# SLIDE GUIDE

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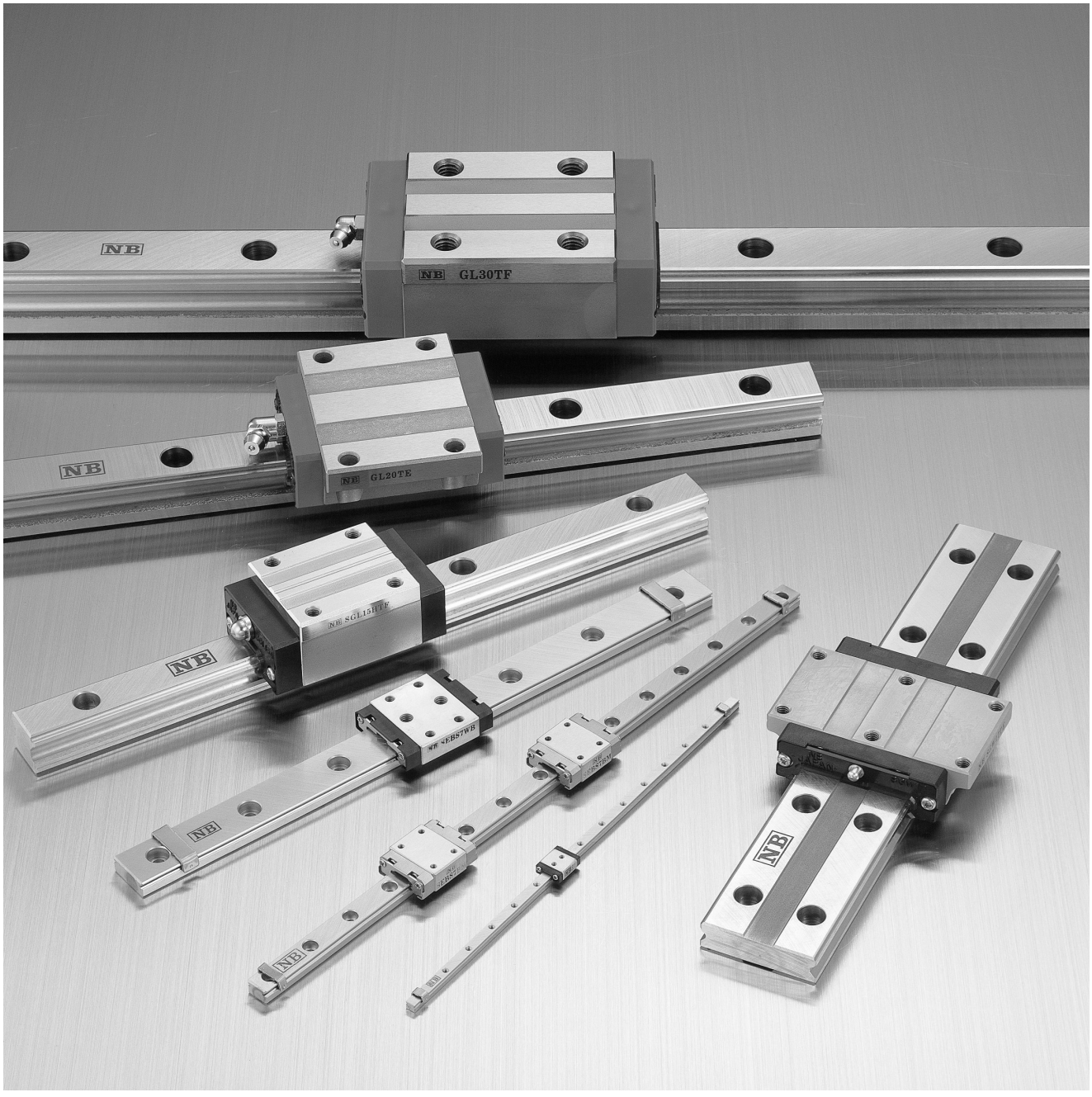
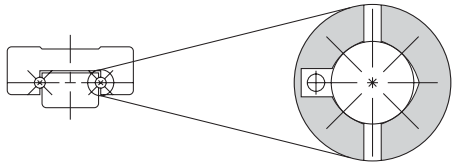
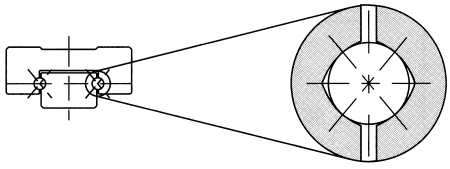
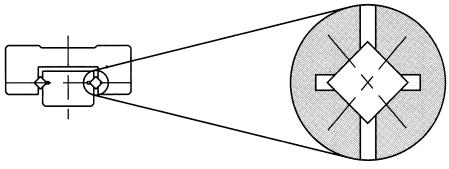
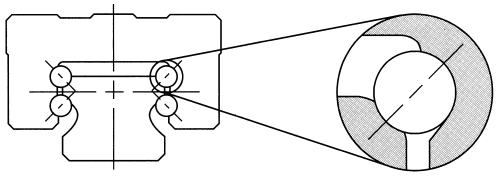
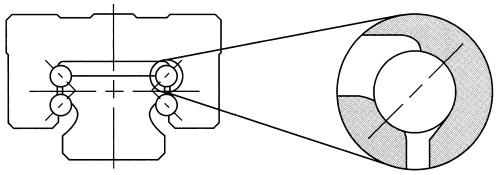
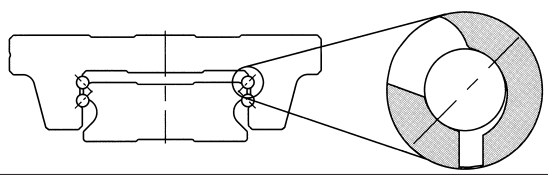
**NB slide guides are high-precision and high-rigidity linear bearings designed to utilize the motion of rolling elements. They have numerous advantageous characteristics including low friction, no stick-slip, and smooth linear motion even under high load conditions. Since they can maintain their high-efficiency and high-functionality characteristics for an extended period of time, they meet a wide range of needs, from general industrial to precision machinery.**



# TYPE

Table A-1 Types

| | rolling element | cross-section geometry and contact structure | advantages | pages |
|---|---|---|---|---|
| miniature type | ball element | retained ball, 2-row, 4-point contact (SEBS-B type)  | ● rerained ball type<br>● available in all stainless steel<br>● 2-row, compact<br>● small, light, cost effective | P.A-20 |
| | | 2-row, 4-point contact (SEB-A type)  | ● 2-row, compact<br>● small, light, cost effective<br>● available in various types<br>● available in stainless steel | P.A-20 |
| | roller | crossroller (SER type)  | ● smallest roller guide<br>● crossroller, high precision<br>● available in all stainless steel | P.A-34 |
| high-rigidity type | ball element | 4-row, 2-point contact (GL type)  | ● Ball cushion contribute to low noise<br>● Employing the fiber sheet greatly Increased the lubrication interval.<br>● High load capacity / Long life | P.A-42 |
| | | 4-row, 2-point contact (SGL type)  | ● high self-centering characteristics<br>● high loading capacity due to large number of ball elements<br>● high dust preventive control with side seal and under seal<br>● available in anticorrosion treatment | P.A-60 |
| | | 4-row, 2-point contact (SGW type)  | ● high-moment resistant<br>● low-height design<br>● smooth motion due to large number of ball elements<br>● high dust preventive control with side seal and under seal<br>● available in anticorrosion treatment | P.A-76 |

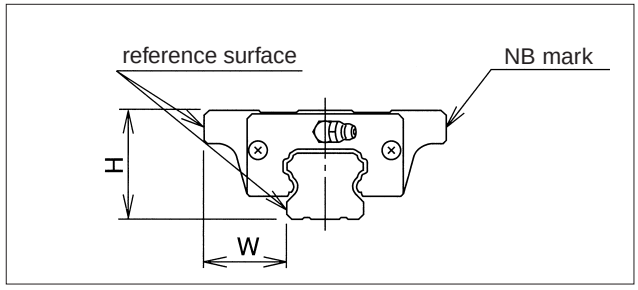
# ACCURACY MEASUREMENT METHOD

The accuracy of slide guides is measured by fixing the rail to the datum base. The accuracy is expressed in terms of the average value at the center portion.

## Dimensional Tolerance and Paired Guide Difference:

The accuracy of the slide guide is obtained by measuring the height, H, and width, W, as shown in Figure A-1. The dimensional tolerance is measured for each of the blocks attached to the rail and is expressed in terms of the deviation from the reference value. The paired-guide difference is obtained by measuring the blocks attached to the rail and is expressed in terms of the difference between the maximum and minimum values.

Figure A-1 Accuracy Measurement

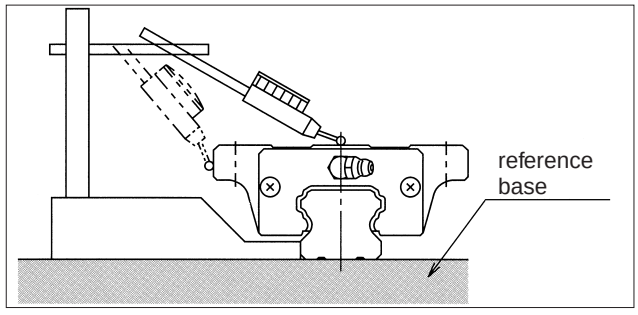



## Motion Accuracy:

The rail is first fixed to the reference base. The motion accuracy is obtained by measuring the difference in the indicator readings when the block is moved along the entire span of the rail.

Note : Indicator is placed on the center of the block reference surface.

Figure A-2 Measurement Method for Motion Accuracy




## Notation for Number of Rails and Paired Guide Difference:

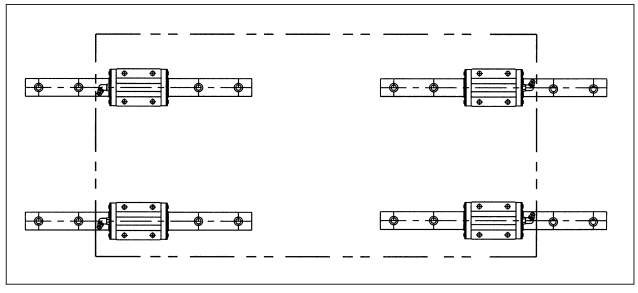
When more than two rails are used in parallel, the guide difference must be measured on more than one block. For measuring the height, H, the number of rails can be specified by simply indicating the necessary number of rails in the part number call-out. For measuring the width, W, contact NB.

Note : When four rails are used as illustrated in Figure A-3, W4 should be specified in the call-out. Please indicate the number of rails when ordering.

example part number
**SGL25TF2-350/ W 2**

symbol for number of rails
W 2 : 2 parallel axes
W 3 : 3 parallel axes

Figure A-3 4-Parallel Axes



# RIGIDITY AND PRE-LOAD

The rolling elements of the slide guide deform elastically due to the applied load. The amount of deformation depends on the type of rolling element. It is proportional to the 2/3rd power for ball elements. For rollers, it is proportional to the 0.9th power. In either case, the amount of deformation decreases as the applied load increases. Greater rigidity is achieved by applying a pre-load.

A pre-load causes internal stress within the slide guide, resulting in some reduction in lifetime. However, when the part is used under shock or vibration loading conditions, a pre-load will absorb the load and will actually help lengthen the life of the part. Because the pre-load causes elastic deformation of the rolling elements, it becomes less tolerable to the installation dimensional difference. Extreme care should be exercised in machining the installation surface.

Three primary ranges of pre-loads are available from NB: normal, light, and medium. This allows the user to select the appropriate level for the application.

Figure A-4 Elastic Deformation of Rolling Elements

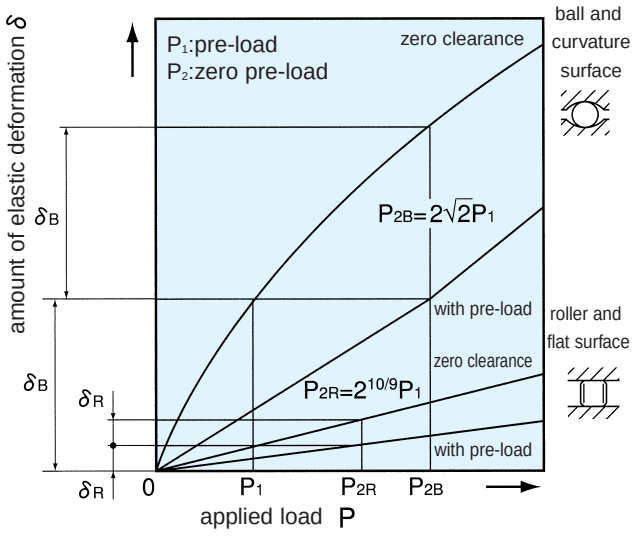



Table A-2 Type of Pre-Load

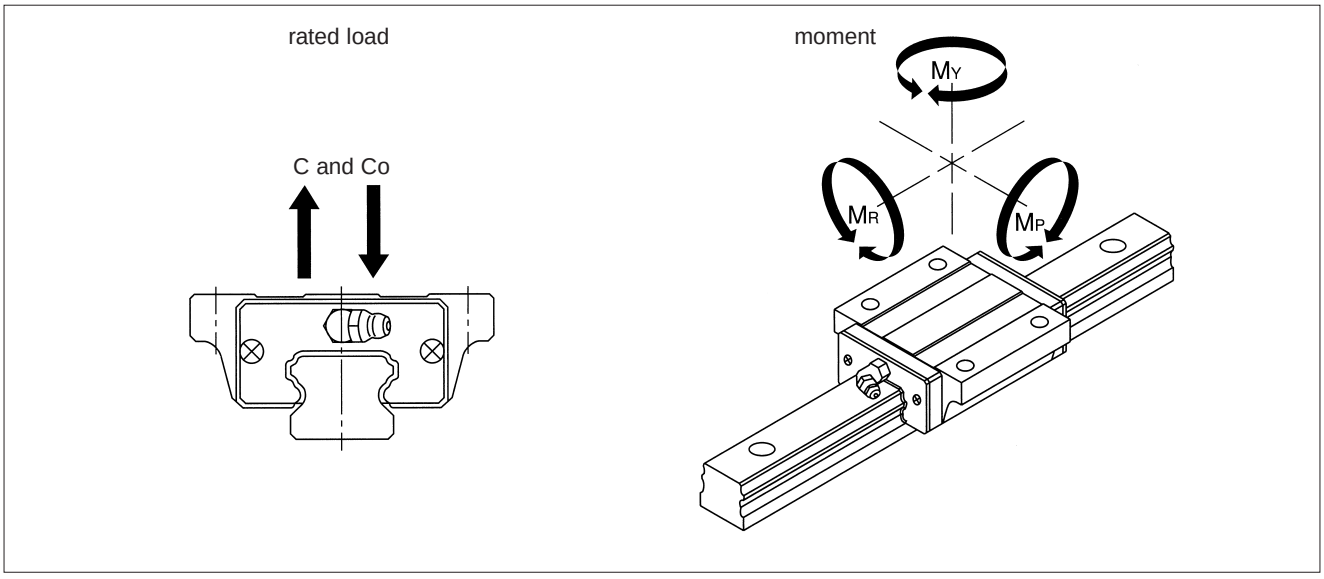
| type of pre-load | symbol | effect of pre-load | | | | | operating environment |
|---|---|---|---|---|---|---|---|
| | | vibration absorption ability | self-aligning ability | lifetime | rigidity | frictional resistance | |
| standard | none | | | | | | minute vibration is applied, accurate motion is required, moment is applied in a given direction |
| light | T1 | | | | | | light vibration is applied, slight torsion is applied, moment is applied |
| medium | T2 | | | | | | shock and vibration are applied, over-hang load is applied, torsion is applied |
| | | increases | reduces | reduces | increases | increases | |

# RATED LOAD AND RATED LIFE

## Loading Direction and Rated Load:

A slide guide experiences load and moment, as shown in Figure A-5. For each load and moment, the Basic load rating and allowable static moment are defined.

Figure A-5 Direction of Loading




## Rated Life Calculation:

Two types of rolling elements are used in NB slide guides: ball or roller elements. There is a different equation for calculating the rated life of each type.

For ball element slide guides (types SEB, SGL and SGW), the equation is:

$$L=\left(\frac{fc}{fw}\cdot\frac{C}{P}\right)^{3}\cdot 50\cdots\cdots(6)$$

For roller element slide guides (type SER), the equations is:

$$L=\left(\frac{fc\cdot fT}{fw}\cdot\frac{C}{P}\right)^{10/3}\cdot 50\cdots\cdots(7)$$

L : travel life (km) fc : contact coefficent
$f_T$ : temperature coefficent fw : load coefficent
C : basic dynamic load rating (N) P : load (N)

※Refer to page Eng. 5 for a description of each coefficient
※The contact coefficient is used when two or more slides are used in close proximity to each other.

If the stroke distance and frequency are constant, life can be expressed in terms of time, the equation is:

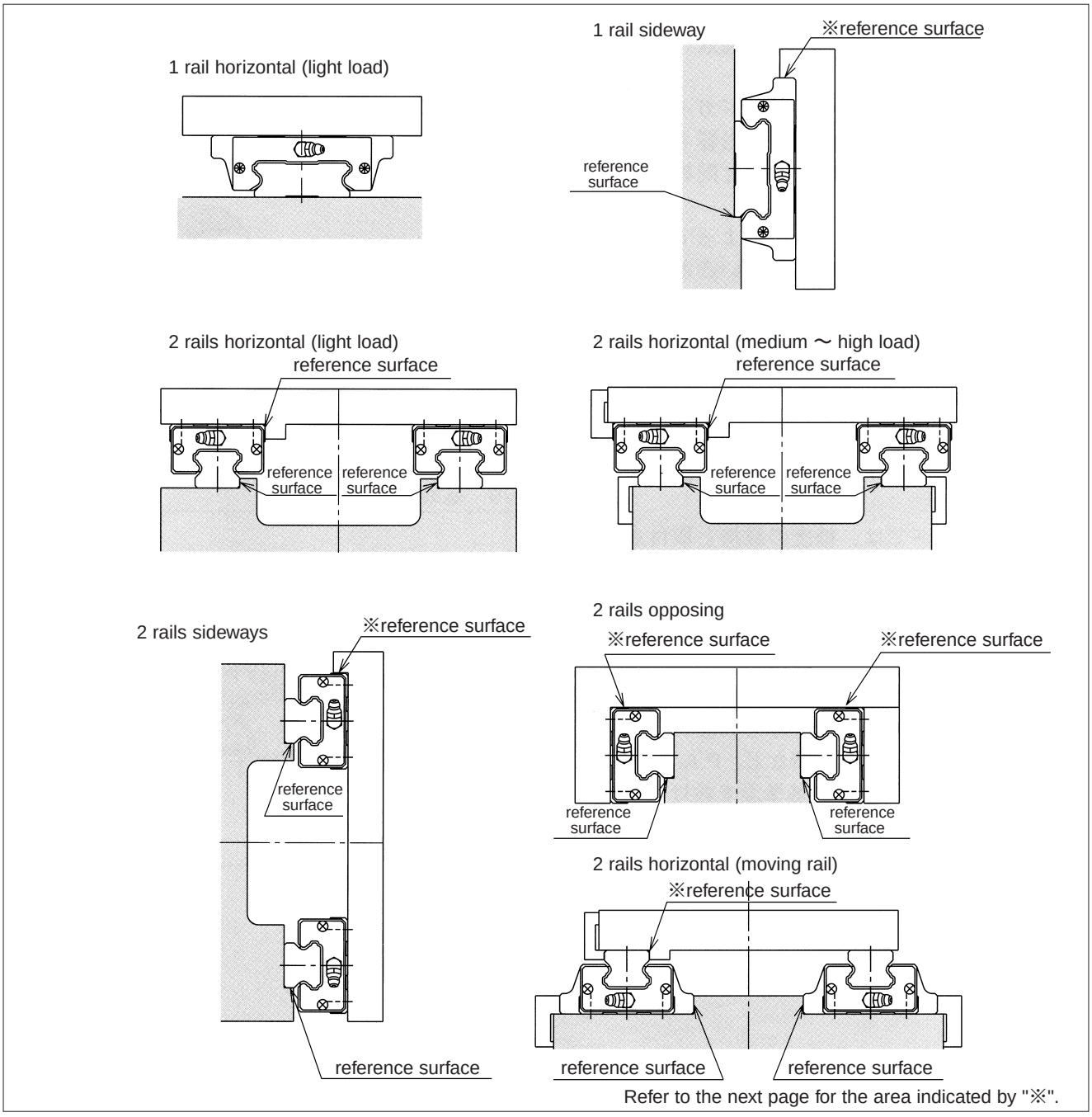
$$L_h=\frac{L\cdot 10^{3}}{2\cdot \ell s\cdot n_1\cdot 60}\cdots\cdots(8)$$

$L_h$ : travel life in time (hr) $\ell s$ : stroke distance (mm)
L : travel life (km) $n_1$ : stroke frequency per min (cpm)

# MOUNTING

Slide guides have a high rated load capacity in spite of their compact size. They can be used in various types of machinery and other equipment using various methods. Figure A-6 shows some representative slide guide arrangements.

Figure A-6 Slide Guide Arrangements




Refer to the next page for the area indicated by "※".

## Mounting Surface Shape and Accuracy:

NB slide guides are designed and fabricated to be accurately mounted by attaching them to a machined mounting base. One approach is to provide a shoulder on the mounting surface and align the reference surface of the rail or block against this surface (Figure A-7). To avoid corner interference, an escape groove should be provided at the shoulder corner or the radius of the shoulder corner should be smaller than the radius of the slide guide corner. The accuracy of the rail surface affects the accuracy of the machinery or other equipment along with the slide guide motion accuracy. The accuracy of the mounting surface should be equivalent to that of the desired slide guide motion accuracy. The specified pre-load may not be achieved due to deformation of the block, for example, the mounted block surface is not flat. Refer to Figure A-8. Careful attention should therefore be given to achieve the specified flatness.

Figure A-7 Shape of Mounting Surface

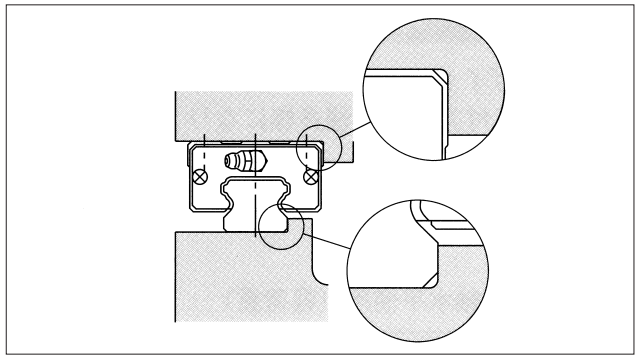
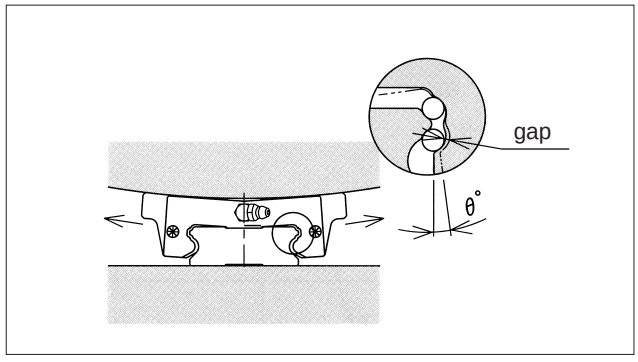


Figure A-8 Effect of Flatness

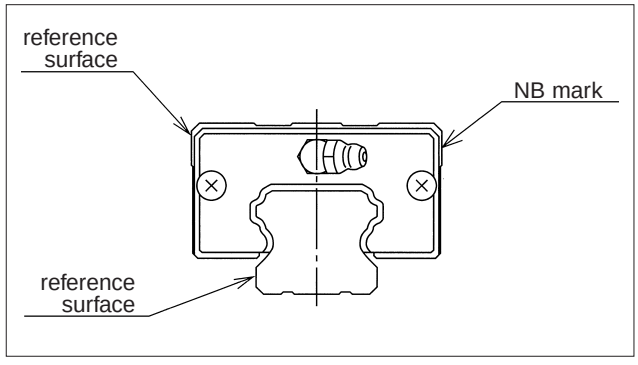



## Reference Surface Indication:

Reference surfaces are provided to enable accurate and simplified mounting. They are placed in the same direction on the block and the rail, as shown in Figure A-9. They are located on the side opposite to the NB mark.

Depending on the mounting arrangement, the standard reference surface may not ensure mounting accuracy (for example, 1 rail sideway or 2 rails opposing, page A7, Figure A-6). In such cases, NB can provide a reference surface on the opposite side. This should be specified when ordering.

Figure A-9 Reference Surfaces



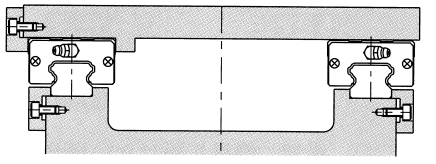
## Mounting:

In general, a slide guide is used with 2 rails in parallel. In that case, one rail is on the so-called reference side and the other is the so-called adjustable side.

● Applications where shock/vibration loading and high load are involved and high accuracy is required.

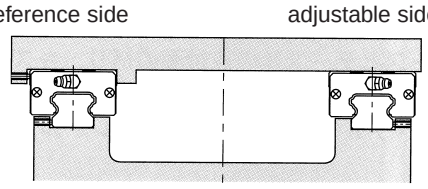
The effect of shock and vibration on accuracy is eliminated by mounting on the slide guide a side piece, which is typically a side plate (Figure A-10), tightening set screws (Figure A-11), or a tapered gib (Figure A-12).

Figure A-10 Mounting of Side Plate



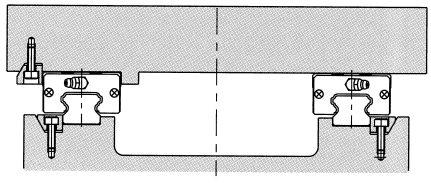

Provide an escape groove in the side plate, and push slightly protruding portion from the bed table.

Figure A-11 Mounting of Tightening Set Screw




Because space is limited in the guide rail portion, small screws must be used. Use as many screws as necessary for the length of the rail.

Figure A-12 Mounting of Tapered Gib




By rotating mounting screws of the tapered gib, the gib applies a side force to the slide guide. The groove shape and surrounding dimensions must be carefully designed to achieve the desired force.

● Applications where light load and low speed are involved.

Figures A-13～15 show the mounting methods when high accuracy is not required or the load capacity of the slide guide is sufficient due to a light load or low speed. In these cases, a side piece or reference surface may not be required.

Figure A-13 Without Side Piece

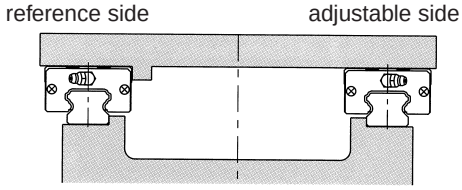



Figure A-14 No Datum Surface on Adjustable Side

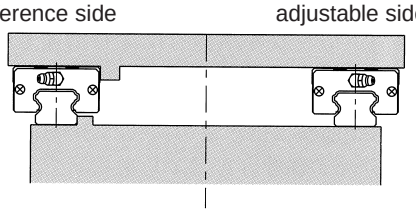
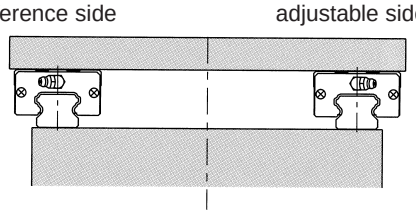



Figure A-15 Without Datum Surface



## Mounting Method:

When reference surfaces are provided for both the table and the base, use the following procedure to mount the slide guide.

1. Remove burrs, scratches, dust, etc. from the base and table. Apply a low viscosity oil to the base and the table. Place the slide guide on the base carefully. Temporarily fix the rail mounting bolts.

2. Tighten the screw for the side piece so that the installation reference surface and the rail reference surface are in contact. If a side piece is not provided, use a C clamp to position the mounting reference surface and the rail reference surface so that they contact each other.

3. Tighten the mounting bolts to the specified torque, and complete the mounting of the rail. The rail is designed so that its accuracy is optimum when the bolts are tightened to the specified value. Refer to the recommended torgue table for each product type for the specified torque.

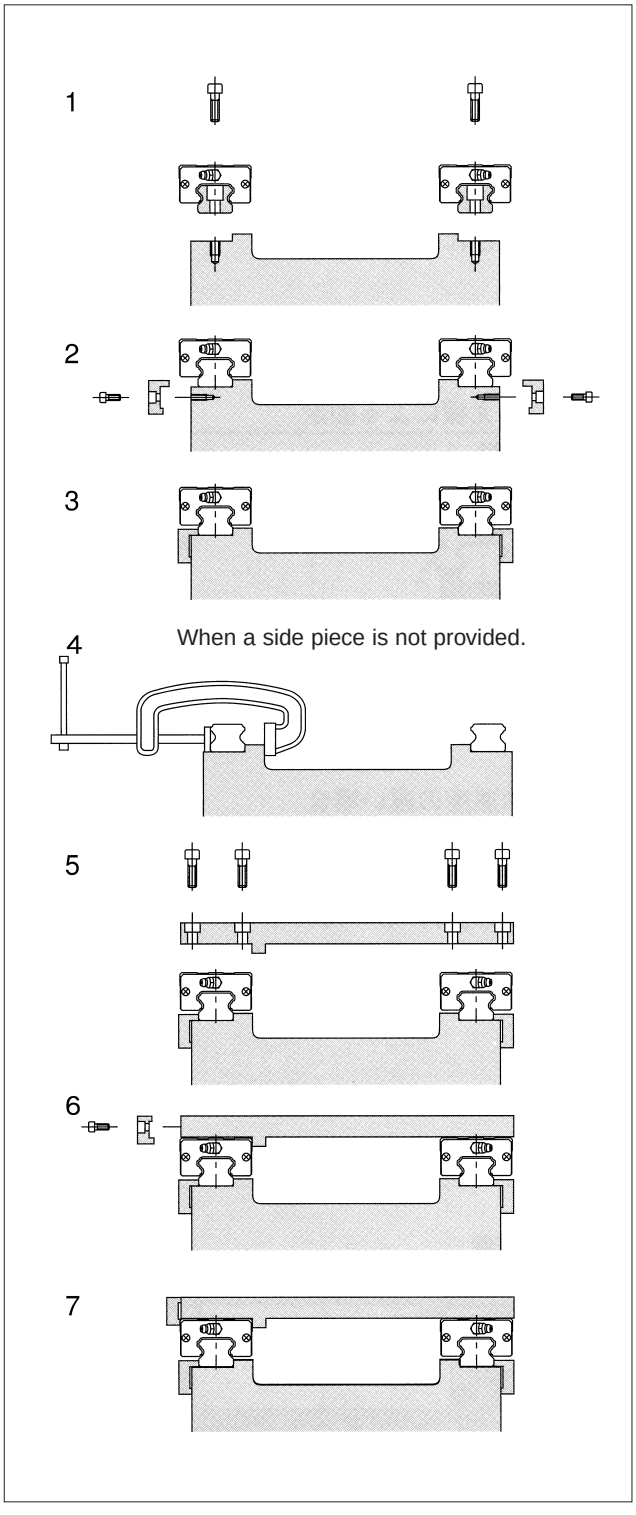
4. Repeat steps 2 and 3 for the rail on the adjustable side.

5. Move the blocks at the mounting location of the table, and place the table softly. Then slightly tighten the screws.

6. Position the reference surface of the block against the table. Tighten the mounting screws in a diagonal sequence.

7. Repeat steps 5 and 6 for the block on the adjustable side.

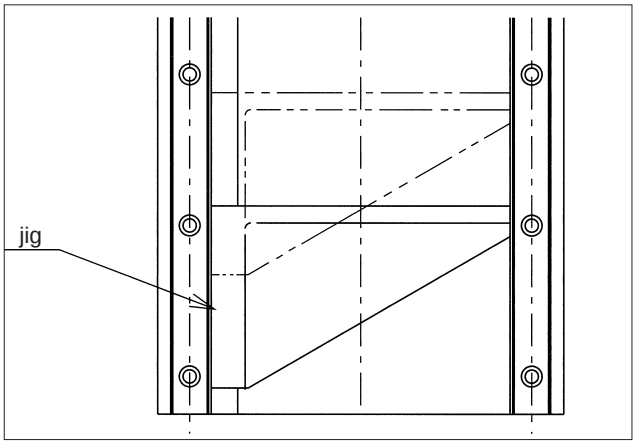
Figure A-16 Mounting Using Reference Surfaces



## When reference surface is not provided on adjustable side:

When a reference surface is not provided on the adjustable side, mount the 2 rails in parallel by using a jig, as mounted in Figure A-17. After mounting the reference-side guide, install the adjustable-side guide.

Figure A-17 Using a Jig




## When reference surface is not provided on reference side:

When a reference surface is not provided on the reference side, mount the 2 rails by using a reference surface in the vicinity of the slide guide, as illustrated in Figure A-18.

Temporarily fix the slide guide to the base, and mount an indicator on the block. Two or more blocks should be used; they should be fixed using a measurement plate (Figure A-18).

Place the indicator against the reference surface of the base. Tighten the bolts from one end of the rail to ensure straightness. If there is no reference surface handy, use a straight edge to achieve straightness (Figure A-19).

Figure A-18 Using Base Reference Surface

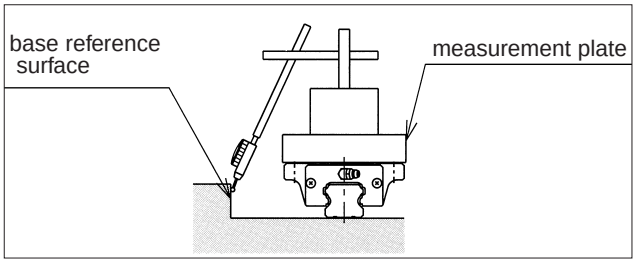
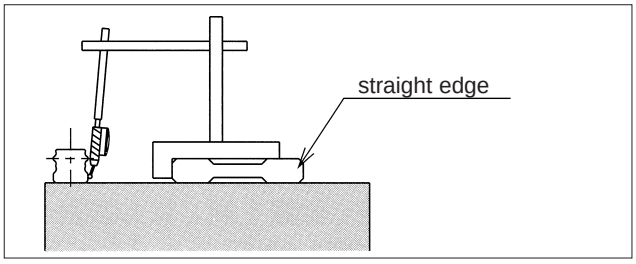


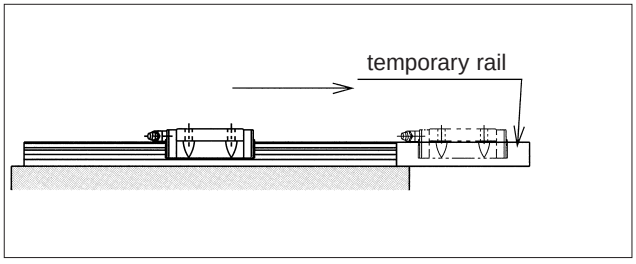

Figure A-19 Using a Straight Edge




## Note:

The SEB-A and SER slide guides do not have ball element retainers, so if they must be removed from the mounting rail, use a temporary rail to prevent the ball elements from falling out will be necessary. Although the SEBS-B SGL and SGW slide guides do have ball element retainers, the ball elements may still fall out depending upon how the guide block is removed from the rail and also the pre-load condition. The use of a temporary rail is strongly recommended to prevent damage to the guide block (Figure A-20). Contact NB for information on temporary rails.

Figure A-20 Guide Block Removal



# RAIL LENGTH

## Guide Rail Length:

Single rails are fabricated as standards to the lengths shown in the dimensional tables for each type and series. Unless otherwise specified, the distance to the first hole from one end of the rail (referred to as dimension "N") is within the range specified in the dimensional tables. The guide rail is therefore fabricated according to the equation given below. For other than standard dimensional requirements, contact NB.

$$L = M \cdot P + 2N$$

L : length (mm) N : distance to the first hole center from the end of the rail (mm) P : hole pitch (mm) M : number of pitches.

## Note:

Slide guide rails are machined with mounting holes as depicted in Figure A-21 during the initial fabrication process (before heat treatment). Specifying a different hole pitch or size will increase the cost and lead time, so please try to avoid changing these specifications.

