

STROKE BUSH

SLIDE ROTARY BUSH

SLIDE GUIDE

BALL SPLINE
ROTARY BALL SPLINE
STROKE BALL SPLINE

TOPBALL® PRODUCTS

SLIDE BUSH

SLIDE UNIT

STROKE BUSH
SLIDE ROTARY BUSH

SLIDE SHAFT

SLIDE WAY/GONIO WAY
SLIDE TABLE
MINIATURE SLIDE

ACTUATOR

SLIDE SCREW

STROKE BUSH

The NB stroke bush is a linear and rotational motion mechanism utilizing the rotational motion of ball elements between an outer cylinder and a shaft. It is compact and can stand high loading. The retainer is made of a light metal alloy with high wear resistance. Smooth motion is achieved under high-speed and high-acceleration conditions. Although the linear motion is limited to a predetermined stroke distance, the smooth combination of linear and rotational motions is achieved with very little frictional resistance. The NB stroke bush may be conveniently used in a variety of applications.

STRUCTURE AND ADVANTAGES

The retainer in the NB stroke bush positions the ball elements in a zigzag arrangement. The inner surface of the outer cylinder is finished by grinding, resulting in the smooth motion of the ball elements. Each of the ball elements is held in a separate hole and smooth motion is achieved for both rotational motion and linear motion. The retainer moves half the distance of the linear motion, therefore, the stroke distance is limited to approximately twice the distance the retainer can travel within the outer cylinder. The actual stroke should be limited to 80% of the maximum stroke as listed in the dimensional tables.

● High Precision

High-carbon, chromium-bearing steel is used for the outer cylinder. It is heat treated and ground to achieve high rigidity and accuracy.

● Ease of Mounting / Replacement

The highly accurate fabrication of the NB stroke bush results in uniform dimensions, facilitating parts replacement and housing fabrication.

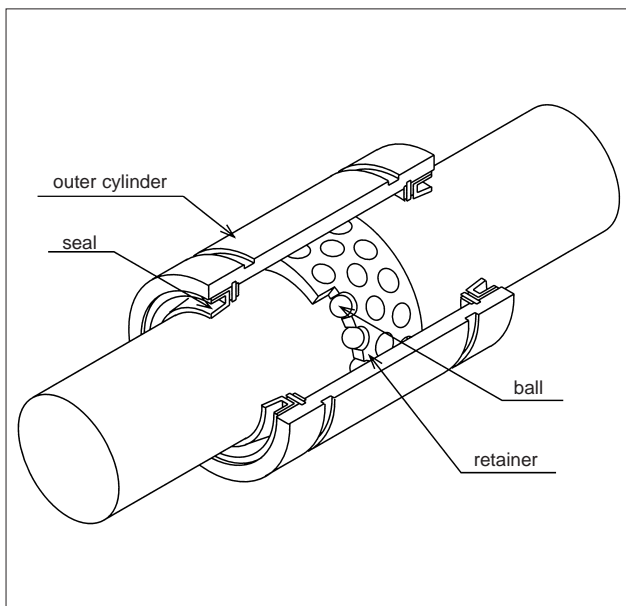
● Light Weight / Space Saving

The use of an aluminum alloy for the retainer and the thin-wall outer cylinder make the NB stroke bush light weight and compact.

● Lubrication

Lubrication holes are provided on the oil grooves of the outer cylinder, making it easy to lubricate the SR stroke bush.

Figure F-1 Structure of SR Stroke Bush



ACCURACY

The accuracies of the SR stroke bush are stated in the dimensional tables. Since the outer cylinder deforms due to tension from the retaining ring, the dimension of the outer cylinder is an average value at points P, where calculated using the following equation:

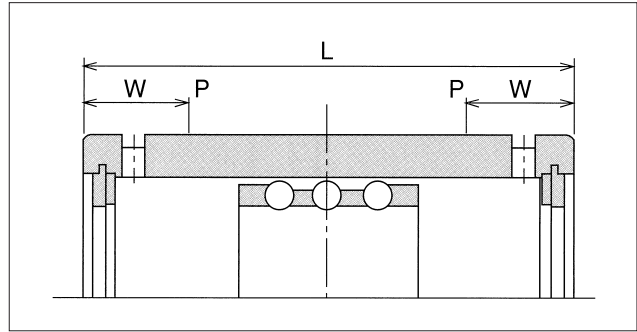
$$W = 4 + \frac{L}{8}$$

W : the distance from the end of the outer race to measurement point P
L : the length of the outer race

FIT

The inner contact diameters of the SR stroke bush are listed in the dimensional tables. The shaft diameter tolerance should be selected to achieve the desired amount of radial clearance. High-speed linear motion can cause the retainer to slip due to inertial force. An interference fit of -3 to $-10 \mu\text{m}$

Figure F-2 Outer Cylinder Measurement Points



will compensate for such slip. The fits generally used between the shaft and the housing are listed in the table below.

Table F-1

| normal operating condition | | vertical use or highly accurate case | |
|----------------------------|---------|--------------------------------------|---------|
| shaft | housing | shaft | housing |
| k5,m5 | H6,H7 | n5,p6 | J6,J7 |

RATED LOAD AND RATED LIFE

The relationship between the rated load and life of the stroke bush is expressed as follows:

$$L = \left(\frac{C}{P}\right)^3$$

L : the rated life (10^6 rotations), C : the basic dynamic rated load (N)
P : load (N)

● For rotation/stroke combined motion

$$L_h = \frac{10^6 \cdot L}{60 \sqrt{(dm \cdot n)^2 + (10 \cdot S \cdot n_1)^2}} / dm$$

ALLOWABLE SPEED FOR COMBINED ROTATION/STROKE MOTION

The allowable speed for combined rotation and stroke motion is obtained from the following equation:

$$DN \geq dm \cdot n + 10 \cdot S \cdot n_1$$

● For stroke motion

$$L_h = \frac{10^6 \cdot L}{600 \cdot S \cdot n_1 / (\pi \cdot dm)}$$

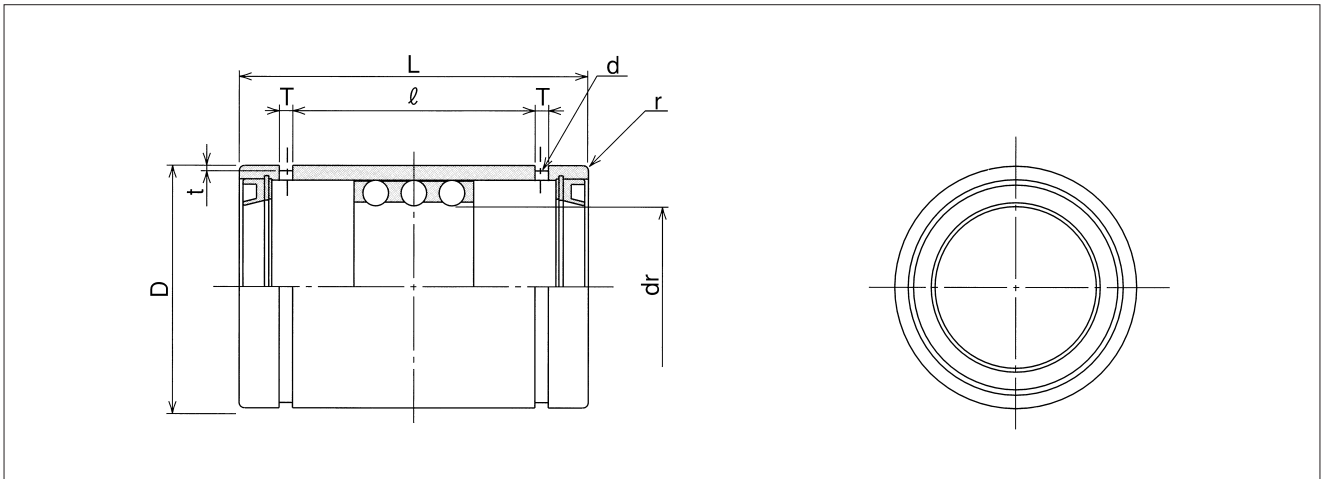
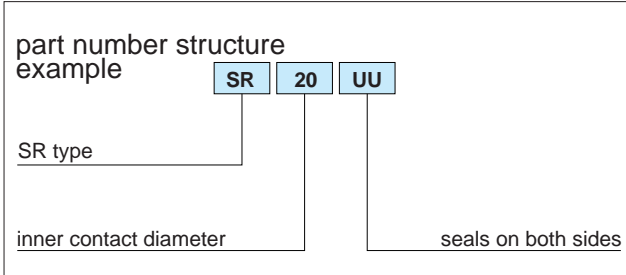
L_h : travel life in time (hr) S : stroke distance (mm)
n : revolution per min. (rpm)
 n_1 : stroke frequency per min. (cpm)
 dm : ball pitch diameter (mm) ≈ 1.15 dm

The value of DN is given as follows depending on the lubrication method.

