STROKE BUSH
SLIDE ROTARY BUSH

STROKE BUSH

SLIDE ROTARY BUSH SRE SERIES

SLIDE ROTARY BUSH RK TYPE

STROKE BUSH

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 withstand 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 specific stroke length, the combined rotation and stroke motion is achieved with very little frictional resistance. The NB stroke bush can 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 precision grinding, resulting in 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 length of the linear motion, therefore, the stroke length is limited to approximately twice the length the retainer can travel within the outer cylinder.

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 and Replacement

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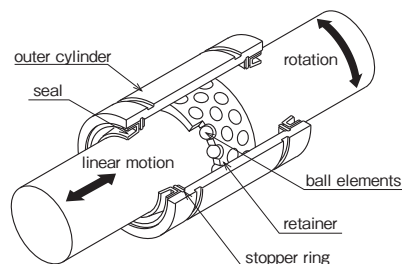
Light Weight and Space Saving

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

Lubrication

One lubrication hole is provided on each oil groove of the outer cylinder, making it easy to lubricate the SR stroke bush.

Figure E-1 Structure of SR Stroke Bush

- outer cylinder
- rotation
- seal
- linear motion
- ball elements
- retainer
- stopper ring

TYPE

Table E-1   Type

Standard Type	Double Retainer Type
SR TYPE	SR-B TYPE
P.E-6	P.E-8

ALLOWABLE SPEED FOR COMBINED ROTATION AND STROKE MOTION

The allowable speed for combined rotation and stroke motion is obtained from the following equation:
The value of DN is given as follows depending on the lubrication method.

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

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

note······$n \leqq 5,000$ $S \cdot n_1 \leqq 50,000$

RATED LOAD AND RATED LIFE

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

$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P} \right)^3 \times 10^6$$

L: rated life f_H: hardness coefficient
f_T: temperature coefficient f_C: contact coefficient
f_W: applied load coefficient
C: basic dynamic load rating (N)
P: applied load (N)
※Refer to page Eng-5 for the coefficients.

● For combined rotation and stroke motion

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

● For stroke motion

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

L_h: life time (hr)   S: stroke length (mm)
n: revolutions per min. (rpm)
n_1: number of cycles per minute (cpm)
dm: ball pitch diameter (mm) ≒ 1.15 dr

FIT

The fits generally used between the shaft and the housing are listed in Table E-2. The inner contact diameters of the SR stroke bush are listed in the dimension tables. The shaft diameter tolerance should be selected to achieve the desired amount of radial clearance (see Table E-3). Please pay attention that high-speed linear motion can cause the retainer to slip due to inertial force.
In selecting a shaft, please take note of:
Hardness: 58HRC or more (refer to hardness coefficient on page Eng-5) recommended
Surface Roughness: less than Ra0.4 recommended

Table E-2

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

Table E-3 Radial Clearance Negative Limit

part number	limit (μm)
6	− 2
8〜10	− 3
12〜16	− 4
20〜30	− 5
35〜50	− 6
60〜80	− 8
100	−10

STROKE BUSH

MOUNTING

Examples of mounting methods of Stroke Bush are shown in Figure E-2. To avoid deformation, do not fix outer cylinder by using set screw.

Figure E-2 Mounting Method

using retaining rings   using holding plates   using set screws
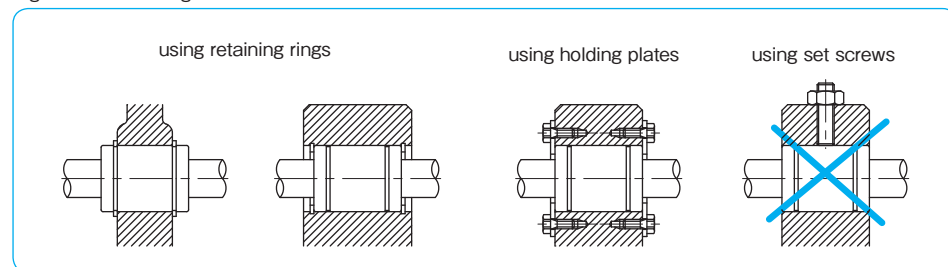
LUBRICATION

Appropriate lubrication is needed to ensure the accuracy of NB Stroke Bush and to maintain bearing life. Anti-rust oil is applied to NB Stroke Bush prior to shipment. The NB selected anti-rust oil has a little to no effect on lubricants, however, please apply lubricant only after cleaning Stroke Bush with kerosene, etc.

Grease Lubricant

Prior to usage, please apply grease, and re-lubricate periodically according to the operating conditions. (Lithium soap-based grease is recommended.) Relubrication can be done by directly applying grease inside the ball bush or by using oil hole as Figure E-3 shows.
A special low dust generation grease is optional for clean room application. Please refer to page Eng-40.

