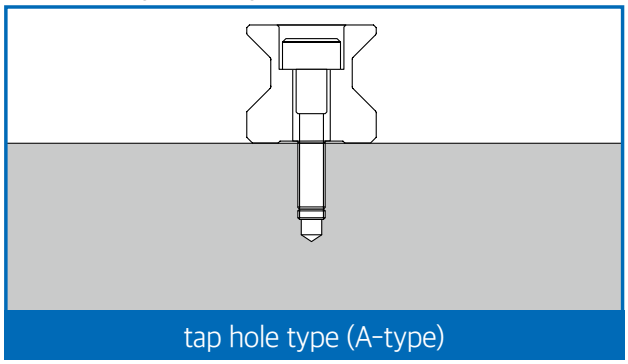


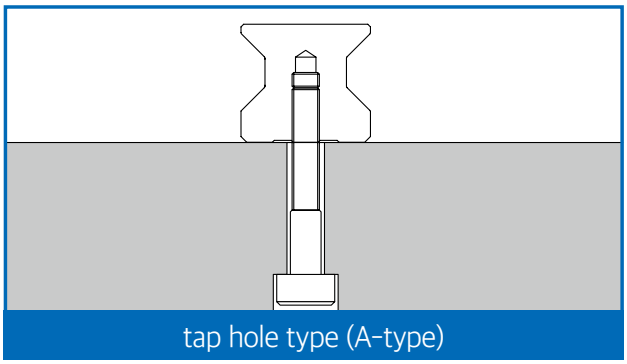
Moment Rigidity

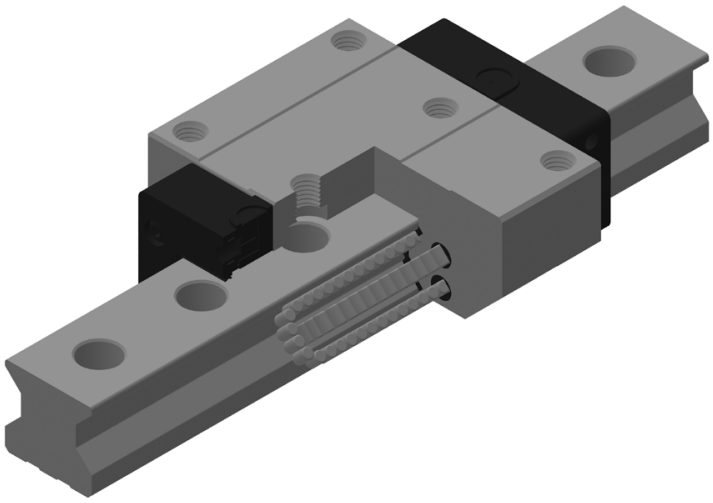


Radial Rigidity

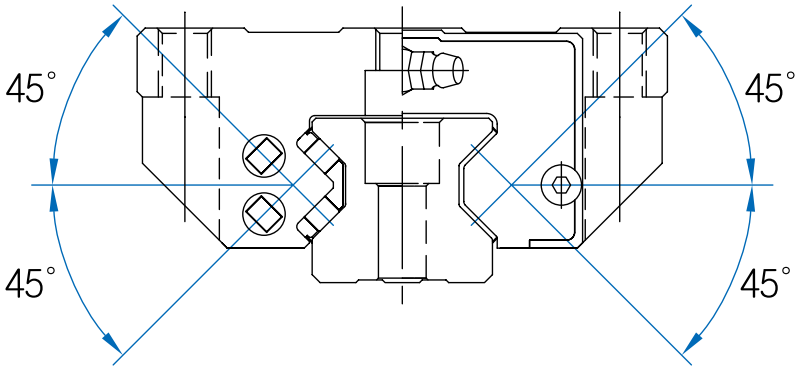
Tap hole type (A-type)


tap hole type (A-type)


tap hole type (A-type)

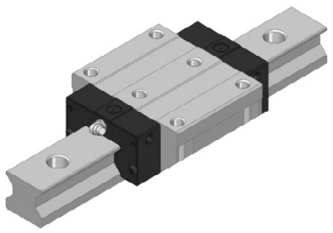
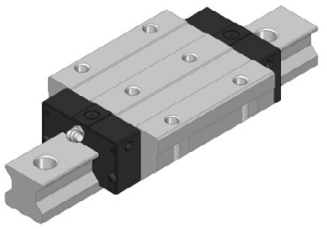
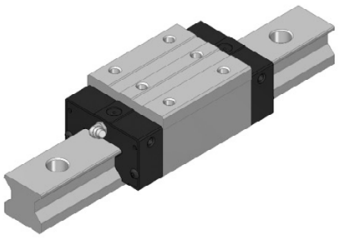
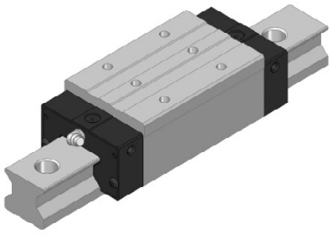


R Series

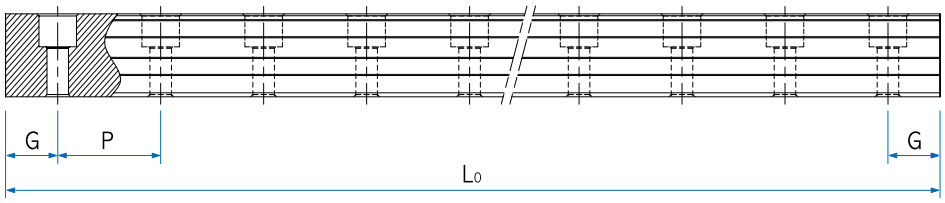


Cross Section

Types and Features

Category	Type	Shape & Feature		
Flange type	R-FN		• A roller type with the tap-pro cessed flange of a block, support ing installation from bottom to top and from top to bottom • 4-direction equal load type with high rigidity and high load	Machine tool CNC machining center CNC tapping center NC milling machine Boring machine Multiple machining center Planner miller Large injection machine Heavy-duty cutting machine Wire-cut pentahedral processing center Display test equipment
	R-FN		• The same cross section as in R-F Series; a roller type with increased load rating by enlarging the entire length (L_1) of a block • 4-direction equal load type with high rigidity and high load	
Compact type	R-RN		• A compact type with the tap-pro cessed top of a block, minimizing the width (W) of a block • 4-direction equal load type with high rigidity and high load	
	R-RL		• The same cross section as in R-R Series; a roller type with increased load rating by enlarging the entire length (L_1) of a block • 4-direction equal load type with high rigidity and high load	

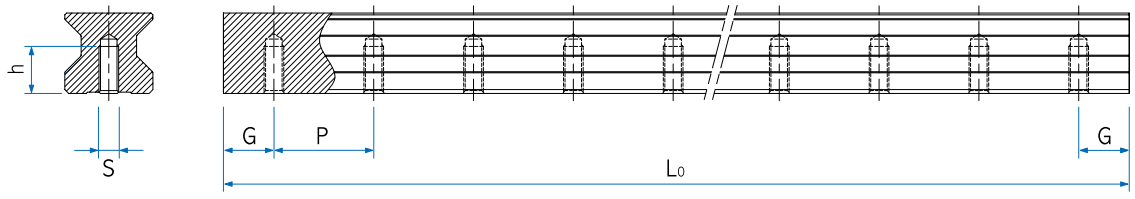
Standard and maximum lengths of rail



Unit : mm

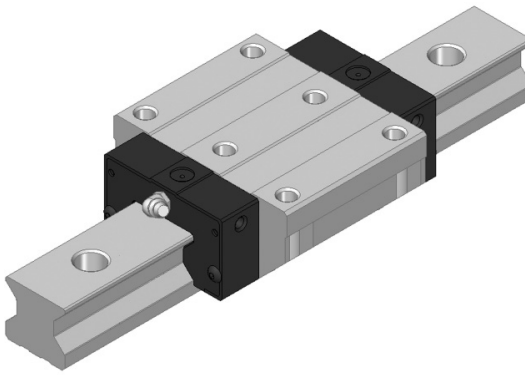
Model No.	R25	R30	R35	R45	R55	R65
Standard type	220	280	280	570	780	1270
	280	360	360	675	900	1570
	340	440	440	780	1020	1870
	400	520	520	885	1140	2170
	460	600	600	990	1260	2470
	⋮	⋮	⋮	⋮	⋮	2770
	3820	3760	3760	3615	3600	3070
	3880	3840	3840	3720	3720	3670
	3940	3920	3920	3825	3840	3970
	4000	4000	4000	3930	3960	
Standard pitch P	30	40	40	52.5	60	75
G	20	20	20	22.5	30	35
Max. length	4000	4000	4000	3930	3960	3970