| | |
|------------------------|------------|
| for oil lubrication | DN=600,000 |
| for grease lubrication | DN=300,000 |

note..... $n \leq 5,000$ $S \cdot n_1 \leq 50,000$

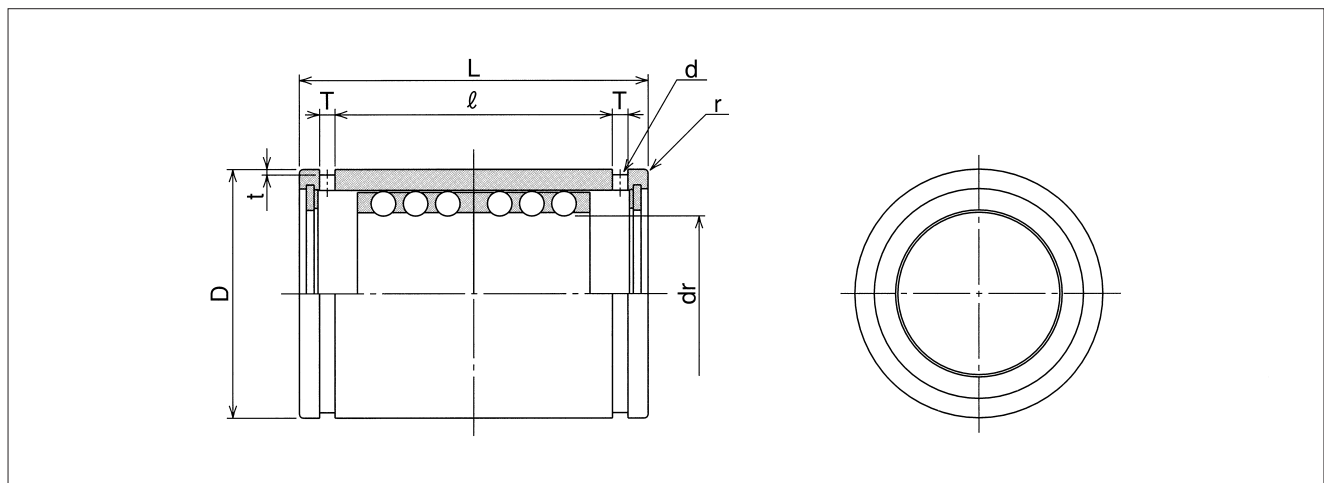
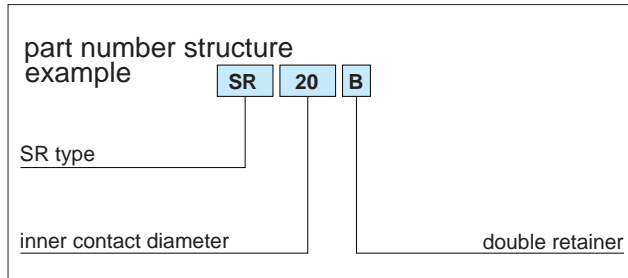
SR-UU TYPE



| part number | maximum stroke mm | number of rows | major dimensions | | | | | | | | | | | basic load rating | | mass g |
|-------------|----------------------|----------------|------------------|----------------------------|-----|----------------------------|-----|-----------------|--------|------|-----|-----|-----|-------------------|-------------------|-----------|
| | | | dr | | D | | L | | ℓ | T | t | d | r | dynamic C N | static Co N | |
| | | | mm | tolerance μm | mm | tolerance μm | mm | tolerance mm | | | | | | | | |
| SR 8UU | 14 | 3 | 8 | +22 | 15 | 0/-11 | 24 | 0 | 12.3 | 1.5 | 0.5 | 1.2 | 0.5 | 343 | 245 | 15.6 |
| SR 10UU | 16 | 3 | 10 | +13 | 19 | 0 | 30 | | 15.5 | 1.5 | 0.5 | 1.2 | 0.5 | 637 | 461 | 28.8 |
| SR 12UU | 17 | 3 | 12 | +27 | 23 | -13 | 32 | | 17.1 | 1.5 | 0.5 | 1.2 | 0.5 | 1,070 | 813 | 42 |
| SR 16UU | 24 | 3 | 16 | +16 | 28 | 0 | 37 | -0.2 | 21.1 | 1.5 | 0.7 | 1.3 | 0.5 | 1,180 | 990 | 71 |
| SR 20UU | 32 | 3 | 20 | +33 | 32 | | 45 | | 26.8 | 2 | 0.7 | 1.5 | 0.5 | 1,260 | 1,170 | 99 |
| SR 25UU | 32 | 3 | 25 | +20 | 37 | | -16 | | 45 | 26.8 | 2 | 0.7 | 1.6 | 1 | 1,330 | 1,330 |
| SR 30UU | 65 | 3 | 30 | +41 | 45 | -19 | 65 | -0.3 | 45.1 | 2.5 | 1 | 2 | 1 | 2,990 | 3,140 | 205 |
| SR 35UU | 75 | 3 | 35 | | 52 | | 70 | | 50.1 | 2.5 | 1 | 2 | 1.5 | 3,140 | 3,530 | 329 |
| SR 40UU | 91 | 3 | 40 | | 60 | | 80 | | 59.9 | 2.5 | 1 | 2 | 1.5 | 4,120 | 4,800 | 516 |
| SR 50UU | 120 | 3 | 50 | +25 | 72 | 0 | 100 | 0 | 77.4 | 3 | 1 | 2.5 | 1.5 | 5,540 | 6,910 | 827 |
| SR 60UU | 120 | 3 | 60 | +49 | 85 | | 100 | | 77.4 | 3 | 1 | 2.5 | 2 | 5,980 | 8,230 | 1,240 |
| SR 80UU | 114 | 3 | 80 | +30 | 110 | | -22 | | 100 | 77 | 3 | 1.5 | 2.5 | 2 | 7,840 | 12,200 |
| SR100UU | 114 | 3 | 100 | +58/+36 | 130 | 0/-25 | 100 | -0.4 | 77 | 3 | 1.5 | 2.5 | 2 | 8,430 | 14,700 | 2,440 |

1N \approx 0.102kgf

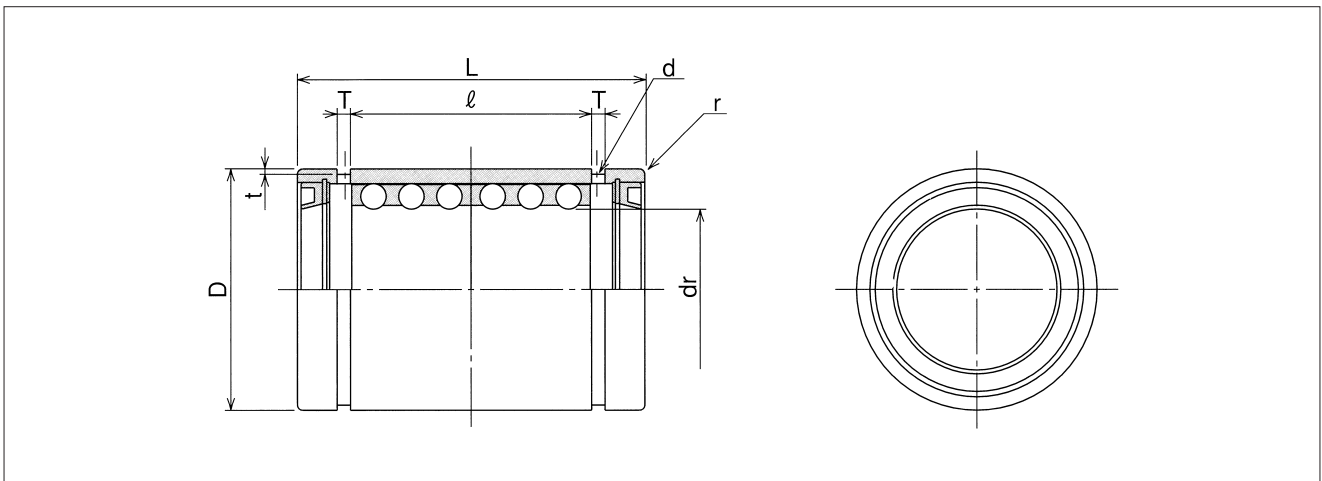
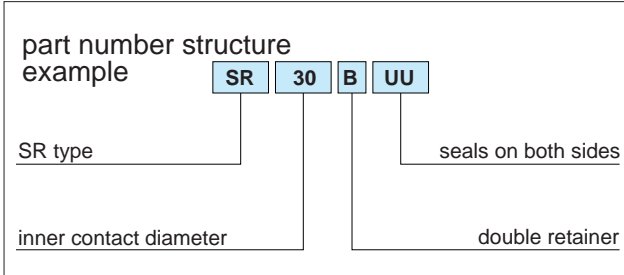
SR-B TYPE



| part number | maximum stroke mm | number of rows | major dimensions | | | | | | | | | | | basic load rating | | mass g |
|-------------|----------------------|----------------|------------------|----------------------------|-----|----------------------------|-----|-----------------|--------|-----|-----|-----|-----|-------------------|-------------------|-----------|
| | | | dr | | D | | L | | ℓ | T | t | d | r | dynamic C N | static Co N | |
| | | | mm | tolerance μm | mm | tolerance μm | mm | tolerance mm | | | | | | | | |
| SR 8B | 8 | 6 | 8 | +22 | 15 | 0/-11 | 24 | 0 | 17.1 | 1.5 | 0.5 | 1.2 | 0.5 | 549 | 490 | 16.8 |
| SR 10B | 8 | 6 | 10 | +13 | 19 | 0 | 30 | | 22.7 | 1.5 | 0.5 | 1.2 | 0.5 | 1,030 | 931 | 31.2 |
| SR 12B | 8 | 6 | 12 | +27 | 23 | -13 | 32 | | 24.5 | 1.5 | 0.5 | 1.2 | 0.5 | 1,720 | 1,630 | 46 |
| SR 16B | 16 | 6 | 16 | +16 | 28 | | 37 | -0.2 | 29.1 | 1.5 | 0.7 | 1.3 | 0.5 | 1,910 | 1,980 | 75 |
| SR 20B | 20 | 6 | 20 | +33 | 32 | 0 | 45 | | 35.8 | 2 | 0.7 | 1.5 | 0.5 | 2,060 | 2,320 | 106 |
| SR 25B | 20 | 6 | 25 | +20 | 37 | 0 | 45 | | 35.8 | 2 | 0.7 | 1.6 | 1 | 2,170 | 2,670 | 125 |
| SR 30B | 44 | 6 | 30 | +20 | 45 | -16 | 65 | 0 | 53.5 | 2.5 | 1 | 2 | 1 | 4,800 | 6,270 | 220 |
| SR 35B | 54 | 6 | 35 | +41 | 52 | 0 | 70 | | 58.5 | 2.5 | 1 | 2 | 1.5 | 5,050 | 7,060 | 346 |
| SR 40B | 66 | 6 | 40 | +25 | 60 | -19 | 80 | | 68.3 | 2.5 | 1 | 2 | 1.5 | 6,710 | 9,560 | 540 |
| SR 50B | 88 | 6 | 50 | +25 | 72 | -19 | 100 | -0.3 | 86.4 | 3 | 1 | 2.5 | 1.5 | 8,970 | 13,800 | 862 |
| SR 60B | 88 | 6 | 60 | +49 | 85 | 0 | 100 | | 86.4 | 3 | 1 | 2.5 | 2 | 9,700 | 16,500 | 1,290 |
| SR 80B | 76 | 6 | 80 | +30 | 110 | -22 | 100 | | 86 | 3 | 1.5 | 2.5 | 2 | 12,700 | 24,300 | 2,110 |
| SR100B | 76 | 6 | 100 | +58/+36 | 130 | 0/-25 | 100 | -0.4 | 86 | 3 | 1.5 | 2.5 | 2 | 13,700 | 29,400 | 2,520 |

