# Linear Rail System

DIAMOND CASE

# I. SBC LINEAR GUIDE FEATURES

1. ECONOMICAL PRICE

Our Linear rails are very economical due to the simplistic design and efficient production in one facility.

2. FAST DELIVERY

Fast delivery is available on all standard items. products are stocked in various locations to assure quick supply..

3. PRECISION POSITIONING

SBC linear guides have low coefficient of friction and excellent repeatability.

4. COST EFFICIENT

The low coefficient of friction of the SBC linear guide allows smaller drives to be used and contributes to energy savings.

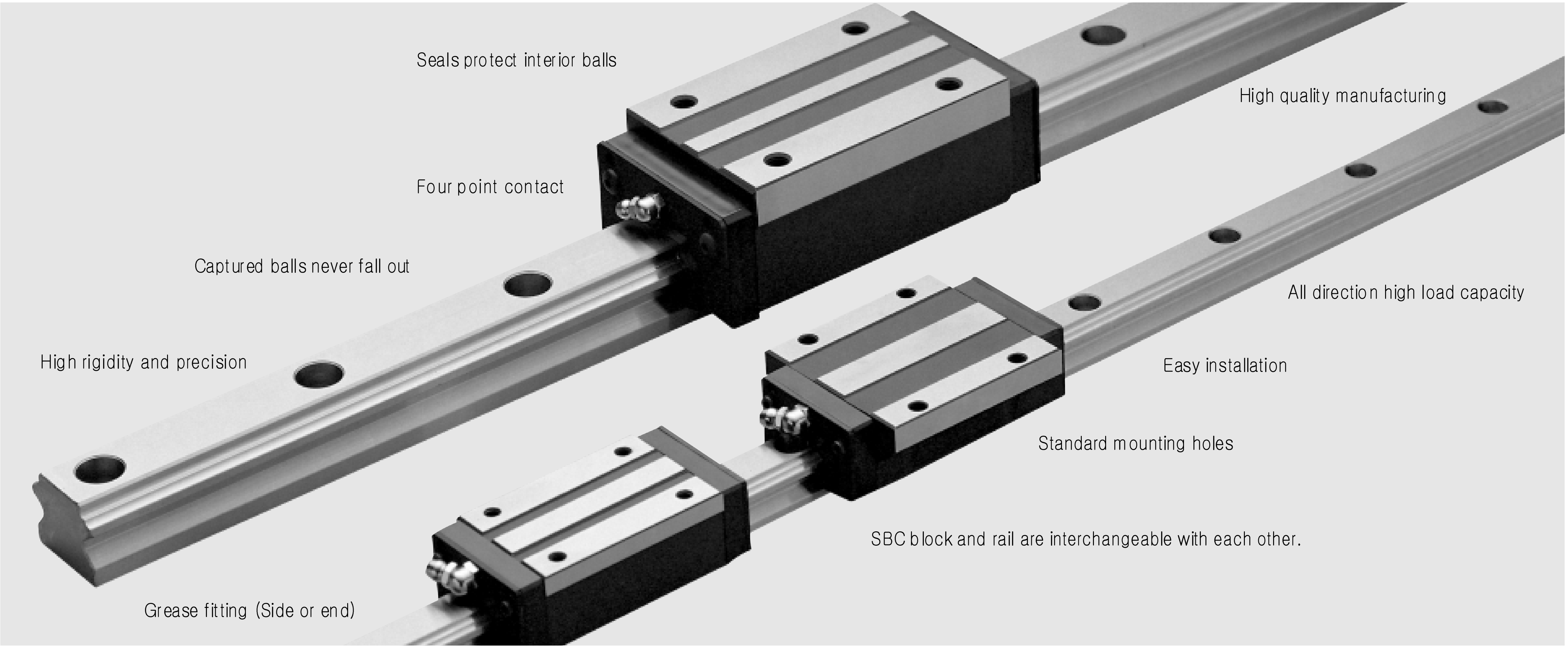
5. MAINTAIN HIGH PRECISION

By reducing the rolling friction and thermal expansion, SBC linear guides can maintain repeatability for long periods of time.

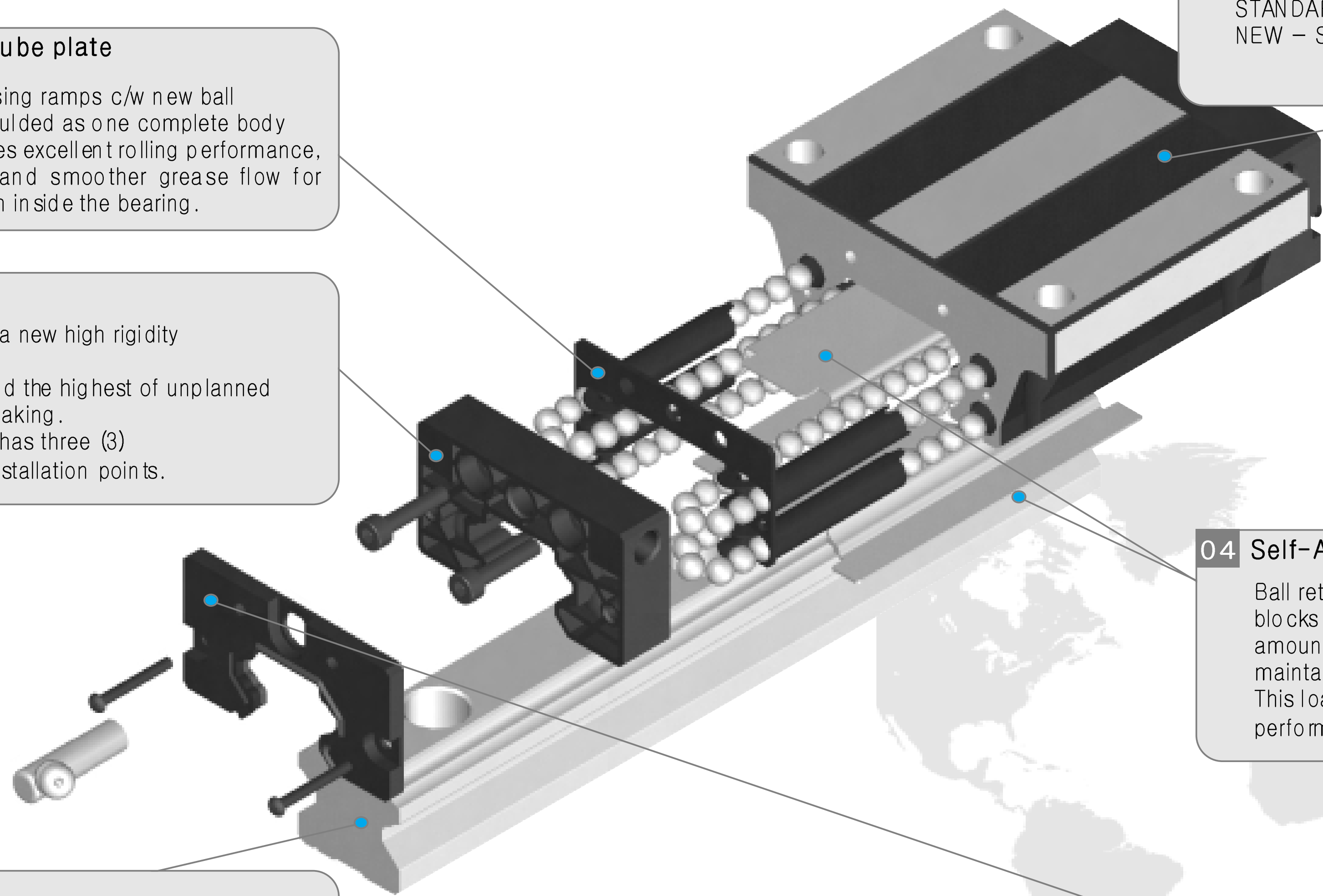
6. EASY INSTALLATION

Equally spaced standard bolt assembly of SBC linear guide assures the load capability and precision positioning.

7. SBC linear guides improve the machine reliance because the life span estimation is based on accurate statistical calculation.



## SBG(S) series NEW FEATURES



**01 The new ball return tube plate**

The end plate and reversing ramps c/w new ball return tubes are now moulded as one complete body component – this creates excellent rolling performance, lower operating noise and smoother grease flow for longer lubricant retention inside the bearing.

**02 Linear Guide Block**

STANDARD – ( SBG/ SBS ) series
NEW – SPACER ( SPG / SPS ) series are all very importantly DIMENSIONALLY INTERCHANGEABLE

**03 End Plate**

Now manufactured with a new high rigidity engineering plastic.
Purpose built to withstand the highest of unplanned impact loads without breaking.
This new end plate now has three (3) optional grease fitting installation points.

**04 Self-Aligning or Floating Ball Retainer Plates**

Ball retainer plates now snap assemble to the blocks and and this unique assembly method allows an amount of internal SELF – ALIGNMENT and load sharing while maintaining rigid ball control.
This load sharing removes skidding and poor rolling performance by keeping balls inside the load zone.

**05 Linear Guide Rail**

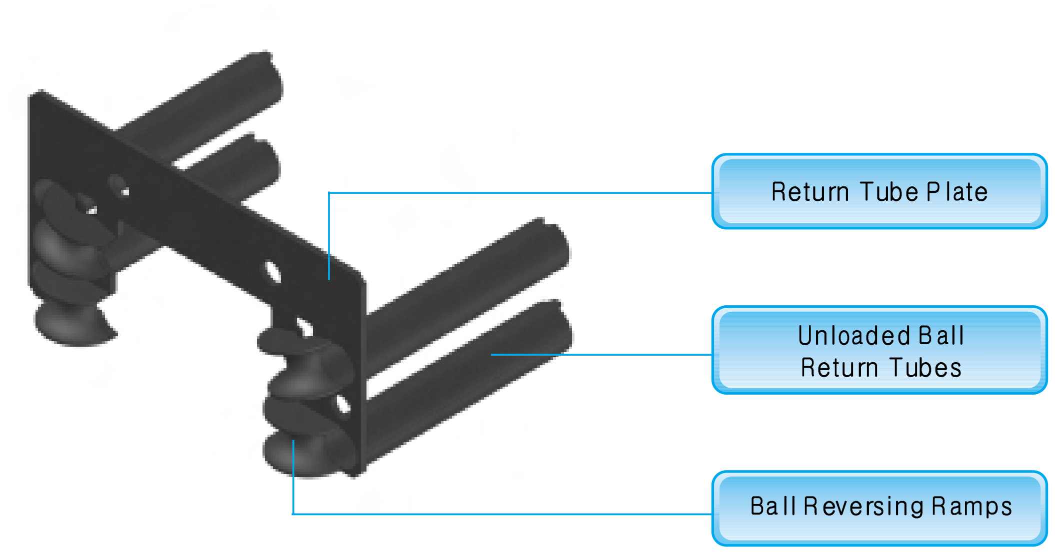
One interchangeable rail can be used for every type of block Standard ( SBG / SBS ),
NEW – SPACER series ( SPG / SPS )

**06 End Seal**

New Double lip structure which improves resistance to dust and particle contamination.

## NEW single component return tube & reversing plate structure

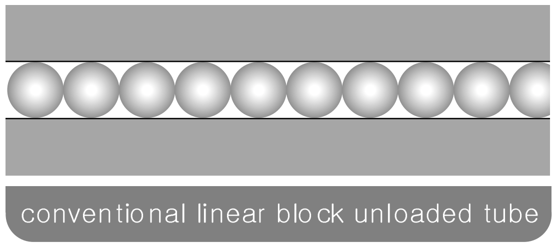
※ Now available Size 15, 20, 25 ,30 and 35 only.



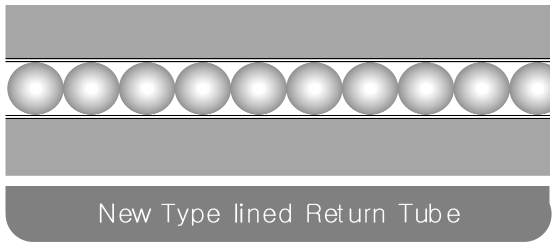

### BALL TUBE KEEPS LUBRICANT CLEAN

- Inserting a moulded tube into the ball return paths keeps lubricant cleaner by providing better loose ball control and free lubricant flow while preventing metal to metal skidding contact with what is normally an imprecise return path wall.

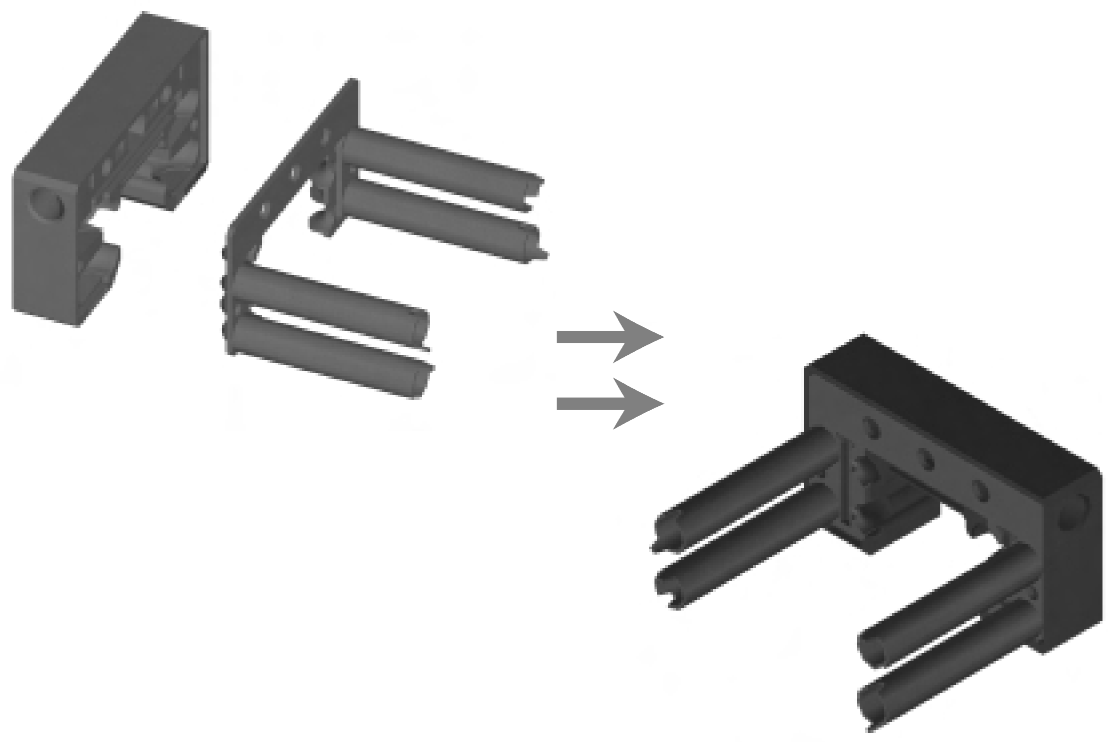
Unloaded return path of standard Linear block




Unloaded return path of the NEW Type Linear block




## Close fitting end-plate reduces grease loss

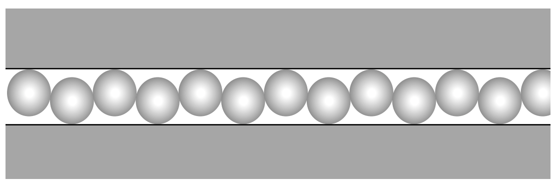


The return tube plate is tightly assembled to the linear guide block end plate.
This greatly reduces lubricant loss from within the guide block body.
Longer internal grease retention improves linear guide performance & increases rail lifespan wear.
The linear guide block now acts as a "GREASE RETAINER."

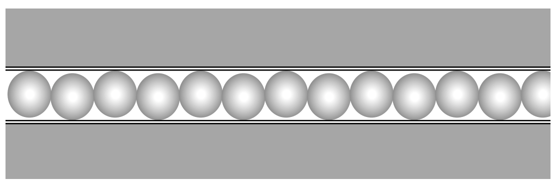
## Improve rolling performance and reduce operational noise with the "NEW" RETURN TUBE PLATE

- The return tube plate is now moulded as one body component and makes for smoother operation of the guide block in any motion plane .
- The new single component return tube plate eliminates alignment errors at assembly, enables closer running tolerances and adds to the performane accuracy of linear guide block and rail assemblies. The smoother end reversing and transitioning of the individual steel balls from unloaded to loaded states through the new end return dramatically improves rolling performance.
- Noise formerly created by metal to metal contact by the balls in the unloaded return tubes, is greatly decreased by the insertion of the new engineering plastic tube liners.
- This specially selected engineering plastic has lubricating qualities and its durability, enhances the application lifespan of bearing.

friction noise between unloaded steel balls and return tube walls



Noise greatly decreased by ENGINEERED PLASTIC TUBE

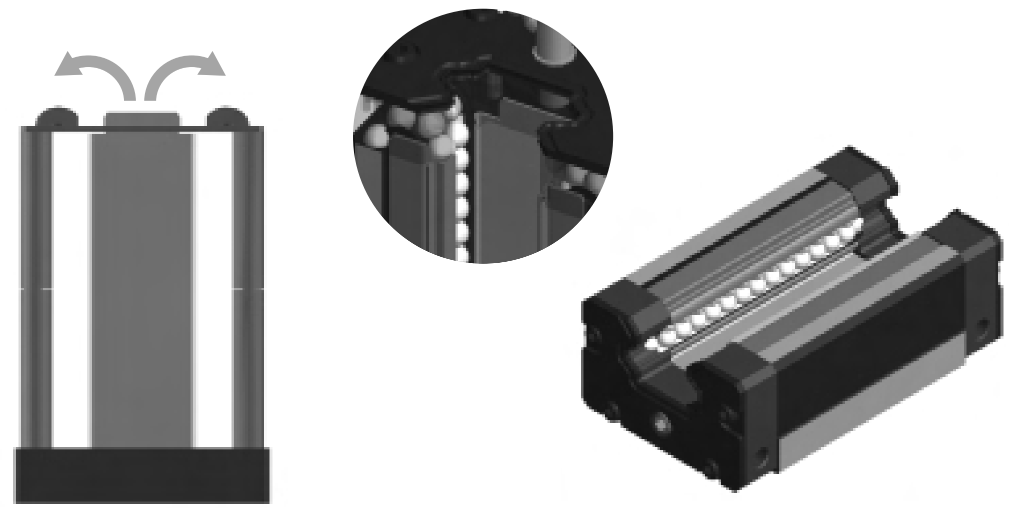


## Self-aligning internal retainer plates (Upper & Lower)

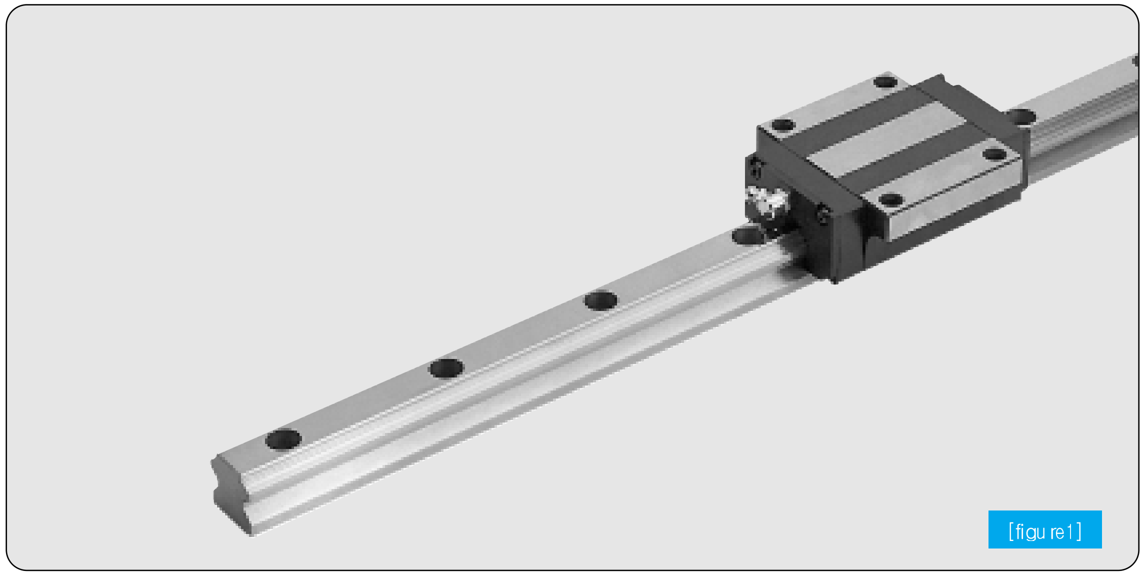
- Standard assembly practice for internal ball retainer plates in conventional blocks is to screw them into the body. Any accumulation of tolerance errors cannot be compensated for by this fixed position method. This can lead to rough rolling performance or small pre-load hot spots when guide block is assembled onto the rail.