Figure A-21 Guide Rail Mounting Hole

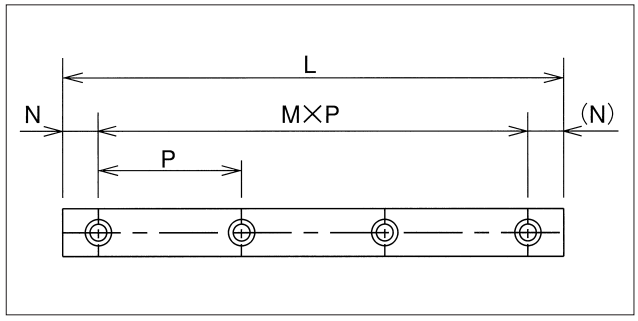
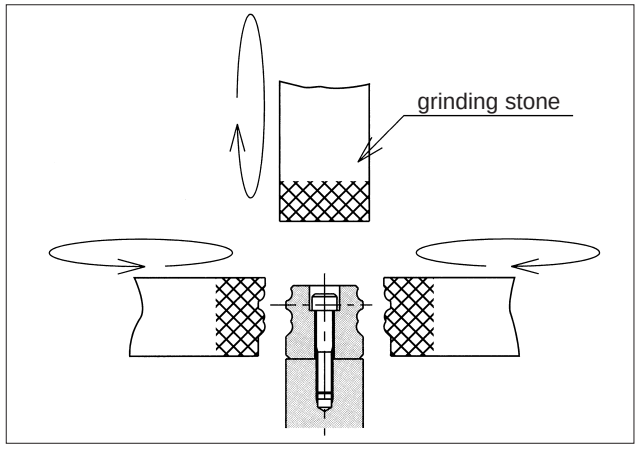



Figure A-22 Guide Rail Grinding Method




# JOINT RAILS

Rails can be joined together to obtain a length which exceeds the specified maximum standard length. There are two ways to do this.

- Place the joints at the same location for the right and left rails so as to make the design and maintenance simple (Figure A-23 ①).
- Place the joints for the right and left rails at different locations so that the block does not move over the two joints at the same time so as to minimize the effect of the joint on accuracy (Figure A-23 ②).

Please keep the following points in mind when using joint rails.

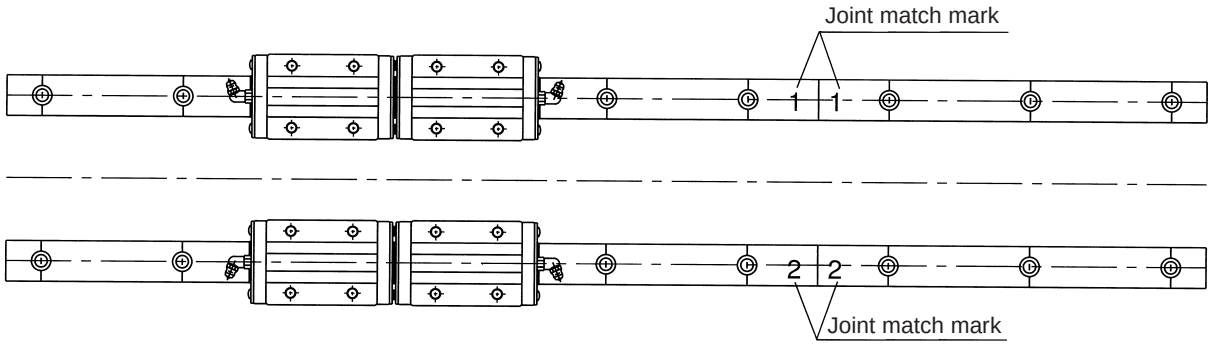
- To avoid dislocation at joints due to shock loading, provide a shoulder at the joint on the installation side.
- Use the joint marks provided.
- Tightly butt the rails to be joined so that there is no gap between them.

## Notes:

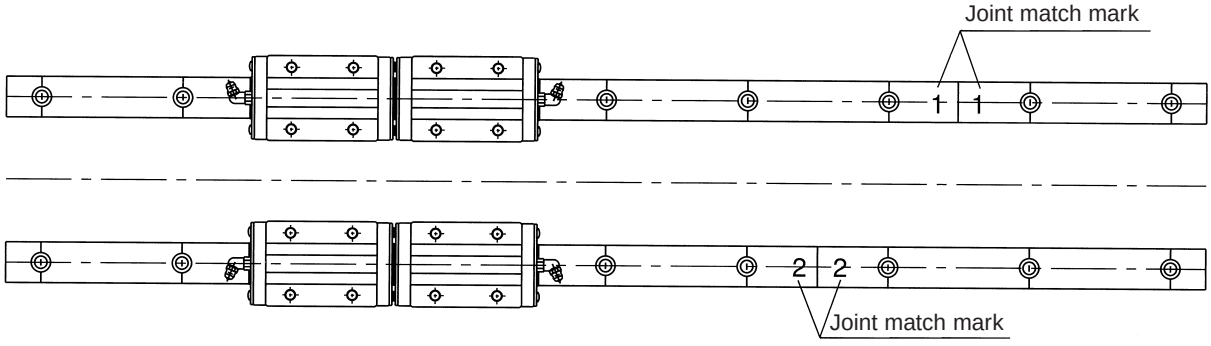
Joined rails are available for SGL and SGW series with standard grade, high grade, and with normal preload.
For joined rails on SEB series please contact NB.
Joined rails are not available for GL and SER series.

Figure A-23 Examples of Joined Guide Rails

① Joints for right/left rails are placed at the same location




② Joints for right/left rails are placed at different locations



# DUST PREVENTION

## Seals:

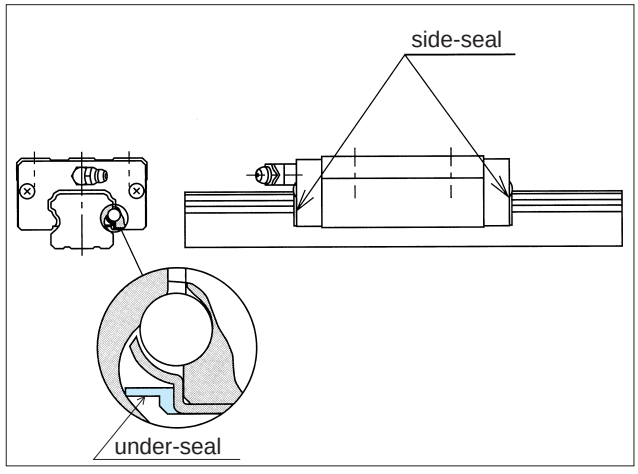
### Side seal (Series: SEB, SER, GL, SGL or SGW)

Slide guides with side-seals are used in typical environments to prevent dust from entering the guide block from above.

### Under seal (Series: GL, SGL or SGW)

Slide guides with side and under seals are used in more harsh environments or to prevent dust entering from below.

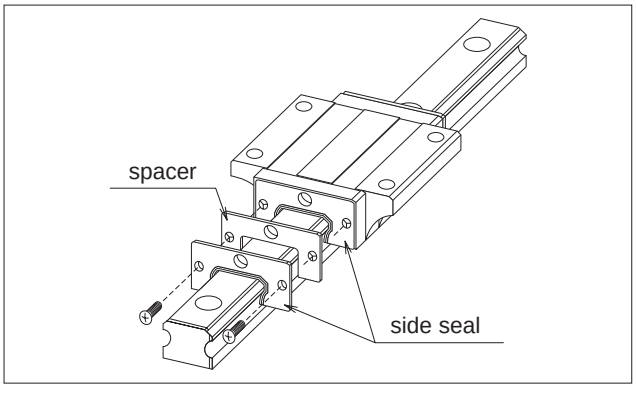
Figure A-24 Side-Seals and Under-Seals




### Double Side Seal Option (Series: GL or SGL)

With this option, the prevention against dust is greatly improved. Ideal for use in applications where bellows or covers are not able to be fitted over the system.

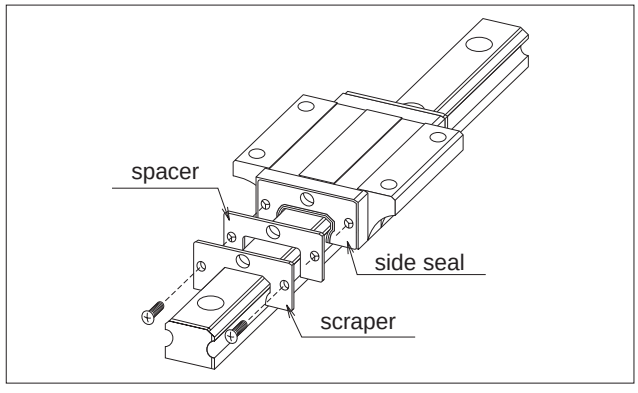
Figure A-25 Double Side-Seal




### Scraper Option (Series: GL or SGL)

When the working application environment has unfavorable foreign matter or debris such as welding splatter or cutting debris, the Scraper option provides an effective protective measure for the Guide Block.

Figure A-26 Scraper



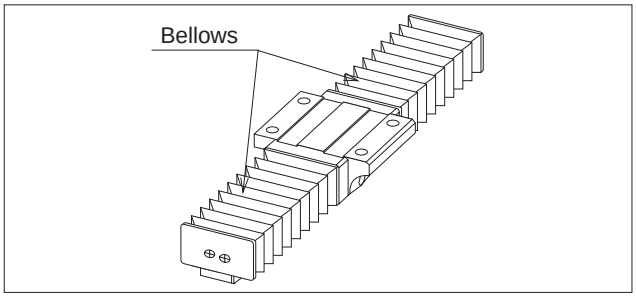

### No Side Seal (Series: SEB or SER)

When the presence of dust or debris is extremely low and only minor motion resistance is desired, a No Side Seal option may be required. Be aware that with this option, that dust prevention can not be expected.

## Bellows Option (Series: GL or SGL)

This option fully covers the Slide Rail preventing dust, debris, and other foreign particles from disrupting the smooth linear motion movement. (Refer to Page A-16 for further details)

Figure A-27 Optional Bellows




## Special Cap:

For GL, SGL and SGW guides, special rail mounting caps are available to prevent dust from entering the installation mounting holes. These caps are installed after the rail is installed by using a jig and slowly inserting them into the holes until their top surface is flush with the rail surface.

Figure A-28 Special Cap Installation

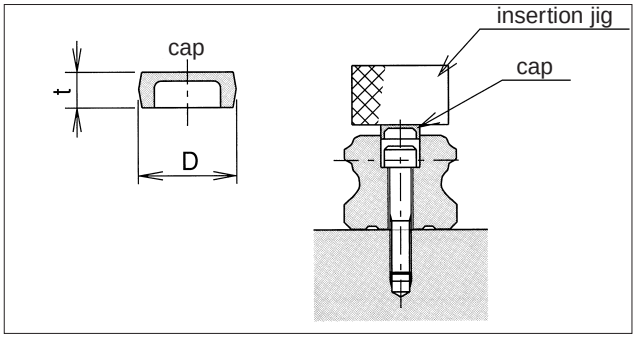



Table A-3 Special Caps

| part number | dimensions | | applicable slide guide | | | | |
|---|---|---|---|---|---|---|---|
| | D mm | t mm | GL-F, E, TF, TE | GL-HTF, HTE | SGL-F, E, TF, TE | SGL-HTF, HTE | SGW |
| F3 | 6.1 | 1.3 | 15 | – | 15 | – | – |
| F4 | 7.6 | 1.1 | 15D | 15 | 15D | 15 | 17,21,27 |
| F5 | 9.7 | 2.5 | 20 | 20 | 20 | 20 | – |
| F6 | 11.2 | 2.7 | 25,30 | 25 | 25,30 | 25 | 35 |
| F8 | 14.3 | 3.65 | 35 | 30,35 | 35 | 30,35 | – |
| F12 | 20.3 | 4.65 | – | 45 | – | 45 | |

# CORROSION RESISTANCE

For corrosion resistance, the SEB and SER guides are available in stainless steel material option. Low temperature black chrome treatment can be specified for the GL, SGL and SGW guide series. This treatment is suitable for applications where corrosion resistance is required or periodic lubrication is difficult.

# LUBRICATION

Lithium soap grease is applied to NB slide guides before they are shipped so that they are ready for immediate use. The same type of grease should be added periodically depending on the operating conditions.

For GL, SGL, and SGW types, a Fiber Sheet is available which significantly extends lubricant replenishment intervals. Refer to page A-19 for details.

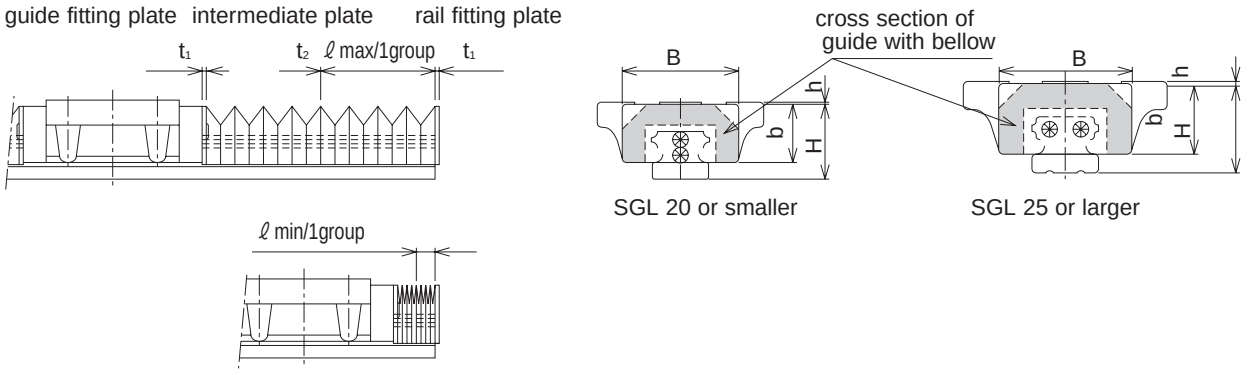
For use in clean rooms or vacuum environments, slide guides without grease are available. Slide guides lubricated with customer specified grease for special applications are also available. Please contact us if you need such products.

NB also provides low dust generation linear system lubricant. Please refer to page Eng-20 for further details.

# BELLOWS

By protecting the entire length of Guide Rails, the dust prevention is greatly enhanced. Please refer to Figure A-29 for dimensional information.
External dimensions and the stroke of Slide Guide are affected when using bellows.

Figure A-29 Dimensions of Slide Guide with Bellows




Note: Do not remove the Guide Fitting Plate installation bolts or the Slide Guide is no longer functional.

| Part Number | | B | H | h | b | t1 | t2 | ℓ max/1 group | ℓ min/1 group |
|---|---|---|---|---|---|---|---|---|---|
| GL 15F/TF/E/TE | SGL 15F/TF/E/TE | 33 | 23 | 1 | 19 | 1.5 | 1.0 | 32 | 6.5 |
| GL 15HTE | SGL 15HTE | | | | | | | | |
| GL 15HTF | SGL 15HTF | | | 5 | | | | | |
| GL 20F/TF/E/TE | SGL 20F/TF/E/TE | 41 | 27 | 1 | 21.5 | | | 40 | |
| GL 20HTF/HTE | SGL 20HTF/HTE | | | 3 | | | | | |
| GL 25F/TF/E/TE | SGL 25F/TF/E/TE | 47 | 32 | 1 | 25.5 | | | 44 | |
| GL 25HTF | SGL 25HTF | | | 8 | | | | | |
| GL 25HTE | SGL 25HTE | | | 4 | | | | | |
| GL 30F/TF/E/TE | SGL 30F/TF/E/TE | 58 | 40 | 2 | 31 | | | 56 | |
| GL 30HTE | SGL 30HTE | | | | | | | | |
| GL 30HTF | SGL 30HTF | | | 5 | | | | | |
| GL 35F/TF/E/TE | SGL 35F/TF/E/TE | 68 | 46 | 2 | 37 | | | 68 | |
| GL 35HTE | SGL 35HTE | | | | | | | | |
| GL 35HTF | SGL 35HTF | | | 9 | | | | | |
| GL 45HTF | SGL 45HTF | 84 | 59 | 1 | 50 | 2.0 | | 72 | |
| GL 45HTE | SGL 45HTE | | | 11 | | | | | |

Note: 1 group indicates the minimum unit of bellows.
When bellows are fitted to the Guide Block, the grease fitting cannot be installed.
Please contact NB for details on the installation of bellows, as well as for special application usage.

## Calulcation method of length of Bellows and Slide Guide Rails

Example: In this case, one(1) piece of SGL15TE Guide Block is mounted on a Rail with Bellows; the required stroke is 440mm. Group numbers required for a stroke of 440mm is calculated as illustrated below.

$$\frac{\text{Stroke}}{\ell \text{ max} - \ell \text{ min}} = \frac{440}{32-6.5} = 17.2 \fallingdotseq 18 \text{ groups(round up)}$$

When 18 groups of Bellows are fitted, the maximum length $\ell 1$ is calculated:

$\ell 1$ = guide fitting plate + $\ell$ max/1 group × number of groups + Intermediate plate × (number of groups − 1)

= 1.5 + 32 × 18 + 1.0 × (18 − 1) = 594.5

When 18 groups of Bellows are fitted, the minimum length $\ell 2$ is calculated:

$\ell 2$ = guide fitting plate + $\ell$ min/1 group × number of groups + intermediate plate × (number of groups − 1)

= 1.5 + 6.5 × 18 + 1.0 × (18 − 1) = 135.5

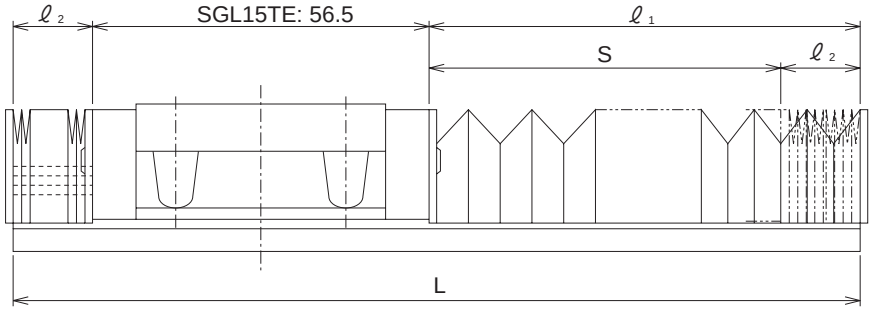
With these calculation results, stroke limit(S) and length of the guide rail needed(L)are obtained as follows:

S = $\ell 1 - \ell 2$ = 594.5 − 135.5 = 459

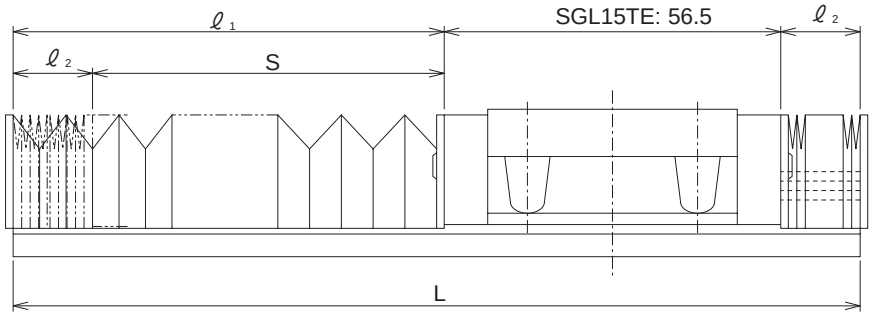
L = $\ell 1 + \ell 2$ + length of SGL 15TE block = 594.5 + 135.5 + 56.5 = 786.5 ≒ 787(round up)

Figure A-30 External diagram f Slide Guide with bellows attached

When Slide Guide is moved to the left side



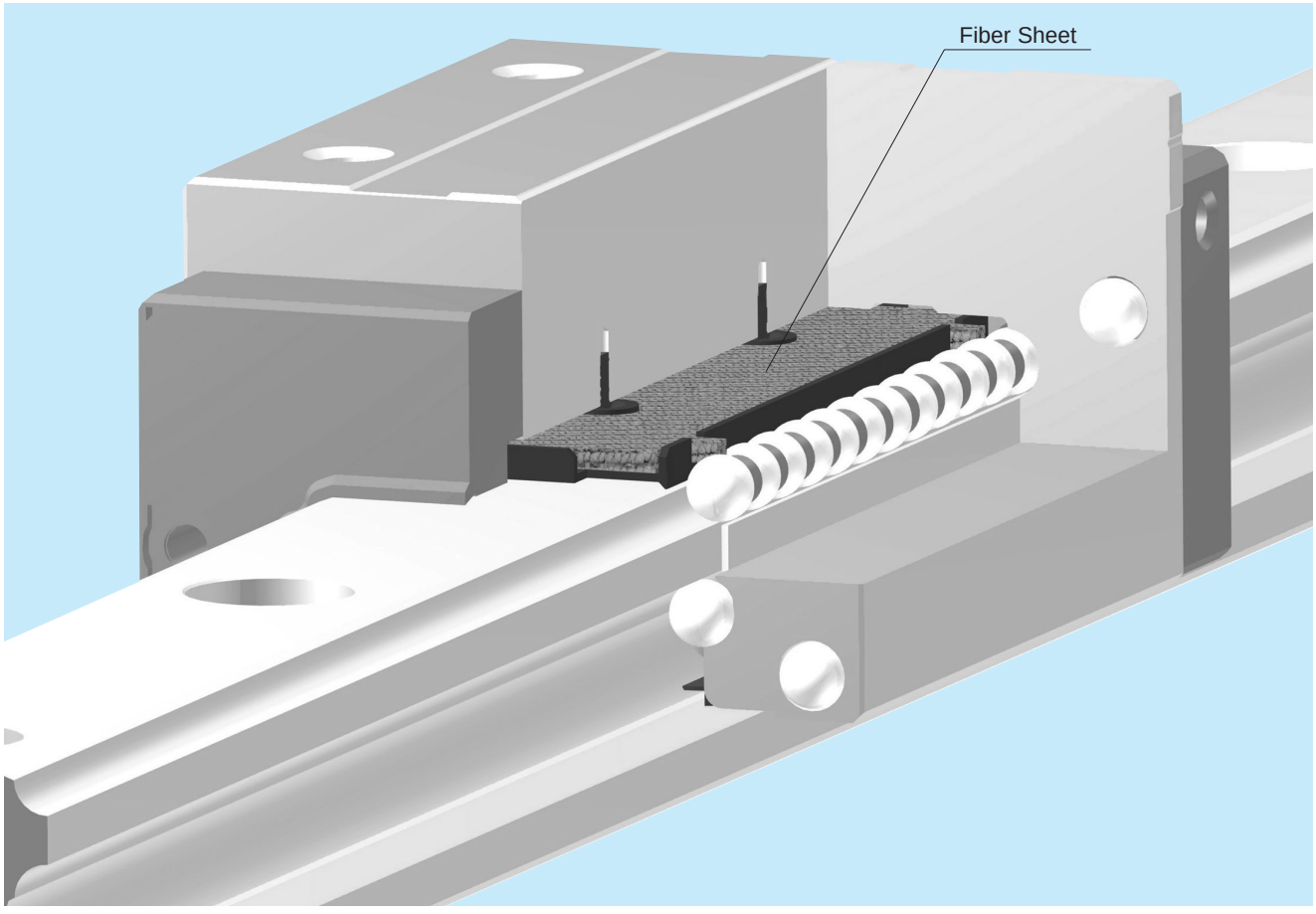

When Slide Guide is moved to the right side



# FIBER SHEET

For the NB slide guide GL, SGL, and SGW types, fiber sheets are available. The sheet significantly extends lubricant replenishment intervals and has an excellent durability even under harsh conditions with dust, which absorbs lubricant. Embedded in a block body, as shown in Fig.A-31, it does not change the length of the block. In addition, the fiber sheet does not require any change in mounting method, which allows replacement with existing products without a design change.

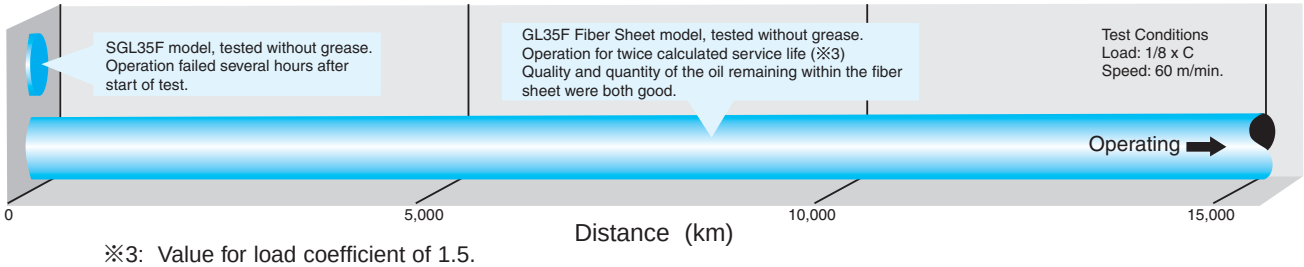
Figure A-31 Detailed View of the Fiber Sheet



# Simplified lubrication management

NB's fiber sheet is material with a porous structure containing the lubricant oil. The oil is supplied to the ball elements at the proper time and in the proper amount by the principle of capillarity, greatly increasing the intervals between when oiling is required.

Figure A-32 Degreased model durability test

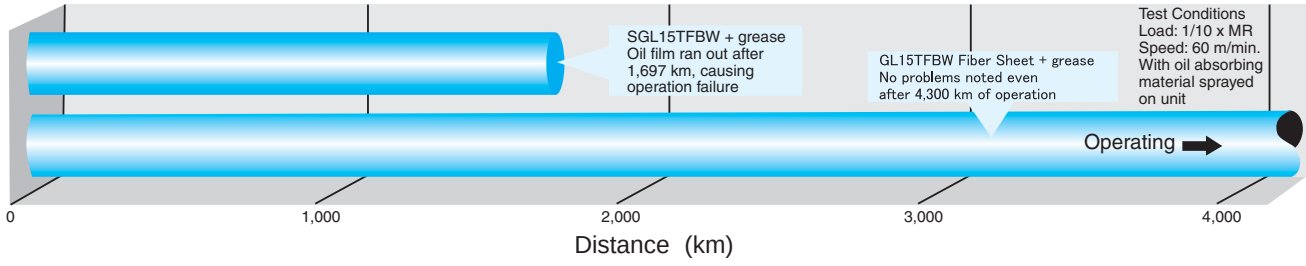



※3: Value for load coefficient of 1.5.

# Outstanding durability even under poor operating conditions

An acceleration test was performed with oil absorbing material sprayed on the units to validate the GL type's lubrication performance and durability even under poor operating conditions.

Figure A-33 Lubrication acceleration test



# SLIDE GUIDE Miniature SEB Type

**The SEB type slide guide is a linear motion bearing in which the ball elements roll along two tracking grooves. This is the smallest and lightest slide guide series offered by Nippon Bearing. The compact design allows for the size and weight of machinery and other equipment to be reduced.**

## STRUCTURE AND ADVANTAGES

The SEB type slide guide consists of a rail with precisely machined raceway grooves and a block assembly consisting of the main body, return caps and ball elements. Side-seals are available as an optional feature.

### Retained Ball:

With the retained balls, the SEBS "B" type block is able to be removed from the guide rail, simplifying its installation and resulting in lower assembly costs.

### All Stainless Steel Type:

By using Stainless Steel for the return caps, the SEBS "BM" type is constructed from only Stainless Steel making this the ideal choice for special environments such as high temperature, clean room, or vacuum applications.

### Moment Resistant:

A wide block "WA" type, a long block "AY" type, and a wide/long block "WAY" type are moment resistant slide guides available. One of these should be suitable for any demanding operating condition.

### Tapped-Hole rail Types:

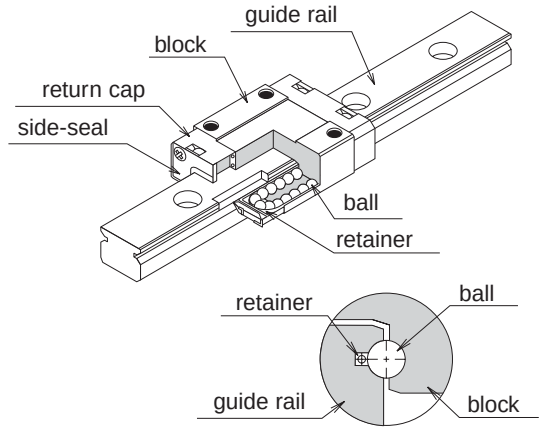
Slide guides with clearance holes are standard and tapped holes are available upon request.

### Anti-Corrosion:

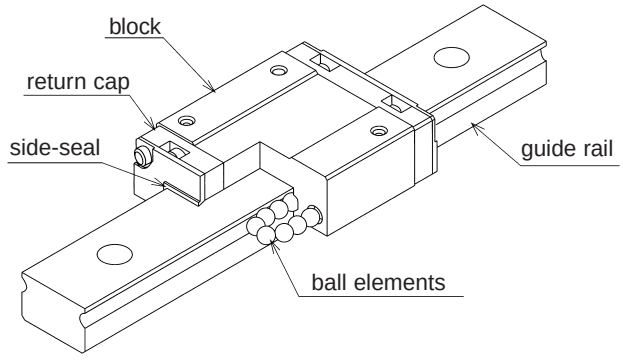
The SEBS type slide guide uses Martensite stainless steel which is highly resistant to corrosion and may be used in hostile environments.

Figure A-34 Structure of SEB Type Slide Guide

SEB-B type (Retained ball type)



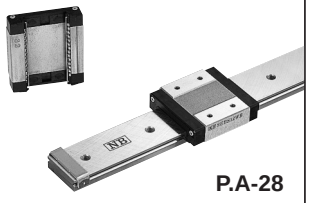
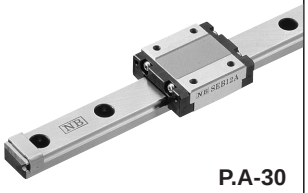
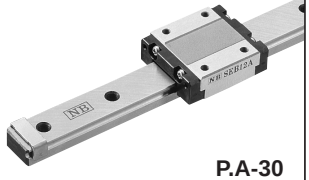
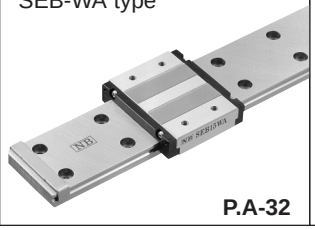
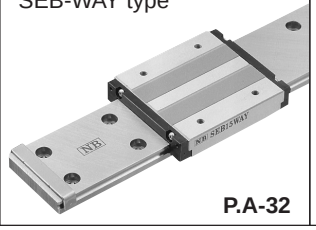
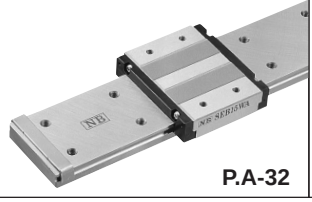
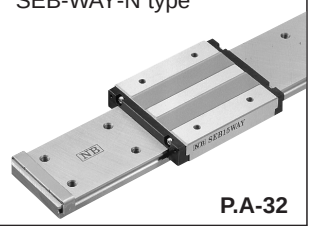

SEB-A type (Non-Retained ball type)



# TYPES

The SEB(S) type slide guides are categorized according to their block shape and the rail installation method. They are also available in stainless steel and with or without optional side-seals.

Table A-4 Type

| | | standard block counterbore rail type | long block counterbore rail type | standard block tapped hole rail type | long block tapped hole rail type |
|---|---|---|---|---|---|
| retained ball type | | SEBS-B type  P.A-26 | SEBS-BY type  P.A-26 | SEBS-B-N type  P.A-26 | SEBS-BY-N type  P.A-26 |
| | All stainless steel | SEBS-BM type  P.A-26 | SEBS-BYM type  P.A-26 | SEBS-BM-N type  P.A-26 | SEBS-BYM-N type  P.A-26 |
| | Wide type | SEBS-WB type  P.A-28 | SEBS-WBY type  P.A-28 | SEBS-WB-N type  P.A-28 | SEBS-WBY-N type  P.A-28 |
| non-retained ball type | | SEB-A type  P.A-30 | SEB-AY type  P.A-30 | SEB-A-N type  P.A-30 | SEB-AY-N type  P.A-30 |
| | Wide type | SEB-WA type  P.A-32 | SEB-WAY type  P.A-32 | SEB-WA-N type  P.A-32 | SEB-WAY-N type  P.A-32 |

# ACCURACY

The SEB(S) slide guides are available in two grades of accuracy: high-grade and precision-grade (P).

Table A-5 Accuracy unit/mm

| accuracy grade | high | precision |
|---|---|---|
| accuracy symbol | none | P |
| allowable dimensional difference in height H | ±0.020 | ±0.010 |
| paired difference for height H | 0.015 | 0.007 |
| allowable dimensional difference in width W | ±0.025 | ±0.015 |
| paired difference for width W | 0.020 | 0.010 |
| Running parallelism of surface C to surface A | Refer to Figure A-36 | |
| Running parallelism of surface D to surface B | | |

Figure A-35 Accuracy

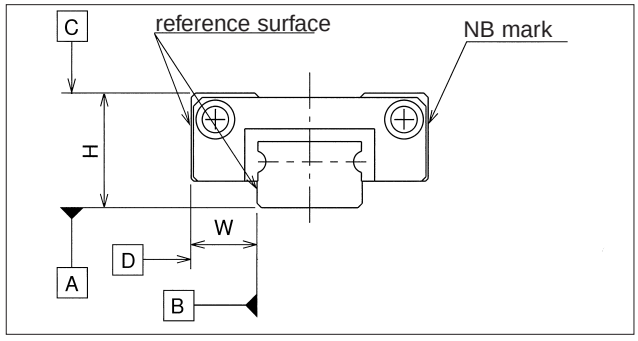
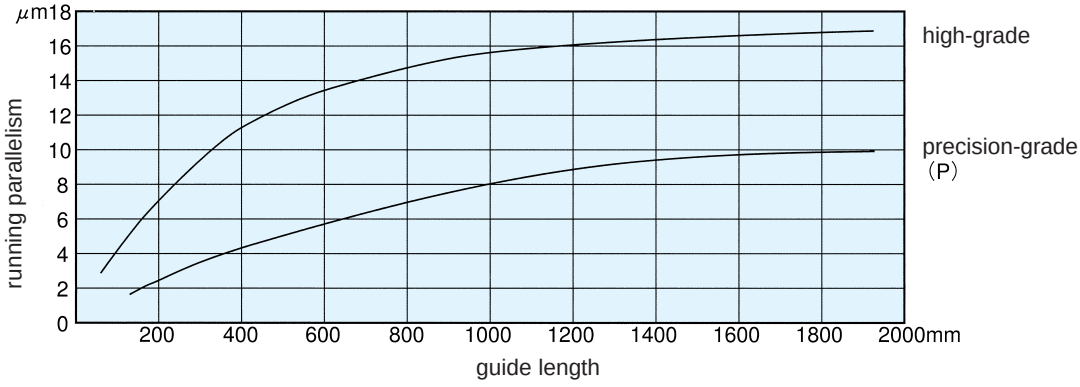



Figure A-36 Motion Accuracy




# PRE-LOAD

SEB(S) slide guides are available with a standard pre-load (no suffix), light pre-load (T1), and a positive-clearance (T0).

Table A-6 Pre-Load symbol and Radial Clearance unit/μm

| pre-load | clearance | standard | light |
|---|---|---|---|
| symbol | T 0 | none | T 1 |
| 2 | +1～+3 | − | − |
| 3 | | | |
| 5 | | −1～0 | |
| 7 | +3～+6 | −3～0 | −4～−2 |
| 9 | | | |
| 12 | | | |
| 15 | +4～+8 | | −7～−3 |
| 20 | | | |
| 3W | +3～+6 | − | − |
| 7W | | −3～0 | −4～−2 |
| 9W | | | |
| 12W | | | |
| 15W | +4～+8 | | −7～−3 |

Table A-7 Operating Conditions and Pre-Load

| pre-load | symbol | operating conditions |
|---|---|---|
| clearance | T0 | Smooth movement is crucial. The installation tolerance is to be absorbed. |
| standard | none | Minute vibration is applied. High-precision movement is required. A moment in a given direction is applied. |
| light | T1 | Light vibration is applied. A slight torque is applied. When moment is applied. |

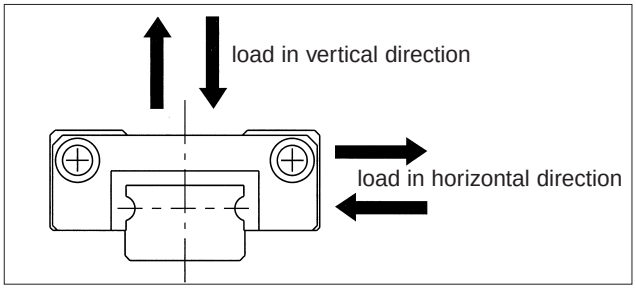
# RATED LOAD

The load rating for SEB(S) slide guides depends on the direction of load.

Table A-8 Load Rating

| | | ratained ball types | standard types |
|---|---|---|---|
| basic dynamic load rating | vertical | 1.00×C | 1.00×C |
| | horizontal | 0.89×C | 1.13×C |
| basic static load rating | vertical | 1.00×Co | 1.00×Co |
| | horizontal | 0.84×Co | 1.19×Co |

Figure A-37 Direction of Load




# EQUIVALENT LOAD

For a guide to which vertical load and horizontal load are applied at the same time, calculate its static equivalent load using the following formula.