1N≒0.102kgf

SR-BUU TYPE



| part number | maximum stroke mm | number of rows | major dimensions | | | | | | | | | | | basic load rating | | mass g |
|-------------|----------------------|----------------|------------------|----------------------------|-----|----------------------------|-----|-----------------|--------|-----|-----|-----|-----|-------------------|-------------------|-----------|
| | | | dr | | D | | L | | ℓ | T | t | d | r | dynamic C N | static Co N | |
| | | | mm | tolerance μm | mm | tolerance μm | mm | tolerance mm | | | | | | | | |
| SR 30BUU | 27 | 6 | 30 | +33/+20 | 45 | 0/-16 | 65 | 0 | 45.1 | 2.5 | 1 | 2 | 1 | 4,800 | 6,270 | 220 |
| SR 35BUU | 37 | 6 | 35 | +41 | 52 | 0 | 70 | | 50.1 | 2.5 | 1 | 2 | 1.5 | 5,050 | 7,060 | 346 |
| SR 40BUU | 49 | 6 | 40 | +25 | 60 | -19 | 80 | -0.3 | 59.9 | 2.5 | 1 | 2 | 1.5 | 6,710 | 9,560 | 540 |
| SR 50BUU | 70 | 6 | 50 | +25 | 72 | -19 | 100 | | 77.4 | 3 | 1 | 2.5 | 1.5 | 8,970 | 13,800 | 862 |
| SR 60BUU | 70 | 6 | 60 | +49 | 85 | 0 | 100 | 0 | 77.4 | 3 | 1 | 2.5 | 2 | 9,700 | 16,500 | 1,290 |
| SR 80BUU | 58 | 6 | 80 | +30 | 110 | -22 | 100 | | 77 | 3 | 1.5 | 2.5 | 2 | 12,700 | 24,300 | 2,110 |
| SR100BUU | 58 | 6 | 100 | +58/+36 | 130 | 0/-25 | 100 | -0.4 | 77 | 3 | 1.5 | 2.5 | 2 | 13,700 | 29,400 | 2,520 |

1N \approx 0.102kgf

SLIDE ROTARY SERIES

NB's Slide Rotary Series consists of three different types. The Slide Rotary Bush, which provides both endless rotary and linear motion functions, the Flanged Slide Rotary Bush, and the Slide Rotary Unit which is assembled using various NB standard housings.

The NB Slide Rotary Series has an idealistic structure, incorporating a combination of linear and rotary motion. Linear and rotary motion are merged into a single unit resulting in great space savings compared to the conventional style of Slide Bushings. All three types of the Slide Rotary Series are available in sizes ranging from 6mm to 30mm. All components in the Slide Rotary Series are standardized for versatile installation requirements.

STRUCTURE AND ADVANTAGES

NB Slide Rotary Bush is composed of retainer fitted into cylindrical steel outer race and is designed to guide steel balls for smooth circulation in its retainer. The retainer is also designed to rotate freely towards radial direction and offers smooth linear and rotary motions.

Smooth Operation

The inner surface of the outer race allows smooth operation of linear and rotary motions while maintaining a uniform load distribution.

High Load Capacity

The use of comparatively large diameter steel balls enhances acceptability of high load capacity.

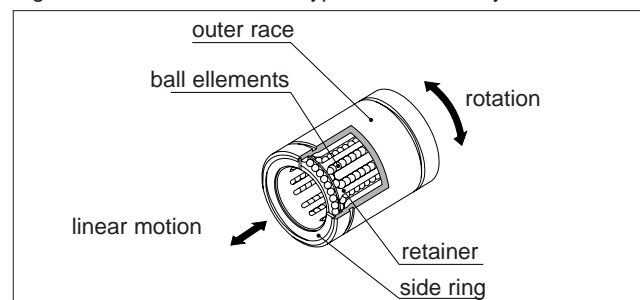
Smooth Rotation

The positioning of the steel balls in a cylindrical formation inside the retainer enables a smooth rotational motion to be achieved independent of the installation direction.

Complete Interchangeability

NB Slide Rotary series is completely interchangeable with SM type Slide Bush, SMK type Flanged Slide Bush and Slide Units such as SMA(W) type, AK(W) type and SMP type.

Figure F-3 Structure of SRE-type NB slide rotary bush



RATED LIFE AND LOADS

The rated life and loads are defined as follows.

Rated Life

When a group of slide rotary bearings of the same type are used under the same conditions, the rated life is defined as the total number of rotations made without flaking by 90% of the bearings.

Basic Dynamic Rated Load

The basic dynamic rated load is defined as the load with a constant magnitude and direction at which a rated life of 10^6 rotations can be achieved.

Basic Static Rated Load

The basic static rated load is defined as the load with a constant direction that would result in a certain contact stress at the mid-point of the rolling element and tracking surface that are experiencing the maximum stress.

Formula 1 gives the relation between the applied load and the rated life of the slide rotary bush.

Calculation Example

The life of an SRE20-type NB slide rotary bush is calculated below based on the following operating conditions.

Conditions

- Motions : Linear and rotational, combined
- Load, P : 30 N
- Stroke, S : 200 mm
- Number of rotations per minute (rpm), n=15

Calculation:

Basic rated load, C=647 N

Based on the above operating conditions, the life is calculated using the following coefficient values.

Hardness coefficient, $f_H=1$ Temperature coefficient, $f_T=1$ Contact coefficient, $f_C=1$ Load coefficient, $f_W=1.5$
Rated life

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

$$= \left(\frac{1 \times 1 \times 1}{1.5} \times \frac{647}{30} \right)^3 = 2,972 \text{ (} 10^6 \text{ rotations)}$$

$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P} \right)^3 \dots\dots\dots ①$$

L : rated life (10^6 rotations) f_H : hardness coefficient
 f_T : temperature coefficient f_C : contact coefficient
 f_W : load coefficient C : basic dynamic rated load (N)
 P : applied load (N)

Since the slide rotary bush is used in applications with combined linear and rotary motions, the life time is obtained using Formulas ② and ③.

When linear and rotary motions are combined

$$L_h = \frac{10^6 \cdot L}{60 \sqrt{(dm \cdot n)^2 + (10 \cdot S \cdot n_1)^2} / dm} \dots\dots\dots ②$$

When only linear motion is involved

$$L_h = \frac{10^6 \cdot L}{600 \cdot S \cdot n_1 / \pi \cdot dm} \dots\dots\dots ③$$

L_h : life (hours) S : stroke (mm) n : number of rotations per minute (rpm) n_1 : number of strokes per minute (cpm)
 dm : ball pitch diameter (mm) = approx. 1.15 dr (dr is the inner contact diameter of the SRE-type bush)

- Number of strokes per minute (cpm), $n_1=10$
- Shaft surface hardness : greater than 58 HRC
- Operating temperature : room temperature
- Other : single shaft with single bush

Life (in time)

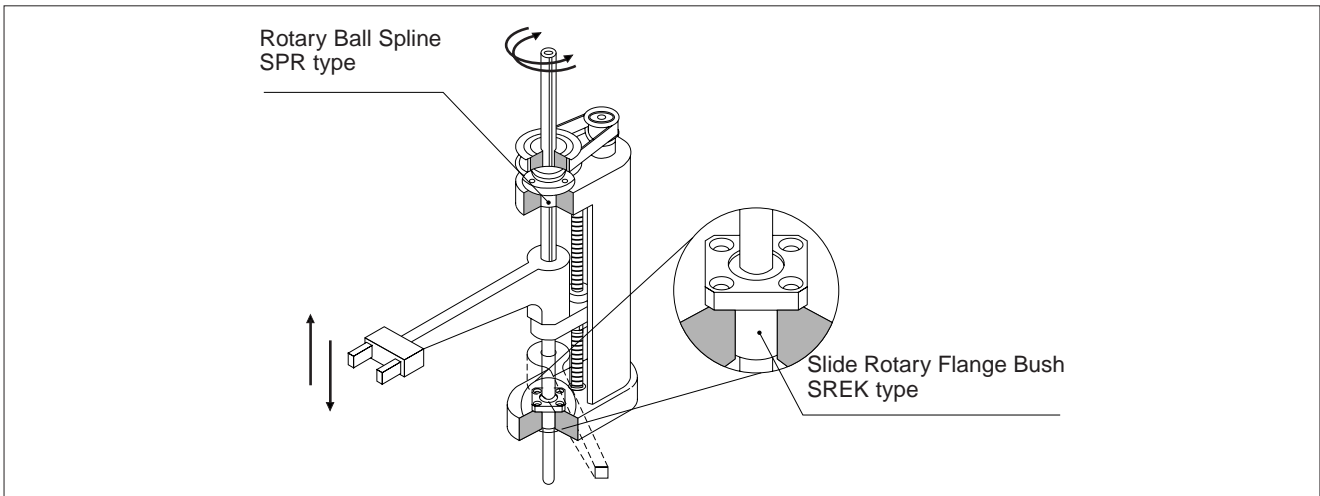
$$L_h = \frac{10^6 \cdot L}{60 \sqrt{(dm \cdot n)^2 + (10 \cdot S \cdot n_1)^2} / dm}$$

$$L_h = \frac{10^6 \cdot L}{60 \sqrt{(1.15 \times 20 \times 15)^2 + (10 \times 200 \times 10)^2} / (1.15 \times 20)}$$