  The new type guide block ball retainers are snap assembled to the internal body and end-plate without fixed position screws.

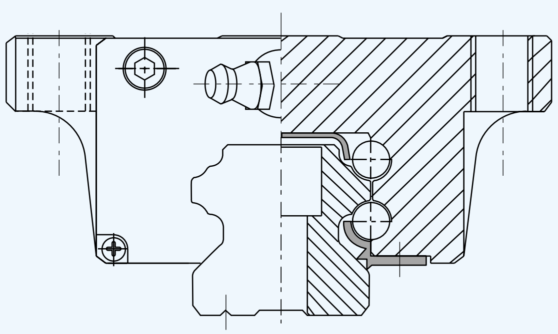
  The retainers can self align according to load orientation and direct more balls into the load zone. This function eliminates ball skid and hot zone pre-load creating smoother running and longer life.
- These new retainers are made of Stainless steel ( SUS304 ) and are corrosion resistant.



- As the retainers are not screw fixed and are free to float and align according to load orientation the upper and lower plates work in tandem to provide best ball track guide and retention through this internally self-aligning function.



[figure1]



[figure2]

# II. LOAD RATING & LIFE

## Load rating & Life

Under normal conditions, the linear rail system can be damaged by meteal fatigue as the result of repeated stress. The repeated stress cause flaking on raceways and steel balls. The life of the linear rail system is defined as the total travel distance that the linear rail system travels until flaking occurs.

## Basic static load rating : Co (kgf)

If an excessive load or shock is applied to a linear rail system in static or dynamic state, permanent but local deformation can occur to the steel balls and raceway. When the deformation is too excessive, it will disturbs the smooth motion of the linear rail system. The basic static load rating, Co, means a constant load with a same direction and magnitude when the deformation sum of steel balls and raceway under the maximum static load equals 0.0001 times of the steel ball diameter. This static load rating Co is the maximum permissible static load.

## Static safety factor : fs

There are two ways to select a linear rail. One depends on the value of static load and the other is based on the required life. Usually, the later is preferred.

$$\frac{C_o}{P_o} \geqq f_s$$

$f_s$ : Static safety factor
$C_o$ : Basic static load rating (Kgf)
$P_o$ : Impact load rating (Kgf)

## Basic dynamic load rating : C (kgf)

The basic dynamic load rating C is a statistical number and it is based on 90% of the bearings surviving 50Km of travel carrying the full load.

## Load rating & Life Estimation : L (km)

Due to the repeated stress, flaking may occur on contact points. We define the nominal life as the total distance of travel without flaking by 90% of a group of an identical group of linear rail systems operating under the same condition.

$$L = \left(\frac{C}{P}\right)^3 \times 50\,Km \qquad L_1 = 50\,Km$$

# III. FRICTIONAL RESISTANCE

## FRICTIONAL RESISTANCE

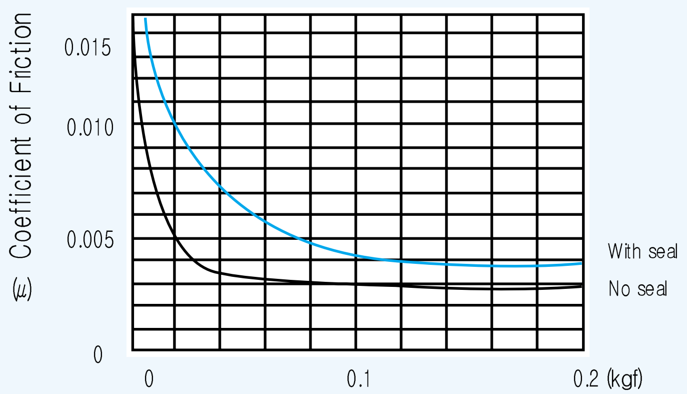
As the static and dynamic coefficient of frictions of the SBC linear guide are so small that they minimize the required driving force and temperature increase.
Frictional force depends on load, preload, velocity and lubrication.
In general, the light load with high speed is more affected by the lubricant characteristic, while the medium or heavy load are more affected by the load.

$F = \mu P + f$

- F : Frictional force(kgf)
- $\mu$ : Coefficient of friction
- P : Load(kgf)
- F : Resistance of seal(kgf)

If a seal is applied, seal resistance has to be added up to the total required driving force. The seal resistance to motion is a factor of its contact area, pressure and lubrication. When heavy load or pre-load is given to the block , the resistance to motion of the linear guide increases,
· If there are a pair of seals, 0.2~3.5(Kgf) must be added according to each model number.

## COEFFICIENT OF FRICTION




Load ratio(P/C)
P:Load
C:Basic dynamic load rating

[figure3]

| Linear Rail System | Type | Coefficient of Friction $\mu$ |
|---|---|---|
| Linear Rail System | SBG, SBS, SBM | 0.002 ~ 0.003 |

Linear Rail System Coefficient of Friction $\mu$ [table1]

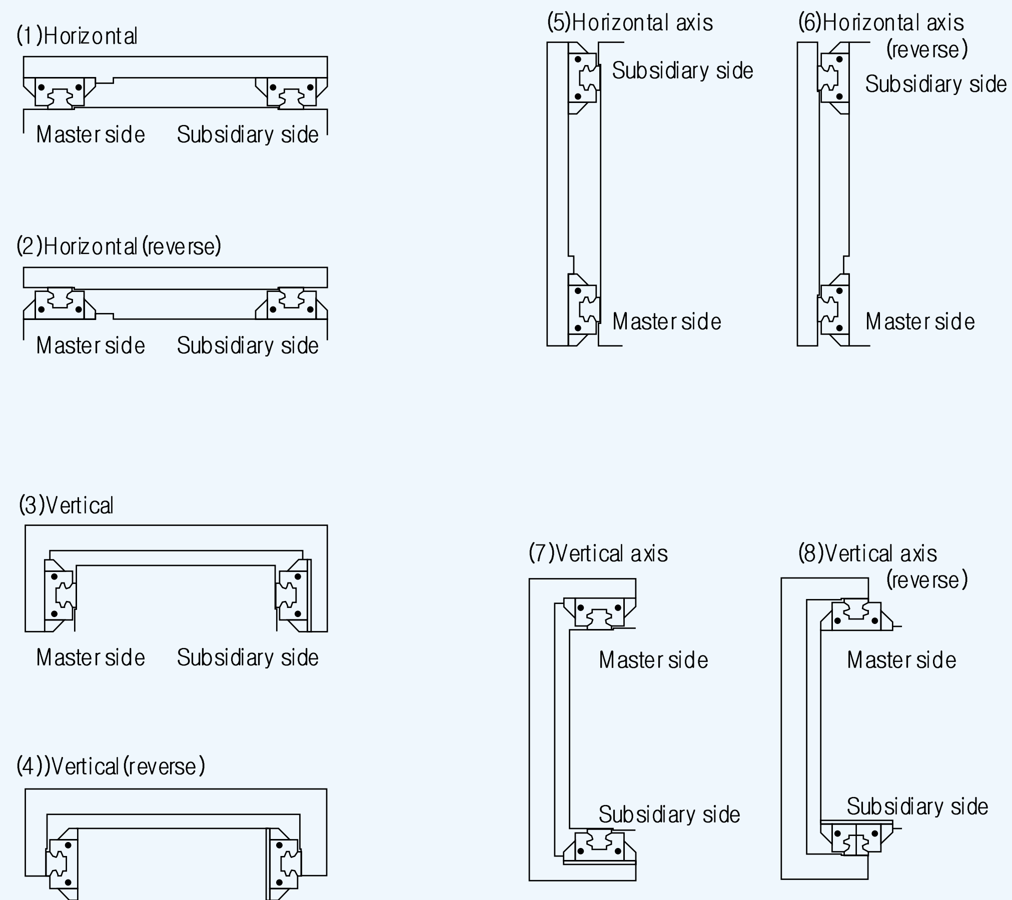
# IV. ARRANGEMENT

## Arrangement

SBC linear rail can be arranged in various configurations. As shown below, (1), (2), (3) and (4) are the most common methods. (5), (6), (7) and (8) are very effective methods when the height of the table is limited.

| | Horizontal | Vertical | Horizontal axis | Vertical axis |
|---|---|---|---|---|
| Table movement | (1) | (3) | (5) | (7) |
| Rail movement | (2) | (4) | (6) | (8) |

[table2]




[figure4]

## MOUNTING

### 1. How to mount

Normally, both the bearing block and rail are mounted to the structure with bolts.
when a horizontal load is applied, shock, or vibration, the horizontal pressure mounting is recommened.

### 2. Horizontal Mounting

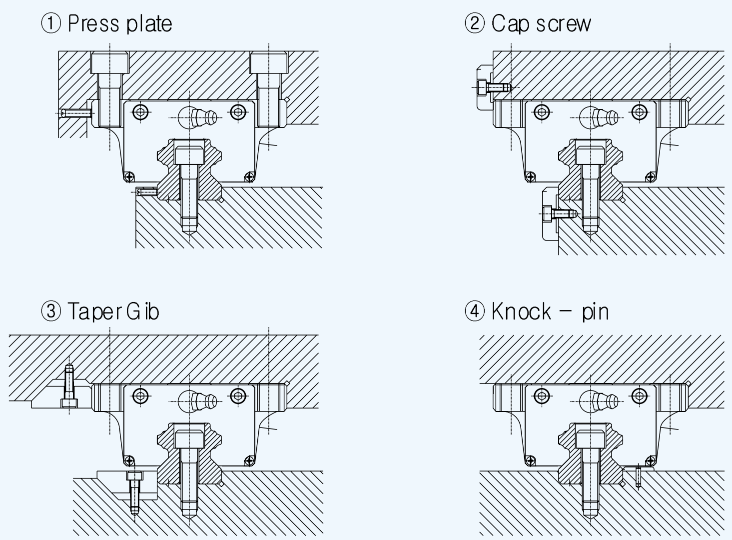
The standard horizontal mounting is the simplest mounting.
High precision and accuracy is maintained during shock and vibration.

① Horizontal Pressure Mounting
This method provides and easy solution to shock and vibration applications.

② Cap Screw Mounting
Small bolts are used when space is limited. The number of bolts can be adjusted as necessary.

③ Taper Gib
Horizontal forces occur due to the angular design of the tapered gib

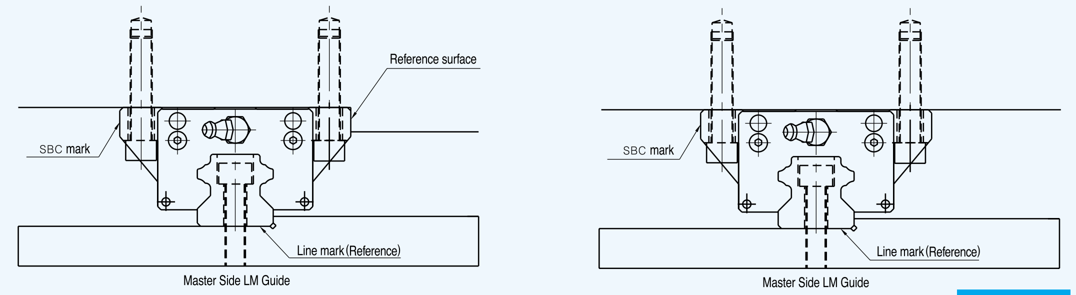
④ Knock – pin




[figure5]

## REFERENCE LINE MOUNTING

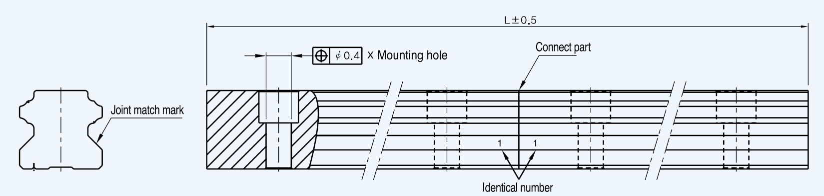
### 1. Identifying Reference Surfaces




[figure6]

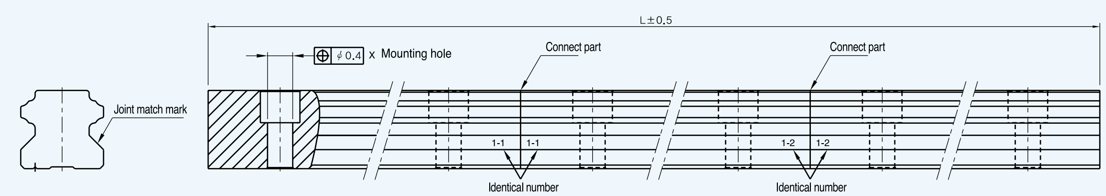
### 2. DIRECTION OF CONNECTING RAILS – All connecting rail must have the same identification number.

① Two rail joining method




[figure7]

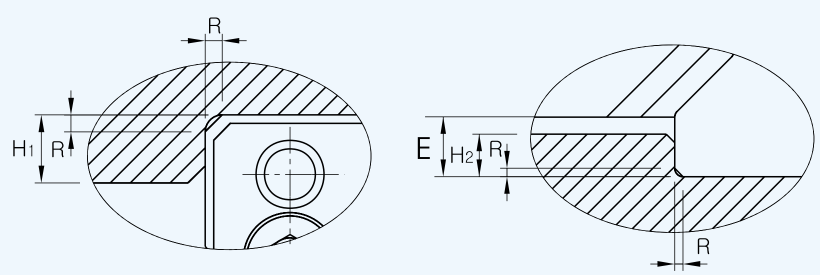
② Multiple rail joining method




[figure8]

## Shoulders height and Fillet radius R

When the bearing and rail are installed on the table and base, A fillet radius, chamfer size, and shoulder height must be considered.




Contact part of bearing

Contact part of rail

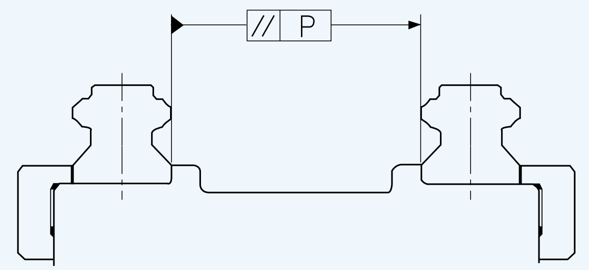
[figure9]

| Model number | Fillet radius R | Shoulders height $H_1$ | Shoulders height $H_2$ | E |
|---|---|---|---|---|
| 15 | 0.5 | 4 | 2 | 2.65 |
| 20 | 0.5 | 5 | 2.5 | 3.5 |
| 25 | 1.0 | 5 | 3.5 | 5 |
| 30 | 1.0 | 5 | 4.5 | 6.5 |
| 35 | 1.0 | 6 | 6 | 7.5 |
| 45 | 1.0 | 8 | 8 | 9.8 |
| 55 | 1.5 | 8 | 8 | 9.8 |
| 65 | 1.5 | 10 | 10 | 17.5 |

[table3]

## PERMISSIBLE TOLERANCES OF MOUNTING SURFACE

1. PERMISSIBLE TOLERANCE(P) OF PARALLELISM




[figure10]

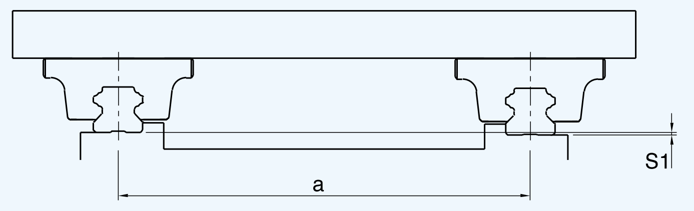
Mounting errors can cause rolling resistance to motion. Due to the self adjusting feature of the SBC linear rail, rolling resistance or bearing life will not be affected as long as the permissible tolerance is observed per the following table.

| Size | Permissible Tolerance(P)For Parallelism | | |
|---|---|---|---|
| | Clearance(block) | | |
| | K 1 | K 2 | K 3 |
| 15 | 25 | 18 | |
| 20 | 25 | 20 | 18 |
| 25 | 30 | 22 | 20 |
| 30 | 40 | 30 | 27 |
| 35 | 50 | 35 | 30 |
| 45 | 60 | 40 | 35 |
| 55 | 70 | 50 | 45 |
| 65 | 80 | 60 | 55 |

[table4]

## PERMISSIBLE TOLERANCES OF MOUNTING SURFACE

2. Permissible Tolerance(S1) of Two Level offset – “X”




[figure11]

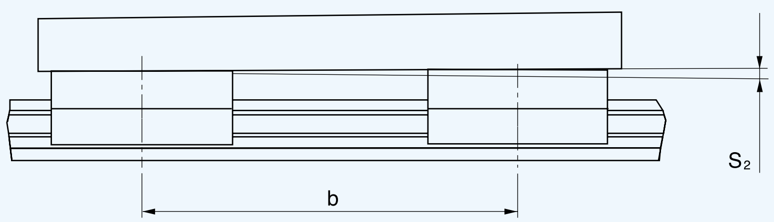
| Constant | Clearance(block) | | |
|---|---|---|---|
| | K1 | K2 (0.05C) | K3 (0.08C) |
| Y | 0.0004 | 0.00026 | 0.00017 |

[table5]

$S_X = a \times Y$ 

$S_1$:Permissible Tolerance of two level offset(mm)
a:Rail to Rail Distance(mm)
Y:Constant

3. Permissible Tolerance(S2) of Two Level offset – “Y”




[figure12]

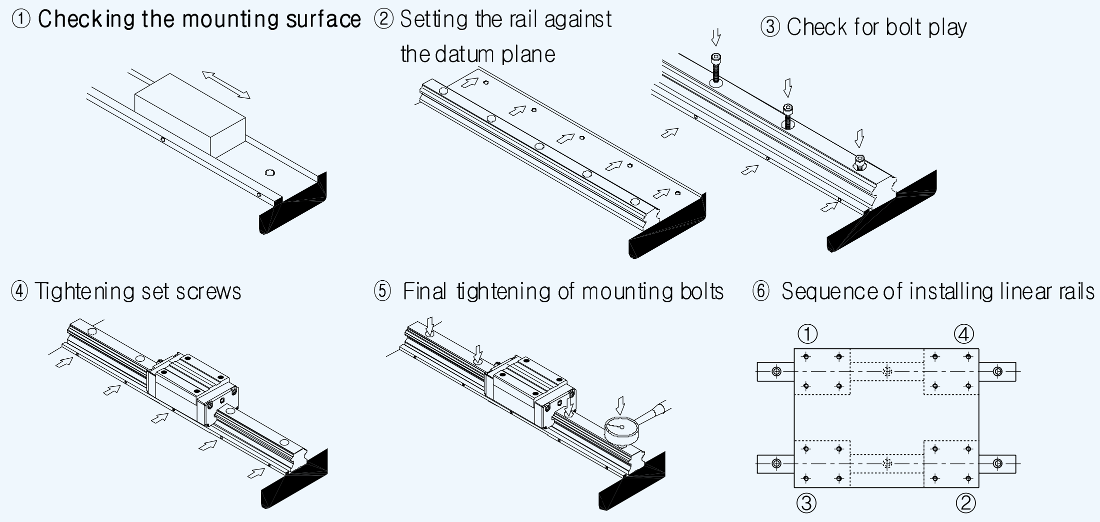
$S_Y = b \times 0.00004$ 

$S_2$:Permissible Vertical Tolerance(mm)
b:Block(Carrier) to Block distance on the same rail(mm)

## MOUNTING PROCEDURE

1.MOUNTING PROCEDURE

① Clean and dry the mounting surfaces.
② Coat each surface with low viscosity spindle oil, then place the rail on the surface and tighten the mounting bolts temporarily.
③ Place the carriage plate on the blocks carefully and tighten the mounting bolts temporarily.
④ Position the carriage plate by tightening the set screws to press the master block and tighten the mounting bolts with a torque wrench.
⑤ Follow the above order to mount subsidiary blocks.