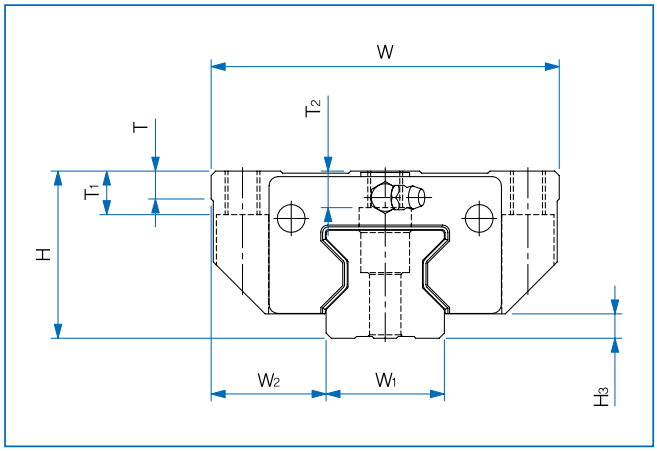
Standard tap hole type of rail



Model No.	S	h(mm)
R25	M6	12
R30	M8	15
R35	M8	17
R45	M12	24
R55	M14	24
R65	M16	25

R-FN Series, R-FL Series





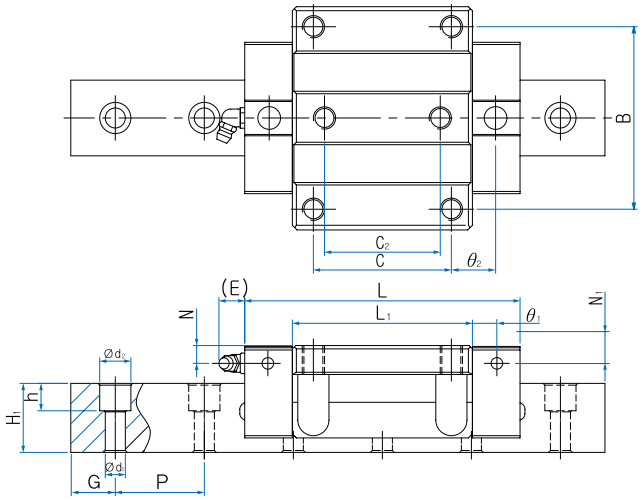
Model No.	External dimensions			Dimensions of block														H3
	Height H	Width W	Length L	B	C	C2	M	L1	T	T1	T2	N	E	θ1	N1	θ2	Grease nipple	
R 25FN	36	70	92.2	57	45	40	M8	63.3	7.5	9	6.7	5.5	12	6	5.5	15.2	B-M6F	6.5
R 25FL			110.2					81.3								24.2		
R 30FN	42	90	103.8	72	52	44	M10	71	8	11	8	6.5	12	6	6	16		7
R 30FL			126.6					93.8								27.4		
R 35FN	48	100	118.3	82	62	52	M10	79.5	8	12.5	10.5	7.6	12	12	7.6	16		7
R 35FL			142.3					103.5								28		
R 45FN	60	120	146.3	100	80	60	M12	101.7	10	15	13.5	8	16	12	8	17.9		9.5
R 45FL			178.8					134.2								34.1		
R 55FN	70	140	168.6	116	95	70	M14	121.6	12	18	13.4	9	16	13.5	9	21.3		10
R 55FL			207.7					160.7								40.9		
R 65FN	90	170	207.2	142	110	82	M16	146.2	15	25	24	13.8	16	18.5	13.8	29.1		13
R 65FL			255.2					194.2								53.1		

Composition of Model Name & Number

R35	FN		SS	2	G2	—	1000L	20/20		P		—	2
1	2	3	4	5	6		7	8	9	10	11		12

1 Model No.
2 Type of block : RN-Rectangular standard type / RL-Rectangular long type/ FN-Flange standard type / FL-Flange long type
3 No symbol-Standard block / E-Special block specification
4 Type of seal : SS-End seal+ Inside seal / ZZ-End seal+ Inside seal+ Metal scraper (*1)
5 Number of blocks assembled in one shaft
6 Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
7 Length of rail
8 Size of G value: standard G value has no symbol
9 No symbol-Rail counterbore type (top assembly) / A- Rail tap hole type (bottom assembly) (*3)
10 Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
11 No symbol-Standard rail / E-special rail specification
12 Number of axes used in the same plane

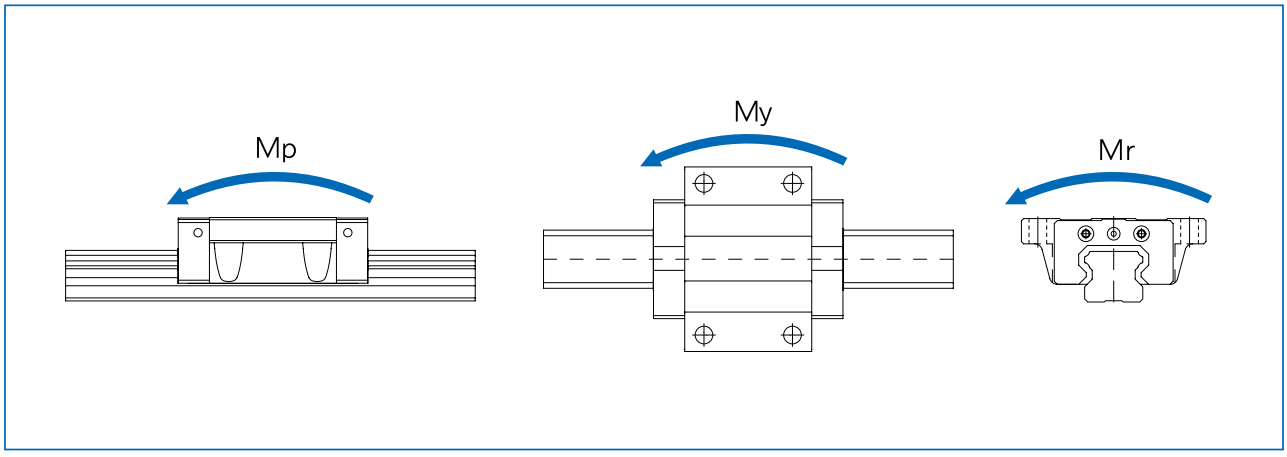
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3)) See Standard Tap Hole Type of Rail at page 93. (*4) See Selection of Precision Class at page 23.



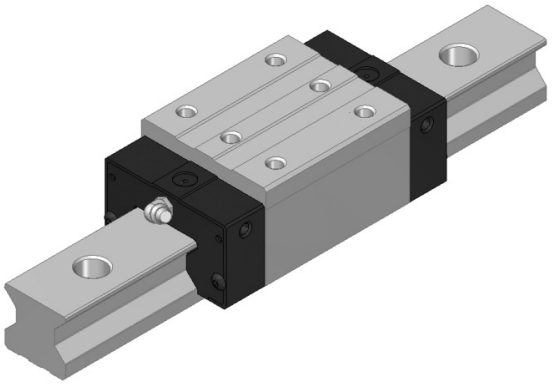
Unit : mm

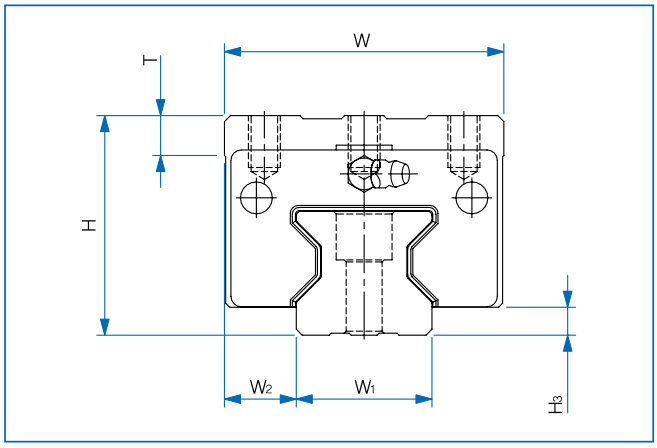
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W_1 ±0.05	W_2	Height H_1	G	Pitch P	$d_1 x d_2 x h$	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
23	23.5	24	20	30	7x11x9.7	29.1	56.2	0.570	3.090	0.570	3.090	0.820	0.8	3.1
						35.6	73.1	0.925	4.949	0.925	4.949	1.065	1.1	
28	31	28	20	40	9x14x12	44.4	87.3	0.985	5.395	0.985	5.395	1.470	1.4	4.4
						55.0	114.8	1.640	8.946	1.640	8.946	1.935	1.9	
34	33	31	20	40	9x14x12	61.0	114.0	1.460	7.972	1.460	7.972	2.345	2.1	6.2
						75.6	150.0	2.450	13.036	2.450	13.036	3.090	2.8	
45	37.5	38	22.5	52.5	14x20x17	103.8	202.0	3.265	17.712	3.265	17.712	5.430	4.0	10.1
						132.3	276.2	5.840	30.565	5.840	30.565	7.440	5.3	
53	43.5	43.5	30	60	16x23x20	146.9	278.0	5.390	28.523	5.390	28.523	8.880	6.8	13.4
						181.9	380.3	8.960	49.534	8.960	49.534	11.690	8.9	
63	53.5	55	35	75	18x26x22	231.0	450.6	10.600	56.301	10.600	56.301	17.140	13.0	20.1
						303.0	576.0	18.160	91.519	18.160	91.519	21.910	17.2	

1N≒0.102kgf



R-RN Series, R-RL Series





Model No.	External dimensions			Dimensions of block											H3
	Height H	Width W	Length L	B	C	M X ℓ	L1	T	N	E	θ1	N1	θ2	Grease nipple	
R 25RN	40	48	92.2	35	35	M6 x 9	63.3	9	9.5	12	6	9.5	20.2	B-M6F	6.5
R 25RL			110.2		50		81.3						21.7		
R 30RN	45	60	103.8	40	40	M8 x 11	71	9	9.5	12	6	9	22		7
R 30RL			126.6		60		93.8						23.4		
R 35RN	55	70	118.3	50	50	M8 x 13	79.5	12	14.6	12	12	14.6	22		7
R 35RL			142.3		72		103.5						23		
R 45RN	70	86	146.3	60	60	M10 x 20	101.7	20	18	16	12	18	27.9		9.5
R 45RL			178.8		80		134.2						34.1		
R 55RN	80	100	168.6	75	75	M12 x 19	121.6	20	19	16	13.5	19	31.3		10
R 55RL			207.7		95		160.7						40.9		