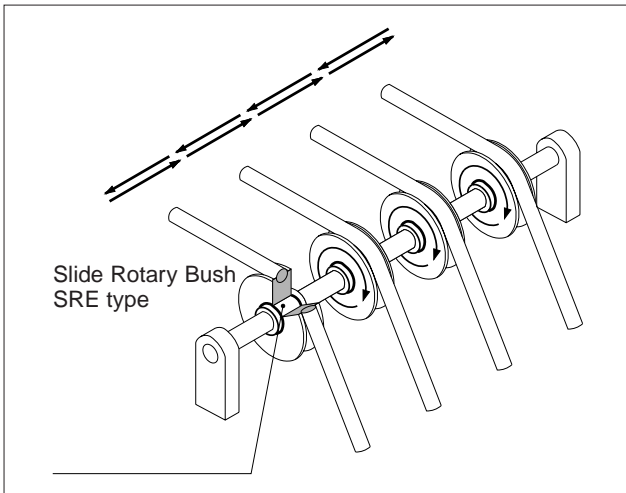
$$= 56,900 \text{ (hours)}$$

Application Examples

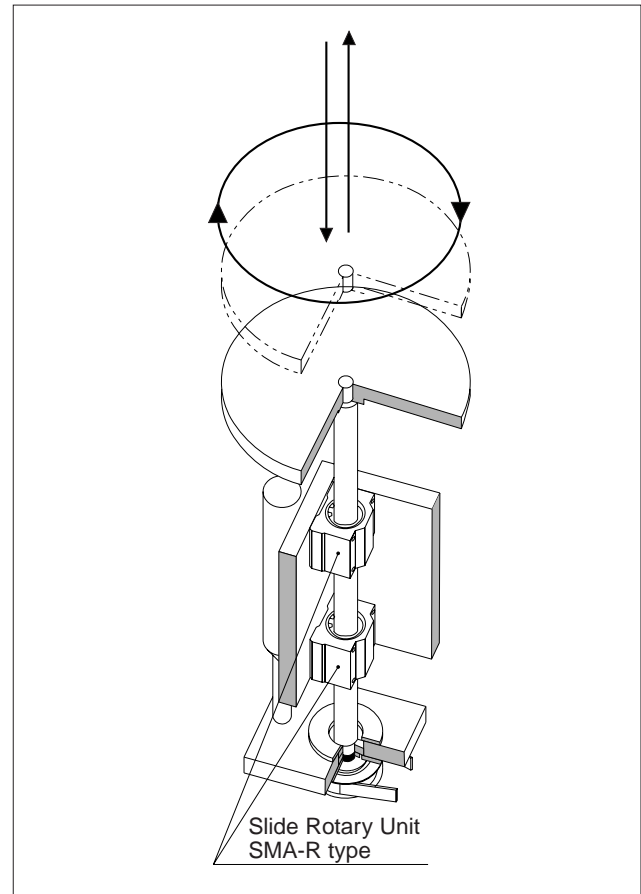
Application Example 1 Vertical Shaft Robot Arm



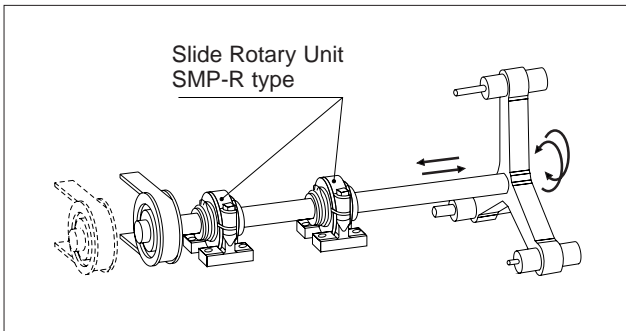
Application Example 2 Multiple Gearing Idler



Application Example 4 Turntable



Application Example 3 Tool Changer



Precautions Regarding Use

Shaft

Since the balls roll directly over the shaft surface in the SRE-type slide rotary bush, the accuracy and hardness of the shaft are important factors.

Outer Diameter : A tolerance of g6 is recommended for smooth operation.

Hardness : A hardness of greater than 58HRC is recommended for long life. If the hardness is less than 58 HRC, the life is calibrated using the hardness coefficient.

Surface Roughness : A roughness of less than 0.4Ra is recommended.

Housing

An inner diameter tolerance of H7 is recommended.

Lubrication

Lubrication is needed (1) to prevent heat fusing and reduce wear between the rolling elements and between the rolling elements and the tracking surface, (2) to reduce wear of the structural elements, and (3) to prevent oxidation. Lubrication affects both the performance and life of the bush. A lubrication

method and a lubrication agent appropriate to the operating conditions should be used. For oil lubrication, turbine oil (V32-68) should be used. For grease lubrication, lithium soap grease no. 2 should be used. The replenishment interval depends on the operating conditions.

Dust Control

Dust and other contaminants affect the bush's lifetime and accuracy. Appropriate control methods are thus important.

Operating Temperature Range

The SRE-type bush can be operated at temperatures ranging from -20°C to 110°C . In a case of operating at a temperature outside this range, please contact NB.

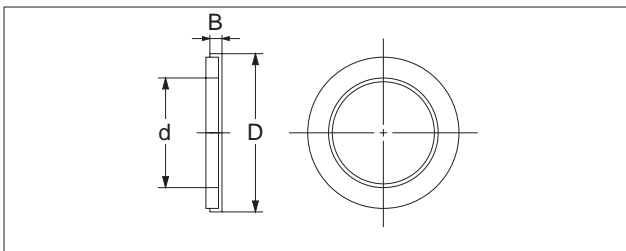
Retainer Material

The standard material of SRE Retainer is "Phosphor Bronze". When requiring other material, please contact NB.

Felt Seal

The use of an FLM felt seal will improve the effectiveness of lubrication and extend the interval between applications of a lubricant.

Figure F-4 Felt seal diagram



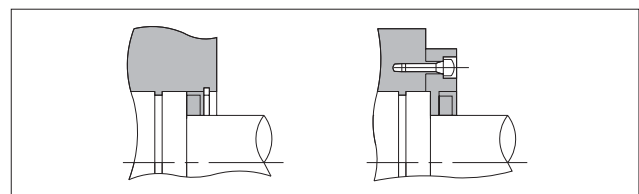
Installation

The felt seal should be installed as shown in Figure F-5. Please note that felt seal is not designed for stopper function.

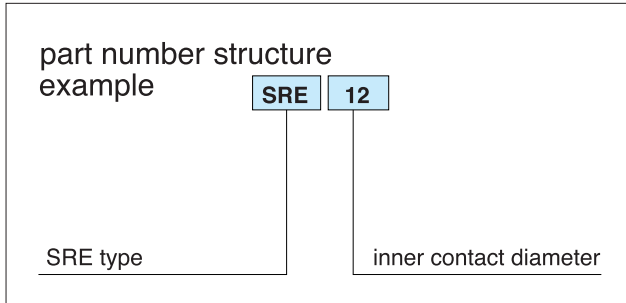
Table F-2 Felt seal dimensions

| part number | major dimensions | | | applicable slide rotary bush |
|-------------|------------------|----|---|------------------------------|
| | d | D | B | |
| FLM 6 | 6 | 12 | 2 | SRE 6 |
| FLM 8 | 8 | 15 | 2 | SRE 8 |
| FLM10 | 10 | 19 | 3 | SRE10 |
| FLM12 | 12 | 21 | 3 | SRE12 |
| FLM13 | 13 | 23 | 3 | SRE13 |
| FLM16 | 16 | 28 | 4 | SRE16 |
| FLM20 | 20 | 32 | 4 | SRE20 |
| FLM25 | 25 | 40 | 5 | SRE25 |
| FLM30 | 30 | 45 | 5 | SRE30 |

Figure F-5 Example of Installation



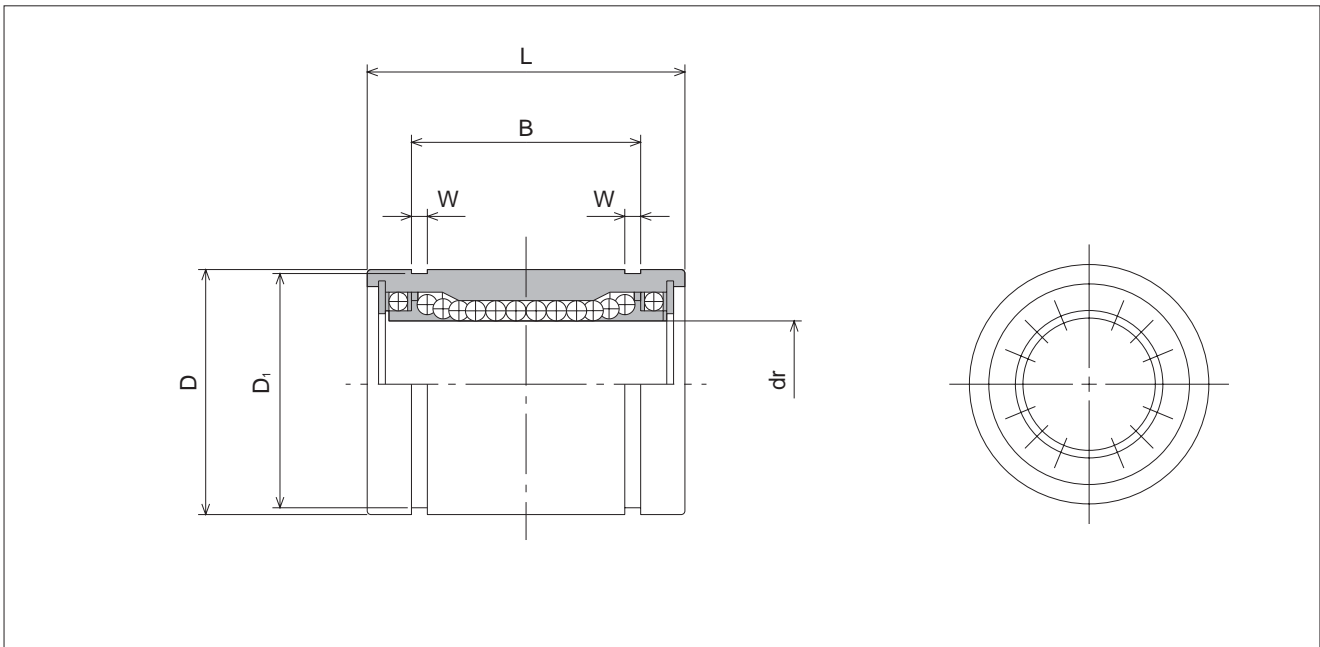
SRE TYPE



| part number | major dimensions | | | | | | | |
|--------------|------------------------|-----------|----|-----------|----|-----------|------|-----------|
| | inner contact diameter | | D | | L | | B | |
| | dr | tolerance | | tolerance | | tolerance | | tolerance |
| | mm | μm | mm | mm | mm | mm | mm | mm |
| SRE 6 | 6 | +4 -5 | 12 | 0 | 19 | 0 -0.2 | 13.5 | 0 -0.2 |
| SRE 8 | 8 | | 15 | -11 | 24 | | 17.5 | |
| SRE10 | 10 | | 19 | | 29 | | 22 | |
| SRE12 | 12 | +3 -6 | 21 | 0 | 30 | -0.2 | 23 | -0.2 |
| SRE13 | 13 | | 23 | -13 | 32 | | 23 | |
| SRE16 | 16 | | 28 | | 37 | | 26.5 | |
| SRE20 | 20 | +3 -7 | 32 | 0 | 42 | 0 -0.3 | 30.5 | 0 -0.3 |
| SRE25 | 25 | | 40 | -16 | 59 | | 41 | |
| SRE30 | 30 | | 45 | | 64 | | 44.5 | |

*If the inner contact diameter exceeds 30 mm, please contact NB.