[figure13]

2. BOLT MOUNTING TORQUE

Unit:N.cm

| BOLT | M2 | M2.3 | M2.6 | M3 | M4 | M5 | M6 | M8 | M10 | M12 | M14 | M16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mounting Torque(Steel) | 58.8 | 78.4 | 117.6 | 196 | 392 | 784 | 1274 | 2940 | 6762 | 11789 | 15680 | 19600 |
| Mounting Torque(Cast Iron) | 39.2 | 58.8 | 78.4 | 127.4 | 274.4 | 588 | 921.2 | 2009 | 4508 | 7840 | 10496 | 13093 |
| Mounting Torque(Aluminium) | 29.4 | 39.2 | 58.8 | 98 | 205.8 | 441 | 686 | 1470 | 3332 | 5880 | 7840 | 9800 |

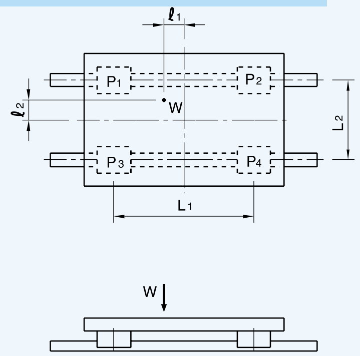
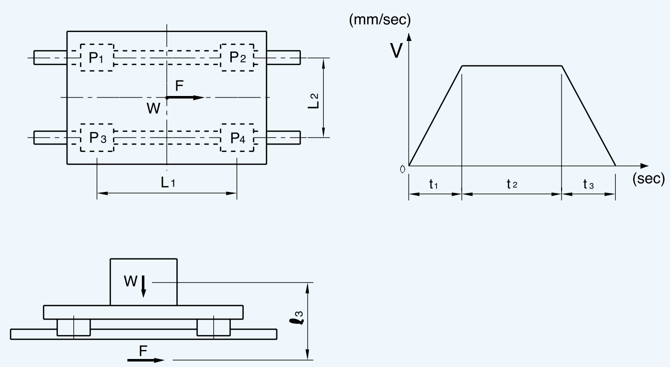
[table6]

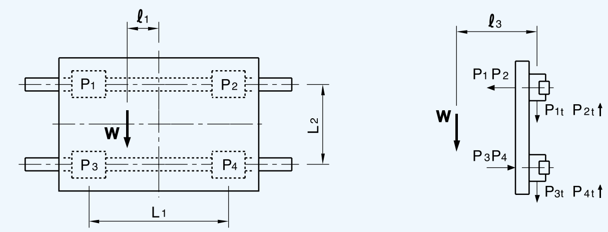
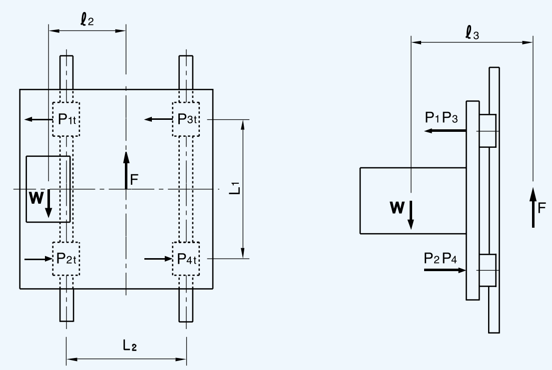
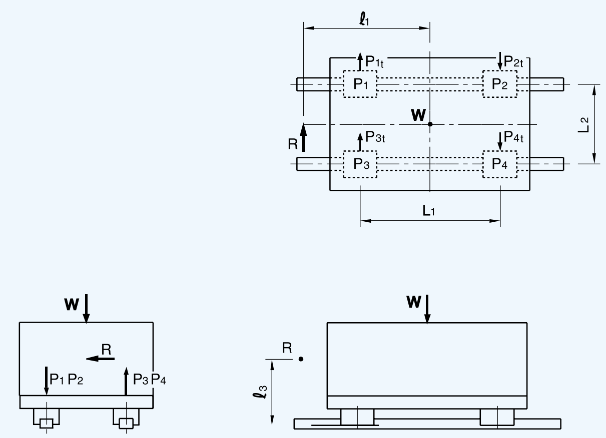
# V. CALCULATING THE APPLIED LOADS

## CALCULATING THE APPLIED LOADS

Loads exerted on a linear rail system vary according to direction. it is important to consider the above condition before selecting the type of linear rail system and model. Refer to the below example when calculating the loads

W : load(N)
Ln : distance(mm)
F : acceleration force(N)
Rn : External force(N)
g : gravitational acceleration(mm/sec²)(g=9.8×10³ )
Vn : Velocity(mm/sec)
Pnt : Lateral load(N)
Pn : Radial load

| Position of Linear Rail System | Load Calculation formulas of Linear Rail System |
|---|---|
| Horizontal axis  | $P_1=\frac{W}{4}+\frac{W\ell_1}{2L_1}+\frac{W\ell_2}{2L_2}$<br>$P_2=\frac{W}{4}-\frac{W\ell_1}{2L_1}+\frac{W\ell_2}{2L_2}$<br>$P_3=\frac{W}{4}+\frac{W\ell_1}{2L_1}-\frac{W\ell_2}{2L_2}$<br>$P_4=\frac{W}{4}-\frac{W\ell_1}{2L_1}-\frac{W\ell_2}{2L_2}$ |
| Horizontal axis with inertia forces  | $P_1=P_2=P_3=P_4=\frac{W}{4}$<br>$P_1=P_3=\frac{W}{4}+\frac{VW\ell_3}{2L_1gt}$<br>$P_2=P_4=\frac{W}{4}-\frac{VW\ell_3}{2L_1gt}$<br>$P_1=P_3=\frac{W}{4}-\frac{VW\ell_3}{2L_1gt}$<br>$P_2=P_4=\frac{W}{4}+\frac{VW\ell_3}{2L_1gt}$<br>[figure14] |

| Position of Linear Rail System | Load Calculation formulas |
|---|---|
| Horizontal axis  | $P_1=P_2=P_3=P_4=\frac{W}{2}\times\frac{\ell_3}{L_2}$<br>$P_{1t}=P_3=\frac{W}{4}+\frac{W\ell_1}{2L_1}$<br>$P_{2t}=P_{4t}=\frac{W}{4}-\frac{W\ell_1}{2L_1}$ |
| Vertical axis  | $P_1=P_2=P_3=P_4=\frac{W\ell_3}{2L_1}$<br>$P_{1t}=P_{2t}=P_{3t}=P_{4t}=\frac{W\ell_2}{2L_1}$ |
| Horizontal axis with external force R  | $P_1=P_2=P_3=P_4=\frac{W}{4}+\frac{R}{2}\times\frac{\ell_3}{L_2}$<br>$P_{1t}=P_{3t}=\frac{W}{4}+\frac{R}{4}+\frac{R\ell_1}{2L_1}$<br>$P_{2t}=P_{4t}=\frac{W}{4}+\frac{R}{4}-\frac{R\ell_1}{2L_1}$<br>[figure15] |

## STATIC SAFETY FACTORS

When calculating a load exerted on the linear rail system, both mean load and maximum load need to be considered. Reciprocating machines create moment of inertia. When selecting the right linear rail system, consider all of the loads.

$$\frac{C_o}{P_o} \geq f_s$$

$f_s$ :Static safety factor
$C_0$:Basic static load rating (N)
$P_0$:Impact load rating (N)

| Operating | Load conditions | fs |
|---|---|---|
| Normally stationary | Impact load or shaft deflection is small. | 1 ~ 1.3 |
| | Impact or twisting load is applied. | 2 ~ 1.3 |
| Normally moving | Normal load is exerted or shaft deflection is small. | 1 ~ 1.3 |
| | Impact or twisting load is applied. | 2.5 ~ 5 |

[table7]

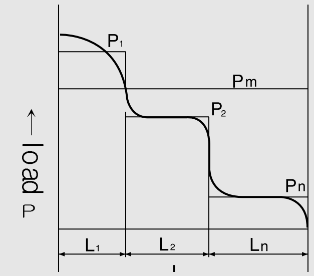
## CALCULATING THE MEAN LOAD

Loads acting on a linear rail system vary according to various conditions.
All load conditions must be taken into consideration in order to calculate the life of the linear rail system.

### Step loads

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

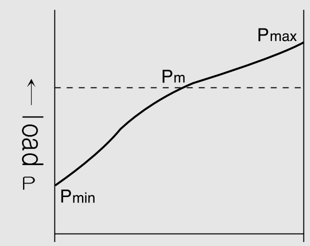
$P_m$ : Mean load (kgf)
$P_n$ : Varying load (kgf)
$L$ : Total length of travel (mm)
$L_n$ : Length of travel carrying $P_n$ (mm)




### Loads that vary linearly

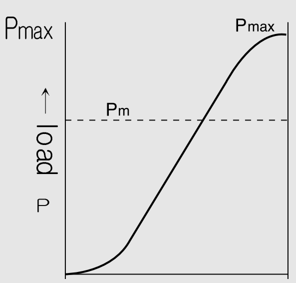
$$P_m \fallingdotseq \frac{1}{3}(P_{min} + 2 \cdot P_{max})$$

$P_{max}$ : Maximum load (kgf)
$P_{min}$ : Minimum load (kgf)

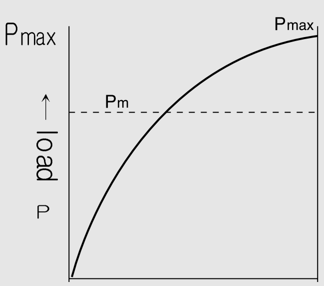



### Load varying sinusoidally

a) $P_m \fallingdotseq 0.65 P_{max}$




b) $P_m \fallingdotseq 0.75 P_{max}$




[figure16]

# VI. LIFE CALCULATION

## Life calculation

When using a linear rail system loads, vibrations, and impacts must be taken into account. Additionally, surface hardness and heat could be factors affecting bearing life.

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

- L : Nominal life(km)
- C : Basic dynamic load rating(kgf)
- $P_C$ : Load (kgf)
- $f_H$ : hardness factor
- $f_T$ : Temperature factor
- $f_C$ : Contact factor
- $f_W$ : Load factor

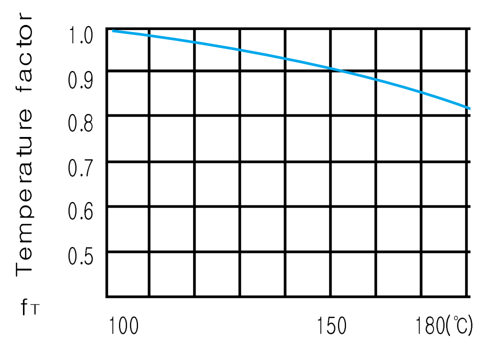
When the nominal life L is calculated by above equation. The life of linear rail system can be calculated by following equation, if the stroke and reciprocating frequency per minutes are invariable.

$$L_h=\frac{L\times10^3}{2\times l_s\times n_1\times60}$$

- $L_h$ : hour of nominal life (h)
- ls : stroke (m)
- $n_1$ : reciprocation frequency per minute (o.p.m)

### ※Temperature factor, $f_T$

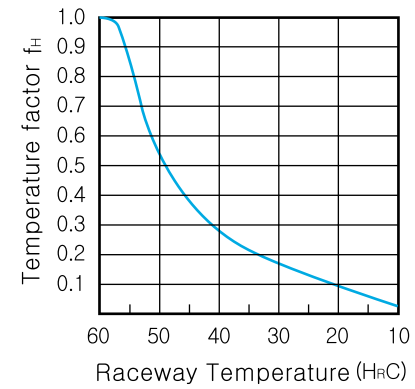
If the temperature of the linear rail system is over 100℃, the hardness of the block and rail will be reduced, and as the result, the temperature factor, $f_T$ should be taken into account.




[figure17]

### ※ Hardness factor, $f_H$

To optimize the load capacity of a linear rail system, the hardness of the rail should be HRC 58 to 62. SBC linear rail systems have a surface hardness of HRC 60.




[figure 18]

### ※ contact factor, $f_C$

When two or more blocks are used in close contact, it is hard to obtain a uniform load distribution because of mounting errors and tolerances. The basic dynamic load C should be multiplied by the contact factors $f_C$ shown below.

| Number of blocks in close contact | Contact factor ($f_C$) |
|---|---|
| 1 | 1.00 |
| 2 | 0.81 |
| 3 | 0.72 |
| 4 | 0.66 |
| 5 | 0.61 |

[table8]

※ Load factor fw

Reciprocating machines creates vibrations. Vibrations are difficult to calculate precisely. Refer to the following table to compensate for these vibrations.

$P = f_w \cdot P_c$

P : The load boaded on blocks (kgf)    Pc : load (kgf)

fw : load factor    V : velocity (m/min)

| | Velocity(v) | Observed vibrations(G) | fw |
|---|---|---|---|
| No Impacts or vibrations | Low speed V≦15m/min | G≦0.5 | 1 ~ 1.5 |
| Small Impacts or vibrations | Medium speed 15<V≦60m/min | 0.5<G≦1.0 | 1.5 ~ 2.0 |
| Significant Impacts and vibrations | High speed V>60m/min | 1.0<G≦2.0 | 2 ~ 3.5 |

[table9]

# VII. CALCULATION EXAMPLE

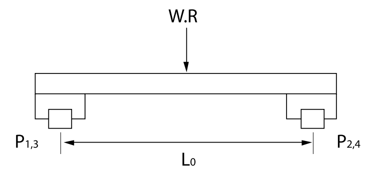
## CALCULATION EXAMPLE

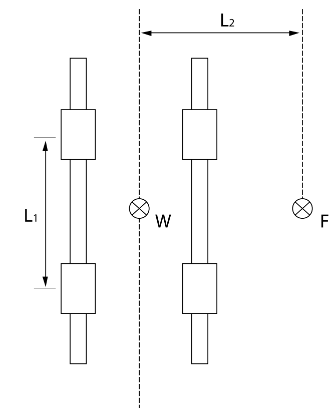
### 1. Working Condition

MODEL SBG30 FL-2-K2-1600L-II

Basic static load rating Co = 5,490 Kgf

Basic dynamic load rating C = 2,980 Kgf




Load W = 300 Kgf

External force F = 300 Kgf

Velocity V = 0.36 m/s

Stroke Ls = 1,000 ㎜

Required life 12,000hr (8hr × 300days × 5years)

Reciprocation frequency : 30/per min

Position of Linear Rail System

$L_0$ = 1,000 ㎜ (Distance between Blocks : suppose

$L_2$ = 200 ㎜ (Distance between Blocks : suppose)

$L_3$ = 200 ㎜

### 2. Load Calculation of Linear Rail System

$$P_{1.3} = \frac{W}{4} + \frac{R}{4} - \frac{R}{2} \times \frac{\ell_2}{\ell_0} \qquad P_{2.4} = \frac{W}{4} + \frac{R}{4} - \frac{R}{2} \times \frac{\ell_2}{\ell_0}$$

### 3. Checking the static safety factor(fS

$$\frac{C_O}{P_O} \geqq f_S$$

<---- $C_O$ = 5,490 Kgf

$P_{max}$ = 180 Kgf

As the result, static safety factor (fS)=30.5

## CALCULATION EXAMPLE

4. Checking by the required life

▶ calculating required life

$$L_h = \frac{L \times 10^3}{2 \times \ell_s \times n_1 \times 60}$$

← Lh = 12,000 hr
Ls = 1 m
n1 = 30 /per min

As the result, required life L = 43,200 Km

▶ Calculating Nominal life

$$L_h = \left(\frac{C}{f_w \times P}\right) \times 50(Km)$$

← C = 2,980 Kgf
P = 180 Kgf
fw = 1.5 (Load factor)

As the result, Nominal life L=67,220 Km

5. Conclusion

Using SBG30FL, both permissible load and life are satisfactory.

# Ⅷ. PRELOAD

## SELECTING RADIAL CLEARANCE

The block side to side movement by vibration is called clearance. In order to reduce the clearance, three types of blocks are available.

## PRELOAD

| | Conditions | Examples |
|---|---|---|
| Heavy preload K3 | ① Where rigidity is required, and vibration and impact are present.<br>② Engineered machinery for heavy equipment. | Machining centers, low speed transmission shafts, main shaft leading section on the boring machinery, Z axis shaft for engineered machinery. |
| Light preload K2 | ① Where overhung loads occur.<br>②Light load that requires precision. | Grinder table transmission shafts, automatic wrapping machinery, industrial robots, high speed material handling equipment, NC drilling machinery, Z axis for general industrial equipments, printer puncher, discharge processors, and precise X,Y tables |
| Normal class K1 | ① Where the load direction is constant, impact and vibration are light | Beam welding machinery, binding machinery, automatic wrapping machinery, X and Y axis for general machinery, automatic chassis cutters, welding machinery, heat cutters, tool change equipment, and material handling equipments. |

[table10]

## SBG/SBS TYPE RADIAL CLEARANCE

Unit : ㎛

| INDICATION / SIZE | Normal class | Light preload | Heavy preload |
|---|---|---|---|
| | K 1 | K 2 | K 3 |
| 15 | −4 ~ +2 | −12 ~ −4 | |
| 20 | −5 ~ +2 | −12 ~ −5 | −23 ~ −14 |
| 25 | −6 ~ +4 | −16 ~ −6 | −26 ~ −16 |
| 30 | −7 ~ +4 | −19 ~ −7 | −31 ~ −19 |
| 35 | −8 ~ +4 | −22 ~ −8 | −35 ~ −22 |
| 45 | −10 ~ +5 | −25 ~ −10 | −40 ~ −25 |
| 55 | −12 ~ +5 | −29 ~ −12 | −46 ~ −29 |
| 65 | −14 ~ +7 | −32 ~ −14 | −50 ~ −32 |

[table11]

# IX. ACCURACY

## GRADE LEVELS

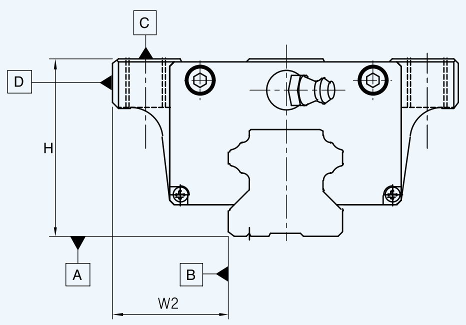
- Grade levels are divided into three type −N, H, and , P
- Maximum tolerance pertinent to each level.

Unit : ㎛

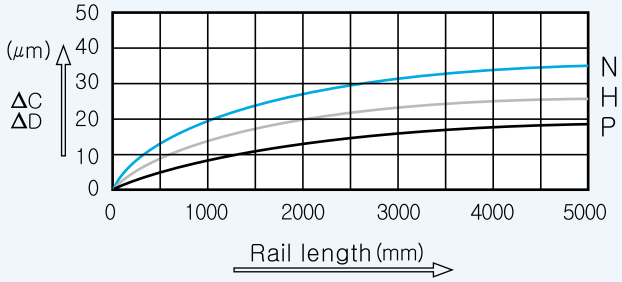
| | Grade levels | | |
|---|---|---|---|
| | N | H | P |
| Measurement of H and W2 ❶ | ±100 | ±40 | ±20 |
| Maximum difference of H and W2 on each block of the same rail. ❷ | 30 | 15 | 7 |
| Ground plan △C△D ❸ | (Refer to the figure 20) | | |

[table12]

❶Measured from the center of the block
❷Measured from the center of the block on the same position of a rail
❸Applied to the assembled ball rails



[figure19]



[figure20]

# X . LUBRICATION

## LUBRICATION

Lubrication for linear rail system is a key part for its performance. The lubrication functions to reduce friction caused by frictional movement, so it reduces friction and take out the heat. Therefore, the right lubrication and right lubrication applying is critical for service life of linear rail system,

Lubrication role :

① Reduce friction and wearing for each moving part.
② Eliminate the heat on linear rail system.
③ Prevent corrosion on inside and outside of linear rail system.
④ Dust-prevention.

Lubrication preconditions for linear rail system are as follows.

① Form a strong oil film
② Have high thermal stability
③ Low-fiction
④ Low-wear
⑤ Non-corrosive
⑥ Rust-prevention
⑦ Oil must have high-viscosity and Grease must have consistency against repeated agitation of grease.
⑧ High conductivity for heat

## Classification and selection of lubrication

Grease and Oil is representative of lubrication. Comparison of oil and grease for linear rail system is as shown in table 13. When selecting lubrication, consider its performance, use and purpose.

| ITEM | GREASE | OIL |
|---|---|---|
| Rotation | Low, intermediate | High |
| Seal | Simple | Cautious |
| Lubrication change | Complicate | Simple |
| Life | Short | Long |
| Thermal radiation | Bad | Good |
| Friction torque | Large | Less |
| Performance | Good | Excellent |

[table13]

## General lubrication

| Lubricant | Grease | | Oil |
|---|---|---|---|
| | Soap-based grease | Lithium-based grease | Turbin oil 1~4 |
| | | Calcium-based grease | Coolant oil 1~3 |
| | | Natrium-based grease | Spindle oil 1~2 |
| | Non-soap based grease | Bentone-based grease (High-temperature grease) | |

[table14]

## Lubricants for special environments

General grease can't be used for special conditions like continual vibration, clean room, vaccum, high and low temperature. If this is case, the appropriate lubricant should be selected.

| Operating environment | Lubricant features | Brand |
|---|---|---|
| Vibrations | Easy oil film forming is required | SNG5050(NTG KOREA) |
| Clean rooms | Low oil separation is required | |
| High and low temperature | -40℃~250℃ | VACUMM GREASE (Dow Corning) |
| Vaccum | Water and chemical resistance is required | |

[table15]

## SNG-5050 GREASE

SNG-5050 Grease is a wide-temperature range grease developed with additive and a urea-based consistency enhancer. Especially, this is suitable for clean room and long life grease compare to lithium-based grease.