**P = Pa + X ・ Ps**

P: equivalent load Pa: vertical load Ps: horizontal load
X: 0.84 for SEB-A type; 1.19 for SEB-B type

# RAIL LENGTH

Slide guides with most commonly used lengths are available as standard. Unless otherwise specified, the distance to the first mounting hole (N) from one end of the rail will be located within the ranges listed in Tables A-9 and A-10 for slide guides with non-standard lengths satisfying the following equation.

**L = M ・ P + 2N**

L : length (mm) N : distance to the first hole from the end of the rail (mm)
M : number of pitches P : hole pitch (mm)

Figure A-38 Rail

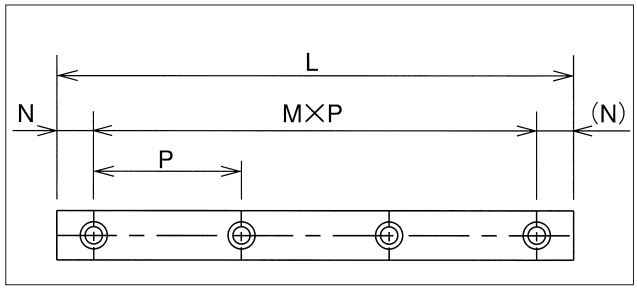



Table A-9 Standard-Type Rails unit/mm

| size | N | |
|---|---|---|
| | and over | less than |
| 2 | 3 | 7 |
| 3 | | 8 |
| 5 | | 10.5 |
| 7 | | |
| 9 | 4 | 14 |
| 12 | | 16.5 |
| 15 | | 24 |
| 20 | 6 | 36 |

Table A-10 Wide-Type Rails unit/mm

| size | N | |
|---|---|---|
| | and over | less than |
| 3W | 3 | 10.5 |
| 5W | 4 | |
| 7W | | 19 |
| 9W | | |
| 12W | 5 | 25 |
| 15W | | |

# MOUNTING

## Mounting Surface Shapes:

Slide guides are mounted by pushing the reference surface of the rail and the block against the shoulder provided on the mounting surface. An escape groove or a radius corner should be provided at the corner of the shoulder to prevent interference. The recommended shoulder height values on the mounting reference surface of the other component are shown in Table A-11.

Figure A-39 Mounting Surface Shape-1

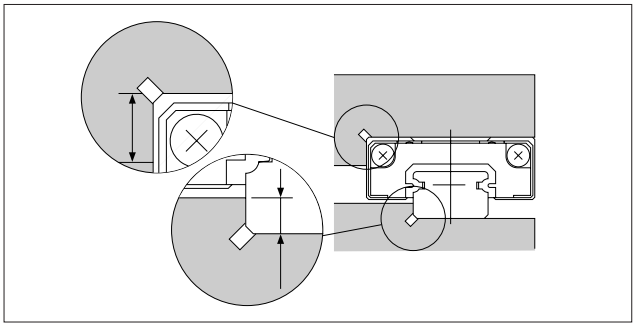


Figure A-40 Mounting Surface Shape-2

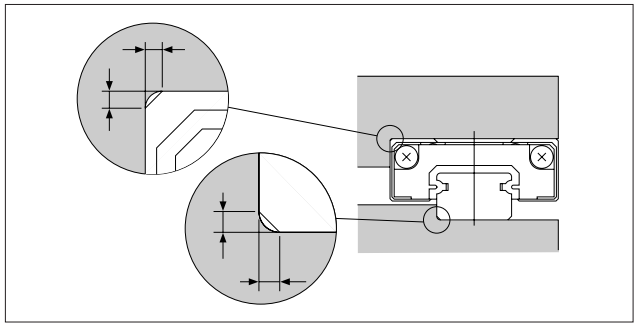


Table A-11 Shoulder Height on the Mounting Reference Surface unit/mm

| size | shoulder height on the block side h1 | shoulder height on the rail side h2 |
|---|---|---|
| 2 | 1 | 0.5 |
| 3 | 1.2 | 0.8 |
| 5 | 2 | 1 |
| 7 | 2.5 | |
| 9 | 3 | 1.5 |
| 12 | 4 | 2 |
| 15 | 5 | 3.5 |
| 20 | | 5 |
| 3W | 1.5 | 0.8 |
| 5W | 2 | 1 |
| 7W | 3 | 1.5 |
| 9W | | 2.5 |
| 12W | 4 | |
| 15W | 5 | |

Table A-12 Maximum Corner Radius Values unit/mm

| size | block mounting part $r_1$ | rail mounting part $r_2$ |
|---|---|---|
| 2 | 0.1 | 0.1 |
| 3 | 0.15 | |
| 5 | 0.3 | 0.3 |
| 7 | | |
| 9 | | |
| 12 | | |
| 15 | | |
| 20 | | 0.5 |
| 3W | 0.15 | 0.1 |
| 5W | 0.3 | 0.3 |
| 7W | | |
| 9W | | |
| 12W | | |
| 15W | | |

## Recommended Torque Values:

The bolts used to secure the rail should be tightened to a certain torque using a torque wrench. The recommended torque values are given in Tables A-13. Please adjust the torque depending on the operating conditions.

Table A-13 Recommended Torque unit/N·m

| bolts size | M1 | M1.4 | M1.6 | M2 | M2.6 | M3 | M4 | M5 | M6 |
|---|---|---|---|---|---|---|---|---|---|
| recommended torque | 0.03 | 0.10 | 0.15 | 0.3 | 0.65 | 1.0 | 2.3 | 4.7 | 8.0 |

(When using stainless steel bolts)

# MOUNTING BOLTS

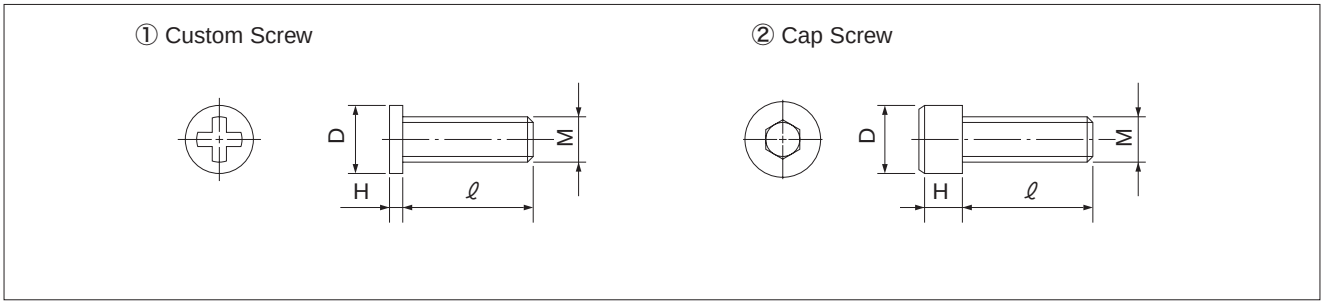
Extremely small custom bolts for mounting are available from NB.

Table A-14 Mounting Bolt Dimension unit/mm

| | | bolt size | D | H | pitch | ℓ |
|---|---|---|---|---|---|---|
| custom screw | Figure A-41 ① | M1 | 1.8 | 0.45 | 0.25 | 3, 4, 5 |
| | | M1.4 | 2.5 | 0.8 | 0.3 | 2.5, 3, 4 |
| | | M1.6 | 2.3 | 0.5 | 0.35 | 4, 5, 6 |
| | | M2 | 3 | 0.6 | 0.4 | 6 |
| cap screw | Figure A-41 ② | M2 | 3.8 | 2 | 0.4 | 4, 5, 6, 8, 10 |
| | | M2.6 | 4.5 | 2.6 | 0.45 | 4, 5, 6, 8, 10 |

All the material is stainless steel.

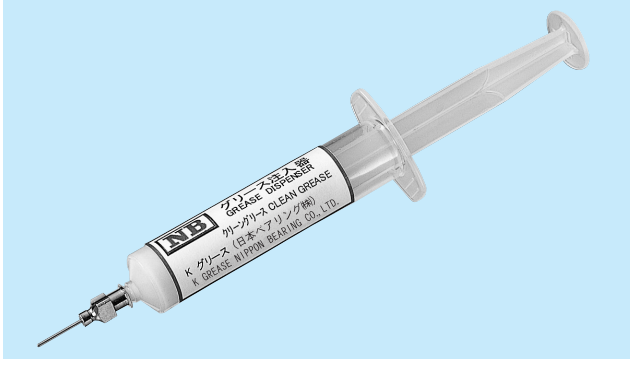
Figure A-41 Mounting Screws




# LUBRICATION

A high grade lithium soap grease is applied to the NB Slide Guides in our factory making these ready for immediate use. A similar type grease should be added periodically depending on the operating conditions.

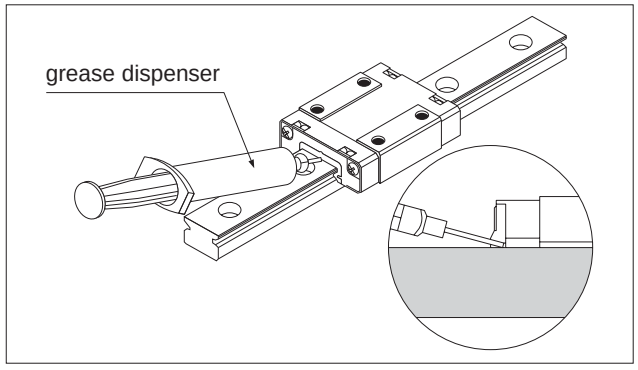
For use in clean rooms or vacuum environments, NB Slide Guides without grease are available upon request. Additionally, customer specified grease cases, please contact NB.




A special syringe lubricant applicator (refer to Figure A-42) is available from NB as an option. In particular, the SEBS-B ball retaining type has a special structure that allows the user to replenish lubricant easily (patented), as shown in the magnified view of the inside Fig.A-42.

Please refer to Page Eng-20 for details on the low dust generation lubricant.

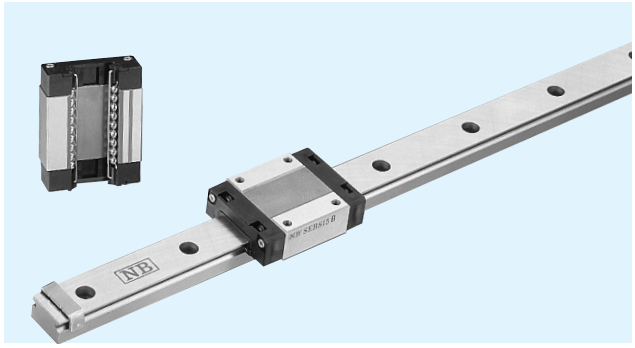
Figure A-42 Greasing Method



# SEBS-B/BY TYPE

# SEBS-BM/BYM TYPE

## – Retained Ball Type –

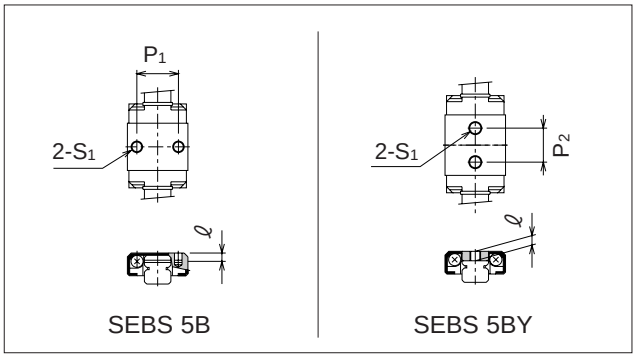


part number structure

example **SEBS 15 B Y M UU 2 T1 - 589 N P / W2**

- SEBS: anticorrosion
- size
- retained ball type
- block size: blank standard; Y long
- return cap: blank resin; M stainless steal
- seal: blank without seal; UU seals on both ends
- number of blocks attached to one rail
- total length of rail
- pre-load symbol: T0 clearance; blank standard; T1 light pre-load
- mounting hole rail: blank counter bore; N tapped hole
- accuracy grade: blank high; P precision
- symbol for number of rails: blank single rail; W2 double rails; W3 triple rails

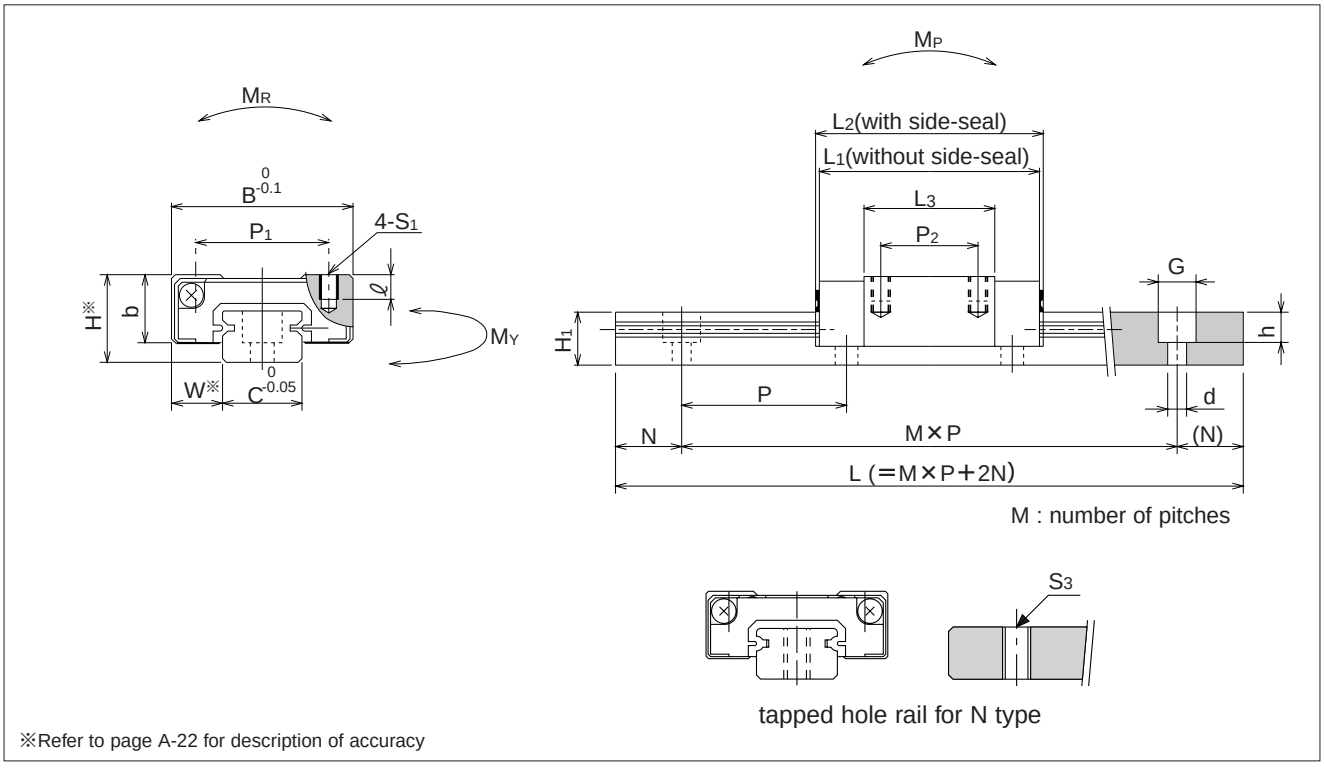
Note: The symbol for the number of rails does not mean the number of rails ordered.




| part number | | assembly dimensions | | block dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H | W | B | $L_1$ | $L_2$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | $L_3$ | b |
| resin return cap | stainlees return cap | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm |
| **SEBS 5B** | **SEBS 5BM** | 6 | 3.5 | 12 | 16.3 | 16.7 | 8 | – | M2 | 1.5 | 9.3 | 4.5 |
| **SEBS 5BY** | **SEBS 5BYM** | | | | 19.3 | 19.7 | – | 7 | M2.6 | 1.8 | 12.3 | |
| **SEBS 7B** | **SEBS 7BM** | 8 | 5 | 17 | 23 | 23 | 12 | 8 | M2 | 2.5 | 12.8 | 6.5 |
| **SEBS 7BY** | **SEBS 7BYM** | | | | 32.5 | 32.5 | | 13 | | | 22.3 | |
| **SEBS 9B** | **SEBS 9BM** | 10 | 5.5 | 20 | 30.8 | 30.8 | 15 | 10 | | 3 | 19.6 | 7.8 |
| **SEBS 9BY** | **SEBS 9BYM** | | | | 40.3 | 40.3 | | 16 | | | 29.1 | |
| **SEBS 12B** | **SEBS 12BM** | 13 | 7.5 | 27 | 33.8 | 34.2 | 20 | 15 | M3 | 3.5 | 20.2 | 10 |
| **SEBS 12BY** | **SEBS 12BYM** | | | | 45.7 | 46.1 | | 20 | | | 32.1 | |
| **SEBS 15B** | **SEBS 15BM** | 16 | 8.5 | 32 | 41.6 | 42 | 25 | 20 | | 4 | 26.6 | 12 |
| **SEBS 15BY** | **SEBS 15BYM** | | | | 57.5 | 57.9 | | 25 | | | 42.5 | |
| **SEBS 20B** | **SEBS 20BM** | 25 | 13 | 46 | 65.9 | 65.9 | 38 | 38 | M4 | 6 | 44.7 | 17.5 |
| **SEBS 20BY** | **SEBS 20BYM** | | | | 85.7 | 85.7 | | | | | 64.5 | |

| part number | standard rail length L mm | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SEBS 5B** | 40 | 55 | 70 | 85 | 100 | 130 | 160 | | | | | |
| **SEBS 7B** | 40 | 55 | 70 | 85 | 100 | 130 | 160 | 190 | 220 | 250 | 280 | 310 |
| **SEBS 9B** | 55 | 75 | 95 | 115 | 135 | 155 | 175 | 195 | 235 | 275 | 315 | 355 |
| **SEBS 12B** | 70 | 95 | 120 | 145 | 170 | 195 | 220 | 245 | 270 | 295 | 320 | 345 |
| **SEBS 15B** | 70 | 110 | 150 | 190 | 230 | 270 | 310 | 350 | 390 | 430 | 470 | 510 |
| **SEBS 20B** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 760 | 880 | 1,000 | |

With custom length rails, kindly advise distance (N) from one end of rail to first hole.
Unless we are advised (N) distance by customer, we assume distance (N) to be as state in page A-23.
Joint rails are used when the required length exceeds the maximum standard length listed in the dimensional tables contact NB for details.




※Refer to page A-22 for description of accuracy

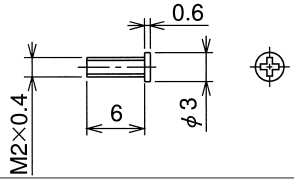
| guide-rail dimensions | | | | | | basic load rating | | allowable static moment | | | mass | | | block size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ | C | d×G×h | $S_3$ | N | P | dynamic C | static Co | $M_P$ | $M_Y$ | $M_R$ | block kg resin return cap | block kg stainless return cap | guide rail kg/m | |
| mm | mm | mm | | mm | mm | kN | kN | N・m | N・m | N・m | | | | |
| 4 | 5 | 2.4×3.5×0.8 | M2.6 | 5 | 15 | 0.52 | 0.76 | 1.14 | 0.96 | 1.97 | 0.003 | 0.004 | 0.13 | **5B** |
| | | | | | | 0.64 | 1.01 | 1.95 | 1.64 | 2.62 | 0.004 | 0.005 | | **5BY** |
| 4.7 | 7 | 2.4×4.2×2.3 | M3 | | | 1.29 | 1.69 | 3.66 | 3.07 | 6.18 | 0.009 | 0.012 | 0.21 | **7B** |
| | | | | | | 1.90 | 2.96 | 10.42 | 8.74 | 10.82 | 0.015 | 0.018 | | **7BY** |
| 5.5 | 9 | 3.5×6×3.5 | M4 | 7.5 | 20 | 1.71 | 2.54 | 7.78 | 6.53 | 11.81 | 0.018 | 0.022 | 0.31 | **9B** |
| | | | | | | 2.27 | 3.80 | 16.84 | 14.13 | 17.71 | 0.027 | 0.031 | | **9BY** |
| 7.5 | 12 | 3.5×6×4.5 | | 10 | 25 | 3.10 | 3.83 | 12.43 | 10.43 | 23.91 | 0.035 | 0.044 | 0.59 | **12B** |
| | | | | | | 4.35 | 6.22 | 30.73 | 25.78 | 38.85 | 0.053 | 0.062 | | **12BY** |
| 9.5 | 15 | | M5 | 15 | 40 | 5.65 | 6.76 | 29.29 | 24.58 | 52.41 | 0.064 | 0.077 | 0.97 | **15B** |
| | | | | | | 7.93 | 10.99 | 72.43 | 60.78 | 85.16 | 0.098 | 0.110 | | **15BY** |
| 15 | 20 | 6×9.5×8.5 | M6 | 20 | 60 | 11.45 | 14.58 | 103.69 | 87.00 | 149.50 | 0.228 | 0.266 | 2.05 | **20B** |
| | | | | | | 14.88 | 21.21 | 210.80 | 176.88 | 217.45 | 0.323 | 0.360 | | **20BY** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | maximum length mm | |
|---|---|---|---|---|---|---|---|
| | | | | | | counter bore | tapped hore (N type) |
| | | | | | | 600 | 300 |
| | | | | | | 1,000 | 700 |
| 395 | 435 | 475 | | | | 1,300 | 1,000 |
| 370 | 395 | 420 | 445 | 470 | 495 | | |
| 550 | 590 | 630 | 670 | | | | |

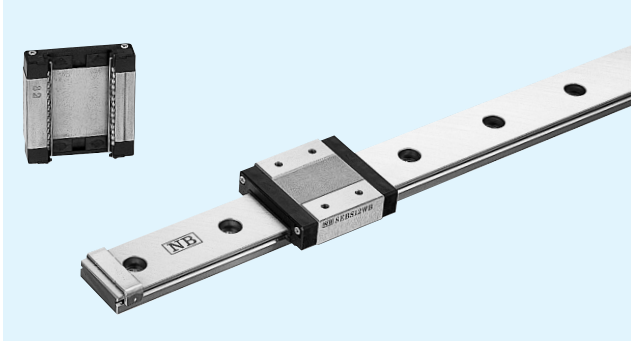
SEBS5 rail-mounting bolt

SEBS5 rails are provided with custom bolts for mounting.



# SEBS-WB/WBY TYPE

## — Retained Ball · Wide Type —

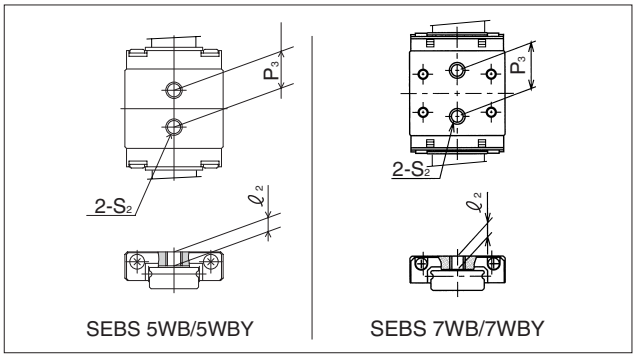


part number structure

example **SEBS 15WB Y UU 2 T1 -589 N P /W2**

- SEBS:anticorrosion
- size
- block size: blank standard; Y long
- seal: blank without seal; UU seals on both ends
- number of blocks attached to one rail
- pre-load symbol: T0 clearance; blank standard; T1 light pre-load
- total length of rail
- mounting hole rail: blank counter bore; N tapped hole
- accuracy grade: blank high; P precision
- symbol for number of rails: blank single rail; W2 double rails; W3 triple rails

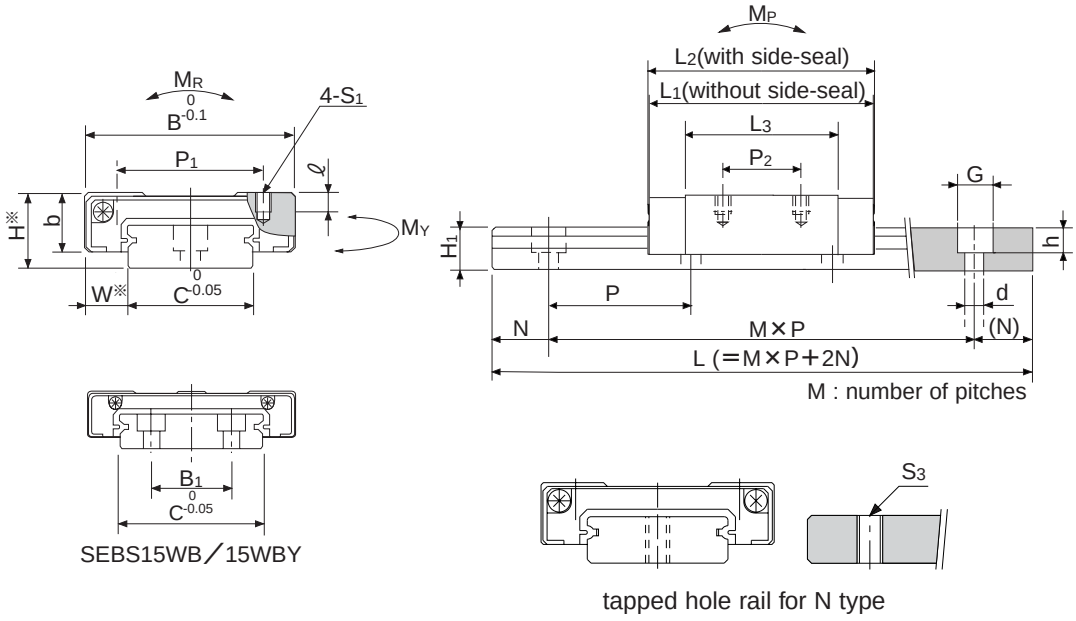
Note: The symbol for the number of rails does not mean the number of rails ordered.




| part number | assembly dimensions | | block dimensions | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $P_1$ | $P_2$ | $S_1$ | $\ell_1$ | $L_3$ | $P_3$ | $S_2$ | $\ell_2$ | b |
| | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | | mm | mm |
| **SEBS 5WB** | 6.5 | 3.5 | 17 | 21.3 | 21.7 | – | – | – | – | 14.3 | 6.5 | M3 | 2.3 | 5 |
| **SEBS 5WBY** | | | | 27.3 | 27.7 | | | | | 20.3 | 11 | | | |
| **SEBS 7WB** | 9 | 5.5 | 25 | 31.4 | 31.4 | 19 | 10 | M3 | 2.8 | 20.2 | 12 | M4 | 3.5 | 7 |
| **SEBS 7WBY** | | | | 40.1 | 40.1 | | 19 | | | 28.9 | 18 | | | |
| **SEBS 9WB** | 12 | 6 | 30 | 38.5 | 38.5 | 21 | 12 | | | 26.3 | – | – | – | 9 |
| **SEBS 9WBY** | | | | 50.5 | 50.5 | 23 | 24 | | 3 | 38.3 | | | | |
| **SEBS 12WB** | 14 | 8 | 40 | 42.6 | 43 | 28 | 15 | | 3.6 | 29 | – | – | – | 11 |
| **SEBS 12WBY** | | | | 58.1 | 58.5 | | 28 | | | 44.5 | | | | |
| **SEBS 15WB** | 16 | 9 | 60 | 54.2 | 54.6 | 45 | 20 | M4 | 4.5 | 38.8 | – | – | – | 13 |
| **SEBS 15WBY** | | | | 73.3 | 73.7 | | 35 | | | 57.9 | | | | |

| part number | standard rail length L mm | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SEBS 5WB** | 50 | 70 | 90 | 110 | 130 | 150 | 170 | 190 | | | | |
| **SEBS 7WB** | 50 | 80 | 110 | 140 | 170 | 200 | 230 | 260 | 290 | 350 | 410 | 470 |
| **SEBS 9WB** | 50 | 80 | 110 | 140 | 170 | 200 | 230 | 260 | 290 | 350 | 410 | 470 |
| **SEBS 12WB** | 70 | 110 | 150 | 190 | 230 | 270 | 310 | 350 | 390 | 430 | 470 | 550 |
| **SEBS 15WB** | 70 | 110 | 150 | 190 | 230 | 270 | 310 | 350 | 390 | 430 | 470 | 550 |

The rail length shoud be longer than the mated block length.
The minimum standard rail can not be used for SEBS 9 WBY and SEBS 15 WBY.




SEBS15WB／15WBY

tapped hole rail for N type

※Refer to page A-22 for description of accuracy

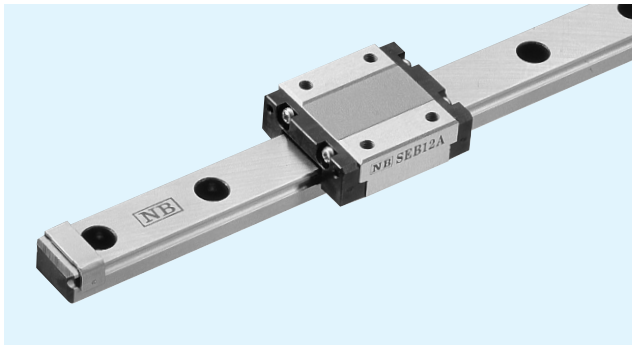
| guide-rail dimensions | | | | | | | basic load rating | | allowable static moment | | | mass | | block size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ | C | $B_1$ | d×G×h | $S_3$ | N | P | dynamic C | static Co | $M_P$ | $M_Y$ | $M_R$ | block | guide rail | |
| mm | mm | mm | mm | | mm | mm | kN | kN | N・m | N・m | N・m | kg | kg/m | |
| 4 | 10 | – | 3×5.5×3 | M3 | 5 | 20 | 0.71 | 1.18 | 2.61 | 2.19 | 6.00 | 0.007 | 0.26 | **5WB** |
| | | | | | | | 0.91 | 1.68 | 5.17 | 4.33 | 8.57 | 0.010 | | **5WBY** |
| 5.2 | 14 | – | 3.5×6×3.2 | M4 | 10 | 30 | 1.71 | 2.54 | 7.78 | 6.53 | 18.15 | 0.020 | 0.51 | **7WB** |
| | | | | | | | 2.27 | 3.80 | 16.84 | 14.13 | 27.22 | 0.028 | | **7WBY** |
| 7.5 | 18 | – | 3.5×6×4.5 | | | | 2.97 | 4.37 | 18.14 | 15.22 | 40.41 | 0.037 | 0.96 | **9WB** |
| | | | | | | | 3.87 | 6.38 | 37.43 | 31.41 | 59.05 | 0.052 | | **9WBY** |
| 8 | 24 | – | 4.5×8×4.5 | M5 | 15 | 40 | 4.11 | 5.74 | 26.42 | 22.16 | 70.29 | 0.071 | 1.37 | **12WB** |
| | | | | | | | 5.46 | 8.61 | 57.16 | 47.96 | 105.44 | 0.106 | | **12WBY** |
| 9.5 | 42 | 23 | | | | | 7.50 | 10.14 | 62.27 | 52.25 | 215.53 | 0.148 | 2.86 | **15WB** |
| | | | | | | | 9.95 | 15.21 | 134.73 | 113.05 | 323.30 | 0.216 | | **15WBY** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | maximum length mm | |
|---|---|---|
| | counter bore | tapped hore (N type) |
| | 600 | 500 |
| | 1,000 | 700 |
| 530 | 1,300 | 1,000 |
| 630 710 | | |
| 630 710 790 870 | | |

# SEB-A/AY TYPE

## – Standard Type –

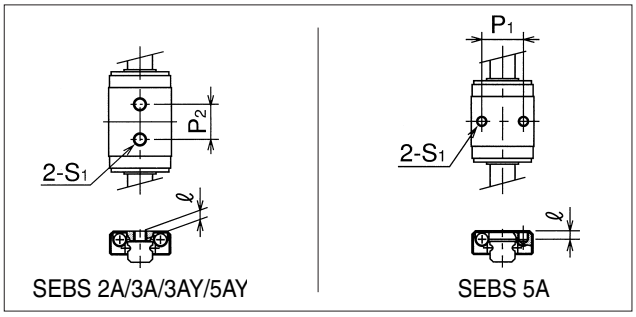



part number structure

example SEBS | 15A | Y | UU | 2 | T1 | - | 589 | N | P | / | W2

- SEBS:anticorrosion size
- block size: blank standard; Y long
- seal: blank without seal; UU seals on both ends
- number of blocks attached to one rail
- pre-load symbol: T0 clearance; blank standard; T1 light pre-load
- total length of rail
- mounting hole rail: blank counter bore; N tapped hole
- accuracy grade: blank high; P precision
- symbol for number of rails: blank single rail; W2 double rails; W3 triple rails

Note: The symbol for the number of rails does not mean the number of rails ordered.

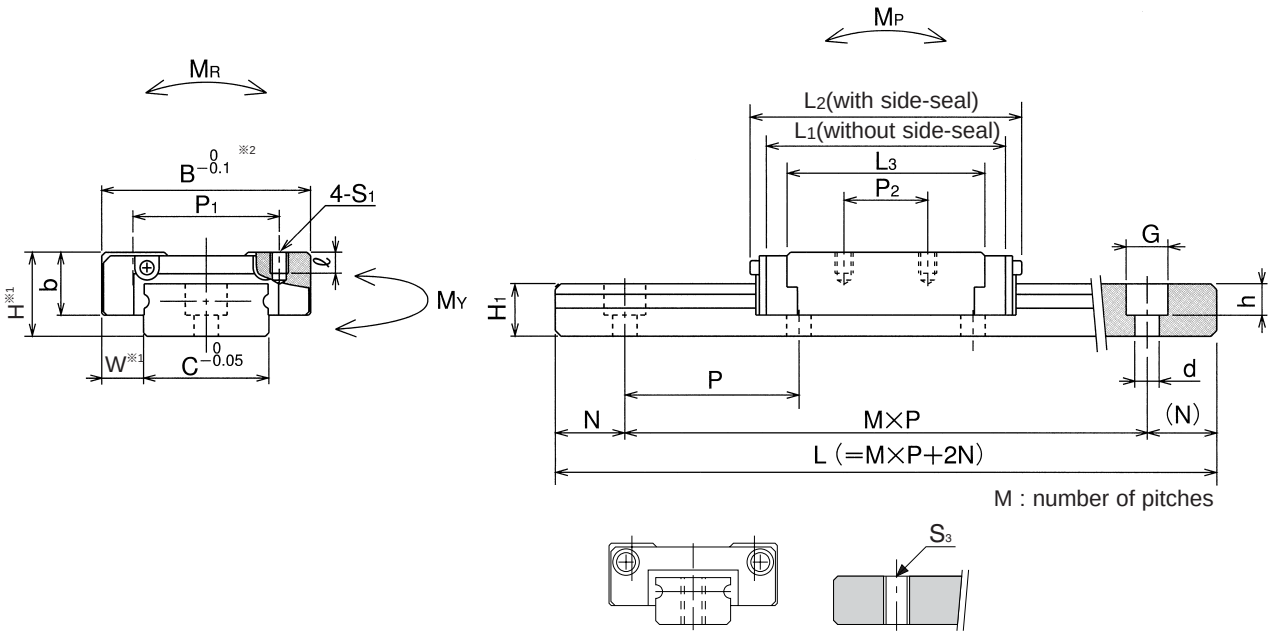



SEBS 2A/3A/3AY/5AY SEBS 5A

| part number | | assembly dimensions | | block dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H | W | B | $L_1$ | $L_2$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | $L_3$ | b |
| standard | anticorrosion | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm |
| – | **SEBS 2A** | 3.2 | 2 | 6 | 12.9 | 14.3 | – | 4 | M1.4 | 1.05 | 9.3 | 2.5 |
| – | **SEBS 3A** | 4 | 2.5 | 8 | 10.5 | 11.8 | – | 3.5 | M1.6 | 1.3 | 6.5 | 3 |
| | **SEBS 3AY** | | | | 14.5 | 15.8 | – | 5.5 | M2 | | 10.5 | |
| – | **SEBS 5A** | 6 | 3.5 | 12 | 15.6 | 17 | 8 | – | M2 | 1.5 | 9.8 | 4.5 |
| | **SEBS 5AY** | | | | 19.2 | 20.6 | – | 7 | M2.6 | 1.8 | 13.4 | |
| – | **SEBS 7A** | 8 | 5 | 17 | 21.9 | 24 | 12 | 8 | M2 | 2.5 | 15.1 | 6.5 |
| | **SEBS 7AY** | | | | 31 | 33 | | 13 | | | 24.6 | |
| **SEB 9A** | **SEBS 9A** | 10 | 5.5 | 20 | 28.1 | 29.5 | 15 | 10 | | 3 | 20.4 | 7.8 |
| **SEB 9AY** | **SEBS 9AY** | | | | 38.1 | 40 | | 16 | | | 30.4 | |
| **SEB 12A** | **SEBS 12A** | 13 | 7.5 | 27 | 30 | 33.5 | 20 | 15 | M3 | 3.5 | 22.8 | 10 |
| **SEB 12AY** | **SEBS 12AY** | | | | 42 | 45.5 | | 20 | | | 34.7 | |
| **SEB 15A** | **SEBS 15A** | 16 | 8.5 | 32 | 38.5 | 42 | 25 | 20 | | 4 | 29.5 | 12 |
| **SEB 15AY** | **SEBS 15AY** | | | | 54.5 | 58 | | 25 | | | 45.4 | |
| **SEB 20A** | **SEBS 20A** | 25 | 13 | 46 | 55.7 | 61 | 38 | 38 | M4 | 6 | 45.7 | 17.5 |
| **SEB 20AY** | **SEBS 20AY** | | | | 79.5 | 85 | | | | | 69.5 | |

| part number | | standard rail length L mm | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| standard | anticorrosion | | | | | | | | | | | | |
| – | SEBS 2A | 32 | 40 | 56 | 80 | 104 | | | | | | | |
| – | SEBS 3A | 30 | 40 | 60 | 80 | 100 | | | | | | | |
| – | SEBS 5A | 40 | 55 | 70 | 85 | 100 | 130 | 160 | | | | | |
| – | SEBS 7A | 40 | 55 | 70 | 85 | 100 | 130 | 160 | 190 | 220 | 250 | 280 | 310 |
| SEB 9A | SEBS 9A | 55 | 75 | 95 | 115 | 135 | 155 | 175 | 195 | 235 | 275 | 315 | 355 |
| SEB 12A | SEBS 12A | 70 | 95 | 120 | 145 | 170 | 195 | 220 | 245 | 270 | 295 | 320 | 345 |
| SEB 15A | SEBS 15A | 70 | 110 | 150 | 190 | 230 | 270 | 310 | 350 | 390 | 430 | 470 | 510 |
| SEB 20A | SEBS 20A | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 760 | 880 | 1,000 | |

Joint rails are used when the required length exceeds the maximum standard length listed in the dimensional tables. Contact NB for details.
Only N type rail is available for SEBS 2A and SEBS 3A.