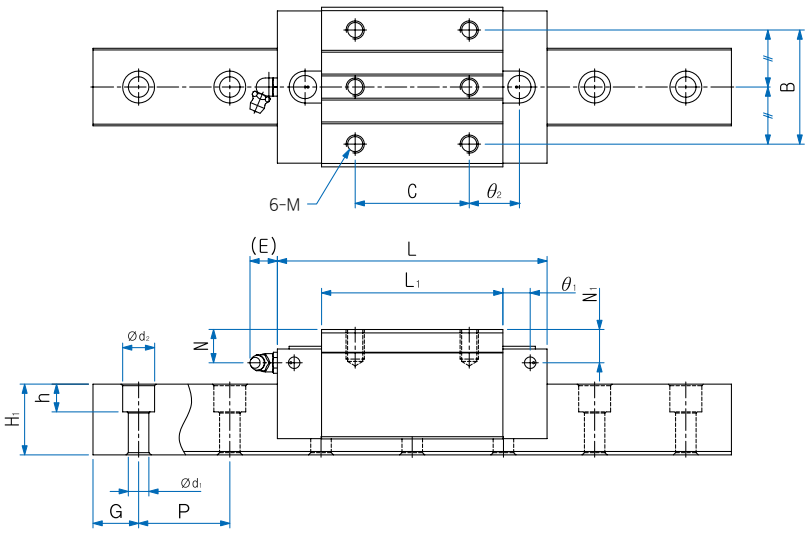
Composition of Model Name & Number

R35 | RN | | SS | 2 | G2 — 1000L | 20/20 | | P | | — 2

1 2 3 4 5 6 7 8 9 10 11 12

1 Model No.
2 Type of block : RN-Rectangular standard type / RL-Rectangular long type/ FN-Flange standard type / FL-Flange long type
3 No symbol-Standard block / E-Special block specification
4 Type of seal : SS-End seal+ Inside seal / ZZ-End seal+ Inside seal+ Metal scraper (*1)
5 Number of blocks assembled in one shaft
6 Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
7 Length of rail
8 Size of G value: standard G value has no symbol
9 No symbol-Rail counterbore type (top assembly) / A- Rail tap hole type (bottom assembly) (*3)
10 Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
11 No symbol-Standard rail / E-special rail specification
12 Number of axes used in the same plane

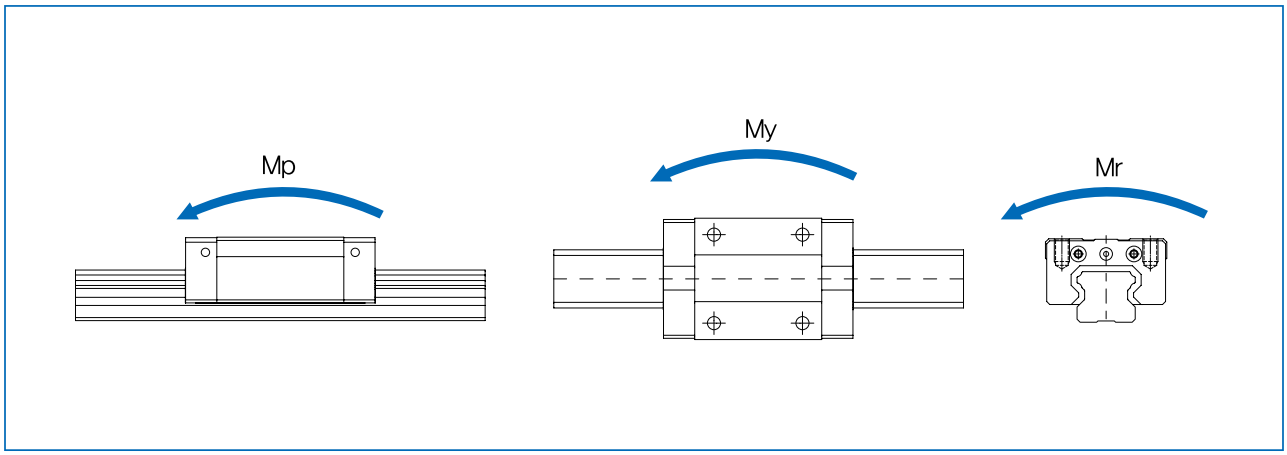
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3)) See Standard Tap Hole Type of Rail at page 93. (*4) See Selection of Precision Class at page 23.



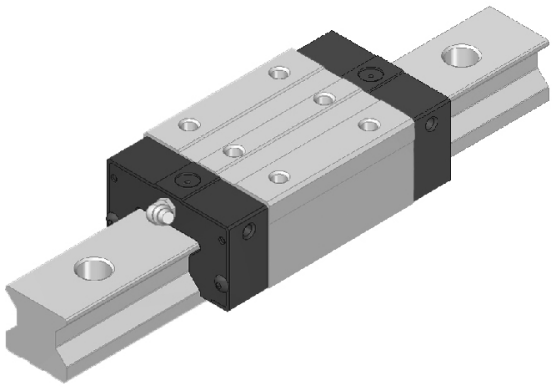
Unit : mm

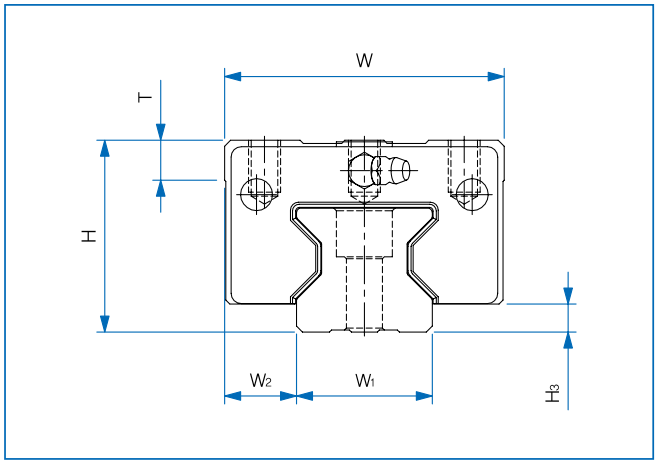
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
Width W1 ±0.05	W2	Height H1	G	Pitch P	d1xd2xh	C kN	Co kN	Mp		My		Mr	Block kg	Rail kg/m
								1 block	Double blocks	1 block	Double blocks	1 block		
23	12.5	24	20	30	7x11x9.7	29.1	56.2	0.570	3.090	0.570	3.090	0.820	0.7	3.1
						35.6	73.1	0.925	4.949	0.925	4.949	1.065	0.9	
28	16	28	20	40	9x14x12	44.4	87.3	0.985	5.395	0.985	5.395	1.470	1.2	4.4
						55.0	114.8	1.640	8.946	1.640	8.946	1.935	1.5	
34	18	31	20	40	9x14x12	61.0	114.0	1.460	7.972	1.460	7.972	2.345	2.0	6.2
						75.6	150.0	2.450	13.036	2.450	13.036	3.090	2.5	
45	20.5	38	22.5	52.5	14x20x17	103.8	202.0	3.265	17.712	3.265	17.712	5.430	3.9	10.1
						132.3	276.2	5.840	30.565	5.840	30.565	7.440	5.0	
53	23.5	43.5	30	60	16x23x20	146.9	278.0	5.390	28.523	5.390	28.523	8.880	6.2	13.4
						181.9	380.3	8.960	49.534	8.960	49.534	11.690	8.1	

1N≒0.102kgf



RS-RN Series, RS-RL Series





Model No.	External dimensions			Dimensions of block											H3
	Height H	Width W	Length L	B	C	M X ℓ	L1	T	N	E	θ1	N1	θ2	Grease nipple	
RS 25RN	36	48	92.2	35	35	M6 x 9	63.3	9	5.5	12	6	5.5	20.2	B-M6F	6.5
RS 25RL			110.2		50		81.3						21.7		
RS 35RN	48	70	118.3	50	50	M8 x 12	79.5	12	7.6	12	12	7.6	22		7
RS 35RL			142.3		72		103.5						23		
RS 45RN	60	86	146.3	60	60	M10 x 18	101.7	20	8	16	12	8	27.9		9.5
RS 45RL			178.8		80		134.2						34.1		
RS 55RN	70	100	168.6	75	75	M12 x 19	121.6	20	9	16	13.5	9	31.3		10
RS 55RL			207.7		95		160.7						40.9		
RS 65RN	90	126	207.2	76	70	M16 x 21	146.2	20	13.8	16	18.5	13.8	49.1		13
RS 65RL			255.2		120		194.2						48.1		