Features

1. Excellent stability of oxidation
2. Long life grease
3. Low dust accumulating and excellent chemical-resistance.
4. Wide-temperature range. (-40℃~250℃)

| TEST ITEM | | SNG-5050 |
|---|---|---|
| Consistency (25℃) | | 248 |
| Dropping point ℃ | | 260 |
| Evaporation (99℃, 22h) % | | 0.11 |
| Evaporation (150℃, 22h) % | | 0.57 |
| Oil separation rate (99℃, 24h) % | | 0.5 |
| Film evaporation | 150℃ | 5.54 |
| Stability of oxidation (99℃, 24h) % | | 0.015 |
| mm2/S | 100℃ | 11.28 |
| Bearing rust proof | | Good |
| Wear resistance mm (120 rpm, 392N, 1h) | | 0.57 |

[table16]

## How to lubricate

Lubrication method for linear rail system are divided into grease gun and pump.

1. Grease
- With grease gun
  The grease is fed through the grease fitting on linear rail system. If there are many locations to be greased, the grease can be fed with integrated piping at one location.
- With pump
  The grease is fed periodically by automation pump.
2. Oil -Brushed on, Sprayed or pumped

## Lubricating interval

1 Grease

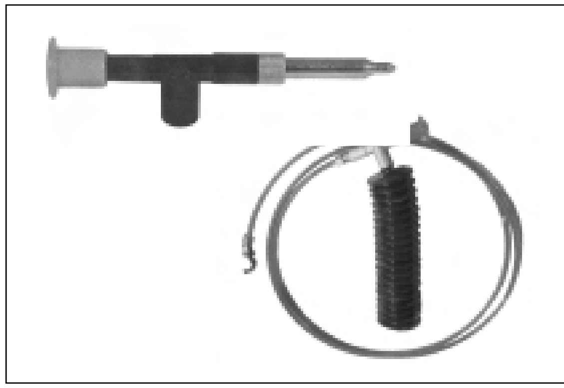
Grease should be checked periodically.

2. Oil

Automatic interval lubricant feeding is determined by oil volume and contamination.

## CARTRIDGE GUN

SB-10 grease gun with nozzle is used for feeding the linear rail system and linear actuator. Translucent case makes it possible to check the quantity. Easy install and uninstall with the cartridge gun of 100 gram grease. CRG-50 for clean room grease, CRG-51 for extra heavy grease and CRG-52 for high-temperature grease are available.

| SB-10 | SB-40 |
|---|---|
|  |  |





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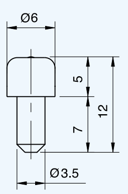
## Grease fitting and applied model

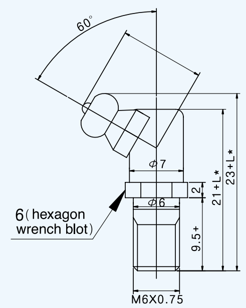
① Standard




SBG15SL, FL

L*=2(DD, ZZ)
5(KK)

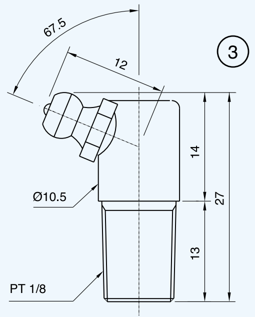
② Standard & for scraper




SBG20SL, FL
SBG25SL, FL
SBG30SL, FL
SBG35SL, FL
SBG20SLL, FLL
SBG25SLL, FLL
SBG30SLL, FLL
SBG35SLL, FLL

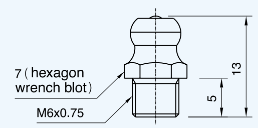
L* = 3mm(DD,ZZ, TYPE)
6mm(KK, TYPE)

③ Standard & for scraper



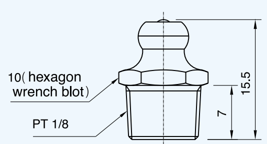

SBG45SL, FL
SBG55SL, FL
SBG65SL, FL
SBG45SLL, FLL
SBG55SLL, FLL
SBG65SLL, FLL

④ Side grease fitting



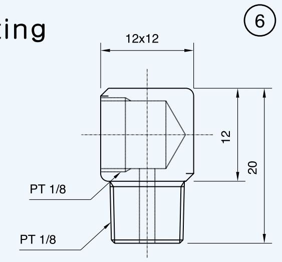

SBG20SL, FL
SBG25SL, FL
SBG30SL, FL
SBG35SL, FL
SBG20SLL, FLL
SBG25SLL, FLL
SBG30SLL, FLL
SBG35SLL, FLL

⑤ Side grease fitting



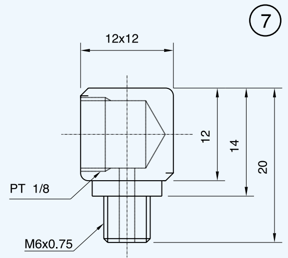

SBG45SL, FL
SBG55SL, FL
SBG65SL, FL
SBG45SLL, FLL
SBG55SLL, FLL
SBG65SLL, FLL

⑥ for joint of a copper pipe ϕ4




SBG45SL, FL
SBG55SL, FL
SBG65SL, FL
SBG45SLL, FLL
SBG55SLL, FLL
SBG65SLL, FLL

⑦ for joint of a copper pipe ϕ4




SBG20SL, FL
SBG25SL, FL
SBG30SL, FL
SBG35SL, FL
SBG20SLL, FLL
SBG25SLL, FLL
SBG30SLL, FLL
SBG35SLL, FLL

※ SBS in indentical with SBG

[figure21]

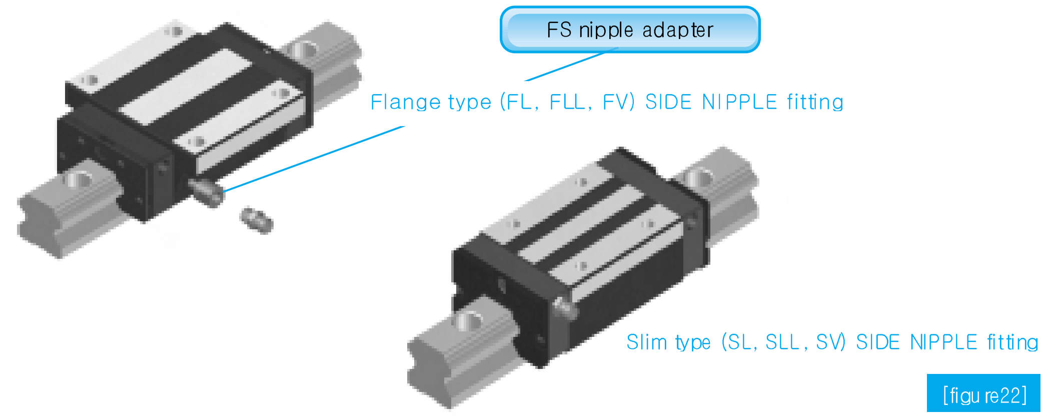
## Grease fitting

### 1. Side grease fitting

When greasing is difficult because of limited space in front of the grease nipple, the side grease fitting can be supplied.

#### Simple grease fitting installation options

- Lubrication is made easier, as grease fittings can be installed in any direction (Front, Left and Right).



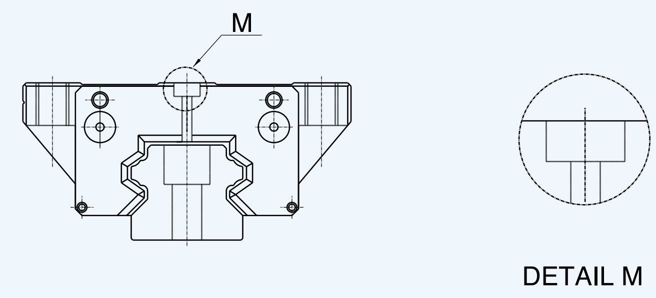

[figure22]

※ FL, FLL, FV type (15, 20, 25, 30 and 35) should have an FS nipple adapter as shown. Sizes 45, 55 and 65 do not need this FS adapter.

※ SL, SLL, SV type do not need the FS nipple adapter as shown

### 2. Upper grease fitting

SBG type can also be supplied with upper grease fitting.




[figure23]

# XI. OPTION

## RAYDENT-TREATMENT

For corrosion resistance, Raydent surface treatment is available. This treatment is suitable for corrosion resistance . the treatment can be applied to SBG, SBS and SBM types.

ANTI CORROSIVE COATING

[figure24]

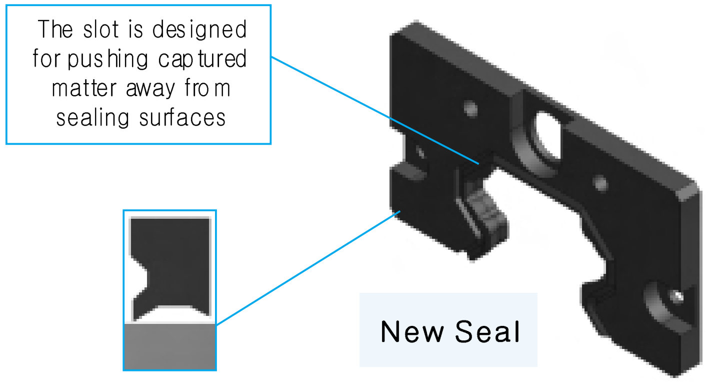
## DUST-PROTECTION

1. SEAL

End seal and side seal are standard to SBG/SBS type for dust protection.

| DUST PROTECTION SEAL | SYMBOL |
|---|---|
| SIDE SEAL + END SEAL | NO SYMBOL |
| SIDE SEAL + END SEAL + END SEAL | DD |
| SIDE SEAL + END SEAL + SCRAPER | ZZ |
| SIDE SEAL + END SEAL + END SEAL + SCRAPER | KK |

[table17]




[figure25]

Unit : mm

| Model number | No Symbol | DD | ZZ | KK |
|---|---|---|---|---|
| SBG15FL | 60.8 | 66.8 | 65.2 | 71.4 |
| SBG20FL(SL) | 77.2 | 83.6 | 82 | 88.4 |
| SBG20FLL(SLL) | 93.2 | 99.6 | 98.6 | 105 |
| SBG25FL(SL) | 86.9 | 93.3 | 92.2 | 98.6 |
| SBG25FLL(SLL) | 106.4 | 112.8 | 112.3 | 118.7 |
| SBG30FL(SL) | 102.5 | 107.1 | 104.9 | 109.5 |
| SBG30FLL(SLL) | 125 | 129.6 | 127.4 | 132 |
| SBG35FL(SL) | 112.6 | 117.2 | 115.8 | 120.4 |
| SBG35FLL(SLL) | 138.1 | 142.7 | 141.3 | 145.9 |
| SBG45FL(SL) | 140.4 | 145.1 | 142.7 | 147.3 |
| SBG45FLL(SLL) | 172.4 | 177.1 | 174.7 | 179.3 |
| SBG55FL(SL) | 164.8 | 170 | 169 | 175 |
| SBG55FLL(SLL) | 202.8 | 208 | 207 | 213 |
| SBG65FL(SL) | 195.2 | 201.2 | 198 | 204 |
| SBG65FLL(SLL) | 255.2 | 261.2 | 258 | 264 |

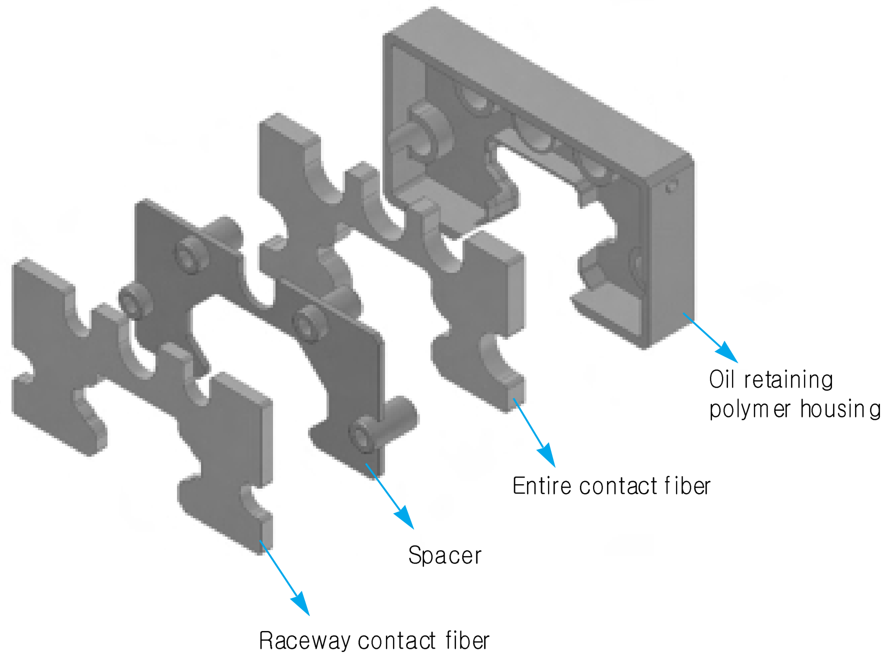
The lenght of linear block with each seal

[table18]

※ Note : SBS in identical with SBG

## 2. Self Lubricating Seal

SBC has developed a new maintenance free “Self Lubricating Seal” offering longer life for its full range of linear guides. Each compact seal kit which is fitted to the linear guide end plate is comprised of 3 elements which will guarantee total surface lubrication and long maintenance free bearing life.




### Oil Retaining Polymer Housing

The SBC " Oil Retaining Polymer Housing " is manufactured from high quality engineering polymer and has a porous sub structure which stores oil for ongoing lubrication. Its contact surfaces are tolerance matched to the guide rail to ensure perfect sealing and smooth motion. The oil soaked polymer operates both as an independent wiping seal as well as an oil retaining reservoir feeding both the raceway and full contact fiber seals contained within. The accurate tolerance matching of this polymer element to all guide rail sizes ensures minimal frictional resistance, excellent lubricant retention and longer travel life. As oil film coating of linear bearing raceways is always the most efficient method of lubrication, the new SBC "Oil Retaining Polymer Housing " is an important component of the complete SBC "Self Lubricating Seal" which now offers longer travel life and better corrosion resistance for all linear guides under standard operational parameters.

### - Contact Fiber Seals

The SBC "Self Lubricating Seal" contains 2 additional fiber elements within the "Oil Retaining Polymer Housing". The primary fiber element is formed to match and coat the raceway tracking profile with oil while the secondary fiber wipes and coats all other exposed guideway sufaces. The primary raceway fiber ensures that there is always a film barrier preventing metal to metal contact between track surface and load bearing ball elements. The second fiber provides a fine oil coating to all other exposed rail surfaces ensuring total protection and corrosion resistance for standard applications. In addition to the longer life benefits provided by the oil soaked fiber elements the major benefit of fitting the SBC "Self Lubricating Seal" is the fact that fitted bearings now become maintenance free and need only be further attended to under harsh operational conditions.

The SBC "Self Lubricating Seal" offers big benefits in a small size envelope and can be retro fitted to all standard linear guide bearings made by the SBC





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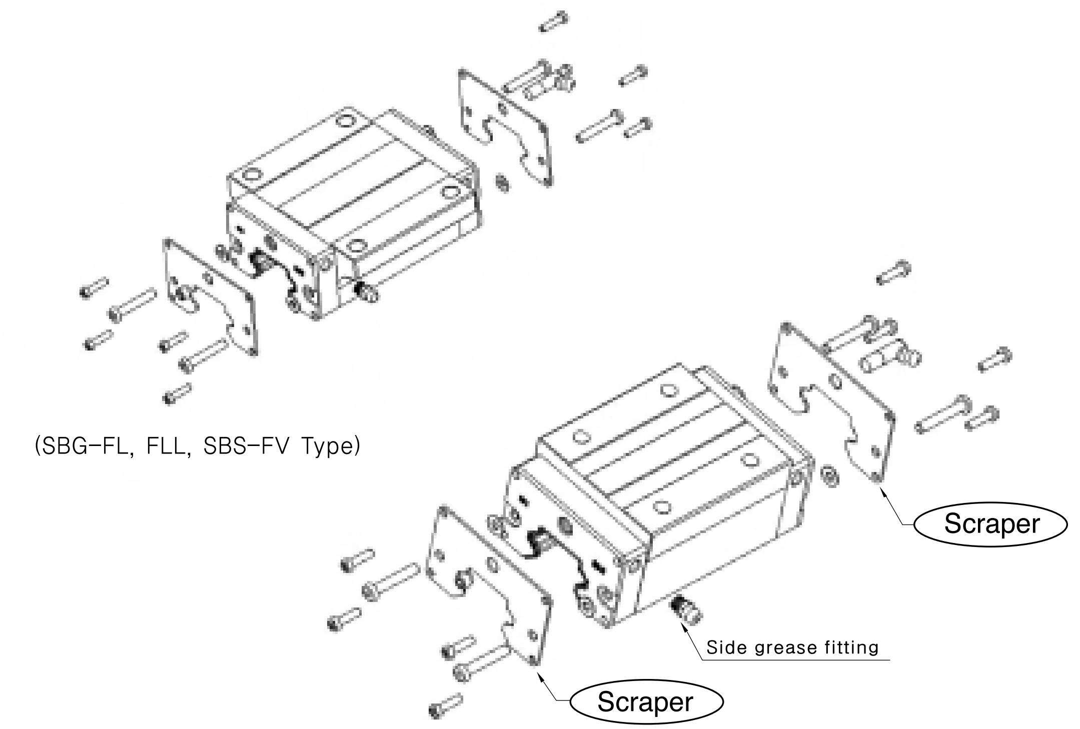
### 3. Scraper

To remove debris with high temperature the metal scraper can be supplied. When the scraper is assembled, the entire length of block will increase 5mm.



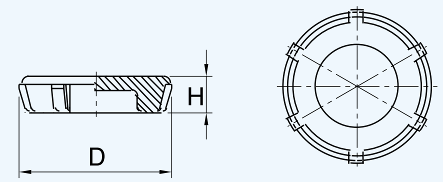

(SBG-FL, FLL, SBS-FV Type)

(SBG-SL, SLL, SBS-SL, HL, SLL, HLL, SV Type)

[figure26]

### 4. Rail mounting holes

Contaminants invade into the bolt holes of the rail and pollute the inside of the bearing. You can use hole caps made from hardened rubber to fill the holes.




[figure27]

| Cap | applied model | D | H |
|---|---|---|---|
| RC-15 | SBG/SBS15 | 7.9 | 1 |
| RC-20 | SBG/SBS20 | 10 | 2.7 |
| RC-25 | SBG/SBS25 | 11.3 | 2.6 |
| RC-30 | SBG/SBS30,35 | 14.4 | 3.4 |
| RC-45 | SBG45 | 20.4 | 4.4 |
| RC-55 | SBG55 | 23.5 | 5.5 |
| RC-65 | SBG65 | 26.5 | 5.5 |

[table19]

### Rail Plate Cover

Rail plate covers are also available and made of stainless steel. This new cover creates a better seal and stops the inclusion of contaminants that may be trapped around the rail mounting holes.

## 5. BELLOWS

For the best protection of the linear rail system, bellows should be used.

