



LINEAR GUIDEWAY





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PREFACE

A linear guideway allows a type of linear motion that utilizes rolling elements such as balls or rollers. By using recirculating rolling elements between the rail and the block, a linear guideway can achieve high precision linear motion. Compared to a traditional slide, the coefficient of friction for a linear guideway is only 1/50. Because of the restraint effect between the rails and the blocks, linear guideways can take up loads in both the up/down and the left/right directions. With these features, linear guideways can greatly enhance moving accuracy, especially, when accompanied with precise ball screws.

1. GENERAL INFORMATION

1-1 Advantages and Features of Linear Guideways

(1) High positional accuracy

When a load is driven by a linear motion guideway, the frictional contact between the load and the bed desk is rolling contact. The coefficient of friction is only 1/50 of traditional contact, and the difference between the dynamic and the static coefficient of friction is small. Therefore, there would be no slippage while the load is moving.

(2) Long life with high motion accuracy

With a traditional slide, errors in accuracy are caused by the counter flow of the oil film. Insufficient lubrication causes wear between the contact surfaces, which become increasingly inaccurate. In contrast, rolling contact has little wear; therefore, machines can achieve a long life with highly accurate motion.

(3) High speed motion is possible with a low driving force

Because linear guideways have little friction resistance, only a small driving force is needed to move a load. This results in greater power savings, especially in the moving parts of a system. This is especially true for the reciprocating parts.

(4) Equal loading capacity in all directions

With this special design, these linear guideways can take loads in either the vertical or horizontal directions. Conventional linear slides can only take small loads in the direction parallel to the contact surface. They are also more likely to become inaccurate when they are subjected to these loads.

(5) Easy installation

Installing a linear guideway is fairly easy. Grinding or milling the machine surface, following the recommended installation procedure, and tightening the bolts to their specified torque can achieve highly accurate linear motion.

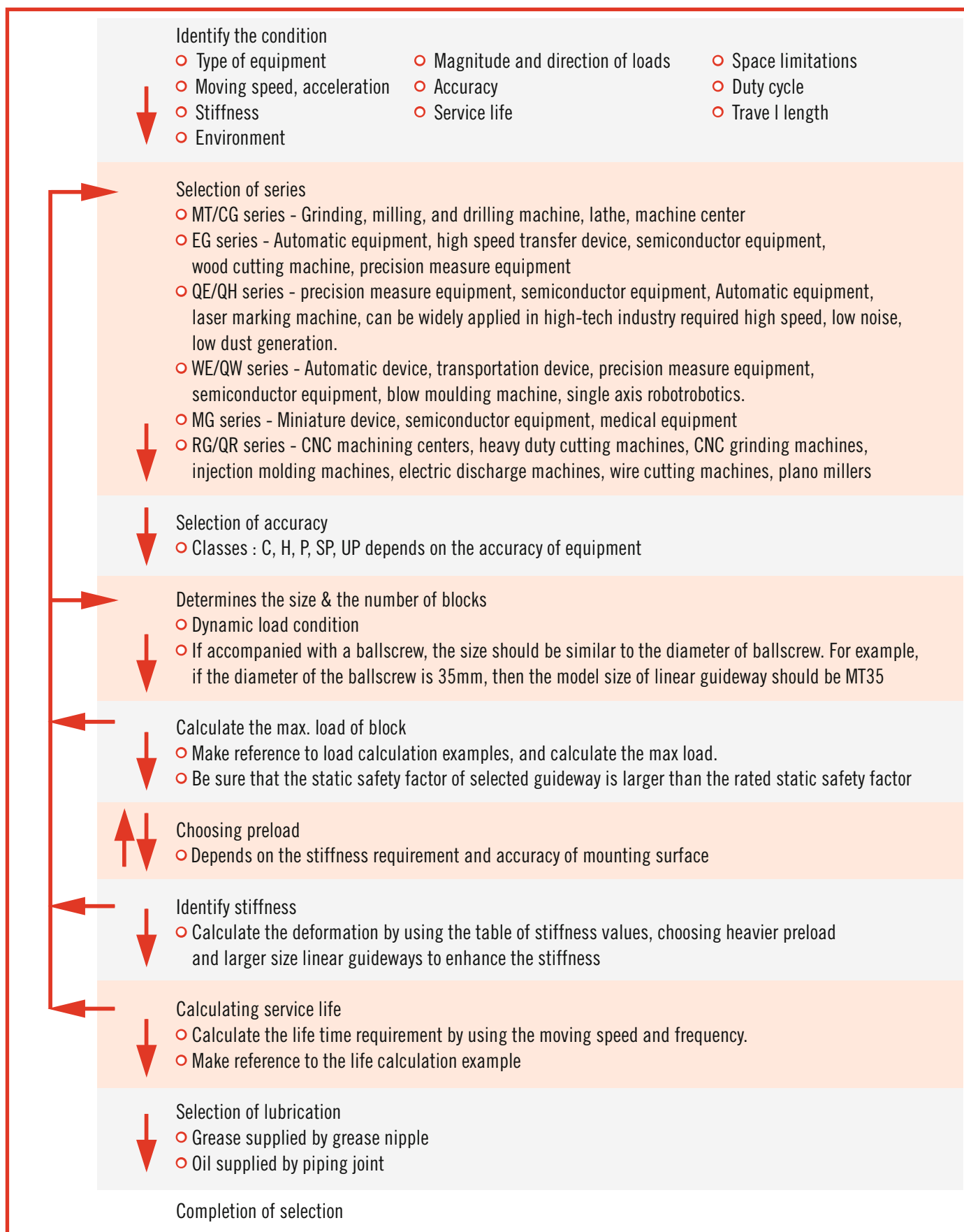
(6) Easy lubrication

With a traditional sliding system, insufficient lubrication causes wear on the contact surfaces. Also, it can be quite difficult to supply sufficient lubrication to the contact surfaces because finding an appropriate lubrication point is not very easy. With a linear motion guideway, grease can be easily supplied through the grease nipple on the linear guideway block. It is also possible to utilize a centralized oil lubrication system by piping the lubrication oil to the piping joint.

(7) Interchangeability

Compared with traditional boxways or v-groove slides, linear guideways can be easily replaced should any damage occur. For high precision grades consider ordering a matched, non-interchangeable, assembly of a block and rail.

1-2 Selecting Linear Guideways



1-3 Basic Load Ratings of Linear Guideways

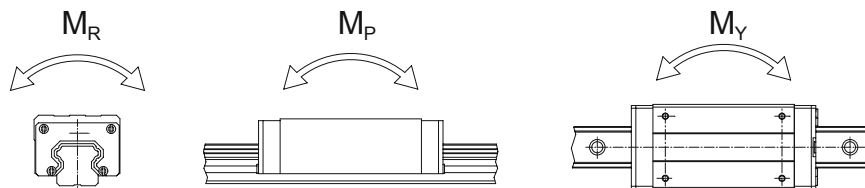
1-3-1 Basic Static Load

(1) Static load rating (C_0)

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

(2) Static permissible moment (M_0)

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



(3) Static safety factor

This condition applies when the guideway system is static or under low speed motion. The static safety factor, which depends on environmental and operating conditions, must be taken into consideration. A larger safety factor is especially important for guideways subject to impact loads (See Table 1-1). The static load can be obtained by using Eq. 1.1

Table 1-1 Static Safety Factor

Load Condition	f_{SL}, f_{SM} (Min.)
Normal Load	1.0~3.0
With impacts/vibrations	3.0~5.0

$$f_{SL} = \frac{C_0}{P} \quad \text{or} \quad f_{SM} = \frac{M_0}{M} \quad \dots \dots \dots \text{Eq.1.1}$$

f_{SL} : Static safety factor for simple load
 f_{SM} : Static safety factor for moment
 C_0 : Static load rating (kN)
 M_0 : Static permissible moment (kN·mm)
 P : Calculated working load (kN)
 M : Calculated applying moment (kN·mm)

1-3-2 Basic Dynamic Load

(1) Dynamic load rating (C)

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

LINEAR GUIDEWAY

1-4 Service Life of Linear Guideways

1-4-1 Service Life

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

1-4-2 Nominal Life (L)

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

1-4-3 Calculation of Nominal Life

The acting load will affect the nominal life of a linear guideway. Based on the selected basic dynamic rated load and the actual load. The nominal life of ball type and roller type linear guideway can be calculated by Eq.1.2 and Eq. 1.3 respectively.

$$\text{Ball type} \quad L = \left(\frac{C}{P} \right)^3 \cdot 50\text{km} = \left(\frac{C}{P} \right)^3 \cdot 31\text{mile} \quad \text{Eq.1.2}$$

$$\text{Roller type} \quad L = \left(\frac{C}{P} \right)^{\frac{10}{3}} \cdot 100\text{km} = \left(\frac{C}{P} \right)^{\frac{10}{3}} \cdot 62\text{mile} \quad \text{Eq.1.3}$$

L : Nominal life
C : Basic dynamic load rating
P : Actual load

If the environmental factors are taken into consideration, the nominal life is influenced greatly by the motion conditions, the hardness of the raceway, and the temperature of the linear guideway. The relationship between these factors is expressed in Eq.1.4 and Eq. 1.5.

$$\text{Ball type} \quad L = \left(\frac{f_h \cdot f_t \cdot C}{f_w \cdot P_c} \right)^3 \cdot 50\text{km} = \left(\frac{f_h \cdot f_t \cdot C}{f_w \cdot P_c} \right)^3 \cdot 31\text{mile} \quad \text{Eq.1.4}$$

$$\text{Roller type} \quad L = \left(\frac{f_h \cdot f_t \cdot C}{f_w \cdot P_c} \right)^{\frac{10}{3}} \cdot 100\text{km} = \left(\frac{f_h \cdot f_t \cdot C}{f_w \cdot P_c} \right)^{\frac{10}{3}} \cdot 62\text{mile} \quad \text{Eq.1.5}$$

L : Nominal life
f_h : Hardness factor
C : Basic dynamic load rating
f_t : Temperature factor
P_c : Calculated load
f_w : Load factor

1-4-4 Factors of Normal Life

(1) Hardness factor (f_h)

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

Raceway hardness

HRC	60	50	40	30	20	10
f _h	1.0	0.6	0.3	0.2	0.1	0.0

(2) Temperature factor (f_t)

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

Temperature

Temperature (°C)	f_t
100	1.0
150	0.9
200	0.8
250	0.7
300	0.6

(3) Load factor (f_w)

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

Table 1-2 Load factor

Loading Condition	Service Speed	f_w
No impacts & vibration	$V \leq 15$ m/min	1 ~ 1.2
Small impacts	$15 \text{ m/min} < V \leq 60$ m/min	1.2 ~ 1.5
Normal load	$60 \text{ m/min} < V \leq 120$ m/min	1.5 ~ 2.0
With impacts & vibration	$V > 120$ m/min	2.0 ~ 3.5

1-4-5 Calculation of Service Life (L_h)

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

$$\text{Ball type} \quad L_h = \frac{L \cdot 10^3}{V_e \cdot 60} = \frac{\left(\frac{C}{P}\right)^3 \cdot 50 \cdot 10^3}{V_e \cdot 60} \text{ hr} \quad \text{Eq.1.6}$$

$$\text{Roller type} \quad L_h = \frac{L \cdot 10^3}{V_e \cdot 60} = \frac{\left(\frac{C}{P}\right)^{\frac{10}{3}} \cdot 100 \cdot 10^3}{V_e \cdot 60} \text{ hr} \quad \text{Eq.1.7}$$

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

1-5 Applied Loads

1-5-1 Calculation of Load

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

(1) Load on one block

Table 1-3 Calculation example of loads on block

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

W: Applied weight

l: Distance from external force to driver

c: Rail spacing

P_n : Load (radial, reverse radial), $n=1\sim4$

F: External force

d: Block spacing

a, b, k: Distance from external force to geometric center

P_{tn} : Load (lateral), $n=1\sim4$

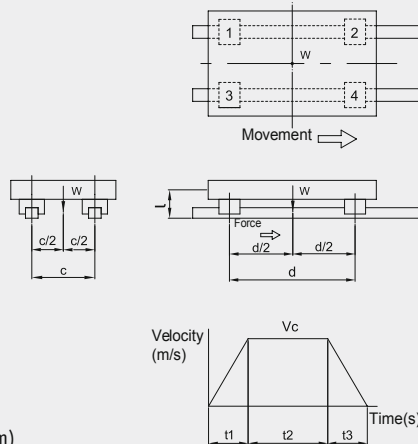
h: Distance from center of gravity to driver

(2) Loads with inertia forces

Table 1-4 Calculation Examples for Loads with Inertia Forces

Considering the acceleration and deceleration

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



Load on one block

○ Constant velocity

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

○ Acceleration

$$P_1 = P_3 = \frac{W}{4} + \frac{1}{2} \cdot \frac{W}{g} \cdot \frac{V_c}{t_1} \cdot \frac{l}{d}$$

$$P_2 = P_4 = \frac{W}{4} - \frac{1}{2} \cdot \frac{W}{g} \cdot \frac{V_c}{t_1} \cdot \frac{l}{d}$$

○ Deceleration

$$P_1 = P_3 = \frac{W}{4} - \frac{1}{2} \cdot \frac{W}{g} \cdot \frac{V_c}{t_3} \cdot \frac{l}{d}$$

$$P_2 = P_4 = \frac{W}{4} + \frac{1}{2} \cdot \frac{W}{g} \cdot \frac{V_c}{t_3} \cdot \frac{l}{d}$$

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

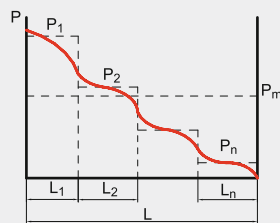
When the load on a linear guideway fluctuates greatly, the variable load condition must be considered in the life calculation. The definition of the mean load is the load equal to the bearing fatigue load under the variable loading conditions. It can be calculated by using table 1-5.

Table 1-5 Calculation Examples for Mean Load (P_m)

Operation Condition

Mean load

Step load



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

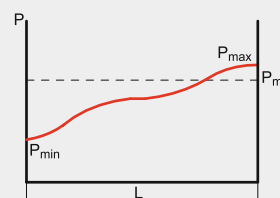
P_m : Mean load

P_n : Stepping

L : Total running distance

L_n : Running distance under load P_n

Linear variation



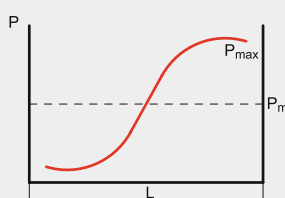
$$P_m = 1/3 (P_{min} + 2 \cdot P_{max})$$

P_m : Mean load

P_{min} : Min. Load

P_{max} : Max. Load

Sinusoidal loading



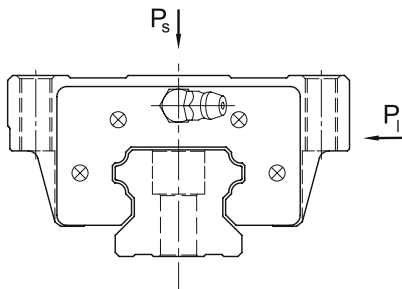
$$P_m = 0.65 \cdot P_{max}$$

P_m : Mean load

P_{max} : Max. Load

1-5-3 Calculation for Bidirectional Equivalent Loads

MTECH linear guideways can accept loads in several directions simultaneously. To calculate the service life of the guideway when the loads appear in multiple directions, calculate the equivalent load (P_e) by using the equations below.



MT/EG/WE/QH/QE/QW/RG/QR Series

$$P_e = P_s + P_l \quad \dots\dots\dots \text{Eq.1.8}$$

MG Series

$$\text{when } P_s > P_l \quad P_e = P_s + 0.5 \cdot P_l \quad \dots\dots\dots \text{Eq.1.9}$$

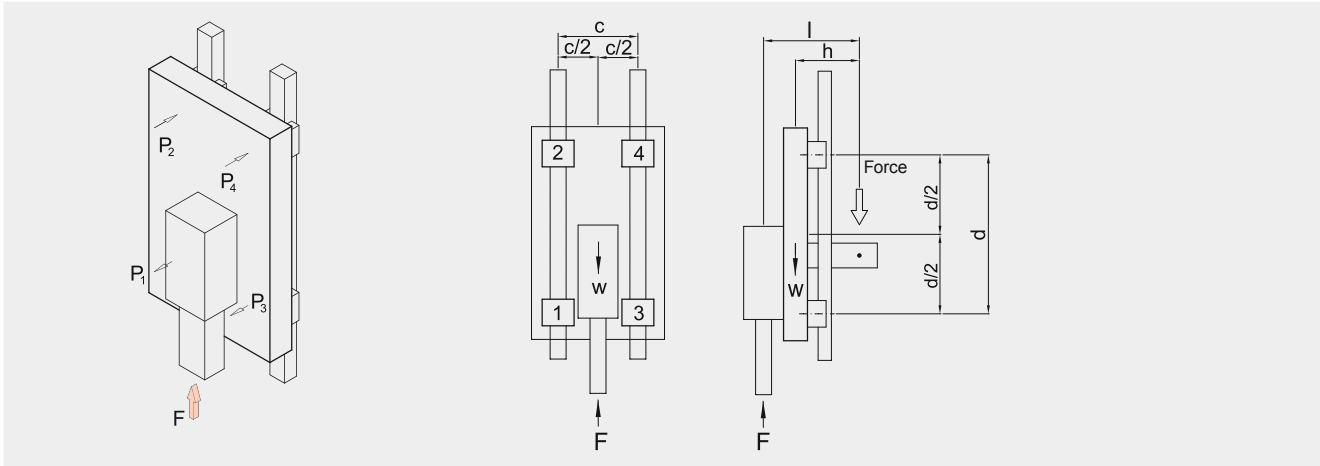
$$\text{when } P_l > P_s \quad P_e = P_l + 0.5 \cdot P_s \quad \dots\dots\dots \text{Eq.1.9}$$

1-5-4 Calculation Example for Service Life

A suitable linear guideway should be selected based on the acting load. The service life is calculated from the ratio of the working load and the basic dynamic load rating.

Table 1-6 Calculation Example for Service Life

Type of Linear Guideway	Dimension of device	Operating condition
Type: MTH 30 CA	d : 600 mm	Weight (W) : 15 kN
C : 38.74 kN	c : 400 mm	Acting force (F) : 1 kN
C0 : 52.19 kN	h : 200 mm	Temperature: normal temperature
Preload: Z0	l : 250 mm	Load status: normal load



○ Calculation of acting loads

$$P_1 \sim P_4 = + \frac{W \times h}{2d} - \frac{F \times l}{2d} = + \frac{15 \times 200}{2 \times 600} - \frac{1 \times 250}{2 \times 600} = 2.29 \text{ (kN)}$$

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

○ Because preload is Z0, $P_c = P_{\max} = 2.29 \text{ (kN)}$

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

○ Calculation for life L

$$L = \left(\frac{f_h \times f_t \times C}{f_w \times P_c} \right)^3 \times 50 = \left(\frac{1 \times 1 \times 38.74}{2 \times 2.29} \right)^3 \times 50 = 30,258 \text{ (km)}$$

1-6 Friction

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

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

$$F = \mu \cdot W + S \quad \text{Eq.1.11}$$

F : Friction (kN)

S : Friction resistance (kN)

μ : Coefficient of friction

W : Normal loads (kN)

1-7 Lubrication

Supplying insufficient lubrication to the guideway will greatly reduce the service life due to an increase in rolling friction. The lubricant provides the following functions;

- Reduces the rolling friction between the contact surfaces to avoid abrasion and surface burning of the guideway.
- Generates a lubricant film between the rolling surfaces and decreases fatigue.
- Anti-corrosion .

1-7-1 Grease

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

$$T = \frac{100 \cdot 1000}{V_e \cdot 60} \text{ hr} \dots\dots\dots \text{Eq.1.12}$$

T : Feeding frequency of oil (hour)

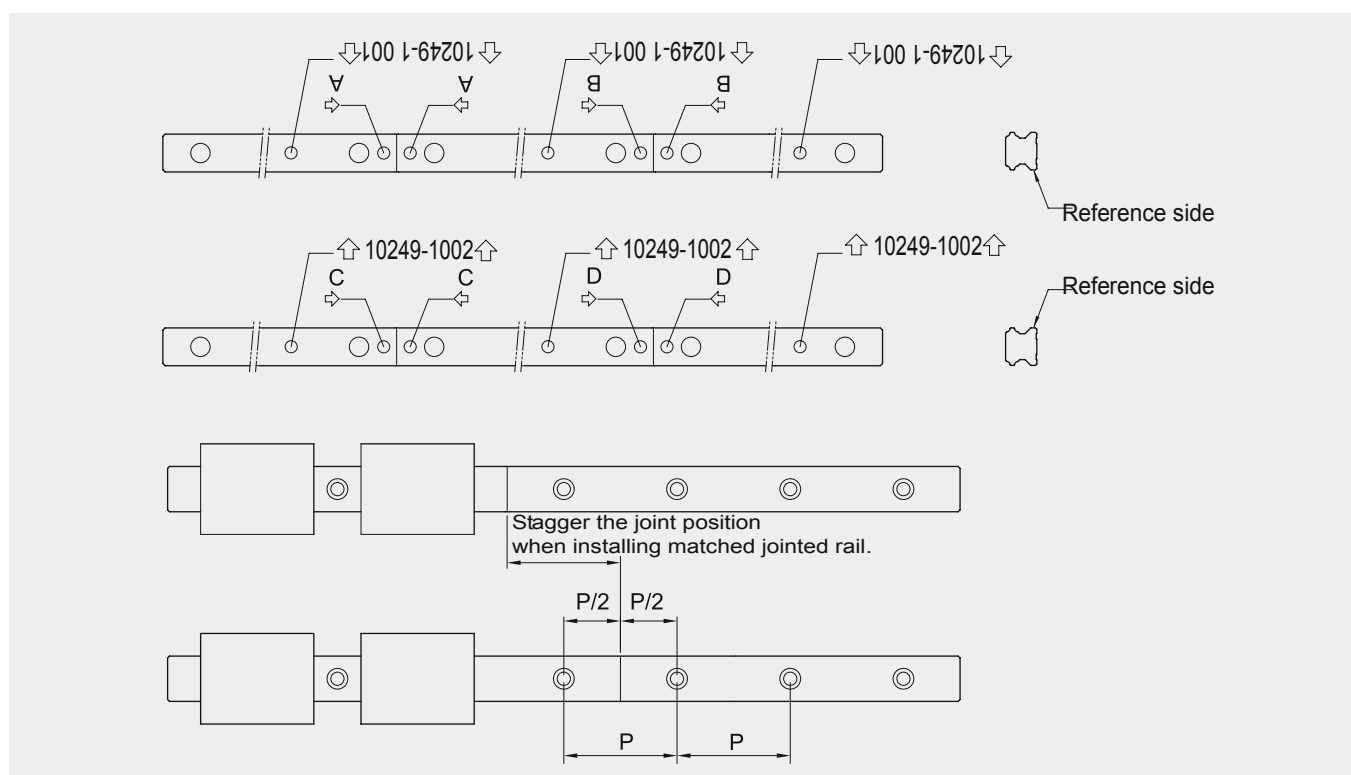
V_e : speed (m/min)

1-7-2 Oil

The recommended viscosity of oil is about 32~150c St. The standard grease nipple may be replaced by an oil piping joint for oil lubrication. Since oil evaporates quicker than grease, the recommended oil feed rate is approximate 0.3cm³/hr.

1-8 Jointed Rail

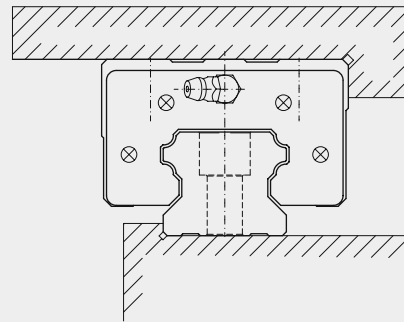
Jointed rail should be installed by following the arrow sign and ordinal number which is marked on the surface of each rail. For matched pair, jointed rails, the jointed positions should be staggered. This will avoid accuracy problems due to discrepancies between the 2 rails (see figure).



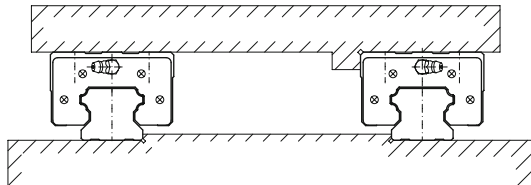
1-9 Mounting Configurations

Linear guideways have equal load ratings in the radial, reverse radial and lateral directions. The application depends on the machine requirements and load directions. Typical layouts for linear guideways are shown below:

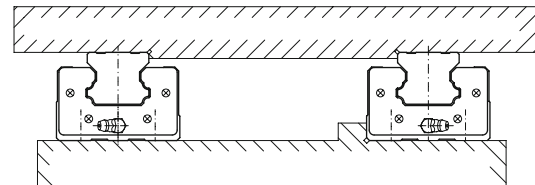
Use of one rail and mounting reference side



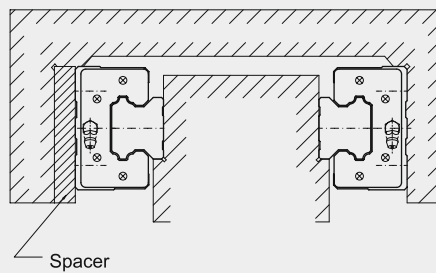
use of two rails(block movement)



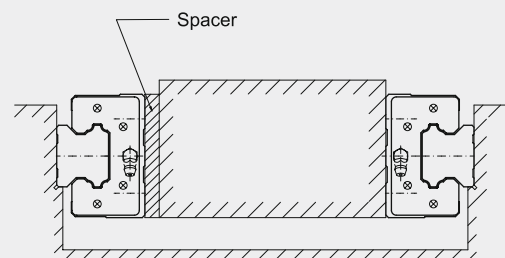
use of two rails(block fixed)



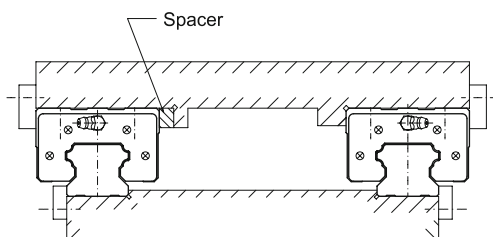
use of two external rails



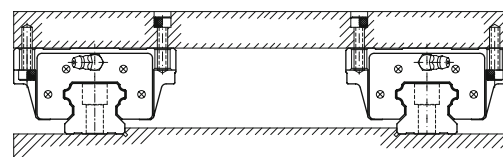
use of two internal rails



total surface fixed installation



MTW type block with mounting holes in different directions.

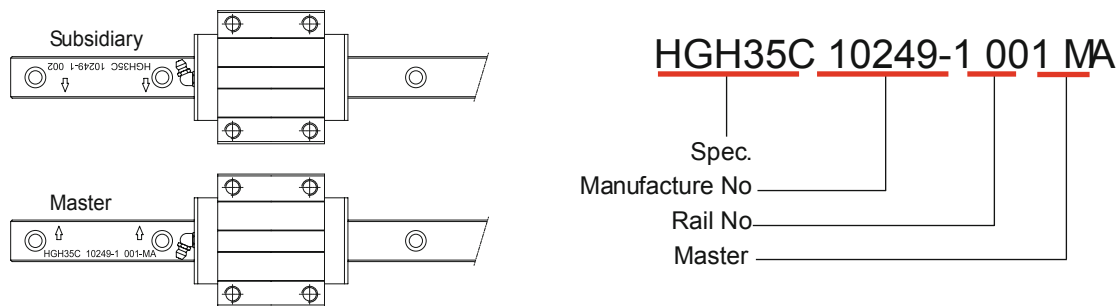


1-10 Mounting Procedures

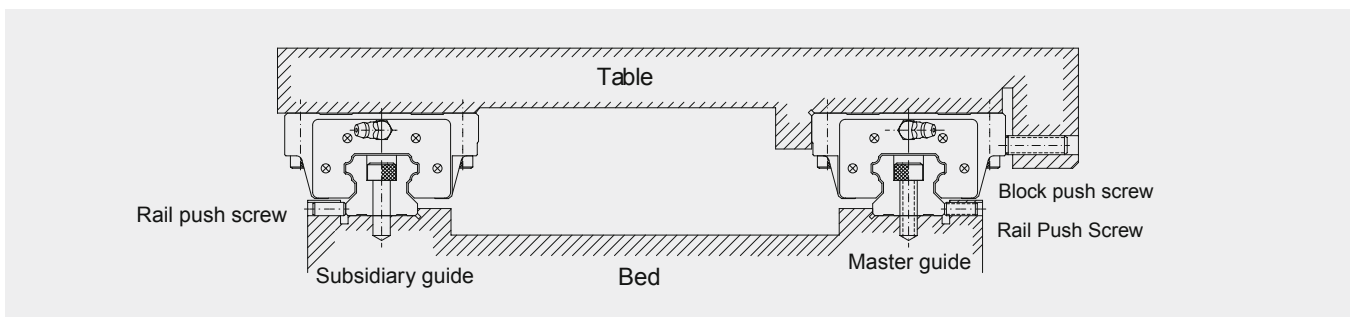
Three installation methods are recommended based on the required running accuracy and the degree of impacts and vibrations.

1-10-1 Master and Subsidiary Guide

For non-interchangeable type Linear Guideways, there are some differences between the master guide and subsidiary guide. The accuracy of the master guide's datum plane is better than the subsidiary's and it can be a reference side for installation. There is a mark "MA" printed on the rail, as shown in the figure below.



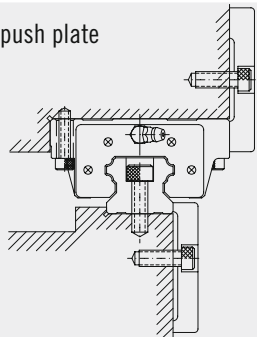
1-10-2 Installation to Achieve High Accuracy and Rigidity



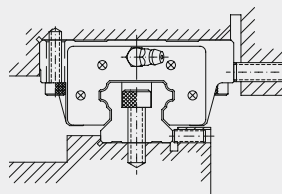
(1) Mounting methods

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

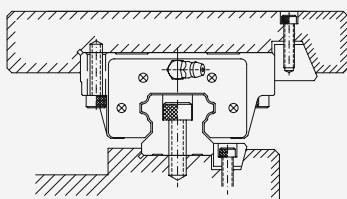
Mounting with a push plate



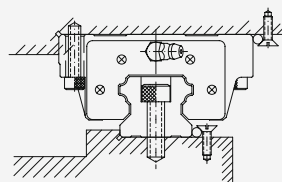
Mounting with push screws



Mounting with taper gib

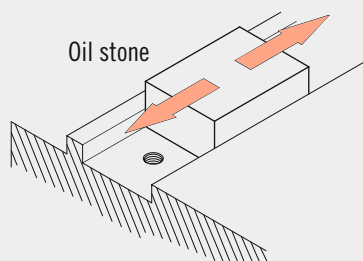


Mounting with needle roller

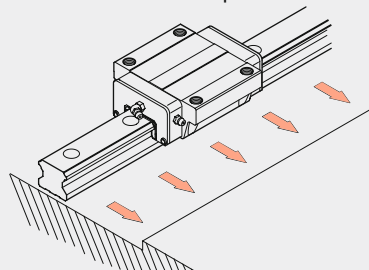


(2) Procedure of rail installation

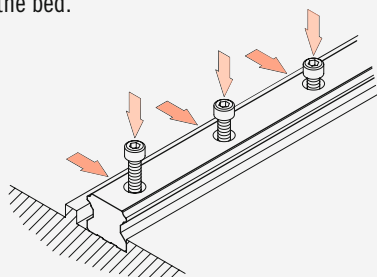
- 1) Before starting, remove all dirt from the mounting surface of the machine.



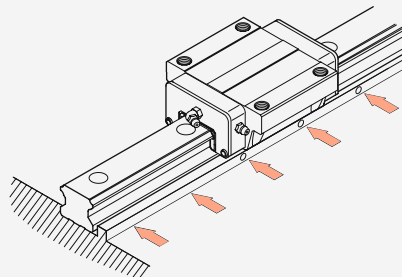
- 2) Place the linear guideway gently on the bed. Bring the guideway into close contact with the datum plane of the bed.



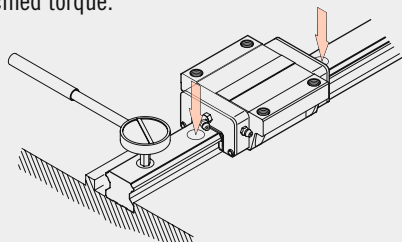
- 3) Check for correct thread engagement when inserting a bolt into the mounting hole while the rail is being placed on the mounting surface of the bed.



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

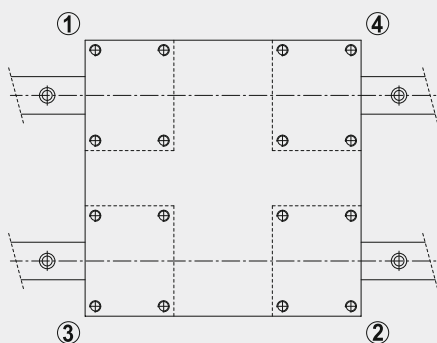


- 5) Tighten the mounting bolts with a torque wrench to the specified torque.