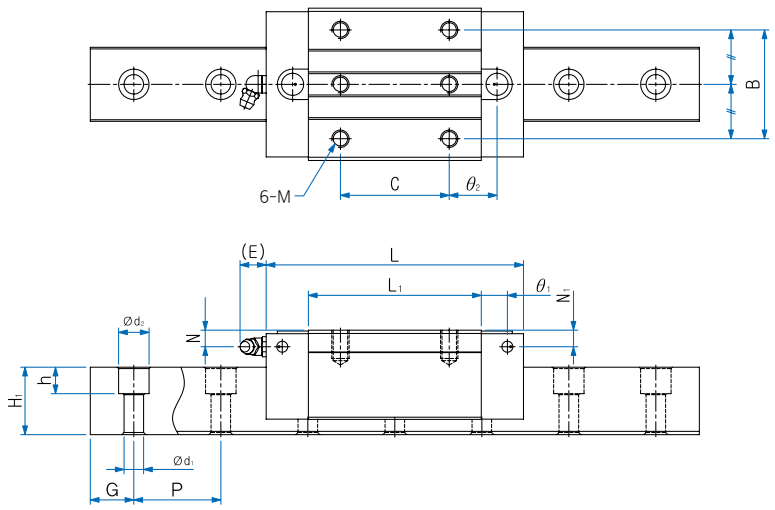
Composition of Model Name & Number

RS35 | RN | ☐ | SS | 2 | G2 | — | 1000L | 20/20 | ☐ | P | ☐ | — | 2

1 2 3 4 5 6 7 8 9 10 11 12

1. Model No.
2. Type of block : RN-Rectangular standard type / RL-Rectangular long type
3. No symbol-Standard block / E-Special block specification
4. Type of seal : SS-End seal+ Inside seal / ZZ-End seal+ Inside seal+ Metal scraper (*1)
5. Number of blocks assembled in one shaft
6. Symbol of clearance : No symbol-Normal preload / G1-Light preload / G2-Heavy preload / Gs-Special preload (*2)
7. Length of rail
8. Size of G value: standard G value has no symbol
9. No symbol-Rail counterbore type (top assembly) / A- Rail tap hole type (bottom assembly) (*3)
10. Symbol of precision : No symbol-Moderate / H-High / P-Precision / SP-Super precision / UP-Ultra precision (*4)
11. No symbol-Standard rail / E-special rail specification
12. Number of axes used in the same plane

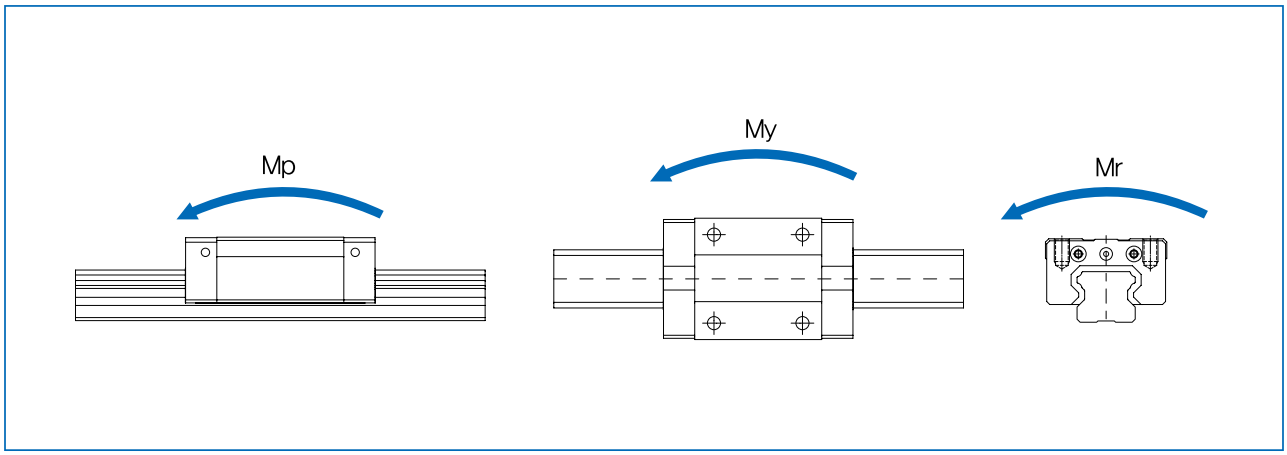
(*1) See Symbol List of Optional Parts at page 101. (*2) See Radial Clearance at page 18.
(*3)) See Standard Tap Hole Type of Rail at page 93. (*4) See Selection of Precision Class at page 23.



Unit : mm

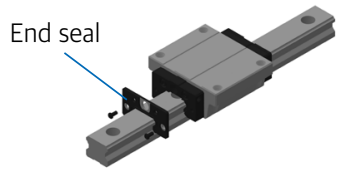
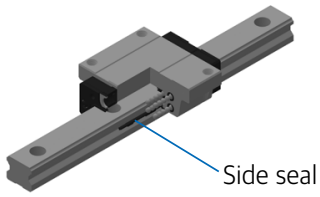
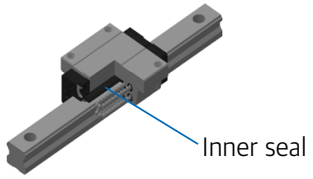
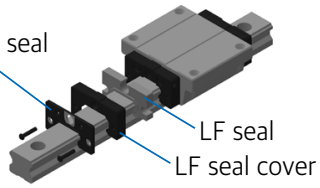
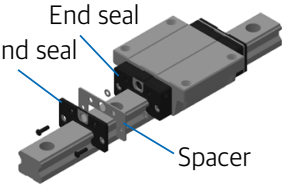
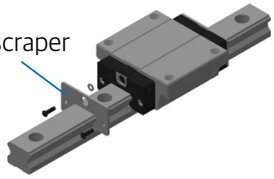
Dimensions of rail						Basic load rating		Static allowance moment kN·m					Mass	
								Mp		My		Mr		
Width W_1 ±0.05	W_2	Height H_1	G	Pitch P	d_1x$d_2$xh	C kN	Co kN	1 block	Double blocks	1 block	Double blocks	1 block	Block kg	Rail kg/m
23	12.5	24	20	30	7x11x9.7	29.1	56.2	0.570	3.090	0.570	3.090	0.820	0.6	3.1
						35.6	73.1	0.925	4.949	0.925	4.949	1.065	0.8	
34	18	31	20	40	9x14x12	61.0	114.0	1.460	7.972	1.460	7.972	2.345	1.7	6.2
						75.6	150.0	2.450	13.036	2.450	13.036	3.090	2.1	
45	20.5	38	22.5	52.5	14x20x17	103.8	202.0	3.265	17.712	3.265	17.712	5.430	3.2	10.1
						132.3	276.2	5.840	30.565	5.840	30.565	7.440	4.2	
53	23.5	43.5	30	60	16x23x20	146.9	278.0	5.390	28.523	5.390	28.523	8.880	5.3	13.4
						181.9	380.3	8.960	49.534	8.960	49.534	11.690	6.8	
63	31.5	55	35	75	18x26x22	231.0	450.6	5.390	34.735	5.390	34.735	8.880	30.4	20.1
						303.0	576.0	8.960	60.425	8.960	60.425	11.690	33.6	

1N≒0.102kgf

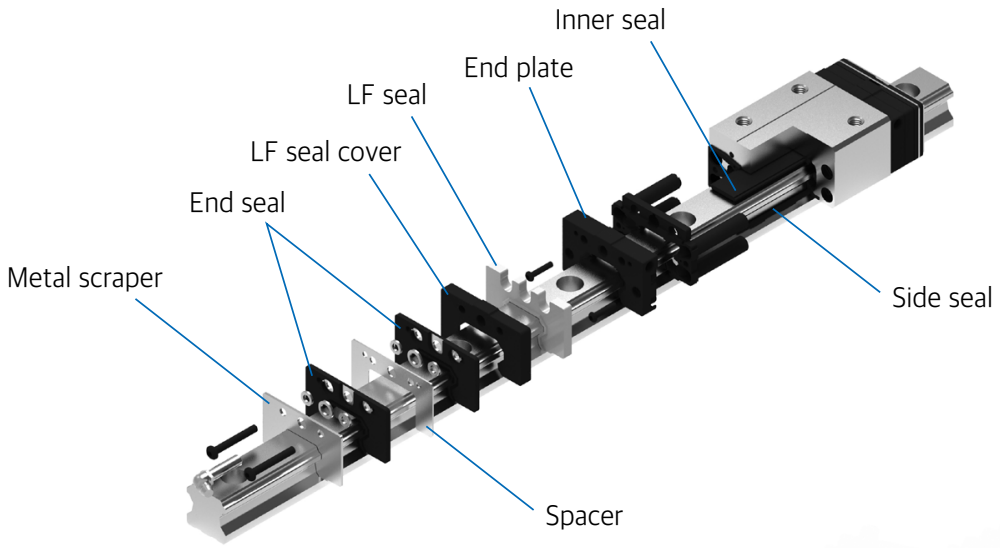


13 Options

1. Seal and rail cap

Item	Seal attachment position	Applied environments
End seal		• Where there is a lot of dust or particles
Side seal		• Where foreign substance can easily flow in from the flank or bottom • Where the assembled linear motion guide moves in a vertical, horizontal, or reverse direction • Where there are a lot of cutting chips or foreign substance • Where cutting chips or foreign substances are highly likely to flow into a block
Inner seal		
LF seal		• Where a long interval of refilling is needed due to a narrow space • An environment at 40℃ or so • Where there needs to avoid any contact with organic solvents, such as thinner or milky white oil
Double seal		• Where strong sealing is needed due to a lot of dust or cutting chips
Metal scarper		• Where spatters, such as slag or metal powder, arise in welding