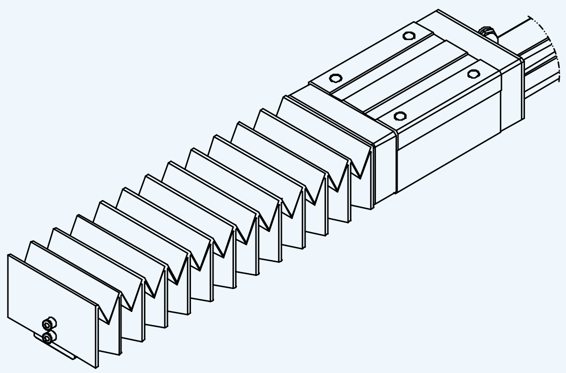
SH 25 — 70 / 420

- 420 — Extended length($L_{max}$)
- 70 — Collapsed length($L_{min}$)
- SH 25 — Model number.... Bellows for SBG 25

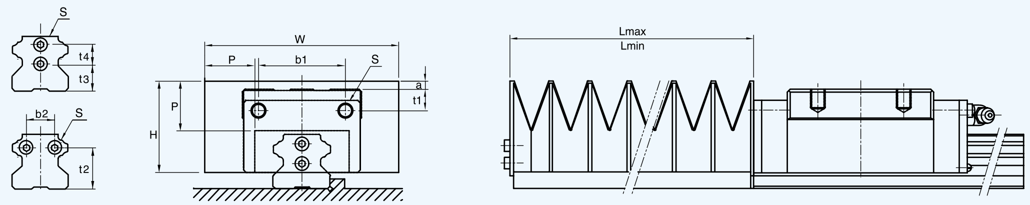
Note:The calculation of Bellows length is as below.

$$L_{min} = \frac{L_{max}}{A}$$

(A:Extended ratio) — table 21



[figure28]




[figure29]

Unit:mm

| Model number | Main Dimensions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | W | H | P | a | | | | | b1 | b2 |
| | | | | SBG | | SBS | | | | |
| | | | | FL,FLL | SL,SLL | SL,SLL,SV | FV | HL,HLL | | |
| SH 15 | 55 | 27 | 15 | 6 | 2 | 6 | 6 | – | 13 | – |
| SH 20 | 66 | 32 | 17 | 5.5 | 5.5 | 7.5 | 7.5 | – | 20 | – |
| SH 25 | 78 | 38 | 20 | 8.5 | 4.5 | 10 | 10 | 7 | 35/21 | – |
| SH 30 | 84 | 42 | 20 | 7 | 4 | 7 | – | – | 34 | – |
| SH 35 | 88 | 43 | 20 | 2.5 | – | 2.5 | – | – | 39 | 14 |
| SH 45 | 100 | 51 | 20 | – | – | – | – | – | 68 | 20 |
| SH 55 | 108 | 54 | 20 | – | – | – | – | – | 80 | 26 |
| SH 65 | 132 | 68 | 20 | – | – | – | – | – | 100 | 32 |

[table20]

Unit:mm

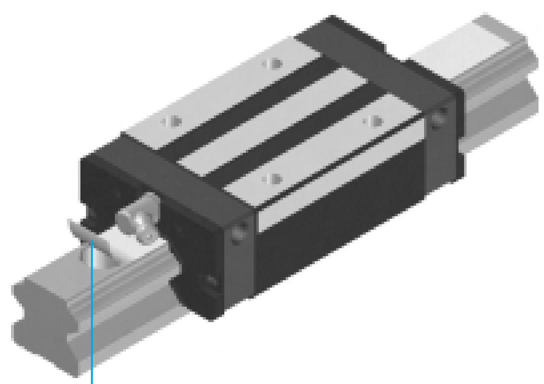
| Main Dimensions | | | | | | | | | | | Applicable type |
|---|---|---|---|---|---|---|---|---|---|---|---|
| t1 | | | | | t2 | t3 | t4 | Sx Bolt neck length | | A | |
| SBG | | SBS | | | | | | RAIL | BLOCK | | |
| FL,FLL | SL,SLL | SL,SLL,SV | FV | HL,HLL | | | | | | | |
| 4.5 | 8.5 | 4.5 | 4.5 | – | – | 10 | – | M4x8 | M2x7 | 6 | SBG 15/SBS 15 |
| 6 | 6 | 4 | 4 | – | – | 6 | 8 | M3x6 | M2x8 | 6 | SBG 20/SBS 20 |
| 4.5 | 8.5 | 4 | 4 | 7 | – | 10 | 8 | M3x6 | M3x20/M2x8 | 6 | SBG 25/SBS 25 |
| 8.5 | 11.5 | 8.5 | – | – | – | 11 | 10 | M4x8 | M3x8 | 6 | SBG 30/SBS 30 |
| 9.5 | 16.5 | 9.5 | – | – | 23 | – | – | M4x8 | M3x8 | 6 | SBG 35/SBS 35 |
| 5.5 | 15.6 | – | – | – | 29 | – | – | M5x10 | M4x12 | 6 | SBG 45 |
| 6.25 | 16.25 | – | – | – | 35 | – | – | M5x10 | M5x15 | 6 | SBG 55 |
| 8.5 | 8.5 | – | – | – | 42 | – | – | M6x12 | M6x18 | 6 | SBG 65 |

[table21]

# Ⅻ. ST dustproof tape (Stainless steel dustproof Tape)

"New" ST dustproof tape greatly improves rail face sealing and works in conjunction with guide block seals. Conventional plastic plugs do not offer the same improved sealing performance .

## "NEW" Features of ST dust proof tape



- Simple to tape the ST band onto the rail
- Remove conventional plug ( Hole cap ) problems ( plugs drop out under vibration, not as effective in dustproof )
- ST strip is made of stainless steel ( SUS304 ) for anti-corrosion.
- ST strip is resistant to holding chips or hot cutting chips.
- A special silicone adhesive is applied to ST tape, it is resistant to machining coolants or oils.
- The bonding strength of the adhesive increases as time goes by.

Ordering example

| ST | 20 | 2000L |
|---|---|---|
| Stainless dustproof tape | Linear rail model | Length |

※ All sizes are available.

### ■ Installation of ST tape

(1) After assembling a rail to the bed, clean the surface of the rail and remove any oil.
(2) Attach the ST tape slowly over the rail length to within 2 or 3 mm from each end of the rail.
(3) It is strongly recommend to wear safety gloves, the edge of this tape is sharp and can cut as you attach to a rail.
(4) After attachment to the rail, pressure wipe with dry cloth 3 or 4 times to assist fixity.
(5) Tape should be applied 4 to 6 hours prior to rail usage to allow initial bonding.

# Ⅷ. LENGTH OF LM GUIDE

## STANDARD AND MAX. LENGTH

Table show the standard and maximum length of SBC linear rail. If the maximum length exceeds this size, butt joints can be supplied. For the standard length of the rail, refer to the dimensions in the following table.


[figure30]

Unit:mm

| Model number | SBG15 SBS15 | SBG20 SBS20 | SBG25 SBS25 | SBG30 SBS30 | SBG35 SBS35 | SBG45 SBS45 | SBG55 | SBG65 |
|---|---|---|---|---|---|---|---|---|
| STANDARD LENGTH | 160 | 220 | 220 | 280 | 280 | 570 | 780 | 1,270 |
| | 220 | 280 | 280 | 440 | 440 | 885 | 900 | 1,570 |
| | 280 | 340 | 340 | 600 | 600 | 1,095 | 1,020 | 2,020 |
| | 460 | 460 | 460 | 760 | 760 | 1,200 | 1,140 | 2,470 |
| | 640 | 640 | 640 | 1,000 | 1,000 | 1,410 | 1,260 | 2,620 |
| | 820 | 820 | 820 | 1,240 | 1,240 | 1,620 | 1,380 | 2,920 |
| | 1,000 | 1,000 | 1,000 | 1,480 | 1,480 | 1,620 | 1,500 | 3,000 |
| | 1,240 | 1,240 | 1,240 | 1,640 | 1,640 | 1,830 | 1,620 | |
| | 1,480 | 1,480 | 1,480 | 1,800 | 1,800 | 2,040 | 1,740 | |
| | 1,600 | 1,600 | 1,600 | 2,040 | 2,040 | 2,250 | 1,860 | |
| | 2,200 | 1,840 | 1,840 | 2,200 | 2,200 | 2,460 | 1,980 | |
| | | 2,080 | 2,080 | 2,520 | 2,520 | 3,000 | 2,220 | |
| | | 2,200 | 2,200 | 3,000 | 2,840 | | 2,580 | |
| | | 3,000 | 3,000 | | 3,000 | | 3,000 | |
| F | 60 | 60 | 60 | 80 | 80 | 105 | 120 | 150 |
| G | 20 | 20 | 20 | 20 | 20 | 22.5 | 30 | 35 |
| Max. Length | 3,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 |

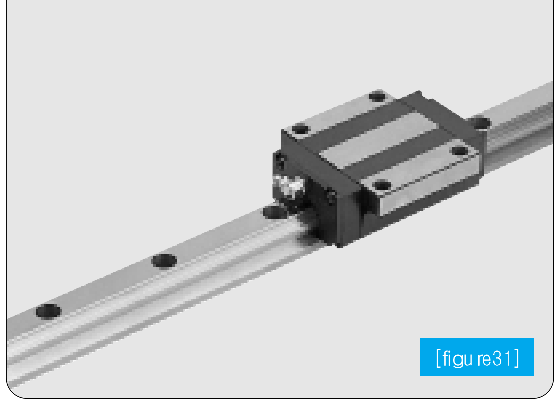
[table22]

# Linear Rail System

## LINEAR BLOCK

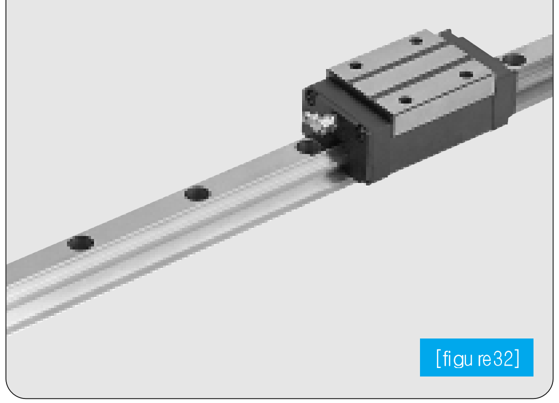
Linear blocks are available in flange and slim type without flange. Linear blocks are available in high load capacity with standard block length and ultra high load with longer block length.

FLANGE TYPE



[figure31]

SLIM TYPE



[figure32]

※ NOTE : If temperature is over 80 celsius, please contact our sales department.
(Aluminum end-plate can be replaced for this temperature)

## SEAL RESISTANCE

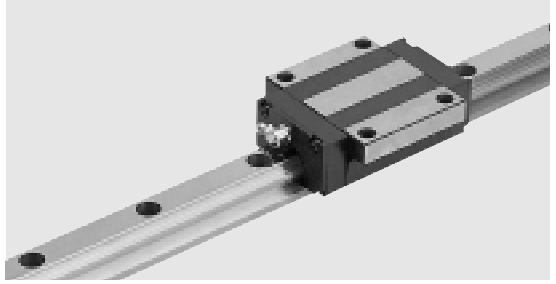
The maximum resistance to motion of SBC seals is shown in table 23.

Unit:N

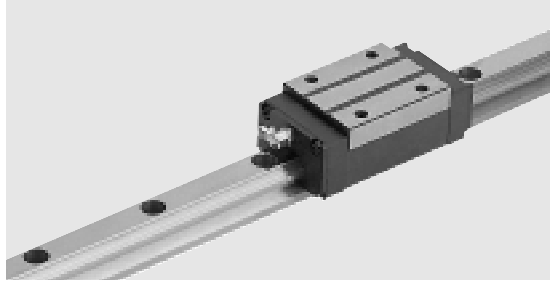
| Model | SBG15 | SBG20 | SBG25 | SBG30 | SBG35 | SBG45 | SBG55 | SBG65 |
|---|---|---|---|---|---|---|---|---|
| Seal resistance | 1.96 | 2,548 | 3.92 | 7.84 | 11.76 | 19.6 | 19.6 | 34.3 |

SBG(SBS) SEAL RESISTANCE [table23]

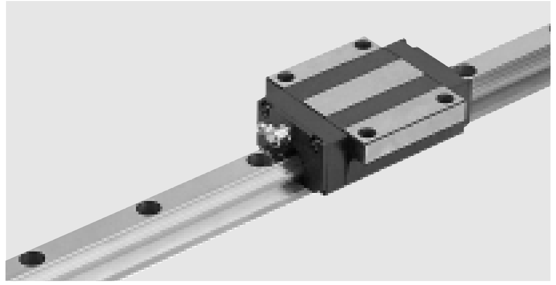
SBG - FL



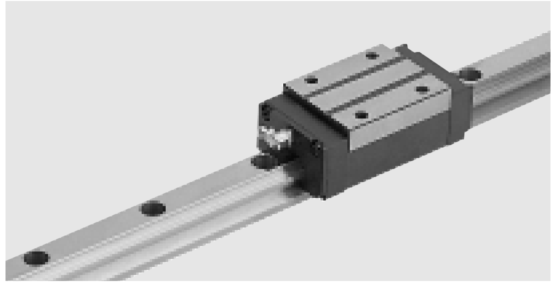
SBG - SL



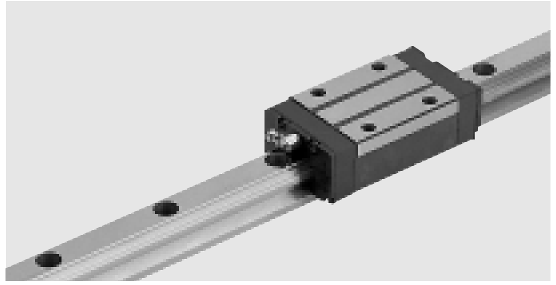
SBG - FLL



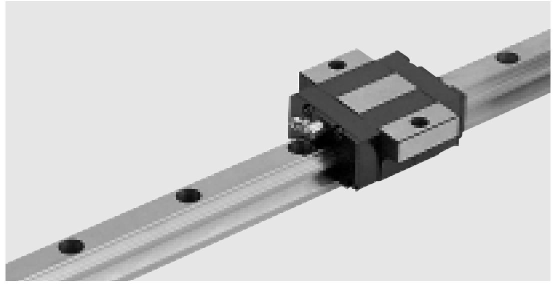
SBG - SLL



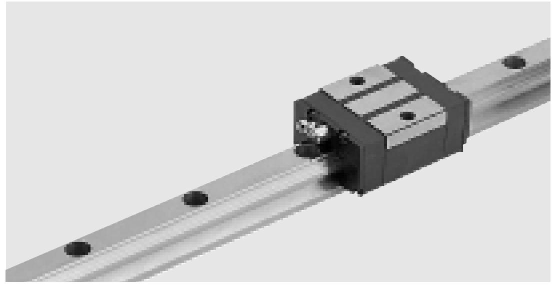
SBS - SL



SBS - FV



SBS - SV

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A

## ORDERING EXAMPLE

SBG - 25 - FL - N - R - ZZ - 2 - K1 - 1000 - R - B - N - II

**Model**
SBG,SBS

**Block size:**
15
20
25
30
35
45
55
65

**Block type**
FL – Flange type
FLL – Flange type Long
SL – Slim type
SLL – Slim type Long
FV – Flange compact type
SV – Slim compact type

**Grease fitting position**
No symbol : Front grease fitting
N :Side grease fitting

**Block raydent**
No symbol : Standard
R : Raydent

**Seal**
No symbol : End seal
DD : End seal + End seal
ZZ : End seal + Scraper
KK : End seal + Scraper + End seal + Scraper

※ Side seal is basically assembled.
But, No side seal available for block size 15

**Block quantity on rail**
1,2,3,4

**Preload**
k1 : Normal preload
k2 : Light preload
k3 : Heavy preload

**Rail length**

**Rail raydent**
No symbol : Standard
R : Raydent

**Bottom mounting rail**
No symbol : Standard
B : Bottom mounting rail

**Accuracy**
N : Normal
H : High
P : Precision

**Rail**
No symbol : 1 Row
II : 2 Row
III : 3 Row
IV : 4 Row

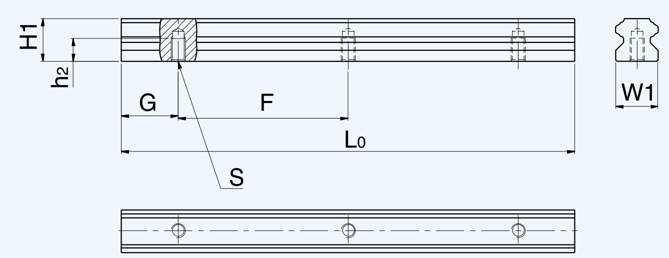
## BOTTOM MOUNTING RAIL

### 1. Reduces assembly time

Bottom rail mounting reduces assembly time as it does not need hole plugs.

### 2. Protect block from contaminants

Contamination to the bearing is reduced by eliminating the holes holding contaminants.



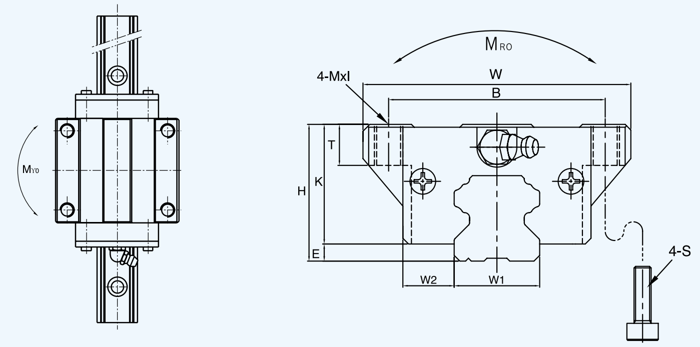

[figure33]

Dimension:mm

| Reference | Width W1 | Height H1 | h2 | G | S | Pitch F | Max. length of rail Lomx | Weight kg/m |
|---|---|---|---|---|---|---|---|---|
| 15 | 15 | 15 | 8 | 20 | M5×0.8 | 60 | 3000 | 1.53 |
| 20 | 20 | 17.5 | 10 | 20 | M6 | 60 | 4000 | 2.28 |
| 25 | 23 | 21.8 | 12 | 20 | M6 | 60 | 4000 | 3.21 |
| 30 | 28 | 25 | 15 | 20 | M8 | 80 | 4000 | 4.58 |
| 35 | 34 | 29 | 17 | 20 | M8 | 80 | 4000 | 6.62 |
| 45 | 45 | 38 | 24 | 22.5 | M12 | 105 | 4000 | 11.43 |

1KN= 102kg • f

## SBG - FL / FLL

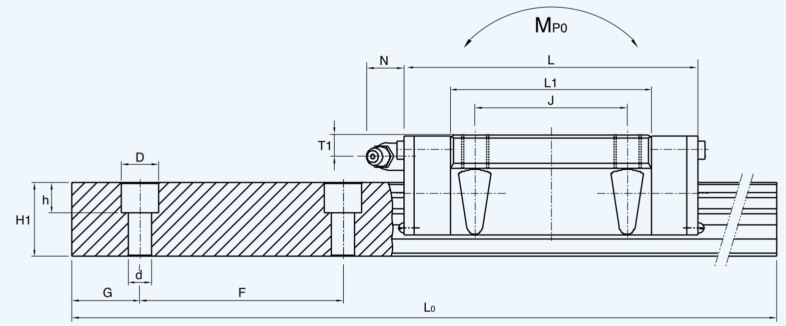



Dimension:mm

| Reference | Mounting Dimension | | | | | Block Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | Width W | Length L | Mounting tap hole B x J | M | S | $L_1$ | K | T | Nipple Mounting | $T_1$ | N |
| SBG15 FL | 24 | 3 | 16 | 47 | 60.8 | 38×30 | M5 | M4 | 38.8 | 21 | 7.2 | Ø3.5 | 4 | 5 |
| SBG20 FL | 30 | 3.5 | 21.5 | 63 | 77.2 | 53×40 | M6 | M5 | 50.8 | 26.5 | 9 | M6×0.75 | 7 | 9.8 |
| SBG20 FLL | 30 | 3.5 | 21.5 | 63 | 93.2 | 53×40 | M6 | M5 | 66.8 | 26.5 | 9 | M6×0.75 | 7 | 9.8 |
| SBG25 FL | 36 | 6.5 | 23.5 | 70 | 86.9 | 57×45 | M8 | M6 | 59.5 | 29.5 | 10 | M6×0.75 | 6.5 | 9.8 |
| SBG25 FLL | 36 | 6.5 | 23.5 | 70 | 106.4 | 57×45 | M8 | M6 | 79 | 29.5 | 10 | M6×0.75 | 6.5 | 9.8 |
| SBG30 FL | 42 | 7 | 31 | 90 | 102.5 | 72×52 | M10 | M8 | 70.4 | 35 | 12 | M6×0.75 | 8.5 | 10.7 |
| SBG30 FLL | 42 | 7 | 31 | 90 | 125 | 72×52 | M10 | M8 | 92.9 | 35 | 12 | M6×0.75 | 8.5 | 10.7 |
| SBG35 FL | 48 | 7.5 | 33 | 100 | 112.6 | 82×62 | M10 | M8 | 80.4 | 40.5 | 13 | M6×0.75 | 9.5 | 10.7 |
| SBG35 FLL | 48 | 7.5 | 33 | 100 | 138.1 | 82×62 | M10 | M8 | 105.9 | 40.5 | 13 | M6×0.75 | 9.5 | 10.7 |
| SBG45 FL | 60 | 10 | 37.5 | 120 | 140.4 | 100×80 | M12 | M10 | 98 | 50 | 15 | PT 1/8 | 10.5 | 11 |
| SBG45 FLL | 60 | 10 | 37.5 | 120 | 172.4 | 100×80 | M12 | M10 | 130 | 50 | 15 | PT 1/8 | 10.5 | 11 |
| SBG55 FL | 70 | 13 | 43.5 | 140 | 164.8 | 116×95 | M14 | M12 | 118 | 57 | 17 | PT 1/8 | 12 | 11 |
| SBG55 FLL | 70 | 13 | 43.5 | 140 | 202.8 | 116×95 | M14 | M12 | 156 | 57 | 17 | PT 1/8 | 12 | 11 |
| SBG65 FL | 90 | 17.5 | 53.5 | 170 | 195.2 | 142×110 | M16 | M14 | 147 | 72.5 | 23 | PT 1/8 | 15 | 11 |
| SBG65 FLL | 90 | 17.5 | 53.5 | 170 | 255.2 | 142×110 | M16 | M14 | 207 | 72.5 | 23 | PT 1/8 | 15 | 11 |