SLIDE ROTARY BUSH

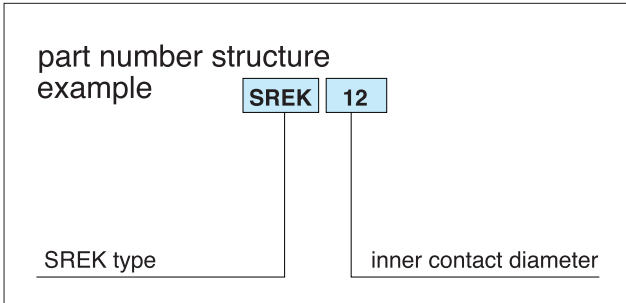
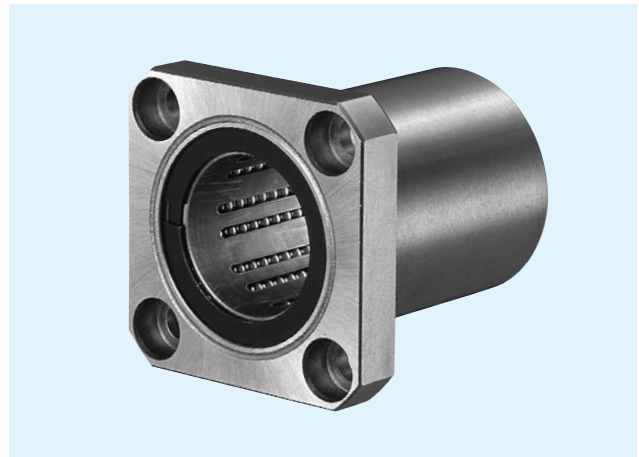


| W | D ₁ | basic load rating | | allowable number of rotations per minute | number of ball circuit | mass | part number |
|------|----------------|-------------------|--------------------------|--|------------------------|------|--------------|
| | | dynamic C | static C ₀ | | | | |
| mm | mm | N | N | rpm | | g | |
| 1.1 | 11.5 | 78 | 176 | 300 | 6 | 9 | SRE 6 |
| 1.1 | 14.3 | 137 | 314 | 300 | 8 | 15 | SRE 8 |
| 1.3 | 18 | 157 | 372 | 300 | 8 | 20 | SRE10 |
| 1.3 | 20 | 274 | 588 | 300 | 8 | 40 | SRE12 |
| 1.3 | 22 | 323 | 686 | 300 | 8 | 45 | SRE13 |
| 1.6 | 27 | 451 | 882 | 250 | 8 | 65 | SRE16 |
| 1.6 | 30.5 | 647 | 1,180 | 250 | 8 | 110 | SRE20 |
| 1.85 | 38 | 882 | 1,860 | 250 | 8 | 210 | SRE25 |
| 1.85 | 43 | 1,180 | 2,650 | 200 | 8 | 290 | SRE30 |

1N ≙ 0.102kgf

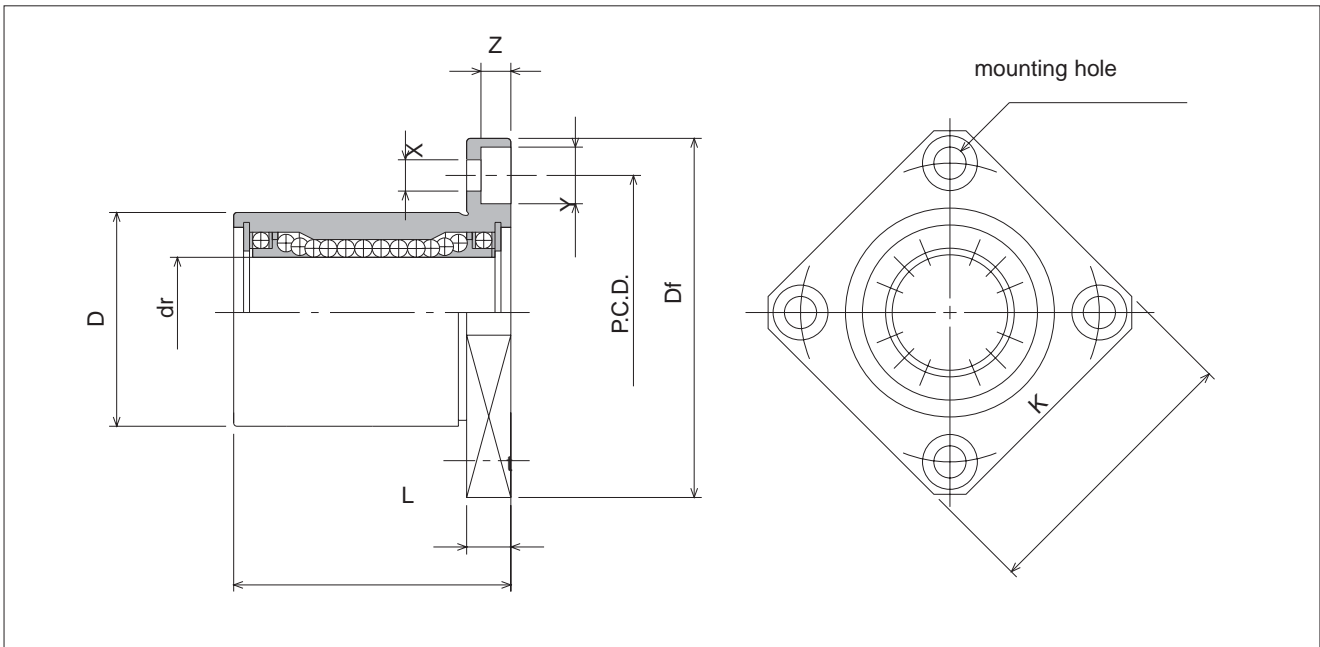
SREK TYPE

– Square Flange type –



| part number | major dimensions | | | | | | |
|---------------|------------------------|-----------------|----|-----------------|-----------|----|----|
| | inner contact diameter | | D | | L ±0.3 | Df | K |
| | dr mm | tolerance μm | mm | tolerance μm | | | |
| SREK 6 | 6 | +4 -5 | 12 | 0 | 19 | 28 | 22 |
| SREK 8 | 8 | | 15 | -13 | 24 | 32 | 25 |
| SREK10 | 10 | | 19 | 0 -16 | 29 | 40 | 30 |
| SREK12 | 12 | 21 | 30 | | 42 | 32 | |
| SREK13 | 13 | 23 | 32 | | 43 | 34 | |
| SREK16 | 16 | -6 | 28 | 0 -19 | 37 | 48 | 37 |
| SREK20 | 20 | +3 -7 | 32 | | 42 | 54 | 42 |
| SREK25 | 25 | | 40 | | 59 | 62 | 50 |
| SREK30 | 30 | | 45 | 64 | 74 | 58 | |

SLIDE ROTARY BUSH



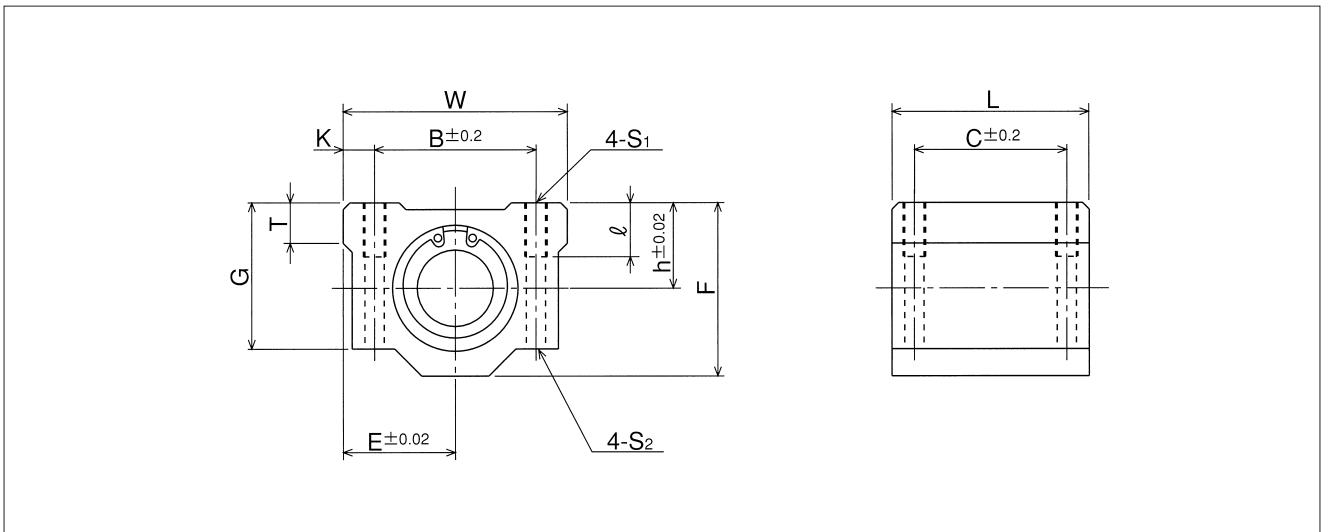
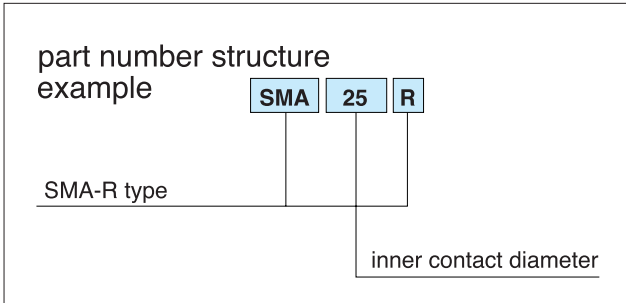
| flange | | | perpendicularity | basic load rating | | allowable rotational speed | mass | part number |
|--------|-------|-------------|------------------|-------------------|----------------|----------------------------|------|---------------|
| t | P.C.D | X×Y×Z | | dynamic | static | | | |
| mm | mm | mm | μm | C | C ₀ | rpm | g | |
| 5 | 20 | 3.5×6×3.1 | 12 | 78 | 176 | 300 | 19 | SREK 6 |
| 5 | 24 | 3.5×6×3.1 | | 137 | 314 | 300 | 27 | SREK 8 |
| 6 | 29 | 4.5×7.5×4.1 | | 157 | 372 | 300 | 36 | SREK10 |
| 6 | 32 | 4.5×7.5×4.1 | | 274 | 588 | 300 | 55 | SREK12 |
| 6 | 33 | 4.5×7.5×4.1 | | 323 | 686 | 300 | 68 | SREK13 |
| 6 | 38 | 4.5×7.5×4.1 | | 451 | 882 | 250 | 93 | SREK16 |
| 8 | 43 | 5.5×9×5.1 | 15 | 647 | 1,180 | 250 | 155 | SREK20 |
| 8 | 51 | 5.5×9×5.1 | | 882 | 1,860 | 250 | 270 | SREK25 |
| 10 | 60 | 6.6×11×6.1 | | 1,180 | 2,650 | 200 | 395 | SREK30 |