※1 Refer to page A-22 for description of accuracy
※2 $B^{0}_{-0.05}$ only for SEBS 3WA and 3WAY

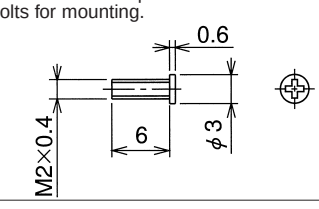
tapped hole rail for N type

| guide-rail dimensions | | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ | C | $S_3$ | d×G×h | N | P | dynamic C | static Co | $M_P$ | $M_Y$ | $M_R$ | block | guide rail | |
| mm | mm | | mm | mm | mm | kN | kN | N・m | N・m | N・m | kg | kg/m | |
| 2 | 2 | M1 | – | 4 | 8 | 0.21 | 0.38 | 0.53 | 0.64 | 0.41 | 0.001 | 0.03 | **2A** |
| 2.6 | 3 | M1.6 | – | 5 | 10 | 0.25 | 0.36 | 0.39 | 0.46 | 0.57 | 0.001 | 0.05 | **3A** |
| | | | | | | 0.35 | 0.58 | 0.97 | 1.16 | 0.93 | 0.002 | | **3AY** |
| 4 | 5 | M2.6 | 2.4×3.5×1 | 5 | 15 | 0.59 | 0.81 | 1.32 | 1.58 | 2.11 | 0.004 | 0.13 | **5A** |
| | | | | | | 0.74 | 1.11 | 2.39 | 2.86 | 2.90 | 0.005 | | **5AY** |
| 4.7 | 7 | M3 | 2.4×4.2×2.3 | | | 1.08 | 1.41 | 3.07 | 3.66 | 5.18 | 0.011 | 0.21 | **7A** |
| | | | | | | 1.59 | 2.48 | 8.74 | 10.4 | 9.07 | 0.016 | | **7AY** |
| 5.5 | 9 | M4 | 3.5×6×3.5 | 7.5 | 20 | 1.92 | 2.53 | 7.64 | 9.11 | 11.5 | 0.019 | 0.30 | **9A** |
| | | | | | | 2.62 | 3.94 | 17.5 | 20.8 | 17.9 | 0.028 | | **9AY** |
| 7.5 | 12 | | 3.5×6×4.5 | 10 | 25 | 2.60 | 3.20 | 10.4 | 12.4 | 20.0 | 0.037 | 0.60 | **12A** |
| | | | | | | 3.65 | 5.21 | 25.7 | 30.7 | 32.6 | 0.055 | | **12AY** |
| 9.5 | 15 | M5 | | 15 | 40 | 4.74 | 5.67 | 24.5 | 29.2 | 43.9 | 0.068 | 1.00 | **15A** |
| | | | | | | 6.65 | 9.22 | 60.7 | 72.4 | 71.4 | 0.101 | | **15AY** |
| 15 | 20 | M6 | 6×9.5×8.5 | 20 | 60 | 8.99 | 11.1 | 72.7 | 86.7 | 114 | 0.226 | 2.09 | **20A** |
| | | | | | | 12.4 | 17.8 | 176 | 210 | 182 | 0.338 | | **20AY** |

1kN≒102kgf　1N・m≒0.102kgf・m

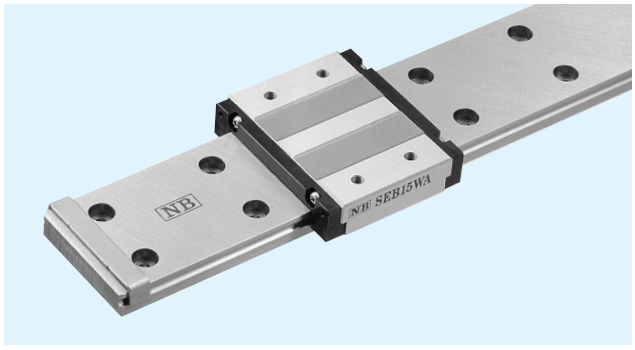
| | maximum length | | | |
|---|---|---|---|---|
| | counter bore | | tapped hole(N type) | |
| | standard | anticorrosion | standard | anticorrosion |
| | – | – | – | 150 |
| | – | – | – | 150 |
| | – | 600 | – | 300 |
| | – | 1,000 | – | 700 |
| 395 435 475 | 500 | 1,300 | 500 | 1,000 |
| 370 395 420 445 470 495 | | | | |
| 550 590 630 670 | 1,900 | | 1,900 | |

SEBS5 rail-mounting bolt
SEBS5 rails are provided with custom bolts for mounting.



# SEB-WA/WAY TYPE

## – Wide Type –

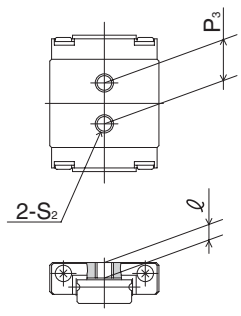


part number structure

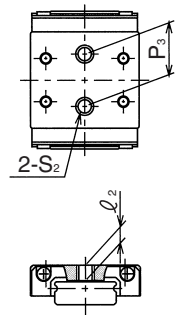
example SEBS | 15WA | Y | UU | 2 | T1 | -589 | N | P | / | W2

- SEBS:anticorrosion size
- block size: blank standard; Y long
- seal: blank without seal; UU seals on both ends
- number of blocks attached to one rail
- pre-load symbol: T0 clearance; blank standard; T1 light pre-load
- total length of rail
- mounting hole rail: blank counter bore; N tapped hole
- accuracy grade: blank high; P precision
- symbol for number of rails: blank single rail; W2 double rails; W3 triple rails

Note: The symbol for the number of rails does not mean the number of rails ordered.




SEBS 3WA/3WAY

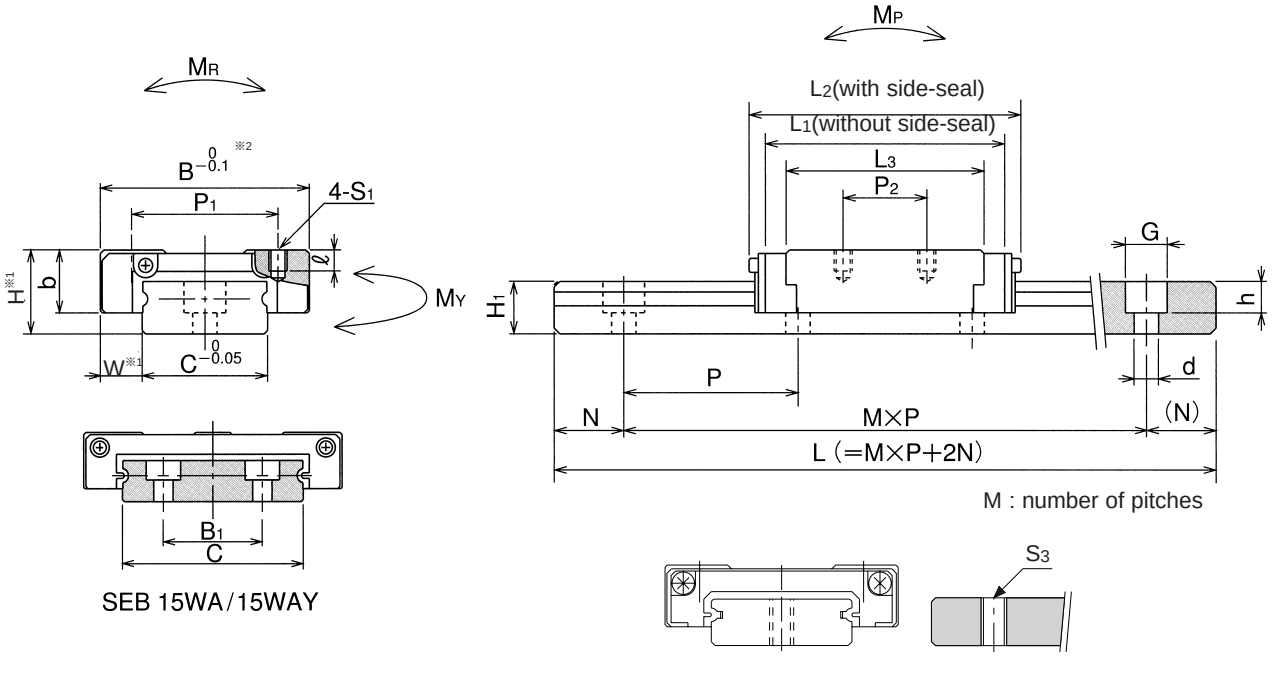



SEBS 7WA/7WD/7WAY

| part number | | assembly dimensions | | block dimensions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H | W | B | $L_1$ | $L_2$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | $L_3$ | $P_3$ | $S_2$ | $\ell_2$ | b |
| standard | anticorrosion | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | | mm | mm |
| – | SEBS 3WA | 4.5 | 3 | $12^{0}_{-0.05}$ | 14.2 | 15 | – | 4.5 | M2 | 1.7 | 9.7 | – | – | – | 3.5 |
| | SEBS 3WAY | | | | 19 | 19.8 | – | 8 | | | 14.5 | | | | |
| – | SEBS 7WA | 9 | 5.5 | 25 | 30.1 | 32 | 18 | 12 | M2.6 | 2.5 | 22.1 | 12 | M4 | 3.5 | 7 |
| | SEBS 7WD | | | | | | 19 | 10 | M3 | 2.8 | | | | | |
| | SEBS 7WAY | | | | 39.6 | 41 | | 19 | | | 31.6 | 18 | | | |
| SEB 9WA | SEBS 9WA | 12 | 6 | 30 | 35.9 | 38 | 21 | 12 | M2.6 | 3 | 28.4 | – | – | – | 9 |
| SEB 9WD | SEBS 9WD | | | | | | | | M3 | 2.8 | | | | | |
| SEB 9WAY | SEBS 9WAY | | | | 48 | 50 | 23 | 24 | | 3 | 40.4 | | | | |
| SEB 12WA | SEBS 12WA | 14 | 8 | 40 | 40.7 | 44 | 28 | 15 | | 3.5 | 33.5 | – | – | – | 11 |
| SEB 12WAY | SEBS 12WAY | | | | 55 | 58.5 | | 28 | | | 47.8 | | | | |
| SEB 15WA | SEBS 15WA | 16 | 9 | 60 | 51.2 | 55 | 45 | 20 | M4 | 4.5 | 42 | – | – | – | 13 |
| SEB 15WAY | SEBS 15WAY | | | | 70.5 | 74 | | 35 | | | 61.1 | | | | |

| part number | | standard rail length L mm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| standard | anticorrosion | | | | | | | | | | | |
| – | SEBS 3WA | 40 | 55 | 70 | 85 | 100 | | | | | | |
| – | SEBS 7WA | 50 | 80 | 110 | 140 | 170 | 200 | 230 | 260 | 290 | 350 | 410 |
| SEB 9WA | SEBS 9WA | 50 | 80 | 110 | 140 | 170 | 200 | 230 | 260 | 290 | 350 | 410 |
| SEB12WA | SEBS12WA | 70 | 110 | 150 | 190 | 230 | 270 | 310 | 350 | 390 | 430 | 470 |
| SEB15WA | SEBS15WA | 70 | 110 | 150 | 190 | 230 | 270 | 310 | 350 | 390 | 430 | 470 |

Joint rails are used when the required length exceeds the maximum standard length listed in the dimensional tables. Contact NB for details.



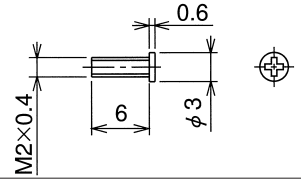

※1 Refer to page A-22 for description of accuracy
※2 $B^{0}_{-0.05}$ only for SEBS 3WA and 3WAY

| guide-rail dimensions | | | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ | C | $B_1$ | $S_3$ | d×G×h | N | P | dynamic C | static Co | $M_P$ | $M_Y$ | $M_R$ | block | guide rail | |
| mm | mm | mm | | mm | mm | mm | kN | kN | N・m | N・m | N・m | kg | kg/m | |
| 2.6 | 6 | – | M3 | 2.4×4×1.5 | 5 | 15 | 0.33 | 0.54 | 0.83 | 0.99 | 1.67 | 0.003 | 0.10 | **3WA** |
| | | | | | | | 0.44 | 0.81 | 1.81 | 2.15 | 2.51 | 0.004 | | **3WAY** |
| 5.2 | 14 | – | M4 | 3.5×6×3.2 | 10 | 30 | 1.43 | 2.12 | 6.53 | 7.78 | 15.2 | 0.021 | 0.51 | **7WA** **7WD** |
| | | | | | | | 1.90 | 3.19 | 14.1 | 16.8 | 22.8 | 0.030 | | **7WAY** |
| 7.5 | 18 | – | | 3.5×6×4.5 | | | 2.49 | 3.66 | 15.2 | 18.1 | 33.9 | 0.038 | 0.96 | **9WA** **9WD** |
| | | | | | | | 3.25 | 5.35 | 31.4 | 37.4 | 49.5 | 0.055 | | **9WAY** |
| 8 | 24 | – | M5 | 4.5×8×4.5 | 15 | 40 | 3.64 | 5.21 | 25.7 | 30.7 | 63.8 | 0.077 | 1.38 | **12WA** |
| | | | | | | | 4.75 | 7.62 | 53.2 | 63.4 | 93.3 | 0.109 | | **12WAY** |
| 9.5 | 42 | 23 | | | | | 6.29 | 8.51 | 52.2 | 62.2 | 180 | 0.245 | 2.27 | **15WA** |
| | | | | | | | 8.35 | 12.7 | 113 | 134 | 271 | 0.313 | | **15WAY** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | maximum length mm | | | |
|---|---|---|---|---|
| | counter bore | | tapped hole(N type) | |
| | standard | anticorrosion | standard | anticorrosion |
| | | 150 | | 150 |
| 470 | – | 1,000 | – | 700 |
| 470 530 | 1,900 | 1,300 | 1,900 | 1,000 |
| 550 630 710 | | | | |
| 550 630 710 790 870 | | | | |

SEBS3WA/3WAY rail-mounting bolt
SEBS3WA/3WAY rails are provided with custom bolts for mounting.



# SLIDE GUIDE Miniature SER Type

**The NB SER type slide guide is a linear motion bearing utilizing the rotational motion of precision rollers placed in two rows. Despite its compact shape, it can be used in various applications requiring high load capacity.**

## STRUCTURE AND ADVANTAGES

The NB SER type slide guide consists of a rail with two precision-machined raceway grooves and a block assembly. The block assembly consists of a main body, rollers, and bottom roller retainers. All of these components are made of metallic materials.

### High Load Capacity and Long Life:

Since roller elements are used, the contact surface is large which provides a high load capacity and long travel life.

### Compactness:

Since a cross roller method is utilized, only two raceway grooves are necessary and presents a very compact package.

### Moment Resistant Type:

The wide block design (WA Type) has an extremely high moment loading capacity. This will allow for single shaft designs in the most hostile environment applications.

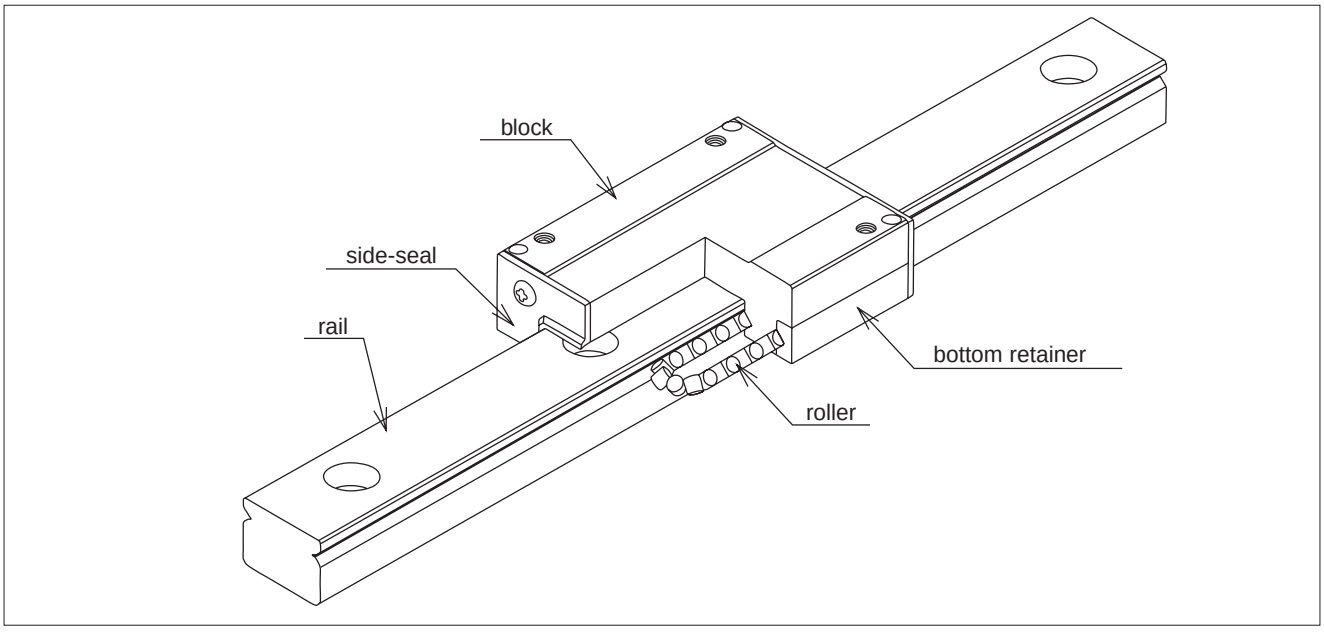
### Rail Bolt Hole Types:

SER type rails with counterbore bolt holes (standard) and optional tapped mounting holes (N-type) are available enabling various installation methods.

### All Stainless Steel:

Since all the components for the SER type guide are made of metallic materials, stainless steel provides excellent corrosion and thermal characteristics. The SERS type slide guide is ideal for clean-room or vacuum applications.

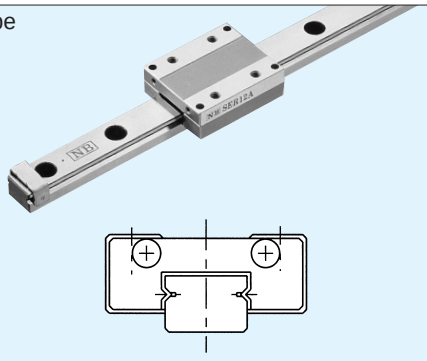
Figure A-43 Structure of SER Type Slide Guide



# TYPES

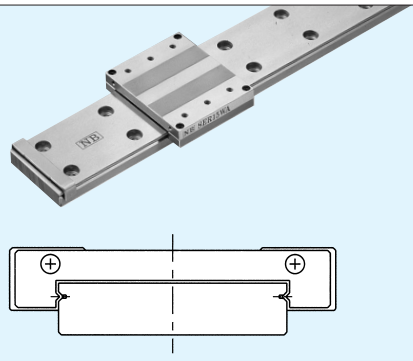
SER type slide guides are available with a standard block or a wide block (WA) configuration. Each type can be used with standard rails with counterbore holes or the optional N-Type rails, which is with tapped holes.

SER-A Type



P.A-38

SER-WA Type



P.A-40

# ACCURACY

SER-type slide guides are available with high-grade accuracy or precision-grade accuracy (P).

Table A-15 Accuracy unit/mm

| accuracy grade | high | precision |
|---|---|---|
| accuracy symbol | none | P |
| allowable dimensional difference in height H | ±0.015 | ±0.008 |
| paired difference for height H | 0.015 | 0.007 |
| allowable dimensional difference in width W | ±0.020 | ±0.010 |
| paired difference for width W | 0.020 | 0.010 |
| Running parallelism of surface C to surface A | refer to Figure A-45 | |
| Running parallelism of surface D to surface B | | |

Figure A-44 Accuracy

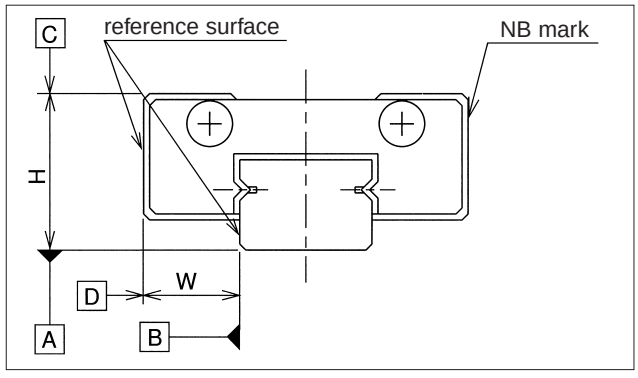
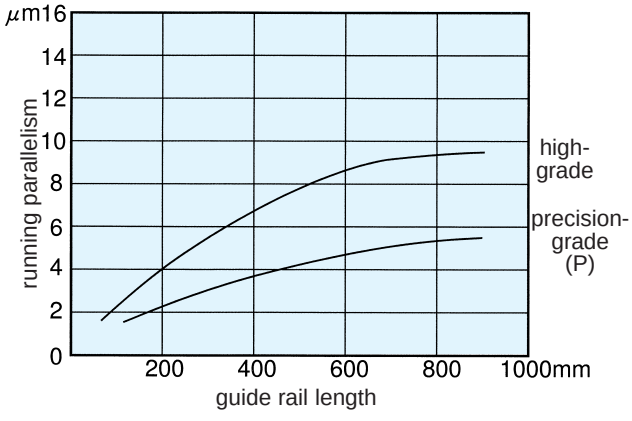



Figure A-45 Motion Accuracy



# PRE-LOAD

The SER(S) type slide guides are available only with a standard (0 to slightly negative) preload.

# RAIL LENGTH

Slide guides with most commonly used lengths are available as standard. For slide guides with a non-standard length, unless otherwise specified, the distance from one end of the rail to the first installation hole (N) will be within the ranges listed in Tables A-16 and A-17, satisfying the following equation.

$$L = M \cdot P + 2N$$

L : length (mm)  N : distance from the end of the rail to the first hole (mm)
M : number of pitches  P : hole pitch (mm)

Figure A-46 Rail

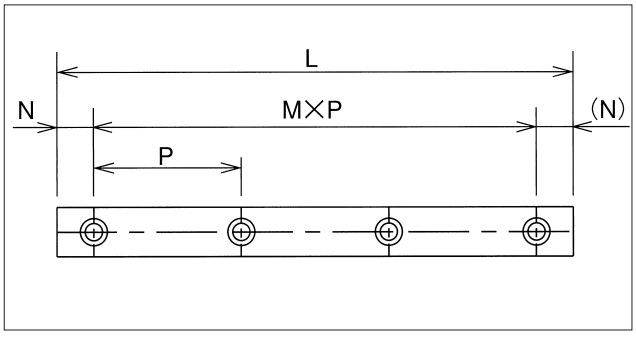



Table A-16 Standard Type Slide Guide unit/mm

| part number | | N | | L max. |
|---|---|---|---|---|
| standard | anticorrosion | and over | less than | |
| SER 9A | SERS 9A | 4 | 14 | 275 |
| SER12A | SERS12A | | 16.5 | 470 |
| SER15A | SERS15A | | 24 | 670 |
| SER20A | SERS20A | 6 | 36 | 880 |

Table A-17 Wide Type Slide Guide unit/mm

| part number | | N | | L max. |
|---|---|---|---|---|
| standard | anticorrosion | and over | less than | |
| SER 9WA | SERS 9WA | 4 | 19 | 290 |
| SER12WA | SERS12WA | 5 | 25 | 470 |
| SER15WA | SERS15WA | | | 670 |

# MOUNTING

## Mounting Surface Shapes:

Slide guides are mounted by pushing the reference surface of the rail and the block against the shoulder provided on the mounting surface. An escape groove or a radius corner should be provided at the corner of the shoulder, as shown in Figs.A-47 and A-48, to prevent interference. The recommended shoulder height values on the mounting reference surface of the other component are shown in Table A-18.

Figure A-47 Shoulder Shape-1

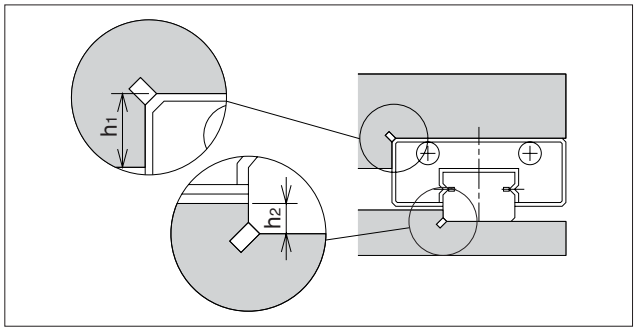
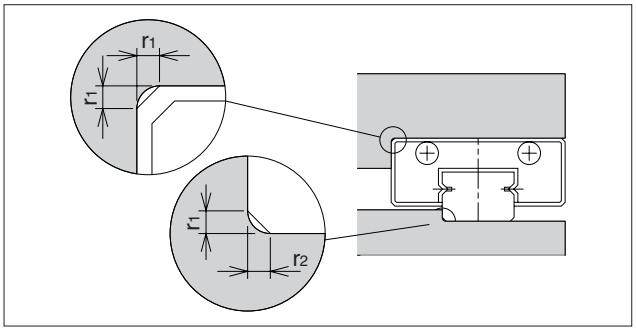



Table A-18 Shoulder Shape Dimensions unit/mm

| size | shoulder height on the block side $h_1$ | shoulder height on the rail side $h_2$ |
|---|---|---|
| SER 9A | 3 | 1.5 |
| SER12A | 4 | 2 |
| SER15A | 5 | 3.5 |
| SER20A | | 5 |
| SER 9WA | 3 | 2.5 |
| SER12WA | 4 | |
| SER15WA | 5 | |

Figure A-48 Shoulder Shape-2




## Recommended Torque Values:

The bolts used to secure the rail should be tightened to a certain toque using a torque wrench. The recommended torque values are given in Table A-20. Please adjust the torque depending on the operating conditions.

# MOUNTING BOLTS

Small bolts for the SER(S) type slide guide are available from NB.

Table A-21 units/mm

| bolt size | pitch | length ℓ | application |
|---|---|---|---|
| M2 | 0.4 | 4,5,6,8,10 | SER 9A |

All bolts are made of stainless steel.

# LUBRICATION

A high grade lithium soap grease is applied to the NB Slide Guides in our factory making these ready for immediate use. A similar type grease should be added periodically depending on the operating conditions.

For use in clean rooms or vacuum environments, NB Slide Guides without grease are available upon request. Additionally, customer specified grease cases, please contact NB.

A special syringe lubricant applicator is available from NB as an option.

Please refer to Page Eng-20 for details on the low dust generation lubricant.

Table A-19 Maximum Corner Radius Values unit/mm

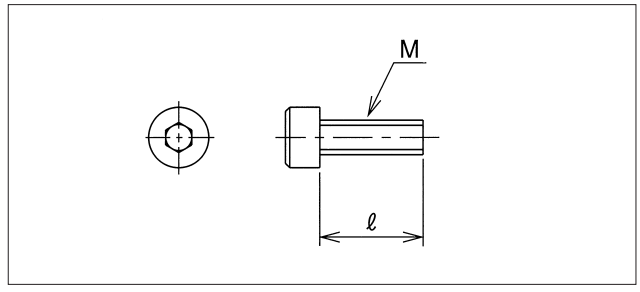
| size | block mounting part $r_1$ | rail mounting part $r_2$ |
|---|---|---|
| SER 9A | 0.3 | 0.1 |
| SER12A | | 0.3 |
| SER15A | | |
| SER20A | | 0.5 |
| SER 9WA | | 0.3 |
| SER12WA | | |
| SER15WA | | |

Table A-20 Recommended Torque unit/N·m

| bolts size | M2 | M3 | M4 | M5 | M6 |
|---|---|---|---|---|---|
| recommended torque | 0.3 | 1.0 | 2.3 | 4.7 | 8.0 |

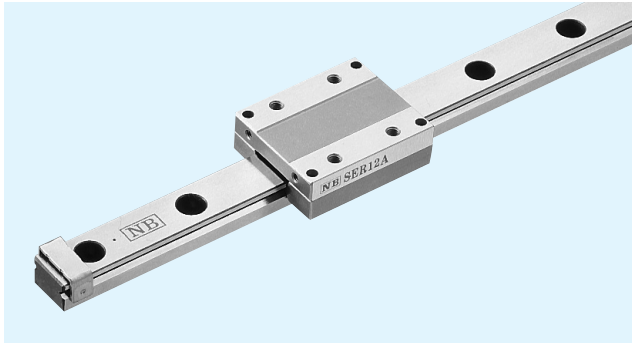
(When using stainless steel bolts)

Figure A-49 Mounting Bolt




# SER-A TYPE

## – Standard Type –




part number structure

example SERS 15A UU 2 - 589 N P / W2

specification
- SER standard
- SERS anticorrosion

size

seal
- blank without side-seal
- UU seals on both ends

number of blocks attached to one rail

total rail length

mounting hole rail
- blank counter bore
- N tapped hole

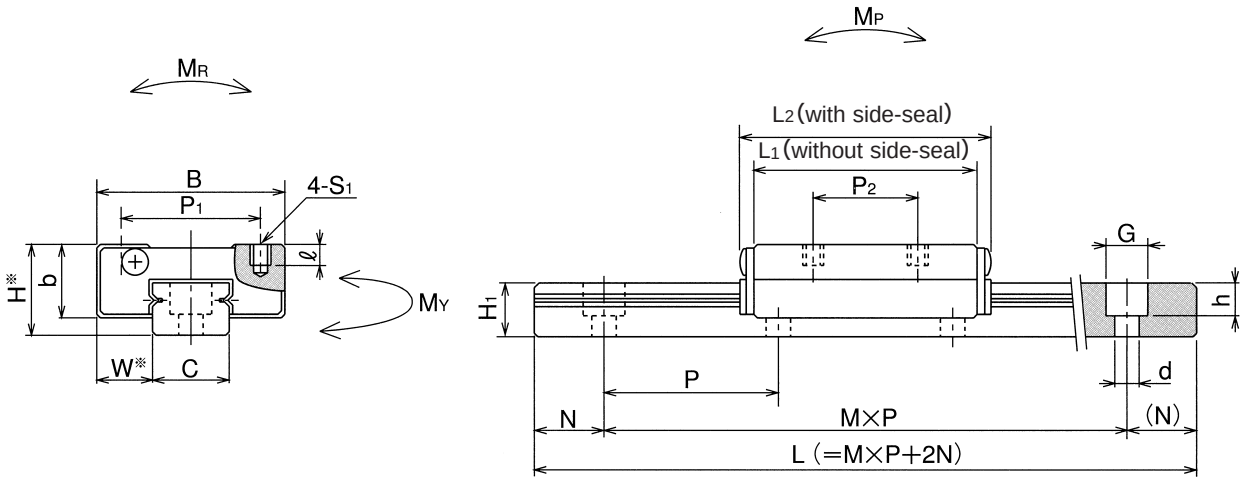
accuracy grade
- blank high
- P precision

symbol for number of rails
- blank single rail
- W2 double rails
- W3 triple rails

Note: The symbol for the number of rails does not mean the number of rails ordered.

| part number | | assembly dimensions | | block dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H | W | B | $L_1$ | $L_2$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | b |
| standard | anticorrosion | mm | mm | mm | mm | mm | mm | mm | | mm | mm |
| **SER 9A** | **SERS 9A** | 10 | 5.7 | 20 | 28 | 32 | 15 | 13 | M2 | 2.5 | 7.8 |
| **SER12A** | **SERS12A** | 13 | 8 | 27 | 32 | 36 | 20 | 15 | M3 | 3 | 10.5 |
| **SER15A** | **SERS15A** | 16 | 8.5 | 32 | 40 | 44 | 25 | 20 | | 4 | 11.5 |
| **SER20A** | **SERS20A** | 25 | 13 | 46 | 60 | 66 | 38 | 38 | M4 | 6 | 17.5 |

| part number | | standard rail length L mm | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|---|---|
| standard | anticorrosion | | | | | | | | |
| **SER 9A** | **SERS 9A** | 55 | 75 | 95 | 115 | 155 | 195 | 275 | 275 |
| **SER12A** | **SERS12A** | 120 | 170 | 220 | 270 | 320 | 370 | 470 | 470 |
| **SER15A** | **SERS15A** | 150 | 230 | 310 | 430 | 550 | 670 | | 670 |
| **SER20A** | **SERS20A** | 220 | 280 | 340 | 460 | 640 | 880 | | 880 |




tapped hole rail for N type

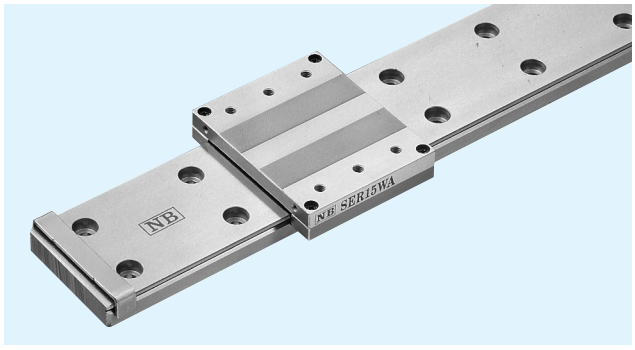
※ Refer to page A-35 for a description of accuracy.

| guide-rail dimensions | | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ mm | C mm | $S_2$ | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 5.5 | 8.6 | M4 | 2.6×4.5×3 | 7.5 | 20 | 2.65 | 2.94 | 11.8 | 13.7 | 19.6 | 0.02 | 0.35 | **9A** |
| 7.5 | 11 | | 3.5×6×4.5 | 10 | 25 | 3.43 | 3.92 | 15.7 | 17.6 | 29.4 | 0.05 | 0.55 | **12A** |
| 9.5 | 15 | M5 | | 15 | 40 | 4.70 | 5.78 | 29.0 | 32.3 | 54.9 | 0.09 | 1.0 | **15A** |
| 15 | 20 | M6 | 6×9.5×8.5 | 20 | 60 | 8.82 | 9.80 | 59.0 | 66.6 | 151 | 0.26 | 2.3 | **20A** |

1kN≒102kgf　1N・m≒0.102kgf・m

# SER-WA TYPE

## – Wide Type –




part number structure

example: SERS | 15WA | UU | 2 | - | 589 | N | P | / | W2

specification
- SER: standard
- SERS: anticorrosion

size

seal
- blank: without side-seal
- UU: seals on both ends

number of blocks attached to one rail

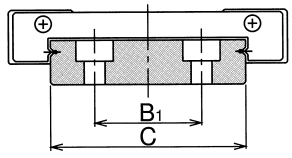
total rail length

mounting hole rail
- blank: counter bore
- N: tapped hole

accuracy grade
- blank: high
- P: precision

symbol for number of rails
- blank: single rail
- W2: double rails
- W3: triple rails

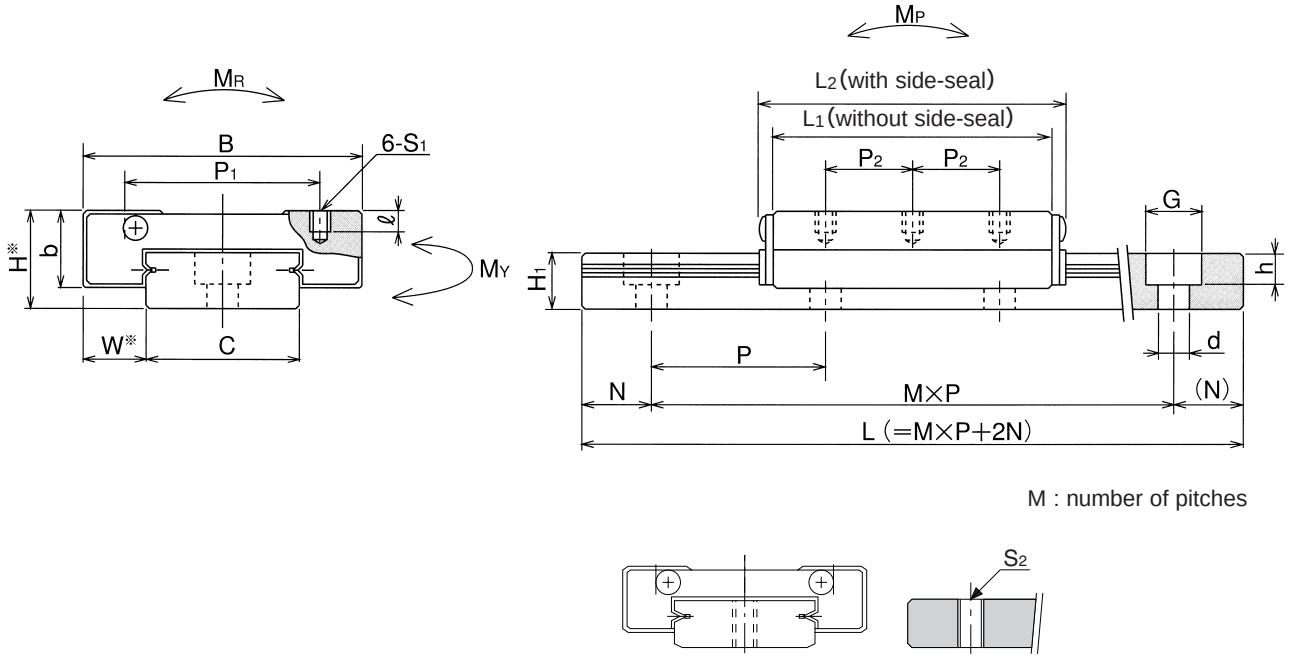
Note: The symbol for the number of rails does not mean the number of rails ordered.