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

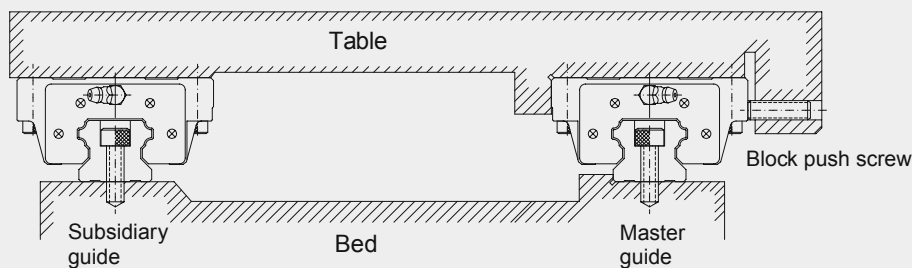
(3) Procedure of block installation



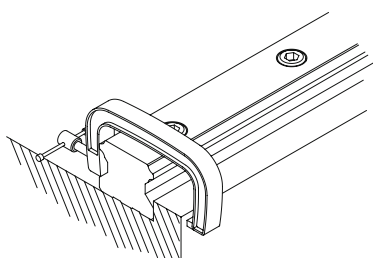
- Place the table gently on the blocks. Next, tighten the block mounting bolts temporarily.
- Push the blocks against the datum plane of the table and position the table by tightening the push screws.
- The table can be fixed uniformly by tightening the mounting bolts on master guide side and subsidiary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

1-10-3 Installation of the Master Guide without Push Screws

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

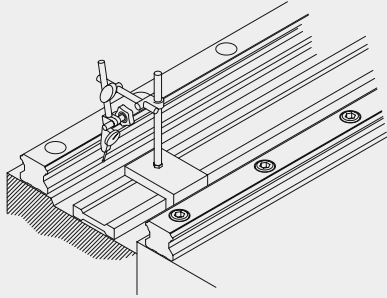


(1) Installation of the rail on the subsidiary guide side

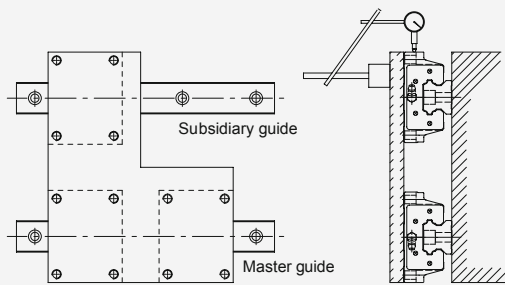


- Using a vice
Place the rail into the mounting plane of the bed. Tighten the mounting bolts temporarily; then use a vice to push the rail against the side datum plane of the bed. Tighten the mounting bolts in sequence to the specified torque.

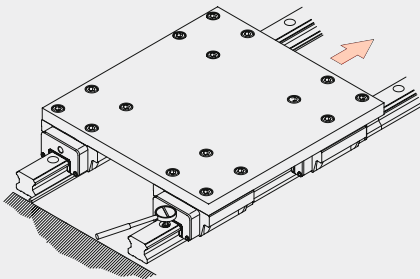
(2) Installation of the rail on the subsidiary guide side



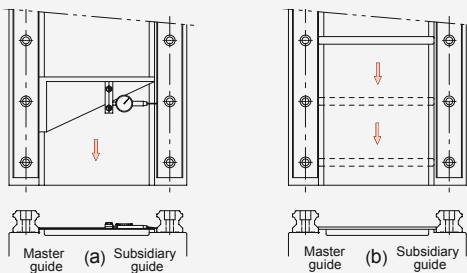
- Method with use of a straight edge
Set a straight edge between the rails parallel to the side datum plane of the rail on the master guide side by using a dial gauge. Use the dial gauge to obtain the straight alignment of the rail on the subsidiary guide side. When the rail on the subsidiary guide side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



- Method with use of a table
Fix two blocks on the master guide side to the table. Temporarily fix the rail and one block on the subsidiary guide side to the bed and the table. Fix a dial gauge stand on the table surface and bring it into contact with the side of the block on the subsidiary guide side. Move the table from one end of the rail to the other. While aligning the rail on the subsidiary side parallel to the rail on the master guide side, tighten the bolts in sequence.



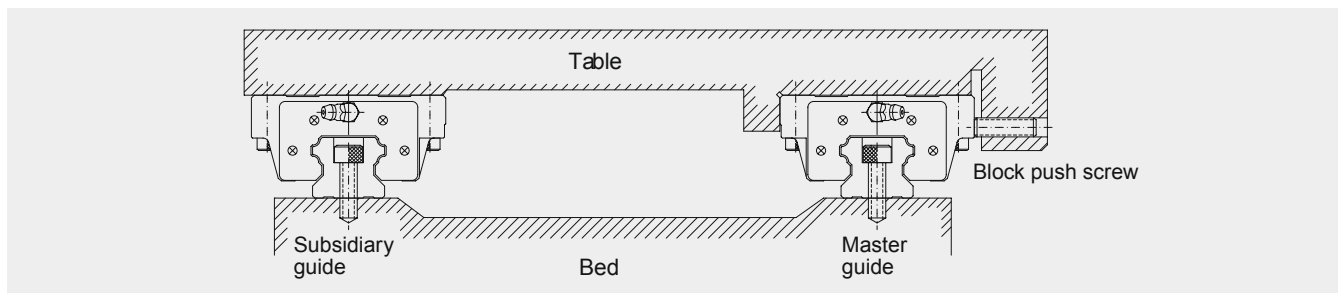
- Method following the master guide side
When a rail on the master guide side is correctly tightened, fix both blocks on the master guide side and one of the two blocks on the subsidiary guide side completely to the table. When moving the table from one end of the rail, tighten the mounting bolts on the subsidiary guide side completely.



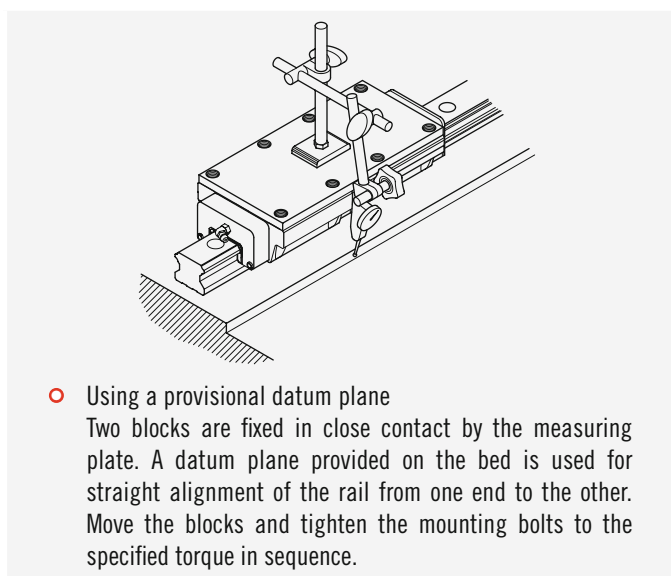
- Method with use of a jig
Use a special jig to ensure the rail position on the subsidiary guide side. Tighten the mounting bolts to the specified torque in sequence.

1-10-4 When There Is No Side Surface of The Bed On The Master Guide Side

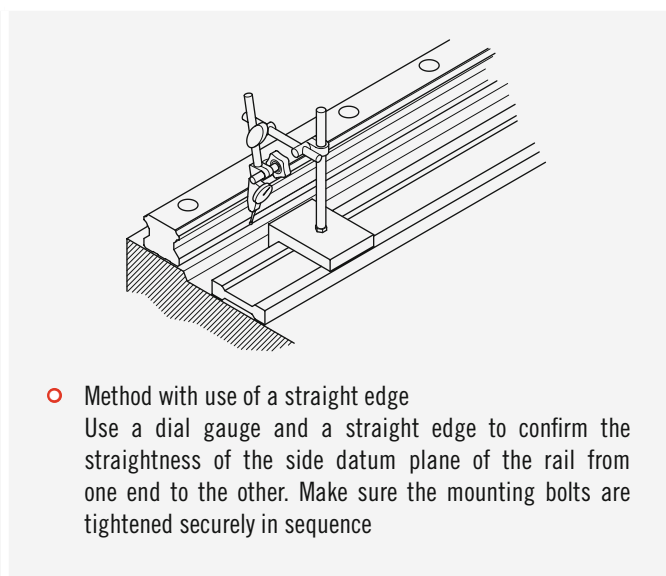
To ensure parallelism between the subsidiary guide and the master guide when there is no side surface, the following rail installation method is recommended. The installation of the blocks is the same as mentioned previously.



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



- Using a provisional datum plane
Two blocks are fixed in close contact by the measuring plate. A datum plane provided on the bed is used for straight alignment of the rail from one end to the other. Move the blocks and tighten the mounting bolts to the specified torque in sequence.



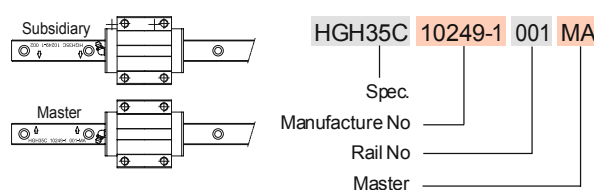
- Method with use of a straight edge
Use a dial gauge and a straight edge to confirm the straightness of the side datum plane of the rail from one end to the other. Make sure the mounting bolts are tightened securely in sequence

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

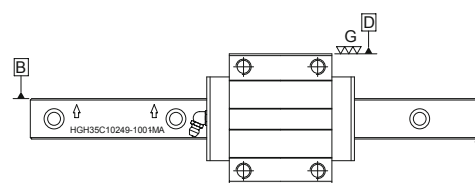
The method of installation for the rail on the subsidiary guide side is the same as the case without push screws.

1-10-5 Linear Guideway Mounting Instructions

1. MTECH guideways are supplied with a coating of anti-corrosion oil before being shipped. Please clean the oil before moving or running the blocks.
2. Recognition of master and subsidiary rails: For non-interchangeable type linear guideways, there are some differences between the master rail and subsidiary rail. The accuracy of the master rail's datum plane is better than the subsidiary's and it can be a reference side for installation. There is a mark "MA" printed on the rail. Check for the correct order before starting the installation. The rail number of master is an odd number and the rail number of subsidiary is an even number. Please install the rails according to the indication and carry on the installation according to the order for multi-rails installment (e.g.: 001 pairs 002 ; 003 pairs 004 etc.)
3. Recognition of datum plane: The datum plane (B) of rail is the side indicated by the arrow, which is marked on the top surface of the rail. The datum plane of block is smooth ground surface which shows as D in Figure 2.

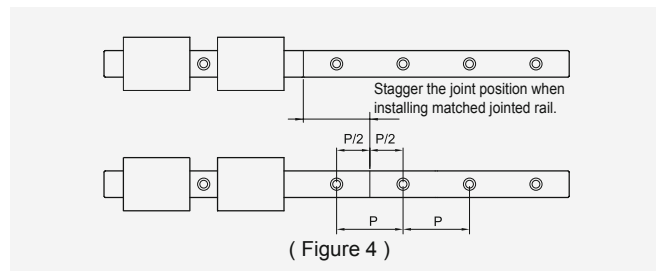
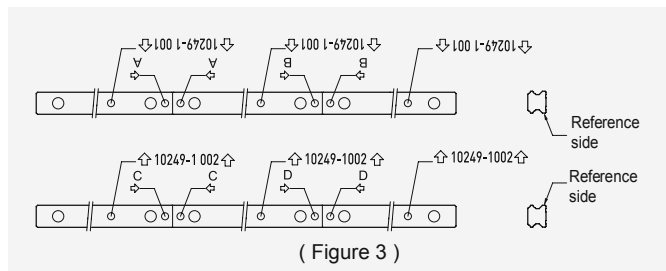


(Figure 1)

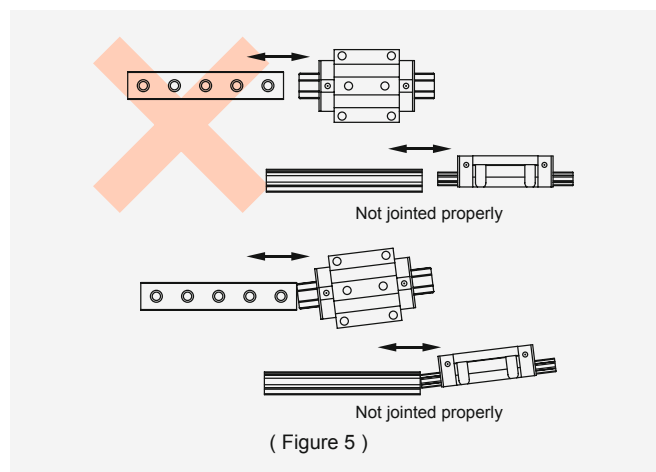
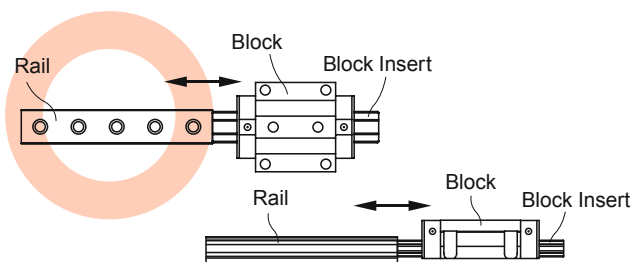


(Figure 2)

4. Butt-joint rail: Butt-joint rail should be installed by following the arrow sign and ordinal number which is marked on the surface of each rail as shown in the figure 3. To avoid accuracy problems due to discrepancies between the 2 rails such as for matched pair, butt-joint rails, the jointed positions should be staggered as shown in figure 4.



5. Do not remove blocks from rails when assembling the guideways in machines as far as possible. Please use block inserts (please see Figure 5) if it is necessary to remove/ mount block from/ onto rail.



6. Please do not randomly mix block units and rails for non interchangeable type to avoid any installation problem.
7. To ensure the straightness of rail, please tighten the mounting bolts sequentially with a torque wrench to the specified torque. (Refer to MTECH Technical Information).

1-10-6 Linear Guideway Usage Instructions

1. Lubricate the blocks after assembling the guideways in machines. Use a lithium soap-base grease or oil.
2. The guideways are packaged with anti-corrosion oil before delivery. If the rails were cleaned before installation, remember to lubricate the rails after assembling the guideways in machine. (Please confirm the compatibility between lubricant & anti rust rail)
3. The blocks are composed of various plastic parts, please avoid prolonged exposure of these parts with any organic solvent when cleaning the blocks to prevent possible damage.
4. Try to avoid any foreign objects from getting into the block as this could result in damage to the product.
5. Please do not disassemble the parts, the incautious actions of disassembly may bring foreign objects into the block and diminish the precision of the guideways or cause possible damage.
6. When handling the guideways please hold them horizontally. Improper handling can cause the blocks to fall off the rail.
7. Please avoid the inappropriate falling or clash on the blocks, which will damage the function of guideways.
8. For special application conditions, please apply the appropriate surface treatment or refer to the Linear Guideway Technical Information catalog for more detailed instructions.
9. The operating temperature range of the E2 type (Self lubricant kit) is $-10^{\circ}\text{C} \sim 60^{\circ}\text{C}$. For Q1 types (Quiet linear guideway), the range is $-10^{\circ}\text{C} \sim 80^{\circ}\text{C}$. The maximum service temperature of the SE type (Metallic end cap) is 150°C and for other standard types it is 100°C .
10. Please refer to the Linear Guideway Technical Information catalog for more detailed instructions. Please do not hesitate to contact MTECH if there are further questions related to the application.

2. MTECH LINEAR GUIDEWAY PRODUCT SERIES

In an effort to meet customer's requirement and service needs MTECH offers several different types of guides. We supply the MT series which is suitable for CNC machineries, the EG series for automation industries, the RG series for high rigidity applications, and the miniature series, MGN/MGW, for medical devices and semiconductor equipment.

(1) Types & series

Table 2-1 Types & Series

Series	Assembly Height	Load	Square Tap hole	Flange Combination
MT	High	Heavy Load	MTH-CA	MTW-CC
		Super Heavy Load	MTH-HA	MTW-HC
	Low	Heavy Load	MTL-CA	-
		Super Heavy Load	MTL-HA	-
EG	Low	Medium Load	EGH-SA	-
		Heavy Load	EGH-CA	-
MGN	-	Standard	MGN-C	-
		Long	MGN-H	-
MGW	-	Standard	MGW-C	-
		Long	MGW-H	-
RG	High	Heavy Load	RGH-CA	RGW-CC
		Super Heavy Load	RGH-HA	RGW-HC
	Low	Heavy Load	RGL-CA	
		Super Heavy Load	RGL-HA	

(2) Accuracy classes

Table 2-2 Accuracy classes

Series	Assembly Type					Interchangeable Type		
	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)	Normal (C)	High (H)	Precision (P)
MT	●	●	●	●	●	●	●	●
EG	●	●	●	●	●	●	●	●
MGN	●	●	●	—	—	●	●	●
MGW	●	●	●	—	—	●	●	●
RG	—	●	●	●	●	—	●	●

(3) Classification of preload

Table 2-3 Preload

Series	Non-interchangeable Type			Interchangeable Type	
	Light preload (ZO)	Medium Preload (ZA)	Heavy Preload (ZB)	Light preload (ZO)	Medium Preload (ZA)
MT	●	●	●	●	●
EG	●	●	●	●	●

Series	Non-interchangeable Type			Interchangeable Type	
	Very Light Preload (ZO)	Medium Preload (ZA)	Heavy Preload (ZB)	Very Light Preload (ZO)	Light Preload (ZA)
RG	●	●	●	●	●

Series	Non-interchangeable Type			Interchangeable Type		
	Light Clearance (ZF)	Very Light Preload (ZO)	Light preload (Z1)	Light Clearance (ZF)	Very Light Preload (ZO)	Light preload (Z1)
MGN	●	●	●	●	●	
MGW	●	●	●	●	●	

MT SERIES

Heavy Load Ball Type

2-1 MT Series - Heavy Load Ball Type Linear Guideway

MT series linear guideways are designed with load capacity and rigidity higher than other similar products with circular-arc groove and structure optimization. It features equal load ratings in the radial, reverse radial and lateral directions, and self-aligning to absorb installation-error. Thus, MTECH MT series linear guideways can achieve a long life with high speed, high accuracy and smooth linear motion.

2-1-1 Features of MT Series

(1) Self-aligning capability

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

(2) Interchangeability

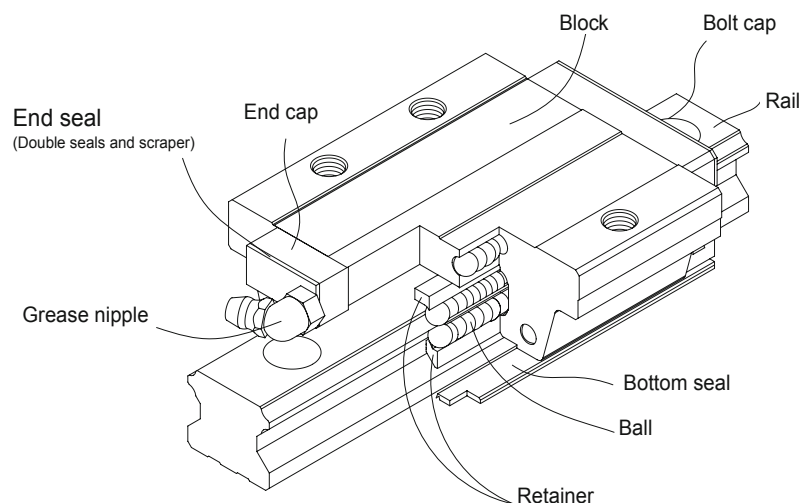
Because of precision dimensional control, the dimensional tolerance of MT series can be kept in a reasonable range, which means that any blocks and any rails in a specific series can be used together while maintaining dimensional tolerance. And a retainer is added to prevent the balls from falling out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

(3) High rigidity in all four directions

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

2-1-2 Construction of MT Series

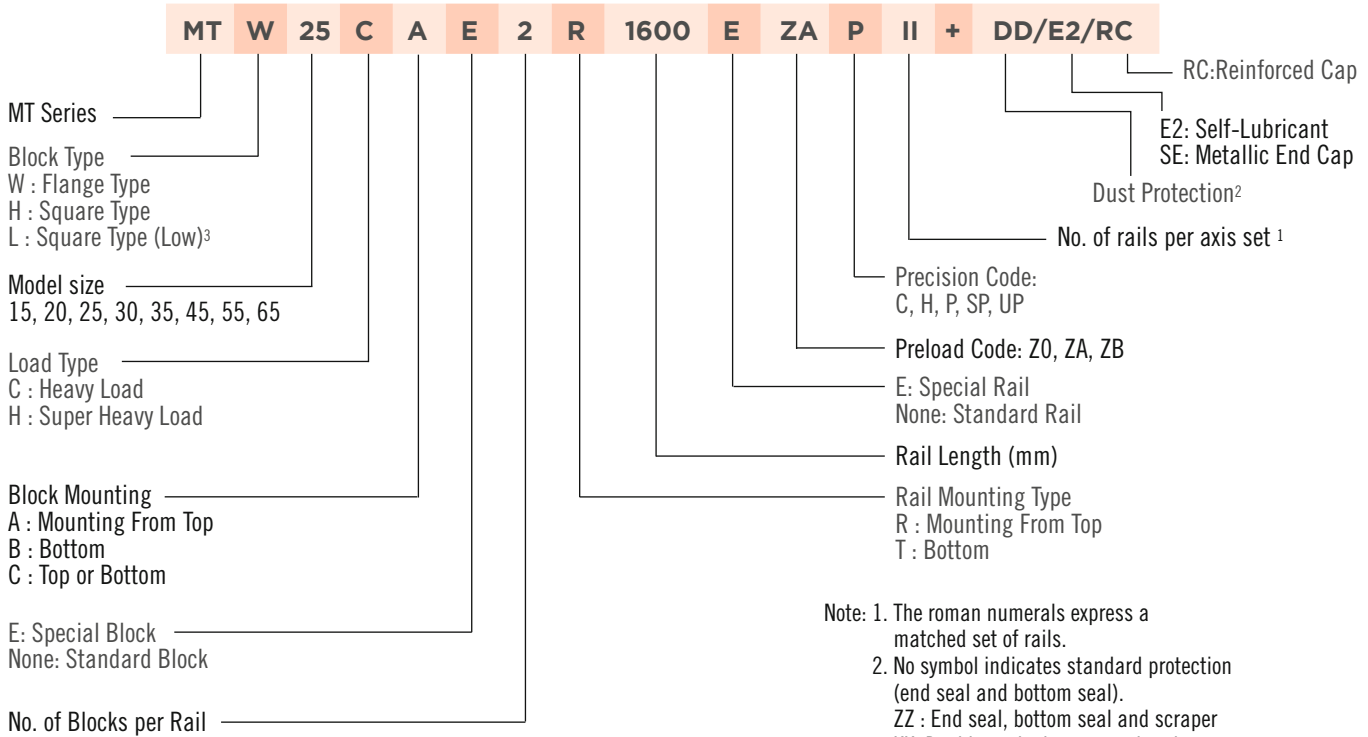
- Rolling circulation system: Block, Rail, End Cap and Retainer
- Lubrication system: Grease Nipple and Piping Joint
- Dust protection system: End seal, Bottom Seal, Bolt Cap, Double Seals and Scraper



2-1-3 Model Number of MT Series

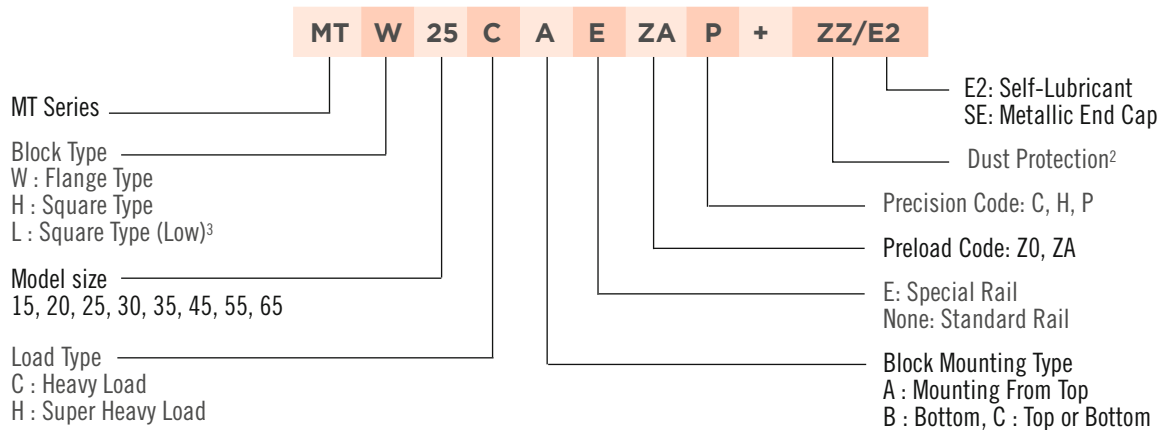
MT series guideways can be classified into non-interchangeable and interchangeable types. The sizes are identical. The only difference between the two types is that the interchangeable type of blocks and rails can be freely exchanged, and their accuracy can reach up to P class. The model number of MT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

(1) Non-interchangeable type

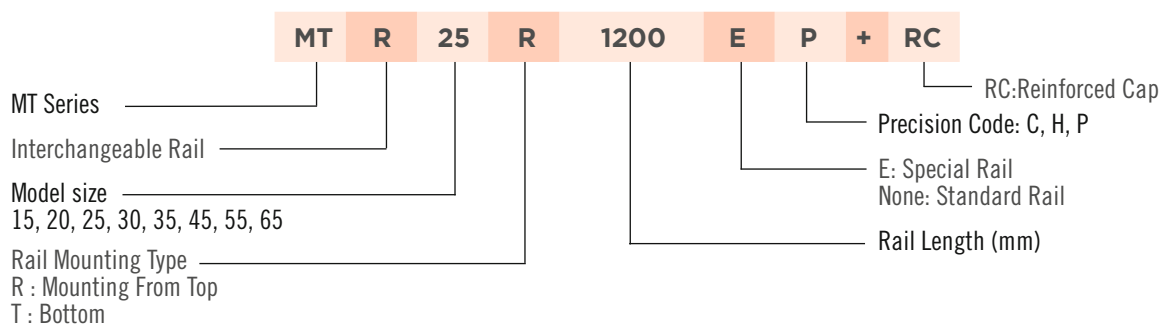


(2) Interchangeable type

○ Model Number of MT Block



○ Model Number of MT Rail

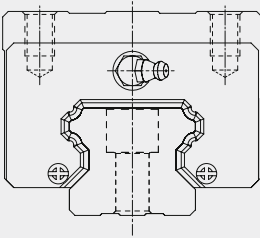
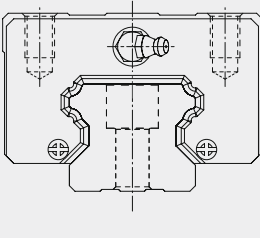
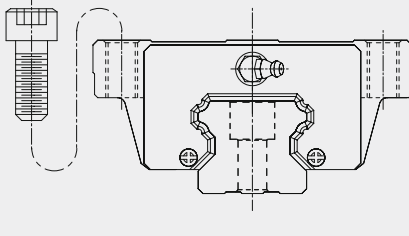
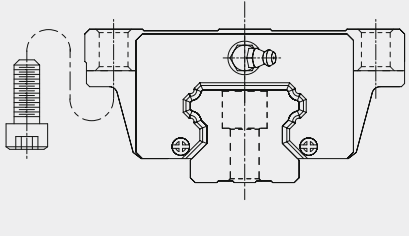
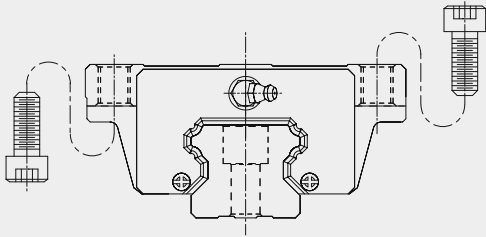


2-1-4 Types

(1) Block types

There're two types of blocks: flange and square. The flange type is suitable for heavy moment load application because of the lower assembly height and wider mounting surface.

Table 2-1-1 Block Types

Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Application
Square	MTH-CA MTH-HA		28 ↓ 90	100 ↓ 4000	<ul style="list-style-type: none"> Machine Centers NC Lathes Grinding Machines Precision Machining Machines Heavy Cutting Machines Automation Devices Transportation Equipment Measuring Equipment Devices Requiring High Positional Accuracy
	MTL-CA MTL-HA		24 ↓ 70	100 ↓ 4000	
Flange	MTW-CA MTW-HA		24 ↓ 90	100 ↓ 4000	
	MTW-CB MTW-HB		24 ↓ 90	100 ↓ 4000	
	MTW-CC MTW-HC		24 ↓ 90	100 ↓ 4000	

* Please refer to the chapter 2-1-13 for the dimensional detail.

(2) Rail types

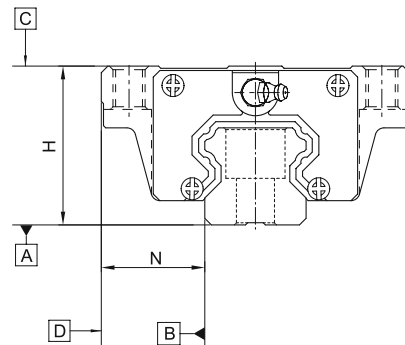
Besides the standard top mounting type, the bottom mounting type is also available.

Table 2-1-2 Rail Types

Mounting from Top	Mounting from bottom
	

2-1-5 Accuracy Classes

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



(1) Accuracy of non-interchangeable guideways

Table 2-1-3 Accuracy Standards

unit: mm

Item	MT - 15, 20				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.03	0 -0.03	0 -0.015	0 -0.008
Dimensional tolerance of width N	± 0.1	± 0.03	0 -0.03	0 -0.015	0 -0.008
Variation of height H	0.02	0.01	0.006	0.004	0.003
Variation of width N	0.02	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	See Table 2-1-11				
Running parallelism of block surface D to surface B	See Table 2-1-11				

Table 2-1-4 Accuracy Standards

unit: mm

Item	MT - 25, 30, 35				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.04	0 -0.04	0 -0.02	0 -0.01
Dimensional tolerance of width N	± 0.1	± 0.04	0 -0.04	0 -0.02	0 -0.01
Variation of height H	0.02	0.015	0.007	0.005	0.003
Variation of width N	0.03	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	See Table 2-1-11				
Running parallelism of block surface D to surface B	See Table 2-1-11				

Table 2-1-5 Accuracy Standards

unit: mm

Item	MT - 45, 55				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.05	0 -0.05	0 -0.03	0 -0.02
Dimensional tolerance of width N	± 0.1	± 0.05	0 -0.05	0 -0.03	0 -0.01
Variation of height H	0.03	0.015	0.007	0.005	0.003
Variation of width N	0.03	0.02	0.01	0.007	0.005
Running parallelism of block surface C to surface A	See Table 2-1-11				
Running parallelism of block surface D to surface B	See Table 2-1-11				

Table 2-1-6 Accuracy Standards

unit: mm

Item	MT - 65				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.07	0 -0.07	0 -0.05	0 -0.03
Dimensional tolerance of width N	± 0.1	± 0.07	0 -0.07	0 -0.05	0 -0.03
Variation of height H	0.03	0.02	0.01	0.007	0.005
Variation of width N	0.03	0.025	0.015	0.01	0.007
Running parallelism of block surface C to surface A	See Table 2-1-11				
Running parallelism of block surface D to surface B	See Table 2-1-11				

(2) Accuracy of interchangeable guideways

Table 2-1-7 Accuracy Standards

unit: mm

Item	MT - 15, 20		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.03	± 0.015
Dimensional tolerance of width N	± 0.1	± 0.03	± 0.015
Variation of height H	0.02	0.01	0.006
Variation of width N	0.02	0.01	0.006
Running parallelism of block surface C to surface A	See Table 2-1-11		
Running parallelism of block surface D to surface B	See Table 2-1-11		

Table 2-1-7 Accuracy Standards

unit: mm

Item	MT - 25, 30, 35		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.04	± 0.02
Dimensional tolerance of width N	± 0.1	± 0.04	± 0.02
Variation of height H	0.02	0.015	0.007
Variation of width N	0.03	0.015	0.007
Running parallelism of block surface C to surface A	See Table 2-1-11		
Running parallelism of block surface D to surface B	See Table 2-1-11		

Table 2-1-9 Accuracy Standards

unit: mm

Item	MT - 45, 55		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.05	± 0.025
Dimensional tolerance of width N	± 0.1	± 0.05	± 0.025
Variation of height H	0.03	0.015	0.007
Variation of width N	0.03	0.02	0.01
Running parallelism of block surface C to surface A	See Table 2-1-11		
Running parallelism of block surface D to surface B	See Table 2-1-11		

Table 2-1-10 Accuracy Standards

unit: mm

Item	MT - 65		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.07	± 0.035
Dimensional tolerance of width N	± 0.1	± 0.07	± 0.035
Variation of height H	0.03	0.02	0.01
Variation of width N	0.03	0.025	0.015
Running parallelism of block surface C to surface A	See Table 2-1-11		
Running parallelism of block surface D to surface B	See Table 2-1-11		

(3) Accuracy of running parallelism

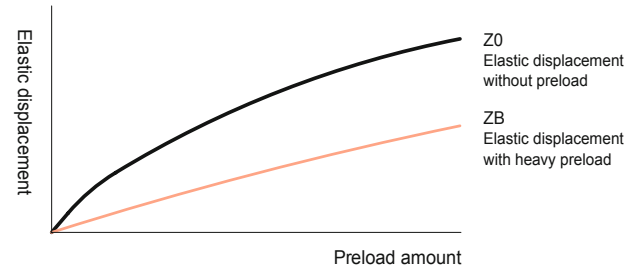
Table 2-1-11 Accuracy of Running Parallelism

Rail Length (mm)	Accuracy (μm)				
	C	H	P	SP	UP
~ 100	12	7	3	2	2
100 ~ 200	14	9	4	2	2
200 ~ 300	15	10	5	3	2
300 ~ 500	17	12	6	3	2
500 ~ 700	20	13	7	4	2
700 ~ 900	22	15	8	5	3
900 ~ 1,100	24	16	9	6	3
1,100 ~ 1,500	26	18	11	7	4
1,500 ~ 1,900	28	20	13	8	4
1,900 ~ 2,500	31	22	15	10	5
2,500 ~ 3,100	33	25	18	11	6
3,100 ~ 3,600	36	27	20	14	7
3,600 ~ 4,000	37	28	21	15	7

2-1-6 Preload

(1) Definition

A preload can be applied to each guideway. Oversized balls are used. Generally, a linear motion guideway has a negative clearance between groove and balls in order to improve stiffness and maintain high precision. The figure shows the load is multiplied by the preload, the rigidity is doubled and the deflection is reduced by one half. The preload no larger than ZA would be recommended for the model size under MT20 to avoid an over-preload affecting the guideway's life.