1N ≅ 0.102kgf

SLIDE ROTARY UNIT

SMA-R TYPE

— Block type —

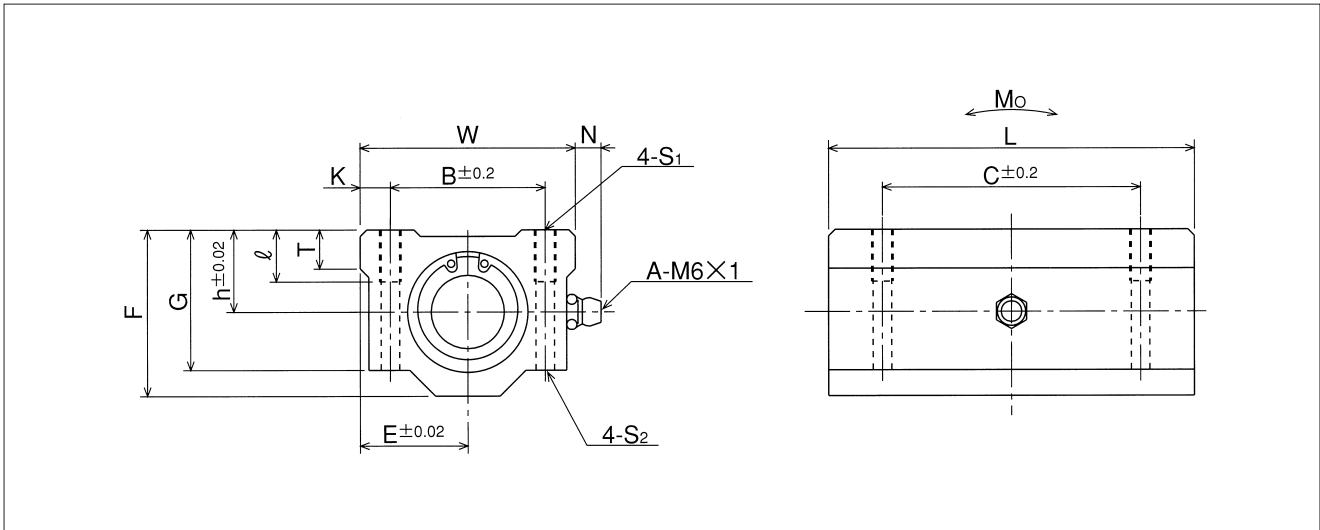
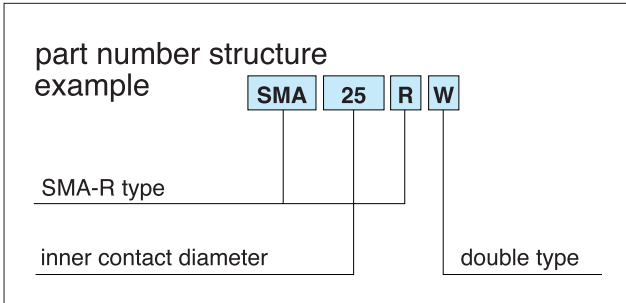


| part number | major dimensions | | | | | | | | | | | | | | | basic load rating | | mass |
|-------------|------------------------|----|------------------|----|----|----|------|------|----|---------------------|----|------|----------------|----|----------------|-------------------|----------------|------|
| | inner contact diameter | | outer dimensions | | | | | | | mounting dimensions | | | | | | dynamic | static | |
| | mm | μm | h | E | W | L | F | G | T | B | C | K | S ₁ | ℓ | S ₂ | C | C ₀ | |
| SMA 6R | 6 | | 9 | 15 | 30 | 25 | 18 | 15 | 6 | 20 | 15 | 5 | M4 | 8 | 3.4 | 78 | 176 | 35 |
| SMA 8R | 8 | +4 | 11 | 17 | 34 | 30 | 22 | 18 | 6 | 24 | 18 | 5 | M4 | 8 | 3.4 | 137 | 314 | 50 |
| SMA10R | 10 | -5 | 13 | 20 | 40 | 35 | 26 | 21 | 8 | 28 | 21 | 6 | M5 | 12 | 4.3 | 157 | 372 | 76 |
| SMA12R | 12 | | 15 | 21 | 42 | 36 | 28 | 24 | 8 | 30.5 | 26 | 5.75 | M5 | 12 | 4.3 | 274 | 588 | 100 |
| SMA13R | 13 | +3 | 15 | 22 | 44 | 39 | 30 | 24.5 | 8 | 33 | 26 | 5.5 | M5 | 12 | 4.3 | 323 | 686 | 116 |
| SMA16R | 16 | -6 | 19 | 25 | 50 | 44 | 38.5 | 32.5 | 9 | 36 | 34 | 7 | M5 | 12 | 4.3 | 451 | 882 | 189 |
| SMA20R | 20 | | 21 | 27 | 54 | 50 | 41 | 35 | 11 | 40 | 40 | 7 | M6 | 12 | 5.2 | 647 | 1,180 | 265 |
| SMA25R | 25 | +3 | 26 | 38 | 76 | 67 | 51.5 | 42 | 12 | 54 | 50 | 11 | M8 | 18 | 7 | 882 | 1,860 | 570 |
| SMA30R | 30 | -7 | 30 | 39 | 78 | 72 | 59.5 | 49 | 15 | 58 | 58 | 10 | M8 | 18 | 7 | 1,180 | 2,650 | 755 |

1N≒0.102kgf

SLIDE ROTARY UNIT SMA-RW TYPE

— Double-Wide Block type —



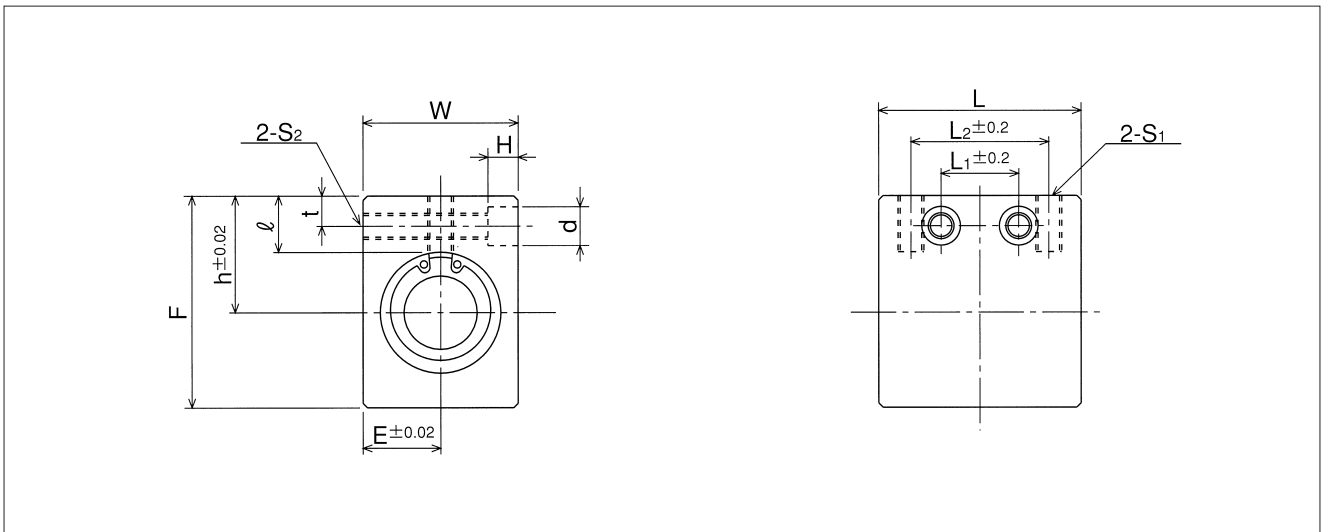
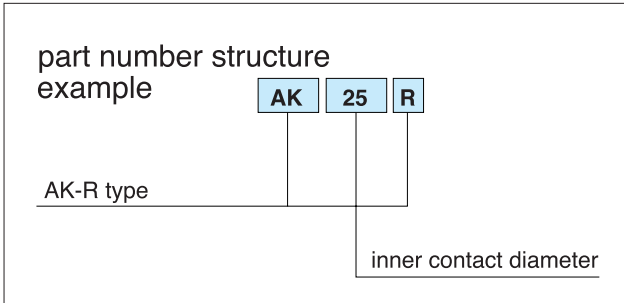
| part number | major dimensions | | | | | | | | | | | | | | | basic load rating | | mass | |
|-------------|------------------------|----|------------------|----|----|-----|------|------|----|-----|---------------------|-----|------|----------------|----|-------------------|--------|-------|----------------|
| | inner contact diameter | | outer dimensions | | | | | | | | mounting dimensions | | | | | dynamic | static | | |
| | mm | μm | h | E | W | L | F | G | T | N | B | C | K | S ₁ | ℓ | S ₂ | C | | C ₀ |
| SMA 6RW | 6 | | 9 | 15 | 30 | 48 | 18 | 15 | 6 | 7 | 20 | 36 | 5 | M4 | 8 | 3.4 | 126 | 352 | 64 |
| SMA 8RW | 8 | +4 | 11 | 17 | 34 | 58 | 22 | 18 | 6 | 7 | 24 | 42 | 5 | M4 | 8 | 3.4 | 222 | 628 | 98 |
| SMA10RW | 10 | -5 | 13 | 20 | 40 | 68 | 26 | 21 | 8 | 7 | 28 | 46 | 6 | M5 | 12 | 4.3 | 254 | 744 | 148 |
| SMA12RW | 12 | | 15 | 21 | 42 | 70 | 28 | 24 | 8 | 6.5 | 30.5 | 50 | 5.75 | M5 | 12 | 4.3 | 444 | 1,180 | 201 |
| SMA13RW | 13 | +3 | 15 | 22 | 44 | 75 | 30 | 24.5 | 8 | 6.5 | 33 | 50 | 5.5 | M5 | 12 | 4.3 | 523 | 1,370 | 232 |
| SMA16RW | 16 | -6 | 19 | 25 | 50 | 85 | 38.5 | 32.5 | 9 | 6 | 36 | 60 | 7 | M5 | 12 | 4.3 | 731 | 1,760 | 378 |
| SMA20RW | 20 | | 21 | 27 | 54 | 96 | 41 | 35 | 11 | 7 | 40 | 70 | 7 | M6 | 12 | 5.2 | 1,050 | 2,360 | 590 |
| SMA25RW | 25 | +3 | 26 | 38 | 76 | 130 | 51.5 | 42 | 12 | 4 | 54 | 100 | 11 | M8 | 18 | 7 | 1,430 | 3,720 | 1,140 |
| SMA30RW | 30 | -7 | 30 | 39 | 78 | 140 | 59.5 | 49 | 15 | 5 | 58 | 110 | 10 | M8 | 18 | 7 | 1,910 | 5,300 | 1,520 |