SER 15WA

| part number | | assembly dimensions | | block dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H | W | B | $L_1$ | $L_2$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | b |
| standard | anticorrosion | mm | mm | mm | mm | mm | mm | mm | | mm | mm |
| **SER 9WA** | **SERS 9WA** | 12 | 6.5 | 30 | 35 | 39 | 21 | 10 | M3 | 3 | 8.8 |
| **SER12WA** | **SERS12WA** | 14 | 9 | 40 | 40 | 44 | 28 | 12.5 | | | 11 |
| **SER15WA** | **SERS15WA** | 16 | | 60 | 50 | 54 | 45 | 15 | M4 | 4.5 | 11.5 |

| part number | | standard rail length L mm | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|---|---|
| standard | anticorrosion | | | | | | | | |
| **SER 9WA** | **SERS 9WA** | 80 | 110 | 140 | 170 | 200 | 260 | 290 | 290 |
| **SER12WA** | **SERS12WA** | 110 | 150 | 190 | 230 | 310 | 390 | 470 | 470 |
| **SER15WA** | **SERS15WA** | 150 | 230 | 310 | 430 | 550 | 670 | | 670 |




※ Refer to page A-35 for a description of accuracy.

| guide-rail dimensions | | | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ | C | $B_1$ | $S_2$ | d×G×h | N | P | dynamic C | static Co | $M_P$ | $M_Y$ | $M_R$ | block | guide rail | |
| mm | mm | mm | | mm | mm | mm | kN | kN | N・m | N・m | N・m | kg | kg/m | |
| 7.5 | 17 | – | M4 | 3.5×6×4.5 | 10 | 30 | 3.43 | 3.72 | 24.5 | 27.4 | 51.9 | 0.06 | 0.90 | **9WA** |
| 8 | 22 | – | M5 | 4.5×8×4.5 | 15 | 40 | 4.41 | 5.00 | 35.3 | 39.2 | 85.3 | 0.10 | 1.22 | **12WA** |
| 9.5 | 42 | 23 | | | | | 7.35 | 8.92 | 55.9 | 61.7 | 215 | 0.18 | 2.8 | **15WA** |

1kN≒102kgf　1N・m≒0.102kgf・m

# SLIDE GUIDE GL TYPE

**The NB slide guide GL type realized low noise with a ball cushion embedded between the steel balls and significantly extended lubricant replenishment intervals by the use of fiber sheet. In addition, its compact size as well as high load capacity allows for the size and weight of machinery and other equipment to be reduced.**

## STRUCTURE AND ADVANTAGES

The GL type slide guide consists of a rail with 4 rows of precisely machined raceway groove and a block assembly consisting of the main body, steel balls, ball cushions, a retainer, a fiber sheet, and return caps.

### Low Noise:

By incorporating a ball cushion between steel balls, the metal contact between the steel balls is prevented, which allows for a reducion in noise levels. (See the noise data in Fig. A-44, page A-53.)

### Can Significantly Extend Lubricant Replenishment Intervals:

A lubricant-containing fiber sheet incorporated in the block supplies appropriate amount of lubricant to the raceway grooves at appropriate intervals, which can significantly extend the lubricant replenishment interval.

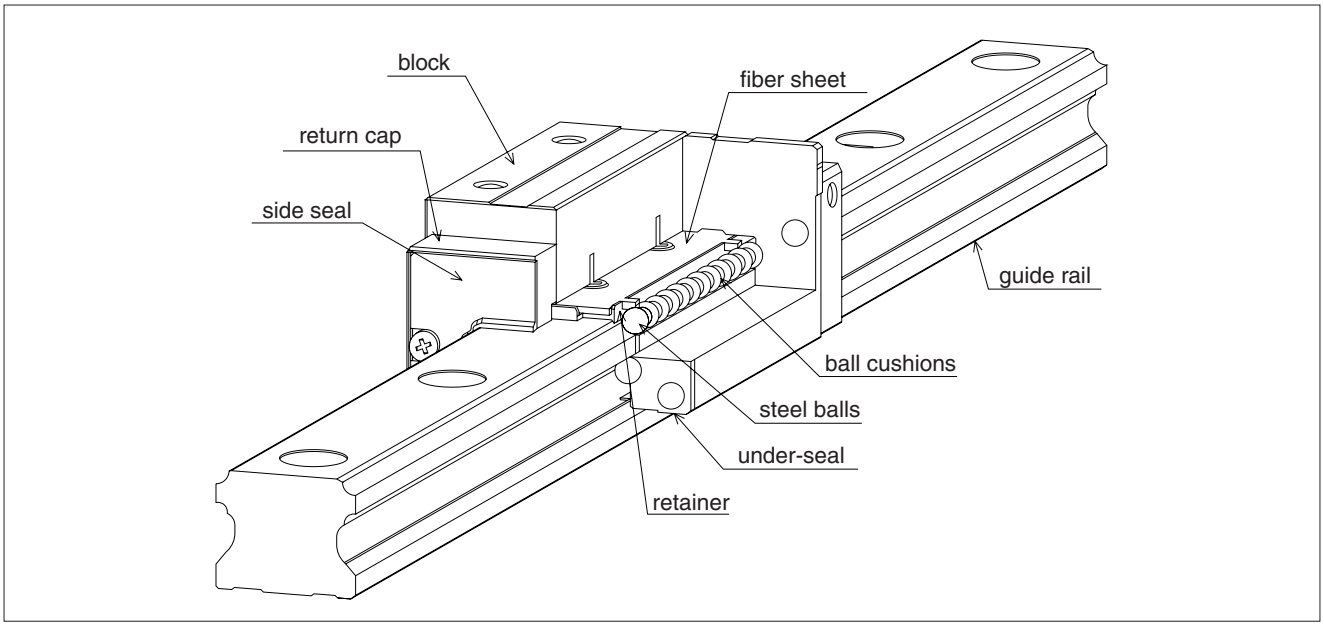
### High Load Capacity and Long Life:

With large-diameter steel balls employed, this slide guide has a higher load rating and a longer life compared to low-noise guides offered by other companies.
(See the load rating comparison data in Fig. A-44, page A-53.)

### Omni-Directional Load Capacity:

The steel balls are positioned at 45° contact angle so that the load capacity is equal in four directions (above, underneath, right and left).

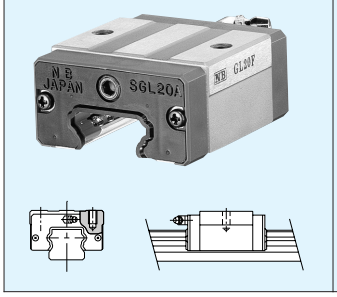
Figure A-50 Structure of GL type Slide Guide



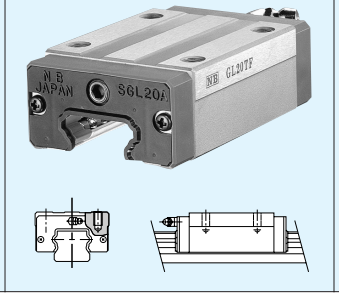
# BLOCK TYPES

Six different types of blocks are available depending on the mounting space and desired mounting method.

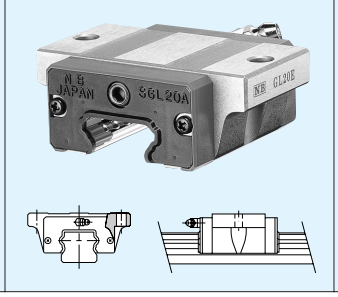
GL-F **P.A-48**



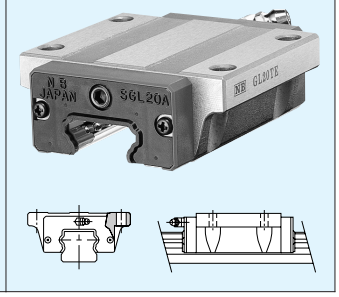
GL-TF **P.A-50**
GL-HTF **PA-52**



GL-E **P.A-54**



GL-TE **P.A-56**
GL-HTE **P.A-58**



# ACCURACY

Three accuracy grades are available: normal-grade (no suffix), high-grade (H), and precision-grade (P).

Table A-22 Accuracy unit/mm

| part number | GL15,20 | | | GL25,30,35 | | | GL45 | | |
|---|---|---|---|---|---|---|---|---|---|
| accuracy grade | normal | high | precision | normal | high | precision | normal | high | precision |
| accuracy symbol | none | H | P | none | H | P | none | H | P |
| allowable dimensional tolerance for height H | ±0.1 | ±0.03 | −0.03~0 | ±0.1 | ±0.04 | −0.04~0 | ±0.1 | ±0.05 | −0.05~0 |
| paired difference for height H | 0.02 | 0.01 | 0.006 | 0.02 | 0.015 | 0.007 | 0.03 | 0.015 | 0.007 |
| allowable dimensional tolerance for width W | ±0.1 | ±0.03 | −0.03~0 | ±0.1 | ±0.04 | −0.04~0 | ±0.1 | ±0.05 | −0.05~0 |
| paired difference for width W | 0.02 | 0.01 | 0.006 | 0.03 | 0.015 | 0.007 | 0.03 | 0.02 | 0.01 |
| Running parallelism of surface C to surface A<br>Running parallelism of surface D to surface B | refer to Figure A-51 | | | | | | | | |

Figure A-51 Motion Accuracy

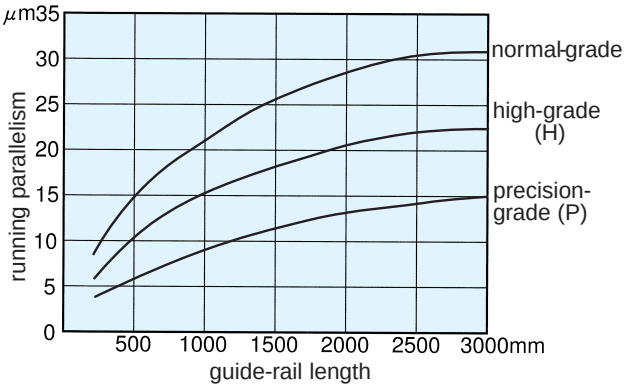
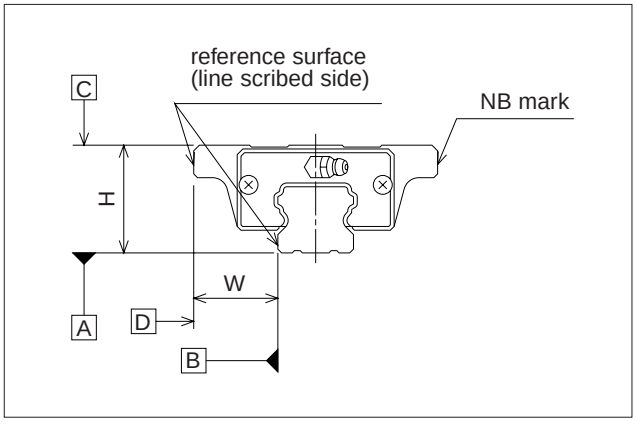


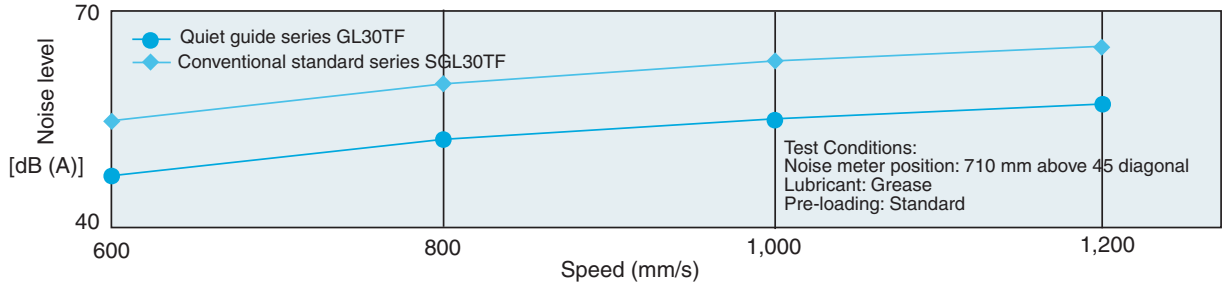

Figure A-52 Accuracy



# Low Noise

Ball cushions are inserted between the steel balls preventing metal contact and enabling low noise.

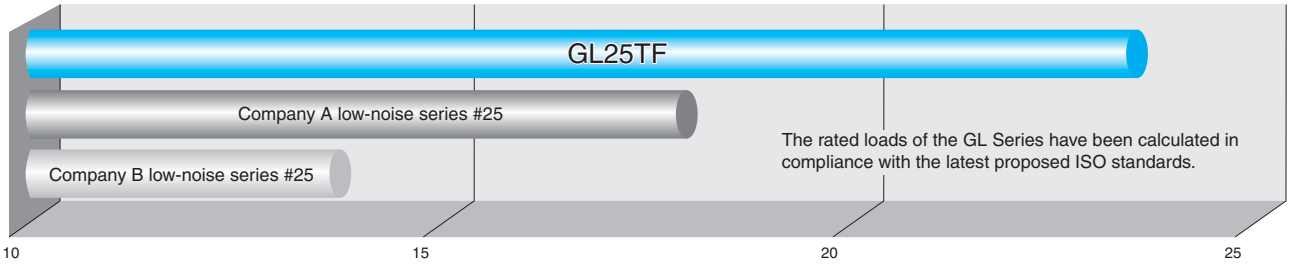
Figure A-53 Noise Data




# High load capacity / long life

The GL type slide guide has a rated load of 1.2 to 1.6 times greater than the load of other companies "low-noise" type guides. This high load capacity enables a longer service life.

Figure A-54 Rated load comparison data

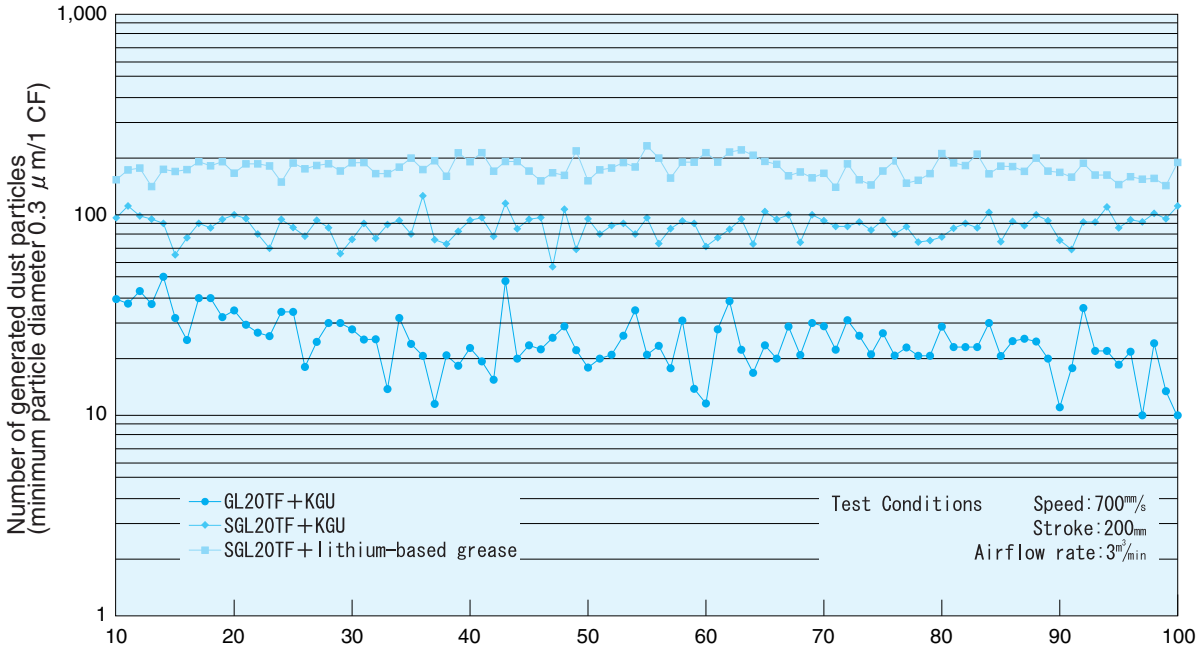



※1: Except for GL type "H" Series.

# Clean Operation

Ball cushions eliminate metal contact between the steel balls and prevent excess grease spatter, enabling linear operation with low levels of dust generation.

Figure A-55 Dust generation data




※2: Products applicable for clean room are custom made.

# PRE-LOAD

GL type slide guides are available with a standard pre-load (no suffix), light pre-load (T1), and medium pre-load (T2).

Table A-23 Pre-load Symbol and Radial Clearance unit/μm

| pre-load category | standard | light | medium |
|---|---|---|---|
| pre-load symbol | none | T1 | T2 |
| GL15 | − 4～+2 | −12～− 4 | − |
| GL20 | − 5～+2 | −14～− 5 | −23～−14 |
| GL25 | − 6～+3 | −16～− 6 | −26～−16 |
| GL30 | − 7～+4 | −19～− 7 | −31～−19 |
| GL35 | − 8～+4 | −22～− 8 | −35～−22 |
| GL45 | −10～+5 | −25～−10 | −40～−25 |

Table A-24 Operating Condition and Pre-Load

| category | symbol | operating condition |
|---|---|---|
| standard | none | Minute vibration is applied.<br>Precision motion is required.<br>Moment in a given direction is applied. |
| light | T1 | Light vibration is applied.<br>Light combined load is applied.<br>Moment is applied. |
| medium | T2 | Shock/vibration is applied.<br>Over-hang load Is applied.<br>Combined load is applied. |

# RAIL LENGTH

Slide guides with most commonly used lengths are available as standard. Unless otherwise specified, the distance to the first mounting hole (N) from one end of the rail will be located within the range listed in Table A-25 for slide guides that have a non-standard length satisfying the following equation.

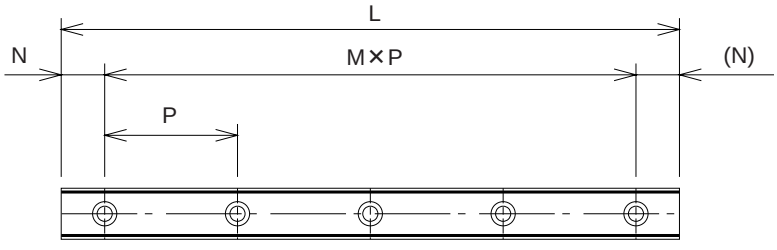
$$L = M \cdot P + 2N$$

L : length (mm) N : distance to the first hole from the end of the rail (mm)
M : number of pitches P : hole pitch (mm)

Table A-25 Fabrication Range unit/mm

| part number | N | | Lmax |
|---|---|---|---|
| | and over | less than | |
| GL15 | 6 | 36 | 2,000 |
| GL20 | 10 | 40 | 3,000 |
| GL25 | 11 | 41 | |
| GL30 | 12 | 52 | |
| GL35 | 16 | 56 | |
| GL45 | 20 | 60 | |

Figure A-57 Rail



# MOUNTING

As shown in Figure A-58, the standard method of slide guide mounting is to bring the reference surface of the rail and/or block into contact with the shoulder on the mounting surface. The shape of the shoulder should be finished to no more than the value shown in Table A-27, to prevent interfere with the corner of the rail or block.

Use a torque wrench to attach the rail with the set torque, to ensure the precision performances. The recommended torque values are shown in Table A-26. Adjust the torque value as needed according to the operating conditions.

Table A-26 Recommended Torque unit/N・m

| bolt size | M3 | M4 | M5 | M6 | M8 | M12 |
|---|---|---|---|---|---|---|
| recommended torque | 1.4 | 3.2 | 6.6 | 11.2 | 27.6 | 96.4 |

(When using alloy steel bolts)

Figure A-58 Mounting Reference Surface Shapes

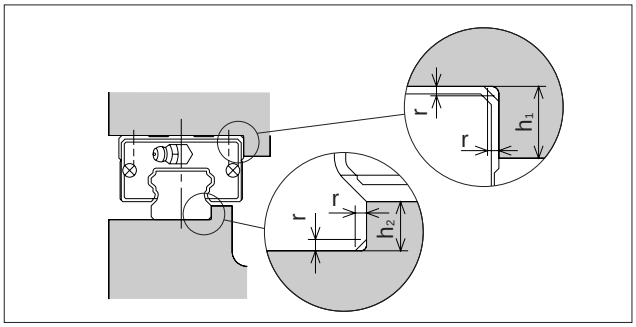


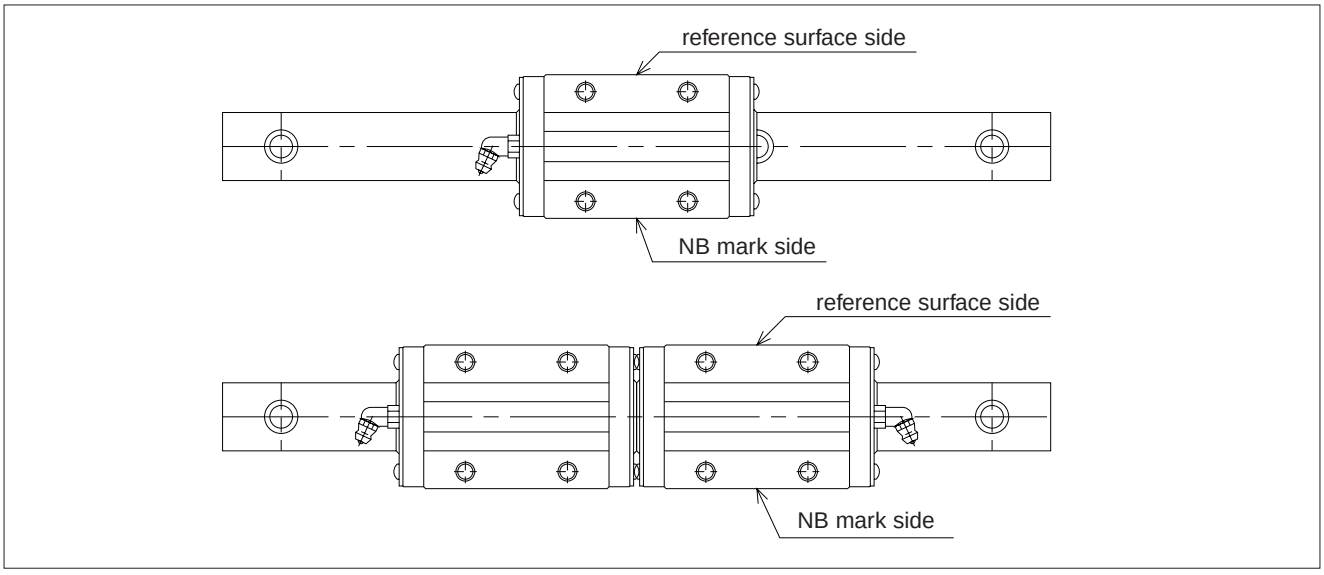

Table A-27 Mounting Surface Dimensions unit/mm

| part number | $h_1$ | $h_2$ | $r_{max}$ |
|---|---|---|---|
| SGL15 | 4 | 3.5 | 0.5 |
| SGL20 | 5 | 5 | 0.5 |
| SGL25 | 5 | 5.5 | 1 |
| SGL30 | 6 | 7.5 | 1 |
| SGL35 | 6 | 8 | 1 |
| SGL45 | 8 | 8 | 1 |

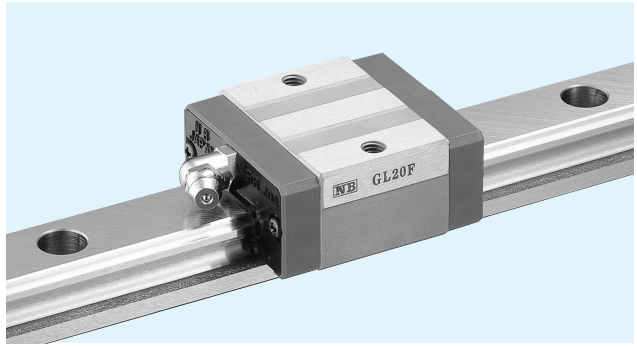
# GREASE FITTING

A grease fitting is attached to the GL slide guide in the return cap for lubrication purposes. Unless otherwise specified, the orientation of the grease fitting is as shown in Figure A-59. When more than two blocks are used on one rail, the grease fitting orientation must be specified.

Figure A-59 Number of Blocks and Grease Fitting Orientation



# GL-F TYPE




part number structure example GL 15 F B 2 T1 - 589 D P / W2 LB F J KGL

- GL type
- size
- block style
- seal(refer to page A-14)

| | |
|---|---|
| B(standard) | With side seals + under-seal |
| BW | With double seals + under-seal |
| BS | B + scraper |

- number of blocks per rail
- symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

- total length of rail
- size of rail installation hole(D type rail is available only for GL 15)
- accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

- symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease
Fiber sheet comes only with standard grease.

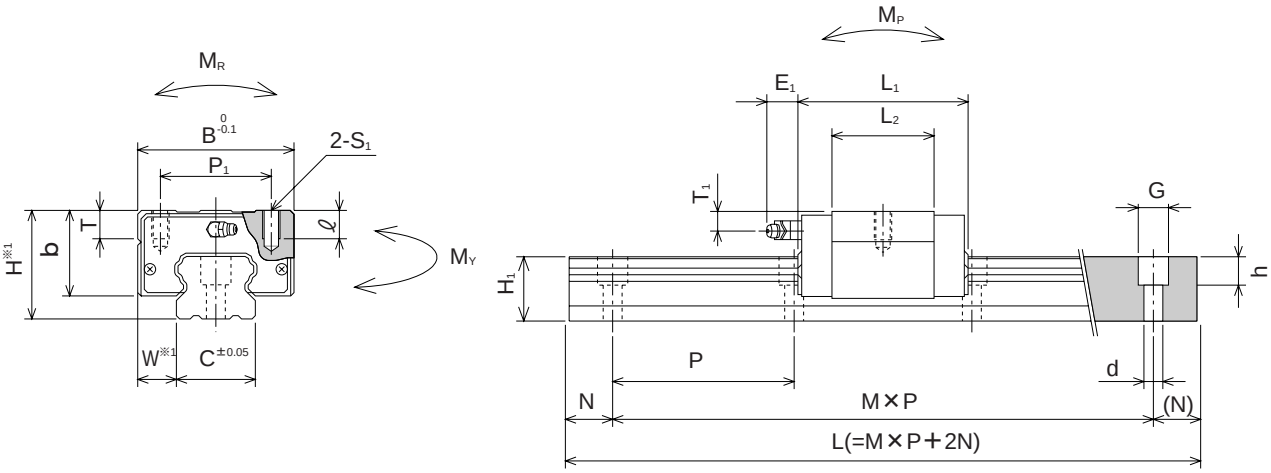
- with bellows(refer to page A-16)
- with rail mounting hole caps
- with low temperature black chrome treatment
- symbol for number of rails

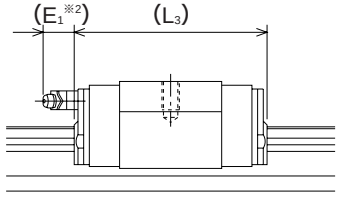
| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

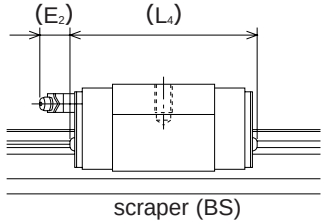
| part number | assembly dimensions | | block dimensions | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $S_1$ | $\ell$ | T | b | $E_1$ | $E_2$ |
| | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm |
| **GL15F GL15F-D** | 24 | 9.5 | 34 | 40.7 | 22.7 | 46.9 | 47.3 | 26 | M4 | 7 | 6 | 19.5 | 5 | 5.4 |
| **GL20F** | 28 | 11 | 42 | 47.9 | 29.5 | 54.1 | 54.5 | 32 | M5 | 8 | 7.5 | 22 | 14 | 13.3 |
| **GL25F** | 33 | 12.5 | 48 | 58.7 | 37.7 | 65.1 | 65.9 | 35 | M6 | 9 | 8 | 26 | | 13.1 |
| **GL30F** | 42 | 16 | 60 | 68 | 40 | 76.6 | 75.6 | 40 | M8 | 12 | 9 | 32.5 | | 14 |
| **GL35F** | 48 | 18 | 70 | 77 | 46 | 85.6 | 84.6 | 50 | | | 13 | 38 | | |

| part number | standard rail length L mm | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **GL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |
| **GL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |




double-seal (BW)




scraper (BS)

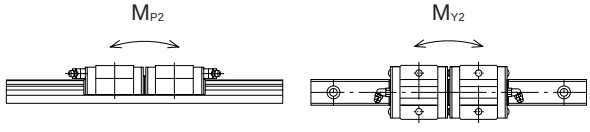
※1 Refer to page A-43 for a description of accuracy.

※2 6mm for GL15FBW.

| | | guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$ mm | grease fitting | $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ $M_{P2}$ N・m | $M_Y$ $M_{Y2}$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 5 | pressed fitting | 13.5 | 15 | 3.5×6×4.5 | 20 | 60 | 7.29 | 9.46 | 37<br>252 | 37<br>252 | 74 | 0.1 | 1.3 | **15** |
| | | | | 4.5×7.5×5.3 | | | | | | | | | | |
| 6 | B-M6F | 16 | 20 | 6×9.5×8.5 | | | 11.91 | 14.81 | 72<br>447 | 72<br>447 | 159 | 0.2 | 2.1 | **20** |
| 6.5 | | 20 | 23 | 7×11×9 | | | 17.0 | 21.2 | 123<br>751 | 123<br>751 | 255 | 0.3 | 3.0 | **25** |
| 9 | | 24 | 28 | | | 80 | 23.0 | 28.7 | 195<br>1,263 | 195<br>1,263 | 418 | 0.5 | 4.6 | **30** |
| 8.5 | | 27.5 | 34 | 9×14×12 | | | 32.0 | 37.8 | 294<br>1,873 | 294<br>1,873 | 693 | 0.8 | 6.2 | **35** |

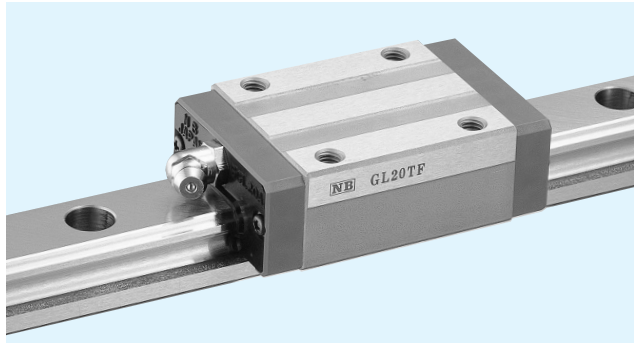
1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 1,240 | 1,360 | 1,480 | | | | | 2,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | 3,000 |




When two blocks are used in contact.