## SBG - FL / FLL

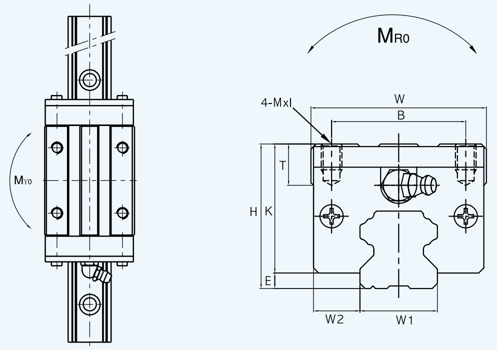



Dimension:mm

| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail $L_{0MAX}$ | Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment(kgf·m) $M_{R0}$ | $M_{P0}$ | $M_{Y0}$ | Bearing (kg) | Rail (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 8,330 | 13,426 | 7 | 5 | 5 | 0.18 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 14,210 | 25,088 | 22 | 18 | 18 | 0.42 | 2.20 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 16,905 | 36,554 | 29 | 32 | 32 | 0.54 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 20,972 | 39,200 | 36 | 32 | 31 | 0.62 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 24,667 | 48,069 | 44 | 50 | 49 | 0.78 | 3.10 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 29,204 | 53,802 | 60 | 50 | 49 | 1.10 | 4.45 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 35,300 | 67,904 | 75 | 81 | 80 | 1.44 | 4.45 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 38,808 | 68,698 | 96 | 75 | 73 | 1.57 | 6.40 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 46,070 | 90,405 | 126 | 133 | 131 | 2.14 | 6.40 |
| 45 | 38 | 105 | 14×20×17 | 22.5 | 4000 | 61,642 | 110,662 | 202 | 159 | 157 | 2.96 | 11.25 |
| 45 | 38 | 105 | 14×20×17 | 22.5 | 4000 | 75,597 | 138,552 | 250 | 238 | 235 | 3.75 | 11.25 |
| 53 | 45 | 120 | 16×23×20 | 30 | 4000 | 91,209 | 156,918 | 344 | 274 | 270 | 4.49 | 15.25 |
| 53 | 45 | 120 | 16×23×20 | 30 | 4000 | 111,847 | 196,666 | 427 | 413 | 405 | 5.68 | 15.25 |
| 63 | 58.5 | 150 | 18×26×22 | 35 | 4000 | 147,980 | 240,100 | 629 | 495 | 484 | 8.70 | 23.90 |
| 63 | 58.5 | 150 | 18×26×22 | 35 | 4000 | 189,140 | 320,460 | 834 | 850 | 830 | 9.5 | 23.90 |

1KN= 102kgf

## SBG - SL / SLL

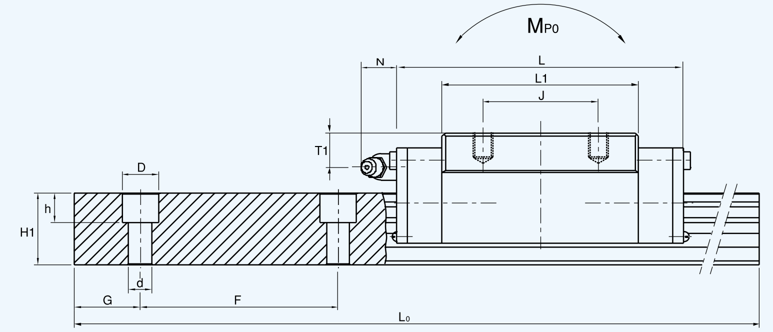



Dimension:mm

| Reference | Mounting Dimension | | | | | Block Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | Width W | Length L | Mounting tap hole B x J | Mounting tap hole M x *l* | $L_1$ | K | T | Nipple Mounting | Nipple $T_1$ | Nipple N |
| SBG 15 SL | 28 | 3 | 9.5 | 34 | 60.8 | 26×26 | M4×5 | 38.8 | 25 | 8 | Ø 3.5 | 8 | 5 |
| SBG 20 SL | 30 | 3.5 | 12 | 44 | 77.2 | 32×36 | M5×8 | 50.8 | 26.5 | 8 | M6×0.75 | 7 | 9.8 |
| SBG 20 SLL | 30 | 3.5 | 12 | 44 | 93.2 | 32×50 | M5×8 | 66 .8 | 26.5 | 8 | M6×0.75 | 7 | 9.8 |
| SBG 25 SL | 40 | 6.5 | 12.5 | 48 | 86.9 | 35×35 | M6×8 | 59.5 | 33.5 | 12 | M6×0.75 | 10.5 | 9.8 |
| SBG 25 SLL | 40 | 6.5 | 12.5 | 48 | 106.4 | 35×50 | M6×8 | 79 | 33.5 | 12 | M6×0.75 | 10.5 | 9.8 |
| SBG 30 SL | 45 | 7 | 16 | 60 | 102.5 | 40×40 | M8×10 | 70.4 | 38 | 12 | M6×0.75 | 11.5 | 10.7 |
| SBG 30 SLL | 45 | 7 | 16 | 60 | 125 | 40×60 | M8×10 | 92.9 | 38 | 12 | M6×0.75 | 11.5 | 10.7 |
| SBG 35 SL | 55 | 7.5 | 18 | 70 | 112.6 | 50×50 | M8×12 | 80.4 | 47.5 | 15 | M6×0.75 | 16.5 | 10.7 |
| SBG 35 SLL | 55 | 7.5 | 18 | 70 | 138.1 | 50×72 | M8×12 | 105.9 | 47.5 | 15 | M6×0.75 | 16.5 | 10.7 |
| SBG 45 SL | 70 | 10 | 20.5 | 86 | 140.4 | 60×60 | M10×17 | 98 | 60 | 15 | PT 1/8 | 20.5 | 11 |
| SBG 45 SLL | 70 | 10 | 20.5 | 86 | 172.4 | 60×80 | M10×17 | 130 | 60 | 15 | PT 1/8 | 20.5 | 11 |
| SBG 55 SL | 80 | 13 | 23.5 | 100 | 164.8 | 75×75 | M12×18 | 118 | 67 | 18 | PT 1/8 | 22 | 11 |
| SBG 55 SLL | 80 | 13 | 23.5 | 100 | 202.8 | 75×95 | M12×18 | 156 | 67 | 18 | PT 1/8 | 22 | 11 |
| SBG 65 SL | 90 | 17.5 | 31.5 | 126 | 195.2 | 76×70 | M16×20 | 147 | 72.5 | 23 | PT 1/8 | 15 | 11 |
| SBG 65 SLL | 90 | 17.5 | 31.5 | 126 | 255.2 | 76×120 | M16×20 | 207 | 72.5 | 23 | PT 1/8 | 15 | 11 |



## SBG - SL / SLL




Dimension:mm

| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail $L_{DMAX}$ | Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment(kgf·m) $M_{R0}$ | $M_{P0}$ | $M_{Y0}$ | Bearing (kg) | Rail (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 8,330 | 13,426 | 7 | 5 | 5 | 0.2 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 14,210 | 25,088 | 22 | 18 | 18 | 0.33 | 2.20 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 16,905 | 36,554 | 29 | 32 | 32 | 0.45 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 20,972 | 39,200 | 36 | 32 | 31 | 0.56 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 24,667 | 48,069 | 44 | 50 | 49 | 0.73 | 3.10 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 29,204 | 53,802 | 60 | 50 | 49 | 0.98 | 4.45 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 35,300 | 67,904 | 75 | 81 | 80 | 1.28 | 4.45 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 38,808 | 68,698 | 96 | 75 | 73 | 1.63 | 6.40 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 46,070 | 90,405 | 126 | 133 | 131 | 2.12 | 6.40 |
| 45 | 38 | 105 | 14×20×17 | 22.5 | 4000 | 61,642 | 110,662 | 202 | 159 | 157 | 2.96 | 11.25 |
| 45 | 38 | 105 | 14×20×17 | 22.5 | 4000 | 75,597 | 138,552 | 250 | 238 | 235 | 3.75 | 11.25 |
| 53 | 45 | 120 | 16×23×20 | 30 | 4000 | 91,209 | 156,918 | 344 | 274 | 270 | 4.52 | 15.25 |
| 53 | 45 | 120 | 16×23×20 | 30 | 4000 | 111,847 | 196,666 | 427 | 413 | 405 | 5.68 | 15.25 |
| 63 | 58.5 | 150 | 18×26×22 | 35 | 4000 | 147,980 | 240,100 | 629 | 495 | 484 | 7.43 | 23.90 |
| 63 | 58.5 | 150 | 18×26×22 | 35 | 4000 | 189,140 | 320,460 | 834 | 850 | 830 | 12.05 | 23.90 |

1KN= 102kgf



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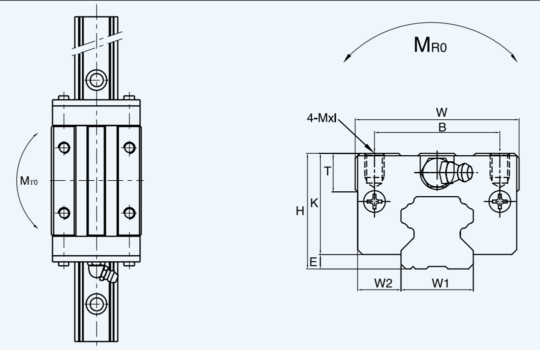
## SBS - SL / SLL

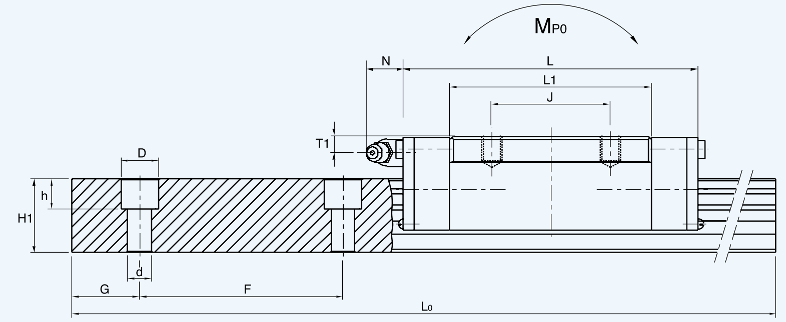



Dimension:mm

| Reference | Mounting Dimension Height H | E | W2 | Width W | Length L | Block Dimensions Mounting tap hole B x J | Mounting tap hole M x l | $L_1$ | K | T | Nipple Mounting | $T_1$ | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SBS 15 SL | 24 | 3 | 9.5 | 34 | 60.8 | 26×26 | M4×5 | 38.8 | 21 | 6 | Ø 3.5 | 4 | 5 |
| SBS 20 SL | 28 | 3.5 | 12 | 44 | 77.2 | 32×32 | M5×7 | 50.8 | 24.5 | 7.5 | M6×0.75 | 5 | 9.8 |
| SBS 20 SLL | 28 | 3.5 | 12 | 44 | 93.2 | 32×50 | M5×7 | 66 .8 | 24.5 | 7.5 | M6×0.75 | 5 | 9.8 |
| SBS 25 SL | 33 | 6.5 | 12.5 | 48 | 86.9 | 35×35 | M6×6 | 59.5 | 26.5 | 8 | M6×0.75 | 5.2 | 9.8 |
| SBS 25 SLL | 33 | 6.5 | 12.5 | 48 | 106.4 | 35×50 | M6×6 | 79 | 26.5 | 8 | M6×0.75 | 5.2 | 9.8 |
| SBS 25 HL | 36 | 6.5 | 12.5 | 48 | 86.9 | 35×35 | M6×8 | 59.5 | 29.5 | 11 | M6×0.75 | 8.2 | 9.8 |
| SBS 25 HLL | 36 | 6.5 | 12.5 | 48 | 106.4 | 35×50 | M6×8 | 79 | 29.5 | 11 | M6×0.75 | 8.2 | 9.8 |
| SBS 30 SL | 42 | 7 | 16 | 60 | 102.5 | 40×40 | M8×10 | 70.4 | 35 | 12 | M6×0.75 | 8.5 | 10.7 |
| SBS 30 SLL | 42 | 7 | 16 | 60 | 125 | 40×60 | M8×10 | 92.9 | 35 | 12 | M6×0.75 | 8.5 | 10.7 |
| SBS 35 SL | 48 | 7.5 | 18 | 70 | 112.6 | 50×50 | M8×12 | 80.4 | 40.5 | 15 | M6×0.75 | 9.5 | 10.7 |
| SBS 35 SLL | 48 | 7.5 | 18 | 70 | 138.1 | 50×72 | M8×12 | 105.9 | 40.5 | 15 | M6×0.75 | 9.5 | 10.7 |
| SBS 45 SL | 60 | 10 | 20.5 | 86 | 140.4 | 60×60 | M10×10 | 98 | 49.3 | 15 | PT 1/8 | 20.5 | 11 |
| SBS 45 SLL | 60 | 10 | 20.5 | 86 | 172.4 | 60×80 | M10×10 | 130 | 49.3 | 15 | PT 1/8 | 20.5 | 11 |



## SBS - SL / SLL

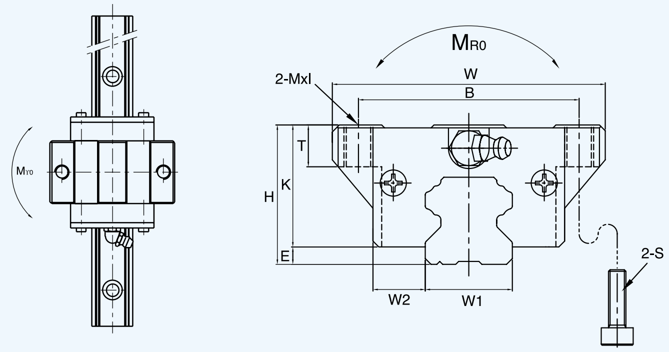



Dimension:mm

| Rail Size Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail $L_{0MAX}$ | Load capacity Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment(kgf·m) $M_{R0}$ | $M_{P0}$ | $M_{Y0}$ | Weight Bearing (kg) | Rail (kg/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 8,330 | 13,426 | 7 | 5 | 5 | 0.2 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 14,210 | 25,088 | 22 | 18 | 18 | 0.33 | 2.20 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 16,905 | 36,554 | 29 | 32 | 32 | 0.45 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 20,972 | 39,200 | 36 | 32 | 31 | 0.56 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 24,667 | 48,069 | 44 | 50 | 49 | 0.73 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 20,972 | 39,200 | 36 | 32 | 31 | 0.56 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 24,667 | 48,069 | 44 | 50 | 49 | 0.73 | 3.10 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 29,204 | 53,802 | 60 | 50 | 49 | 0.98 | 4.45 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 35,300 | 67,904 | 75 | 81 | 80 | 1.28 | 4.45 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 38,808 | 68,698 | 96 | 75 | 73 | 1.63 | 6.40 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 46,070 | 90,405 | 126 | 133 | 131 | 2.12 | 6.40 |
| 45 | 38 | 105 | 14×20×17 | 22.5 | 4000 | 61,642 | 110,662 | 202 | 159 | 157 | 2.96 | 11.25 |
| 45 | 38 | 105 | 14×20×17 | 22.5 | 4000 | 75,597 | 138,552 | 250 | 238 | 235 | 3.75 | 11.25 |

1KN= 102kgf

## SBS - FV

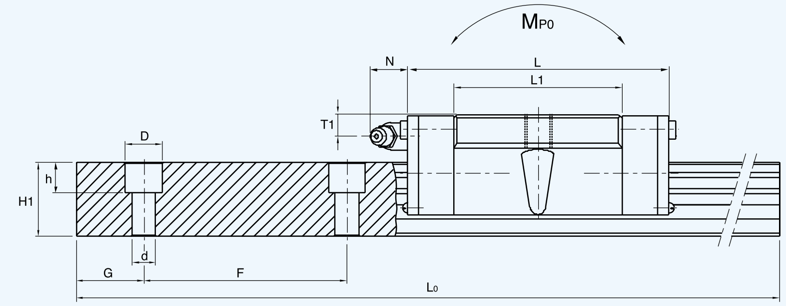



Dimension:mm

| Reference | Mounting Dimension | | | | | Block Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height | E | W2 | Width | Length | Mounting tap hole | | | $L_1$ | K | T | Nipple | | |
| | H | | | W | L | B | M | S | | | | Mounting | $T_1$ | N |
| SBS 15 FV | 24 | 3 | 16 | 47 | 44.9 | 38 | M5 | M4 | 22.9 | 21 | 7.2 | Ø3.5 | 4 | 5 |
| SBS 20 FV | 28 | 3.5 | 21.5 | 63 | 54.2 | 53 | M6 | M5 | 27.8 | 24.5 | 7 | M6×0.75 | 5 | 9.8 |
| SBS 25 FV | 33 | 6.5 | 23.5 | 70 | 62.6 | 57 | M8 | M6 | 35.2 | 26.5 | 7 | M6×0.75 | 5.2 | 9.8 |



## SBS - FV

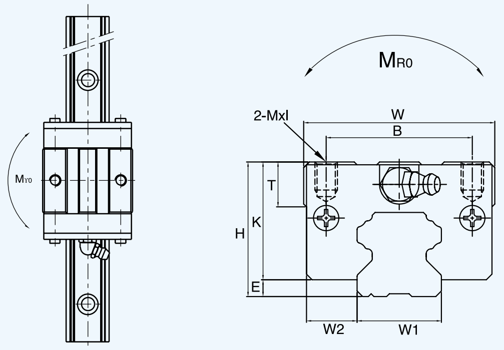



Dimension:mm

| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width | Height | Pitch | Bolt Hole | G | Max. length of rail | Dynamic | Stationary | Stationary Moment(kgf·m) | | | Bearing | Rail |
| W1 | H1 | F | dxDxh | | $L_{0MAX}$ | C(N) | $C_0$(N) | $M_{R0}$ | $M_{P0}$ | $M_{Y0}$ | (kg) | (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 4,488 | 7,232 | 4 | 3 | 3 | 0.10 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 7,654 | 13,504 | 12 | 10 | 10 | 0.24 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 11,290 | 21,109 | 19 | 17 | 17 | 0.37 | 3.10 |

1KN= 102kgf

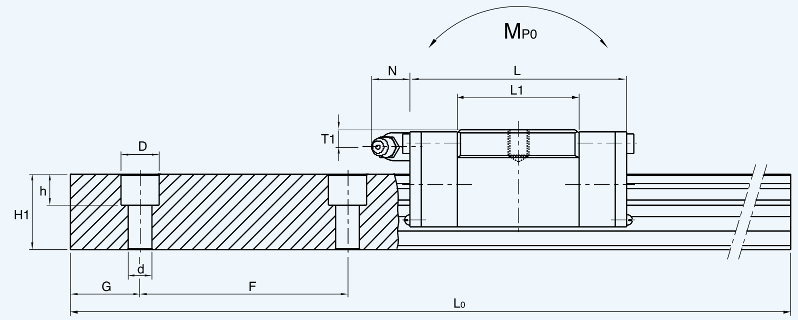
## SBS - SV




Dimension:mm

| Reference | Mounting Dimension | | | | | Block Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | Width W | Length L | Mounting tap hole B | Mounting tap hole M x *l* | $L_1$ | K | T | Nipple Mounting | Nipple $T_1$ | Nipple N |
| SBS 15 SV | 24 | 3 | 9.5 | 34 | 44.9 | 26 | M4×5 | 22.9 | 21 | 6 | Ø3.5 | 4 | 5 |
| SBS 20 SV | 28 | 3.5 | 12 | 44 | 54.2 | 32 | M5×7 | 27.8 | 24.5 | 7.5 | M6×0.75 | 5 | 9.8 |
| SBS 25 SV | 33 | 6.5 | 12.5 | 48 | 62.6 | 35 | M6×8 | 35.2 | 26.5 | 8 | M6×0.75 | 5.2 | 9.8 |