Oil Lubricant

Prior to usage, please apply oil directly to the shaft surface or by using oil hole as Figure E-3 shows.
Turbine oil (ISO standard VG32-68) is recommended.

Figure E-3 Oil hole

Oil groove

Oil hole
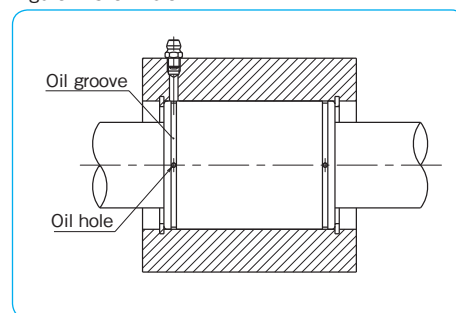
USE AND HANDLING PRECAUTIONS

Maximum Stroke

The maximum stroke in the dimension table is the stroke limit.

Retainer Slippage

The retainer can slip under high-speed motion, vertical application, unbalanced-loading, and vibrating conditions.
It is suggested that the stroke to be set as a 80% of the maximum stroke in the dimension table. It is also recommended that the bush be cycled to perform the maximum stroke several times, so that the retainer returns to its central position.

Accuracy

The accuracies of the SR stroke bush are stated in the dimension 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:

Figure E-4 Outer Cylinder Measurement Points
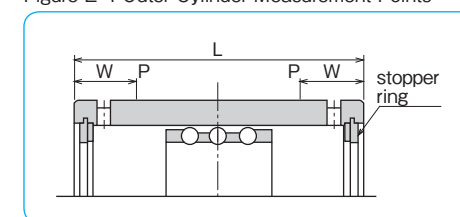
$$W=4+L/8$$

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

stopper ring

Operating Temperature Range

The operating temperature is ranging from -20 ℃ to 110℃. In case of operation at temperature outside this range, please contact NB.

Dust Prevention

Dust and other contaminations affect the bush's lifetime and accuracy if dust or particle enter into inside of bush. Although seals work under a normal environment, in a harsh environment, it is necessary to attach protective covers.

STROKE BUSH

SR TYPE
—Standard Type—

part number structure

example **SR** **20**

SR type — inner contact diameter (dr)

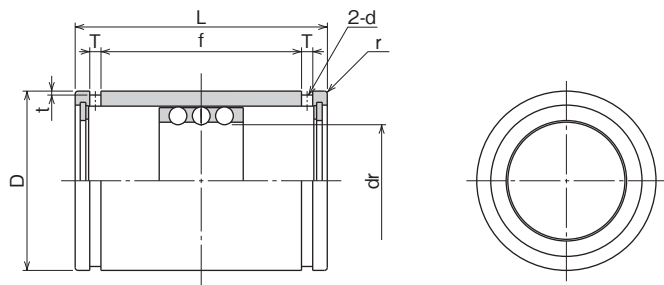| part number	maximum stroke mm	number of rows	dr mm	tolerance μm	D mm	tolerance μm	L mm	tolerance mm	f mm	T mm	t mm	d mm	r mm	dynamic C N	static Co N	mass g
SR 6	19	3	6	+22/+13	12	0/−11	20		11.3	1.1	0.5	1	0.5	216	147	8.9
SR 8	24	3	8	+22/+13	15	−11	24		17.1	1.5	0.5	1.2	0.5	343	245	15.6
SR 10	30	3	10		19	0/−13	30	0/−0.2	22.7	1.5	0.5	1.2	0.5	637	461	28.8
SR 12	32	3	12	+27	23		32		24.5	1.5	0.5	1.2	0.5	1,070	813	42
SR 16	40	3	16	+16	28		37		29.1	1.5	0.7	1.3	0.5	1,180	990	71
SR 20	50	3	20	+33/+20	32	0/−16	45		35.8	2	0.7	1.5	0.5	1,260	1,170	99
SR 25	50	3	25	+33/+20	37		45		35.8	2	0.7	1.6	1	1,330	1,330	117
SR 30	82	3	30		45		65		53.5	2.5	1	2	1	2,990	3,140	205
SR 35	92	3	35	+41/+25	52	0/−19	70	0/−0.3	58.5	2.5	1	2	1.5	3,140	3,530	329
SR 40	108	3	40	+41/+25	60		80		68.3	2.5	1	2	1.5	4,120	4,800	516
SR 50	138	3	50		72		100		86.4	3	1	2.5	1.5	5,540	6,910	827
SR 60	138	3	60	+49	85	0	100		86.4	3	1	2.5	2	5,980	8,230	1,240
SR 80	132	3	80	+30	110	−22	100	0	86	3	1.5	2.5	2	7,840	12,200	2,050
SR100	132	3	100	+58/+36	130	0/−25	100	−0.4	86	3	1.5	2.5	2	8,430	14,700	2,440