# GL-TF TYPE




part number structure example GL 15 TF B 2 T1 - 589 D P / W2 LB F J KGL

GL type

size

block style

seal(refer to page A-14)

| | |
|---|---|
| B(standard) | With side seals + under-seal |
| BW | With double seals + under-seal |
| BS | B + scraper |

number of blocks per rail

symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

total length of rail

size of rail installation hole(D type rail is available only for GL 15)

accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease
Fiber sheet comes only with standard grease.

with bellows(refer to page A-16)

with rail mounting hole caps

with low temperature black chrome treatment

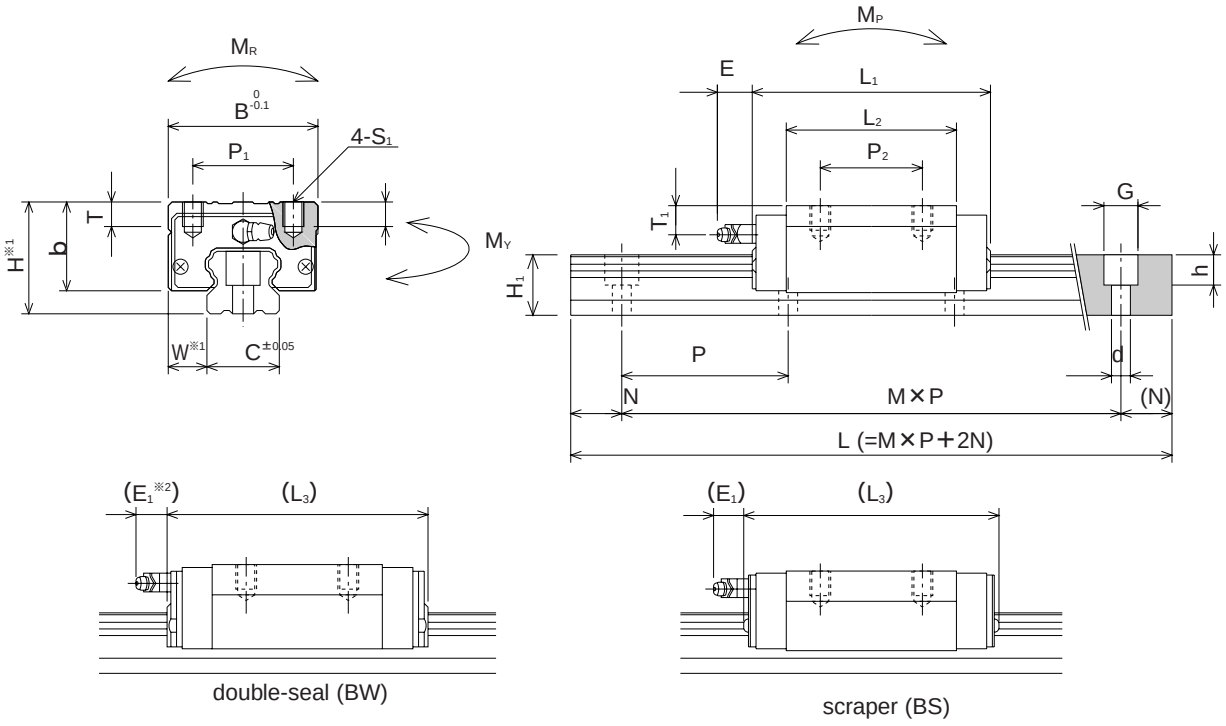
symbol for number of rails

| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | T | b | $E_1$ | $E_2$ |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm |
| **GL15TF GL15TF-D** | 24 | 9.5 | 34 | 56.5 | 38.5 | 62.7 | 63.1 | 26 | 26 | M4 | 7 | 6 | 19.5 | 5 | 5.4 |
| **GL20TF** | 28 | 11 | 42 | 65.8 | 47.4 | 72.0 | 72.4 | 32 | 32 | M5 | 8 | 7.5 | 22 | 14 | 13.3 |
| **GL25TF** | 33 | 12.5 | 48 | 80 | 59 | 86.4 | 87.2 | 35 | 35 | M6 | 9 | 8 | 26 | | 13.1 |
| **GL30TF** | 42 | 16 | 60 | 95.7 | 67.7 | 104.3 | 103.3 | 40 | 40 | M8 | 12 | 9 | 32.5 | | 14 |
| **GL35TF** | 48 | 18 | 70 | 109 | 78 | 117.6 | 116.6 | 50 | 50 | | | 13 | 38 | | |

| part number | standard rail length L mm | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **GL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |
| **GL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |



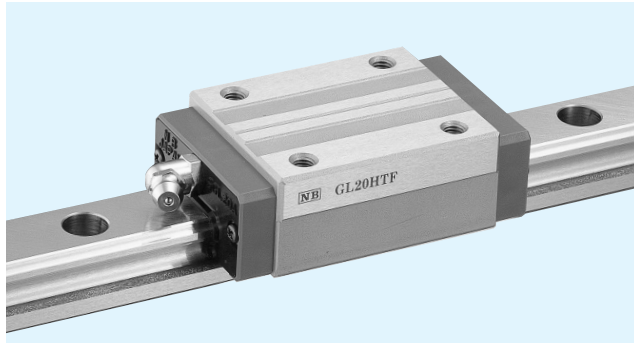

※1 Refer to page A-43 for a description of accuracy.
※2 6mm for GL15TFBW.

| | | guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$ mm | grease fitting | $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | size |
| 5 | pressed fitting | 13.5 | 15 | 3.5×6×4.5 / 4.5×7.5×5.3 | 20 | 60 | 10.6 | 16.2 | 100 | 100 | 127 | 0.2 | 1.3 | **15** |
| 6 | B-M6F | 16 | 20 | 6×9.5×8.5 | | | 16.4 | 23.3 | 165 | 165 | 250 | 0.3 | 2.1 | **20** |
| 6.5 | | 20 | 23 | 7×11×9 | | | 24.8 | 36.3 | 335 | 335 | 437 | 0.4 | 3.0 | **25** |
| 9 | | 24 | 28 | | | 80 | 33.6 | 49.2 | 529 | 529 | 716 | 0.8 | 4.6 | **30** |
| 8.5 | | 27.5 | 34 | 9×14×12 | | | 46.7 | 64.8 | 796 | 796 | 1,188 | 1.3 | 6.2 | **35** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 1,240 | 1,360 | 1,480 | | | | | 2,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | 3,000 |

# GL-HTF TYPE




part number structure example GL 20 HTF B 2 T1 - 589 P / W2 LB F J - KGL

GL type

size

block style

seal(refer to page A-14)

| | |
|---|---|
| B(standard) | With side seals + under-seal |
| BW | With double seals + under-seal |
| BS | B + scraper |

number of blocks per rail

symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

total length of rail

accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease
Fiber sheet comes only with standard grease.

with bellows(refer to page A-16)

with rail mounting hole caps

with low temperature black chrome treatment

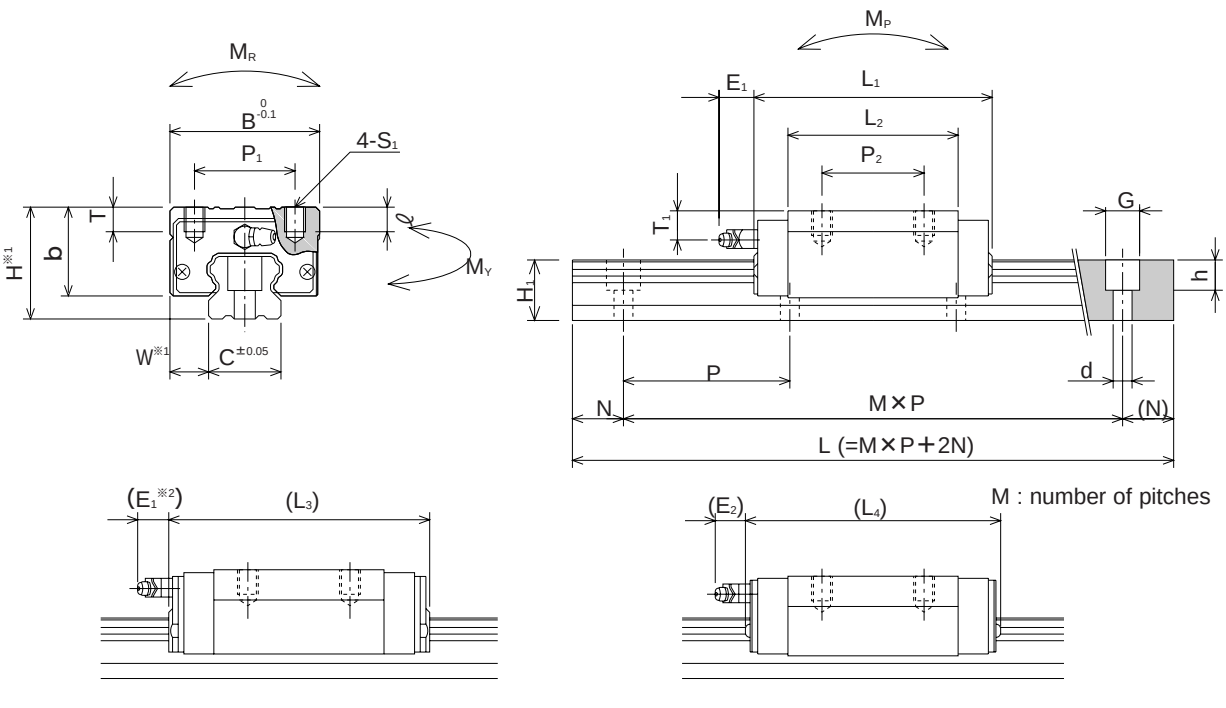
symbol for number of rails

| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | T | b | $E_1$ | $E_2$ |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm |
| **GL15HTF** | 28 | 9.5 | 34 | 56.5 | 38.5 | 62.7 | 63.1 | 26 | 26 | M4 | 5 | 6 | 23.7 | 5 | 5.4 |
| **GL20HTF** | 30 | 12 | 44 | 71.6 | 53.2 | 77.8 | 78.2 | 32 | 36 | M5 | 6 | 9.5 | 24 | 14 | 13.3 |
| **GL25HTF** | 40 | 12.5 | 48 | 80 | 59 | 86.4 | 87.2 | 35 | 35 | M6 | 8 | 9 | 33 | | 13.1 |
| **GL30HTF** | 45 | 16 | 60 | 95.7 | 67.7 | 104.3 | 103.3 | 40 | 40 | M8 | 10 | | 35.5 | | 14 |
| **GL35HTF** | 55 | 18 | 70 | 109 | 78 | 117.6 | 116.6 | 50 | 50 | | 12 | 13 | 45 | | |
| **GL45HTF** | 70 | 20.5 | 86 | 139 | 102 | 147.5 | 148 | 60 | 60 | M10 | 17 | 15 | 60 | 16 | 16 |

| part number | standard rail length L mm | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **GL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |
| **GL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |
| **GL45** | 570 | 675 | 780 | 885 | 990 | 1,095 | 1,200 | 1,305 | 1,410 | 1,515 | 1,620 | 1,725 | 1,830 | 1,935 | 2,040 | 2,145 |




double-seal (BW)

scraper (BS)

※1 Refer to page A-43 for a description of accuracy.

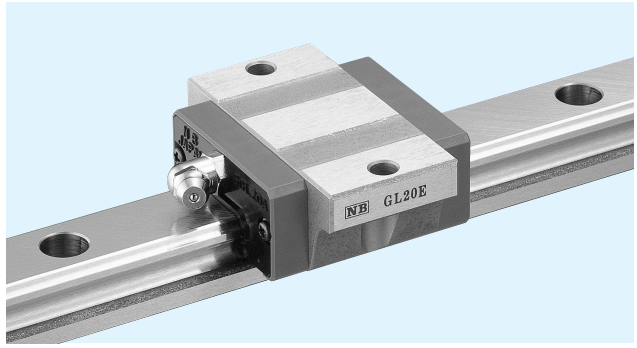
※2 6mm for GL15HTFBW.

| | | guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$ | grease fitting | $H_1$ | C | d×G×h | N | P | dynamic C | static Co | $M_P$ | $M_Y$ | $M_R$ | block | guide rail | |
| mm | | mm | mm | mm | mm | mm | kN | kN | N・m | N・m | N・m | kg | kg/m | |
| 9 | pressed fitting | 13.5 | 15 | 4.5×7.5×5.3 | 20 | 60 | 10.6 | 16.2 | 100 | 100 | 127 | 0.2 | 1.3 | **15** |
| 8 | B-M6F | 16 | 20 | 6×9.5×8.5 | | | 18.4 | 27.5 | 227 | 227 | 296 | 0.4 | 2.1 | **20** |
| 13.5 | | 20 | 23 | 7×11×9 | | | 24.8 | 36.3 | 335 | 335 | 437 | 0.6 | 3.0 | **25** |
| 12 | | 24 | 28 | 9×14×12 | | 80 | 33.6 | 49.2 | 529 | 529 | 716 | 0.9 | 4.6 | **30** |
| 15.5 | | 27.5 | 34 | | | | 46.7 | 64.8 | 796 | 796 | 1,188 | 1.5 | 6.2 | **35** |
| 20 | B-PT1/8 | 36.5 | 45 | 14×20×17 | 22.5 | 105 | 74.8 | 101.2 | 1,553 | 1,553 | 2,312 | 3.1 | 10.5 | **45** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|---|
| 1,240 | 1,360 | 1,480 | | | | | | 2,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | | 3,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | | 3,000 |
| 2,250 | 2,355 | 2,460 | 2,565 | 2,670 | 2,775 | 2,880 | 2,985 | 3,000 |

# GL-E TYPE




part number structure example GL 15 E B 2 T1 - 589 D P / W2 LB F J KGL

GL type

size

block style

seal(refer to page A-14)

| | |
|---|---|
| B(standard) | With side seals + under-seal |
| BW | With double seals + under-seal |
| BS | B + scraper |

number of blocks per rail

symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

total length of rail

size of rail installation hole(D type rail is available only for GL 15)

accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease
Fiber sheet comes only with standard grease.

with bellows(refer to page A-16)

with rail mounting hole caps

with low temperature black chrome treatment

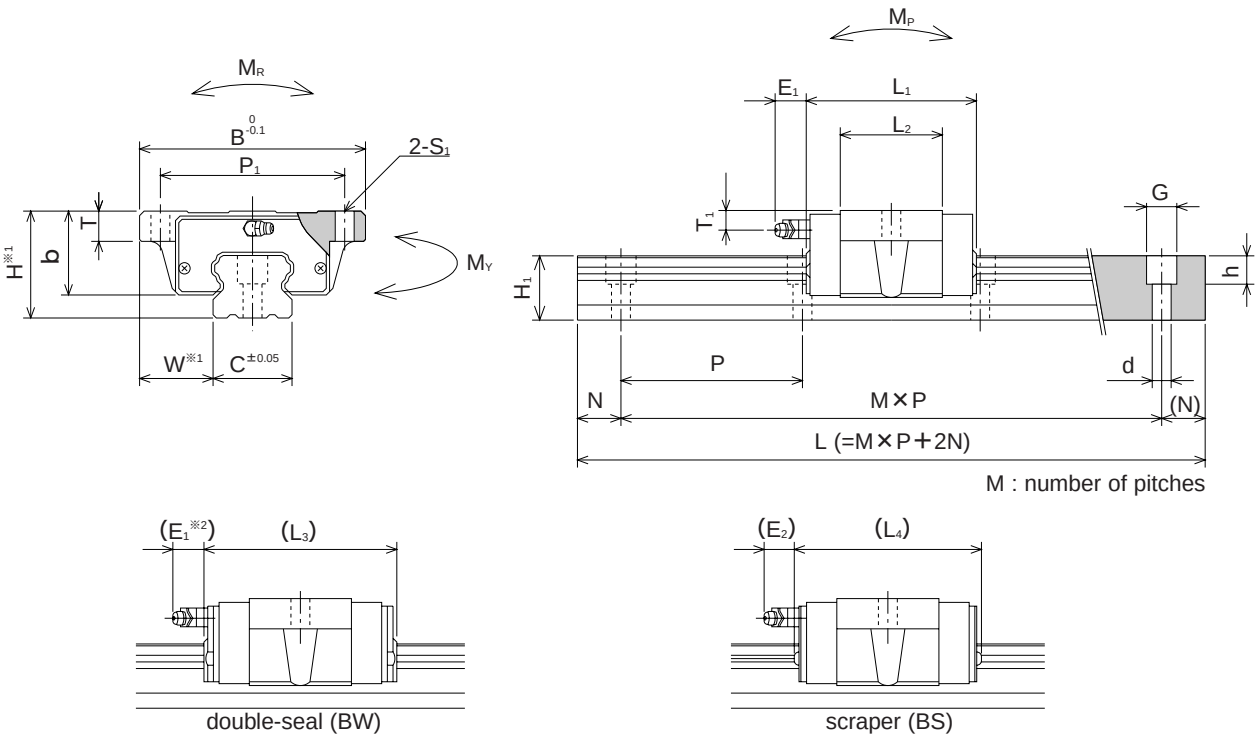
symbol for number of rails

| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

| part number | assembly dimensions | | block dimensions | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $S_1$ | T | b | $E_1$ | $E_2$ |
| | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm |
| **GL15E**<br>**GL15E-D** | 24 | 18.5 | 52 | 40.7 | 22.7 | 46.9 | 47.3 | 41 | 4.5 | 7 | 19.5 | 5 | 5.4 |
| **GL20E** | 28 | 19.5 | 59 | 47.9 | 29.5 | 54.1 | 54.5 | 49 | 5.5 | 9 | 22 | 14 | 13.3 |
| **GL25E** | 33 | 25 | 73 | 58.7 | 37.7 | 65.1 | 65.9 | 60 | 7 | 10 | 26 | | 13.1 |
| **GL30E** | 42 | 31 | 90 | 68 | 40 | 76.6 | 75.6 | 72 | 9 | | 32.5 | | 14 |
| **GL35E** | 48 | 33 | 100 | 77 | 46 | 85.6 | 84.6 | 82 | | 13 | 38 | | |

| part number | standard rail length L mm | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **GL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |
| **GL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |



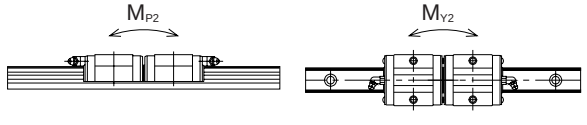

※1 Refer to page A-43 for a description of accuracy.

※2 6mm for GL15EBW.

| | | guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$ mm | grease fitting | $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ $M_{P2}$ N・m | $M_Y$ $M_{Y2}$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 5 | pressed fitting | 13.5 | 15 | 3.5×6×4.5 | 20 | 60 | 7.29 | 9.46 | 37<br>252 | 37<br>252 | 74 | 0.1 | 1.3 | **15** |
| | | | | 4.5×7.5×5.3 | | | | | | | | | | |
| 6 | B-M6F | 16 | 20 | 6×9.5×8.5 | | | 11.91 | 14.81 | 72<br>447 | 72<br>447 | 159 | 0.2 | 2.1 | **20** |
| 6.5 | | 20 | 23 | 7×11×9 | | | 17.0 | 21.2 | 123<br>751 | 123<br>751 | 255 | 0.4 | 3.0 | **25** |
| 9 | | 24 | 28 | | | 80 | 23.0 | 28.7 | 195<br>1,263 | 195<br>1,263 | 418 | 0.6 | 4.6 | **30** |
| 8.5 | | 27.5 | 34 | 9×14×12 | | | 32.0 | 37.8 | 294<br>1,873 | 294<br>1,873 | 693 | 0.9 | 6.2 | **35** |

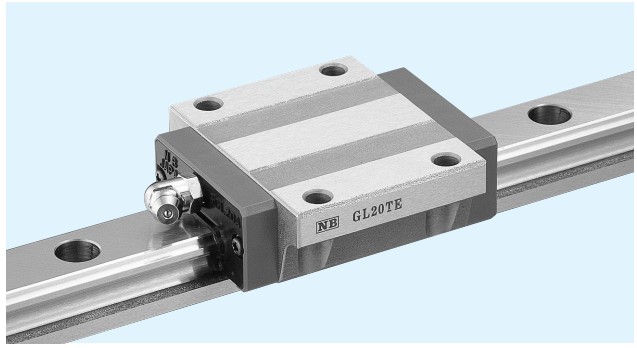
1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 1,240 | 1,360 | 1,480 | | | | | 2,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | 3,000 |




When two blocks are used in contact.

# GL-TE TYPE




part number structure example GL 15 TE B 2 T1 - 589 D P / W2 LB F J KGL

GL type

size

block style

seal(refer to page A-14)

| | |
|---|---|
| B(standard) | With side seals + under-seal |
| BW | With double seals + under-seal |
| BS | B + scraper |

number of blocks per rail

symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

total length of rail

size of rail installation hole(D type rail is available only for GL 15)

accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease
Fiber sheet comes only with standard grease.

with bellows(refer to page A-16)

with rail mounting hole caps

with low temperature black chrome treatment

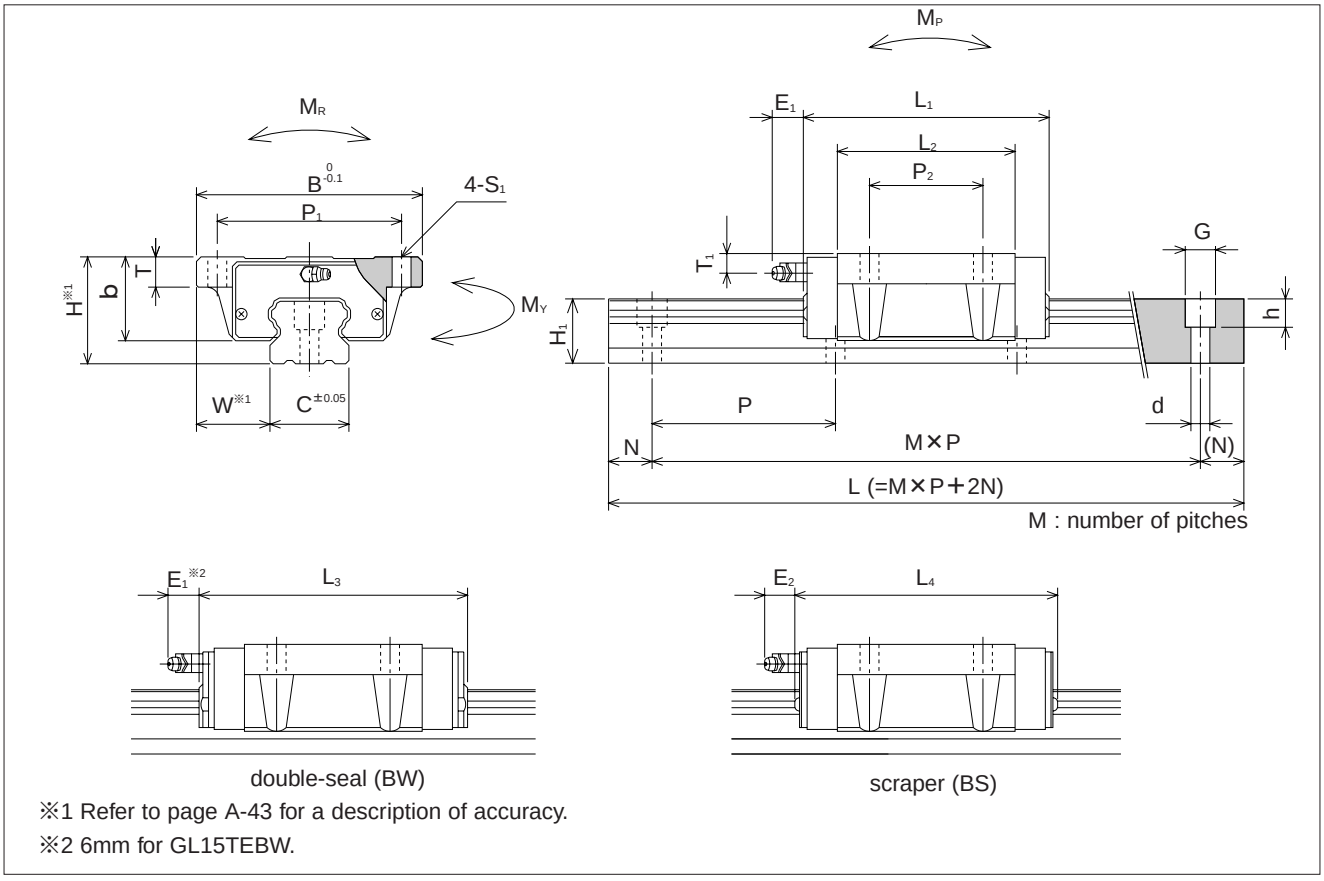
symbol for number of rails

| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

| part number | assembly dimensions | | block dimensions | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $P_2$ | $S_1$ | T | b | $E_1$ | $E_2$ |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm |
| **GL15TE GL15TE-D** | 24 | 18.5 | 52 | 56.5 | 38.5 | 62.7 | 63.1 | 41 | 26 | 4.5 | 7 | 19.5 | 5 | 5.4 |
| **GL20TE** | 28 | 19.5 | 59 | 65.8 | 47.4 | 72.0 | 72.4 | 49 | 32 | 5.5 | 9 | 22 | 14 | 13.3 |
| **GL25TE** | 33 | 25 | 73 | 80 | 59 | 86.4 | 87.2 | 60 | 35 | 7 | 10 | 26 | | 13.1 |
| **GL30TE** | 42 | 31 | 90 | 95.7 | 67.7 | 104.3 | 103.3 | 72 | 40 | 9 | | 32.5 | | 14 |
| **GL35TE** | 48 | 33 | 100 | 109 | 78 | 117.6 | 116.6 | 82 | 50 | | 13 | 38 | | |

| part number | standard rail length L mm | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **GL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |
| **GL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |




※1 Refer to page A-43 for a description of accuracy.

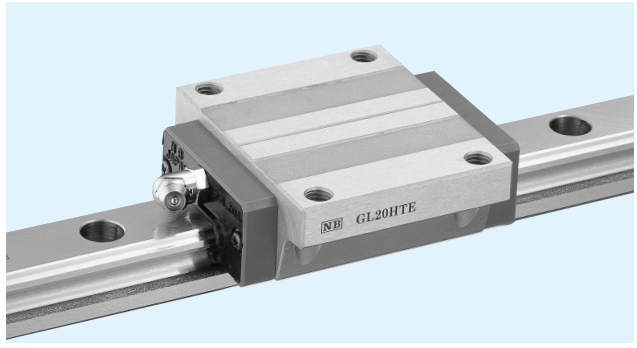
※2 6mm for GL15TEBW.

| | | guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$ mm | grease fitting | $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static CO kN | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | size |
| 5 | pressed fitting | 13.5 | 15 | 3.5×6×4.5 | 20 | 60 | 10.6 | 16.2 | 100 | 100 | 127 | 0.2 | 1.3 | **15** |
| | | | | 4.5×7.5×5.3 | | | | | | | | | | |
| 6 | B-M6F | 16 | 20 | 6×9.5×8.5 | | | 16.4 | 23.3 | 165 | 165 | 250 | 0.3 | 2.1 | **20** |
| 6.5 | | 20 | 23 | 7×11×9 | | | 24.8 | 36.3 | 335 | 335 | 437 | 0.6 | 3.0 | **25** |
| 9 | | 24 | 28 | | | 80 | 33.6 | 49.2 | 529 | 529 | 716 | 1.0 | 4.6 | **30** |
| 8.5 | | 27.5 | 34 | 9×14×12 | | | 46.7 | 64.8 | 796 | 796 | 1,188 | 1.5 | 6.2 | **35** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 1,240 | 1,360 | 1,480 | | | | | 2,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | 3,000 |
| 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | 3,000 |

# GL-HTE TYPE




part number structure example GL | 20 | HTE | B | 2 | T1 - 589 | P / W2 | LB | F | J | KGL

GL type

size

block style

seal(refer to page A-14)

| | |
|---|---|
| B(standard) | With side seals + under-seal |
| BW | With double seals + under-seal |
| BS | B + scraper |

number of blocks per rail

symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

total length of rail

size of rail installation hole

accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease
Fiber sheet comes only with standard grease.

with bellows(refer to page A-16)

with rail mounting hole caps

with low temperature black chrome treatment

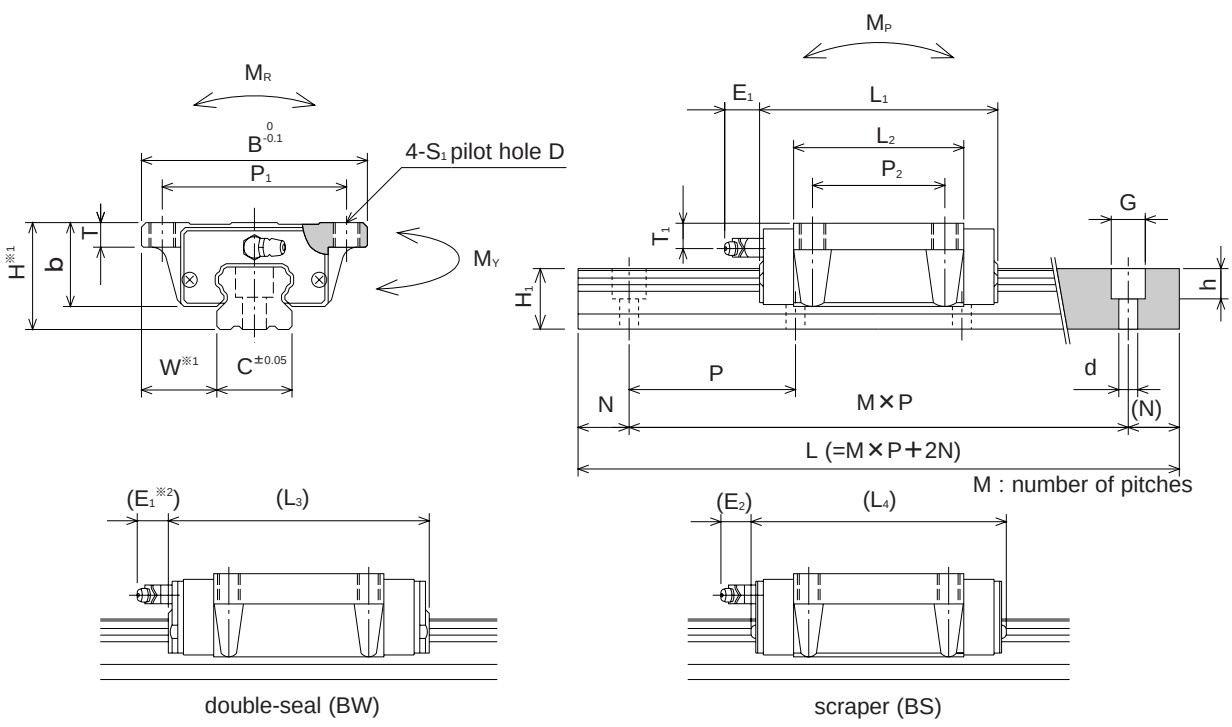
symbol for number of rails

| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for number of rails does not mean the number of rails ordered.

| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $P_2$ | $S_1$ | D | T | b | $E_1$ | $E_2$ |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm |
| **GL15HTE** | 24 | 16 | 47 | 56.5 | 38.5 | 62.7 | 63.1 | 38 | 30 | M5 | 4.4 | 7.5 | 19.7 | 5 | 5.4 |
| **GL20HTE** | 30 | 21.5 | 63 | 71.6 | 53.2 | 77.8 | 78.2 | 53 | 40 | M6 | 5.4 | 10.5 | 24 | 14 | 13.3 |
| **GL25HTE** | 36 | 23.5 | 70 | 80 | 59 | 86.4 | 87.2 | 57 | 45 | M8 | 6.8 | 12.5 | 29 | | 13.1 |
| **GL30HTE** | 42 | 31 | 90 | 95.7 | 67.7 | 104.3 | 103.3 | 72 | 52 | M10 | 8.5 | 10 | 32.5 | | 14 |
| **GL35HTE** | 48 | 33 | 100 | 109 | 78 | 117.6 | 116.6 | 82 | 62 | | | 13 | 38 | | |
| **GL45HTE** | 60 | 37.5 | 120 | 139 | 102 | 147.5 | 148 | 100 | 80 | M12 | 10.5 | 15 | 50 | 16 | 16 |

| part number | standard rail length L mm | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **GL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 | 1,240 |
| **GL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |
| **GL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 | 1,480 |
| **GL45** | 570 | 675 | 780 | 885 | 990 | 1,095 | 1,200 | 1,305 | 1,410 | 1,515 | 1,620 | 1,725 | 1,830 | 1,935 | 2,040 | 2,145 |




※1 Refer to page A-43 for a description of accuracy.
※2 6mm for GL15HTEBW

| | | guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$ mm | grease fitting | $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 5 | pressed fitting | 13.5 | 15 | 4.5×7.5×5.3 | 20 | 60 | 10.6 | 16.2 | 100 | 100 | 127 | 0.2 | 1.3 | **15** |
| 8 | B-M6F | 16 | 20 | 6×9.5×8.5 | | | 18.4 | 27.5 | 227 | 227 | 296 | 0.4 | 2.1 | **20** |
| 9.5 | | 20 | 23 | 7×11×9 | | | 24.8 | 36.3 | 335 | 335 | 437 | 0.6 | 3.0 | **25** |
| 9 | | 24 | 28 | 9×14×12 | | 80 | 33.6 | 49.2 | 529 | 529 | 716 | 1.0 | 4.6 | **30** |
| 8.5 | | 27.5 | 34 | | | | 46.7 | 64.8 | 796 | 796 | 1,188 | 1.5 | 6.2 | **35** |
| 10 | B-PT1/8 | 36.5 | 45 | 14×20×17 | 22.5 | 105 | 74.8 | 101.2 | 1,553 | 1,553 | 2,312 | 3.1 | 10.5 | **45** |

| | maximum length mm |
|---|---|
| 1,240 1,360 1,480 | 2,000 |
| 1,360 1,480 1,600 1,660 1,720 1,840 1,960 | 3,000 |
| 1,360 1,480 1,600 1,660 1,720 1,840 1,960 | 3,000 |
| 1,640 1,720 1,800 1,880 1,960 | 3,000 |
| 1,640 1,720 1,800 1,880 1,960 | 3,000 |
| 2,250 2,355 2,460 2,565 2,670 2,775 2,880 2,985 | 3,000 |

# SLIDE GUIDE SGL TYPE

**The SGL slide guide is a linear motion bearing utilizing the rotational motion of ball elements along four rows of raceway grooves. It can be used in various applications due to its compactness and high load capacity.**

## STRUCTURE AND ADVANTAGES

SGL slide guides consist of a rail with four precision-machined raceway grooves and a block assembly. The block assembly consists of the main body, ball elements, retainers, and return caps.

### High Load Capacity and Long Life:

The use of larger ball elements and a raceway with grooves machined to a radius close to that of the ball elements increases the area of the contact surface. The results are load capacity and provides longer life.

### Low Wear:

Because a 4-row/2-point contact design is used, low wear and stable motion characteristics are achieved even under a pre-loaded conditions.

### Omni-Directional Load Capacity:

The ball elements are positioned at 45° contact angle so that the load capacity is equal in four directions (above, underneath, right and left).

### Absorption of Mounting Dimensional Error:

Because the ball elements are positioned to increase their self-aligning characteristics, the dimensional error caused during installation is absorbed.

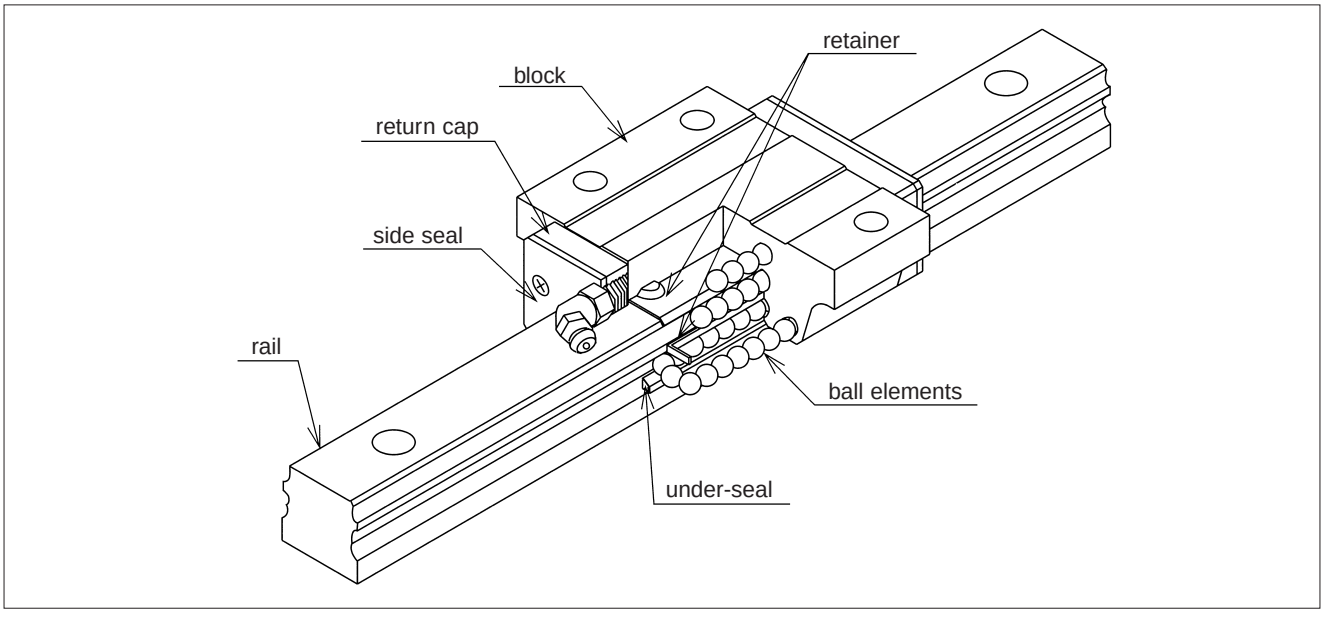
### Anti-Corrosion Specification:

The rail and block assembly may be Raydent treated to increase the corrosion resistance. This treatment is standardized with the symbol "RD", and suitable for use in clean room applications.

### Dust Prevention:

Side seals are provided as a standard. To improve the dust prevention characteristics, underseals and special rail mounting caps are also available.

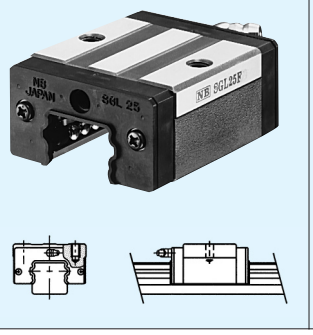
Figure A-60 Structure of SGL type Slide Guide



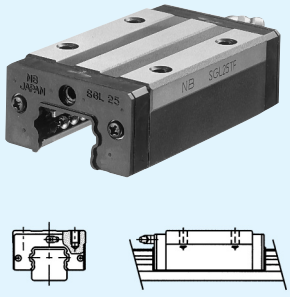
# BLOCK TYPES

Six different types of blocks are available depending on the mounting space requirements and desired mounting method.

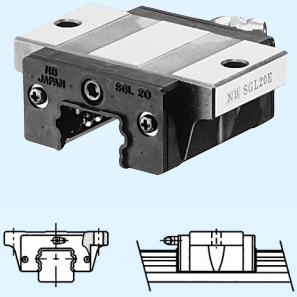
SGL-F **P.A-64**



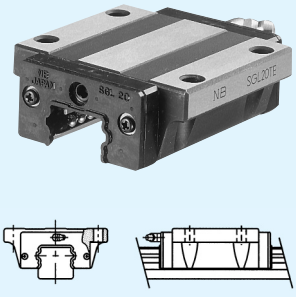
SGL-TF **P.A-66**
SGL-HTF **P.A-68**



SGL-E **P.A-70**



SGL-TE **P.A-72**
SGL-HTE **P.A-74**



# ACCURACY

Three accuracy grades are available: normal-grade (no suffix), high-grade (H), and precision-grade (P).