Symbol List of Optional Parts



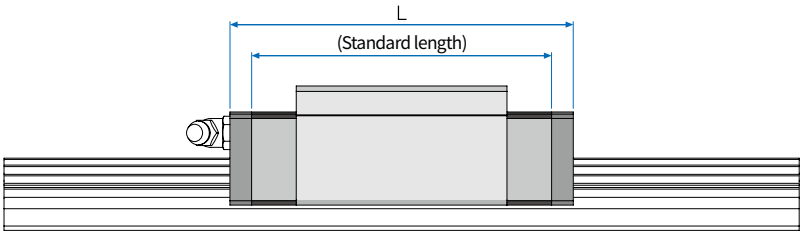
Symbol	Optional parts
UU	End seal
SS	Side seal+ Inner seal + End seal
DD	Side seal+ Inner seal + End seal+ Spacer+ End seal
ZZ	Side seal+ Inner seal + End seal+ Metal scraper
KK	Side seal+ Inner seal + End seal+ Spacer+ End seal+ Metal scraper
UULF	LF Unit+ End seal
SSLF	Side seal+ Inner seal + LF Unit+ End seal
DDLF	Side seal+ Inner seal + LF Unit+ End seal+ Spacer+ End seal
ZZLF	Side seal+ Inner seal + LF Unit+ End seal+ Metal scraper
KKLF	Side seal+ Inner seal + LF Unit+ End seal+ Spacer+ End seal+ Metal scraper

Optional-parts mapping table by model number

Model No.		Full ball type								Spacer ball chain type					Full roller type
		H		HB	S	HS		M	MB	H...S		HS...S		S...S	R
		15~35	45~55	17~35	15~25	25~35		5~20	5~15	25~35		25~35		15~25	25~65
End seal	UU	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Side seal	-	O	O *1)	-	O	O	O *1)	-	-	O	O *1)	O	O *1)	O	-
Inner seal	-	O	O	-	O	O	O	-	-	O	O	O	O	O	-
Side seal +Inner seal +End seal	SS	O	O	O *2)	O	O	O	-	-	O	O	O	O	O	O *2)
Side seal +Inner seal +End seal +Metal scraper	ZZ	O	O	O	O	O	O	-	-	O	O	O	O	O	O *3)
Side seal +Inner seal +Double seal	DD	O	O	O	O	O	O	-	-	O	O	O	O	O	O *3)
Side seal +Inner seal +End seal +Metal scraper	KK	O	O	O	O	O	O	-	-	O	O	O	O	O	O *3)
LF seal +End seal	UULF	O	O	O	O	O	O	O	O	O	O	O	O	O	O *3)
LF seal +Side seal +Inner seal +End seal	SSLF	O	O	O	O	O	O	-	-	O	O	O	O	O	O *3)
LF seal +Side seal +Inner seal +Double seal	DDLF	O	O	O	O	O	O	-	-	O	O	O	O	O	O *3)
LF seal +Side seal +Inner seal +End seal +Metal scraper	ZZLF	O	O	O	O	O	O	-	-	O	O	O	O	O	O *3)
LF seal +Side seal +Inner seal +Double seal +Metal scraper	KKLF	O	O	-	O	O	O	-	-	O	O	O	O	O	O *3)

*1) In H,HS, H...S, and HS...S Series, the basic optional part of model no. 30 and no. 35 is Inner Seal.
*2) In H Series (model no. 45 and no. 55) and HB Series and R Series, Side Seal and Inner Seal is an integral type.
*3) In R Series, if it is necessary to apply LF seal and metal scrapper, please contact us.

Dimension Table of the Installation of Optional Parts



Unit:mm

Model No.		L									
		UU	SS	ZZ	DD	KK	UULF	SSLF	DDLF	ZZLF	KKLF
H	15 FN/RN/FN...S/RN...S	56.5	56.5	60.7	61.5	65.7	70.5	70.5	75.5	74.7	79.7
	15 FL/RL/FL...S/RL...S	64.8	64.8	69	69.8	74	78.8	78.8	83.8	83	88
	20 FN/RN/FN...S/RN...S	73.2	73.2	78.2	79.4	84.4	87.2	87.2	93.4	92.2	98.4
	20 FL/RL/FL...S/RL...S	89.1	89.1	94.1	95.3	100.3	103.1	103.1	109.3	108.1	114.3
	25 FN/RN/FN...S/RN...S	83.2	83.2	89.2	90.4	96.4	97.2	97.2	104.4	103.2	110.4
	25 FL/RL/FL...S/RL...S	103.1	103.1	109.1	110.3	116.3	117.1	117.1	124.3	123.1	130.3
	30 FN/RN/FN...S/RN...S	99.3	99.3	105.3	106.5	112.5	113.3	113.3	120.5	119.3	126.5
	30 FL/RL/FL...S/RL...S	121.5	121.5	127.5	128.7	134.7	135.5	135.5	142.7	141.5	148.7
	35 FN/RN/FN...S/RN...S	111.8	111.8	117.8	119	125	125.8	125.8	133	131.8	139
	35 FL/RL/FL...S/RL...S	137.2	137.2	143.2	144.4	150.4	151.2	151.2	158.4	157.2	164.4
	45 FN/RN/FN...S/RN...S	139	139	148.9	-	-	154	154	-	163.9	-
	45 FL/RL/FL...S/RL...S	170.8	170.8	180.7	-	-	185.8	185.8	-	195.7	-
	55 FN/RN/FN...S/RN...S	163	163	172.9	-	-	179	179	-	188.9	-
	55 FL/RL/FL...S/RL...S	201.1	201.1	211	-	-	217.1	217.1	-	227	-
HB	17 F/R	51	51	54.6	-	-	61.2	61.2	-	64.8	-
	21 F/R	59	59	63.4	-	-	69.2	69.2	-	73.6	-
	27 F/R	72.5	72.5	76.9	-	-	85.1	85.1	-	89.5	-
	35 F/R	105.3	105.3	110.9	-	-	120.3	120.3	-	125.9	-
S	15 FC/RC/FC...S/RC...S	39.8	39.8	44	44.8	49	53.8	53.8	58.8	58	63
	15 FN/RN/FN...S/RN...S	56.5	56.5	60.7	61.5	65.7	70.5	70.5	75.5	74.7	79.7
	20 FC/RC/FC...S/RC...S	47.8	47.8	52.8	54	59	61.8	61.8	68	66.8	73
	20 FN/RN/FN...S/RN...S	66.8	66.8	71.8	73	78	80.8	80.8	87	85.8	82
	25 FC/RC/FC...S/RC...S	59.4	59.4	65.4	66.6	72.6	73.4	73.4	80.6	79.4	86.6
	25 FN/RN/FN...S/RN...S	83.2	83.2	89.2	90.4	96.4	97.2	97.2	104.4	103.2	110.4
HS	25 RN/RN...S	83.2	83.2	89.2	90.4	96.4	97.2	97.2	104.4	103.2	110.4
	25 RL/RL...S	103.1	103.1	109.1	110.3	116.3	117.1	117.1	124.3	123.1	130.3
	30 RN/RN...S	99.3	99.3	105.3	106.5	112.5	113.3	113.3	120.5	119.3	126.5
	30 RL/RL...S	121.5	121.5	127.5	128.7	134.7	135.5	135.5	142.7	141.5	148.7
	35 RN/RN...S	111.8	111.8	117.8	119	125	125.8	125.8	133	131.8	139
	35 RL/RL...S	137.2	137.2	143.2	144.4	150.4	151.2	151.2	158.4	157.2	164.4

Unit:mm

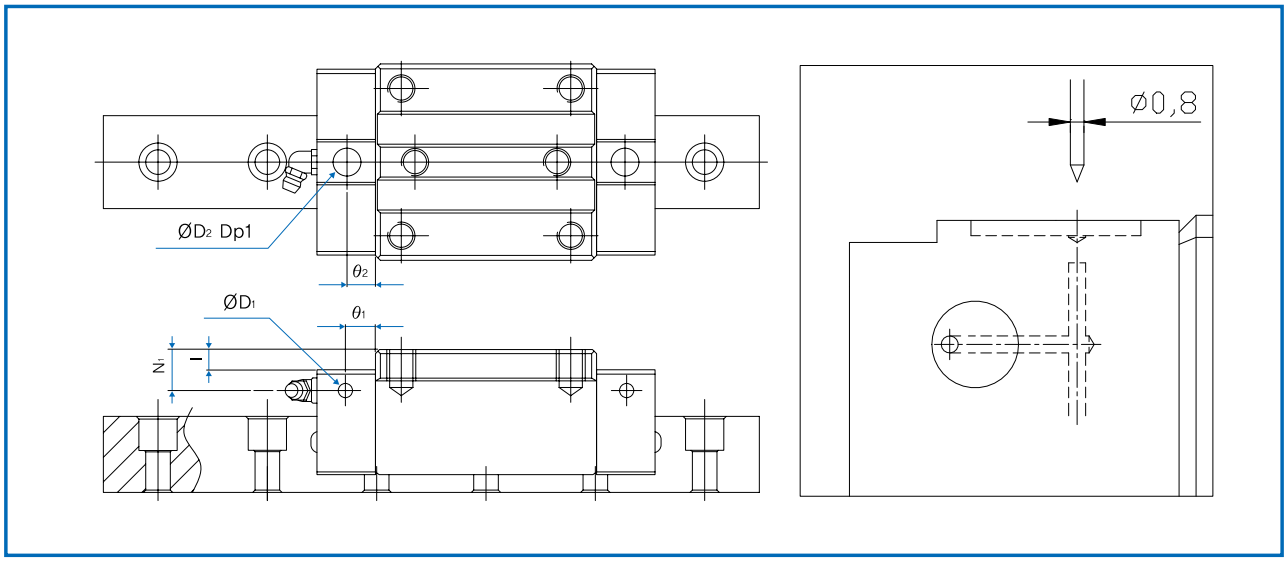
Model No.		L	
		UU	UULF
M	5 C	17	21.4
	5 N/NA	20	24.4
	7 C	19.8	24.8
	7 N	24.3	29.3
	7 L/LA	31.8	36.8
	9 C	22.4	27.4
	9 N	31.3	36.3
	9 L/LA	41.4	46.4
	12 C	26.4	32.4
	12 N	34.9	40.9
	12 L	45.4	51.4
	15 C	34.4	41.4
	15 N	44.4	51.4
	15 L	59.4	66.4
	20 C	39.8	46.8
	20 N	51.8	58.8
	20 L	69.8	76.8