1N≒0.102kgf

SLIDE ROTARY UNIT

AK-R TYPE

— Compact Block type —



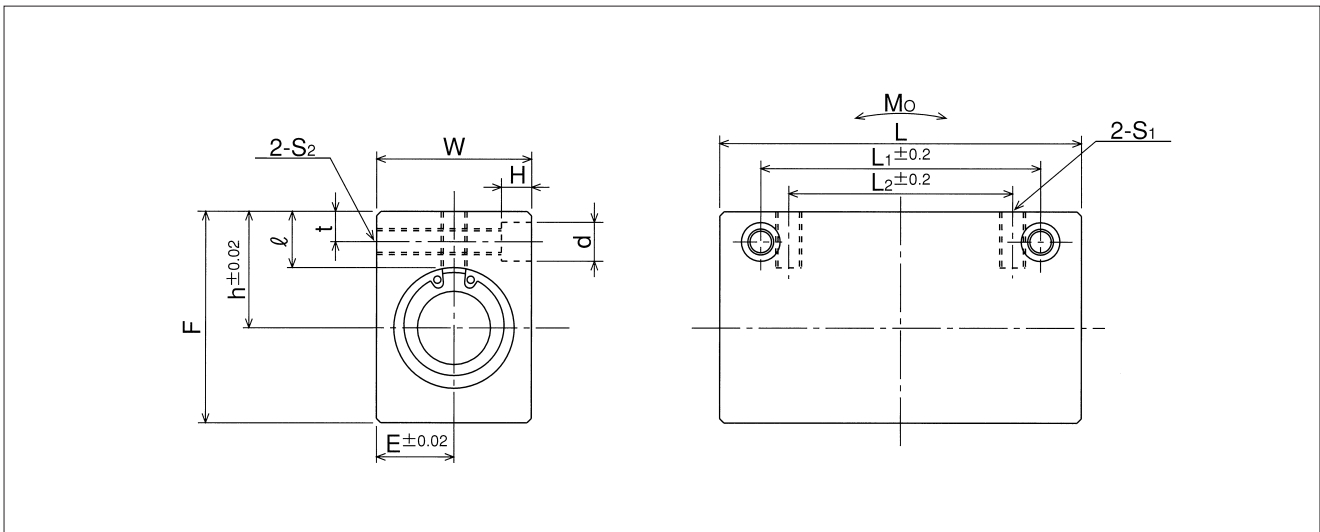
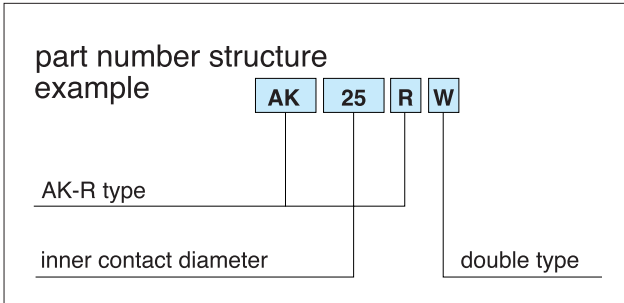
| part number | major dimensions | | | | | | | | | | | | | | | basic load rating | | mass |
|-------------|------------------------|----|------------------|----|----|----|----|---------------------|----------------|------|----------------|----|----------------|----|----|-------------------|----------------|------|
| | inner contact diameter | | outer dimensions | | | | | mounting dimensions | | | | | | | | dynamic | static | |
| | mm | μm | h | E | W | L | F | L ₂ | S ₁ | ℓ | L ₁ | t | S ₂ | d | H | C | C ₀ | |
| | | | mm | mm | mm | mm | mm | mm | | mm | mm | mm | | mm | mm | N | N | |
| AK 6R | 6 | | 14 | 8 | 16 | 27 | 22 | 18 | M 4 | 8 | 9 | 5 | M 4 | 6 | 5 | 78 | 176 | 22 |
| AK 8R | 8 | +4 | 16 | 10 | 20 | 32 | 26 | 20 | M 5 | 8.5 | 10 | 5 | M 4 | 6 | 5 | 137 | 314 | 38 |
| AK10R | 10 | -5 | 19 | 13 | 26 | 39 | 32 | 27 | M 6 | 9.5 | 15 | 6 | M 5 | 8 | 6 | 157 | 372 | 64 |
| AK12R | 12 | | 20 | 14 | 28 | 40 | 34 | 27 | M 6 | 9.5 | 15 | 6 | M 5 | 8 | 6 | 274 | 588 | 88 |
| AK13R | 13 | +3 | 25 | 15 | 30 | 42 | 43 | 28 | M 6 | 13.5 | 16 | 7 | M 6 | 9 | 7 | 323 | 686 | 128 |
| AK16R | 16 | -6 | 27 | 18 | 36 | 47 | 49 | 32 | M 6 | 13 | 18 | 7 | M 6 | 9 | 7 | 451 | 882 | 193 |
| AK20R | 20 | | 31 | 21 | 42 | 52 | 54 | 36 | M 8 | 15 | 18 | 8 | M 8 | 11 | 8 | 647 | 1,180 | 282 |
| AK25R | 25 | +3 | 37 | 26 | 52 | 69 | 65 | 42 | M10 | 17 | 22 | 9 | M10 | 14 | 10 | 882 | 1,860 | 544 |
| AK30R | 30 | -7 | 40 | 29 | 58 | 74 | 71 | 44 | M10 | 17.5 | 22 | 9 | M10 | 14 | 10 | 1,180 | 2,650 | 730 |

1N≒0.102kgf

SLIDE ROTARY UNIT

AK-RW TYPE

— Double-Wide Compact Block type —



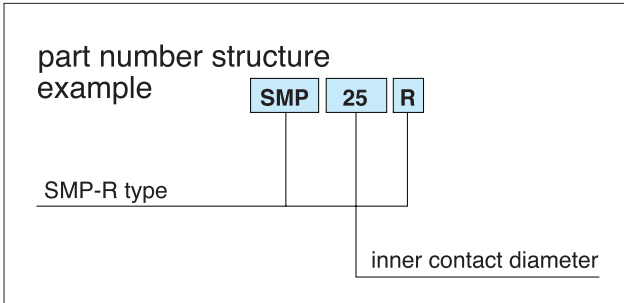
| part number | major dimensions | | | | | | | | | | | | | | | basic load rating | | mass |
|-------------|------------------------|----------|------------------|----|----|-----|----|---------------------|----------------|------|----------------|---|----------------|----|----|-------------------|----------------|-------|
| | inner contact diameter | | outer dimensions | | | | | mounting dimensions | | | | | | | | dynamic | static | |
| | mm | μm | h | E | W | L | F | L ₂ | S ₁ | ℓ | L ₁ | t | S ₂ | d | H | C | C ₀ | |
| AK 6RW | 6 | +4 -5 | 14 | 8 | 16 | 46 | 22 | 20 | M 4 | 8 | 30 | 5 | M 4 | 6 | 5 | 126 | 352 | 41 |
| AK 8RW | 8 | | 16 | 10 | 20 | 56 | 26 | 30 | M 5 | 8.5 | 42 | 5 | M 4 | 6 | 5 | 222 | 628 | 71 |
| AK10RW | 10 | | 19 | 13 | 26 | 68 | 32 | 36 | M 6 | 9.5 | 50 | 6 | M 5 | 8 | 6 | 254 | 744 | 118 |
| AK12RW | 12 | +3 -6 | 20 | 14 | 28 | 70 | 34 | 36 | M 6 | 9.5 | 50 | 6 | M 5 | 8 | 6 | 444 | 1,180 | 164 |
| AK13RW | 13 | | 25 | 15 | 30 | 74 | 43 | 42 | M 6 | 13.5 | 55 | 7 | M 6 | 9 | 7 | 523 | 1,370 | 240 |
| AK16RW | 16 | | 27 | 18 | 36 | 84 | 49 | 52 | M 6 | 13 | 65 | 7 | M 6 | 9 | 7 | 731 | 1,760 | 361 |
| AK20RW | 20 | +3 -7 | 31 | 21 | 42 | 94 | 54 | 58 | M 8 | 15 | 70 | 8 | M 8 | 11 | 8 | 1,050 | 2,360 | 540 |
| AK25RW | 25 | | 37 | 26 | 52 | 128 | 65 | 80 | M10 | 17 | 100 | 9 | M10 | 14 | 10 | 1,430 | 3,720 | 1,060 |
| AK30RW | 30 | | 40 | 29 | 58 | 138 | 71 | 90 | M10 | 17.5 | 110 | 9 | M10 | 14 | 10 | 1,910 | 5,300 | 1,424 |