(2) Preload classes

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

Table 2-1-12 Preload Classes

Class	Code	Preload	Condition	Examples of Application
Light Preload	Z0	0~0.02C	Certain load direction, low impact, low precision required	Transportation devices, auto-packing machines, X-Y axis for general industrial machines, welding machines, welders
Medium Preload	ZA	0.05C~0.07C	High precision required	Machining centers, Z axis for general industrial machines, EDM, NC lathes, Precision X-Y tables, measuring equipment
Heavy Preload	ZB	0.10C~0.12C	High rigidity required, with vibration and impact	Machining centers, grinding machines, NC lathes, horizontal and vertical milling machines, Z axis of machine tools, Heavy cutting machines

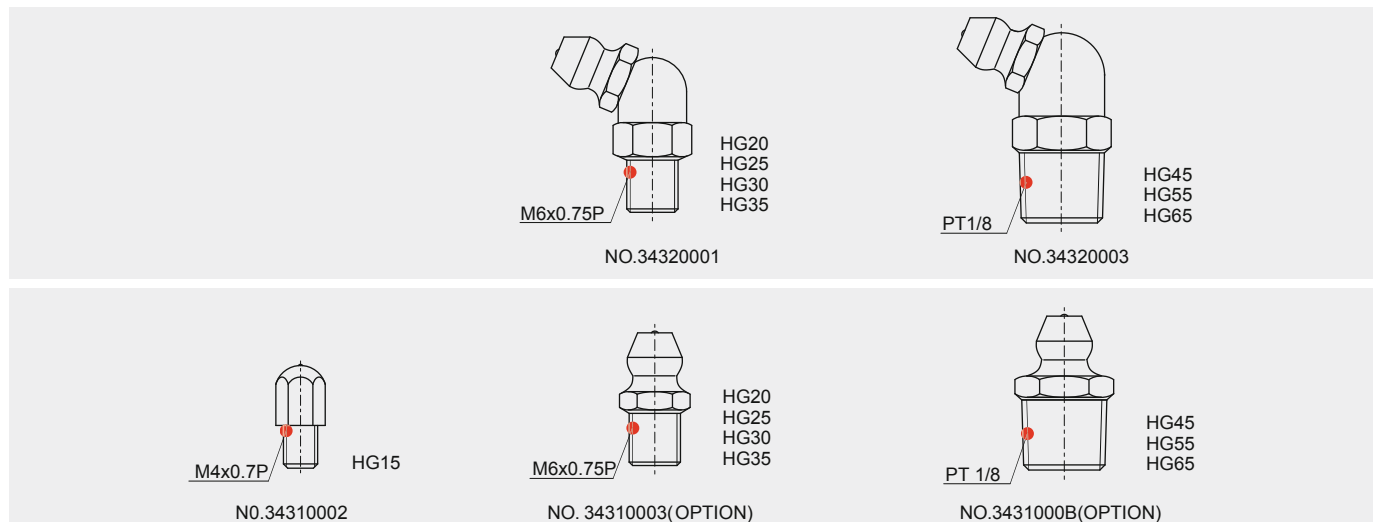
Class	Interchangeable Guideway	Non-Interchangeable Guideway
Preload classes	Z0, ZA	Z0, ZA, ZB

Note: The "C" in the preload column denotes basic dynamic load rating.

2-1-7 Lubrication

(1) Grease

- Grease nipple



○ Mounting location

The standard location of the grease fitting is at both ends of the block, but the nipple can be mounted at each side of block. For lateral installation, we recommend that the nipple be mounted at the non-reference side, otherwise please contact us. It is possible to perform lubrication by using the oil-piping joint.

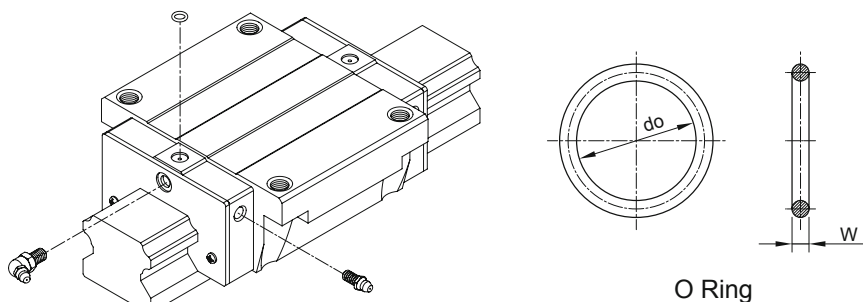
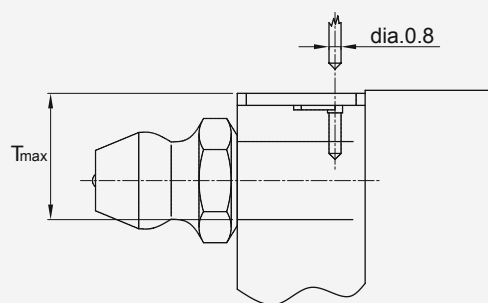


Table 2-1-13 O-Ring size and max. permissible depth for piercing

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do (mm)	W (mm)	T _{max} (mm)
MT15	2.5±0.15	1.5±0.15	3.75
MT20	4.5±0.15	1.5±0.15	5.7
MT25	4.5±0.15	1.5±0.15	5.8
MT30	4.5±0.15	1.5±0.15	6.3
MT35	4.5±0.15	1.5±0.15	8.8
MT45	4.5±0.15	1.5±0.15	8.2
MT55	4.5±0.15	1.5±0.15	11.8
MT65	4.5±0.15	1.5±0.15	10.8



○ The lubricant amount for a block filled with grease

Table 2-1-14 The lubricant Amount for a Block Filled with Grease

Size	Heavy load (cm ³)	Super heavy load (cm ³)	Size	Heavy load (cm ³)	Super heavy load (cm ³)
MT15	1	-	MT35	10	12
MT20	2	3	MT45	17	21
MT25	5	6	MT55	26	33
MT30	7	8	MT65	50	61

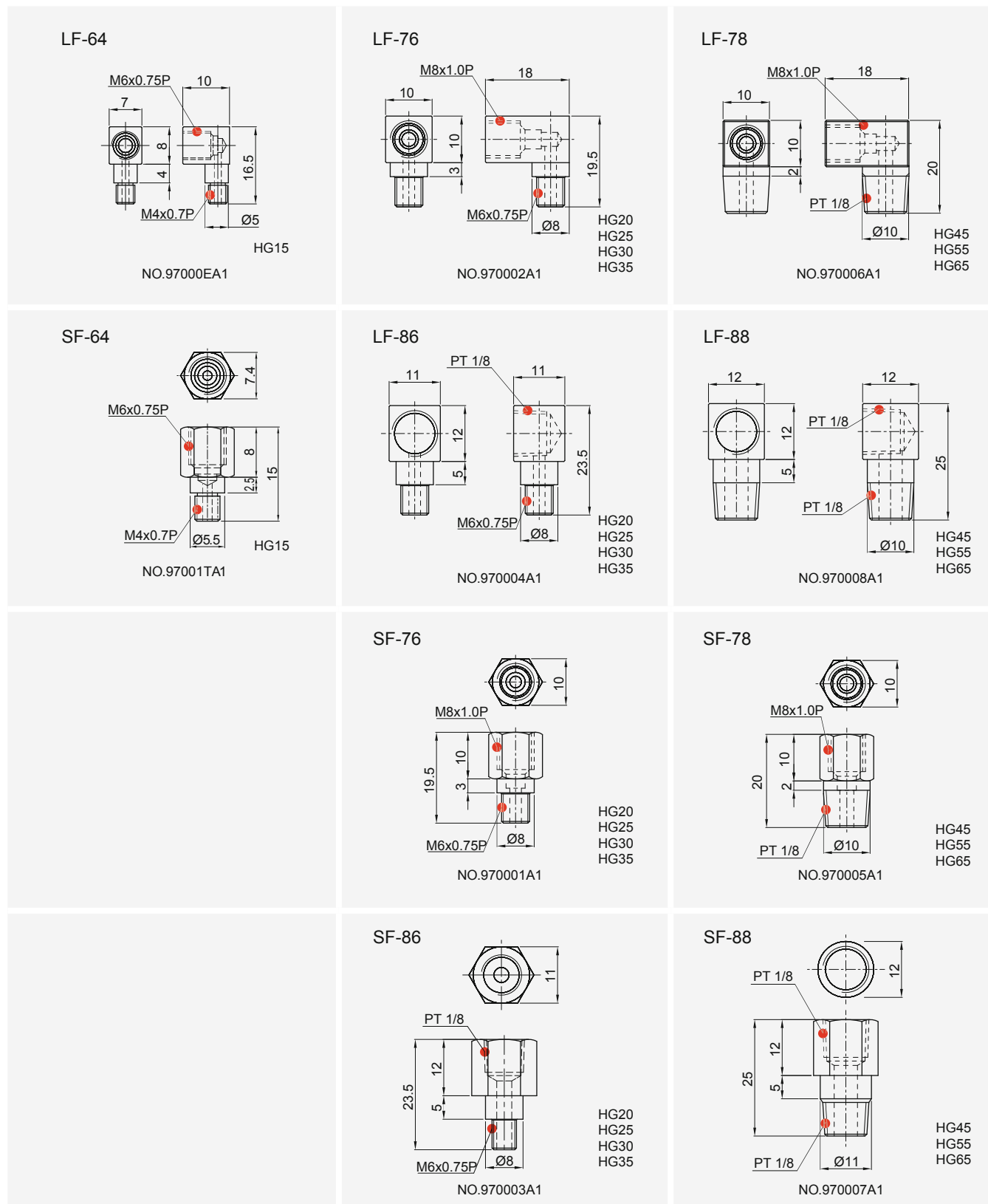
○ Frequency of replenishment

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

(2) Oil

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

○ Types of oil piping joint



- Oil refilling rate

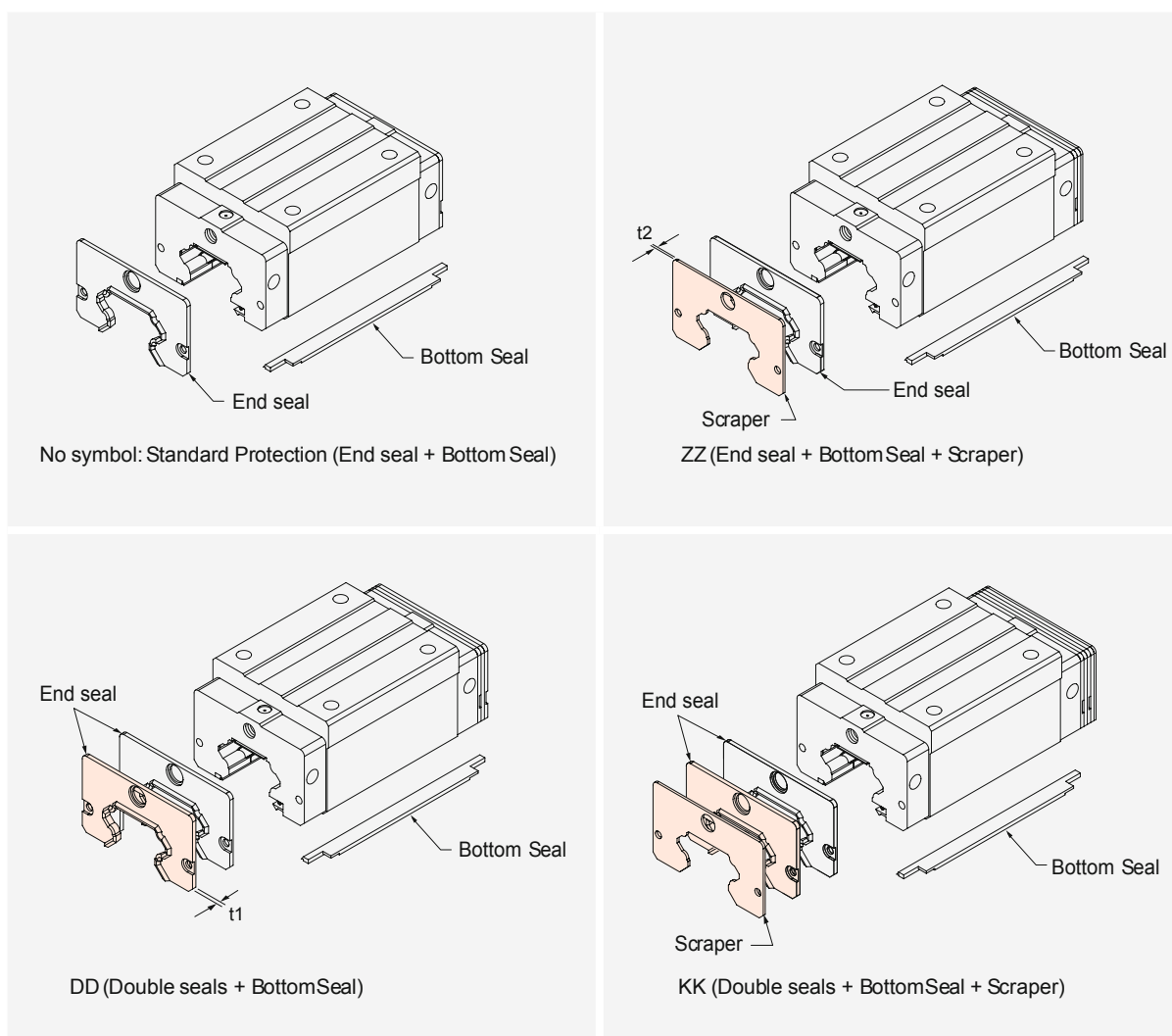
Table 2-1-15

Size	Refilling rate (cm ³ /hr)	Size	Refilling rate (cm ³ /hr)
MT15	0.2	MT35	0.3
MT20	0.2	MT45	0.4
MT25	0.3	MT55	0.5
MT30	0.3	MT65	0.6

2-1-8 Dust Proof Accessories

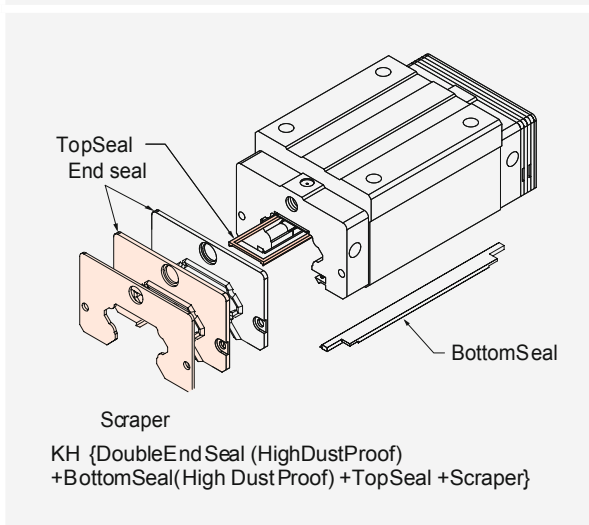
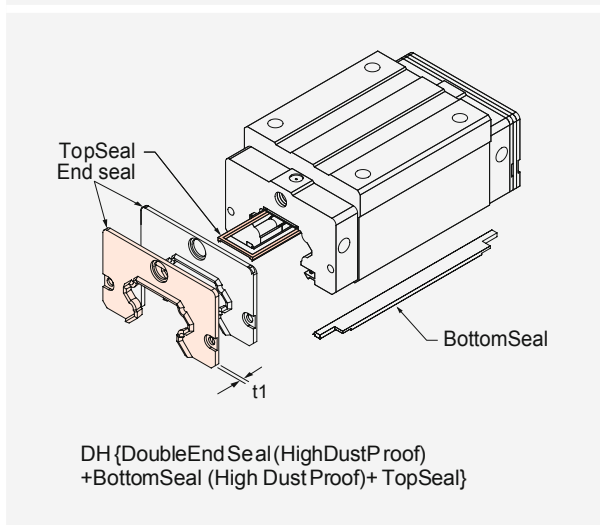
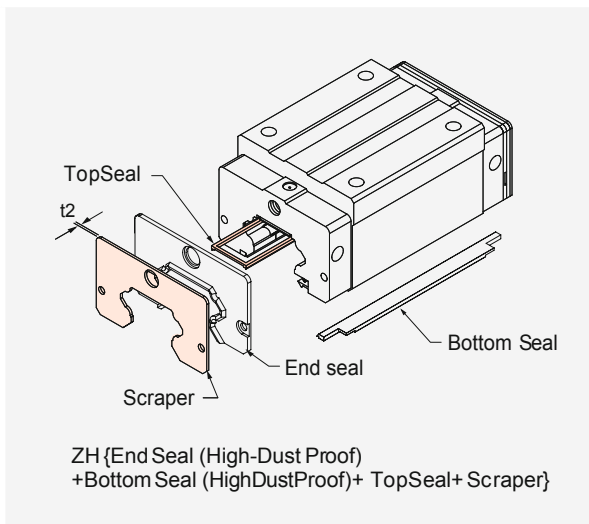
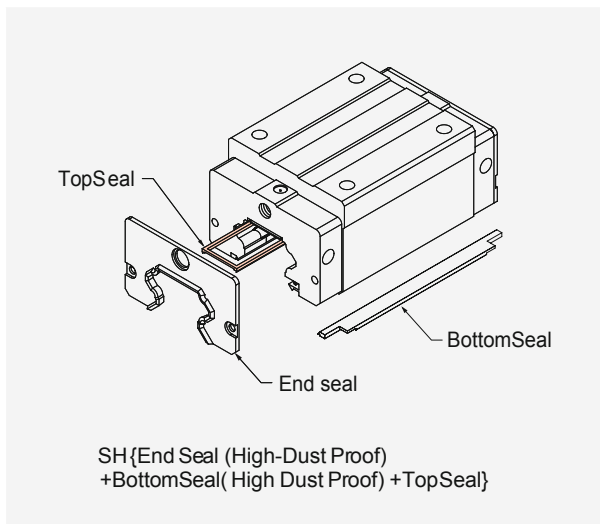
(1) Codes of standard dust proof accessories

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



(2) Codes of high-dust proof accessories

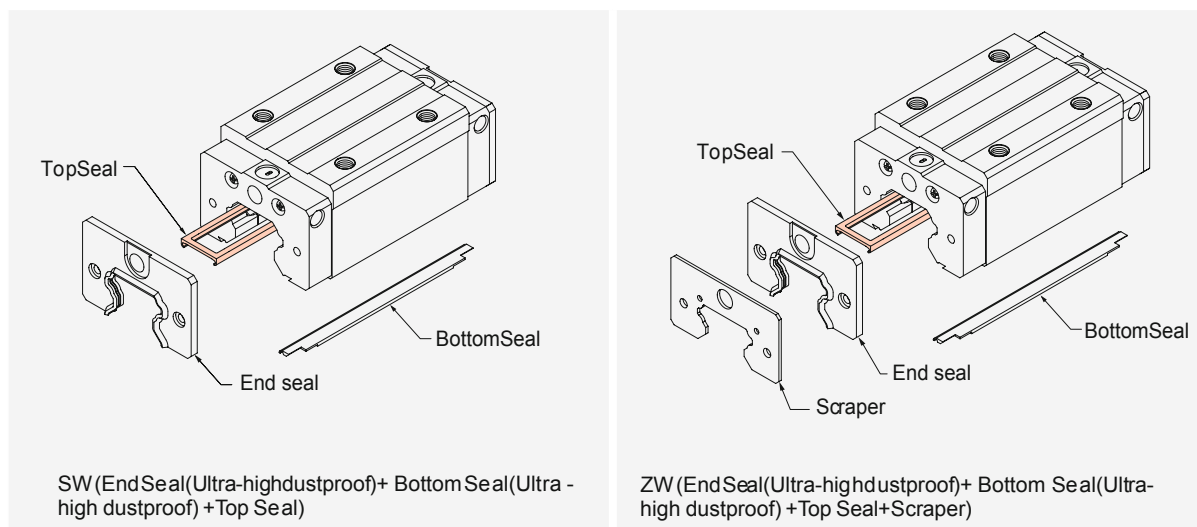
MTECH develops many kinds of dust proof accessories for different application and working environment to avoid dust or debris. If the following accessories are needed, please add the code followed by the model number.



Note 1. The available size for high dust proof accessories are MT20(C/H), 25(C/H), 30(C/H), 35(C/H) and 45C.
2. The value of friction force will increase 0.6~1.2 kgf.

(3) Codes of ultra-high dust proof accessories

MTECH has developed high dust proof accessories which is used for environment that is full of dust and particle, such as wood working machinery and glass/stone machining equipment. These accessories show high performance of dust proof. If accessories are needed, please add the code followed by the model number.



Note: 1. The available size for high dust proof accessories are MT15C, MT20(C/H), MT30(C/H), MT35(C/H), MT45(C/H).
2. The value of friction force will increase 1.5~4.0 kgf.

(4) Function of dust proof accessories

- End seal and bottom seal
To prevent life reduction caused by iron chips or dust entering the block.
- Double seals
Enhances the wiping effect, foreign matter can be completely wiped off.

Table 2-1-16 Dimensions of end seal

Size	Thickness (t1) (mm)	Size	Thickness (t1) (mm)
MT15 ES	3	MT35 ES	3.2
MT20 ES	3.5	MT45 ES	4.5
MT25 ES	3.5	MT55 ES	4.5
MT30 ES	3.2	MT65 ES	6

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

Table 2-1-17 Dimensions of scraper

Size	Thickness (t2) (mm)	Size	Thickness (t2) (mm)
MT15 SC	1.5	MT35 SC	1.5
MT20 SC	1.5	MT45 SC	1.5
MT25 SC	1.5	MT55 SC	1.5
MT30 SC	1.5	MT65 SC	1.5

- Top Seal
Top seal can efficiently avoid dust from the surface of rail or tapping hole getting inside the block.

○ Bolt caps for rail mounting holes

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

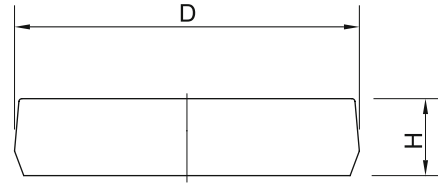
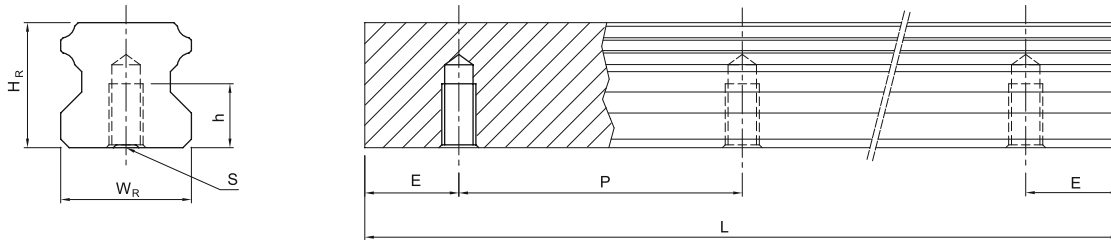


Table 2-1-18 Dimensions of Bolt Caps for Rail Mounting Holes

Rail Size	Bolt size	Diameter (D) (mm)	Thickness (H) (mm)	Rail Size	Bolt size	Diameter (D) (mm)	Thickness (H) (mm)
MT15	M4	7.65	1.1	MT35	M8	14.20	3.5
MT20	M5	9.65	2.5	MT45	M12	20.25	4.5
MT25	M6	11.15	2.5	MT55	M14	23.25	5.0
MT30	M8	14.20	3.5	MT65	M16	26.35	5.0

(5) Dimesions for MTR-T (Rail Mounting from Bottom)



Model No.	Dimensions of Rail (mm)						Weight (kg/m)
	WR	HR	S	h	P	E	
MTR15T	15	15	M5 x 0.8P	8	60	20	1.48
MTR20T	20	17.5	M6 x 1P	10	60	20	2.29
MTR25T	23	22	M6 x 1P	12	60	20	3.35
MTR30T	28	26	M8 x 1.25P	15	80	20	4.67
MTR35T	34	29	M8 x 1.25P	17	80	20	6.51
MTR45T	45	38	M12 x 1.75P	24	105	22.5	10.87
MTR55T	53	44	M14 x 2P	24	120	30	15.67
MTR65T	63	53	M20 x 2.5P	30	150	35	21.73

2-1-9 Friction

The maximum value of resistance per end seal are as shown in the table.

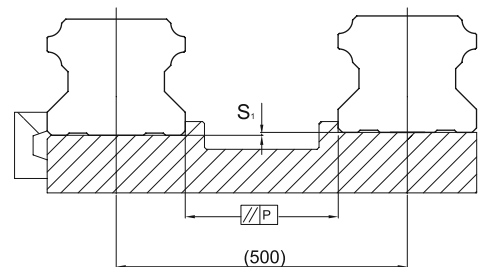
Table 2-1-20 Seal Resistance

Size	Resistance N (kgf)	Size	Resistance N (kgf)
MT15	1.18 (0.12)	MT35	3.04 (0.31)
MT20	1.57 (0.16)	MT45	3.83 (0.39)
MT25	1.96 (0.2)	MT55	4.61 (0.47)
MT30	2.65 (0.27)	MT65	5.79 (0.59)

2-1-10 The Accuracy Tolerance of Mounting Surface

(1) The accuracy tolerance of rail-mounting surface

Because of the Circular-arc contact design, the MT linear guideway can compensate for some surface-error on installation and still maintain smooth linear motion. As long as the accuracy requirements for the mounting surface are followed, high accuracy and rigidity of linear motion of the guideway can be obtained without any difficulty. In order to satisfy the needs of fast installation and smooth movement, MTECH offers the normal clearance type of preload to customers of its high absorption ability of the deviation in mounting surface accuracy.



(2) The parallelism tolerance of reference surface (P)

Table 2-1-20 Max. Parallelism Tolerance (P)

unit: μm

Size	Preload classes		
	Z0	ZA	ZB
MT15	25	18	13
MT20	25	20	18
MT25	30	22	20
MT30	40	30	27
MT35	50	35	30
MT45	60	40	35
MT55	70	50	45
MT65	80	60	55

(3) The accuracy tolerance of reference surface height

Table 2-1-21 Max. Tolerance of Reference Surface Height (S_1)

unit: μm

Size	Preload classes		
	Z0	ZA	ZB
MT15	130	85	35
MT20	130	85	50
MT25	130	85	70
MT30	170	110	90
MT35	210	150	120
MT45	250	170	140
MT55	300	210	170
MT65	350	250	200

2-1-11 Cautions for Installation

(1) Shoulder heights and fillets

Improper shoulder heights and fillets of mounting surfaces will cause a deviation in accuracy and the interference with the chamfered part of the rail or block. As long as the recommended shoulder heights and fillets are followed, installation inaccuracies should be eliminated.

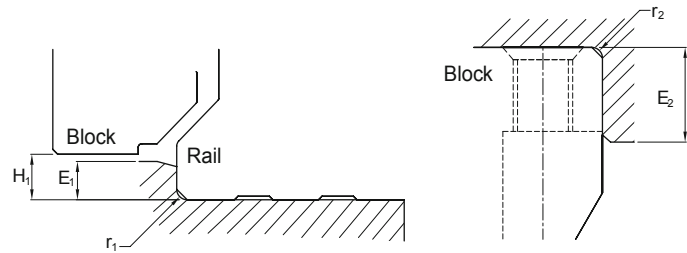


Table 2-1-23 Shoulder Heights and Fillets

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height of the rail E_1 (mm)	Shoulder height of the block E_2 (mm)	Clearance under block H_1 (mm)
MT15	0.5	0.5	3	4	4.3
MT20	0.5	0.5	3.5	5	4.6
MT25	1.0	1	5	5	5.5
MT30	1.0	1	5	5	6
MT35	1.0	1	6	6	7.5
MT45	1.0	1	8	8	9.5
MT55	1.5	1.5	10	10	13
MT65	1.5	1.5	10	10	15

(2) Tightening Torque of Bolts for Installation

Improper tightening of bolts will seriously influence the accuracy of Linear Guideway installation. The following tightening torques for different sizes of bolts are recommended.

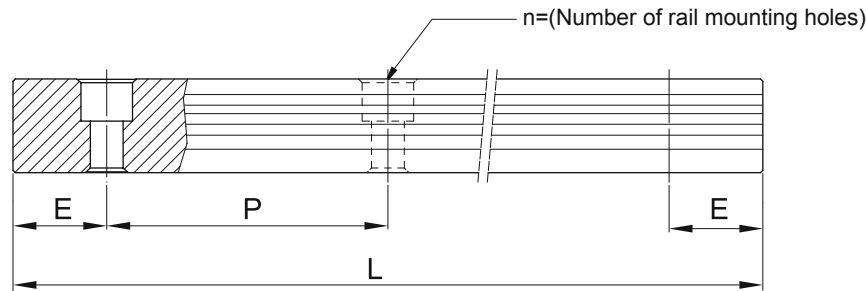
Table 2-1-24 Mounting Torque

Size	Bolt size	Torque N-cm (kgf-cm)		
		Iron	Casting	Aluminum
MT15	M4x0.7Px16L	392 (40)	274 (28)	206 (21)
MT20	M5x0.8Px16L	883 (90)	588 (60)	441 (45)
MT25	M6x1Px20L	1373 (140)	921 (94)	686 (70)
MT30	M8x1.25Px25L	3041 (310)	2010 (205)	1470 (150)
MT35	M8x1.25Px25L	3041 (310)	2010 (205)	1470 (150)
MT45	M12x1.7Px35L	11772 (1200)	7840 (800)	5880 (600)
MT55	M14x2Px45L	15696 (1600)	10500 (1100)	7840 (800)
MT65	M16x2Px50L	19620 (2000)	13100 (1350)	9800 (1000)

Note : 1 kgf = 9.81 N

2-1-12 Standard and Maximum Lengths of Rail

MTECH offers standard rail lengths for customer needs. For non-standard E-values, the recommended dimension should no greater than 1/2 of the pitch (P) dimension. This will prevent an unstable rail end.



$$L = (n-1) \times P + 2 \times E \quad \text{Eq.2.1}$$

L : Total length of rail (mm)

n : Number of mounting holes

P : Distance between any two holes (mm)

E : Distance from the center of the last hole to the edge (mm)

Table 2-1-25 Rail Standard Length and Max. Length

unit: mm

Item	MT15	MT20	MT25	MT30	MT35	MT45	MT55	MT65
StandardLength L(n)	160 (3)	220 (4)	220 (4)	280 (4)	280 (4)	570 (6)	780 (7)	1,270 (9)
	220 (4)	280 (5)	280 (5)	440 (6)	440 (6)	885 (9)	1,020 (9)	1,570 (11)
	280 (5)	340 (6)	340 (6)	600 (8)	600 (8)	1,200 (12)	1,260 (11)	2,020 (14)
	340 (6)	460 (8)	460 (8)	760 (10)	760 (10)	1,620 (16)	1,500 (13)	2,620 (18)
	460 (8)	640 (11)	640 (11)	1,000 (13)	1,000 (13)	2,040 (20)	1,980 (17)	
	640 (11)	820 (14)	820 (14)	1,640 (21)	1,640 (21)	2,460 (24)	2,580 (22)	
	820 (14)	1,000 (17)	1,000 (17)	2,040 (26)	2,040 (26)	2,985 (29)	2,940 (25)	
		1,240 (21)	1,240 (21)	2,520 (32)	2,520 (32)			
			1,600 (27)	3,000 (38)	3,000 (38)			
Pitch (P)	60	60	60	80	80	105	120	150
Distance to End (E)s	20	20	20	20	20	22.5	30	35
Max. Standard Length	4,000(67)	4,000 (67)	4,000 (67)	3,960 (50)	3,960 (50)	3,930 (38)	3,900 (33)	3,970 (27)
Max. Length	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000

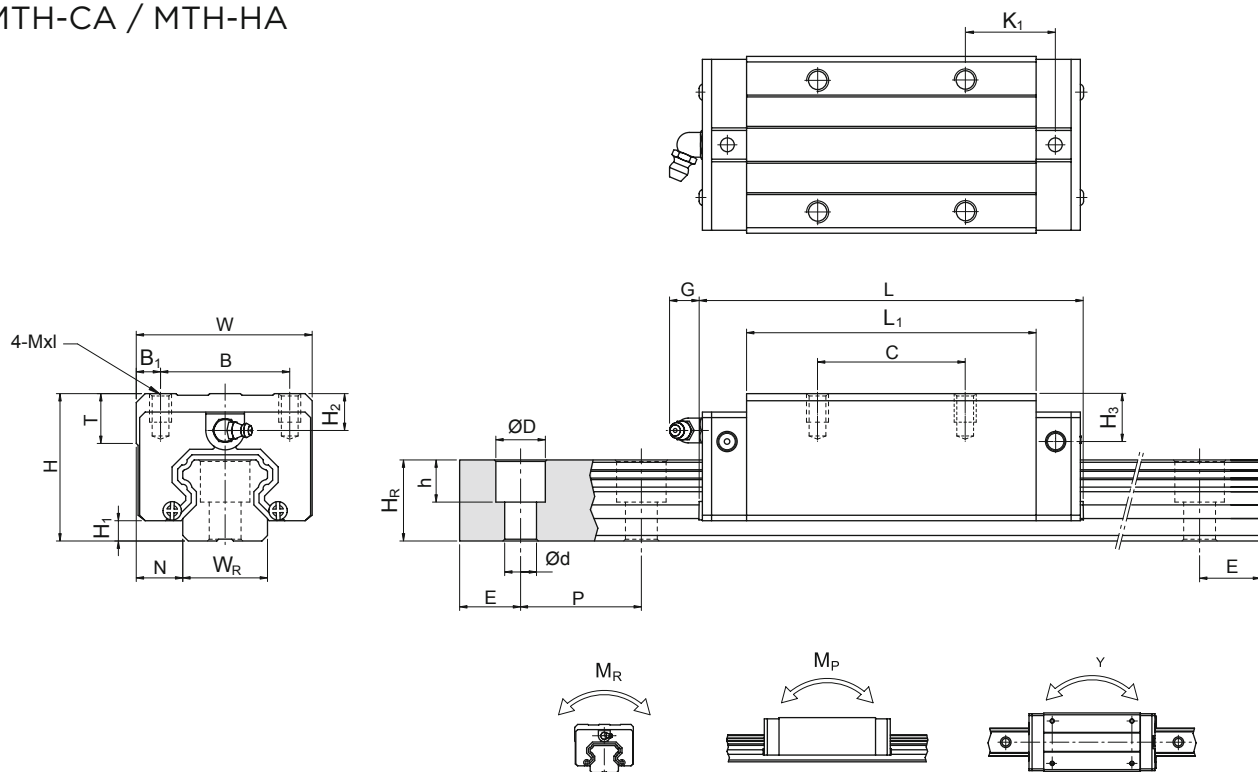
Note: 1. Tolerance of E value for standard rail is 0.5~0.5 mm. Tolerance of E value for jointed rail is 0~-0.3 mm.