Table A-28 Accuracy unit/mm

| part number | SGL15,20 | | | SGL25,30,35 | | | SGL45 | | |
|---|---|---|---|---|---|---|---|---|---|
| accuracy grade | normal | high | precision | normal | high | precision | normal | high | precision |
| accuracy symbol | none | H | P | none | H | P | none | H | P |
| allowable dimensional tolerance for height H | ±0.1 | ±0.03 | −0.03〜0 | ±0.1 | ±0.04 | −0.04〜0 | ±0.1 | ±0.05 | −0.05〜0 |
| paired difference for height H | 0.02 | 0.01 | 0.006 | 0.02 | 0.015 | 0.007 | 0.03 | 0.015 | 0.007 |
| allowable dimensional tolerance for width W | ±0.1 | ±0.03 | −0.03〜0 | ±0.1 | ±0.04 | −0.04〜0 | ±0.1 | ±0.05 | −0.05〜0 |
| paired difference for width W | 0.02 | 0.01 | 0.006 | 0.03 | 0.015 | 0.007 | 0.03 | 0.02 | 0.001 |
| Running parallelism of surface C to surface A<br>Running parallelism of surface D to surface B | refer to Figure A-61 | | | | | | | | |

Figure A-61 Motion Accuracy

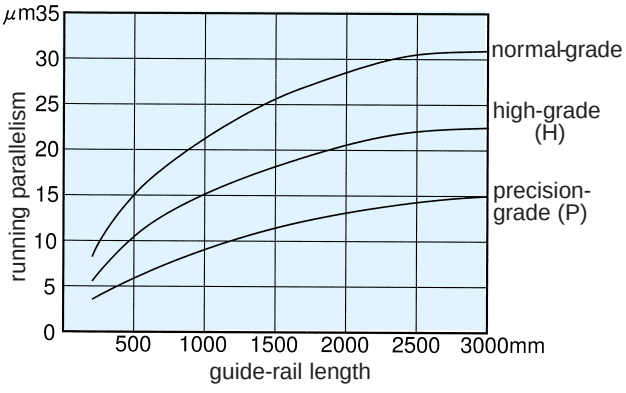
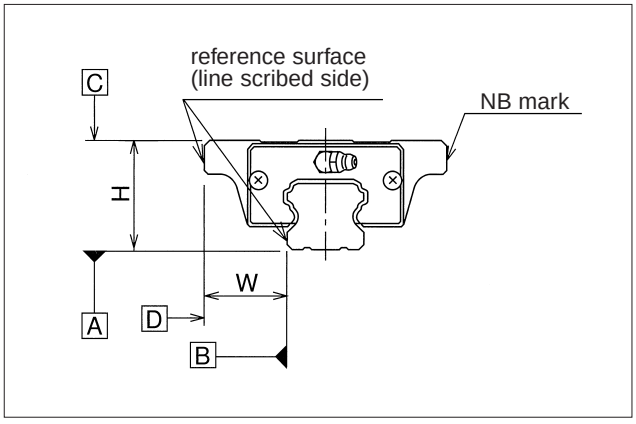



Figure A-62 Accuracy



# PRE-LOAD

SGL slide guides are available with a standard pre-load(no suffix), light pre-load(T1), and medium pre-load(T2).

Table A-29 Pre-Load Symbol and Radial Clearance unit/μm

| pre-load category | standard | light | medium |
|---|---|---|---|
| pre-load symbol | none | T1 | T2 |
| SGL15 | −4〜+2 | −12〜−4 | − |
| SGL20 | −5〜+2 | −14〜−5 | −23〜−14 |
| SGL25 | −6〜+3 | −16〜−6 | −26〜−16 |
| SGL30 | −7〜+4 | −19〜−7 | −31〜−19 |
| SGL35 | −8〜+4 | −22〜−8 | −35〜−22 |
| SGL45 | −10〜+5 | −25〜−10 | −40〜−25 |

Table A-30 Operating Condition and Pre-Load

| category | symbol | operating condition |
|---|---|---|
| standard | none | Minute vibration is applied. Precision motion is required. Moment in a given direction is applied. |
| light | T1 | Light vibration is applied. Light moment is applied. Moment is applied. |
| medium | T2 | Shock/vibration is applied. Over-hang load is applied. Torsional load is applied. |

# RAIL LENGTH

Slide guides with most commonly used lengths are available as standard. Unless otherwise specified, the distance to the first mounting hole (N) from one end of the rail will be located within the range listed in Table A-31 for slide guides that have a non-standard length satisfying the following equation.

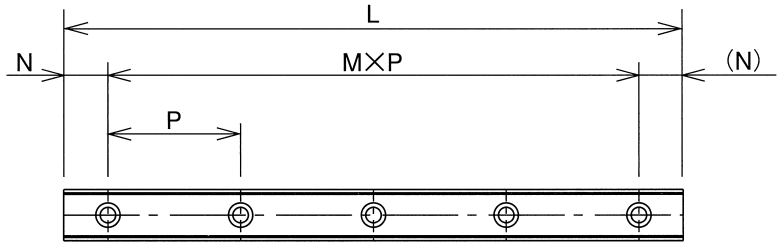
$$L = M \cdot P + 2N$$

L : length (mm) N : distance to the first hole from the end of the rail (mm)
M : number of pitches P : hole pitch (mm)

Table A-31 Fabrication Range unit/mm

| part number | N | | Lmax |
|---|---|---|---|
| | and over | less than | |
| SGL15 | 6 | 36 | 2,000 |
| SGL20 | 10 | 40 | 3,000 |
| SGL25 | 11 | 41 | |
| SGL30 | 12 | 52 | |
| SGL35 | 16 | 56 | |
| SGL45 | 20 | 60 | |

Figure A-63 Rail



# MOUNTING

Slide guides are generally mounted by pushing the reference surface of the rail and block against the shoulder of the mounting surface. An escape groove should be provided at the corner of the shoulder in order to avoid interference with the corner of the rail or block.

The bolts used to secure the rail should be tightened using a torque wrench. The recommended torque values are listed in Table A-32.

Table A-32 Recommended Torque unit/N·m

| bolt size | M3 | M4 | M5 | M6 | M8 | M12 |
|---|---|---|---|---|---|---|
| recommended torque | 1.4 | 3.2 | 6.6 | 11.2 | 27.6 | 96.4 |

(When using stainless steel bolts)

Figure A-64 Mounting Reference Surface Shapes

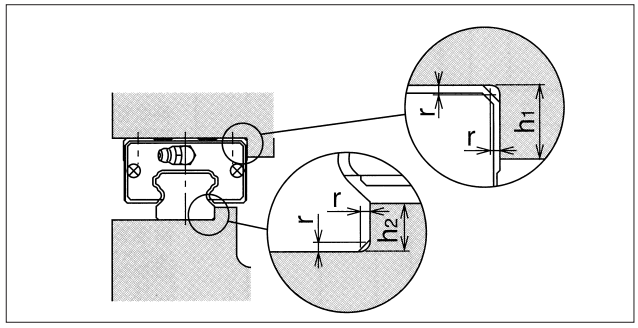


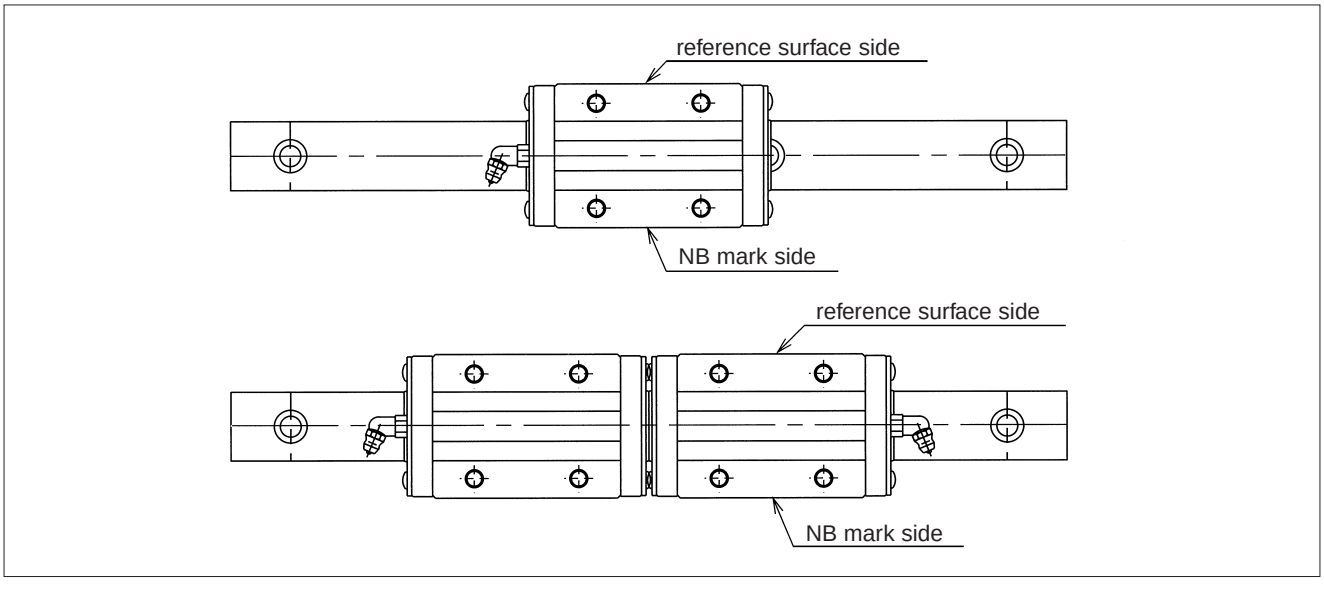

Table A-33 Mounting Surface Dimensions unit/mm

| part number | $h_1$ | $h_2$ | $r_{max}$ |
|---|---|---|---|
| SGL15 | 4 | 3.5 | 0.5 |
| SGL20 | 5 | 5 | 0.5 |
| SGL25 | 5 | 5.5 | 1 |
| SGL30 | 6 | 7.5 | 1 |
| SGL35 | 6 | 8 | 1 |
| SGL45 | 8 | 8 | 1 |

# GREASE FITTING

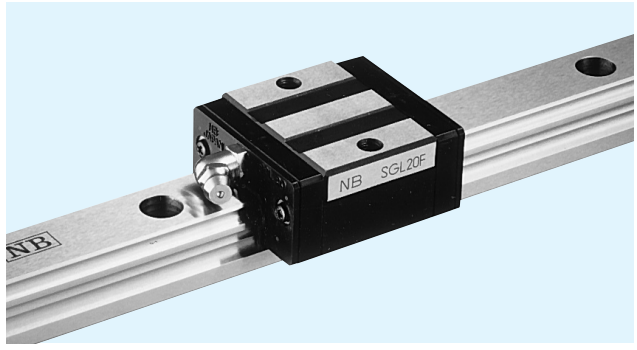
A grease fitting is attached to the SGL slide guide in the return cap for lubrication purposes. Unless otherwise specified, the orientation of the grease fitting is as shown in Figure A-65. When more than 2 blocks are used on one rail, the grease fitting orientation must be specified.

Figure A-65 Number of Blocks and Grease Fitting Orientation



# SGL-F TYPE

## — High Rigidity Non-Flange Type — (Short Configuration)




part number structure example SGL 15 F B 2 T1 - 589 D P / W2 FS LB F J KGL

- SGL type
- size
- block style
- seal(refer to page A-14)

| | |
|---|---|
| blank | With side-seals |
| B | With side seals + under-seals |
| BW | With double seals + under-seals |
| BS | B + scraper |

- number of blocks per rail
- symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

- total length of rail
- size of rail installation hole(D type rail is available only for SGL 15)
- accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

- symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease

- with bellows(refer to page A-16)
- with rail mounting hole caps
- with low temperature black chrome treatment
- with Fiber Sheet
  Fiber sheet comes only with standard grease.
- symbol for number of rails

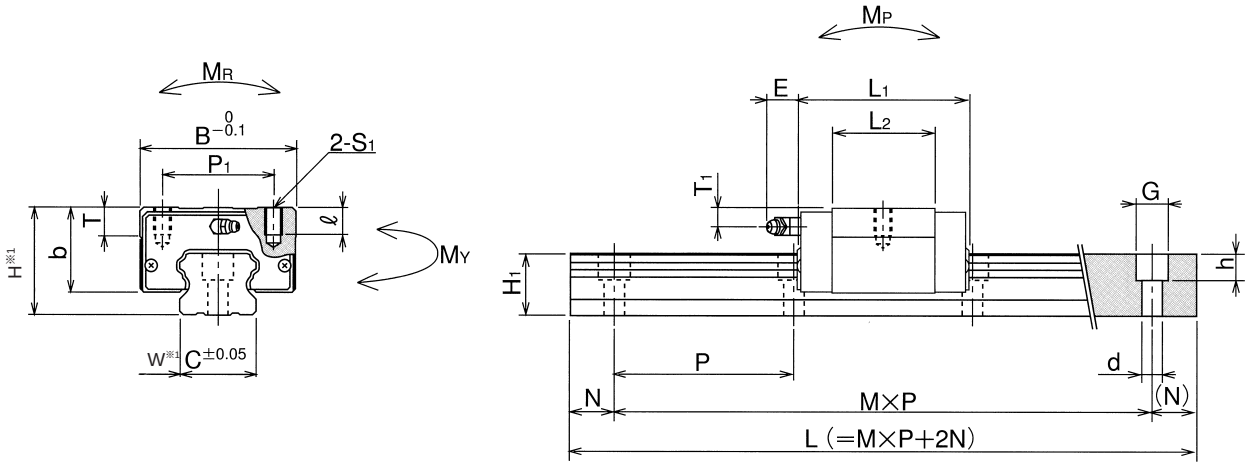
| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

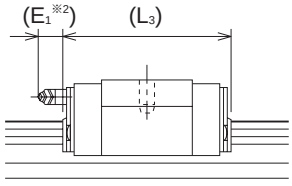
| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $S_1$ | $\ell$ | T | b | $E_1$ | $E_2$ | $T_1$ | grease fitting |
| | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm | mm | |
| **SGL15F**<br>**SGL15F-D** | 24 | 9.5 | 34 | 40.7 | 22.7 | 46.9 | 47.3 | 26 | M4 | 7 | 6 | 19.5 | 5 | 5.4 | 5 | pressed fitting |
| **SGL20F** | 28 | 11 | 42 | 47.9 | 29.5 | 54.1 | 54.5 | 32 | M5 | 8 | 7.5 | 22 | 14 | 13.3 | 6 | B-M6F |
| **SGL25F** | 33 | 12.5 | 48 | 58.7 | 37.7 | 65.1 | 65.9 | 35 | M6 | 9 | 8 | 26 | | 13.1 | 6.5 | |
| **SGL30F** | 42 | 16 | 60 | 68 | 40 | 76.6 | 75.6 | 40 | M8 | 12 | 9 | 32.5 | | 14.0 | 9 | |
| **SGL35F** | 48 | 18 | 70 | 77 | 46 | 85.6 | 84.6 | 50 | | | 13 | 38 | | | 8.5 | |

| part number | standard rail length L mm | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SGL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 |
| **SGL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |
| **SGL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |

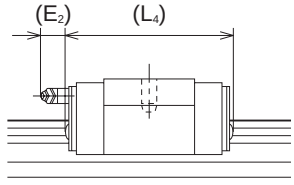
Rails exceeding the maximum specified length may be fabricated if joints are used. Contact NB for assistance.




M : number of pitches




double seal (BW)



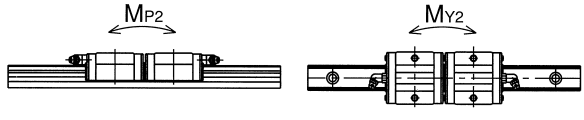

scraper (BS)

※1 Refer to page A-61 for a description of accuracy.
※2 6mm for SGL15FBW.

| guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ $M_{P2}$ N・m | $M_Y$ $M_{Y2}$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 13.5 | 15 | 3.5×6×4.5 | 20 | 60 | 7.29 | 9.46 | 37<br>252 | 37<br>252 | 74 | 0.1 | 1.3 | **15** |
| | | 4.5×7.5×5.3 | | | | | | | | | | |
| 16 | 20 | 6×9.5×8.5 | | | 11.91 | 14.81 | 72<br>447 | 72<br>447 | 159 | 0.2 | 2.1 | **20** |
| 20 | 23 | 7×11×9 | | | 17.0 | 21.2 | 123<br>751 | 123<br>751 | 255 | 0.3 | 3.0 | **25** |
| 24 | 28 | | | 80 | 23.0 | 28.7 | 195<br>1,263 | 195<br>1,263 | 418 | 0.5 | 4.6 | **30** |
| 27.5 | 34 | 9×14×12 | | | 32.0 | 37.8 | 294<br>1,873 | 294<br>1,873 | 693 | 0.8 | 6.2 | **35** |

1kN≒102kgf　1N・m≒0.102kgf・m

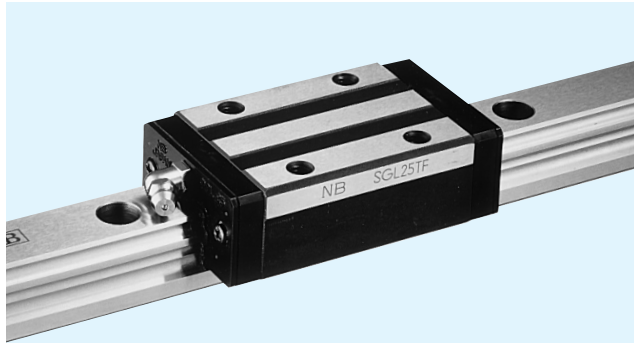
| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 1,120 | 1,240 | 1,360 | 1,480 | | | | 2,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,960 | | | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,960 | | | 3,000 |




When two blocks are used in contact.

# SGL-TF TYPE

## – High Rigidity Non-Flange Type –




part number structure example **SGL 15 TF B 2 T1 - 589 D P / W2 FS LB F J KGL**

- SGL type
- size
- block style
- seal(refer to page A-14)

| | |
|---|---|
| blank | With side-seals |
| B | With side seals + under-seals |
| BW | With double seals + under-seals |
| BS | B + scraper |

- number of blocks per rail
- symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

- total length of rail
- size of rail installation hole(D type rail is available only for SGL 15)
- accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

- symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease

- with bellows(refer to page A-16)
- with rail mounting hole caps
- with low temperature black chrome treatment
- with Fiber Sheet

Fiber sheet comes only with standard grease.

- symbol for number of rails

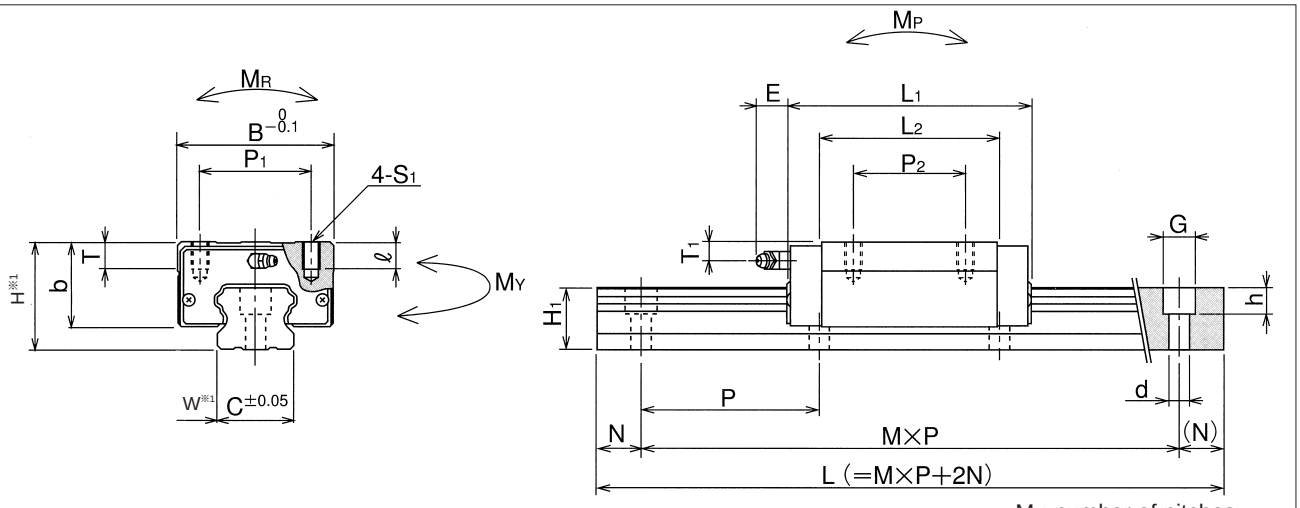
| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

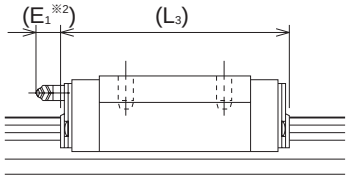
| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | T | b | $E_1$ | $E_2$ | $T_1$ | grease fitting |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm | mm | |
| **SGL15TF**<br>**SGL15TF-D** | 24 | 9.5 | 34 | 56.5 | 38.5 | 62.7 | 63.1 | 26 | 26 | M4 | 7 | 6 | 19.5 | 5 | 5.4 | 5 | pressed fitting |
| **SGL20TF** | 28 | 11 | 42 | 65.8 | 47.4 | 72 | 72.4 | 32 | 32 | M5 | 8 | 7.5 | 22 | 14 | 13.3 | 6 | B-M6F |
| **SGL25TF** | 33 | 12.5 | 48 | 80.2 | 59 | 86.4 | 87.2 | 35 | 35 | M6 | 9 | 8 | 26 | | 13.1 | 6.5 | |
| **SGL30TF** | 42 | 16 | 60 | 95.7 | 67.7 | 104.3 | 103.3 | 40 | 40 | M8 | 12 | 9 | 32.5 | | 14.0 | 9 | |
| **SGL35TF** | 48 | 18 | 70 | 109 | 78 | 117.6 | 116.6 | 50 | 50 | | | 13 | 38 | | | 8.5 | |

| part number | standard rail length L mm | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SGL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 |
| **SGL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |
| **SGL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |

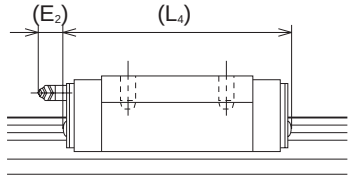
Rails exceeding the maximum specified length may be fabricated if joints are used. Contact NB for assistance.




M : number of pitches




double seal (BW)




scraper (BS)

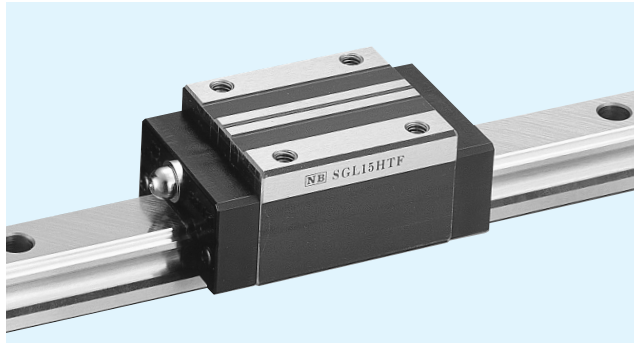
※1 Refer to page A-61 for a description of accuracy.
※2 6mm for SGL15TFBW.

| guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 13.5 | 15 | 3.5×6×4.5 | 20 | 60 | 10.6 | 16.2 | 100 | 100 | 127 | 0.2 | 1.3 | **15** |
| | | 4.5×7.5×5.3 | | | | | | | | | | |
| 16 | 20 | 6×9.5×8.5 | | | 16.4 | 23.3 | 165 | 165 | 250 | 0.3 | 2.1 | **20** |
| 20 | 23 | 7×11×9 | | | 24.8 | 36.3 | 335 | 335 | 437 | 0.4 | 3.0 | **25** |
| 24 | 28 | | | 80 | 33.6 | 49.2 | 529 | 529 | 716 | 0.8 | 4.6 | **30** |
| 27.5 | 34 | 9×14×12 | | | 46.7 | 64.8 | 796 | 796 | 1,188 | 1.3 | 6.2 | **35** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 1,120 | 1,240 | 1,360 | 1,480 | | | | 2,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,960 | | | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,960 | | | 3,000 |

# SGL-HTF TYPE




part number structure example **SGL 15 HTF B 2 T1 - 589 P / W2 FS LB F J - KGL**

- SGL type
- size
- block style
- seal(refer to page A-14)

| | |
|---|---|
| blank | With side-seals |
| B | With side seals + under-seals |
| BW | With double seals + under-seals |
| BS | B + scraper |

- number of blocks per rail
- symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

- total length of rail
- accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

- symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease

- with bellows(refer to page A-16)
- with rail mounting hole caps
- with low temperature black chrome treatment
- with Fiber Sheet
  Fiber sheet comes only with standard grease.
- symbol for number of rails

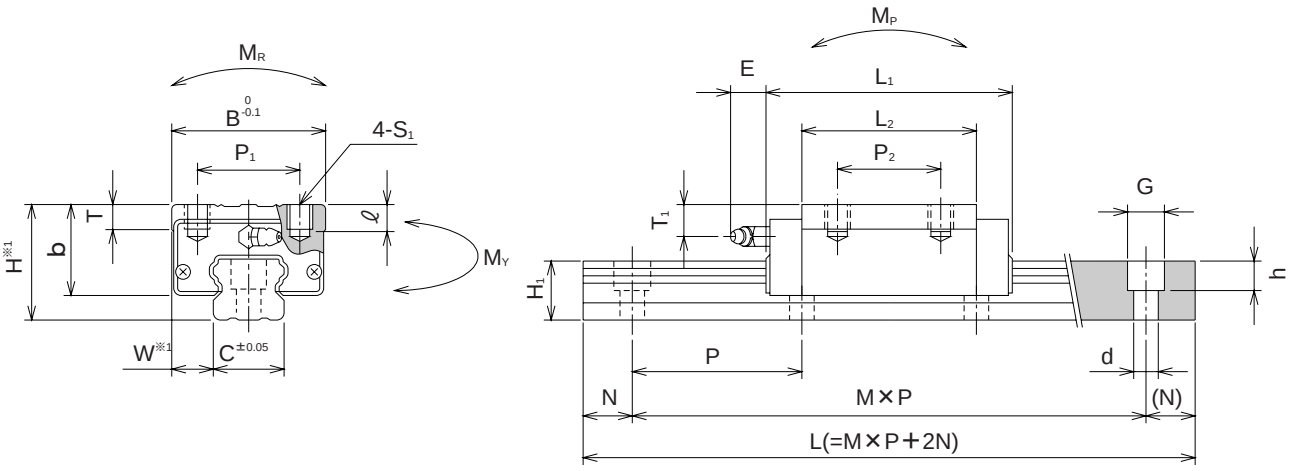
| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

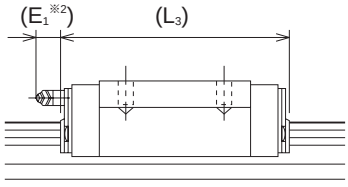
| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $P_2$ | $S_1$ | $\ell$ | T | b | $E_1$ | $E_2$ | $T_1$ | grease fitting |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm | mm | |
| **SGL15HTF** | 28 | 9.5 | 34 | 56.5 | 38.5 | 62.7 | 63.1 | 26 | 26 | M4 | 5 | 6 | 23.7 | 5 | 5.4 | 9 | pressed fitting |
| **SGL20HTF** | 30 | 12 | 44 | 71.6 | 53.2 | 77.8 | 78.2 | 32 | 36 | M5 | 6 | 9.5 | 24 | 14 | 13.3 | 8 | B-M6F |
| **SGL25HTF** | 40 | 12.5 | 48 | 80 | 59 | 86.4 | 87.2 | 35 | 35 | M6 | 8 | 9 | 33 | | 13.1 | 13.5 | |
| **SGL30HTF** | 45 | 16 | 60 | 95.7 | 67.7 | 104.3 | 103.3 | 40 | 40 | M8 | 10 | | 35.5 | | 14.0 | 12 | |
| **SGL35HTF** | 55 | 18 | 70 | 109 | 78 | 117.6 | 116.6 | 50 | 50 | | 12 | 13 | 45 | | | 15.5 | |
| **SGL45HTF** | 70 | 20.5 | 86 | 139 | 102 | 147.5 | 148 | 60 | 60 | M10 | 17 | 15 | 60 | 16 | 16 | 20 | B-PT1/8 |

| part number | standard rail length L mm | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SGL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 |
| **SGL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |
| **SGL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |
| **SGL45** | 570 | 675 | 780 | 885 | 990 | 1,095 | 1,200 | 1,305 | 1,410 | 1,515 | 1,620 | 1,725 | 1,830 | 1,935 | 2,040 |

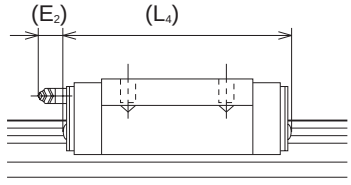
Rails exceeding the maximum specified length may be fabricated if joints are used. Contact NB for assistance.




M : number of pitches




double seal (BW)




scraper (BS)

※1 Refer to page A-61 for a description of accuracy.
※2 6mm for SGL15HTFBW.

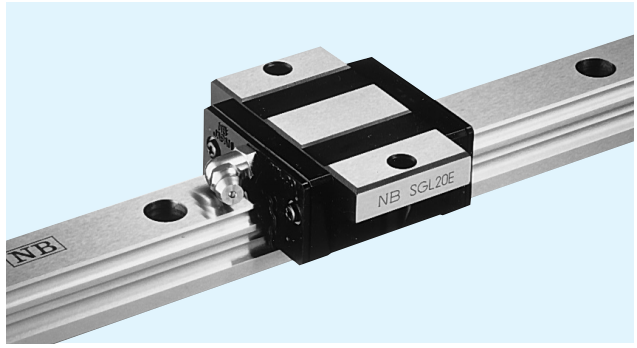
| guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 13.5 | 15 | 4.5×7.5×5.3 | 20 | 60 | 10.6 | 16.2 | 100 | 100 | 127 | 0.2 | 1.3 | **15** |
| 16 | 20 | 6×9.5×8.5 | | | 18.4 | 27.5 | 227 | 227 | 296 | 0.4 | 2.1 | **20** |
| 20 | 23 | 7×11×9 | | | 24.8 | 36.3 | 335 | 335 | 437 | 0.6 | 3.0 | **25** |
| 24 | 28 | 9×14×12 | | 80 | 33.6 | 49.2 | 529 | 529 | 716 | 0.9 | 4.6 | **30** |
| 27.5 | 34 | | | | 46.7 | 64.8 | 796 | 796 | 1,188 | 1.5 | 6.2 | **35** |
| 36.5 | 45 | 14×20×17 | 22.5 | 105 | 74.8 | 101.2 | 1,553 | 1,553 | 2,312 | 3.1 | 10.5 | **45** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|---|---|
| 1,120 | 1,240 | 1,360 | 1,480 | | | | | | 2,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | | 3,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | | 3,000 |
| 2,145 | 2,250 | 2,355 | 2,460 | 2,565 | 2,670 | 2,775 | 2,880 | 2,985 | 3,000 |

# SGL-E TYPE

## — High Rigidity Flange Type — (Short Configuration)




part number structure example SGL 15 E B 2 T1 - 589 D P / W2 FS LB F J KGL

- SGL type
- size
- block style
- seal(refer to page A-14)

| | |
|---|---|
| blank | With side-seals |
| B | With side seals + under-seals |
| BW | With double seals + under-seals |
| BS | B + scraper |

- number of blocks per rail
- symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

- total length of rail
- size of rail installation hole(D type rail is available only for SGL 15)
- accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

- symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease

- with bellows(refer to page A-16)
- with rail mounting hole caps
- with low temperature black chrome treatment
- with Fiber Sheet

Fiber sheet comes only with standard grease.

- symbol for number of rails

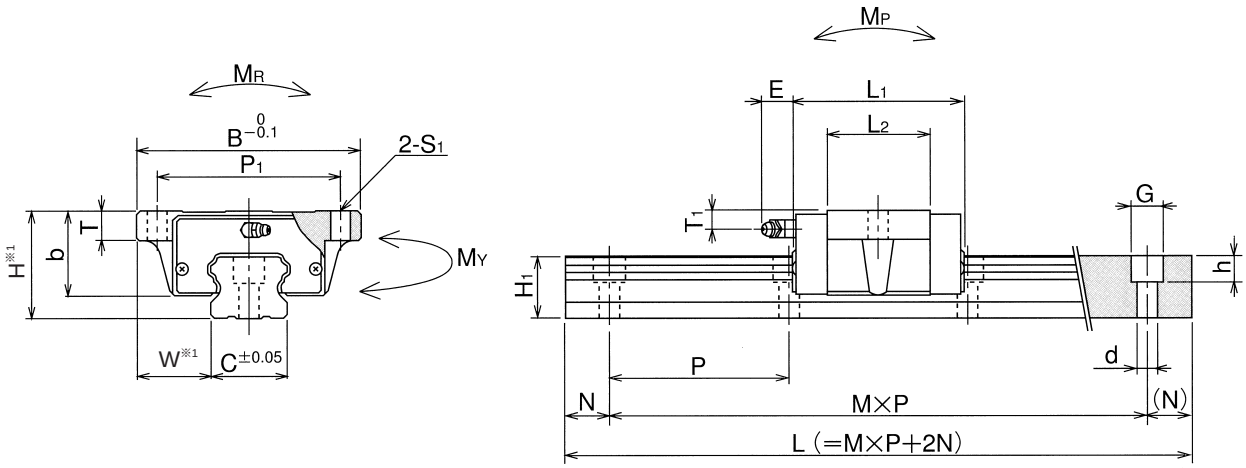
| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

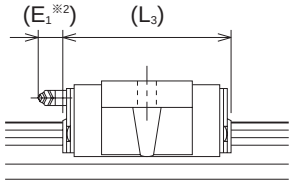
| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $S_1$ | T | b | $E_1$ | $E_2$ | $T_1$ | grease fitting |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | |
| **SGL15E**<br>**SGL15E-D** | 24 | 18.5 | 52 | 40.7 | 22.7 | 46.9 | 47.3 | 41 | 4.5 | 7 | 19.5 | 5 | 5.4 | 5 | pressed fitting |
| **SGL20E** | 28 | 19.5 | 59 | 47.9 | 29.5 | 54.1 | 54.5 | 49 | 5.5 | 9 | 22 | 14 | 13.3 | 6 | B-M6F |
| **SGL25E** | 33 | 25 | 73 | 58.7 | 37.7 | 65.1 | 65.9 | 60 | 7 | 10 | 26 | | 13.1 | 6.5 | |
| **SGL30E** | 42 | 31 | 90 | 68 | 40 | 76.6 | 75.6 | 72 | 9 | | 32.5 | | 14.0 | 9 | |
| **SGL35E** | 48 | 33 | 100 | 77 | 46 | 85.6 | 84.6 | 82 | | 13 | 38 | | | 8.5 | |

| part number | standard rail length L mm | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SGL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 |
| **SGL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |
| **SGL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |

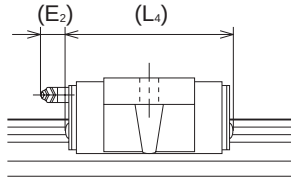
Rails exceeding the maximum specified length may be fabricated if joints are used. Contact NB for assistance.




M : number of pitches




double seal (BW)



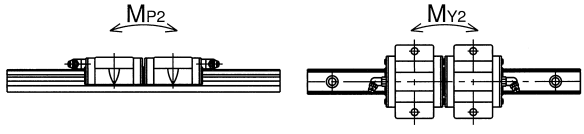

scraper (BS)

※1 Refer to page A-61 for a description of accuracy.
※2 6mm for SGL15EBW.

| guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ $M_{P2}$ N・m | $M_Y$ $M_{Y2}$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 13.5 | 15 | 3.5×6×4.5<br>4.5×7.5×5.3 | 20 | 60 | 7.29 | 9.46 | 37<br>252 | 37<br>252 | 74 | 0.1 | 1.3 | **15** |
| 16 | 20 | 6×9.5×8.5 | | | 11.91 | 14.81 | 72<br>447 | 72<br>447 | 159 | 0.2 | 2.1 | **20** |
| 20 | 23 | 7×11×9 | | | 17.0 | 21.2 | 123<br>751 | 123<br>751 | 255 | 0.4 | 3.0 | **25** |
| 24 | 28 | | | 80 | 23.0 | 28.7 | 195<br>1,263 | 195<br>1,263 | 418 | 0.6 | 4.6 | **30** |
| 27.5 | 34 | 9×14×12 | | | 32.0 | 37.8 | 294<br>1,873 | 294<br>1,873 | 693 | 0.9 | 6.2 | **35** |

1kN≒102kgf　1N・m≒0.102kgf・m

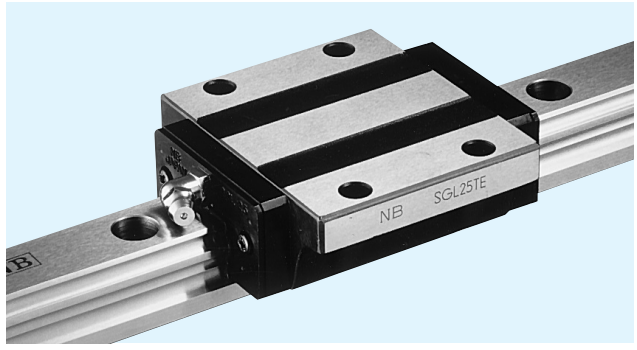
| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 1,120 | 1,240 | 1,360 | 1,480 | | | | 2,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,960 | | | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,960 | | | 3,000 |




When two blocks are used in contact.