1N≒0.102kgf

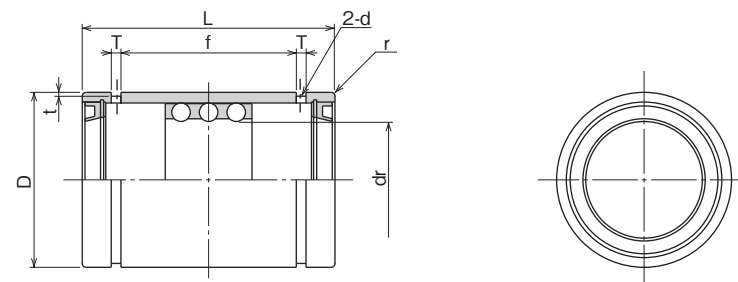
SR-UU TYPE
—Standard Type with Seals—

part number structure

example **SR** **20** **UU**

SR type
inner contact diameter (dr) — seals on both sides

part number	maximum stroke mm	number of rows	dr mm	tolerance μm	D mm	tolerance μm	L mm	tolerance mm	f mm	T mm	t mm	d mm	r mm	dynamic C N	static Co N	mass g
SR 8UU	14	3	8	+22/+13	15	0/−11	24		12.3	1.5	0.5	1.2	0.5	343	245	15.6
SR 10UU	16	3	10	+13	19		30		15.5	1.5	0.5	1.2	0.5	637	461	28.8
SR 12UU	18	3	12	+27	23	0/−13	32	0/−0.2	17.1	1.5	0.5	1.2	0.5	1,070	813	42
SR 16UU	26	3	16	+16	28		37		21.1	1.5	0.7	1.3	0.5	1,180	990	71
SR 20UU	36	3	20	+33/+20	32	0/−16	45		26.8	2	0.7	1.5	0.5	1,260	1,170	99
SR 25UU	36	3	25	+33/+20	37		45		26.8	2	0.7	1.6	1	1,330	1,330	117
SR 30UU	68	3	30		45		65		45.1	2.5	1	2	1	2,990	3,140	205
SR 35UU	76	3	35	+41/+25	52	0/−19	70	0/−0.3	50.1	2.5	1	2	1.5	3,140	3,530	329
SR 40UU	91	3	40	+41/+25	60		80	−0.3	59.9	2.5	1	2	1.5	4,120	4,800	516
SR 50UU	116	3	50		72		100		77.4	3	1	2.5	1.5	5,540	6,910	827
SR 60UU	117	3	60	+49	85	0	100		77.4	3	1	2.5	2	5,980	8,230	1,240
SR 80UU	110	3	80	+30	110	−22	100	0	77	3	1.5	2.5	2	7,840	12,200	2,050
SR100UU	110	3	100	+58/+36	130	0/−25	100	−0.4	77	3	1.5	2.5	2	8,430	14,700	2,440

1N≒0.102kgf

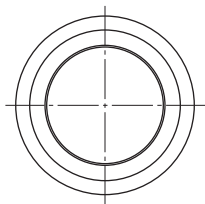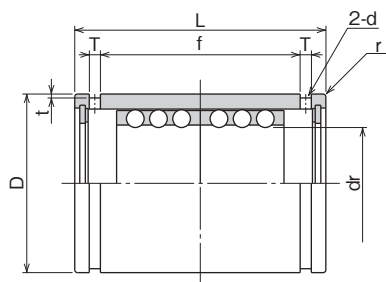STROKE BUSH

SR-B TYPE
—Double Retainer Type—

part number structure

example **SR** **20** **B**

- SR type
- inner contact diameter (dr)
- double retainer

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

1N≒0.102kgf

SR-BUU TYPE
—Double Retainer Type with Seals—

part number structure

example **SR** **30** **B** **UU**

- SR type
- inner contact diameter (dr)
- double retainer
- seals on both sides

part number	maximum stroke mm	number of rows	dr mm	dr tolerance μm	D mm	D tolerance μm	L mm	L tolerance mm	f mm	T mm	t mm	d mm	r mm	dynamic C N	static Co N	mass g
SR 30BUU	30	6	30	+33/+20	45	0/−16	65		45.1	2.5	1	2	1	4,800	6,270	220
SR 35BUU	38	6	35	+41/+25	52		70		50.1	2.5	1	2	1.5	5,050	7,060	346
SR 40BUU	49	6	40		60	0/−19	80	0/−0.3	59.9	2.5	1	2	1.5	6,710	9,560	540
SR 50BUU	66	6	50		72		100		77.4	3	1	2.5	1.5	8,970	13,800	862
SR 60BUU	67	6	60	+49	85		100		77.4	3	1	2.5	2	9,700	16,500	1,290
SR 80BUU	54	6	80	+30/−22	110		100	0	77	3	1.5	2.5	2	12,700	24,300	2,110
SR100BUU	54	6	100	+58/+36	130	0/−25	100	−0.4	77	3	1.5	2.5	2	13,700	29,400	2,520

1N≒0.102kgf

STROKE BUSH

SLIDE ROTARY BUSH SRE SERIES

The NB Slide Rotary Bush SRE Series provides rotary and linear motion functions. Linear motion with unlimited stroke and rotary motion are merged into a single bush resulting in great space saving compared with a combination of any conventional bearings. There are three types; standard, flange, and unit type with sizes ranging from 6 to 40.