2. Maximum standard length means the max. rail length with standard E value on both sides.

3. If different E value is needed, please contact MTECH.

2-1-13 Dimensions for MT Series

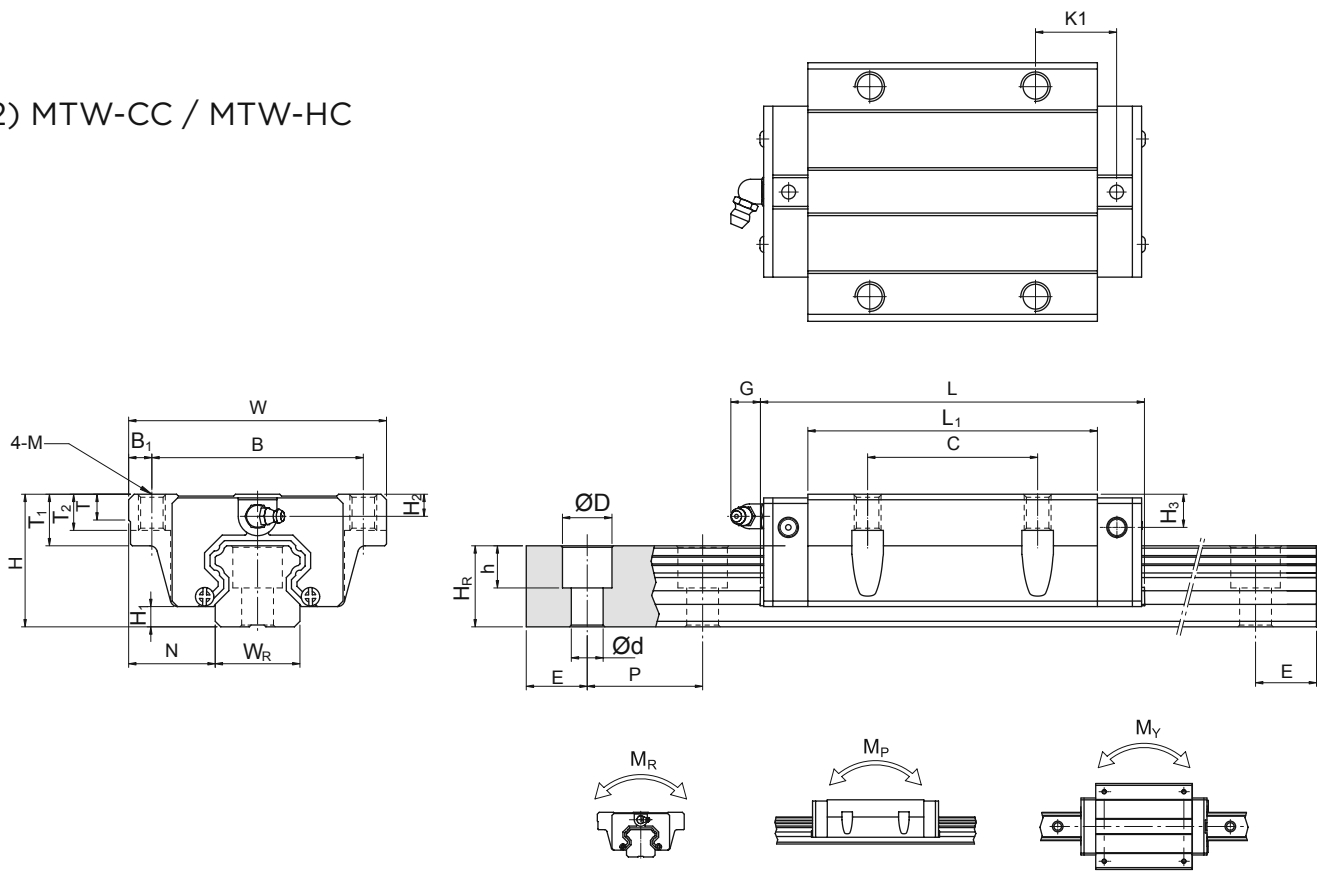
(1) MTH-CA / MTH-HA



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)													Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	G	MxI	T	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)				C(kN)	C ₀ (kN)	M _R kN-m	M _P kN-m	M _Y kN-m
MTH15CA	28	4.3	9.5	34	26	4	26	39.4	61.4	10	5.3	M4x5	6	7.95	7.7	15	15	7.5	5.3	4.5	60	20	M4x16	14.7	23.47	0.12	0.10	0.10	0.18	1.45	
MTH20CA	30	4.6	12	44	32	6	36	50.5	77.5	12.25	12	M5x6	8	6	6	20	17.5	9.5	8.5	6	60	20	M5x16	27.1	36.68	0.27	0.20	0.20	0.30	2.21	
MTH20HA							50	65.2	92.2	12.6														32.7	47.96	0.35	0.35	0.35	0.39		
MTH25CA	40	5.5	12.5	48	35	6.5	35	58	84	15.7	12	M6x8	8	10	9	23	22	11	9	7	60	20	M6x20	34.9	52.82	0.42	0.33	0.33	0.51	3.21	
MTH25HA							50	78.6	104.6	18.5														42.2	69.07	0.56	0.57	0.57	0.69		
MTH30CA	45	6	16	60	40	10	40	70	97.4	20.25	12	M8x10	8.5	9.5	13.8	28	26	14	12	9	80	20	M8x25	48.5	71.87	0.66	0.53	0.53	0.88	4.47	
MTH30HA							60	93	120.4	21.75														58.6	93.99	0.88	0.92	0.92	1.16		
MTH35CA	55	7.5	18	70	50	10	50	80	112.4	20.6	12	M8x12	10.2	16	19.6	34	29	14	12	9	80	20	M8x2	64.6	93.88	1.16	0.81	0.81	1.45	6.30	
MTH35HA							72	105.8	138.2	22.5														77.9	122.77	1.54	1.40	1.40	1.92		
MTH45CA	70	9.5	20.5	86	60	13	60	97	139.4	23	12.9	M10x17	16	18.5	30.5	45	38	20	17	14	105	22.5	M12x35	103.8	146.71	1.98	1.55	1.55	2.73	10.41	
MTH45HA							80	128.8	171.2	28.9														125.3	191.85	2.63	2.68	2.68	3.61		
MTH55CA	80	13	23.5	100	75	12.5	75	117.7	166.7	27.35	12.9	M12x18	17.5	22	29	53	44	23	20	16	120	30	M14x45	153.2	211.23	3.69	2.64	2.64	4.17	15.08	
MTH55HA							95	155.8	204.8	36.4														184.9	276.23	4.88	4.57	4.57	5.49		
MTH65CA	90	15	31.5	126	76	25	70	144.2	200.2	43.1	12.9	M16x20	25	15	15	63	53	26	22	18	150	35	M16x50	213.2	287.48	6.65	4.27	4.27	7.00	21.18	
MTH65HA							120	203.6	259.6	47.8														277.8	420.17	9.38	7.38	7.38	9.82		

Note : 1 kgf = 9.81 N

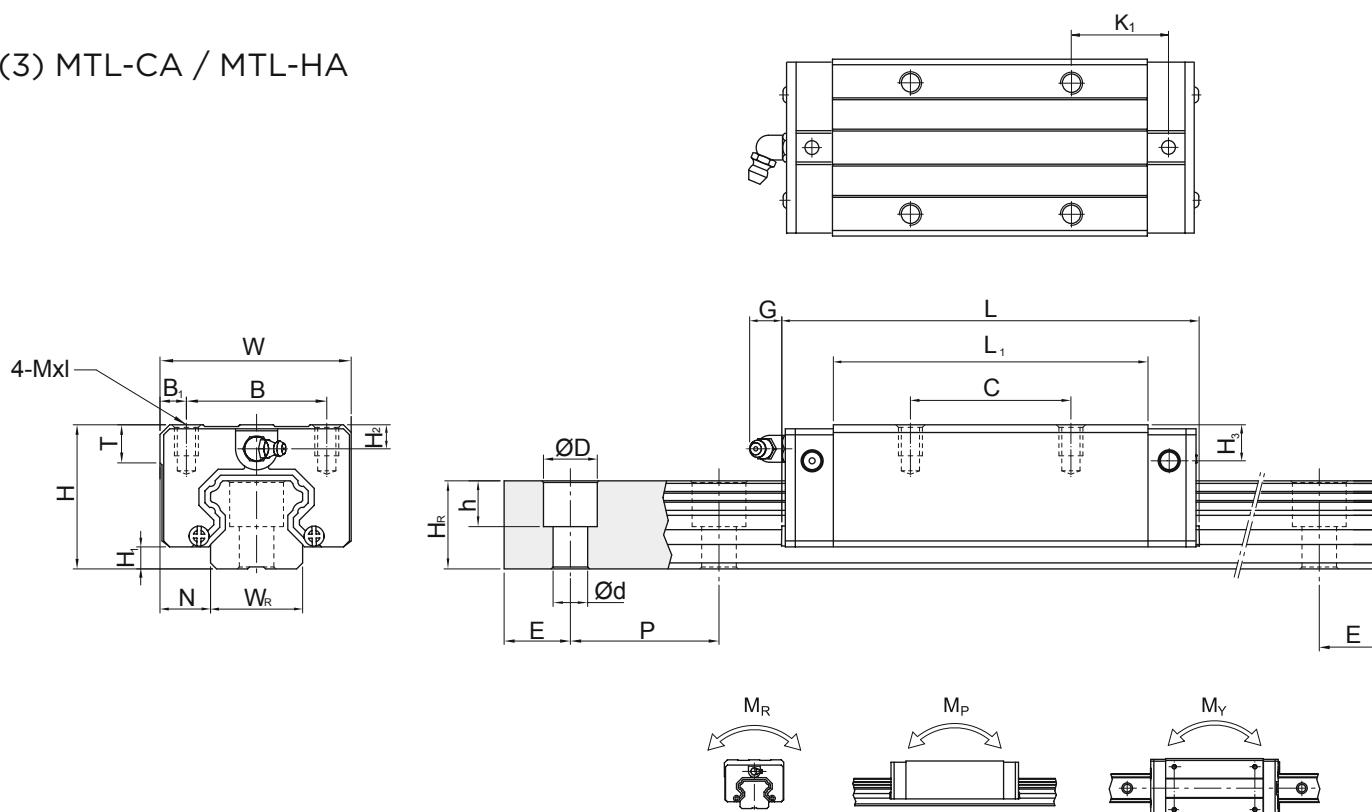
(2) MTW-CC / MTW-HC



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)														Dimensions of Rail (mm)								Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	G	M	T	T ₁	T ₂	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)				C(kN)	C ₀ (kN)	M _R kN-m	M _P kN-m	M _Y kN-m	Block kg	Rail kg/m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
MTW15CC	24	4.3	16	47	38	4.5	30	39.4	61.4	8	5.3	M5	6	8.9	6.95	3.95	3.7	15	15	7.5	5.3	4.5	60	20	M4x16	14.7	23.47	0.10	0.10	0.17	1.45	1.45																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
MTW20CC	30	4.6	21.5	63	53	5	40	50.5	77.5	10.25	12	M6	8	10	9.5	6	6	20	17.5	9.5	8.5	6	60	20	M5x16	27.1	36.68	0.27	0.20	0.20	0.40	2.21																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
MTW20HC								65.2	92.2	17.6																65.2	92.2	17.6	65.2	92.2	17.6		65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2	17.6	65.2	92.2

Note : 1 kgf = 9.81 N

(3) MTL-CA / MTL-HA



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)													Dimensions of Rail (mm)								Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	G	MxI	T	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)	C(kN)				C ₀ (kN)	M _R kN-m	M _P kN-m	M _Y kN-m	Block kg
MTL15CA	24	4.3	9.5	34	26	4	26	39.4	61.4	10	5.3	M4x4	6	3.95	3.7	15	15	7.5	5.3	4.5	60	20	M4x16	14.7	23.47	0.12	0.10	0.10	0.14	1.45		
MTL25CA	36	5.5	12.5	48	35	6.5	35	58	84	15.7	12	M6x6	8	6	5	23	22	11	9	7	60	20	M6x20	34.9	52.82	0.42	0.33	0.33	0.42	3.21		
MTL25HA							50	78.6	104.6	18.5														42.2	69.07	0.56	0.57	0.57	0.57			
MTL30CA	42	6	16	60	40	10	40	70	97.4	20.25	12	M8x10	8.5	6.5	10.8	28	26	14	12	9	80	20	M8x25	48.5	71.87	0.66	0.53	0.53	0.78	4.47		
MTL30HA							60	93	120.4	21.75														58.6	93.99	0.88	0.92	0.92	1.03			
MTL35CA	48	7.5	18	70	50	10	50	80	112.4	20.6	12	M8x12	10.2	9	12.6	34	29	14	12	9	80	20	M8x25	64.6	93.88	1.16	0.81	0.81	1.14	6.30		
MTL35HA							72	105.8	138.2	22.5														77.9	122.77	1.54	1.40	1.40	1.52			
MTL45CA	60	9.5	20.5	86	60	13	60	97	139.4	23	12.9	M10x17	16	8.5	20.5	45	38	20	17	14	105	22.5	M12x35	103.8	146.71	1.98	1.55	1.55	2.08	10.41		
MTL45HA							80	128.8	171.2	28.9														125.3	191.85	2.63	2.68	2.68	2.75			
MTL55CA	70	13	23.5	100	75	12.5	75	117.7	166.7	27.35	12.9	M12x18	17.5	12	19	53	44	23	20	16	120	30	M14x45	153.2	211.23	3.69	2.64	2.64	3.25	15.08		
MTL55HA							95	155.8	204.8	36.4														184.9	276.23	4.88	4.57	4.57	4.27			

Note : 1 kgf = 9.81 N

EG SERIES

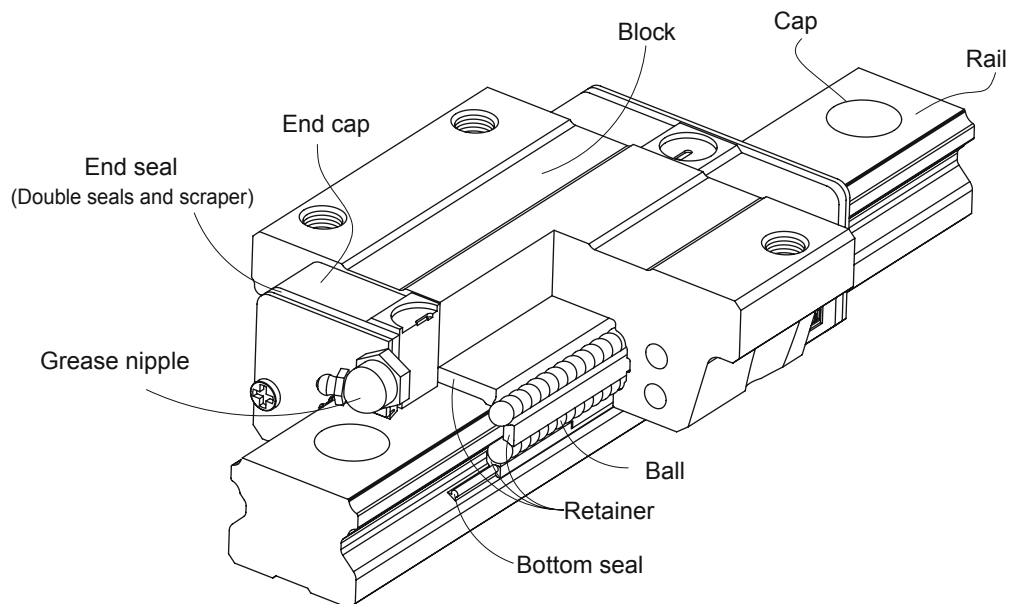
Low Profile Ball Type

2-2 EG Series - Low Profile Ball Type Linear Guideway

2-2-1 Features of the EG Series Linear Guideway

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

2-2-2 Construction of EG Series

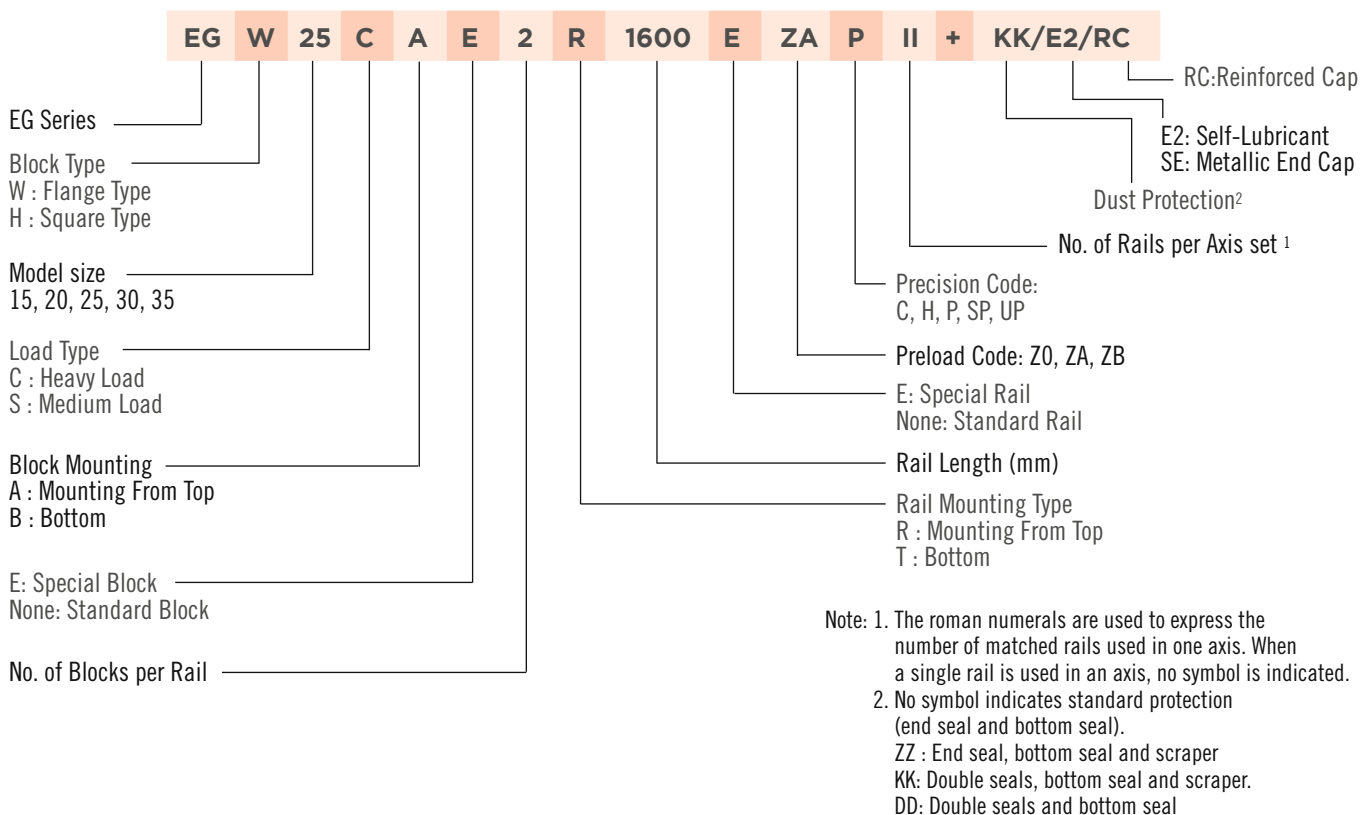


- Rolling circulation system: Block, rail, end cap and retainer
- Lubrication system: Grease nipple and piping Joint
- Dust protection system: End seal, bottom seal, cap and scraper

2-2-3 Model Number of EG Series

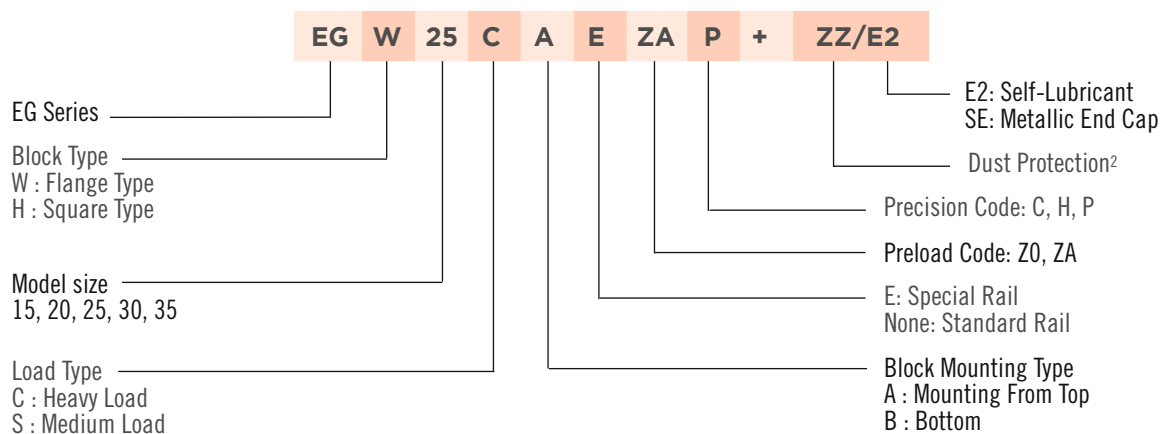
EG series linear guideways are classified into non-interchangeable and interchangeable types. The sizes of these two types are the same as one another. The main difference is that the interchangeable type of blocks and rails can be freely exchanged and they can maintain P-class accuracy. Because of strict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

(1) Non-interchangeable type

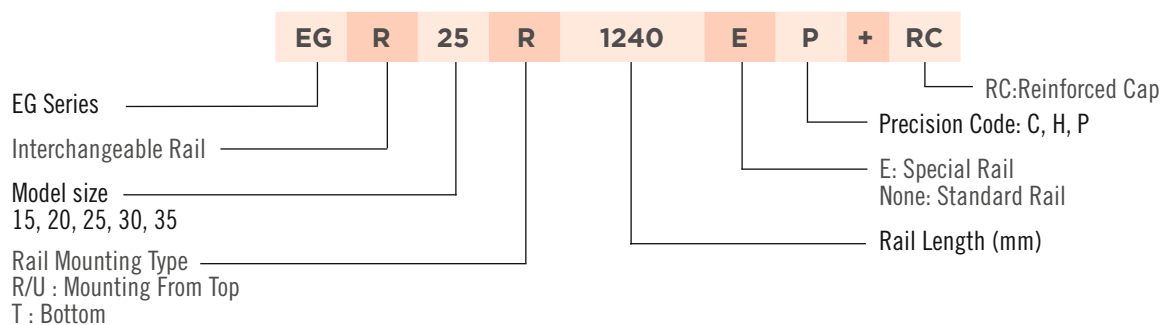


(2) Interchangeable type

○ Model Number of EG Block



○ Model Number of EG Rail

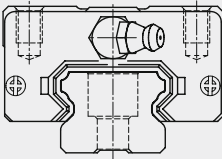
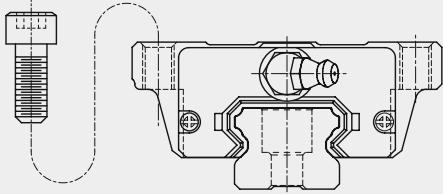
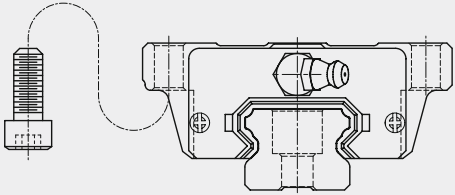


2-2-4 Types

(1) Block types

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

Table 2-2-1 Block Types

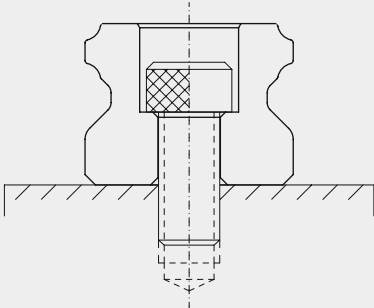
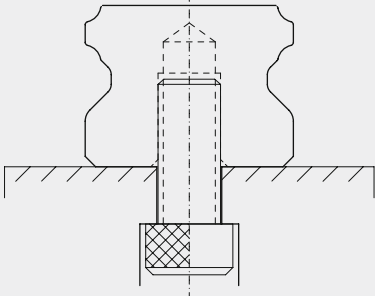
Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Application
Square	QEH-SA QEH-CA		24	100	<ul style="list-style-type: none"> Automation devices High-speed transportation equipment Precision measuring equipment Semiconductor manufacturing equipment
			↓	↓	
Flange	QEW-SA QEW-CA		24	100	
			↓	↓	
	QEW-SB QEW-CB		48	4000	
			↓	↓	

*Please refer to the chapter 2-2-13 for the dimensional detail.

(2) Rail types

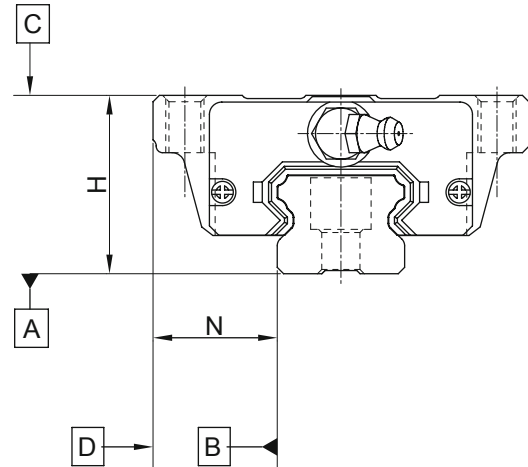
Besides the standard top mounting type, MTECH also offers bottom mounting type rails.

Table 2-2-2 Rail Types

Mounting from Top	Mounting from bottom
	

2-2-5 Accuracy

The accuracy of the EG series can be classified into 5 classes: normal(C), high(H), precision(P), super precision(SP), and ultra precision(UP). Choose the class by referencing the accuracy of selected equipment.



(1) Accuracy of non-interchangeable guideways.

Table 2-2-3 Accuracy Standards

unit: mm

Item	EG - 15, 20				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.03	0 -0.03	0 -0.015	0 -0.008
Dimensional tolerance of width N	± 0.1	± 0.03	0 -0.03	0 -0.015	0 -0.008
Variation of height H	0.02	0.01	0.006	0.004	0.003
Variation of width N	0.02	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	See Table 2-2-7				
Running parallelism of block surface D to surface B	See Table 2-2-7				

Table 2-2-4 Accuracy Standards

unit: mm

Item	EG - 25, 30, 35				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.04	0 -0.04	0 -0.02	0 -0.01
Dimensional tolerance of width N	± 0.1	± 0.04	0 -0.04	0 -0.02	0 -0.01
Variation of height H	0.02	0.015	0.007	0.005	0.003
Variation of width N	0.03	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	See Table 2-2-7				
Running parallelism of block surface D to surface B	See Table 2-2-7				

(2) Accuracy of interchangeable guideways.

Table 2-2-5 Accuracy Standards

unit: mm

Item	EG - 15, 20		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.03	± 0.015
Dimensional tolerance of width N	± 0.1	± 0.03	± 0.015
Variation of height H	0.02	0.01	0.006
Variation of width N	0.02	0.01	0.006
Running parallelism of block surface C to surface A	See Table 2-2-7		
Running parallelism of block surface D to surface B	See Table 2-2-7		

Table 2-2-6 Accuracy Standards

unit: mm

Item	EG - 25, 30, 35		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.04	± 0.02
Dimensional tolerance of width N	± 0.1	± 0.04	± 0.02
Variation of height H	0.02	0.015	0.007
Variation of width N	0.03	0.015	0.007
Running parallelism of block surface C to surface A	See Table 2-2-7		
Running parallelism of block surface D to surface B	See Table 2-2-7		

(3) Accuracy of running parallelism.

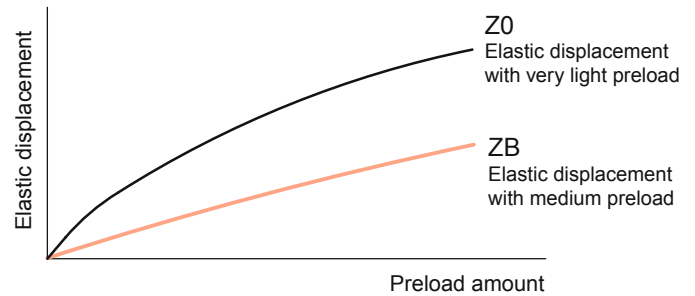
Table 2-2-7 Accuracy of Running Parallelism

Rail Length (mm)	Accuracy (μm)				
	C	H	P	SP	UP
~ 100	12	7	3	2	2
100 ~ 200	14	9	4	2	2
200 ~ 300	15	10	5	3	2
300 ~ 500	17	12	6	3	2
500 ~ 700	20	13	7	4	2
700 ~ 900	22	15	8	5	3
900 ~ 1,100	24	16	9	6	3
1,100 ~ 1,500	26	18	11	7	4
1,500 ~ 1,900	28	20	13	8	4
1,900 ~ 2,500	31	22	15	10	5
2,500 ~ 3,100	33	25	18	11	6
3,100 ~ 3,600	36	27	20	14	7
3,600 ~ 4,000	37	28	21	15	7

2-2-6 Preload

(1) Definition

A preload can be applied to each guideway. Generally, a linear motion guideway has a negative clearance between the groove and balls in order to improve stiffness and maintain high precision. The figure shows that adding a preload can improve stiffness of the linear guideway. A preload no greater than ZA would be recommended for model sizes smaller than EG20. This will avoid an over-loaded condition that would affect guideway life.



(2) Preload classes

MTECH offers three standard preloads for various applications and conditions.

Table 2-2-8 Preload Classes

Class	Code	Preload	Condition
Very Light Preload	Z0	0~0.02C	Certain load direction, low impact, low precision required
Light Preload	ZA	0.03C~0.05C	Low load and high precision required
Medium Preload	ZB	0.06C~0.08C	High rigidity required, with vibration and impact

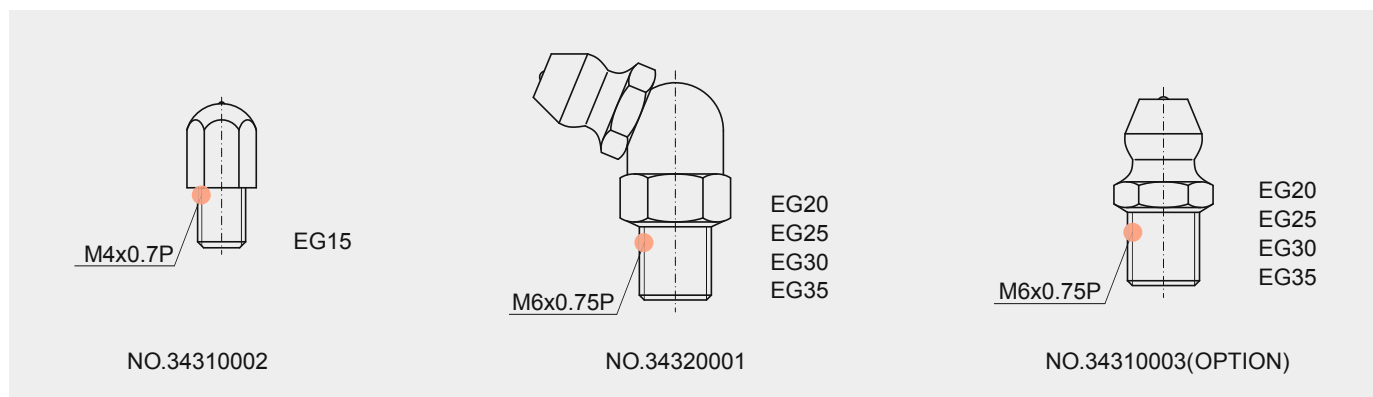
Class	Interchangeable Guideway	Non-Interchangeable Guideway
Preload classes	Z0, ZA	Z0, ZA, ZB

Note: The "C" in the preload column denotes basic dynamic load rating.