# SGL-TE TYPE

## – High Rigidity Flange Type –




part number structure example **SGL 15 TE B 2 T1 - 589 D P / W2 FS LB F J KGL**

- SGL type
- size
- block style
- seal(refer to page A-14)

| | |
|---|---|
| blank | With side-seals |
| B | With side seals + under-seals |
| BW | With double seals + under-seals |
| BS | B + scraper |

- number of blocks per rail
- symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

- total length of rail
- size of rail installation hole(D type rail is available only for SGL 15)
- accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

- symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease

- with bellows(refer to page A-16)
- with rail mounting hole caps
- with low temperature black chrome treatment
- with Fiber Sheet

Fiber sheet comes only with standard grease.

- symbol for number of rails

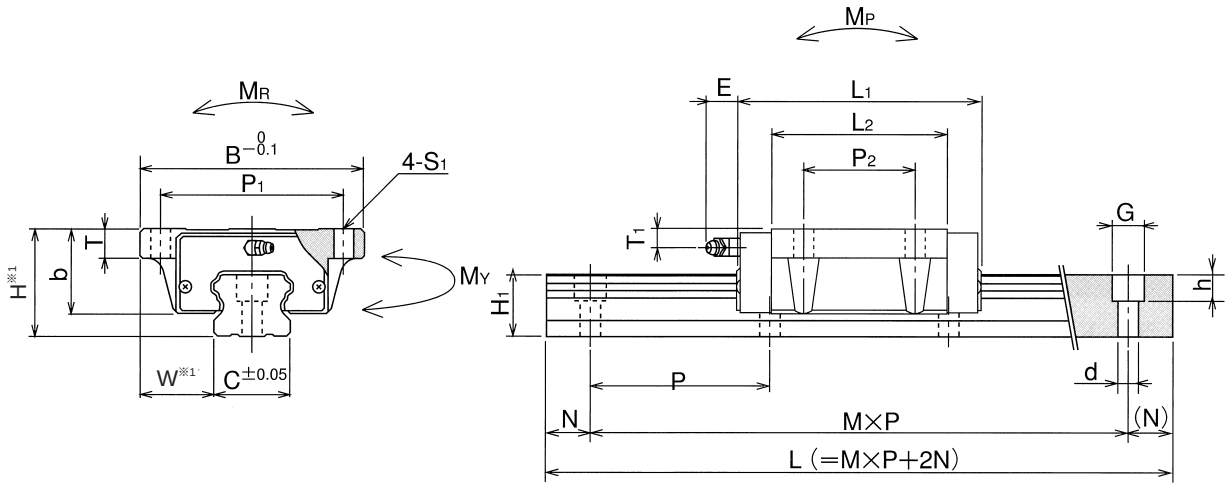
| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

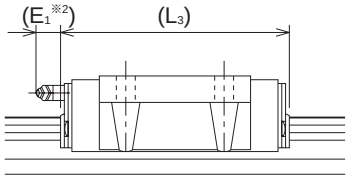
| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $P_2$ | $S_1$ | T | b | $E_1$ | $E_2$ | $T_1$ | grease fitting |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | |
| **SGL15TE**<br>**SGL15TE-D** | 24 | 18.5 | 52 | 56.5 | 38.5 | 62.7 | 63.1 | 41 | 26 | 4.5 | 7 | 19.5 | 5 | 5.4 | 5 | pressed fitting |
| **SGL20TE** | 28 | 19.5 | 59 | 65.8 | 47.4 | 72 | 72.4 | 49 | 32 | 5.5 | 9 | 22 | 14 | 13.3 | 6 | B-M6F |
| **SGL25TE** | 33 | 25 | 73 | 80.2 | 59 | 86.4 | 87.2 | 60 | 35 | 7 | 10 | 26 | | 13.1 | 6.5 | |
| **SGL30TE** | 42 | 31 | 90 | 95.7 | 67.7 | 104.3 | 103.3 | 72 | 40 | 9 | | 32.5 | | 14.0 | 9 | |
| **SGL35TE** | 48 | 33 | 100 | 109 | 78 | 117.6 | 116.6 | 82 | 50 | | 13 | 38 | | | 8.5 | |

| part number | standard rail length L mm | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SGL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 |
| **SGL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |
| **SGL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |

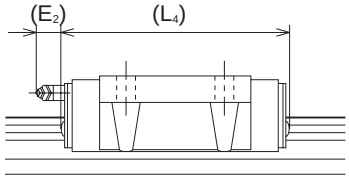
Rails exceeding the maximum specified length may be fabricated if joints are used. Contact NB for assistance.




M : number of pitches




double seal (BW)




scraper (BS)

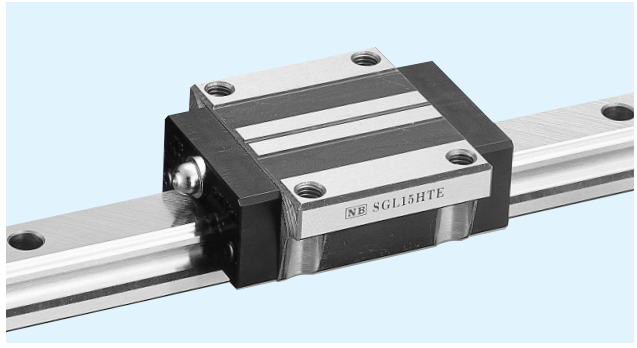
※1 Refer to page A-61 for a description of accuracy.
※2 6mm for SGL15TEBW.

| guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kg | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 13.5 | 15 | 3.5×6×4.5 | 20 | 60 | 10.6 | 16.2 | 100 | 100 | 127 | 0.2 | 1.3 | **15** |
| | | 4.5×7.5×5.3 | | | | | | | | | | |
| 16 | 20 | 6×9.5×8.5 | | | 16.4 | 23.3 | 165 | 165 | 250 | 0.3 | 2.1 | **20** |
| 20 | 23 | 7×11×9 | | | 24.8 | 36.3 | 335 | 335 | 437 | 0.6 | 3.0 | **25** |
| 24 | 28 | | | 80 | 33.6 | 49.2 | 529 | 529 | 716 | 1.0 | 4.6 | **30** |
| 27.5 | 34 | 9×14×12 | | | 46.7 | 64.8 | 796 | 796 | 1,188 | 1.5 | 6.2 | **35** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 1,120 | 1,240 | 1,360 | 1,480 | | | | 2,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,720 | 1,840 | 1,960 | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,960 | | | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,960 | | | 3,000 |

# SGL-HTE TYPE




part number structure example **SGL 15 HTE B 2 T1 - 589 P / W2 FS LB F J - KGL**

- SGL type
- size
- block style
- seal(refer to page A-14)

| | |
|---|---|
| blank | With side-seals |
| B | With side seals + under-seals |
| BW | With double seals + under-seals |
| BS | B + scraper |

- number of blocks per rail
- symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

- total length of rail
- accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

- symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease

- with bellows(refer to page A-16)
- with rail mounting hole caps
- with low temperature black chrome treatment
- with Fiber Sheet
  Fiber sheet comes only with standard grease.
- symbol for number of rails

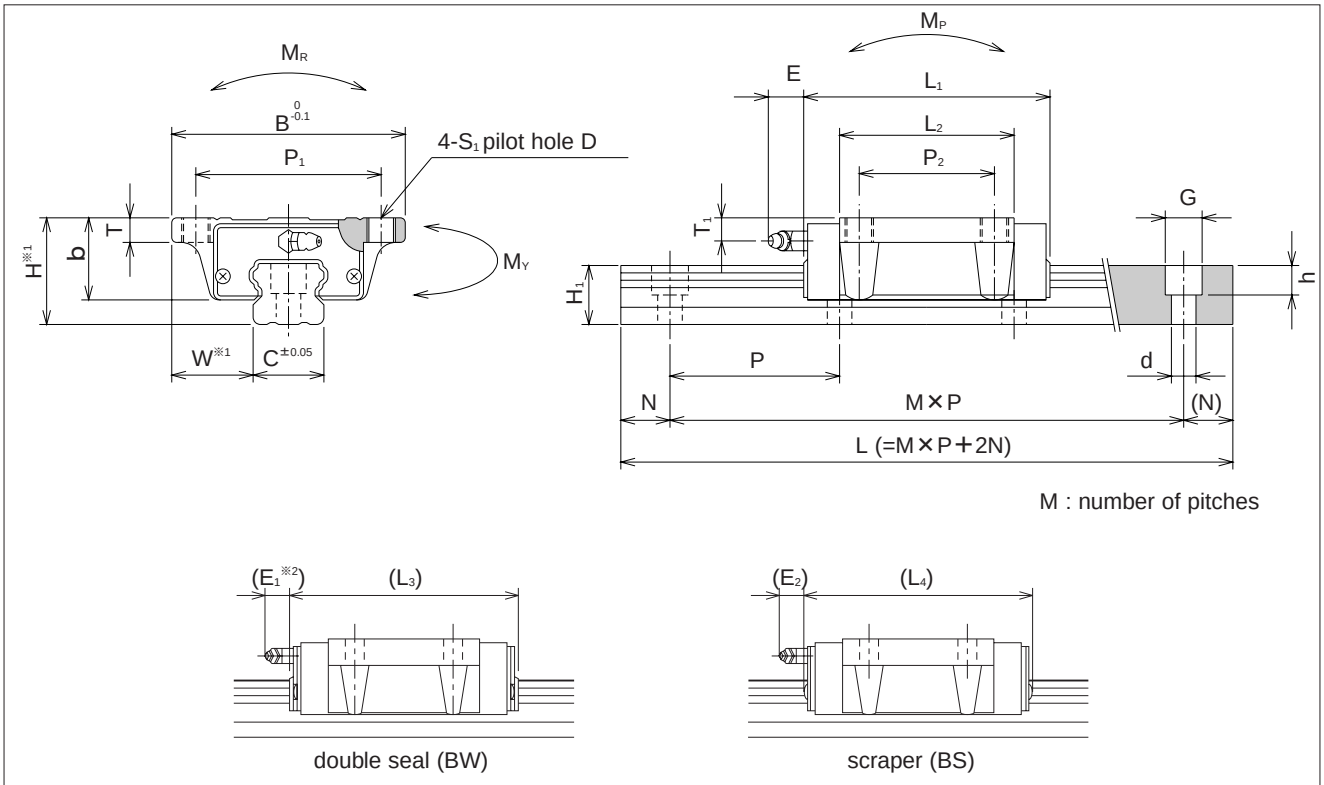
| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

| part number | assembly dimensions | | block dimensions | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $P_1$ | $P_2$ | $S_1$ | D | T | b | $E_1$ | $E_2$ | $T_1$ | grease fitting |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm | mm | |
| **SGL15HTE** | 24 | 16 | 47 | 56.5 | 38.5 | 62.7 | 63.1 | 38 | 30 | M5 | 4.4 | 7.5 | 19.7 | 5 | 5.4 | 5 | pressed fitting |
| **SGL20HTE** | 30 | 21.5 | 63 | 71.6 | 53.2 | 77.8 | 78.2 | 53 | 40 | M6 | 5.4 | 10.5 | 24 | 14 | 13.3 | 8 | B-M6F |
| **SGL25HTE** | 36 | 23.5 | 70 | 80 | 59 | 86.4 | 87.2 | 57 | 45 | M8 | 6.8 | 12.5 | 29 | | 13.1 | 9.5 | |
| **SGL30HTE** | 42 | 31 | 90 | 95.7 | 67.7 | 104.3 | 103.3 | 72 | 52 | M10 | 8.5 | 10 | 32.5 | | 14.0 | 9 | |
| **SGL35HTE** | 48 | 33 | 100 | 109 | 78 | 117.6 | 116.6 | 82 | 62 | | | 13 | 38 | | | 8.5 | |
| **SGL45HTE** | 60 | 37.5 | 120 | 139 | 102 | 147.5 | 148 | 100 | 80 | M12 | 10.5 | 15 | 50 | 16 | 16 | 10 | B-PT1/8 |

| part number | standard rail length L mm | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SGL15** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 |
| **SGL20** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL25** | 220 | 280 | 340 | 400 | 460 | 520 | 580 | 640 | 700 | 760 | 820 | 880 | 940 | 1,000 | 1,120 |
| **SGL30** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |
| **SGL35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 840 | 920 | 1,000 | 1,080 | 1,160 | 1,240 | 1,320 | 1,400 |
| **SGL45** | 570 | 675 | 780 | 885 | 990 | 1,095 | 1,200 | 1,305 | 1,410 | 1,515 | 1,620 | 1,725 | 1,830 | 1,935 | 2,040 |

Rails exceeding the maximum specified length may be fabricated if joints are used. Contact NB for assistance.




※1 Refer to page A-61 for a description of accuracy.
※2 6mm for SGL15HTEBW.

| guide-rail dimensions | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_1$ mm | C mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| 13.5 | 15 | 4.5×7.5×5.3 | 20 | 60 | 10.6 | 16.2 | 100 | 100 | 127 | 0.2 | 1.3 | **15** |
| 16 | 20 | 6×9.5×8.5 | | | 18.4 | 27.5 | 227 | 227 | 296 | 0.4 | 2.1 | **20** |
| 20 | 23 | 7×11×9 | | | 24.8 | 36.3 | 335 | 335 | 437 | 0.6 | 3.0 | **25** |
| 24 | 28 | 9×14×12 | | 80 | 33.6 | 49.2 | 529 | 529 | 716 | 1.0 | 4.6 | **30** |
| 27.5 | 34 | | | | 46.7 | 64.8 | 796 | 796 | 1,188 | 1.5 | 6.2 | **35** |
| 36.5 | 45 | 14×20×17 | 22.5 | 105 | 74.8 | 101.2 | 1,553 | 1,553 | 2,312 | 3.1 | 10.5 | **45** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|---|---|
| 1,120 | 1,240 | 1,360 | 1,480 | | | | | | 2,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | | 3,000 |
| 1,240 | 1,360 | 1,480 | 1,600 | 1,660 | 1,720 | 1,840 | 1,960 | | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | | 3,000 |
| 1,480 | 1,640 | 1,720 | 1,800 | 1,880 | 1,960 | | | | 3,000 |
| 2,145 | 2,250 | 2,355 | 2,460 | 2,565 | 2,670 | 2,775 | 2,880 | 2,985 | 3,000 |

# SLIDE GUIDE SGW TYPE

**The SGW slide guide is a linear motion bearing utilizing the rotational motion of ball elements along four rows of raceway grooves. Its low height and wide profile makes it suitable for single-rail applications.**

## STRUCTURE AND ADVANTAGES

SGW slide guide consists of a rail with four precision-machined raceway grooves and a block assembly. The block assembly consists of the main body, ball elements, retainers, and return caps.

### High Load Capacity and Long Life:

The raceway grooves are machined to a radius close to that of the ball elements. The larger contact surface results are high load capacity and provides longer life.

### High Allowable Moment:

Its wide profile enables it to sustain high moment loads, making it suitable for single-rail applications.

### Omni-Directional Load Capacity:

The ball elements are positioned at 45° contact angle so that the load capacity is equal in four directions (above, underneath, right and left).

### Smooth Motion:

The large number of ball elements produce a smooth rolling motion.

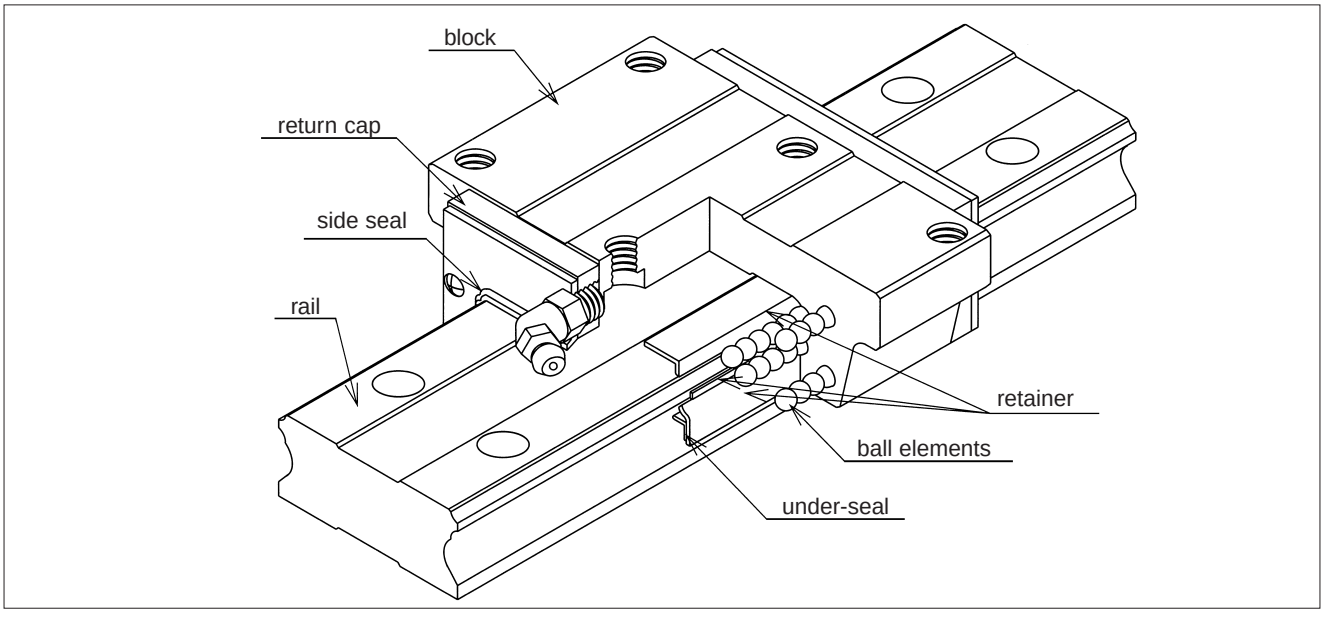
### Anti-Corrosion Specification:

The rail and block assembly may be Raydent treated to increase the corrosion resistance. This treatment is standardized with the symbol "RD", and suitable for use in clean room applications.

### Dust Prevention:

Side seals are provided as standard. To improve the dust prevention characteristics, under-seals and rail mounting caps are also available.

Figure A-66 Structure of SGW type Slide Guide



# ACCURACY

Three accuracy grades are available: normal-grade (no suffix), high-grade (H), and precision-grade (P).

Table A-34 Accuracy unit/mm

| part number | SGW17,21 | | | SGW27,35 | | |
|---|---|---|---|---|---|---|
| accuracy grade | normal | high | precision | normal | high | precision |
| accuracy symbol | blank | H | P | blank | H | P |
| allowable dimensional tolerance for height H | ±0.1 | ±0.03 | −0.03～0 | ±0.1 | ±0.04 | −0.04～0 |
| paired difference for height H | 0.02 | 0.01 | 0.006 | 0.02 | 0.015 | 0.007 |
| allowable dimensional tolerance for width W | ±0.1 | ±0.03 | −0.03～0 | ±0.1 | ±0.04 | −0.04～0 |
| paired difference for width W | 0.02 | 0.01 | 0.006 | 0.03 | 0.015 | 0.007 |
| Running parallelism of surface C to surface A<br>Running parallelism of surface D to surface B | refer to Figure A-67 | | | | | |

Figure A-67 Motion Accuracy

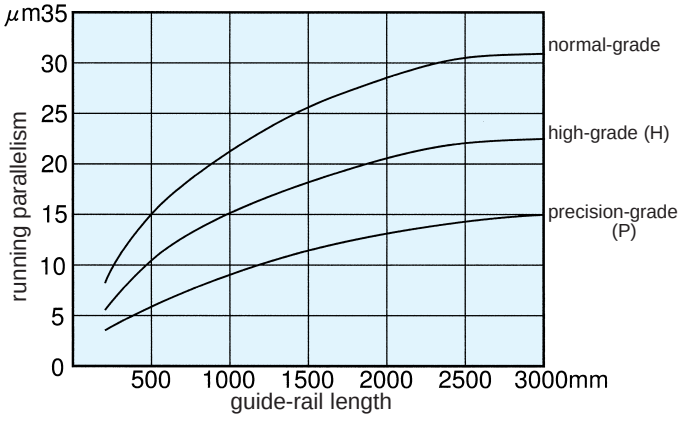
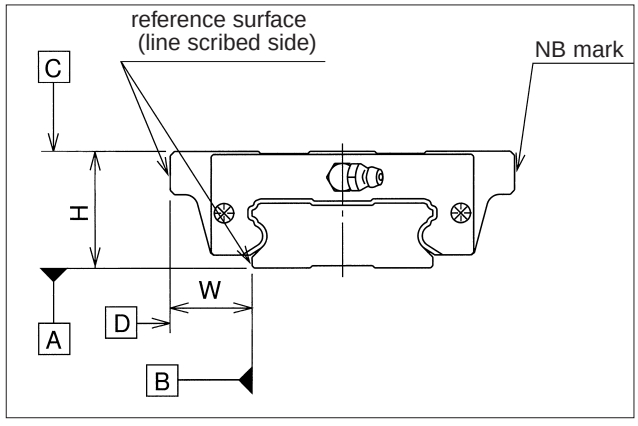



Figure A-68Accuracy




# PRE-LOAD

Three levels of pre-load are available for SGW slide guides: standard, light (T1), and medium (T2).

Table A-35 Pre-Load Call Out and Radial Clearance unit/μm

| category | standard | light | medium |
|---|---|---|---|
| symbol | blank | T1 | T2 |
| SGW17 | −3～+2 | −7～−3 | − |
| SGW21 | −4～+2 | −8～−4 | − |
| SGW27 | −5～+2 | −11～−5 | − |
| SGW35 | −8～+4 | −18～−8 | −28～−18 |

Table A-36 Operating Conditions and Pre-Load

| pre-load category | symbol | operating condition |
|---|---|---|
| standard | blank | Minute vibration is applied. Precision motion is required. Moment in a given direction is applied. |
| light | T1 | Light vibration is applied. Light torsion is applied. Moment is applied. |
| medium | T2 | Shock/vibration is applied. Over-hang load is applied. Torsional load is applied. |

# RAIL LENGTH

Slide guides with most commonly used lengths are available as standard. Unless otherwise specified, the distance to the first installation hole (N) from one end of the rail will be located within the range listed in Table A-37 for slide guides that have a non-standard length satisfying the following equation.

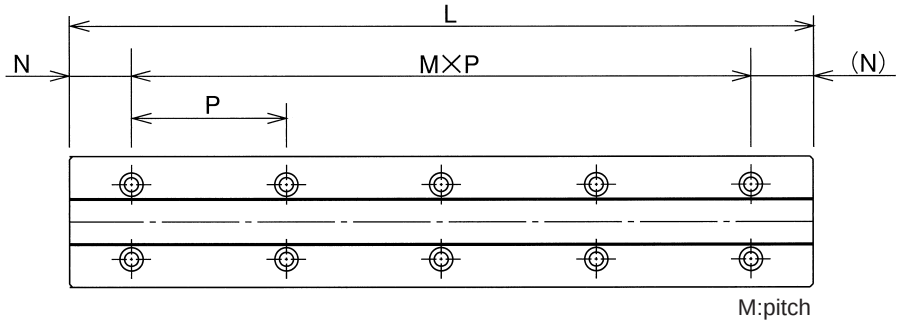
$$L = M \cdot P + 2N$$

L : length (mm)  N : distance to the first hole from the end of the rail (mm)
M : number of pitches  P : hole pitch (mm)

Table A-37 Rail Fabrication Range unit/mm

| part number | N | | Lmax. |
|---|---|---|---|
| | and over | less than | |
| SGW17 | 8 | 28 | 2,000 |
| SGW21 | | 33 | |
| SGW27 | | 38 | 3,000 |
| SGW35 | 12 | 52 | |

Figure A-69 Rail




# MOUNTING

Slide guides are generally mounted by pushing the reference surface of the rail and block against the shoulder of the mounting surface. To avoid interference between the shoulder and the corner of the rail or block, the shoulder should be fabricated with dimensions smaller than those listed in Table A-39. The bolts used to secure the rail should be tightened to a certain torque using a torque wrench. The recommended torque values are given in Table A-38. Please adjust the torque depending on the operating conditions..

Figure A-70 Mounting Reference Surface Shapes

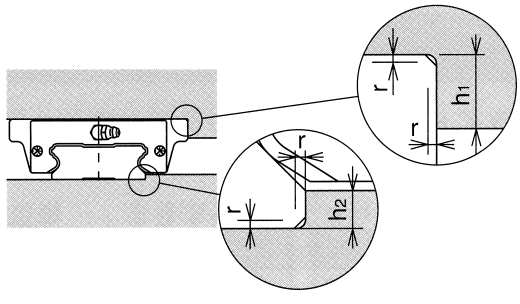



Table A-38 Recommended Torque unit/N·m

| bolts size | M4 | M6 |
|---|---|---|
| recommended torque | 3.2 | 11.2 |

(When using steel bolts)

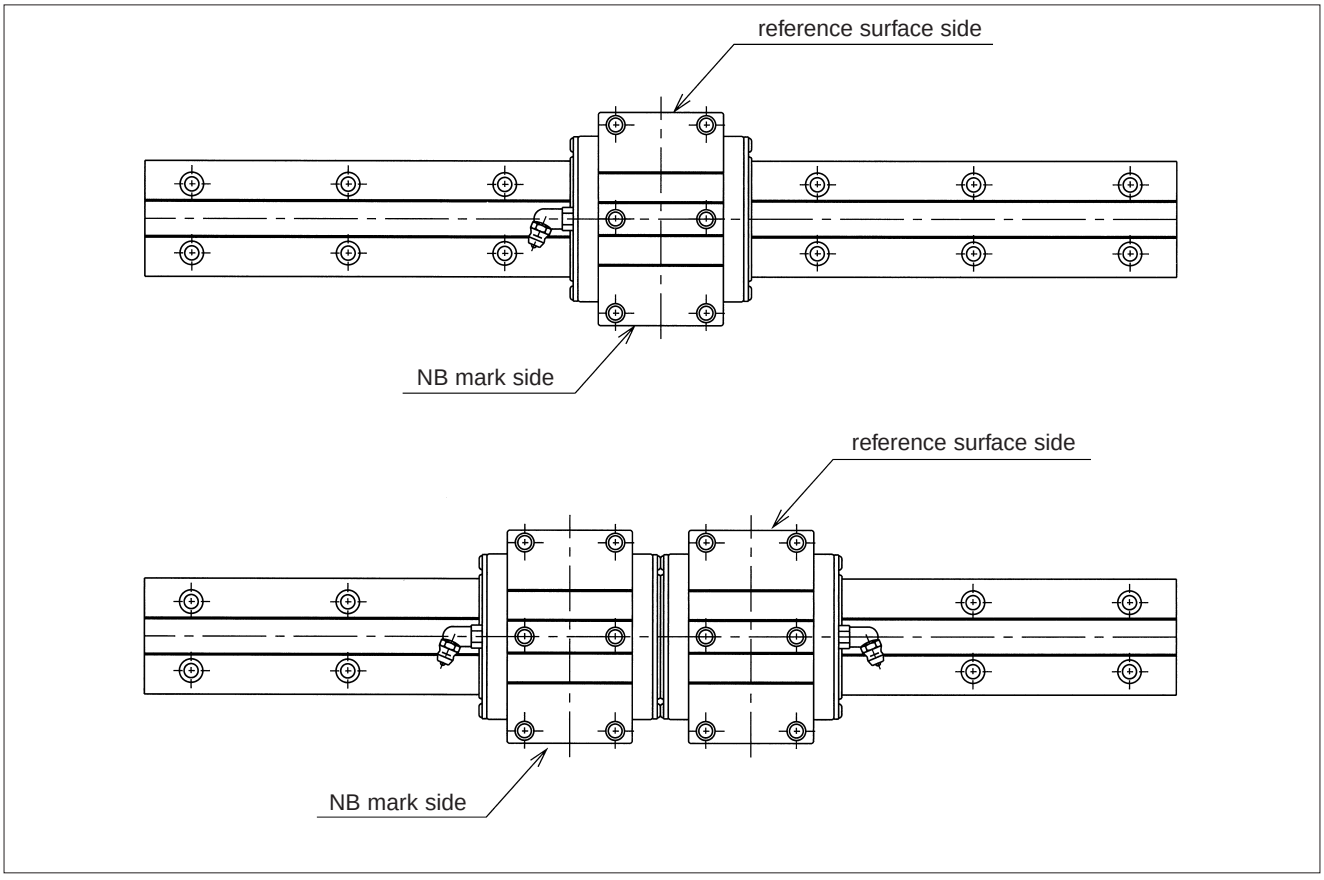
Table A-39 Mounting Surface Dimensions unit/mm

| part number | $h_1$ | $h_2$ | $r_{max.}$ |
|---|---|---|---|
| SGW17 | 4 | 2 | 0.4 |
| SGW21 | 5 | 2.5 | |
| SGW27 | | | |
| SGW35 | | 3.5 | 0.8 |

# GREASE FITTING

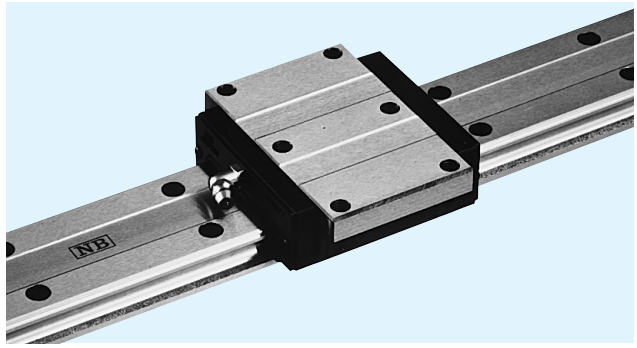
A grease fitting is attached to the SGW slide guide near the return cap for lubrication purposes. Unless otherwise specified, the orientation of the grease fitting is as shown in Figure A-71. When more than 2 blocks are used on one rail, the grease fitting orientation must be specified.

Figure A-71 Number of Blocks and Grease Fitting Orientation



# SGW-TE TYPE

## – High Rigidity Wide Flange Type –



part number structure example **SGW 21 TE B 2 T1 - 589 P / W2 FS LB F - KGL**

- SGW type
- size
- block style
- seal(refer to page A-14)

| | |
|---|---|
| blank | With side-seals |
| B | With side seals + under-seals |

- number of blocks per rail
- symbol for pre-load

| | |
|---|---|
| blank | standard |
| T1 | light |
| T2 | medium |

- total length of rail
- accuracy grade

| | |
|---|---|
| blank | standard |
| H | high |
| P | precision |

- symbol for grease

| | |
|---|---|
| blank | standard grease |
| KGL | litium-based grease |
| KGU | urea-based grease |
| KGF | anti-fretting grease |
| GK | K-grease |

refer to page Eng-20 for details on special grease

- with rail mounting hole caps
- with low temperature black chrome treatment
- with Fiber Sheet
  Fiber sheet comes only with standard grease.
- symbol for number of rails

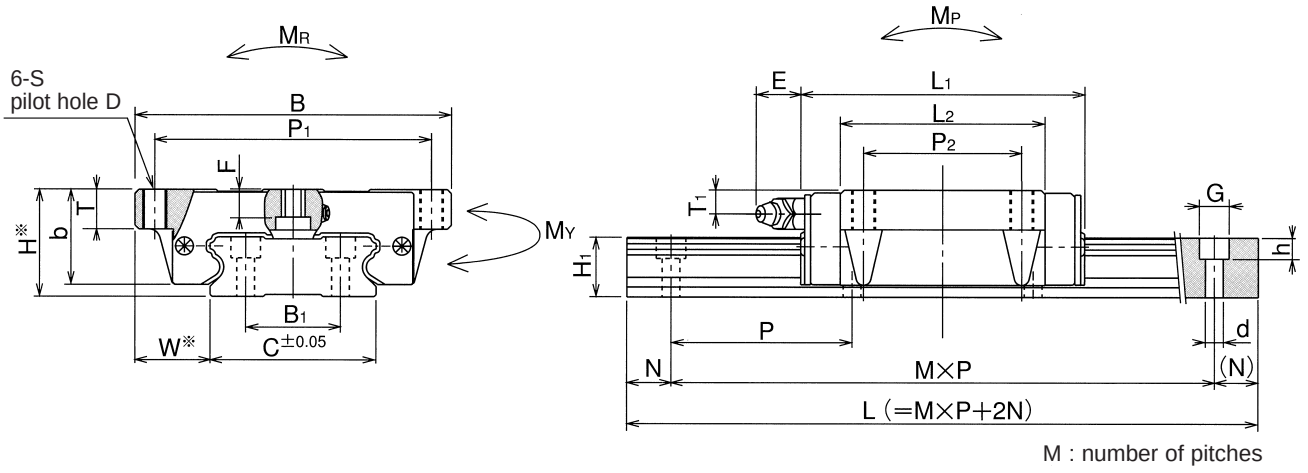
| | |
|---|---|
| blank | single rail |
| W2 | double rails |
| W3 | triple rails |

The symbol for the number of rails does not mean the number of rails ordered.

| part number | assembly dimensions | | block dimensions | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | W | B | $L_1$ | $L_2$ | $P_1$ | $P_2$ | S | D | F | T | b | E | $T_1$ |
| | mm | mm | mm | mm | mm | mm | mm | | mm | mm | mm | mm | mm | mm |
| **SGW17TE** | 17 | 13.5 | 60 | 51 | 33.6 | 53 | 26 | M4 | 3.3 | 3.2 | 6 | 14.5 | 2.5 | 4 |
| **SGW21TE** | 21 | 15.5 | 68 | 58 | 40 | 60 | 29 | M5 | 4.4 | 3.7 | 8 | 18 | | 4.5 |
| **SGW27TE** | 27 | 19 | 80 | 71.8 | 51.8 | 70 | 40 | M6 | 5.3 | 6 | 10 | 24 | 14 | 6 |
| **SGW35TE** | 35 | 25.5 | 120 | 106.6 | 77.6 | 107 | 60 | M8 | 6.8 | 8 | 14 | 31 | | 8 |

| part number | standard rail length L mm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SGW17** | 110 | 150 | 190 | 230 | 270 | 310 | 350 | 390 | 430 | 510 | 590 |
| **SGW21** | 130 | 180 | 230 | 280 | 330 | 380 | 430 | 480 | 530 | 630 | 730 |
| **SGW27** | 160 | 220 | 280 | 340 | 400 | 460 | 520 | 640 | 760 | 880 | 1,000 |
| **SGW35** | 280 | 360 | 440 | 520 | 600 | 680 | 760 | 920 | 1,080 | 1,240 | 1,400 |

Rails exceeding the maximum specified length may be fabricated if joints are used. Contact NB for assistance.




※ Refer to page A-77 for a description of accuracy.

| grease fitting | guide-rail dimensions | | | | | | basic load rating | | allowable static moment | | | mass | | size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $H_1$ mm | C mm | $B_1$ mm | d×G×h mm | N mm | P mm | dynamic C kN | static Co kN | $M_P$ N・m | $M_Y$ N・m | $M_R$ N・m | block kg | guide rail kg/m | |
| pressed fitting | 9 | 33 | 18 | 4.5×7.5×5.3 | 15 | 40 | 4.8 | 8.6 | 43 | 43 | 161 | 0.14 | 2.05 | **17** |
| B-M6F | 11 | 37 | 22 | | | 50 | 7 | 12 | 72 | 72 | 253 | 0.23 | 2.84 | **21** |
| | 15 | 42 | 24 | | 20 | 60 | 13 | 22 | 172 | 172 | 496 | 0.46 | 4.43 | **27** |
| | 19 | 69 | 40 | 7×11×9 | | 80 | 31 | 49 | 579 | 579 | 1,855 | 1.35 | 9.32 | **35** |

1kN≒102kgf　1N・m≒0.102kgf・m

| | | | | | | | maximum length mm |
|---|---|---|---|---|---|---|---|
| 670 | 750 | 830 | 950 | 1,070 | 1,190 | 1,310 | 2,000 |
| 830 | 930 | 1,030 | 1,180 | 1,330 | 1,480 | | 2,000 |
| 1,180 | 1,360 | 1,540 | 1,720 | 1,900 | | | 3,000 |
| 1,640 | 1,880 | 2,120 | | | | | 3,000 |