## SBS - SV




Dimension:mm

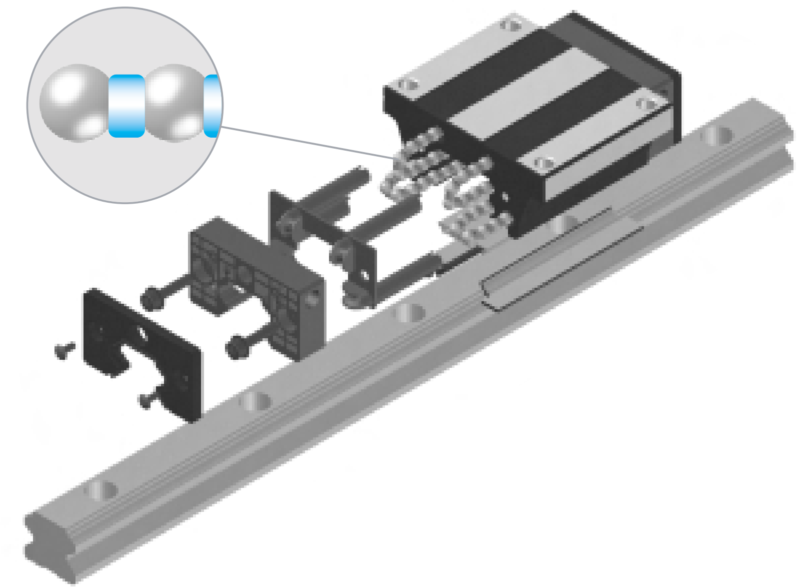
| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail $L_{0MAX}$ | Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment(kgf・m) $M_{R0}$ | Stationary Moment(kgf・m) $M_{P0}$ | Stationary Moment(kgf・m) $M_{Y0}$ | Bearing (kg) | Rail (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 4,488 | 7,232 | 4 | 3 | 3 | 0.10 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 7,654 | 13,504 | 12 | 10 | 10 | 0.19 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 11,290 | 21,109 | 19 | 17 | 17 | 0.32 | 3.10 |

1KN= 102kgf

# SPACER SERIES (Low noise) : SPG AND SPS TYPE

## Design features of the "NEW" SPG series

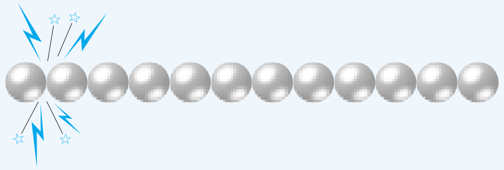
- Lowest operational noise levels
- Optimum grease retention within the guide block
- Longer lifespan
- Ball Spacer designed to last the life of the bearing
- Ball Spacers control steel ball tracking within the recirculation paths providing smooth running and improved life performance

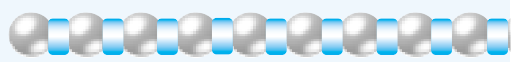


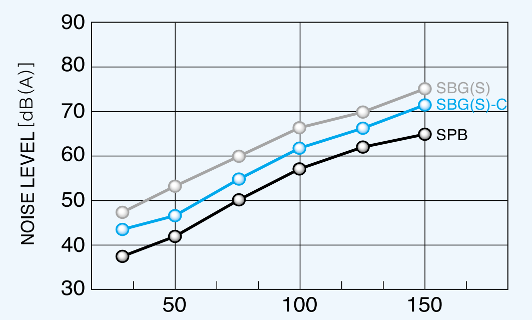
◉ The "NEW" Spacer series consists of two types, SPG and SPS and is currently manufactured in three (3) sizes 15, 20 and 25.
The "NEW" spacer series blocks are dimensionally interchangeable with standard and "C" types.
All blocks can be mounted on the standard rail used for original SBG and SBS series blocks "NEW" SBG (S) series and "NEW" SPACER series (SPG / SPS) use standard rail.

| | | |
|---|---|---|
| SBG FL, FLL, SL, SLL | ← interchangeable → | SPG FL, FLL, SL, SLL |
| SBS SL, SLL, HL, HLL, FV, SV | ← interchangeable → | SPS SL, SLL, HL, HLL, FV, SV |

| CONVENTIONAL TYPE | SPG TYPE |
|---|---|
| Noise from uncontrolled ball contact | Noise level decreased by spacers |





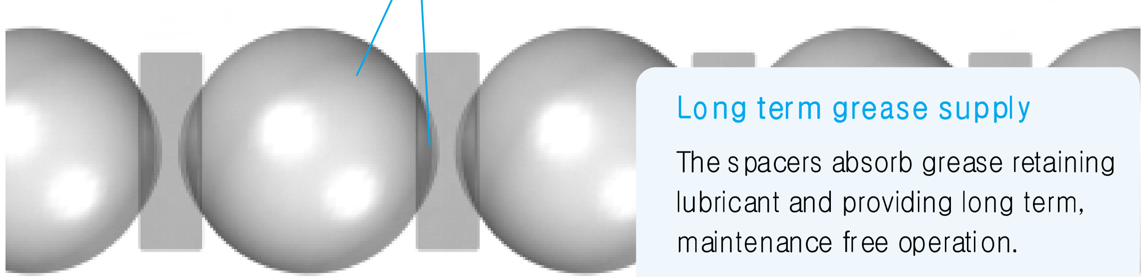



※Above value can be changed depends on working condition.

## Low noise, Longer lifespan

The spacers apply even face pressure between steel balls and minimize the noise level by eliminating metal to metal contact.
The lower noise effect is optimized at speeds above 1500 mm / sec as well as in quiet zone applications.

grease retained and applied here



## Long term grease supply

The spacers absorb grease retaining lubricant and providing long term, maintenance free operation.

## SPG series (Low noise type) ordering example

SPG20 FL N R ZZ 2 K1 1000 R B N II

**MODEL & BLOCK SIZE** (SPG20)
SPG15, 20, 25,30,35
SPS15, 20, 25,30,35

**BLOCK TYPE** (FL)
FL–Flange type
FLL–Flange type Long
SL–Slim type
SLL–Slim type LONG
FV–Flange compact type
SV–Slim compact type

**GREASE FITTING POSITION** (N)
No symbol : Front grease fitting
N : Side grease fitting

**BLOCK RAYDENT** (R)
No symbol : Standard
R : Raydent

**SEAL** (ZZ)
No symbol: Standard (end seal)
DD: End seal + End seal
ZZ : End seal + Scraper
KK: End seal + End seal + Scraper
*Side seal is basically assembled.
But, No side seal available for block size 15.

**BLOCK QUANTITY ON A RAIL** (2)
1, 2, 3, 4, 5, ....

**PRELOAD** (K1)
K0: no preload (clearance type)
K1: normal
K2: light preload
K3: heavy preload

**RAIL LENGTH** (1000)

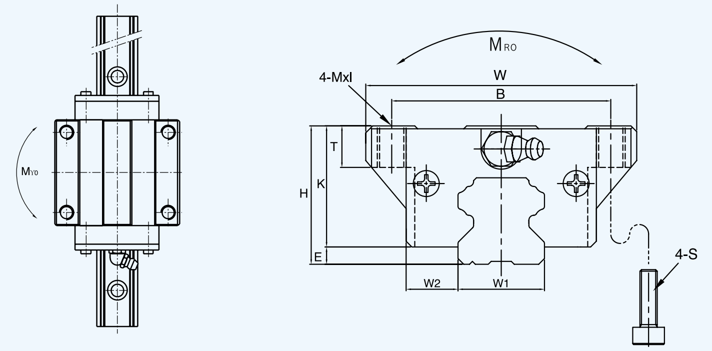
**RAIL RAYDENT** (R)
No symbol : Standard
R : Raydent

**BOTTOM MOUNTING RAIL** (B)
No symbol : Standard
B : Bottom mounting rail

**ACCURACY** (N)
N : Normal
H : High
P : Precision

**RAIL** (II)
No symbol : 1 row
II : 2 row
III : 3 row
IV : 4 row

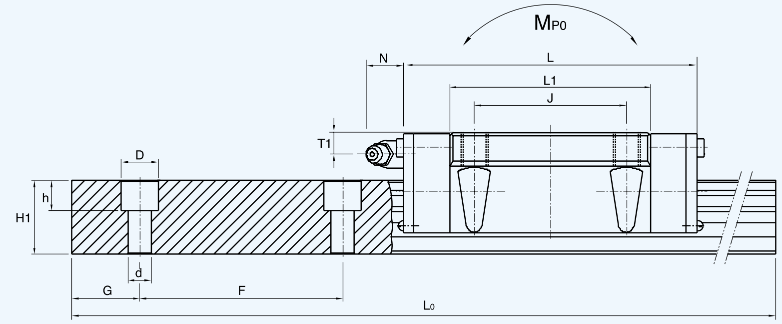
## SPG - FL / FLL




Dimension:mm

| Reference | Mounting Dimension | | | Block Dimensions | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | Width W | Length L | Mounting tap hole B x J | M | S | $L_1$ | K | T | Nipple Mounting | $T_1$ | N |
| SPG15 FL | 24 | 3 | 16 | 47 | 60.8 | 38×30 | M5 | M4 | 38.8 | 21 | 7.2 | Ø3.5 | 4 | 5 |
| SPG20 FL | 30 | 3.5 | 21.5 | 63 | 77.2 | 53×40 | M6 | M5 | 50.8 | 26.5 | 9 | M6×0.75 | 7 | 9.8 |
| SPG20 FLL | 30 | 3.5 | 21.5 | 63 | 93.2 | 53×40 | M6 | M5 | 66.8 | 26.5 | 9 | M6×0.75 | 7 | 9.8 |
| SPG25 FL | 36 | 6.5 | 23.5 | 70 | 86.9 | 57×45 | M8 | M6 | 59.5 | 29.5 | 10 | M6×0.75 | 6.5 | 9.8 |
| SPG25 FLL | 36 | 6.5 | 23.5 | 70 | 106.4 | 57×45 | M8 | M6 | 79 | 29.5 | 10 | M6×0.75 | 6.5 | 9.8 |
| SPG30 FL | 42 | 7 | 31 | 90 | 102.5 | 72×52 | M10 | M8 | 70.4 | 35 | 12 | M6×0.75 | 8.5 | 10.7 |
| SPG30 FLL | 42 | 7 | 31 | 90 | 125 | 72×52 | M10 | M8 | 92.9 | 35 | 12 | M6×0.75 | 8.5 | 10.7 |
| SPG35 FL | 48 | 7.5 | 33 | 100 | 112.6 | 82×62 | M10 | M8 | 80.4 | 40.5 | 13 | M6×0.75 | 9.5 | 10.7 |
| SPG35 FLL | 48 | 7.5 | 33 | 100 | 138.1 | 82×62 | M10 | M8 | 105.9 | 40.5 | 13 | M6×0.75 | 9.5 | 10.7 |

## SPG - FL / FLL

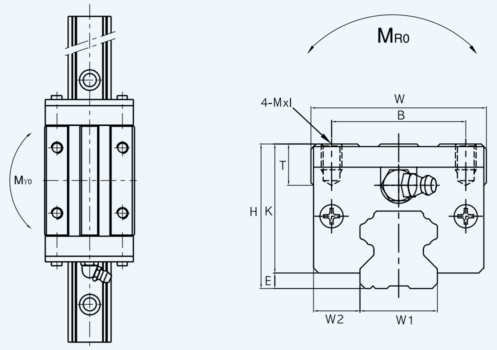



Dimension:mm

| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail $L_{0MAX}$ | Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment (kgf·m) $M_{R0}$ | $M_{P0}$ | $M_{Y0}$ | Bearing (kg) | Rail (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 8,330 | 13,426 | 7 | 5 | 5 | 0.18 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 14,210 | 25,088 | 22 | 18 | 18 | 0.42 | 2.20 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 16,905 | 36,554 | 29 | 32 | 32 | 0.54 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 20,972 | 39,200 | 36 | 32 | 31 | 0.62 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 24,667 | 48,069 | 44 | 50 | 49 | 0.78 | 3.10 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 29,204 | 53,802 | 60 | 50 | 49 | 1.10 | 4.45 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 35,300 | 67,904 | 75 | 81 | 80 | 1.44 | 4.45 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 38,808 | 68,698 | 96 | 75 | 73 | 1.57 | 6.40 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 46,070 | 90,405 | 126 | 133 | 131 | 2.14 | 6.40 |

1KN= 102kgf

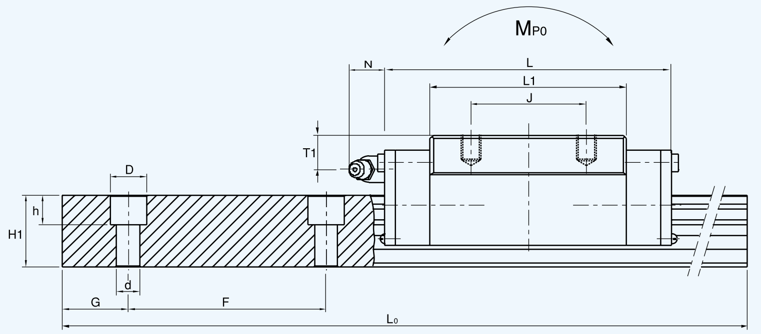
## SPG - SL / SLL




Dimension:mm

| Reference | Mounting Dimension | | | | | Block Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | Width W | Length L | Mounting tap hole B x J | Mounting tap hole M x *l* | L1 | K | T | Nipple Mounting | Nipple T1 | Nipple N |
| SPG 15 SL | 28 | 3 | 9.5 | 34 | 60.8 | 26×26 | M4×5 | 38.8 | 25 | 8 | Ø 3.5 | 8 | 5 |
| SPG 20 SL | 30 | 3.5 | 12 | 44 | 77.2 | 32×36 | M5×8 | 50.8 | 26.5 | 8 | M6×0.75 | 7 | 9.8 |
| SPG 20 SLL | 30 | 3.5 | 12 | 44 | 93.2 | 32×50 | M5×8 | 66 .8 | 26.5 | 8 | M6×0.75 | 7 | 9.8 |
| SPG 25 SL | 40 | 6.5 | 12.5 | 48 | 86.9 | 35×35 | M6×8 | 59.5 | 33.5 | 12 | M6×0.75 | 10.5 | 9.8 |
| SPG 25 SLL | 40 | 6.5 | 12.5 | 48 | 106.4 | 35×50 | M6×8 | 79 | 33.5 | 12 | M6×0.75 | 10.5 | 9.8 |
| SPG 30 SL | 45 | 7 | 16 | 60 | 102.5 | 40×40 | M8×10 | 70.4 | 38 | 12 | M6×0.75 | 11.5 | 10.7 |
| SPG 30 SLL | 45 | 7 | 16 | 60 | 125 | 40×60 | M8×10 | 92.9 | 38 | 12 | M6×0.75 | 11.5 | 10.7 |
| SPG 35 SL | 55 | 7.5 | 18 | 70 | 112.6 | 50×50 | M8×12 | 80.4 | 47.5 | 15 | M6×0.75 | 16.5 | 10.7 |
| SPG 35 SLL | 55 | 7.5 | 18 | 70 | 138.1 | 50×72 | M8×12 | 105.9 | 47.5 | 15 | M6×0.75 | 16.5 | 10.7 |

## SPG - SL / SLL

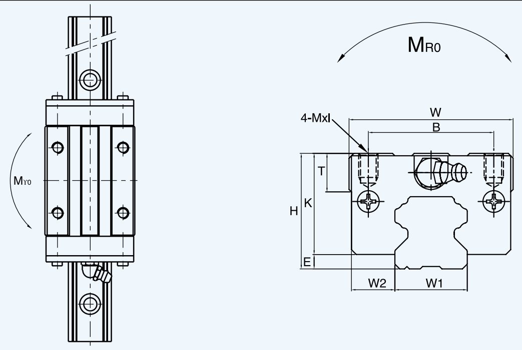



Dimension:mm

| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail LOMAX | Dynamic C(N) | Stationary C0(N) | Stationary Moment(kgf·m) MR0 | MP0 | MY0 | Bearing (kg) | Rail (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 8,330 | 13,426 | 7 | 5 | 5 | 0.2 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 14,210 | 25,088 | 22 | 18 | 18 | 0.33 | 2.20 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 16,905 | 36,554 | 29 | 32 | 32 | 0.45 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 20,972 | 39,200 | 36 | 32 | 31 | 0.56 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 24,667 | 48,069 | 44 | 50 | 49 | 0.73 | 3.10 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 29,204 | 53,802 | 60 | 50 | 49 | 0.98 | 4.45 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 35,300 | 67,904 | 75 | 81 | 80 | 1.28 | 4.45 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 38,808 | 68,698 | 96 | 75 | 73 | 1.63 | 6.40 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 46,070 | 90,405 | 126 | 133 | 131 | 2.12 | 6.40 |

1KN= 102kgf

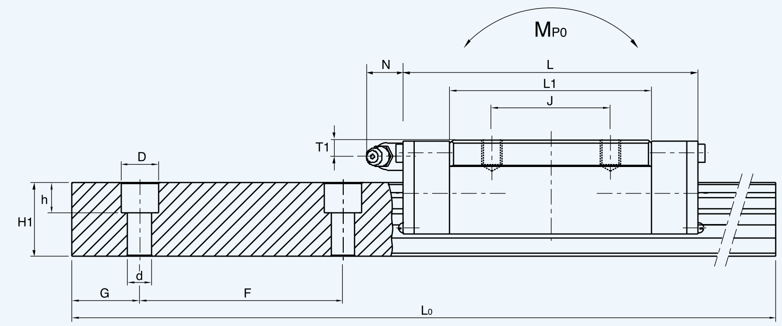
## SPS - SL / SLL




Dimension:mm

| Reference | Mounting Dimension | | | Block Dimensions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | Width W | Length L | Mounting tap hole B x J | Mounting tap hole M x l | $L_1$ | K | T | Nipple Mounting | Nipple $T_1$ | Nipple N |
| SPS 15 SL | 24 | 3 | 9.5 | 34 | 60.8 | 26×26 | M4×5 | 38.8 | 21 | 6 | Ø 3.5 | 4 | 5 |
| SPS 20 SL | 28 | 3.5 | 12 | 44 | 77.2 | 32×32 | M5×7 | 50.8 | 24.5 | 7.5 | M6×0.75 | 5 | 9.8 |
| SPS 20 SLL | 28 | 3.5 | 12 | 44 | 93.2 | 32×50 | M5×7 | 66 .8 | 24.5 | 7.5 | M6×0.75 | 5 | 9.8 |
| SPS 25 SL | 33 | 6.5 | 12.5 | 48 | 86.9 | 35×35 | M6×6 | 59.5 | 26.5 | 8 | M6×0.75 | 5.2 | 9.8 |
| SPS 25 SLL | 33 | 6.5 | 12.5 | 48 | 106.4 | 35×50 | M6×6 | 79 | 26.5 | 8 | M6×0.75 | 5.2 | 9.8 |
| SPS 25 HL | 36 | 6.5 | 12.5 | 48 | 86.9 | 35×35 | M6×8 | 59.5 | 29.5 | 11 | M6×0.75 | 8.2 | 9.8 |
| SPS 25 HLL | 36 | 6.5 | 12.5 | 48 | 106.4 | 35×50 | M6×8 | 79 | 29.5 | 11 | M6×0.75 | 8.2 | 9.8 |
| SPS 30 SL | 42 | 7 | 16 | 60 | 102.5 | 40×40 | M8×10 | 70.4 | 35 | 12 | M6×0.75 | 8.5 | 10.7 |
| SPS 30 SLL | 42 | 7 | 16 | 60 | 125 | 40×60 | M8×10 | 92.9 | 35 | 12 | M6×0.75 | 8.5 | 10.7 |
| SPS 35 SL | 48 | 7.5 | 18 | 70 | 112.6 | 50×50 | M8×12 | 80.4 | 40.5 | 15 | M6×0.75 | 9.5 | 10.7 |
| SPS 35 SLL | 48 | 7.5 | 18 | 70 | 138.1 | 50×72 | M8×12 | 105.9 | 40.5 | 15 | M6×0.75 | 9.5 | 10.7 |

## SPS - SL / SLL



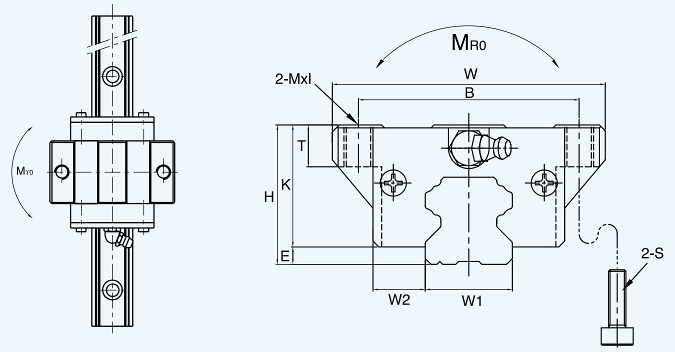

Dimension:mm

| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail $L_{0MAX}$ | Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment (kgf·m) $M_{R0}$ | $M_{P0}$ | $M_{Y0}$ | Bearing (kg) | Rail (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 8,330 | 13,426 | 7 | 5 | 5 | 0.2 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 14,210 | 25,088 | 22 | 18 | 18 | 0.33 | 2.20 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 16,905 | 36,554 | 29 | 32 | 32 | 0.45 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 20,972 | 39,200 | 36 | 32 | 31 | 0.56 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 24,667 | 48,069 | 44 | 50 | 49 | 0.73 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 20,972 | 39,200 | 36 | 32 | 31 | 0.56 | 3.10 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 24,667 | 48,069 | 44 | 50 | 49 | 0.73 | 3.10 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 29,204 | 53,802 | 60 | 50 | 49 | 0.98 | 4.45 |
| 28 | 25 | 80 | 9×14×12 | 20 | 4000 | 35,300 | 67,904 | 75 | 81 | 80 | 1.28 | 4.45 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 38,808 | 68,698 | 96 | 75 | 73 | 1.63 | 6.40 |
| 34 | 29 | 80 | 9×14×12 | 20 | 4000 | 46,070 | 90,405 | 126 | 133 | 131 | 2.12 | 6.40 |