Unit:mm

Model No.		L	
		UU	UULF
MB	5C	21	25.4
	5N	25	29.4
	7C	24	29
	7N	33	38
	7L	43.5	48.5
	9C	28.1	33.1
	9N	40.2	45.2
	9L	52	57
	12C	31.1	37.1
	12N	44.5	50.5
	12L	59.7	65.7
	13C	35.3	42.3
	13N	49.2	56.2
	13L	68.6	75.6
	15C	42.8	49.8
	15N	56.6	63.6
	15L	75.8	82.8

2. Oil inlet

In R Series, it is possible to refill on the side and top. The standard specification of an oil inlet is 'not run through', in order to prevent foreign substances from flowing in a block. For use, please contact WON ST
When performing direct penetration machining for lubrication access on the top surface, please consider the following:
Be aware that there is an unperforated small hall in the top surface O-ring groove for lubrication.
Heat a metal tip with a diameter of 0.8mm and melt the small hall while penetrating it.
Ensure the metal tip penetrates to a depth of 1~2mm after making contact with the small hall.
Drill work may lead to contamination of the internal lubrication pathways

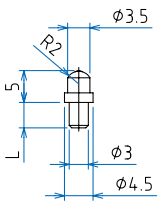


Unit : mm

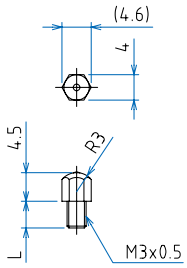
Model No.		Hole for a side nipple			Top oil inlet			
		θ1	N1	D1	D2	(O-ring)	l	θ2
R	25F(L)	6	5.5	3.3	10.2	P7	0.4	6
	30F(L)	6	6	5.1	10.2	P7	0.4	6.5
	35F(L)	12	7.6	5.1	10.2	P7	0.4	7.25
	45F(L)	12	8	5.1	10.2	P7	0.4	7
	55F(L)	13.5	9	5.1	10.2	P7	0.4	8
	65F(L)	18.5	13.75	5.4	10.2	P7	0.4	11
	25R(L)	6	9.5	3.3	10.2	P7	4.4	6
	30R(L)	6	9	5.1	10.2	P7	3.4	6.5
	35R(L)	12	14.6	5.1	10.2	P7	7.4	7.25
	45R(L)	12	18	5.1	10.2	P7	10.4	7
	55R(L)	13.5	19	5.1	10.2	P7	10.4	8
RS	25R(L)	6	5.5	3.3	10.2	P7	0.4	6
	35R(L)	12	7.6	5.1	10.2	P7	0.4	7.25
	45R(L)	12	8	5.1	10.2	P7	0.4	7
	55R(L)	13.5	9	5.1	10.2	P7	0.4	8
	65R(L)	18.5	13.75	5.4	10.2	P7	0.4	11

3. Grease nipple

WON ST provides various types of grease nipples necessary for lubricating a linear motion system.



A-Ø3



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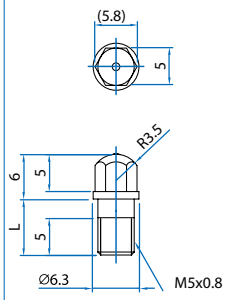
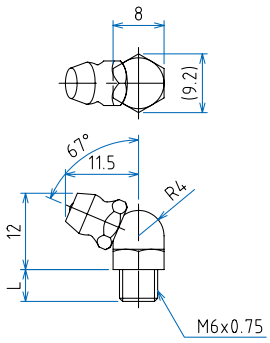
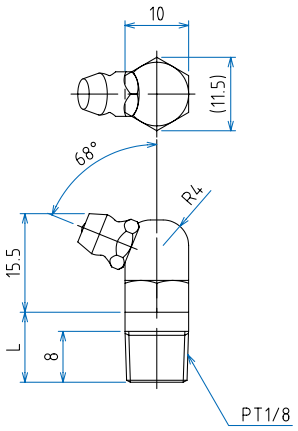


A-M5



B-M6F

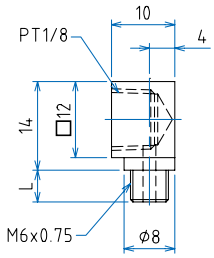


B-PT1/8

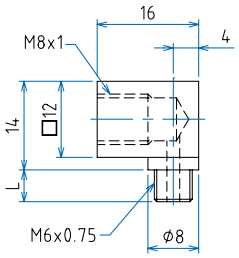
Applied model no.	Nipple model no.	Thread (L) length									
		UU	SS	DD	ZZ	KK	UULF	SSLF	DDLF	ZZLF	KKLF
HB17, HB21	A-Ø3	4	4	-	6.5	-	9	9	-	11	-
M15, M20,MB13,MB15	A-M3	4.2	4.2	-	-	-	7.7	7.7	-	-	-
S-H15	A-M5	5	5	7.5	7.5	10	12	12	14.5	14.5	17
S-H20	B-M6F	7	7	10	10	12	14.5	14.5	17	17	19
S-H25		7	7	10	10	14.5	14.5	14.5	17	17	22
H30		7	7	12	12	14.5	14.5	14.5	19	19	22
H35		10	10	14.5	14.5	17	17	17	19	19	22
HB27		5	5	-	7	-	12	12	-	14.5	-
R25, 30, 35, 45, 55, 65		-	5	-	-	-	-	-	-	-	-
H45, H55	B-PT 1/8	8	8	-	11	-	15.5	15.5	-	18	-