STRUCTURE AND ADVANTAGES

NB Slide Rotary Bush features a special retainer fitted into cylindrical steel outer cylinder 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 cylinder 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 the load capacity.

Smooth Rotation

The positioning of the steel balls in a cylindrical formation inside the retainer enables a smooth rotational motion regardless of the installation direction.

Complete Interchangeability

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

Figure E-5 Structure of Slide Rotary Bush SRE type
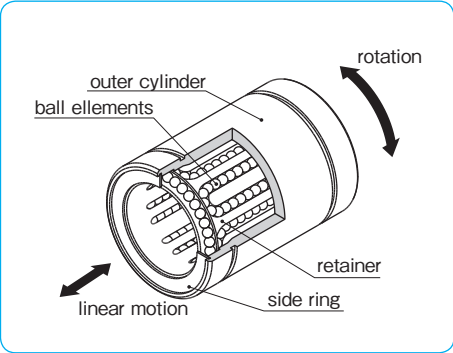
TYPE

Table E-4   Type

Standard Type	Square Flange Type
SRE TYPE	SREK TYPE
P.E-16	P.E-18

Unit	
Block Type	Double-Wide Block Type
SMA-R TYPE	SMA-RW TYPE
P.E-20	P.E-21
AK-R TYPE	AK-RW TYPE
P.E-22	P.E-23
SMP-R TYPE	
P.E-24	

SLIDE ROTARY BUSH

RATED LOAD AND RATED LIFE

The rated life and load rating 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 causing flaking by 90% of the bearings.

Basic Dynamic Load Rating

The basic dynamic load rating 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 Load Rating

The basic static load rating 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.

Equation (1) gives the relation between the applied load and the rated life of the slide rotary bush.

$$L=\left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P}\right)^3 \times 10^6 \quad \cdots \cdots \cdots \cdots \cdots (1)$$

L: rated life (rotations) f_H: hardness coefficient
f_T: temperature coefficient f_C: contact coefficient
f_W: applied load coefficient   C: basic dynamic load rating (N)
P: applied load (N)
※Refer to page Eng-5 for the coefficients.

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

●When linear and rotary motions are combined

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

●When only linear motion is involved

$$L_h = \frac{L}{600 \cdot S \cdot n_1/(\pi \cdot dm)} \quad \cdots \cdots \cdots \cdots (3)$$

L_h: life time (hr)   S: stroke length (mm)   n: revolutions per minute (rpm) n_1: number of cycles per minute (cpm)
dm: ball pitch diameter (mm)≒1.15dr (dr is the inner contact diameter of the SRE series)

Calculation Example

The life of SRE20 type NB slide rotary bush is calculated based on the following conditions.
●Conditions
  Motion: Linear and rotational combined   Load: P=30N   Stroke: S=200mm
  Revolutions per minute: n=15rpm   Number of cycles per minute: n₁=10cpm
  Shaft surface hardness: greater than 58 HRC
  Operating temperature: room temperature   Other: single shaft with single bush
●Calculation
  Basic dynamic load rating: C=647 N
  Based on the above 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
  Applied load coefficient, f_W=1.5
    Rated life

$$L=\left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P}\right)^3 \times 10^6$$

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

  Life (in hours)

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

$$= \frac{2,972 \times 10^6}{60\sqrt{(1.15 \times 20 \times 15)^2 + (10 \times 200 \times 10)^2}/(1.15 \times 20)}$$

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

FIT

Shaft

In order to ensure high accuracy motion of Slide Rotary Bush SRE type, it is essential to select a high quality shaft. In selecting a shaft, please take note of:
  Outer diameter tolerance: g6 recommended
  Surface hardness: 58HRC or higher
            For a shaft with surface hardness less than 58HRC, make a correction in life calculation by adding hardness coefficient.
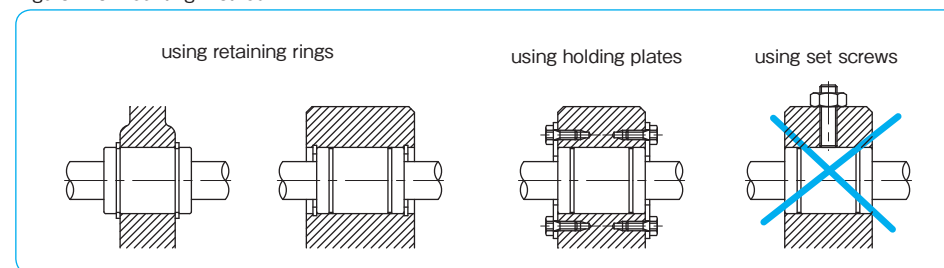 Surface roughness: lower than Ra0.4 or better