2-2-7 Lubrication

(1) Grease

- Grease nipple



○ Mounting location

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

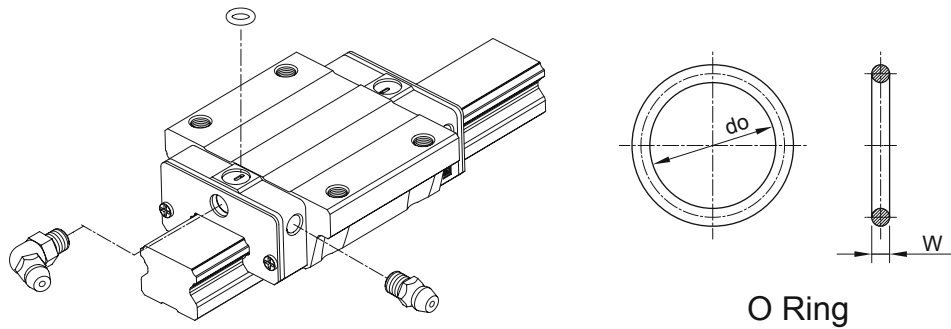
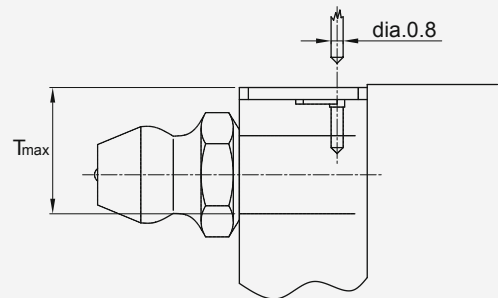


Table 2-2-9 O-Ring size and max. permissible depth for piercing

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do (mm)	W (mm)	T _{max} (mm)
EG15	2.5±0.15	1.5±0.15	6.9
EG20	4.5±0.15	1.5±0.15	8.4
EG25	4.5±0.15	1.5±0.15	10.4
EG30	4.5±0.15	1.5±0.15	10.4
EG35	4.5±0.15	1.5±0.15	10.8



○ The lubricant amount for a block filled with grease

Table 2-2-10 The lubricant Amount for a Block Filled with Grease

Size	Medium load (cm ³)	Heavy load (cm ³)
EG15	0.8	1.4
EG20	1.5	2.4
EG25	2.8	4.6
EG30	3.7	6.3
EG35	5.6	6.6

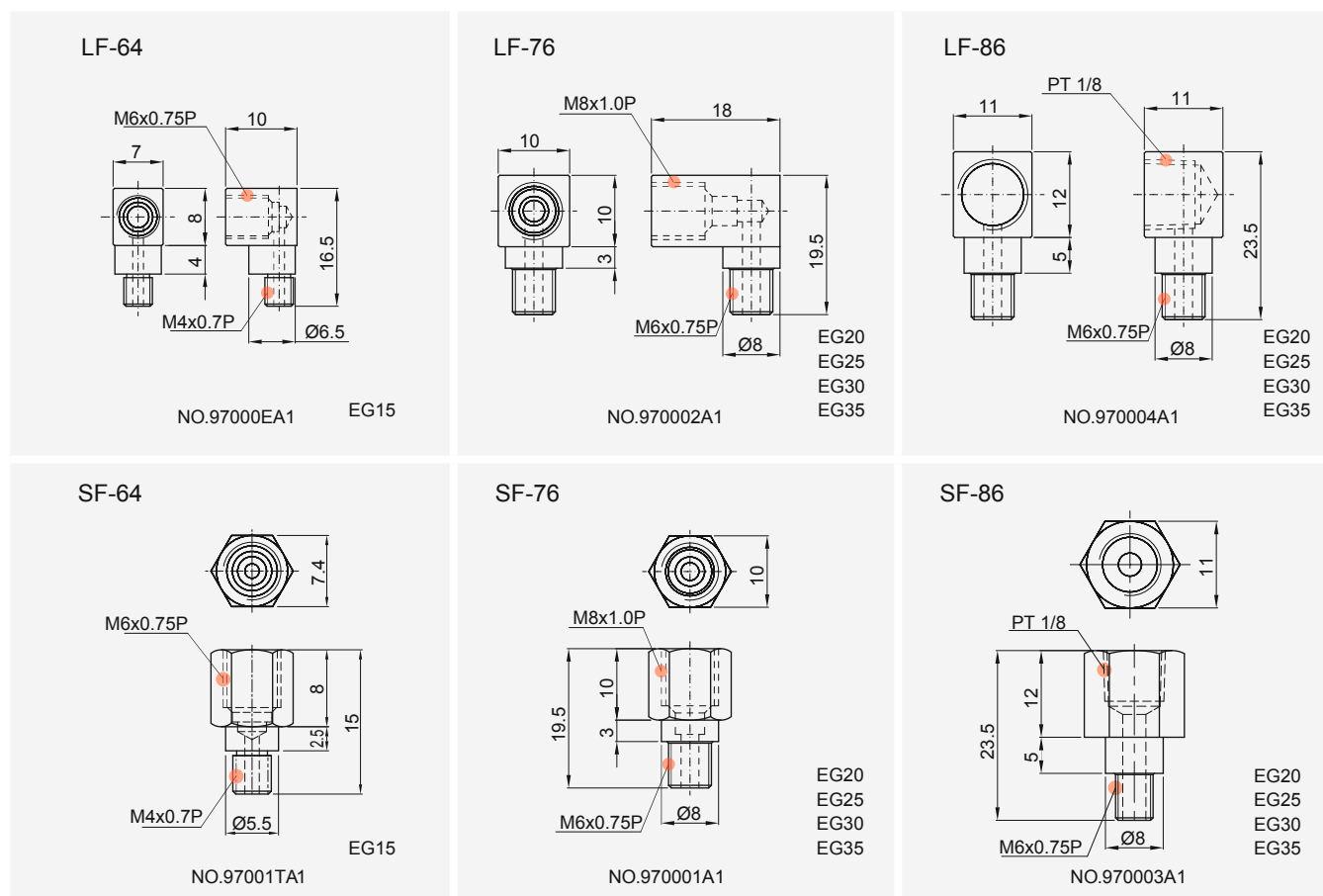
○ Frequency of replenishment

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

(2) Oil

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

○ Types of oil piping joint



○ Oil feeding rate

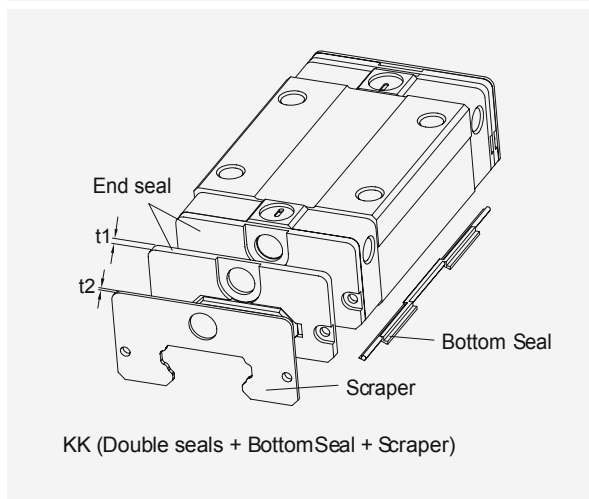
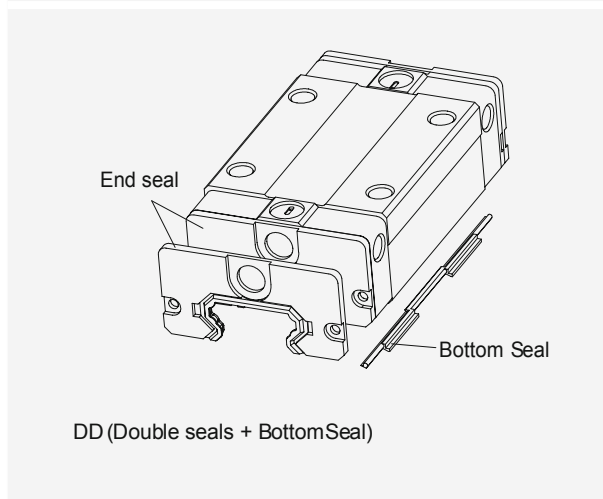
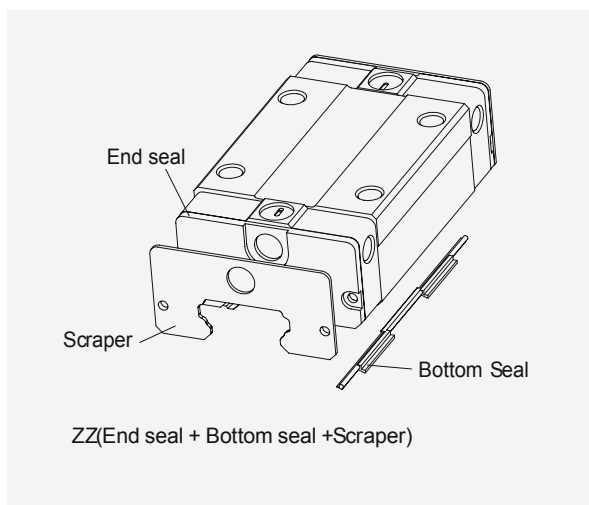
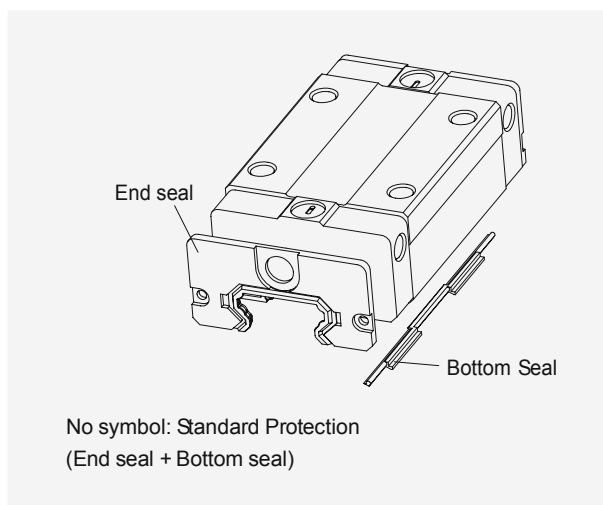
Table 2-2-11 Oil feed rate

Size	Feed rate (cm ³ /hr)
EG15	0.1
EG20	0.133
EG25	0.167
EG30	0.2
EG35	0.233

2-2-8 Dust Protection Equipment

(1) Codes of equipment

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



(2) End seal and bottom seal

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

(3) Double seals

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

Table 2-2-12 Dimensions of end seal

Size	Thickness (t1) (mm)
EG15 ES	2
EG20 ES	2
EG25 ES	2
EG30 ES	2
EG35 ES	2

(4) Scraper

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

Table 2-2-13 Dimensions of Scraper

Size	Thickness (t2) (mm)
EG15 SC	0.8
EG20 SC	0.8
EG25 SC	1
EG30 SC	1
EG35 SC	1.5

(5) Bolt caps for rail mounting holes

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

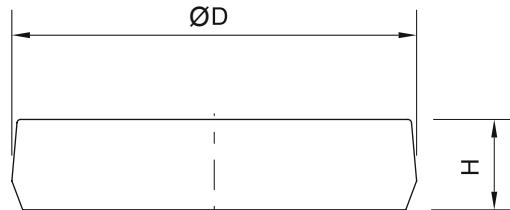
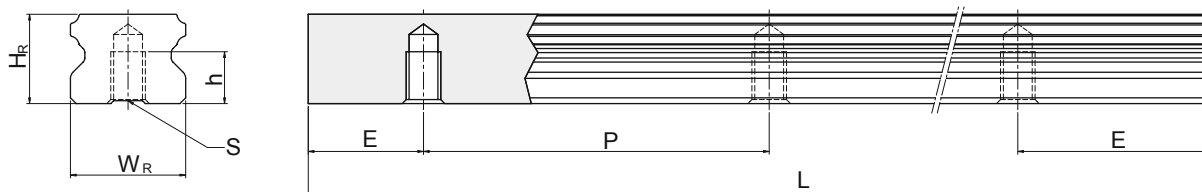


Table 2-2-14 Dimensions of Bolt Caps for Rail Mounting Holes

Rail Size	Bolt size	Diameter (D) (mm)	Thickness (H) (mm)
EGR15R	M3	6.15	1.2
EGR20R	M5	9.65	2.5
EGR25R	M6	11.15	2.5
EGR30R	M6	11.15	2.5
EGR35R	M8	14.20	3.5

(6) Dimensions for EGR-T (rail mounting from bottom)



Model No.	Dimensions of Rail (mm)						Weight (kg/m)
	W _R	H _R	S	h	P	E	
EGR15T	15	12.5	M5 x 0.8P	7	60	20	1.26
EGR20T	20	15.5	M6 x 1P	9	60	20	2.15
EGR25T	23	18	M6 x 1P	10	60	20	2.79
EGR30T	28	23	M8 x 1.25P	14	80	20	4.42
EGR35T	34	27.5	M8 x 1.25P	17	80	20	6.34

2-2-9 Friction

The maximum value of resistance per end seal are as shown in the table.

Table 2-2-16 Seal Resistance

Size	Resistance N (kgf)
EG15	0.98 (0.1)
EG20	0.98 (0.1)
EG25	0.98 (0.1)
EG30	1.47 (0.15)
EG35	1.96 (0.2)

2-2-10 Mounting Surface Accuracy Tolerance

Because of the circular-arc contact design, the EG linear guideway can withstand surface-error installation and deliver smooth linear motion. When the mounting surface meets the accuracy requirements of the installation, the high accuracy and rigidity of the guideway will be obtained without any difficulty. For faster installation and smoother movement, MTECH offers a preload with normal clearance because of its ability to absorb higher deviations in mounting surface inaccuracies.

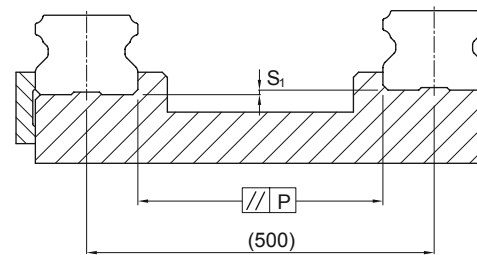


Table 2-1-20 Max. Parallelism Tolerance (P)

unit: μm

Size	Preload classes		
	Z0	ZA	ZB
EG15	25	18	-
EG20	25	20	18
EG25	30	22	20
EG30	40	30	27
EG35	50	35	30

Table 2-1-21 Max. Tolerance of Reference Surface Height (S_1)

unit: μm

Size	Preload classes		
	Z0	ZA	ZB
EG15	130	85	-
EG20	130	85	50
EG25	130	85	70
EG30	170	110	90
EG35	210	150	120

2-2-11 Cautions for Installation

(1) Shoulder heights and chamfers

Improper shoulder heights and chamfers of mounting surfaces will cause deviations in accuracy and rail or block interference with the chamfered part. When recommended shoulder heights and chamfers are used, problems with installation accuracy should be eliminated.

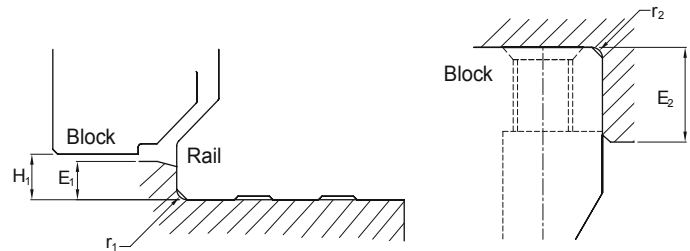


Table 2-2-19 Shoulder Heights and Fillets

unit: mm

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height of the rail E_1 (mm)	Shoulder height of the block E_2 (mm)	Clearance under block H_1 (mm)
EG15	0.5	0.5	2.7	5.0	4.5
EG20	0.5	0.5	5.0	7.0	6.0
EG25	1.0	1	5.0	7.5	7.0
EG30	1.0	1	7.0	7.0	10.0
EG35	1.0	1	7.5	9.5	11.0

(2) Tightening Torque of Bolts for Installation

Improperly tightened mounting bolts will seriously affect the accuracy of linear guide installations. The following tightening torques for different sizes of bolts are recommended.

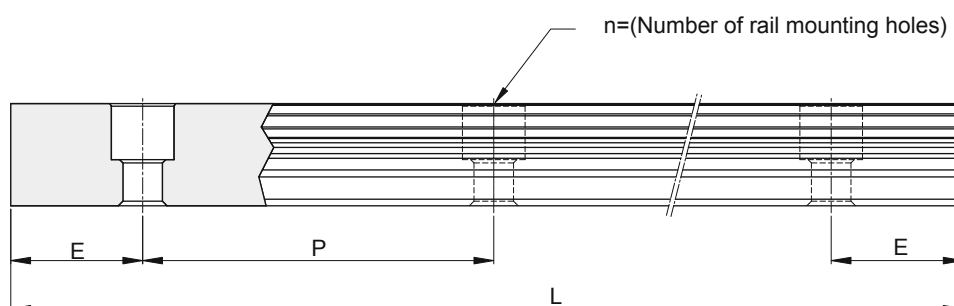
Table 2-2-20 Tightening Torque

Size	Bolt size	Torque N-cm (kgf-cm)		
		Iron	Casting	Aluminum
EG15	M3x0.5Px16L	186 (19)	127 (13)	98 (10)
EG20	M5x0.8Px16L	883 (90)	588 (60)	441 (45)
EG25	M6x1Px20L	1373 (140)	921 (94)	686 (70)
EG30	M6x1.25Px25L	1373 (140)	921 (94)	686 (70)
EG35	M8x1.25Px25L	3041 (310)	2010 (205)	1470 (150)

Note : 1 kgf = 9.81 N

2-2-12 Standard and Maximum Lengths of Rail

MTECH offers a number of standard rail lengths. Standard rail lengths feature end mounting hole placements set to predetermined values (E). For non-standard rail lengths, be sure to specify the E-value to be no greater than 1/2 the pitch (P) dimension. An E-value greater than this will result in unstable rail ends.



$$L = (n-1) \times P + 2 \times E \quad \text{Eq.2.2}$$

L : Total length of rail (mm)

n : Number of mounting holes

P : Distance between any two holes (mm)

E : Distance from the center of the last hole to the edge (mm)

Table 2-2-21 Rail Standard Length and Max. Length

unit: mm

Item	EG15	EG20	EG25	EG30	EG35
Standard Length L(n)	160 (3)	220 (4)	220 (4)	280 (4)	280 (4)
	220 (4)	280 (5)	280 (5)	440 (6)	440 (6)
	280 (5)	340 (6)	340 (6)	600 (8)	600 (8)
	340 (6)	460 (8)	460 (8)	760 (10)	760 (10)
	460 (8)	640 (11)	640 (11)	1,000 (13)	1,000 (13)
	640 (11)	820 (14)	820 (14)	1,640 (21)	1,640 (21)
	820 (14)	1,000 (17)	1,000 (17)	2,040 (26)	2,040 (26)
		1,240 (21)	1,240 (21)	2,520 (32)	2,520 (32)
		1,600 (27)	1,600 (27)	3,000 (38)	3,000 (38)
Pitch (P)	60	60	60	80	80
Distance to End (E) _s	20	20	20	20	20
Max. Standard Length	4,000 (67)	4,000 (67)	4,000 (67)	3,960 (50)	3,960 (50)
Max. Length	4,000	4,000	4,000	4,000	4,000

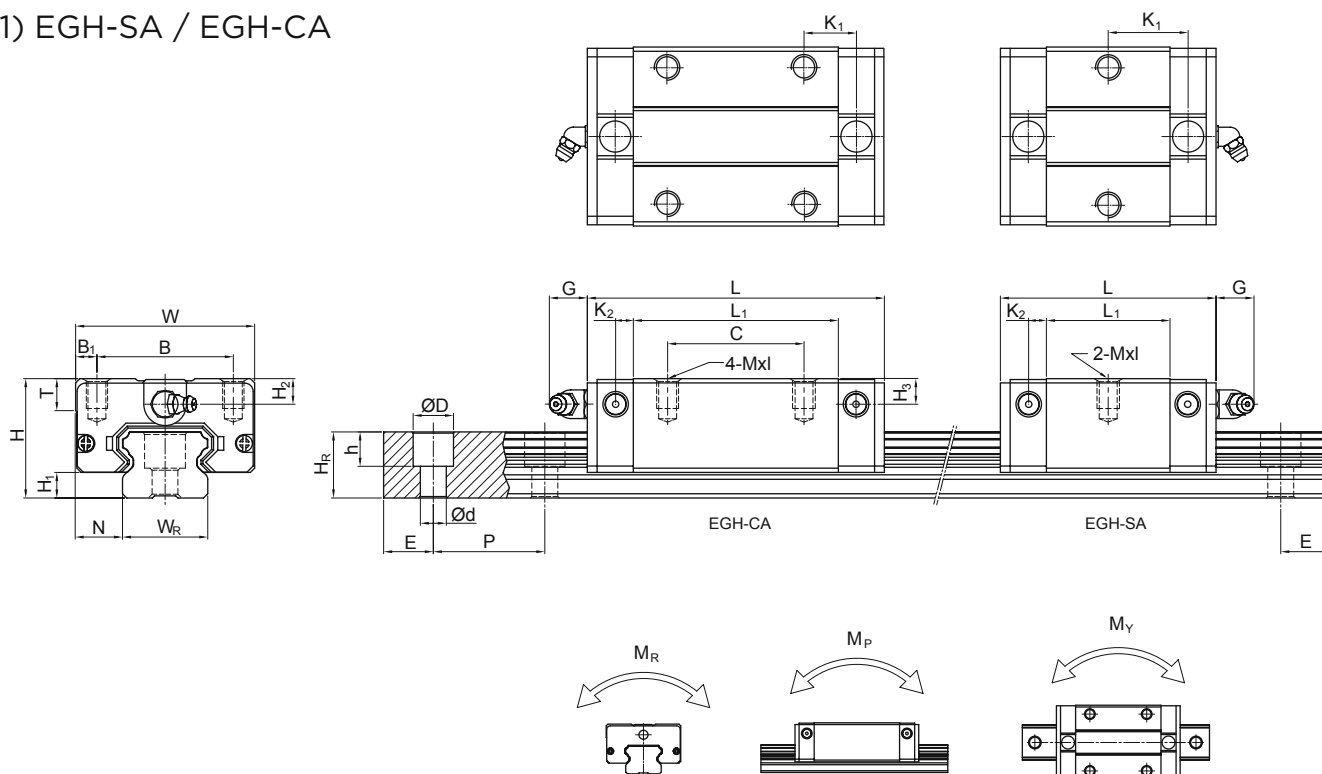
Note: 1. Tolerance of E value for standard rail is 0.5~0.5 mm. Tolerance of E value for jointed rail is 0~0.3 mm.

2. Maximum standard length means the max. rail length with standard E value on both sides.

3. If different E value is needed, please contact MTECH.

2-2-13 Dimensions for EG Series

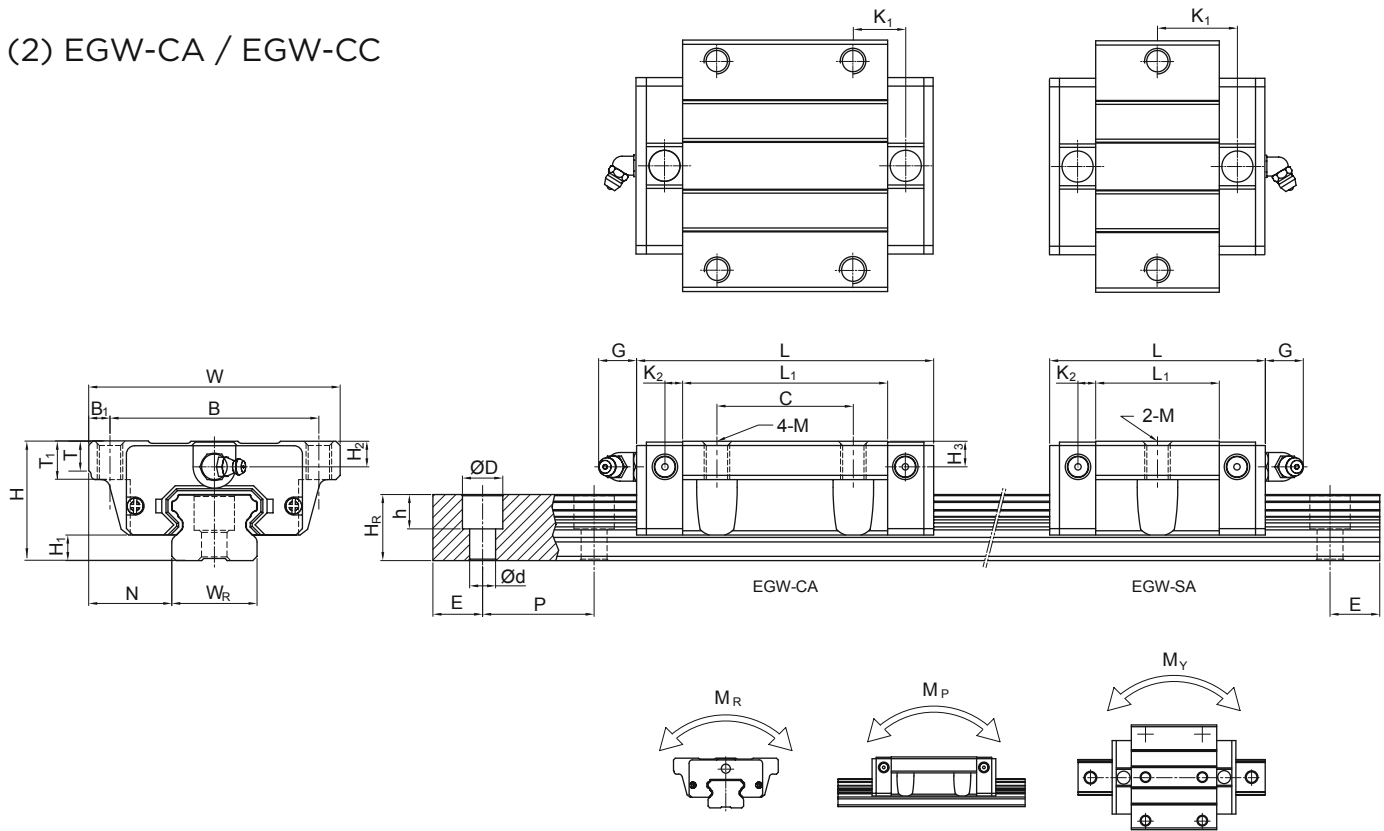
(1) EGH-SA / EGH-CA



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)														Dimensions of Rail (mm)						Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	Mxl	T	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)	C(kN)	C ₀ (kN)	M _R kN-m	M _P kN-m	M _Y kN-m	Block kg	Rail kg/m
EGH15SA	24	4.5	9.5	34	26	4	-	23.1	40.1	14.8	-	-	-	-	-	-	-	-	-	-	-	-	-	M3x16	5.35	9.40	0.08	0.04	0.04	0.09	1.25
EGH15CA							26	39.8	56.8	10.15	3.5	5.7	M4x6	6	5.5	6	15	17.5	6	4.5	3.5	60	20		7.83	16.19	0.13	0.10	0.10	0.15	
EGH20SA	28	6	11	42	32	5	-	29	50	18.75	-	-	-	-	-	-	-	-	-	-	-	-	-	M5x16	7.23	12.74	0.13	0.06	0.06	0.15	2.08
EGH20CA							32	48.1	69.1	12.3	4.15	12	M5x7	7.5	6	6	20	17.5	9.5	8.5	6	60	20		10.31	21.13	0.22	0.16	0.16	0.24	
EGH25SA	33	7	12.5	48	35	6.5	-	35.5	59.1	21.9	-	-	-	-	-	-	-	-	-	-	-	-	-	M6x20	11.40	19.50	0.23	0.12	0.12	0.25	2.67
EGH25CA							35	59	82.6	16.15	4.55	12	M6x9	8	8	8	23	22	11	9	7	60	20		16.27	32.40	0.38	0.32	0.32	0.41	
EGH30SA	42	10	16	60	40	10	-	41.5	69.5	26.75	-	-	-	-	-	-	-	-	-	-	-	-	-	M6x25	16.42	28.10	0.40	0.21	0.21	0.45	4.35
EGH30CA							40	70.1	98.1	21.05	6	12	M8x12	9	8	9	28	26	11	9	7	80	20		23.70	47.46	0.68	0.55	0.55	0.76	
EGH35SA	48	11	18	70	50	10	-	45	75	28.5	-	-	-	-	-	-	-	-	-	-	-	-	-	M8x25	22.66	37.38	0.56	0.31	0.31	0.66	6.14
EGH35CA							50	78	108	20	7	12	M8x12	10	8.5	8.5	34	29	14	12	9	80	20		33.35	64.84	0.98	0.69	0.69	1.13	

Note : 1 kgf = 9.81 N

(2) EGW-CA / EGW-CC



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)														Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	M	T	T ₁	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)	C(kN)	C ₀ (kN)	M _R kN-m	M _P kN-m	M _Y kN-m	Block kg	Rail kg/m
EGW15SC	24	4.5	18.5	52	41	5.5	-	23.1	40.1	14.8	3.5	5.7	M5	5	7	5.5	6	15	12.5	6	4.5	3.5	60	20	M3x16	5.35	9.40	0.08	0.04	0.04	0.12	1.25
EGW15CC							26	39.8	56.8	10.15																7.83	16.19	0.13	0.10	0.10	0.21	
EGW20SC	28	6	19.5	59	49	5	-	29	50	18.75	4.15	12	M6	7	9	6	6	20	15.5	9.5	8.5	6	60	20	M5x16	7.23	12.74	0.13	0.06	0.06	0.19	2.08
EGW20CC							32	48.1	69.1	12.3																10.31	21.13	0.22	0.16	0.16	0.32	
EGW25SC	33	7	25	73	60	6.5	-	35.5	59.1	21.9	4.55	12	M8	7.5	10	8	8	23	18	11	9	7	60	20	M6x20	11.40	19.50	0.23	0.12	0.12	0.35	2.67
EGW25CC							35	59	82.6	16.15																16.27	32.40	0.38	0.32	0.32	0.59	
EGW30SC	42	10	31	90	72	9	-	41.5	69.5	26.75	6	12	M10	7	10	8	9	28	23	11	9	7	80	20	M6x25	16.42	28.10	0.40	0.21	0.21	0.62	4.35
EGW30CC							40	70.1	98.1	21.05																23.70	47.46	0.68	0.55	0.55	1.04	
EGW35SC	48	11	33	100	82	9	-	45	75	28.5	7	12	M10	10	13	8.5	8.5	34	27.5	14	12	9	80	20	M8x25	22.66	37.38	0.56	0.31	0.31	0.84	6.14
EGW35CC							50	78	108	20																33.35	64.84	0.98	0.69	0.69	1.45	

Note : 1 kgf = 9.81 N

MG SERIES

Miniature Type

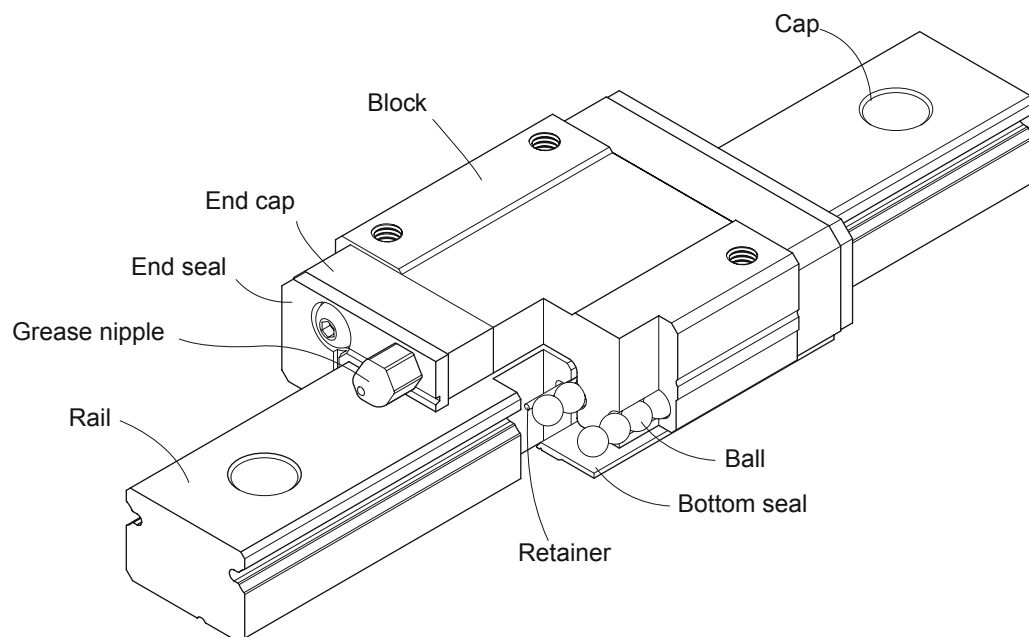
2-3 MG Series - Miniature Linear Guideway

2-3-1 Features of MGN Series

Design features of narrow type miniature guideways-MGN:

1. Tiny and light weight, suitable for miniature equipment.
2. Gothic arch contact design can sustain loads from all directions and offer high rigidity and high accuracy.
3. Steel balls are held by a miniature retainer to avoid balls from falling out, even when the blocks are removed from the rail.
4. Interchangeable types are available in certain precision grades.