4. Connection of oil pipes

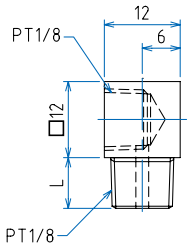
WOL Type



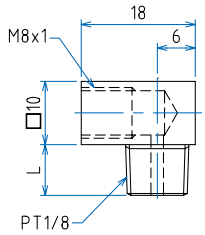
WOL-A



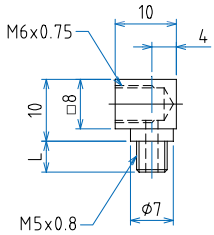
WOL-B



WOL-C

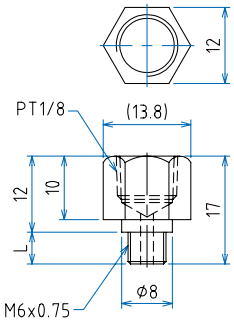


WOL-D

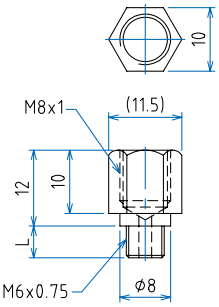


WOL-E

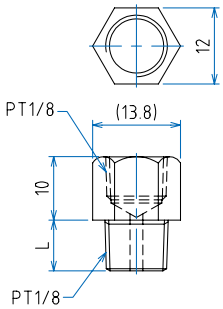
WOS Type



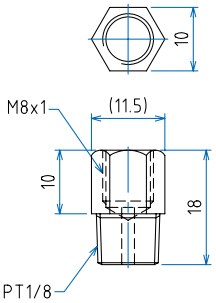
WOS-A



WOS-B



WOS-C

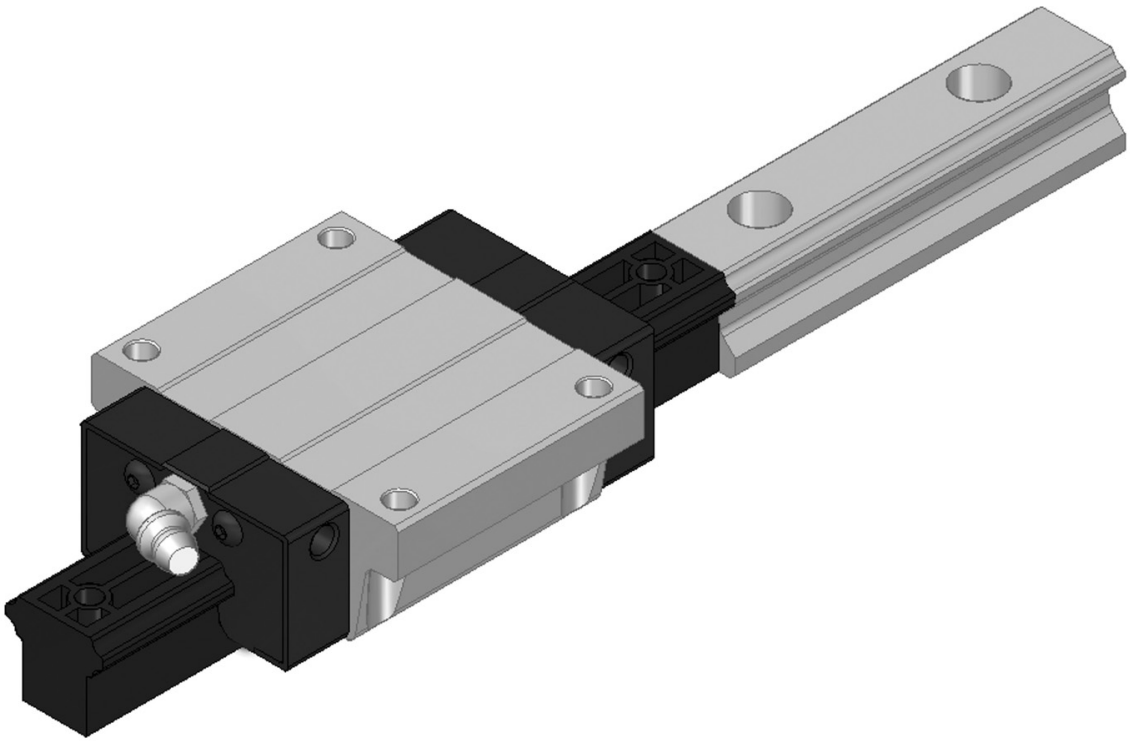


WOS-D

Applied model no.	Nipple model no.	Thread (L) length									
		UU	SS	DD	ZZ	KK	UULF	SSLF	DDLF	ZZLF	KKLF
S-H15	WOL-E	5	5	7.5	7.5	10	12	12	14.5	14.5	17
S-H20	WOS-B	7	7	10	10	12	14.5	14.5	17	17	19
S-H25	WOL-A, WOL-B WOS-A, WOS-B	7	7	10	10	14.5	14.5	14.5	17	17	22
H30		7	7	12	12	14.5	14.5	14.5	19	19	22
H35		10	10	14.5	14.5	17	17	17	19	19	22
HB27		5	5	-	7	-	12	12	-	14.5	-
HB35		5	5	-	10	-	12	12	-	17	-
H45, H55	WOL-C, WOL-D WOS-C, WOS-D	8	8	-	11	-	15.5	15.5	-	18	-

5. How to install with the use of a support rail

To get a block of a linear motion guide in or out of a rail, it is required to use a support rail for safety. If a rail is mounted on a rail without any support rail, a rolling element can be separated from the block. Moreover, internal parts can be damaged or destroyed by foreign substances.
Installing a block without a rolling element may sharply shorten life of the block, reduce load, and cause early destruction.
If you use a support rail, do not lean it. Adhere it to the end of a rail first and then push it in the rail direction by apply force gradually. If a block has a rolling element separated and gets contaminated by dust, please do not use the product but contact WON ST.



14 Precautions for Handling Linear Motion Guide

1. Handling

1) WON Linear Motion Guide is damp-proof packaged after grease removal and cleaning. So, please open it right before use.
2) As for the compatible product of rail and block, a plastic support rail is combined with the block. Please assemble it with the rail carefully.
3) If you reassemble a block-rail set product or a single block product after dismantling it into pieces, foreign substance may intrude into the block or cause performance degradation that leads to unsmooth rolling motion or damage. So please do not disassemble it at your discretion.
4) If either a rail or a block leans to one side, the block or rail may fall to be damaged. Please be careful not to get a block or rail separated.
5) A block' end plate is made of plastic. Imposing an impact on it may cause its damage. Please be careful

2. Lubrication

1) If the product supplied is coated with rust preventive oil, clean it off thoroughly first and then fill with a lubricant before use.
2) DO NOT mix with other lubricants with a different thickener or additive. If so, it may destroy the structure of grease or cause a harmful effect.
3) Viscosity of grease depends on temperature. It increases in winter due to low temperature, and friction of a linear motion guide resistance may increase.
4) If you need to use a special lubricant, please contact WON ST before use.
5) When you use oil as a lubricant, oil may fail to reach the raceway groove depending on the assembly status or direction of a block or rail. In this case, there is no lubrication effect. WON ST offers different lubrication methods suitable for assembly environments. So please contact us.

3. Caution for use

1) After opening the product, please put a damp-proof agent in a dry container for storage.
2) Please handle the product after wearing plastic gloves in a clean place.
3) Please be careful to prevent foreign substances that may impede rolling motion or cause functional damage.
4) Please use a holding door or cover to prevent a linear motion guide from being exposed directly to poor environments that may cause corrosion or damage.
5) As for the linear motion guide based on standard plastic end plate, use it at 80℃ or below. If you need to use it at 80℃ or above, please order a special metal end plate.
6) If rail of a linear motion guide is fixed at ceiling or in a high place and its block bears load downwards, it is possible for the block to be separated from the rail and for the block and its attached parts to fall as the end plate is damaged or a ball falls off. So, it is required to take safety measures, such as the installation of a safety device.

4. Storage

A rail may warp depending on a storage condition. For storage, place a linear motion guide horizontally in the package box offered by WON ST or its equivalent box with the flat bottom. Avoid a place with high or low temperature and high humidity.

Troubles and Troubleshooting of Linear Motion Guide

Type	Trouble	Cause	Action
Fatigue failure of the rolling surface	• Flacking - Caused by rolling fatigue of the rolling surface - Maximum shear stress-induced internal cracks are expressed on the surface.	Damage by life	Replace the linear motion guide.
		Overload	Review the model no. selected; Use a higher model no; Lower a level of load; Reinforce assembly precision for installation; Enhance the rigidity of base and table
		Poor lubrication	Refill a lubricant; Shorten a refilling cycle of lubricant; Review the lubricant in use; Improve the lubricant passage.
		Intrusion of foreign substances	Improve seal performance; Add a seal; Take additio nal measures for dust prevention.
Indentation of the rolling surface	• Indentation - Caused by plastic deformation of the rolling surface due to excessive external load	Impact load or excessive external load	Review the model no. selected; Make service conditions less strict; Lower a level of load; Reinforce assembly precision for installation; Use a higher model no.
		Careless handling	Improve the methods and conditions of handling to prevent impact and fall.
Seizing	• Burning - Rough surface of the rolling surface due to slight burning by friction between a rolling element and the rolling surface - Cause for the discoloration of the rolling surface, weakened hardness, and flaking	Poor lubrication	Refill a lubricant; Use an appropriate lubricant; Improve lubrication
		Overload	Review service conditions; Lower a level of load; Use a higher model no.; Enhance assembly precision for installation.
Cracking	• Cracking - Partial breaking into pieces of a rolling element or rolling surface due to excessive external load	mpact load or excessive external load	Review the model no. selected; Use a higher model no.; Lower a level of load; Reinforce assembly precision for installation
		Poor raceway circulation of a rolling element	Prevent foreign substances; Improve measures for dust prevention; Refill a lubricant; Shorten a refilling cycle of lubricant; Improve lubrication
Abnormal wear	• Abnormal wear - Caused by the sliding of a rolling element and the rolling surface; the more sliding, the rapidly more wear - Accompany oxidation wear causing poor precision and preload failure	Impact load or excessive external load	Review the model no. selected; Use a higher model no.; Lower a level of load; Reinforce assembly precision for installation.
		Intrusion of foreign substances	Reinforce seal performance; Improve measures for dust prevention
		Poor lubrication	Refill a lubricant; Use an appropriate lubricant; Improve lubrication; Improve the lubrication passage.
Flatting corrosion	• Vibration - This problem arises when running at vibrant stroke causes the loss of oil film, and the oxidation of the fine dust caused by the sliding of a rolling element and the rolling surface facilitates wear.	Load	Review service conditions; Use a higher model no.; Reinforce assembly precision for installation.
		Vibration	Improve transfer conditions; Replace a lubricant; Improve lubrication; Shorten a refilling cycle of lubricant.
		Intrusion of foreign substances	Improve a seal; Establish measures for dust prevention.
Rust generation	• Rust - Caused by the loss of oil film or the contact of an exposed part with water, acid, and alkali. In particular, when cooling water flows in a block, it degrades lubrication and causes rust. Early flaking arises due to concentrated stress.	Intrusion of cooling water	Apply surface treatment for rust prevention; Improve seal performance; Replace a lubricant; replace a coolant; Refill a lubricant; Shorten a refilling cycle of lubricant.
		High humidity	Apply surface treatment for rust prevention; Improve environments.
		Poor handling	Improve a storage place; Reinforce sealing treatment; Apply a sufficient amount of rust preventive oil.

<Table of comparison with the full ball type products made by different manufacturers>

1. H Series (Standard Type)

WON	THK	NSK	PMI	HIWIN
H 15FN H 15FL	HSR 15A, B, C HSR 15LC	LH 15EL, EM LH 15GL, GM	MSA 15A	HGW 15CA
H 20FN H 20FL	HSR 20A, B, C HSR 20LA, LB, LC	LH 20EL, EM LH 20GL, GM	MSA 20A MSA 20LA	HGW 20CA HGW 20HA
H 25FN H 25FL	HSR 25A, B, C HSR 25LA, LB, LC	LH 25EL, EM LH 25GL, GM	MSA 25A MSA 25LA	HGW 25CA HGW 25HA
H 30FN H 30FL	HSR 30A, B, C HSR 30LA, LB, LC	LH 30EL, EM LH 30GL, GM	MSA 30A MSA 30LA	HGW 30CA HGW 30HA
H 35FN H 35FL	HSR 35A, B, C HSR 35LA, LB, LC	LH 35EL, EM LH 35GL, GM	MSA 35A MSA 35LA	HGW 35CA HGW 35HA
H 45FN H 45FL	HSR 45A, B, C HSR 45LA, LB, LC	LH 45EL, EM LH 45GL, GM	MSA 45A MSA 45LA	HGW 45CA HGW 45HA
H 55FN H 55FL	HSR 55A, B, C HSR 55LA, LB, LC	LH 55EL, EM LH 55GL, GM	MSA 55A MSA 55LA	HGW 55CA HGW 55HA
H 15RN H 15RL	HSR 15R HSR 15LR	LH 15AN, AL LH 15BL, BL	MSA 15S	HGH 15CA
H 20RN H 20RL	HSR 20R HSR 20LR	LH 20AN, AL LH 20BN, BL	MSA 20S MSA 20LS	HGH 20CA HGH 20HA
H 25RN H 25RL	HSR 25R HSR 25LR	LH 25AN, AL LH 25BN, BL	MSA 25S MSA 25LS	HGH 25CA HGH 25HA
H 30RN H 30RL	HSR 30R HSR 30LR	LH 30AN, AL LH 30BN, BL	MSA 30S MSA 30LS	HGH 30CA HGH 30HA
H 35RN H 35RL	HSR 35R HSR 35LR	LH 35AN, AL LH 35BN, BL	MSA 35S MSA 35LS	HGH 35CA HGH 35HA
H 45RN H 45RL	HSR 45R HSR 45LR	LH 45AN, AL LH 45BN, BL	MSA 45S MSA 45LS	HGH 45CA HGH 45HA
H 55RN H 55RL	HSR 55R HSR 55LR	LH 55AN, AL LH 55BN, BL	MSA 55S MSA 55LS	HGH 55CA HGH 55HA