Housing

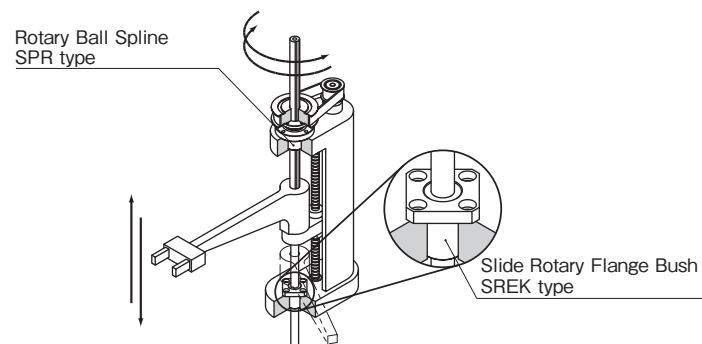 Inner diameter tolerance: H7 recommended

MOUNTING

Examples of mounting methods are shown in Figure E-6. Please do not fix outer cylinder by using set screw to avoid deformation.
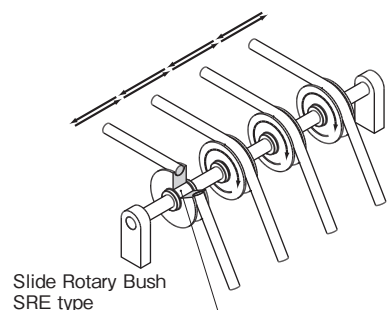
Figure E-6 Mounting Method

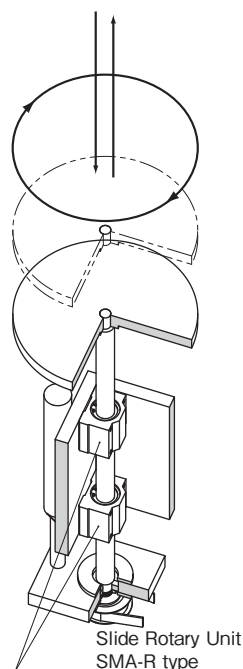using retaining rings   using holding plates   using set screws

SLIDE ROTARY BUSH

APPLICATION EXAMPLES

Application Example 1   Vertical Shaft Robot Arm

Rotary Ball Spline
SPR type

Slide Rotary Flange Bush
SREK type

Application Example 2   Multiple Gearing Idler

Slide Rotary Bush
SRE type

Application Example 3   Tool Changer

Slide Rotary Unit
SMP-R type

Application Example 4   Turntable

Slide Rotary Unit
SMA-R type
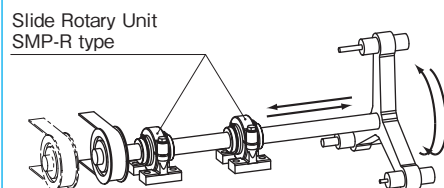
USE AND HANDLING PRECAUTIONS

Lubrication

Lubrication is needed (1) to prevent heat fusing by reducing friction between the rolling elements and the tracking surface, (2) to reduce wear of the structural elements, and (3) to prevent rusting. Lubrication affects both the performance and life of the bush. A lubrication method and a lubrication agent appropriate to the operating conditions should be selected. For oil lubrication, turbine oil (ISO standard VG32-68) is recommended. For grease lubrication, lithium soap based grease No. 2 is recommended. The replenishment interval depends on the operating conditions.

Dust Prevention

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

Operating Temperature Range

The operating temperature is ranging from −20℃ to 110℃. In case of operation at a temperature outside this range, please contact NB.

Retainer Material

The standard material of SRE Retainer is stainless steel. When requiring other material, please contact NB.

FELT SEAL

A felt seal FLM strengthens lubrication characteristics and extends relubrication period of the slide rotary bush. At the time of shipment, the oil impregnation to the felt seal is not applied.

Figure E-7 Felt Seal

steel
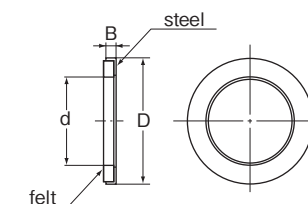
felt

Installation

The felt seal does not work as a retaining ring. Figure E-8 shows how to install the felt seal.