2-3-2 Construction of MGN Series



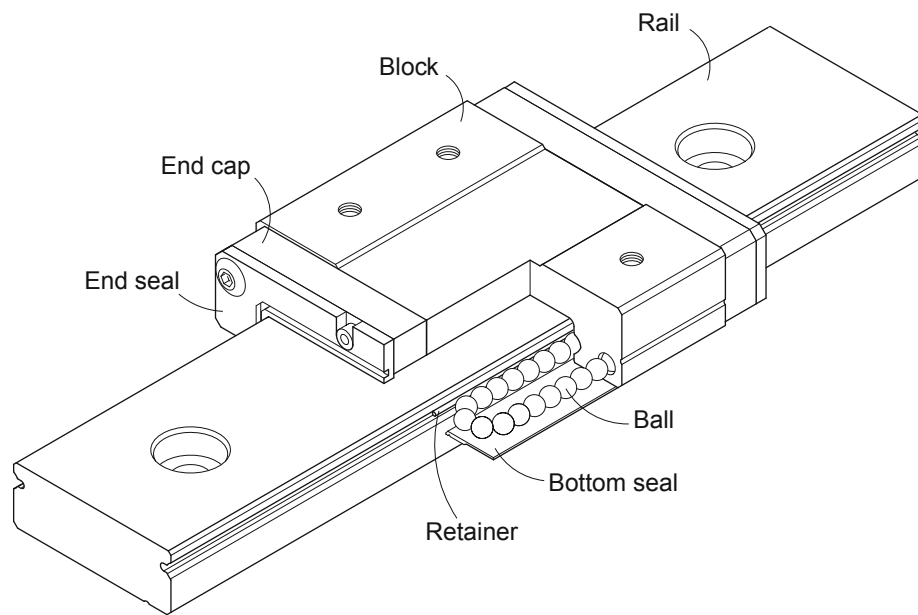
- Rolling circulation system: Block, rail, ball, end cap and retainer
- Lubrication system: Grease nipple is available for MGN15, lubricated by grease gun. MGN7, 9, 12 are lubricated by the hole at the side of the end cap.
- Dust protection system: End seal, bottom seal (optional size 9,12,15), cap (size12,15)

2-3-3 Features of MGW Series

Design features of wide type miniature guideways- MGW:

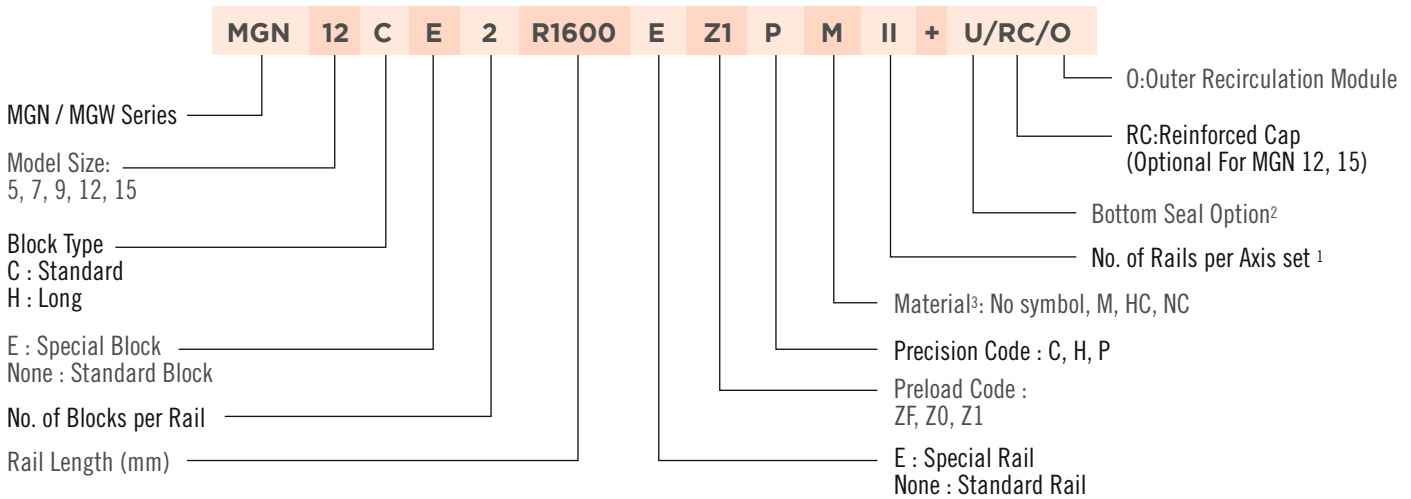
1. The enlarged width design increases the capacity of moment loading.
2. Gothic arch contact design has high rigidity characteristic in all directions.
3. Steel balls are held by a miniature retainer to avoid balls from falling out, even when the blocks are removed from the rail.

2-3-4 Construction of MGW Series



- Rolling circulation system: Block, rail, ball, end cap and retainer
- Lubrication system: Grease nipple is available for MGW15, lubricated by grease gun.
- Dust protection system: End seal, bottom seal (optional size 9,12,15), cap (size12,15)

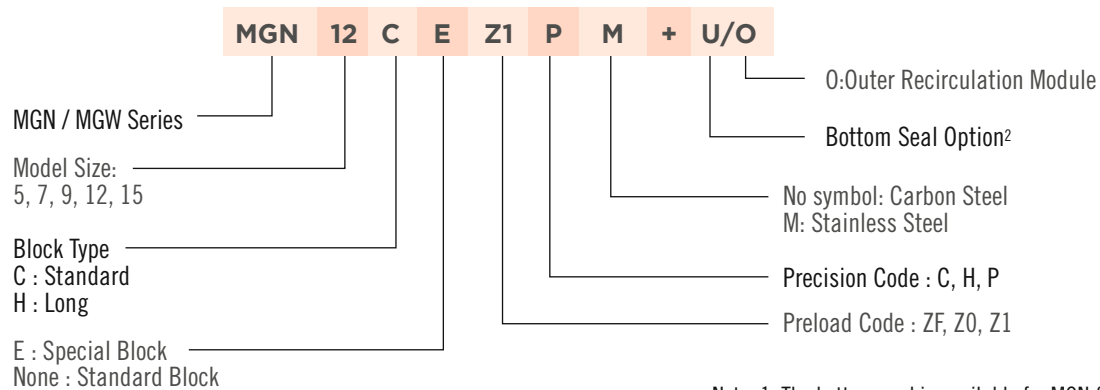
(1) Non-interchangeable type



- Note: 1. Symbol for No. of rails used on the same plane.
No symbol indicates single rail in a axis.
2. The bottom seal is available for MGN & MGW 9, 12, 15.
3. No symbol: Carbon Steel
M: Stainless Steel
HC: Carbon Steel+Hard Chrome Treatment
NC: Carbon Steel+Chemical Black Chrome Treatment
4. MG5 is only supplied with outer recirculation module.

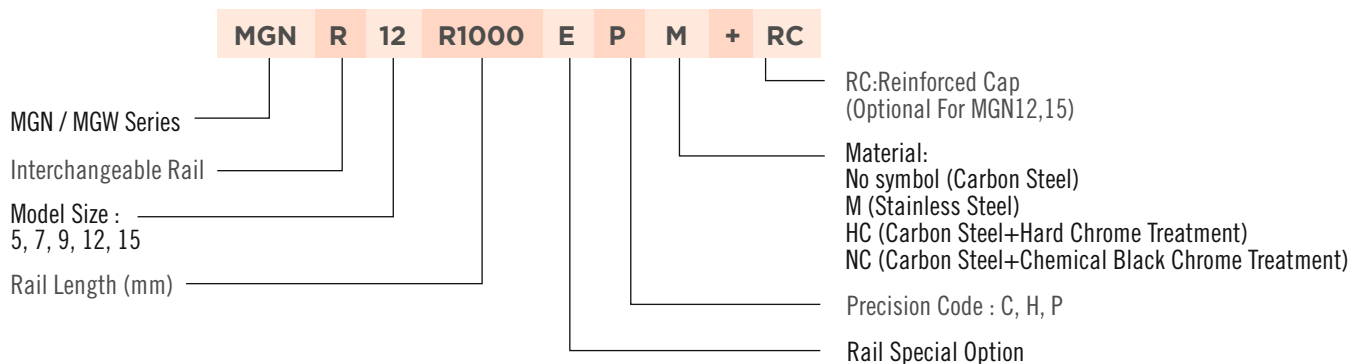
(2) Interchangeable type

○ Interchangeable Block



- Note: 1. The bottom seal is available for MGN & MGW 9, 12, 15.
2. MG5 is only supplied with outer recirculation module.

○ Interchangeable Rail

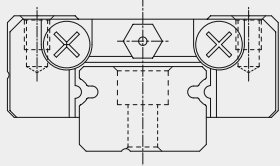
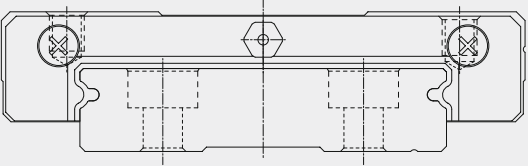


2-3-5 Types

(1) Block types

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

Table 2-4-1 Block Types

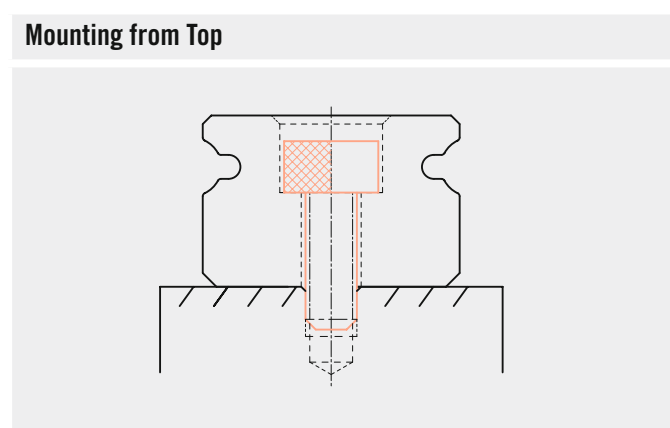
Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Application
Square	MGN-C MGN-H		8	100	<ul style="list-style-type: none"> ○ Printer ○ Robotics ○ Precision measure equipment ○ Semiconductor equipment
			↓	↓	
Flange	MGW-C MGW-H		9	100	
			↓	↓	
			16	2000	

*Please refer to the chapter 2-4-14 for the dimensional detail.

(2) Rail types

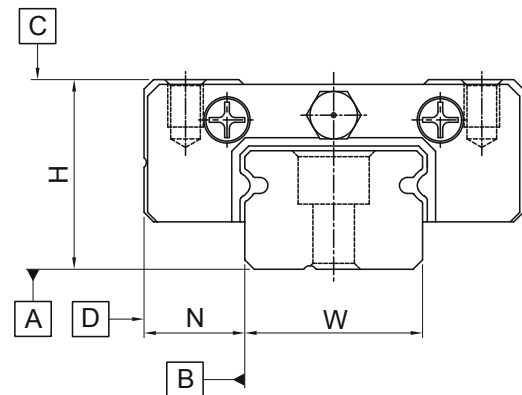
MTECH offers standard top mounting type.

Table 2-4-2 Rail Types



2-3-6 Accuracy Classes

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



(1) Accuracy of non-interchangeable guideways

Table 2-4-3 Accuracy Standard of Non-interchangeable Type

unit: mm

Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.4	± 0.02	± 0.01
Dimensional tolerance of width N	± 0.4	± 0.025	± 0.015
Pair Variation of height H	0.03	0.015	0.007
Pair Variation of width N (Master Rail)	0.03	0.02	0.01
Running parallelism of block surface C to surface A	See Table 2-4-5		
Running parallelism of block surface D to surface B	See Table 2-4-5		

(2) Accuracy of interchangeable guideways

Table 2-4-4 Accuracy Standard of Interchangeable Type

unit: mm

Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.4	± 0.02	± 0.01
Dimensional tolerance of width N	± 0.4	± 0.025	± 0.015
One Set	Pair Variation of height H	0.03	0.015
	Pair Variation of width N	0.03	0.02
Pair Variation of width N (Master Rail)	0.07	0.04	0.02
Running parallelism of block surface C to surface A	See Table 2-4-5		
Running parallelism of block surface D to surface B	See Table 2-4-5		

(3) Accuracy of running parallelism

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

Table 2-4-5 Accuracy of Running Parallelism

Rail Length (mm)	Accuracy (μm)			Rail Length (mm)	Accuracy (μm)		
	C	H	P		C	H	P
~ 50	12	6	2	1,000 ~ 1,200	25	18	11
50 ~ 80	13	7	3	1,200 ~ 1,300	25	18	11
80 ~ 125	14	8	3.5	1,300 ~ 1,400	26	19	12
125 ~ 200	15	9	4	1,400 ~ 1,500	27	19	12
200 ~ 250	16	10	5	1,500 ~ 1,600	28	20	13
250 ~ 315	17	11	5	1,600 ~ 1,700	29	20	14
315 ~ 400	18	11	6	1,700 ~ 1,800	30	21	14
400 ~ 500	19	12	6	1,800 ~ 1,900	30	21	15
500 ~ 630	20	13	7	1,900 ~ 2,000	31	22	15
630 ~ 800	22	14	8	2,000 ~	31	22	16
800 ~ 1,000	23	16	9				

2-3-7 Preload

MGN/MGW series provides three different preload levels for various applications.

Table 2-4-6 Preload Classes

Class	Code	Preload	Accuracy
Light Clearance	ZF	Clearance 4~10μm	C
Very Light Preload	Z0	0	C~P
Light Preload	Z1	0.02C	C~P

Note: The “C” in the preload column denotes basic dynamic load rating.

2-3-8 Dust Proof Accessories

End seals and standard accessories fixed on both sides of the block can prevent dust from entering the block, so the accuracy and service life of a linear guideway can be maintained. Bottom seals are fixed under the skirt portion of the block to prevent dust from entering. Customers can order bottom seals by adding the mark “+U” followed by the model number. Sizes 9, 12 and 15 provide bottom seals as an option, but size 5, 7 do not offer the option due to the space limit of H1. Note that “H1” would be reduced if bottom seals are attached, be aware of possible interference between block and mounting surface.

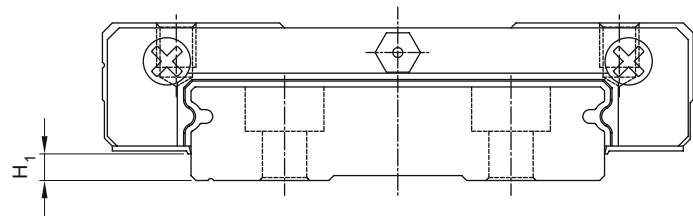


Table 2-4-7

Size	Bottom seal	H ₁ mm	Size	Bottom seal	H ₁ mm
MGN5	-	-	MGW5	-	-
MGN7	-	-	MGW7	-	-
MGN9	•	1	MGW9	•	1.9
MGN12	•	2	MGW12	•	2.4
MGN15	•	3	MGW15	•	2.4

2-3-9 Mounting Surface Accuracy Tolerance

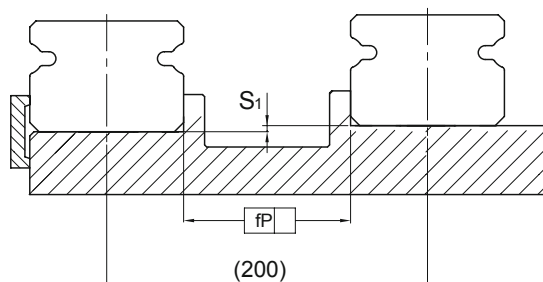


Table 2-4-8 Max. Parallelism Tolerance (P)

unit: μm

Size	Preload classes		
	ZF	Z0	Z1
MG5	2	2	2
MG7	3	3	3
MG9	4	4	3
MG12	9	9	5
MG15	10	10	6

Table 2-4-9 Max. Tolerance of Reference Surface Height (S_1)

unit: μm

Size	Preload classes		
	ZF	Z0	Z1
MG5	20	20	2
MG7	25	25	3
MG9	35	35	6
MG12	50	50	12
MG15	60	60	20

Table 2-4-10 Permissible Error of Mounting Surface

unit: mm

Size	Flatness of the Mounting Surface
MG5	0.015/200
MG7	0.025/200
MG9	0.035/200
MG12	0.050/200
MG15	0.060/200

Note: The values above are suitable for preload of Z F/Z0. For preload of Z1 or using two(or more) rails on the same plane, 50% or less of the values above are recommended.

2-3-10 Cautions for Installation

(1) Shoulder heights and fillets

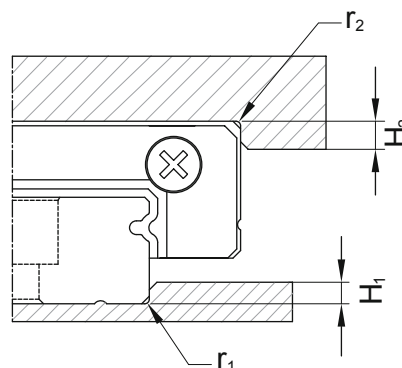


Table 2-4-11 Shoulder Heights and Fillets

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height H_1 (mm)	Shoulder height H_2 (mm)
MGN5	0.1	0.2	1.2	2
MGN7	0.2	0.2	1.2	3
MGN9	0.2	0.3	1.7	3
MGN12	0.3	0.4	1.7	4
MGN15	0.5	0.5	2.5	5
MGW5	0.1	0.2	1.2	2
MGW7	0.2	0.2	1.7	3
MGW9	0.3	0.3	2.5	3
MGW12	0.4	0.4	3	4
MGW15	0.4	0.8	3	5

(2) Tightening torque of bolts for installation

Improperly tightened mounting bolts will seriously affect the accuracy of linear guide installations. The following tightening torques for different sizes of bolts are recommended.

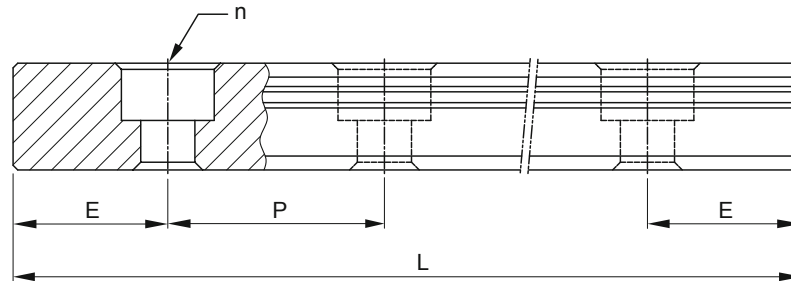
Table 2-4-12 Tightening Torque

Size	Bolt size	Torque N-cm (kgf-cm)		
		Iron	Casting	Aluminum
MGN5	M2x0.4Px6L	57(5.9)	39.2(4)	29.4(3)
MGN7	M2x0.4Px6L	57(5.9)	39.2(4)	29.4(3)
MGN9	M3x0.5Px8L	186(19)	127(13)	98(10)
MGN12	M3x0.5Px8L	186(19)	127(13)	98(10)
MGN15	M3x0.5Px10L	186(19)	127(13)	98(10)
MGW5	M2.5x0.45Px7L	118(12)	78.4(8)	58.8(6)
MGW7	M3x0.5Px6L	186(19)	127(13)	98(10)
MGW9	M3x0.5Px8L	186(19)	127(13)	98(10)
MGW12	M4x0.7Px8L	392(40)	274(28)	206(21)
MGW15	M4x0.7Px10L	392(40)	274(28)	206(21)

Note : 1 kgf = 9.81 N

2-3-11 Standard and Maximum Lengths of Rail

MTECH offers standard lengths of rail for instant requirements. For non-standard rail lengths, it's recommended that the E value is no greater than 1/2 of the pitch(P) to prevent instability at the end of the rail, and the E value should be no less than Emin to avoid a broken mounting hole.



$$L = (n-1) \times P + 2 \times E \quad \text{Eq.2.4}$$

L : Total length of rail (mm)

n : Number of mounting holes

P : Distance between any two holes (mm)

E : Distance from the center of the last hole to the edge (mm)

Table 2-4-13 Rail Standard Length and Max. Length

unit: mm

Item	MGNR5	MGNR7	MGNR9	MGNR12	MGNR15	MGWR5	MGWR7	MGWR9	MGWR12	MGWR15
Standard Length L(n)	40(3)	40(3)	55(3)	70(3)	70(2)	50(3)	80(3)	80(3)	110(3)	110(3)
	55(4)	55(4)	75(4)	95(4)	110(3)	70(4)	110(4)	110(4)	150(4)	150(4)
	70(5)	70(5)	95(5)	120(5)	150(4)	90(5)	140(5)	140(5)	190(5)	190(5)
	100(7)	85(6)	115(6)	145(6)	190(5)	110(6)	170(6)	170(6)	230(6)	230(6)
	130(9)	100(7)	135(7)	170(7)	230(6)	130(7)	200(7)	200(7)	270(7)	270(7)
	160(11)	130(9)	155(8)	195(8)	270(7)	150(8)	260(9)	230(8)	310(8)	310(8)
			175(9)	220(9)	310(8)	170(9)		260(9)	350(9)	350(9)
			195(10)	245(10)	350(9)			290(10)	390(10)	390(10)
			275(14)	270(11)	390(10)			350(14)	430(11)	430(11)
			375(19)	320(13)	430(11)			500(19)	510(13)	510(13)
				370(15)	470(12)			710(24)	590(15)	590(15)
				470(19)	550(14)			860(29)	750(19)	750(19)
				570(23)	670(17)				910(23)	910(23)
				695(28)	870(22)				1070(27)	1070(27)
Pitch (P)	15	15	20	25	40	20	30	30	40	40
Distance to End (E) _s	5	5	7.5	10	15	5	10	10	15	15
Max. Standard Length	250(17)	595(40)	1195(60)	1995(80)	1990(50)	250(13)	590(20)	1970(66)	1990(50)	1990(50)
Max. Length	2504	600	12005	2000	2000	2504	6006	2000	2000	2000

Note: 1. Tolerance of E value for standard rail is 0.5~0.5 mm. Tolerance of E value for jointed rail is 0~0.3 mm.

2. Maximum standard length indicates the max. rail length with standard E value on both sides.

3. If smaller E value is needed, please contact MTECH.

4. MGNR5, MGWR5 are only supplied with stainless steel.

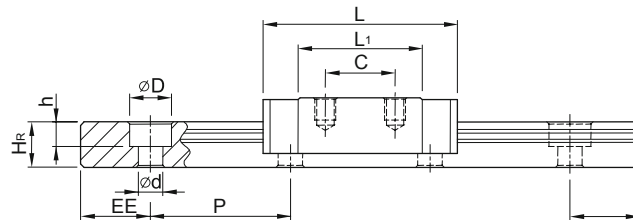
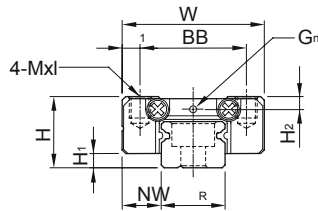
5. MGNR9 of stainless steel is supplied with the maximum length of 1200mm; MGNR9 of carbon steel is supplied with the maximum length of 1000mm.

6. MGWR7 of stainless steel is supplied with the maximum length of 600mm; MGWR7 of carbon steel is supplied with the maximum length of 2000mm.

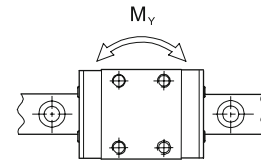
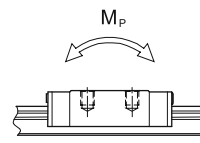
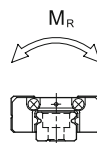
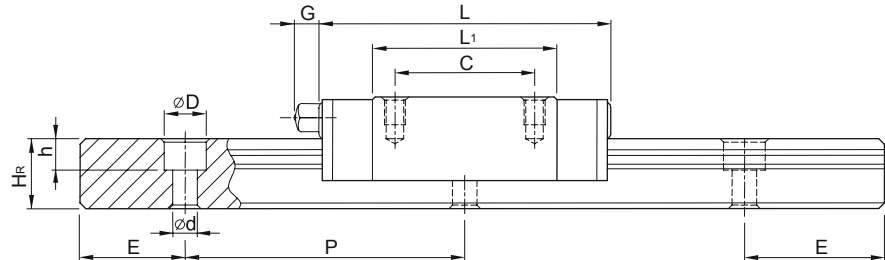
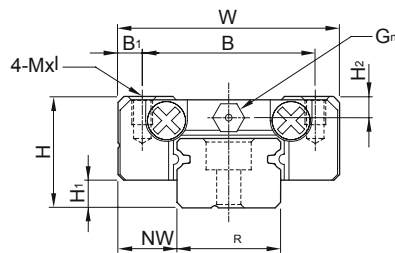
2-3-12 Dimensions for MGN/MGW Series

(1) MGN-C / MGN-H

MGN7, MGN9, MGN12



MGN15

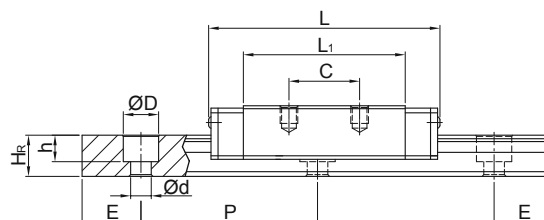
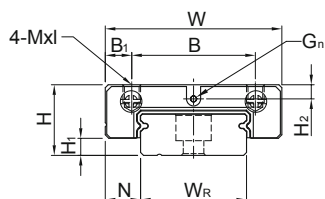


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)										Dimensions of Rail (mm)								Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	G	G _n	MxI	H ₂	W _R	H _R	D	h	d	P	E	(mm)				C(kN)	C ₀ (kN)	M _R N-m	M _P N-m	M _Y N-m
MGN7C	8	1.5	5	17	12	2.5	8	13.5	22.5	-	Ø1.2	M2x2.5	1.5	7	4.8	4.2	2.3	2.4	15	5	M2x6	0.98	1.24	4.70	2.84	2.84	0.010	0.22	
MGN7H							13	21.8	30.8													1.37	1.96	7.64	4.80	4.80	0.015		
MGN9C	10	2	5.5	20	15	2.5	10	18.9	28.9	-	Ø1.4	M3x3	1.8	9	6.5	6	3.5	3.5	20	7.5	M3x8	1.86	2.55	11.76	7.35	7.35	0.016	0.38	
MGN9H							16	29.9	39.9													2.55	4.02	19.60	18.62	18.62	0.026		
MGN12C	13	3	7.5	27	20	3.5	15	21.7	34.7	-	Ø2	M3x3.5	2.5	12	8	6	4.5	3.5	25	10	M3x8	2.84	3.92	25.48	13.72	13.72	0.034	0.65	
MGN12H							20	32.4	45.4													3.72	5.88	38.22	36.26	36.26	0.054		
MGN15C	16	4	8.5	32	25	3.5	20	26.7	42.1	4.5	M3	M3x4	3	15	10	6	4.5	3.5	40	15	M3x10	4.61	5.59	45.08	21.56	21.56	0.059	1.06	
MGN15H							25	43.4	58.8													6.37	9.11	73.50	57.82	57.82	0.092		

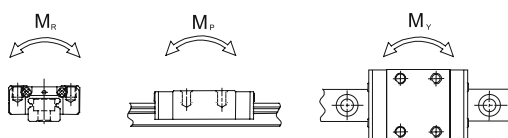
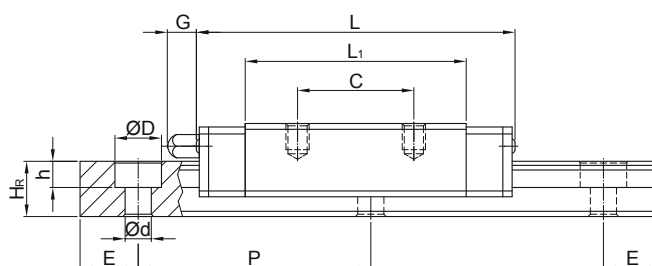
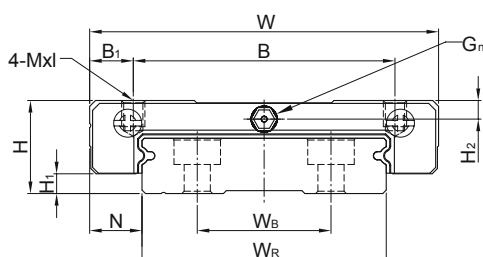
Note : 1 kgf = 9.81 N

(2) MGW-C / MGW-H

MGW7, MGW9, MGW12



MGW15



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)										Dimensions of Rail (mm)										Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	G	G _n	MxI	H ₂	W _R	W _B	H _R	D	h	d	P	E	(mm)	C(kN)				C ₀ (kN)	M _R N-m	M _P N-m	M _Y N-m	Block kg
MGW7C	9	1.9	5.5	25	19	3	10	21	31.2	-	Ø1.2	M3x3	1.85	14	-	5.2	6	3.2	3.5	30	10	M3x6	1.37	2.06	15.70	7.14	7.14	0.020	0.51		
MGW7H							19	30.8	41														1.77	3.14	23.45	15.53	15.53	0.029			
MGW9C	12	2.9	6	30	21	4.5	12	27.5	39.3	-	Ø1.2	M3x3	2.4	18	-	7	6	4.5	3.5	30	10	M3x8	2.75	4.12	40.12	18.96	18.96	0.040	0.91		
MGW9H					23	3.5	24	38.5	50.7														3.43	5.89	54.54	34.00	34.00	0.057			
MGW12C	14	3.4	8	40	28	6	15	31.3	46.1	-	Ø1.2	M3x3.6	2.8	24	-	8.5	8	4.5	4.5	40	15	M4x8	3.92	5.59	70.34	27.80	27.80	0.071	1.49		
MGW12H							28	45.6	60.4														5.10	8.24	102.70	57.37	57.37	0.103			
MGW15C	16	3.4	9	60	45	7.5	20	38	54.8	5.2	M3	M4x4.2	3.2	42	23	9.5	8	4.5	4.5	40	15	M4x10	6.77	9.22	199.34	56.66	56.66	0.143	2.86		
MGW15H							35	57	73.8														8.93	13.38	299.01	122.60	122.60	0.215			

Note : 1 kgf = 9.81 N

RG SERIES

High Rigidity Roller Type

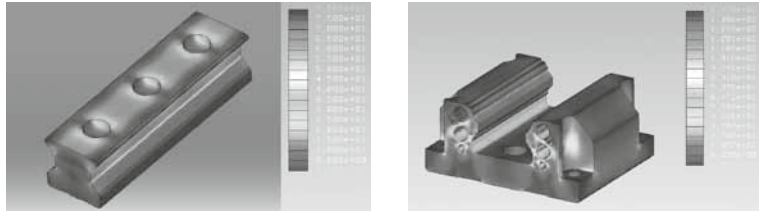
2-4 RG Series – High Rigidity Roller Type Linear Guideway

2-4-1 Advantages and features

The new RG series from MTECH features a roller as the rolling element instead of steel balls. The roller series offers super high rigidity and very high load capacities. The RG series is designed with a 45-degree angle of contact. Elastic deformation of the linear contact surface, during load, is greatly reduced thereby offering greater rigidity and higher load capacities in all 4 load directions. The RG series linear guideway offers high performance for high-precision manufacturing and achieving longer service life.

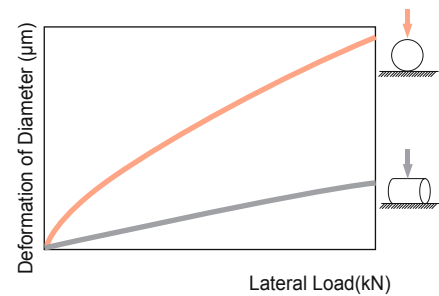
(1) Optimal design

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



(2) Super high rigidity

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

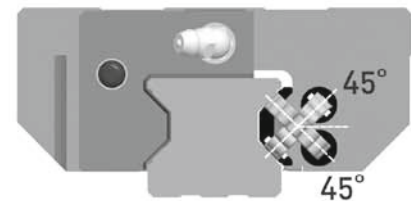


(3) Super high load capacity

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

(4) Operating life increased

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



The acting load will affect the nominal life of a linear guideway. Based on the selected basic dynamic rated load and the actual load. The nominal life of ball type and roller type linear guideway can be calculated by Eq.2.5 respectively.

$$L = \left(\frac{C}{P} \right)^{\frac{10}{3}} \cdot 100\text{km} = \left(\frac{C}{P} \right)^{\frac{10}{3}} \cdot 62\text{mile} \quad \text{Eq.2.5}$$

If the environmental factors are taken into consideration, the nominal life is influenced greatly by the motion conditions, the hardness of the raceway, and the temperature of the linear guideway. The relationship between these factors is expressed in Eq.2.6.

$$L = \left(\frac{f_h \cdot f_t \cdot C}{f_w \cdot P} \right)^{\frac{10}{3}} \cdot 100\text{km} = \left(\frac{f_h \cdot f_t \cdot C}{f_w \cdot P} \right)^{\frac{10}{3}} \cdot 62\text{mile} \quad \text{Eq.2.6}$$

L : Nominal life

C : Basic dynamic load rating

P : Actual load

f_h : Hardness factor

f_t : Temperature factor

f_w : Load factor

(5) Test Data

1. Nominal life test

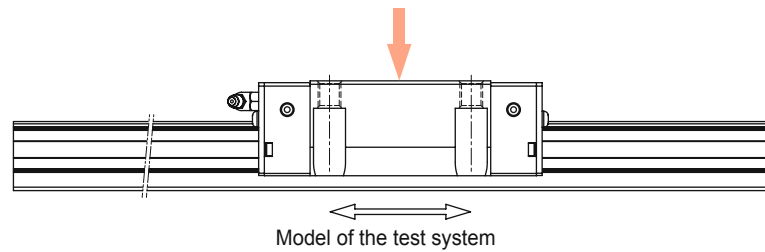


Table 2-9-1

Tested model 1: RGH35CA

Preload: ZA class

Max. Speed: 60m/min

Acceleration: 1G

Stroke: 0.55m

Lubrication: grease held every 100km

External load: 15kN

Traveling distance: 1135km

Test results:

The nominal life of RGH35CA is 1000km .