1N≒0.102kgf

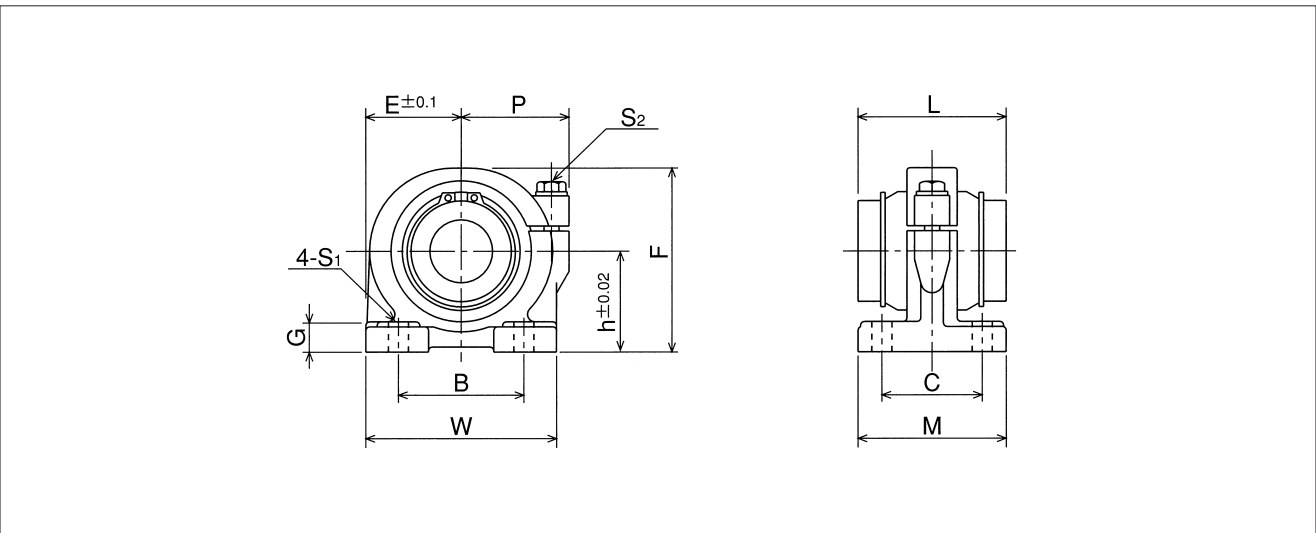
SLIDE ROTARY UNIT

SMP-R TYPE

— Pillow Block type —



| part number | major dimensions | | | | | | | | |
|---------------|------------------------|----------------------------|------------------|---------|---------|---------|---------|---------|---------|
| | inner contact diameter | | outer dimensions | | | | | | |
| | mm | tolerance μm | h mm | E mm | W mm | L mm | F mm | G mm | M mm |
| SMP13R | 13 | +3 | 25 | 25 | 50 | 32 | 46 | 8 | 36 |
| SMP16R | 16 | -6 | 29 | 27.5 | 55 | 37 | 53 | 10 | 40 |
| SMP20R | 20 | +3 -7 | 34 | 32.5 | 65 | 42 | 62 | 12 | 48 |
| SMP25R | 25 | | 40 | 38 | 76 | 59 | 73 | 12 | 59 |
| SMP30R | 30 | | 45 | 42.5 | 85 | 64 | 84 | 15 | 69 |



| P | mounting dimensions | | | adjustment bolt size S ₂ | basic load rating | | mass g | part number |
|----|---------------------|----|----------------------------|---|-------------------|------------------------------|---------------|---------------|
| | B | C | S ₁ (bolt size) | | dynamic C | static C ₀ | | |
| mm | mm | mm | mm | | N | N | | |
| 30 | 30 | 26 | 7 (M5) | M5 | 323 | 686 | 266 | SMP13R |
| 32 | 35 | 29 | 7 (M5) | M5 | 451 | 882 | 369 | SMP16R |
| 37 | 40 | 35 | 8 (M6) | M6 | 647 | 1,180 | 690 | SMP20R |
| 43 | 50 | 40 | 8 (M6) | M6 | 882 | 1,860 | 970 | SMP25R |
| 49 | 58 | 46 | 10 (M8) | M8 | 1,180 | 2,650 | 1,420 | SMP30R |

1N ≅ 0.102kgf

SLIDE ROTARY BUSH

NB's RK type slide rotary bush is a highly accurate rigid component providing smooth continuous linear and rotational motion. Its structure imposes no constraints on either motion. It is much more compact than a standard slide bush with separate rotational bearing.

STRUCTURE AND ADVANTAGES

The RK type slide rotary bush uses a retainer similar to that used in the SR type stroke bush. This retainer provides the results of smooth rotational motion. The SM type slide bush is also used providing the smooth linear motion. Large ball elements are used enabling the bushing to withstand high loads.

1.A smooth unlimited linear and rotational motion is obtained.

2.There is no need to machine separate housing.

3.High accuracy is ensured for extended period of usage.

4.Its high compatibility eliminates replacement problems.

5.High rigidity enables it to withstand an unbalanced load and high load capacity.

※ For best performance, please select tolerance of h5 for the shaft.

Calculation of Life:

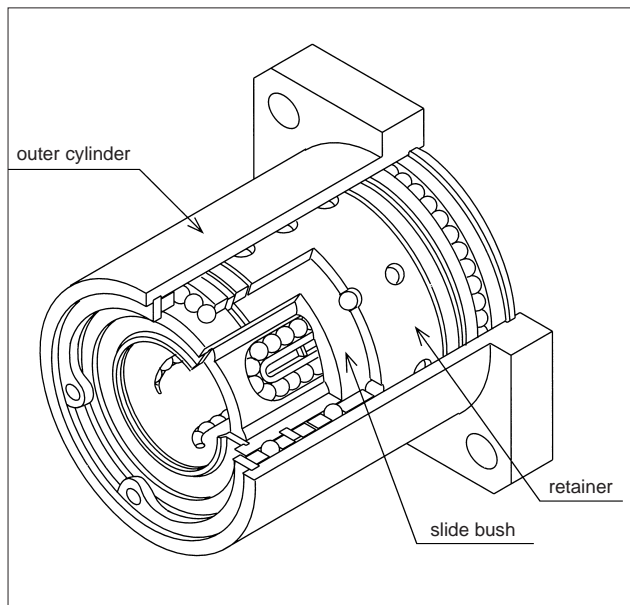
$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_w} \cdot \frac{C}{P} \right)^3 \times 50$$

L : travel life (km) f_H : hardness coefficient f_T : temperature coefficient
 f_C : contact coefficient f_w : the loafficient
 C : basic dynamic load rating (N) P : load (N)

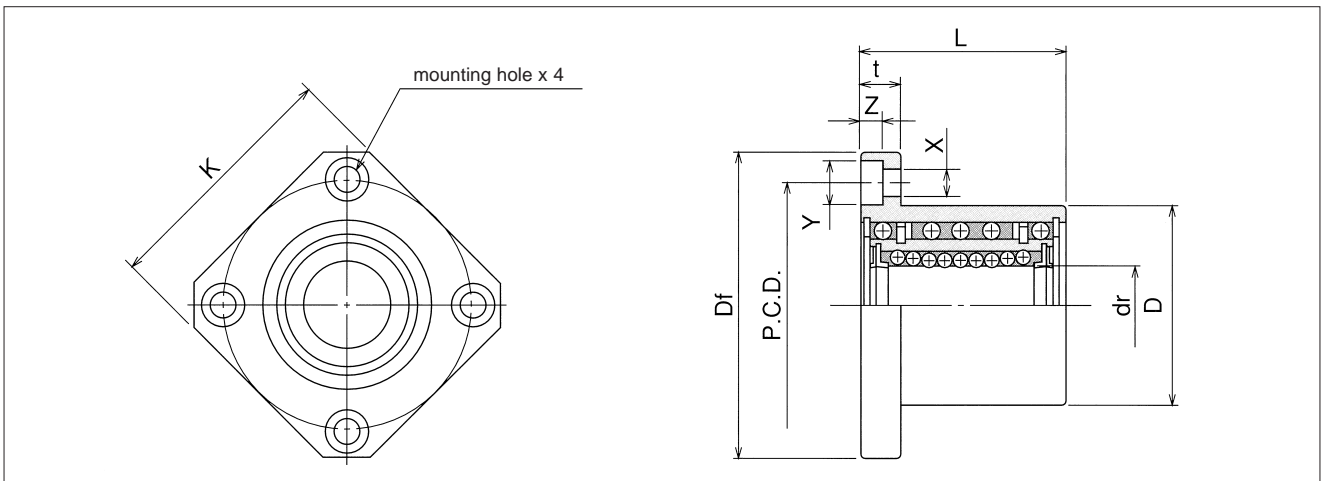
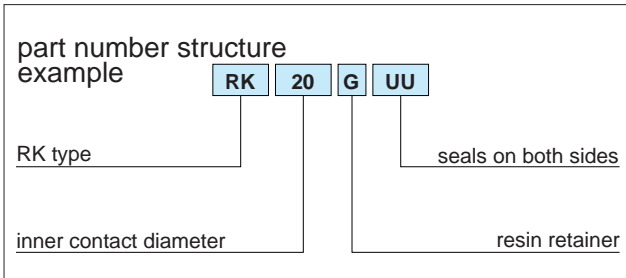
※Refer to page Eng. 5 for the coefficients.

※The contact coefficient is used when two or more bushings are used in close contact with each other on the same shaft.

Figure F-6 Structure of RK Slide Rotary Bush



RK TYPE



| part number | major dimensions | | | | | | | | | | basic load rating | | allowable rotational speed rpm | mass g | |
|-------------|------------------|----------------------------|----|----------------------------|----|-----------------|----------|---------|---------|--------------|-------------------|---------|-----------------------------------|-----------|---------|
| | dr | | D | | L | | flange | | | | | dynamic | | | static |
| | mm | tolerance μm | mm | tolerance μm | mm | tolerance mm | Df mm | K mm | t mm | P.C.D. mm | X×Y×Z mm | C N | | | Co N |
| RK12GUU | 12 | 0 | 32 | 0 | 36 | ±0.3 | 54 | 42 | 8 | 43 | 5.5×9×5.1 | 510 | 784 | 500 | 180 |
| RK16GUU | 16 | -9 | 40 | -25 | 45 | | 62 | 50 | 8 | 51 | 5.5×9×5.1 | 774 | 1,180 | 500 | 280 |
| RK20GUU | 20 | 0 | 45 | 0 | 50 | | 74 | 58 | 10 | 60 | 6.6×11×6.1 | 882 | 1,370 | 400 | 420 |
| RK25GUU | 25 | -10 | 52 | -30 | 67 | | 82 | 64 | 10 | 67 | 6.6×11×6.1 | 980 | 1,570 | 400 | 680 |
| RK30GUU | 30 | -10 | 60 | -30 | 74 | | 96 | 75 | 13 | 78 | 9×14×8.1 | 1,570 | 2,740 | 400 | 990 |

1N≒0.102kgf