Table E-4 Felt Seal Dimensions

part number	major dimensions (mm)			applicable slide rotary bush
	d	D	B	
FLM 6	6	12	2	SRE 6
FLM 8	8	15	2	SRE 8
FLM 10	10	19	3	SRE 10
FLM 12	12	21	3	SRE 12
FLM 13	13	23	3	SRE 13
FLM 16	16	28	4	SRE 16
FLM 20	20	32	4	SRE 20
FLM 25	25	40	5	SRE 25
FLM 30	30	45	5	SRE 30
FLM 40	40	60	5	SRE 40

Figure E-8 Example of Installation

SLIDE ROTARY BUSH
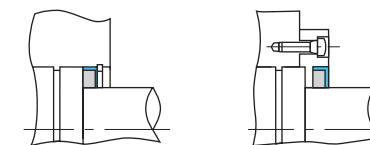
SRE TYPE
− Standard type −

part number structure

example **SRE** **25**

SRE type

inner contact diameter (dr)

part number	major dimensions									part number
	dr		D		L		B			
		tolerance		tolerance		tolerance		tolerance		
	mm	μm	mm	μm	mm	mm	mm	mm		
SRE 6	6	+4 −5	12	0 −11	19	0 −0.2	13.5	0 −0.2		
SRE 8	8		15		24		17.5			
SRE10	10		19		29		22			
SRE12	12	+3 −6	21	0 −13	30		23			
SRE13	13		23		32		23			
SRE16	16		28		37		26.5			
SRE20	20	+3 −7	32	0 −16	42		30.5			
SRE25	25		40		59	0 −0.3	41	0 −0.3		
SRE30	30		45		64		44.5			
SRE40	40	+3/−8	60	0/−19	80		60.5			

※If the inner contact diameter exceeds 40 mm, please contact NB.
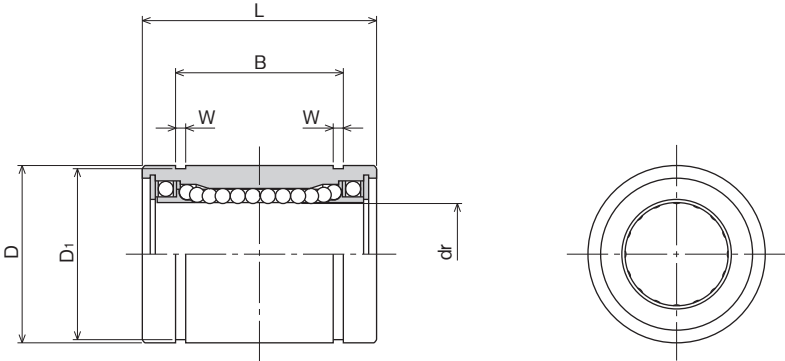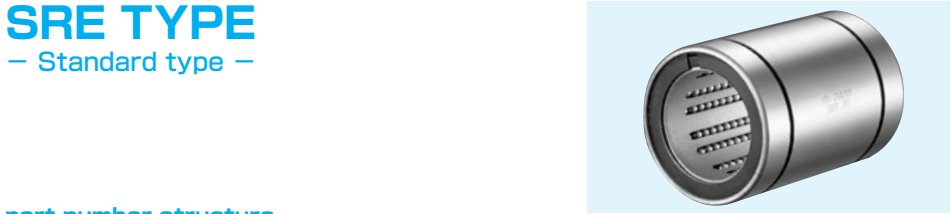
W	D₁	basic load rating		allowable revolutions per minute	mass	part number
		dynamic C	static Co			
mm	mm	N	N	rpm	g	
1.1	11.5	78	176	300	10	SRE 6
1.1	14.3	137	314	300	20	SRE 8
1.3	18	157	372	300	39	SRE10
1.3	20	274	588	300	42	SRE12
1.3	22	323	686	300	56	SRE13
1.6	27	451	882	250	97	SRE16
1.6	30.5	647	1,180	250	133	SRE20
1.85	38	882	1,860	250	293	SRE25
1.85	43	1,180	2,650	200	371	SRE30
2.1	57	1,960	4,020	200	778	SRE40

1N≒0.102kgf

SREK TYPE
− Square Flange type −

part number structure

example **SREK** **25**

SREK type

inner contact diameter (dr)