After traveling 1135km, fatigue flaking did not appear on the surface of the raceway or rollers.



2. Durability Test

Tested model 2: RGW35CC

Preload: ZA class

Max. Speed: 120m/min

Acceleration: 1G

Stroke: 2m

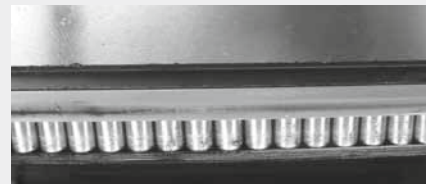
Lubrication: oil feed rate: 0.3cm³/hr

External load: 0kN

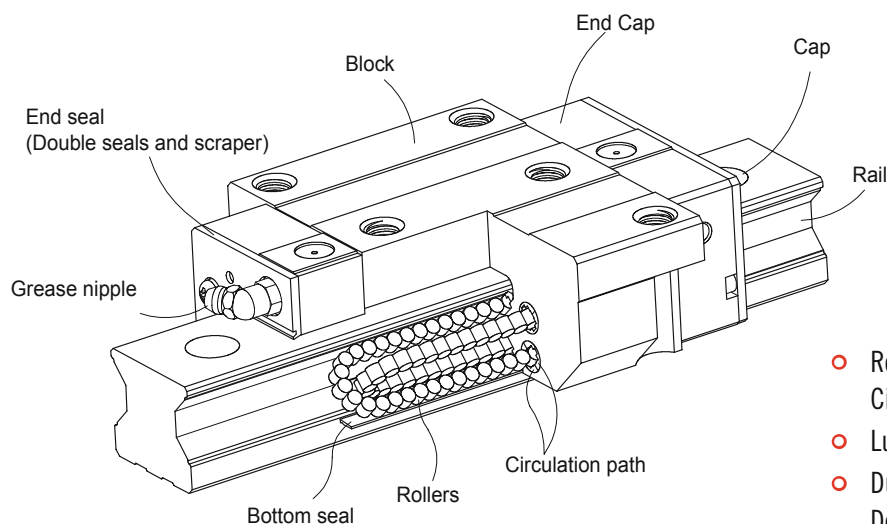
Traveling distance: 15000km

Test results:

Fatigue flaking did not appear on the surface of the raceway or rollers after traveling 15000km.



2-4-2 Construction of RG Series

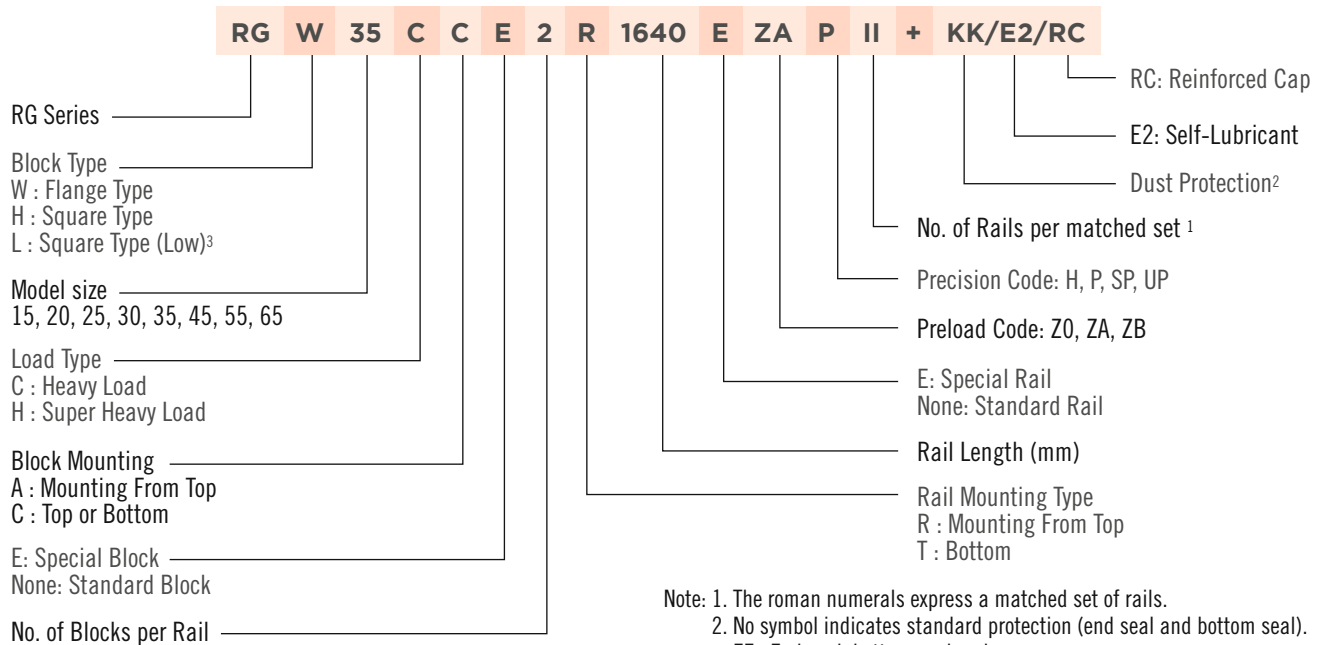


- Rolling circulation system: Block, Rail, End cap, Circulation path, rollers
- Lubrication system: Grease nipple and piping joint
- Dust protection system: End seal, Bottom seal, Cap, Double seals and Scraper

2-4-3 Model Number of RG series

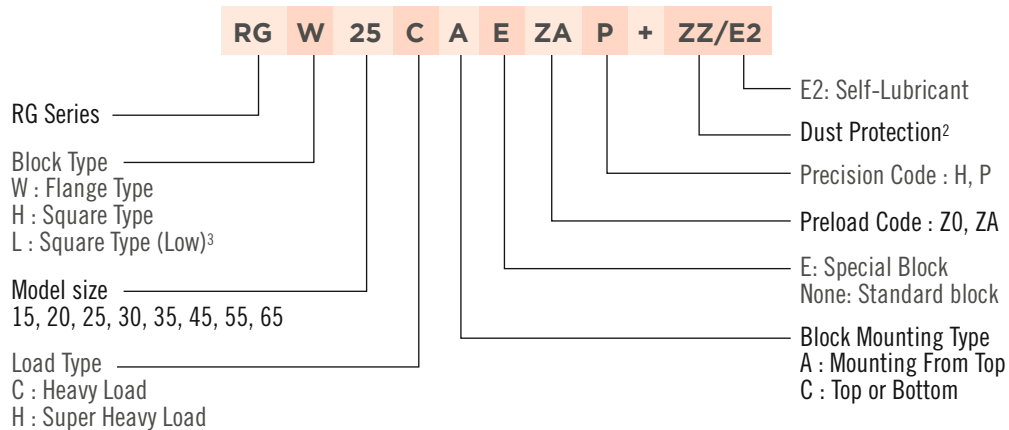
RG series linear guideways are classified into non-interchangeable and interchangeable types. The sizes of these two types are the same as one another. The main difference is that the interchangeable type of blocks and rails can be freely exchanged and they can maintain P-class accuracy. Because of strict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

(1) Non-interchangeable type

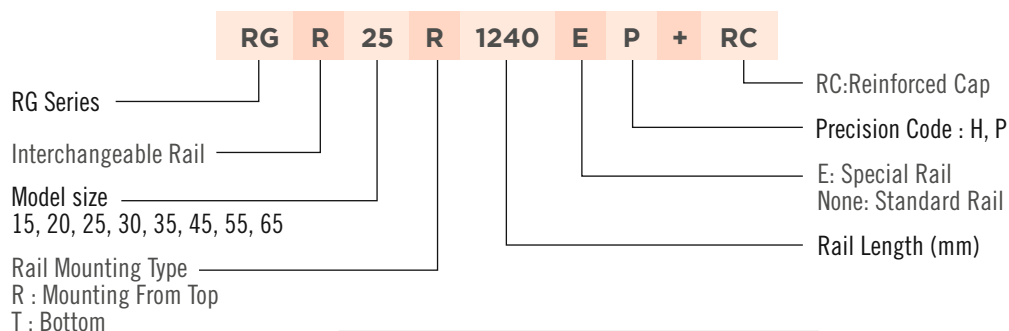


(2) Interchangeable type

○ Model Number of RG Block



○ Model Number of RG Rail

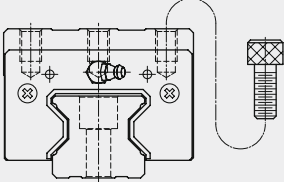
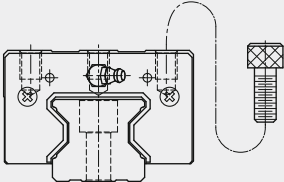
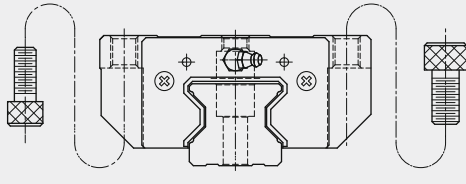
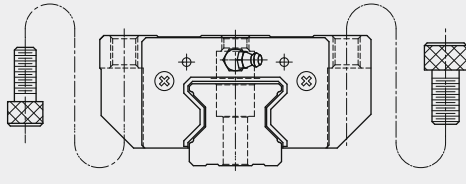


2-4-4 Types

(1) Block types

MTECH offers two types of guide blocks, flange and square type. Because of the low assembly height and large mounting surface, the flange type is excellent for heavy moment load applications.

Table 2-9-2 Block Types

Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Application
Square	RGH-CA RGH-HA		28	100	<ul style="list-style-type: none"> Automation Systems Transportation equipment CNC machining centers Heavy duty cutting machines CNC grinding machines Injection molding machines Plano millers Devices requiring high rigidity Devices requiring high load capacity Electric discharge machines
			↓	↓	
Square	RGL-CA RGL-HA		24	100	
			↓	↓	
Flange	RGW-CC RGW-HC		24	100	
			↓	↓	
Flange	RGW-CC RGW-HC		90	4000	
			↓	↓	

(2) Rail types

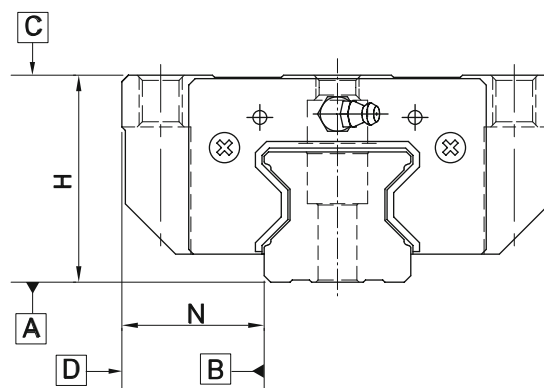
In addition to the standard top mounting type, MTECH also offers the bottom mounting type of rails.

Table 2-9-3 Rail Types

Mounting from Top	Mounting from bottom
	

2-4-5 Accuracy Classes

The accuracy of the RG series can be classified into four classes: high (H), precision (P), super precision (SP) and ultra precision (UP). Customers may choose the class by referencing the accuracy requirements of the applied equipment.



(1) Accuracy of non-interchangeable

Table 2-9-4 Accuracy Standards

unit: mm

Item	RG - 15, 20			
Accuracy Classes	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.03	0 - 0.03	0 - 0.015	0 - 0.008
Dimensional tolerance of width N	± 0.03	0 - 0.03	0 - 0.015	0 - 0.008
Variation of height H	0.01	0.006	0.004	0.003
Variation of width N	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	See Table 2-9-12			
Running parallelism of block surface D to surface B	See Table 2-9-12			

Table 2-9-5 Accuracy Standards

unit: mm

Item	RG - 25, 30, 35			
Accuracy Classes	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.04	0 - 0.04	0 - 0.02	0 - 0.01
Dimensional tolerance of width N	± 0.04	0 - 0.04	0 - 0.02	0 - 0.01
Variation of height H	0.015	0.007	0.005	0.003
Variation of width N	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	See Table 2-9-12			
Running parallelism of block surface D to surface B	See Table 2-9-12			

Table 2-9-6 Accuracy Standards

unit: mm

Item	RG - 45, 55			
Accuracy Classes	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.05	0 - 0.05	0 - 0.03	0 - 0.02
Dimensional tolerance of width N	± 0.05	0 - 0.05	0 - 0.03	0 - 0.02
Variation of height H	0.015	0.007	0.005	0.003
Variation of width N	0.02	0.01	0.007	0.005
Running parallelism of block surface C to surface A	See Table 2-9-12			
Running parallelism of block surface D to surface B	See Table 2-9-12			

Table 2-9-7 Accuracy Standards

unit: mm

Item	RG - 65			
Accuracy Classes	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.07	0 - 0.07	0 - 0.05	0 - 0.03
Dimensional tolerance of width N	± 0.07	0 - 0.07	0 - 0.05	0 - 0.03
Variation of height H	0.02	0.01	0.007	0.005
Variation of width N	0.025	0.015	0.01	0.007
Running parallelism of block surface C to surface A	See Table 2-9-12			
Running parallelism of block surface D to surface B	See Table 2-9-12			

(2) Accuracy of interchangeable

Table 2-9-8 Accuracy Standards

unit: mm

Item	RG - 15, 20	
Accuracy Classes	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.03	± 0.015
Dimensional tolerance of width N	± 0.03	± 0.015
Variation of height H	0.01	0.006
Variation of width N	0.01	0.006
Running parallelism of block surface C to surface A	See Table 2-9-12	
Running parallelism of block surface D to surface B	See Table 2-9-12	

Table 2-9-9 Accuracy Standards

unit: mm

Item	RG - 25, 30, 35	
Accuracy Classes	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.04	± 0.02
Dimensional tolerance of width N	± 0.04	± 0.02
Variation of height H	0.015	0.007
Variation of width N	0.015	0.007
Running parallelism of block surface C to surface A	See Table 2-9-12	
Running parallelism of block surface D to surface B	See Table 2-9-12	

Table 2-9-10 Accuracy Standards

unit: mm

Item	RG - 45, 55	
Accuracy Classes	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.05	± 0.025
Dimensional tolerance of width N	± 0.05	± 0.025
Variation of height H	0.015	0.007
Variation of width N	0.02	0.01
Running parallelism of block surface C to surface A	See Table 2-9-12	
Running parallelism of block surface D to surface B	See Table 2-9-12	

Table 2-9-11 Accuracy Standards

unit: mm

Item	RG - 65	
Accuracy Classes	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.07	± 0.035
Dimensional tolerance of width N	± 0.07	± 0.035
Variation of height H	0.02	0.01
Variation of width N	0.025	0.015
Running parallelism of block surface C to surface A	See Table 2-9-12	
Running parallelism of block surface D to surface B	See Table 2-9-12	

(3) Accuracy of running parallelism

Table 2-9-12 Accuracy of running parallelism

Rail Length (mm)	Accuracy (μm)				Rail Length (mm)	Accuracy (μm)			
	H	P	SP	UP		H	P	SP	UP
~ 100	7	3	2	2	1,100 ~ 1,500	18	11	7	4
100 ~ 200	9	4	2	2	1,500 ~ 1,900	20	13	8	4
200 ~ 300	10	5	3	2	1,900 ~ 2,500	22	15	10	5
300 ~ 500	12	6	3	2	2,500 ~ 3,100	25	18	11	6
500 ~ 700	13	7	4	2	3,100 ~ 3,600	27	20	14	7
700 ~ 900	15	8	5	3	3,600 ~ 4,000	28	21	15	7
900 ~ 1,100	16	9	6	3					

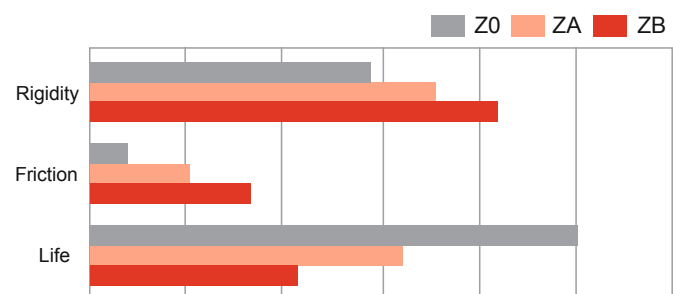
2-4-6 Preload

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

Table 2-9-13

Class	Code	Preload	Condition
Light Clearance	Z0	0.02C ~ 0.04C	Certain load direction, low impact, low precision required
Medium Preload	ZA	0.07C ~ 0.09C	High rigidity required, high precision required
Heavy Preload	ZB	0.12C ~ 0.14C	Super high rigidity required, with vibration and impact

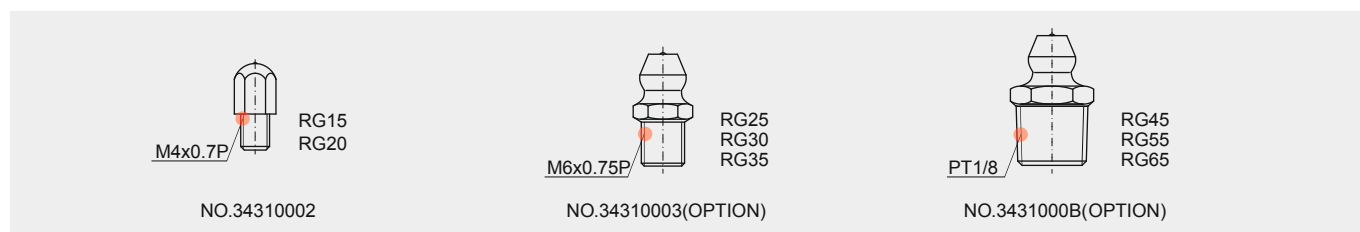
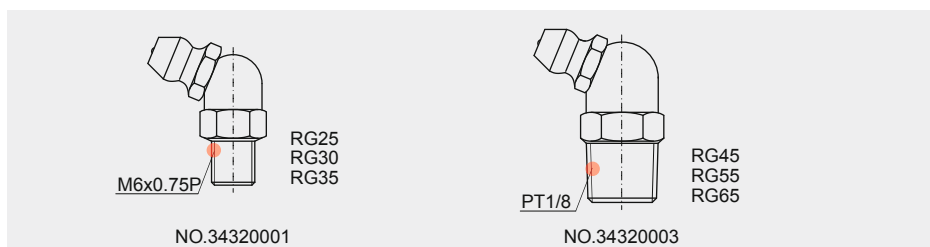
The figure shows the relationship between the rigidity, friction and nominal life. A preload no larger than ZA would be recommended for smaller model sizes to avoid over-preload affecting the life of the guideway.



2-4-7 Lubrication

(1) Grease

○ Grease nipple



○ Mounting location

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

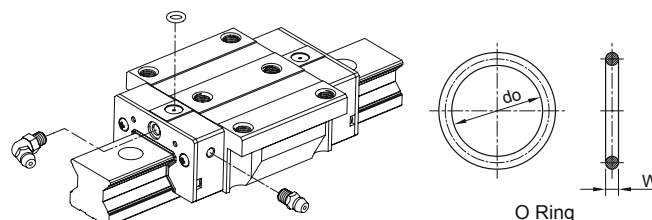
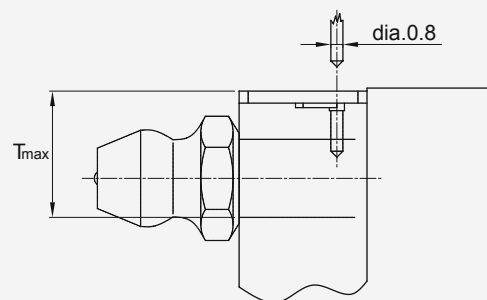


Table 2-9-14 O-Ring size and max. permissible depth for piercing

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do (mm)	W (mm)	T _{max} (mm)
RG15	2.5±0.15	1.5±0.15	3.45
RG20	2.5±0.15	1.5±0.15	4
RG25	7.5±0.15	1.5±0.15	5.8
RG30	7.5±0.15	1.5±0.15	6.2
RG35	7.5±0.15	1.5±0.15	8.65
RG45	7.5±0.15	1.5±0.15	9.2
RG55	7.5±0.15	1.5±0.15	11.6
RG65	7.5±0.15	1.5±0.15	14.5



○ The oil amount for a block filled with grease

Table 2-9-15 The lubricant Amount for a Block Filled with Grease

Size	Heavy load (cm ³)	Super heavy load (cm ³)	Size	Heavy load (cm ³)	Super heavy load (cm ³)
RG15	3	-	RG35	12	14
RG20	5	6	RG45	19	23
RG25	7	8	RG55	28	35
RG30	9	10	RG65	52	63

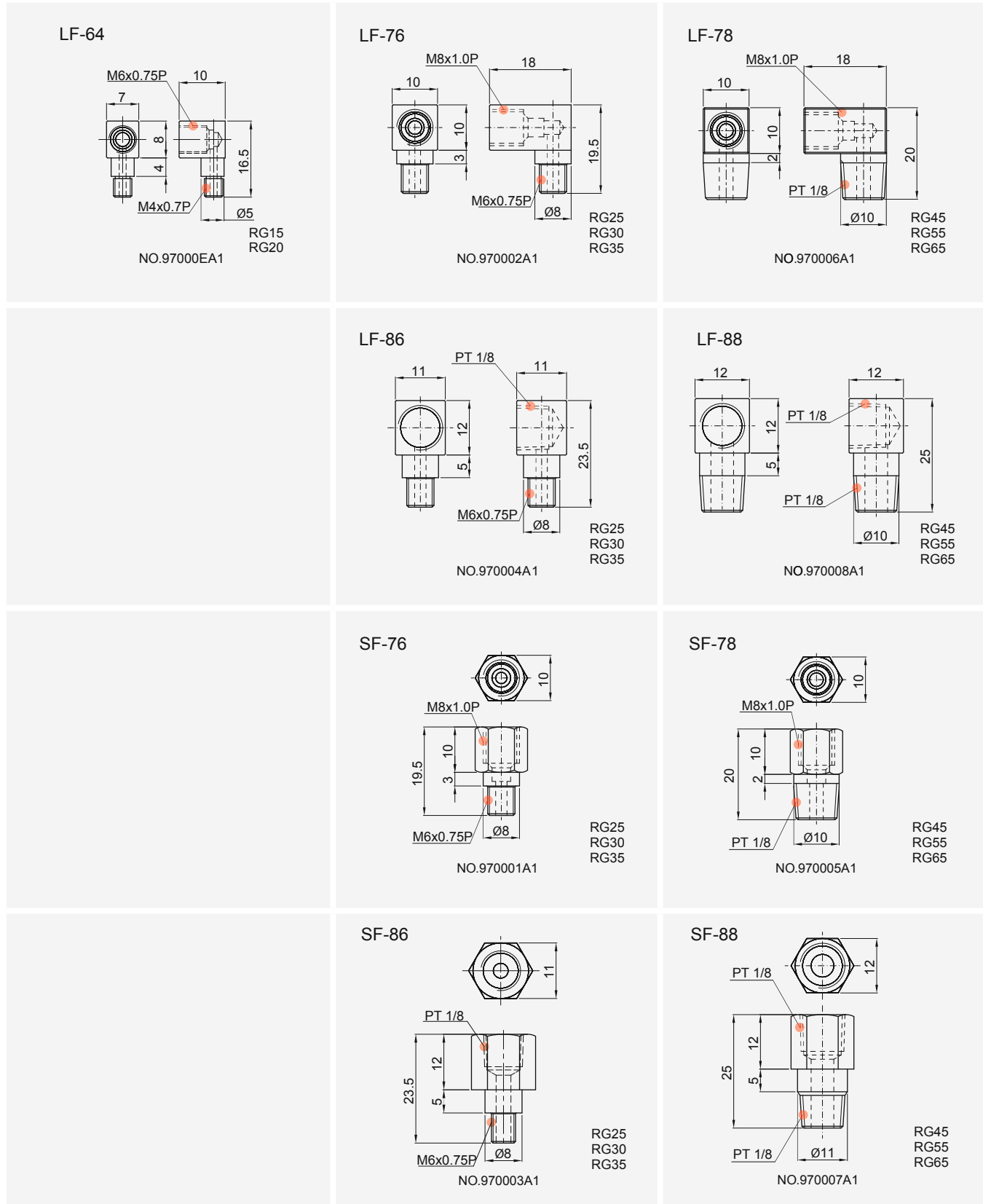
○ Frequency of replenishment

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

(2) Oil

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

○ Types of oil piping joint



- Oil feeding rate

Table 2-9-16 Oil feed rate

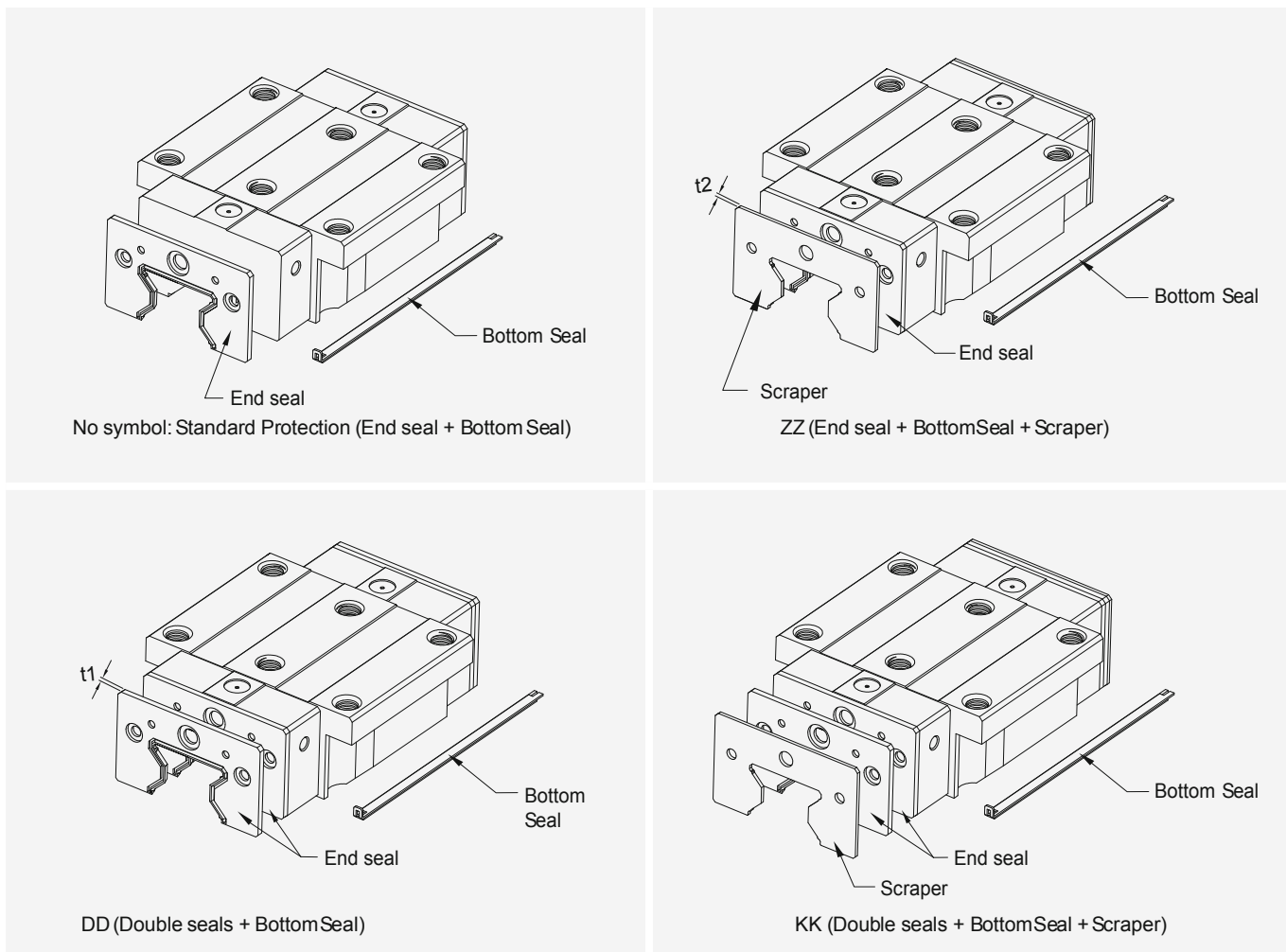
Size	Feed rate (cm ³ /hr)
RG15	0.14
RG20	0.14
RG25	0.167
RG30	0.2
RG35	0.23
RG45	0.3
RG55	0.367
RG65	0.433

2-4-8 Dust Protection Equipment

(1) Codes of equipment

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

Table 2-9-17



(2) End seal and bottom seal

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

(3) Double seals

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

Table 2-9-18 Dimensions of end seal

Size	Thickness (t1) (mm)	Size	Thickness (t1) (mm)
RG15ES	2.2	RG35ES	2.5
RG20ES	2.2	RG45ES	3.6
RG25ES	2.2	RG55ES	3.6
RG30ES	2.4	RG65ES	4.4

(4) Scraper

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

Table 2-9-19 Dimensions of Scraper

Size	Thickness (t2) (mm)	Size	Thickness (t2) (mm)
RG15SC	1.0	RG35SC	1.5
RG20SC	1.0	RG45SC	1.5
RG25SC	1.0	RG55SC	1.5
RG30SC	1.5	RG65SC	1.5

(5) Bolt caps for rail mounting holes

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

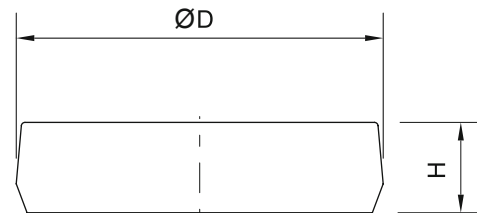
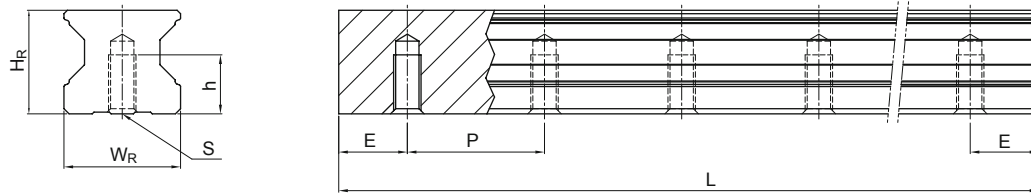


Table 2-9-20 Dimensions of Bolt Caps for Rail Mounting Holes

Rail Size	Bolt size	Diameter (D) (mm)	Thickness (H) (mm)	Rail Size	Bolt size	Diameter (D) (mm)	Thickness (H) (mm)
RGR15	M4	7.65	1.1	RGR35	M8	14.3	3.3
RGR20	M5	9.65	2.2	RGR45	M12	20.3	4.6
RGR25	M6	11.15	2.5	RGR55	M14	23.5	5.5
RGR30	M8	14.2	3.3	RGR65	M16	26.6	5.5

(6) Dimensions for RGR-T (Rail Mounting from Bottom)



Model No.	Dimensions of Rail (mm)						Weight (kg/m)
	W_R	H_R	S	h	P	E	
RGR15T	15	16.5	M5x0.8P	8	30	20	1.86
RGR20T	20	21	M6x1P	10	30	20	2.76
RGR25T	23	23.6	M6x1P	12	30	20	3.36
RGR30T	28	28	M8x1.25P	15	40	20	4.82
RGR35T	34	30.2	M8x1.25P	17	40	20	6.48
RGR45T	45	38	M12x1.75P	24	52.5	22.5	10.83
RGR55T	53	44	M14x2P	24	60	30	15.15
RGR65T	63	53	M20x2.5P	30	75	35	21.24

2-4-9 Friction

The maximum value of resistance per end seal are as shown in the table.

Table 2-9-22 Seal Resistance

Size	Resistance N (kgf)	Size	Resistance N (kgf)
RG15	1.96 (0.2)	RG35	3.53 (0.36)
RG20	2.45 (0.25)	RG45	4.21 (0.43)
RG25	2.74 (0.28)	RG55	5.09 (0.52)
RG30	3.31 (0.31)	RG65	6.66 (0.68)

2-4-10 The Accuracy Tolerance of Mounting Surface

(1) The accuracy tolerance of rail-mounting surface

As long as the accuracy requirements of the mounting surfaces shown in the following tables are met, the high accuracy, high rigidity and long life of the RG series linear guideway will be maintained without any difficulty.