2. HW Series (Wide Type)

WON	THK	NSK	PMI	HIWIN	IKO
HB 17F	HRW 17CA	LW 17EL	-	WEW 17CC	LWFF 33
HB 21F	HRW 21CA	LW 21EL	MSG 21E	WEW 21CC	LWFF 37
HB 27F	HRW 27CA	LW 27EL	MSG 27E	WEW 27CC	LWFF 42
HB 35F	HRW 35CA	LW 35EL	MSG 35E	WEW 35CC	LWFF 69
HB 17R	HRW 17CR	-	-	WEH 17CA	LWFS 33
HB 21R	HRW 21CR	-	MSG 21S	WEH 21CA	LWFS 37
HB 27R	HRW 27CR	-	MSG 27S	WEH 27CA	LWFS 42
HB 35R	HRW 35CR	-	MSG 35S	WEH 35CA	-

S Series (Slim Type)

WON	THK	NSK	PMI	HIWIN
S 15RC S 15RN	SR 15V SR 15W	LS 15CL LS 15AL	MSB 15TS MSB 15S	EGH 15SA EGH 15CA
S 20RC S 20RN	SR 20V SR 20W	LS 20CL LS 20AL	MSB 20TS MSB 20S	EGH 20SA EGH 20CA
S 25RC S 25RN	SR 25V SR 25W	LS 25CL LS 25AL	MSB 25TS MSB 25S	EGH 25SA EGH 25CA
S 15FC S 15FN	SR 15SB SR 15TB	LS 15EM LS 15JM	MSB 15TE MSB 15E	EGW 15CA EGW 15CB
S 20FC S 20FN	SR 20SB SR 20TB	LS 20EM LS 20JM	MSB 20TE MSB 20E	EGW 20CA EGW 20CB
S 25FC S 25FN	SR 25SB SR 25TB	LS 25EM LS 25JM	MSB 25TE MSB 25E	EGW 25CA EGW 25CB

4. M Series (Miniature Standard Type)

WON	THK	NSK	PMI	HIWIN	IKO
M 5C	SRS 5GM	-	-	MGN 5C	LWLC 5
M 5N	SRS 5GN	LU 05TL	-	-	LWL 5
M 7C	SRS 7GS	-	-	-	LWLC 7
M 7N	SRS 7GM	LU 07AL	MSC 7M	MGN 7C	LWL 7
M 7L	SRS 7GN	-	MSC 7LM	MGN 7H	-
M 7LA	-	-	-	-	LWLG 7
M 9C	SRS 9GS	-	-	-	LWLC 9
M 9N	SRS 9GM	LU 09TL	MSC 9M	MGN 9C	LWL 9
M 9L	SRS 9GN	LU 09UL	MSC 9LM	MGN 9H	-
M 9LA	-	-	-	-	LWLG 9
M 12C	SRS 12GS	-	-	-	LWLC 12
M 12N	SRS 12GM	LU 12TL	MSC 12M	MGN 12C	LWL 12
M 12L	SRS 12GN	LU 12UL	MSC 12LM	MGN 12H	LWLG 12
M 15C	SRS 15GS	-	-	-	LWLC 15
M 15N	SRS 15GM	LU 15AL	MSC 15M	MGN 15C	LWL 15
M 15L	SRS 15GN	LU 15BL	MSC 15LM	MGN 15H	LWLG 15
M 20C	-	-	-	-	LWLC 20
M 20N	SRS 20GM	-	-	-	LWL 20
M 20L	-	-	-	-	LWLG 20

MB Series (Miniature Wide Type)

WON	THK	NSK	PMI	HIWIN	IKO
MB 5C	SRS 5WGM	-	-	-	LWLFC 10
MB 5N	SRS 5WGN	LE 05AL	-	-	LWLF 10
MB 7C	SRS 7WGS	-	-	-	LWLFC 14
MB 7N	SRS 7WGM	LU 07TL	MSD 7M	MGW 7C	LWLF 14
MB 7L	SRS 7WGN	-	MSD 7LM	MGW 7H	LWLFG 14
MB 9C	SRS 9WGS	-	-	-	LWLFC 18
MB 9N	SRS 9WGM	LE 09TL, TR	MSD 9M	MGW 9C	LWLF 18
MB 9L	SRS 9WGN	-	MSD 9LM	MGW 9H	LWLFG 18
MB 12C	SRS 12WGS	-	-	-	LWLFC 24
MB 12N	SRS 12WGM	LE 12AL, AR	MSD 12M	MGW 12C	LWLF 24
MB 12L	SRS 12WGN	-	MSD 12LM	MGW 12H	LWLFG 24
MB 15C	SRS 15WGS	-	-	-	LWLFC 42
MB 15N	SRS 15WGM	LE 15AL, AR	MSD 15M	MGW 15C	LWLF 42
MB 15L	SRS 15WGN	-	MSD 15LM	MGW 15H	LWLFG 42

<Table of model number comparison with spacer chain type of a different company>

1. H...S Series(Standard Type)

WON	THK	NSK	PMI	HIWIN
H 15FN...S H 15FL...S	SHS 15C SHS 15LC	SH 15FL SH 15HL	SME 15EA SME 15LEA	QHW 15CA -
H 20FN...S H 20FL...S	SHS 20C SHS 20LC	SH 20FL SH 20HL	SME 20EA SME 20LEA	QHW 20CA QHW 20HA
H 25FN...S H 25FL...S	SHS 25C SHS 25LC	SH 25FL SH 25HL	SME 25EA SME 25LEA	QHW 25CA QHW 25HA
H 30FN...S H 30FL...S	SHS 30C SHS 30LC	SH 30FL SH 30HL	SME 30EA SME 30LEA	QHW 30CA QHW 30HA
H 35FN...S H 35FL...S	SHS 35C SHS 35LC	SH 35FL SH 35HL	SME 35EA SME 35LEA	QHW 35CA QHW 35HA
H 45FN...S H 45FL...S	SHS 45C SHS 45LC	SH 45FL SH 45HL	SME 45EA SME 45LEA	QHW 45CA QHW 45HA
H 55FN...S H 55FL...S	SHS 55C SHS 55LC	SH 55FL SH 55HL	- -	- -
H 15RN...S H 15RL...S	SHS 15R -	SH 15AN SH 15BN	SME 15SA SME 15LSA	QHH 15CA -
H 20RN...S H 20RL...S	SHS 20V SHS 20LV	SH 20AN SH 20BN	SME 20SA SME 20LSA	QHH 20CA QHH 20HA
H 25RN...S H 25RL...S	SHS 25R SHS 25LR	SH 25AN SH 25BN	SME 25SA SME 25LSA	QHH 25CA QHH 25HA
H 30RN...S H 30RL...S	SHS 30R SHS 30LR	SH 30AN SH 30BN	SME 30SA SME 30LSA	QHH 30CA QHH 30HA
H 35RN...S H 35RL...S	SHS 35R SHS 35LR	SH 35AN SH 35BN	SME 35SA SME 35LSA	QHH 35CA QHH 35HA

2. S...S Series(Slim Type)

WON	THK	NSK	PMI	HIWIN
S 15RC...S S 15RN...S	SSR 15XV SSR 15XW	SS 15CL SS 15AL	SME 15EB SME 15LEB	QEH 15SA QEH 15CA
S 20RC...S S 20RN...S	SSR 20XV SSR 20XW	SS 20CL SS 20AL	SME 20EB SME 20LEB	QEH 20SA QEH 20CA
S 25RC...S S 25RN...S	SSR 25XV SSR 25XW	SS 25CL SS 25AL	SME 25EB SME 25LEB	QEH 25SA QEH 25CA
S 15FC...S S 15FN...S	- SSR 15XTB	SS 15JM SS 15EM	SME 15SB SME 15LSB	QEW 15SA QEW 15CA
S 20FC...S S 20FN...S	- SSR 20XTB	SS 20JM SS 20EM	SME 20SB SME 20LSB	QEW 20SA QEW 20CA
S 25FC...S S 25FN...S	- SSR 25XTB	SS 25JM SS 25EM	SME 25SB SME 25LSB	QEW 25SA QEW 25CA

3. HS...S Series(Slim Type)

WON	THK
HS 25RN...S HS 25RL...S	SHS 25V SHS 25LV
HS 30RN...S HS 30RL...S	SHS 30V SHS 30LV
HS 35RN...S HS 35RL...S	SHS 35V SHS 35LV