mounting hole X 4

part number	dr		D		major dimensions			flange	part number
	mm	tolerance μm	mm	tolerance μm	L ±0.3 mm	Df mm	K mm	t mm	
SREK 6	6	+4 −5	12	0 −13	19	28	22	5	
SREK 8	8		15		24	32	25	5	
SREK10	10		19		29	40	30	6	
SREK12	12	+3 −6	21	0 −16	30	42	32	6	
SREK13	13		23		32	43	34	6	
SREK16	16		28		37	48	37	6	
SREK20	20	+3 −7	32	0 −19	42	54	42	8	
SREK25	25		40		59	62	50	8	
SREK30	30		45		64	74	58	10	
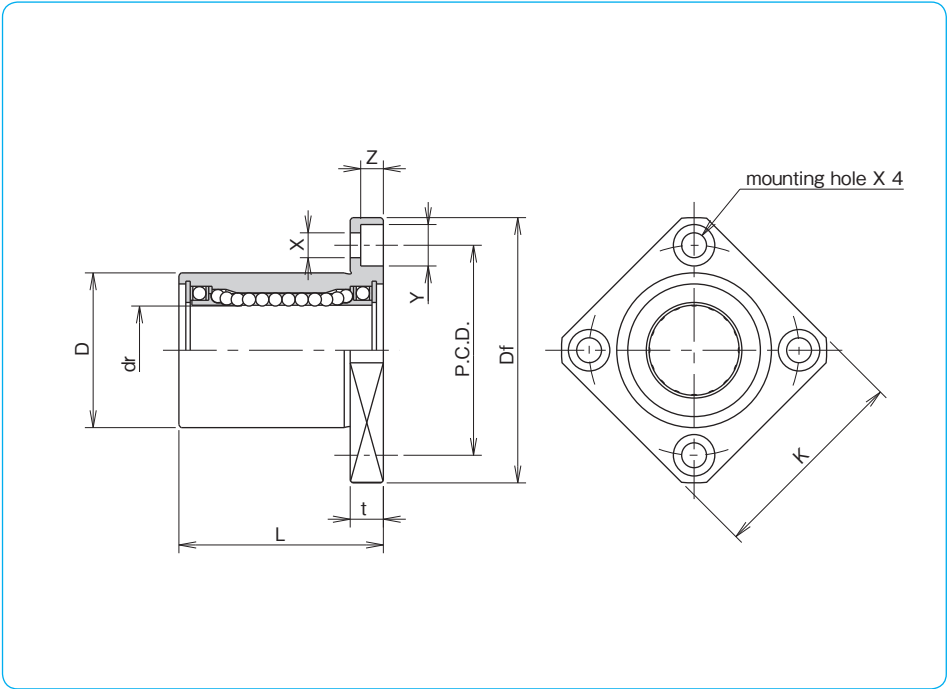
P.C.D. mm	X×Y×Z mm	perpendicularity μm	basic load rating		allowable revolutions per minute rpm	mass g	part number
			dynamic C N	static Co N			
20	3.5×6×3.1	12	78	176	300	21	SREK 6
24	3.5×6×3.1		137	314	300	33	SREK 8
29	4.5×7.5×4.1		157	372	300	61	SREK10
32	4.5×7.5×4.1		274	588	300	67	SREK12
33	4.5×7.5×4.1		323	686	300	83	SREK13
38	4.5×7.5×4.1		451	882	250	126	SREK16
43	5.5×9×5.1	15	647	1,180	250	178	SREK20
51	5.5×9×5.1		882	1,860	250	355	SREK25
60	6.6×11×6.1		1,180	2,650	200	483	SREK30

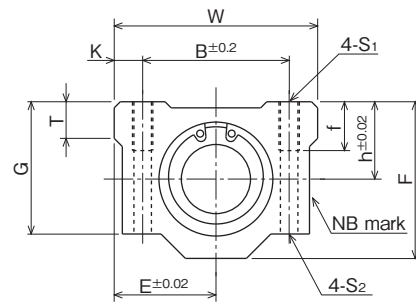1N≒0.102kgf

SMA-R TYPE
—Block type—

part number structure

example **SMA** **25** **R**

SMA-R type

inner contact diameter

part number	inner contact diameter		major dimensions														basic load rating		allowable revolutions per minute	mass
		tolerance	outer dimensions						mounting dimensions								dynamic	static		
			h	E	W	L	F	G	T	B	C	K	S₁	f	S₂		C	Co		
	mm	μm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm		N	N	rpm	g
SMA 6R	6	+4 −5	9	15	30	25	18	15	6	20	15	5	M4	8	3.4		78	176	300	33
SMA 8R	8		11	17	34	30	22	18	6	24	18	5	M4	8	3.4		137	314	300	55
SMA10R	10		13	20	40	35	26	21	8	28	21	6	M5	12	4.3		157	372	300	93
SMA12R	12	+3 −6	15	21	42	36	28	24	8	30.5	26	5.75	M5	12	4.3		274	588	300	104
SMA13R	13		15	22	44	39	30	24.5	8	33	26	5.5	M5	12	4.3		323	686	300	128
SMA16R	16		19	25	50	44	38.5	32.5	9	36	34	7	M5	12	4.3		451	882	250	216
SMA20R	20	+3 −7	21	27	54	50	41	35	11	40	40	7	M6	12	5.2		647	1,180	250	286
SMA25R	25		26	38	76	67	51.5	42	12	54	50	11	M8	18	7		882	1,860	250	645
SMA30R	30		30	39	78	72	59.5	49	15	58	58	10	M8	18	7		1,180	2,650	200	824
SMA40R	40	+3/−8	40	51	102	90	78	62	20	80	60	11	M10	25	8.7		1,960	4,020	200	1,719