1KN= 102kgf

A

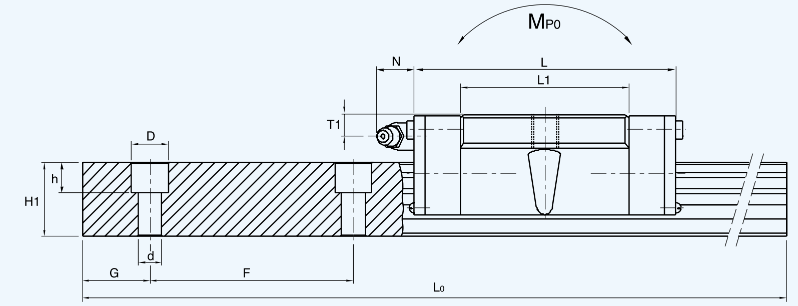
## SPS - FV




Dimension:mm

| Reference | Mounting Dimension | | | Block Dimensions | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | Width W | Length L | Mounting tap hole B | M | S | $L_1$ | K | T | Nipple Mounting | $T_1$ | N |
| SPS 15 FV | 24 | 3 | 16 | 47 | 44.9 | 38 | M5 | M4 | 22.9 | 21 | 7.2 | Ø3.5 | 4 | 5 |
| SPS 20 FV | 28 | 3.5 | 21.5 | 63 | 54.2 | 53 | M6 | M5 | 27.8 | 24.5 | 7 | M6×0.75 | 5 | 9.8 |
| SPS 25 FV | 33 | 6.5 | 23.5 | 70 | 62.6 | 57 | M8 | M6 | 35.2 | 26.5 | 7 | M6×0.75 | 5.2 | 9.8 |

## SPS - FV

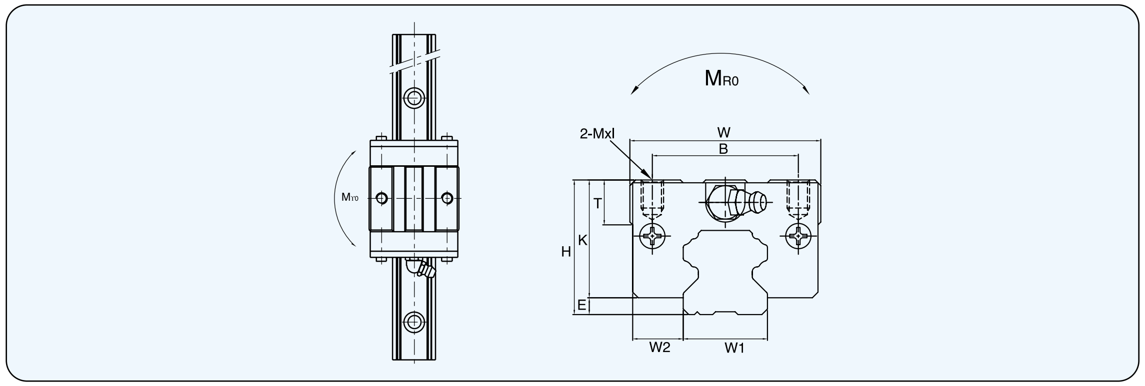



Dimension:mm

| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole dxDxh | G | Max. length of rail $L_{0MAX}$ | Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment(kgf·m) $M_{R0}$ | $M_{P0}$ | $M_{Y0}$ | Bearing (kg) | Rail (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 4,488 | 7,232 | 4 | 3 | 3 | 0.10 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 7,654 | 13,504 | 12 | 10 | 10 | 0.24 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 11,290 | 21,109 | 19 | 17 | 17 | 0.37 | 3.10 |

1KN= 102kgf

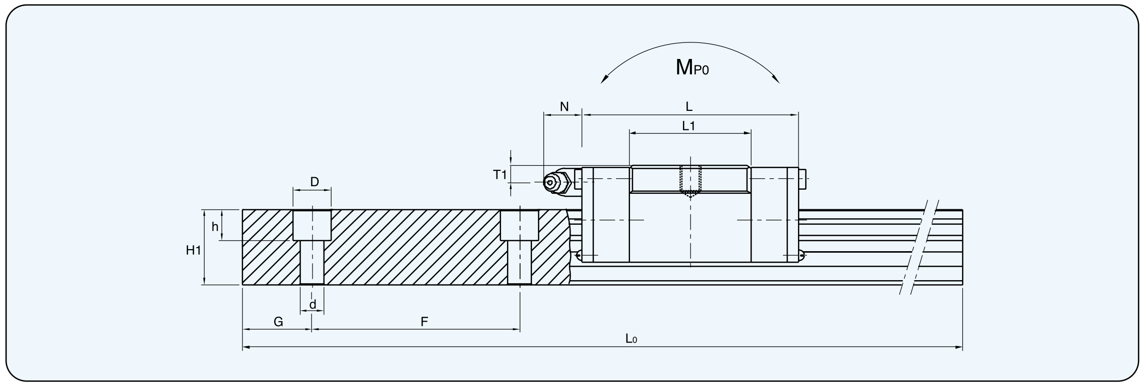
## SPS - SV




Dimension:mm

| Reference | Mounting Dimension | | | | | Block Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | Width W | Length L | Mounting tap hole B | Mounting tap hole M x *l* | $L_1$ | K | T | Nipple Mounting | Nipple $T_1$ | Nipple N |
| SPS 15 SV | 24 | 3 | 9.5 | 34 | 44.9 | 26 | M4×5 | 22.9 | 21 | 6 | Ø3.5 | 4 | 5 |
| SPS 20 SV | 28 | 3.5 | 12 | 44 | 54.2 | 32 | M5×7 | 27.8 | 24.5 | 7.5 | M6×0.75 | 5 | 9.8 |
| SPS 25 SV | 33 | 6.5 | 12.5 | 48 | 62.6 | 35 | M6×8 | 35.2 | 26.5 | 8 | M6×0.75 | 5.2 | 9.8 |

## SPS - SV

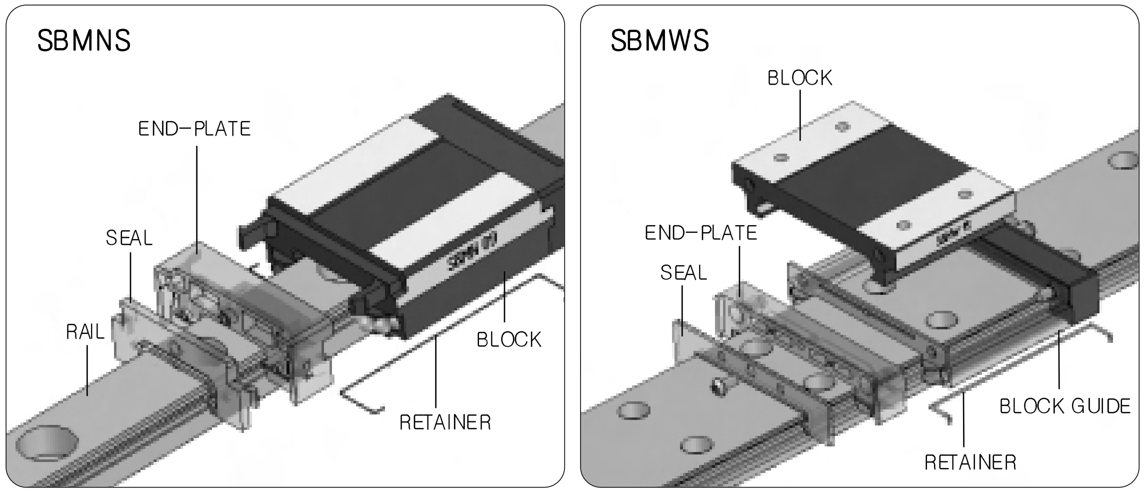



Dimension:mm

| Rail Size | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail $L_{0MAX}$ | Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment(kgf·m) $M_{R0}$ | Stationary Moment(kgf·m) $M_{P0}$ | Stationary Moment(kgf·m) $M_{\gamma 0}$ | Bearing (kg) | Rail (kg/m) |
| 15 | 15 | 60 | 4.5×7.5×5.3 | 20 | 3,000 | 4,488 | 7,232 | 4 | 3 | 3 | 0.10 | 1.45 |
| 20 | 17.5 | 60 | 6×9.5×8.5 | 20 | 4,000 | 7,654 | 13,504 | 12 | 10 | 10 | 0.19 | 2.20 |
| 23 | 21.8 | 60 | 7×11×9 | 20 | 4,000 | 11,290 | 21,109 | 19 | 17 | 17 | 0.32 | 3.10 |

1KN= 102kgf

## MINIATURE SERIES




[figure34]

SBMNS miniature type have compact design, low friction, and high rigidity. It is most widely used in semi-conductor equipment, measuring equipment, medical equipment, other high precision instruments.
SBMWS miniature with increased balls and widened rail has increased the rigidity against moments and achieved the greater load ratings.

## PRODUCT STRUCTURE

1. Assembled type with block and rail

## LINEAR BLOCK APPERANCE

Block with standard length and block(Wide type) with Wider Width for high load capacity are available

## ACCURACY

The accuracy of linear rail system as shown in figure 35 is defined by the parallelism, height, and width dimension tolerance.

A. Parallelism

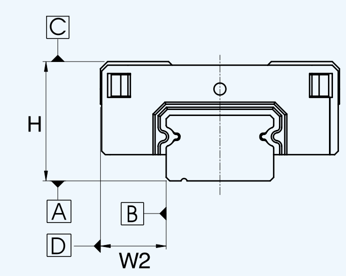
When an LM block runs on a rail bolted to the reference base, the tolerance between linear rail reference dimension and block is called parallelism.

B. Acceptable height

This is the difference between the maximum and minimum height of block installed on the same surface (H).

C. Acceptable width

The difference between the maximum and minimum rail-to-block lateral distance (W2).




[figure35]

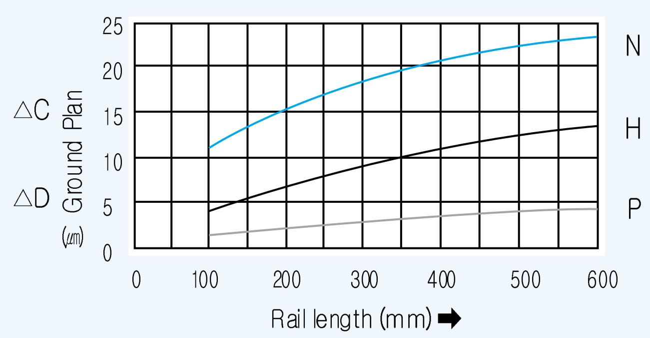
Unit:mm

| | Grade levels | | |
|---|---|---|---|
| | N | H | P |
| Dimensions H and W2 ❶ | ±0.04 | ±0.025 | ±0.015 |
| Mutual maximum difference between H and W2 on each block of the same rail❷ | 0.03 | 0.02 | 0.01 |
| Ground plan △C△D ❸ | △C (Refer to the figure 36) | | |

[table24]

• Grade levels are divided into three types.
• Maximum tolerance pertinent to each level.

❶ Measured from the center of the block
❷ Measured from the center of the block on the same position of a rail
❸ Applied to the assembled linear rail system



[figure36]

## PRELOAD

Unit:㎛

| | Normal K1 | Normal K2 |
|---|---|---|
| SBMNS 9 / SBMWS 9 | ± 2 | −4~0 |
| SBMNS 12 / SBMWS 12 | ± 3 | −6~0 |
| SBMNS 15 / SBMWS 15 | ± 5 | −10~0 |

Only K1, K2 preload is available for SBMNS type

[table25]

## RUST PROTECTION

Both block and rail are made of SUS440C stainless steel.
Rust can occur in water and acid environments.

## SEAL RESISTANCE

The maximum seal resistance of SBMNS / ABMWS type is as shown in table 26

Unit:N

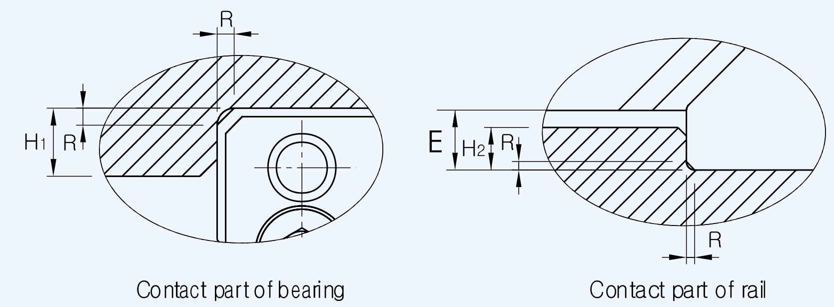
| Model Number | SBMNS9 | SBMNS12 | SBMNS15 | SBMWS9 | SBMWS12 | SBMWS15 |
|---|---|---|---|---|---|---|
| Seal resistance | 0.2 | 0.59 | 1.18 | 0.8 | 1.1 | 1.3 |

SBMNS / SBMWS seal resistance

[table26]

## Shoulders height and Fillet radius R

When the bearing and rail are installed on the table and base, A fillet radius, chamfer size, and shoulder height must be considered.




[figure37]

| Model number | Fillet radius R | Shoulders height $H_1$ | Shoulders height $H_2$ | E |
|---|---|---|---|---|
| SBMNS9 | 0.3 | 3 | 1.9 | 2.2 |
| SBMNS12 | 0.3 | 4 | 2 | 3 |
| SBMNS15 | 0.3 | 5 | 2.5 | 4 |
| SBMWS9 | 0.1 | 3 | 3.4 | 3.7 |
| SBMWS12 | 0.3 | 4 | 3.7 | 4 |
| SBMWS15 | 0.3 | 5 | 3.4 | 3.7 |

[table27]

## MINIATURE ORDERING EXAMPLE

SBMNS – 15 – 2 – K1 – 610 – N – II

**Model**
SBMNS
: Standard–Stainless
SBMWS
: Wide–Stainless

**Size**
9,12,15

**Block quantity on rail**
1,2,3,4……

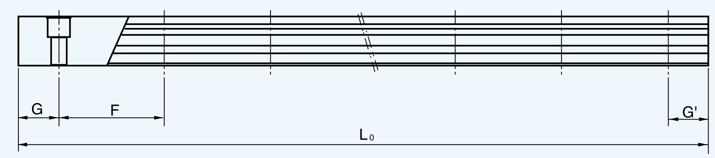
**Preload**
K1 : Normal Preload K2 : Light Preload

**Rail Length (mm)**
610mm

**Accuracy**
N : Normal H : High P : Precision

**Rail**
No symbol : 1 Row II : 2 Row

## SBMNS / SBMWS STANDARD AND MAX. LENGTH



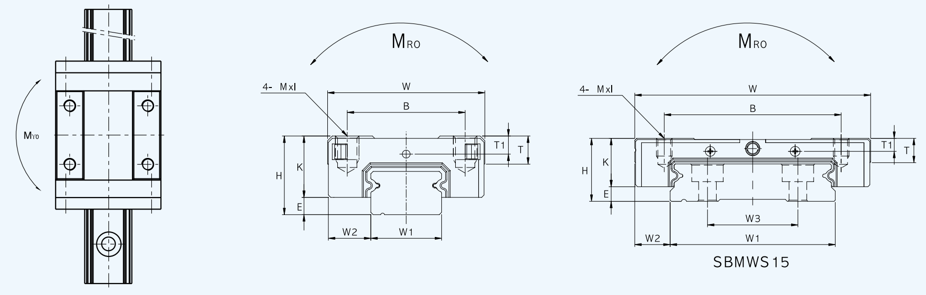
[figure39]

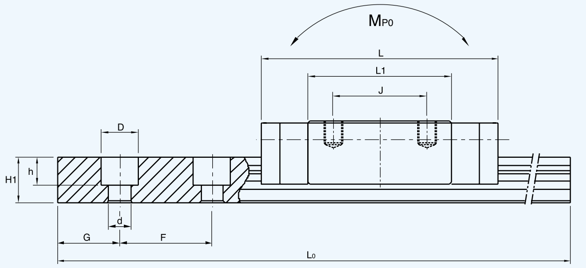
Dimension:mm

| Model number | SBMNS9 | SBMWS9 | SBMNS12 | SBMWS12 | SBMNS15 | SBMWS15 |
|---|---|---|---|---|---|---|
| STANDARD LENGTH | 55 | 50 | 70 | 70 | 70 | 110 |
| | 75 | 80 | 95 | 110 | 110 | 150 |
| | 95 | 110 | 120 | 150 | 150 | 190 |
| | 115 | 140 | 145 | 190 | 190 | 230 |
| | 135 | 170 | 170 | 230 | 230 | 270 |
| | 155 | 200 | 195 | 270 | 270 | 310 |
| | 175 | 260 | 220 | 310 | 310 | 430 |
| | 195 | 290 | 245 | 390 | 350 | 550 |
| | 275 | 320 | 270 | 470 | 390 | |
| | 395 | | 320 | 550 | 430 | |
| | 515 | | 370 | | 470 | |
| | 595 | | 470 | | 550 | |
| | | | 595 | | | |
| F | 20 | 30 | 25 | 40 | 40 | 40 |
| G | 7.5 | 10 | 10 | 15 | 15 | 15 |
| Length | 610 | 610 | 610 | 610 | 610 | 610 |

[table29]

## SBMNS-TYPE (MINIATURE)




Dimension:mm

| Reference | Mounting Dimension | | | | | | Block Dimensions | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height H | E | W2 | W3 | Width W | Length L | Mounting tap hole B x J | Mounting tap hole M | $L_1$ | T | K | T1 | Nipple Mounting hole |
| SBMNS09 | 10 | 2.2 | 5.5 | – | 20 | 29 | 15×10 | M3×3 | 18 | 3.5 | 7.8 | 2.3 | Ø1 |
| SBMNS12 | 13 | 3 | 7.5 | – | 27 | 37.6 | 20×15 | M3×3.5 | 23 | 5 | 10 | 2.7 | Ø1 |
| SBMNS15 | 16 | 4 | 8.5 | – | 32 | 45.5 | 25×20 | M3×4 | 29 | 6 | 12 | 3.1 | Ø2.7 |
| SBMWS09 | 12 | 3.7 | 6 | – | 30 | 42.3 | 21×12 | M3×3 | 27 | 4.5 | 7.8 | 2 | Ø1 |
| SBMWS12 | 14 | 4 | 8 | – | 40 | 48.4 | 28×15 | M3×3.5 | 30.9 | 5 | 10 | 2.4 | Ø1 |
| SBMWS15 | 16 | 3.7 | 9 | 23 | 60 | 57.5 | 45×20 | M4×4.5 | 38.9 | 6 | 12 | 2.6 | Ø2.7 |

Dimension:mm

| Rail Size | | | | | | | Load capacity | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width W1 | Height H1 | Pitch F | Bolt Hole d x D x h | G | Max. length of rail ($L_{0MAX}$) Carbon | Max. length of rail ($L_{0MAX}$) Stainless | Dynamic C(N) | Stationary $C_0$(N) | Stationary Moment(kgf·m) $M_{RO}$ | Stationary Moment(kgf·m) $M_{PO}$ | Stationary Moment(kgf·m) $M_{YO}$ | Bearing (kg) | Rail (kg/m) |
| 9 | 5.5 | 20 | 3.5×6×3.3 | 7.5 | 1,400 | 610 | 1,420 | 2,900 | 1.06 | 0.52 | 0.52 | 0.018 | 0.32 |
| 12 | 7.5 | 25 | 3.5×6×4.5 | 10 | 1,400 | 610 | 2,450 | 3,626 | 1.5 | 0.82 | 0.89 | 0.031 | 0.6 |
| 15 | 9.5 | 40 | 3.5×6×4.5 | 15 | 1,400 | 610 | 4,018 | 5,978 | 3.80 | 1.68 | 1.83 | 0.063 | 0.01 |
| 18 | 7.5 | 30 | 3.5×6×4.5 | 10 | 1,500 | 610 | 2,450 | 3,920 | 3.67 | 1.66 | 1.66 | 0.03 | 0.99 |
| 24 | 8.5 | 40 | 4.8×8×4.5 | 15 | 1,500 | 610 | 4,020 | 6,080 | 4.86 | 1.75 | 1.9 | 0.055 | 1.42 |
| 42 | 9.5 | 40 | 4.8×8×4.5 | 15 | 1,500 | 610 | 6,660 | 9,800 | 13.97 | 3.6 | 3.9 | 0.124 | 2.93 |

1KN= 102kgf