○ The parallelism tolerance of reference surface (P)

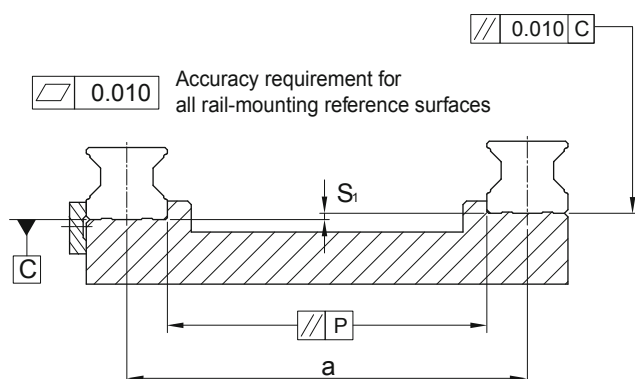


Table 2-9-23 Max. Parallelism Tolerance (P)

unit: μm

Size	Preload classes		
	Light Preload (Z0)	Medium Preload (ZA)	Heavy Preload (ZB)
RG15	5	3	3
RG20	8	6	4
RG25	9	7	5
RG30	11	8	6
RG35	14	10	7
RG45	17	13	9
RG55	21	14	11
RG65	27	18	14

○ The accuracy tolerance of reference surface height (S1)

$$S_1 = a \times K$$

S_1 : Max. tolerance of height

a : Distance between paired rails

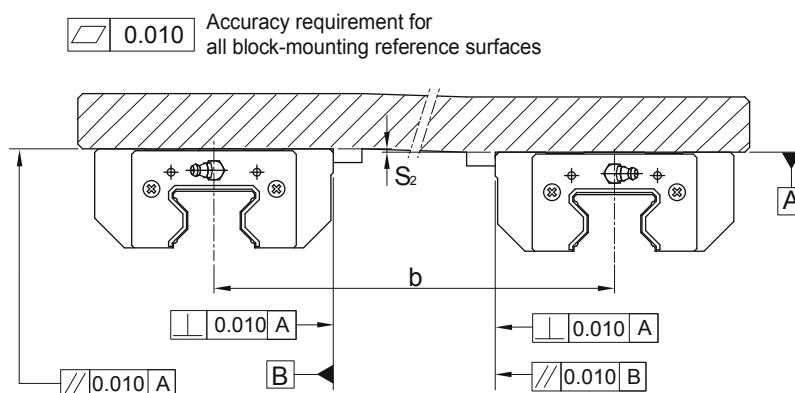
K : Coefficient of tolerance of height

Table 2-9-24 Coefficient of tolerance of height

Size	Preload classes		
	Light Preload (Z0)	Medium Preload (ZA)	Heavy Preload (ZB)
K	2.2×10^{-4}	1.7×10^{-4}	1.2×10^{-4}

(2) The accuracy tolerance of block-mounting surface

- The tolerance of the height of reference surface when two or more pieces are used in parallel (S_2)

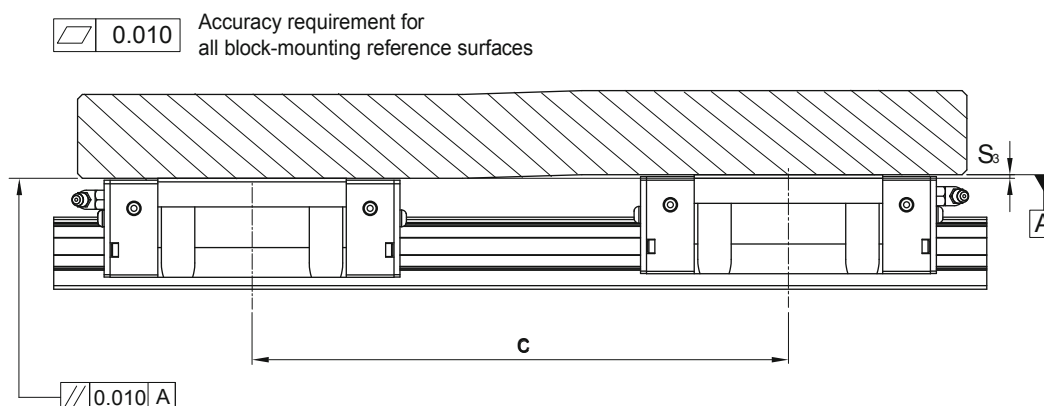


$$S_2 = b \times 4.2 \times 10^{-5}$$

S_2 : Max. tolerance of height

b : Distance between paired blocks

- The tolerance of the height of reference surface when two or more pieces are used in parallel (S_3)



$$S_3 = c \times 4.2 \times 10^{-5}$$

S_3 : Max. tolerance of height

c : Distance between paired blocks

2-4-11 Cautions for Installation

(1) Shoulder heights and fillets

Improper shoulder heights and fillets of mounting surfaces will cause a deviation in accuracy and interference with the chamfered part of the rail or block. By following the recommended shoulder heights and fillets, accuracy problems in installation can be eliminated.

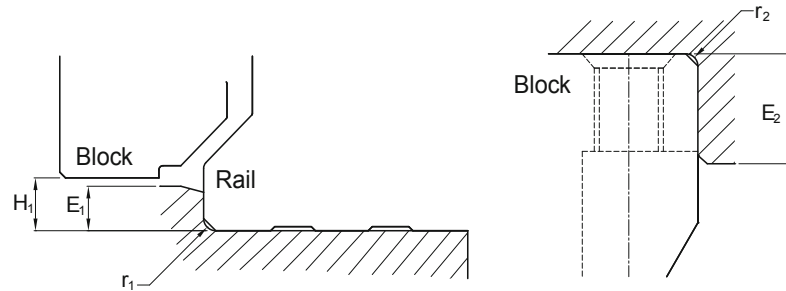


Table 2-9-25

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height of the rail E_1 (mm)	Shoulder height of the block E_2 (mm)	Clearance under block H_1 (mm)
RG15	0.5	0.5	3	4	4
RG20	0.5	0.5	3.5	5	5
RG25	1.0	1.0	5	5	5.5
RG30	1.0	1.0	5	5	6
RG35	1.0	1.0	6	6	6.5
RG45	1.0	1.0	7	8	8
RG55	1.5	1.5	9	10	10
RG65	1.5	1.5	10	10	12

(2) Tightening Torque of Mounting Bolts

Improper tightening of mounting bolts will seriously influence the accuracy of a linear guideway. The following tightening torque for the different sizes of bolt is recommended.

Table 2-9-26

Size	Bolt size	Torque N-cm (kgf-cm)		
		Iron	Casting	Aluminum
RG15	M4x0.7Px16L	392 (40)	274 (28)	206 (21)
RG20	M5x0.8Px20L	883 (90)	588 (60)	441 (45)
RG25	M6x1Px20L	1373 (140)	921 (94)	686 (70)
RG30	M8x1.25Px25L	3041 (310)	2010 (205)	1470 (150)
RG35	M8x1.25Px25L	3041 (310)	2010 (205)	1470 (150)
RG45	M12x1.75Px35L	11772 (1200)	7840 (800)	5880 (600)
RG55	M14x2Px45L	15696 (1600)	10500 (1100)	7840 (800)
RG65	M16x2Px50L	19620 (2000)	13100 (1350)	9800 (1000)

2-4-12 Standard and Maximum Lengths of Rail

MTECH offers a number of standard rail lengths. Standard rail lengths feature end mounting hole placements set to predetermined values (E). For non-standard rail lengths, be sure to specify the E-value to be no greater than 1/2 the pitch (P) dimension. An E-value greater than this will result in unstable rail ends.

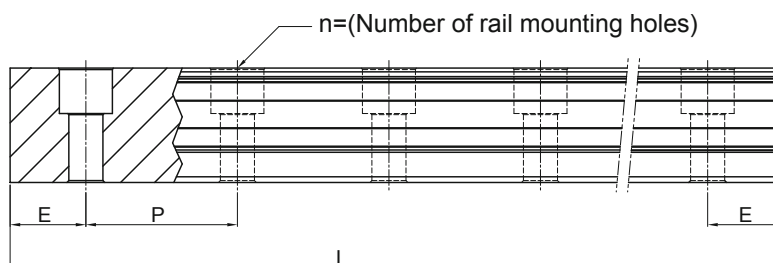


Table 2-9-27

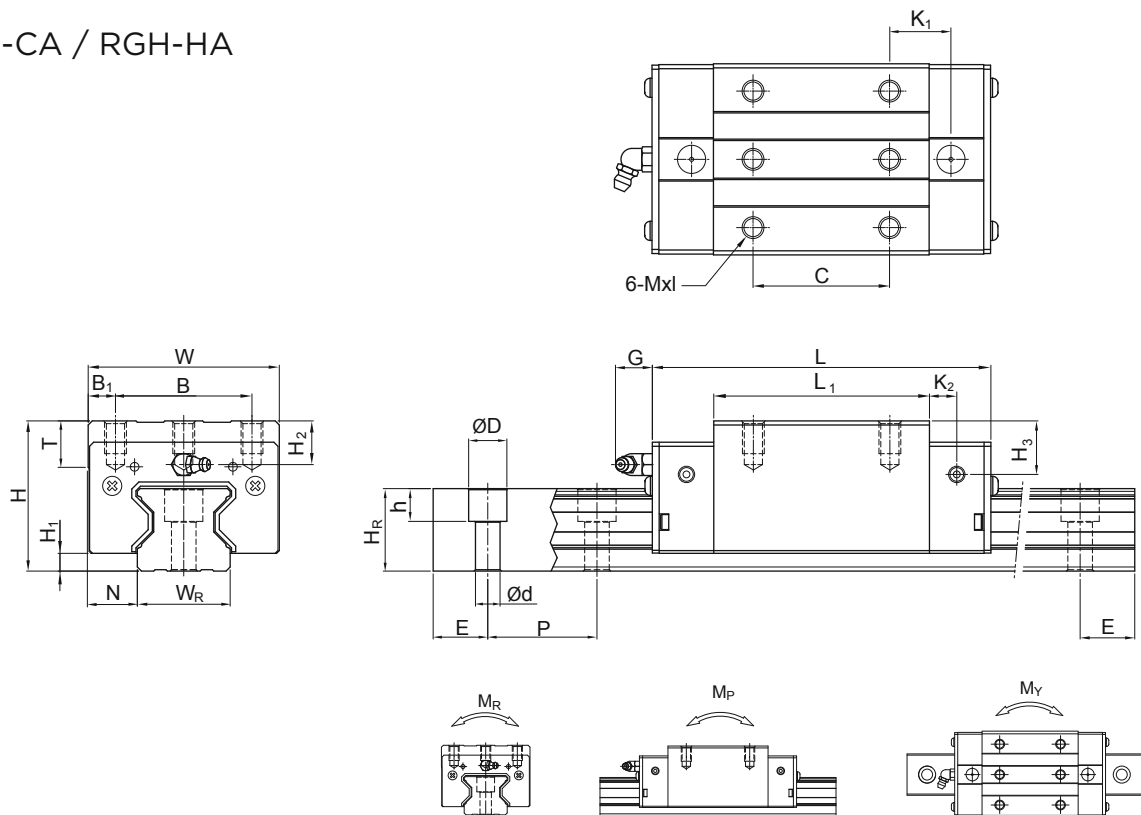
unit: mm

Item	RGR15	RGR20	RGR25	RGR30	RGR35	RGR45	RGR55	RGR65
Standard Length L(n)	160 (5)	220 (7)	220 (7)	280 (7)	280 (7)	570 (11)	780 (13)	1,270 (17)
	220 (7)	280 (9)	280 (9)	440 (11)	440 (11)	885 (17)	1020 (17)	1,570 (21)
	340 (11)	340 (11)	340 (11)	600 (15)	600 (15)	1,200 (23)	1,260 (21)	2,020 (27)
	460 (15)	460 (15)	460 (15)	760 (19)	760 (19)	1,620 (31)	1,500 (25)	2,620 (35)
	580 (19)	640 (21)	640 (21)	1,000 (25)	1,000 (25)	2,040 (39)	1,980 (33)	-
	700 (23)	820 (27)	820 (27)	1,640 (41)	1,640 (41)	2,460 (47)	2,580 (43)	-
	940 (31)	1000 (33)	1,000 (33)	2,040 (51)	2,040 (51)	2,985 (57)	2,940 (49)	-
	1120 (37)	1180 (39)	1,240 (41)	2,520 (63)	2,520 (63)	3,090 (59)	3,060 (51)	-
	1360 (45)	1360 (45)	1,600 (53)	3,000 (75)	3,000 (75)	-	-	-
Pitch (P)	30	30	30	40	40	52.5	60	75
Distance to End (E _s)	20	20	20	20	20	22.5	30	35
Max. Standard Length	4,000 (133)	4,000 (133)	4,000 (133)	4,000 (100)	4,000 (100)	3,982.5 (76)	3,960 (66)	3,970 (53)
Max. Length	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000

Note: 1. Tolerance of E value for standard rail is 0.5~0.5 mm. Tolerance of E value for jointed rail is 0~-0.3 mm.
2. Maximum standard length means the max. rail length with standard E value on both sides.
3. If different E value is needed, please contact MTECH.

2-4-13 Dimensions for RG series

(1) RGH-CA / RGH-HA

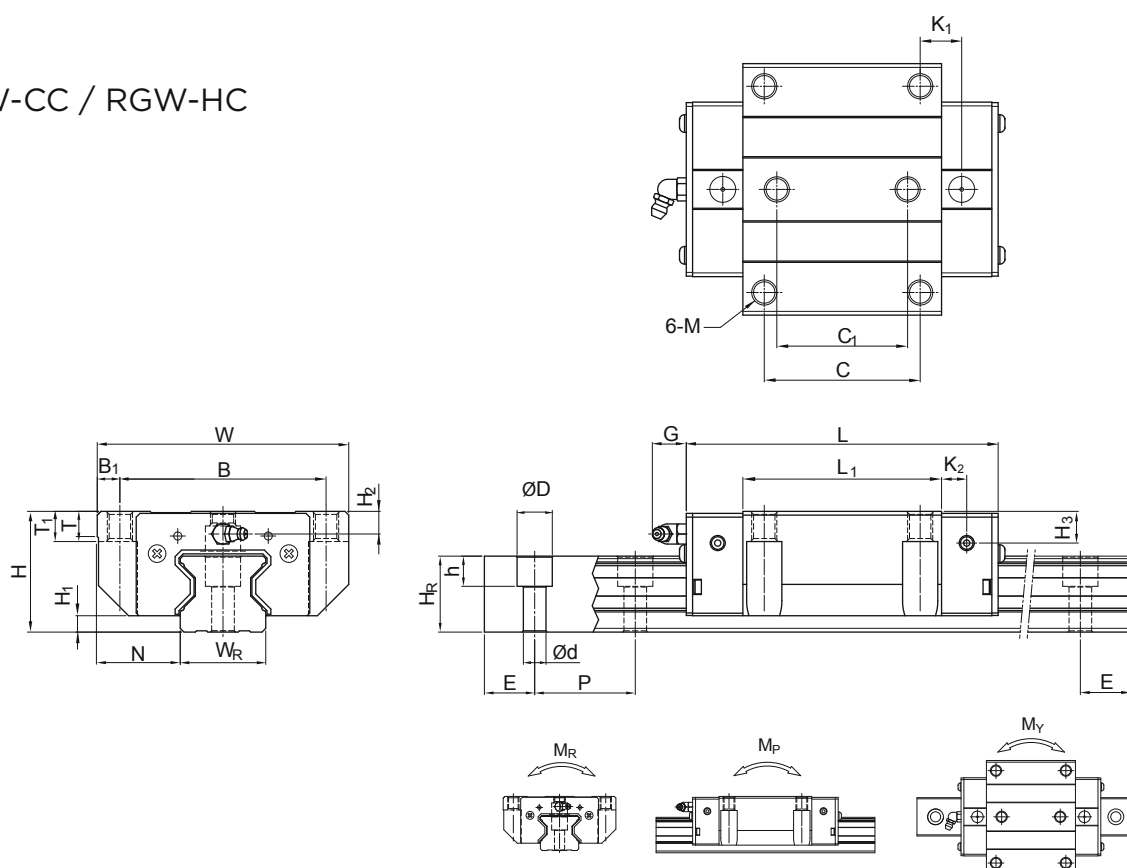


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)														Dimensions of Rail (mm)						Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	MxI	T	H ₂	H ₃	W _R	H _R	D	h	d	P	E				(mm)	C(kN)	C ₀ (kN)	M _R kN-m	M _P kN-m
RGH15CA	28	4	9.5	34	26	4	26	45	68	13.4	4.7	5.3	M4x8	6	7.6	10.1	15	16.5	7.5	5.7	4.5	30	20	M4x16	11.3	24	0.311	0.173	0.173	0.20	1.8
RGH20CA	34	5	12	44	32	6	36	57.5	86	15.8	6	5.3	M5x8	8	8.3	8.3	20	21	9.5	8.5	6	30	20	M5x20	21.3	46.7	0.647	0.46	0.46	0.40	2.76
RGH20HA							50	77.5	106	18.8															26.9	63	0.872	0.837	0.837	0.53	
RGH25CA	40	5.5	12.5	48	35	6.5	35	64.5	97.9	20.75	7.25	12	M6x8	9.5	10.2	10	23	23.6	11	9	7	30	20	M6x20	27.7	57.1	0.758	0.605	0.605	0.61	3.08
RGH25HA							50	81	114.4	21.5															33.9	73.4	0.975	0.991	0.991	0.75	
RGH30CA	45	6	16	60	40	10	40	71	109.8	23.5	8	12	M8x10	9.5	9.5	10.3	28	28	14	12	9	40	20	M8x25	39.1	82.1	1.445	1.06	1.06	0.90	4.41
RGH30HA							60	93	131.8	24.5															48.1	105	1.846	1.712	1.712	1.16	
RGH35CA	55	6.5	18	70	50	10	50	79	124	22.5	10	12	M8x12	12	16	19.6	34	30.2	14	12	9	40	20	M8x25	57.9	105.2	2.17	1.44	1.44	1.57	6.06
RGH35HA							72	106.5	151.5	25.25															73.1	142	2.93	2.6	2.6	2.06	
RGH45CA	70	8	20.5	86	60	13	60	106	153.2	31	10	12.9	M10x17	16	20	24	45	38	20	17	14	52.5	22.5	M12x35	92.6	178.8	4.52	3.05	3.05	3.18	9.97
RGH45HA							80	139.8	187	37.9															116	230.9	6.33	5.47	5.47	4.13	
RGH55CA	80	10	23.5	100	75	12.5	75	125.5	183.7	37.75	12.5	12.9	M12x18	17.5	22	27.5	53	44	23	20	16	60	30	M14x45	130.5	252	8.01	5.4	5.4	4.89	13.98
RGH55HA							95	173.8	232	51.9															167.8	348	11.15	10.25	10.25	6.68	
RGH65CA	90	12	31.5	126	76	25	70	160	232	60.8	15.8	12.9	M16x20	25	15	15	63	53	26	22	18	75	35	M16x50	213	411.6	16.20	11.59	11.59	8.89	20.22
RGH65HA							120	223	295	67.3															275.3	572.7	22.55	22.17	22.17	12.13	

Note : 1. 1 kgf = 9.81 N

2. The theoretical dynamic rated load is C_{100R} , if necessary C_{50R} conversion formula is as follows : $C_{50R} = 1.23 \times C_{100R}$

(2) RGW-CC / RGW-HC

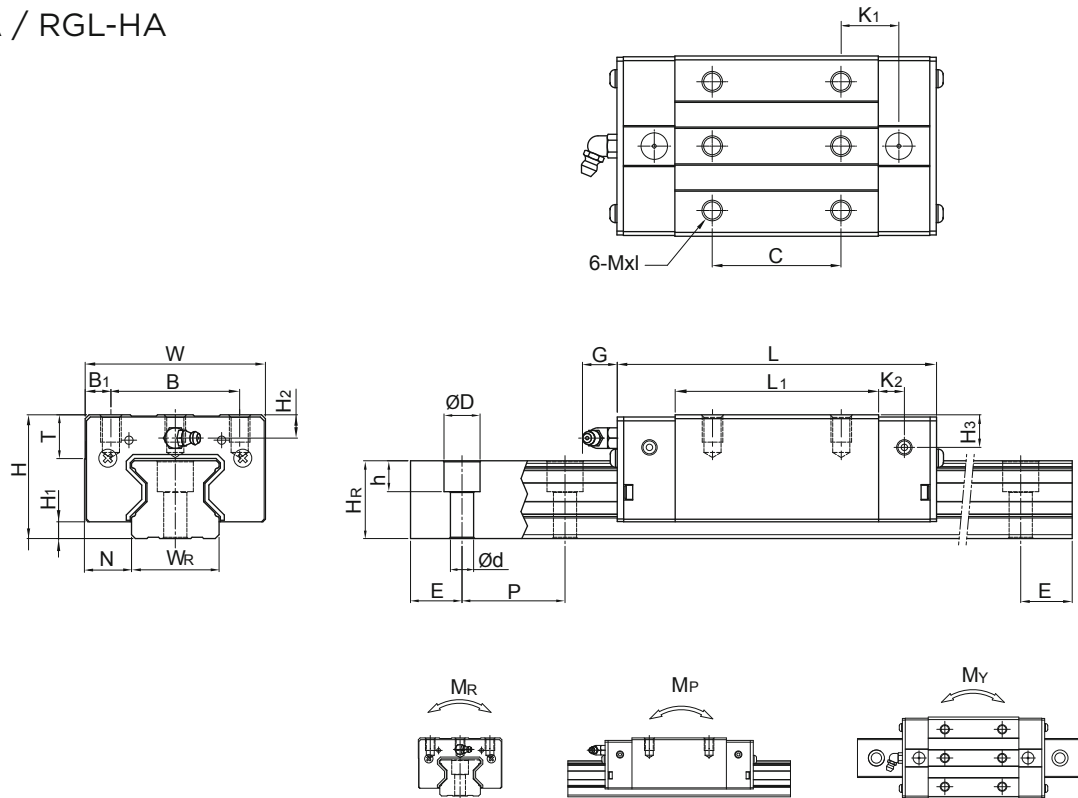


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)															Dimensions of Rail (mm)								Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
H	H ₁	N	W	B	B ₁	C	C ₁	L ₁	L	K ₁	K ₂	G	M	T	T ₁	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)	C(kN)	C ₀ (kN)	M _R kN-m	M _P kN-m	M _Y kN-m	Block kg	Rail kg/m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
RGW15CC	24	4	16	47	38	4.5	30	26	45	68	11.4	4.7	5.3	M5	6	6.95	3.6	6.1	15	16.5	7.5	5.7	4.5	30	20	M4x16	11.3	24	0.311	0.173	0.173	0.22	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
RGW20CC	30	5	21.5	63	53	5	40	35	57.5	86	13.8	6	5.3	M6	8	10	4.3	4.3	20	21	9.5	8.5	6	30	20	M5x20	21.3	46.7	0.647	0.46	0.46	0.47	2.76																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
RGW20HC									77.5	106	23.8																64.5	97.9	15.75	7.25	12	M8		9.5	10	6.2	6	23	23.6	11	9	7	30	20	M6x20	26.9	63	0.872	0.837	0.837	0.63																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
RGW25CC	36	5.5	23.5	70	57	6.5	45	40	64.5	97.9	15.75	7.25	12	M8	9.5	10	6.2	6	23	23.6	11	9	7	30	20	M6x20	27.7	57.1	0.758	0.605	0.605	0.72	3.08																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
RGW25HC									81	114.4	24																81	114.4	24	81	114.4	24		81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81	114.4	24	81

Note : 1. 1 kgf = 9.81 N

2. The theoretical dynamic rated load is C_{100R} , if necessary C_{50R} conversion formula is as follows : $C_{50R} = 1.23 \times C_{100R}$

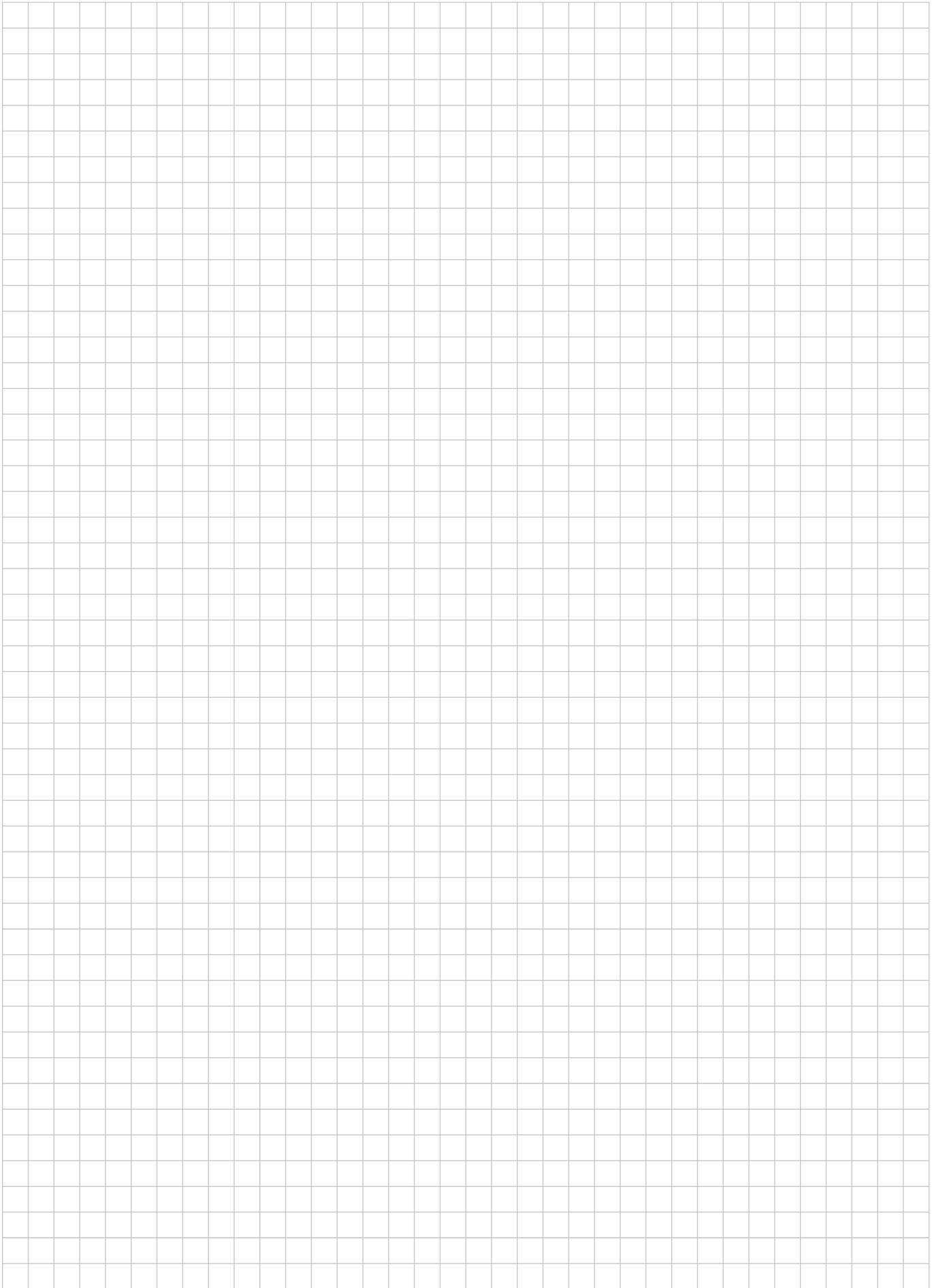
(3) RGL-CA / RGL-HA

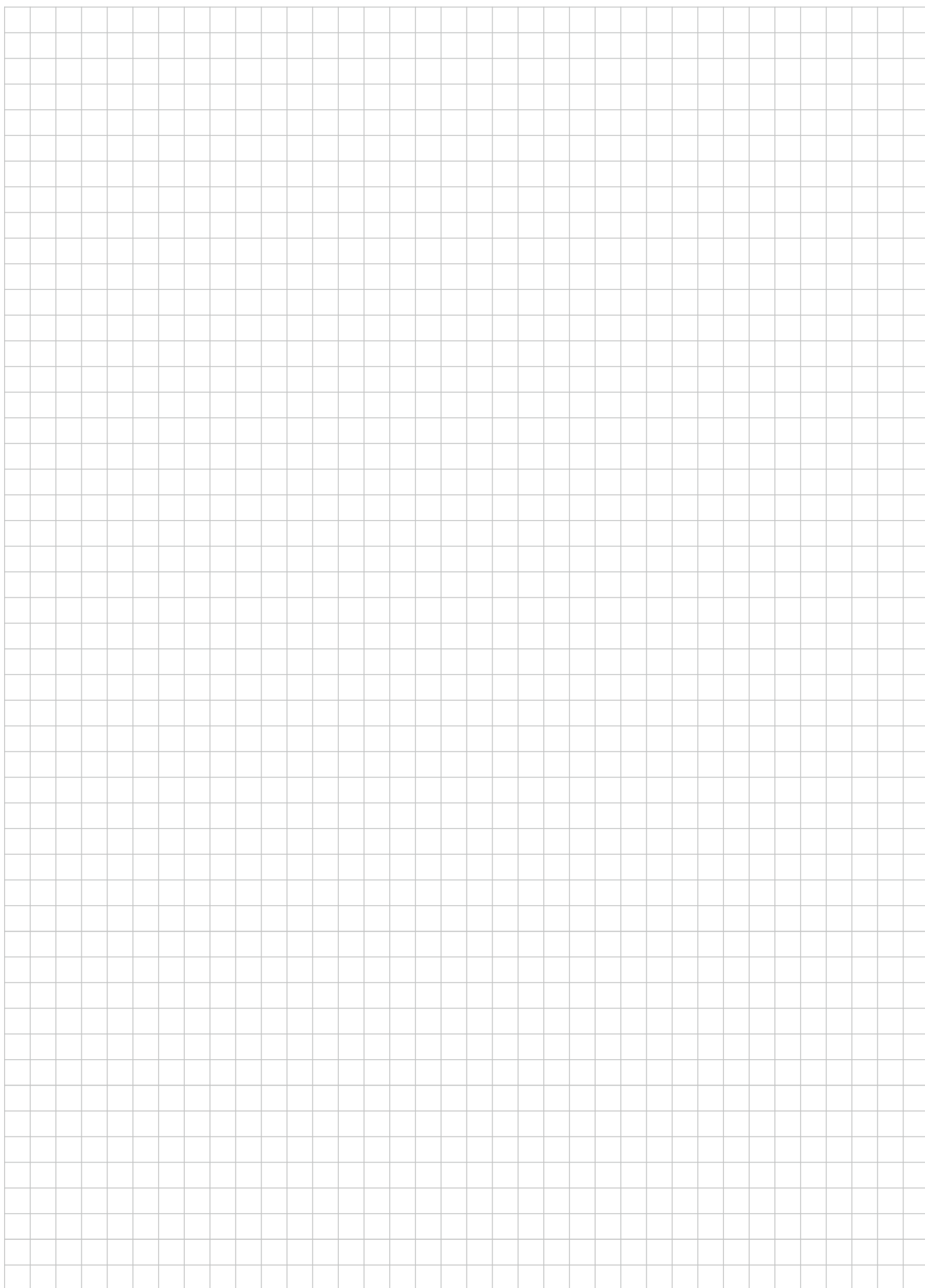


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)														Dimensions of Rail (mm)								Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	MxI	T	H ₂	H ₃	W _R	H _R	D	h	d	P	E	(mm)	C(kN)				C ₀ (kN)	M _R kN-m	M _P kN-m	M _V kN-m	Block kg
RGL15CA	24	4	9.5	34	26	4	26	45	68	13.4	4.7	5.3	M4X5.5	6	3.6	6.1	15	16.5	7.5	5.7	4.5	30	20	M4x16	11.3	24	0.311	0.173	0.173	0.15	1.8		
RGL20CA	30	5	12	44	32	6	36	57.5	86	15.8	6	5.3	M5X6	8	4.3	4.3	20	21	9.5	8.5	6	30	20	M5x20	21.3	46.7	0.647	0.46	0.46	0.32	2.76		
RGL20HA							50	77.5	106	18.8															26.9	63	0.872	0.837	0.837	0.42			
RGL25CA	36	5.5	12.5	48	35	6.5	35	64.5	97.9	20.75	7.25	12	M6x8	9.5	6.2	6	23	23.6	11	9	7	30	20	M6x20	27.7	57.1	0.758	0.605	0.605	0.51	3.08		
RGL25HA							50	81	114.4	21.5															33.9	73.4	0.975	0.991	0.991	0.63			
RGL30CA	42	6	16	60	40	10	40	71	109.8	23.5	8	12	M8x10	9.5	6.5	7.3	28	28	14	12	9	40	20	M8x25	39.1	82.1	1.445	1.06	1.06	0.80	4.41		
RGL30HA							60	93	131.8	24.5															48.1	105	1.846	1.712	1.712	1.03			
RGL35CA	48	6.5	18	70	50	10	50	79	124	22.5	10	12	M8x12	12	9	12.6	34	30.2	14	12	9	40	20	M8x25	57.9	105.2	2.17	1.44	1.44	1.27	6.06		
RGL35HA							72	106.5	151.5	25.25															73.1	142	2.93	2.6	2.6	1.65			
RGL45CA	60	8	20.5	86	60	13	60	106	153.2	31	10	12.9	M10x17	16	10	14	45	38	20	17	14	52.5	22.5	M12x35	92.6	178.8	4.52	3.05	3.05	2.47	9.97		
RGL45HA							80	139.8	187	37.9															116	230.9	6.33	5.47	5.47	3.20			
RGL55CA	70	10	23.5	100	75	12.5	75	125.5	183.7	37.75	12.5	12.9	M12x18	17.5	12	17.5	53	44	23	20	16	60	30	M14x45	130.5	252	8.01	5.4	5.4	3.91	13.98		
RGL55HA							95	173.8	232	51.9															167.8	348	11.15	10.25	10.25	5.32			

Note : 1. 1 kgf = 9.81 N

2. The theoretical dynamic rated load is C_{100R} , if necessary C_{50R} conversion formula is as follows : $C_{50R} = 1.23 \times C_{100R}$







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