1N≒0.102kgf

SMA-RW TYPE
—Double-Wide Block type—

part number structure

example **SMA** **25** **R** **W**

SMA-R type

inner contact diameter

double type

part number	inner contact diameter		major dimensions															basic load rating		allowable revolutions per minute	mass
		tolerance	outer dimensions							mounting dimensions							dynamic	static		
			h	E	W	L	F	G	T	N	B	C	K	S₁	f	S₂		C	Co		
	mm	μm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm		N	N	rpm	g
SMA 6RW	6	+4 −5	9	15	30	48	18	15	6	7	20	36	5	M4	8	3.4		126	352	300	68
SMA 8RW	8		11	17	34	58	22	18	6	7	24	42	5	M4	8	3.4		222	628	300	113
SMA10RW	10		13	20	40	68	26	21	8	7	28	46	6	M5	12	4.3		254	744	300	188
SMA12RW	12	+3 −6	15	21	42	70	28	24	8	6.5	30.5	50	5.75	M5	12	4.3		444	1,180	300	210
SMA13RW	13		15	22	44	75	30	24.5	8	6.5	33	50	5.5	M5	12	4.3		523	1,370	300	254
SMA16RW	16		19	25	50	85	38.5	32.5	9	6	36	60	7	M5	12	4.3		731	1,760	250	431
SMA20RW	20	+3 −7	21	27	54	96	41	35	11	7	40	70	7	M6	12	5.2		1,050	2,360	250	568
SMA25RW	25		26	38	76	130	51.5	42	12	4	54	100	11	M8	18	7		1,430	3,720	250	1,282
SMA30RW	30		30	39	78	140	59.5	49	15	5	58	110	10	M8	18	7		1,910	5,300	200	1,638
SMA40RW	40	+3/−8	40	51	102	175	78	62	20	5	80	140	11	M10	25	8.7		3,180	8,040	200	3,419

1N≒0.102kgf

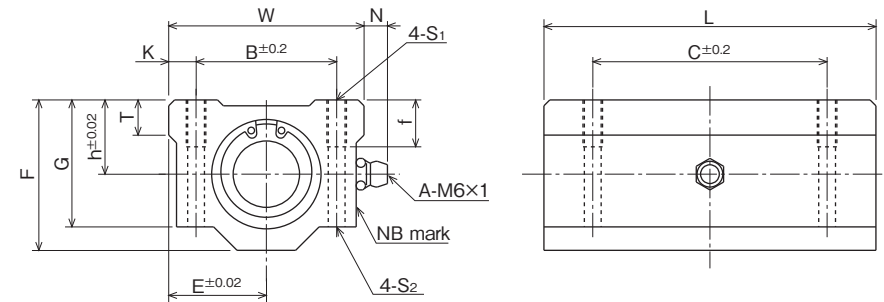SLIDE ROTARY BUSH
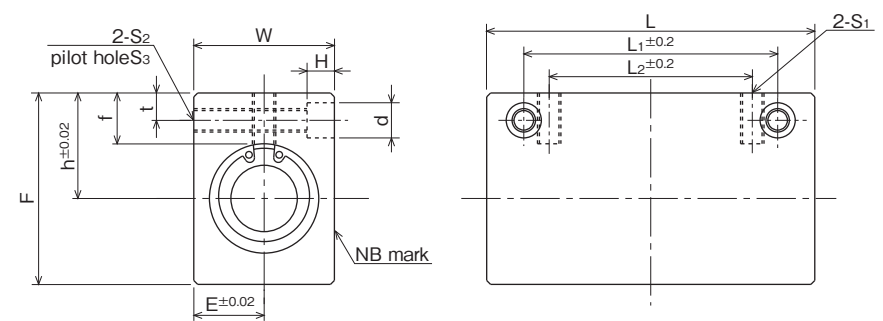
AK-R TYPE
—Compact Block type—

part number structure

example **AK** **25** **R**

AK-R type
inner contact diameter

part number	inner contact diameter mm	tolerance μm	major dimensions														basic load rating		allowable revolutions per minute	mass
			outer dimensions					mounting dimensions									dynamic	static		
			h	E	W	L	F	L2	S1	f	L1	t	S2	S3	d	H	C	Co		
	mm	μm	mm	mm	mm	mm	mm	mm		mm	mm	mm		mm	mm	mm	N	N	rpm	g
AK 6R	6	+4 −5	14	8	16	27	22	18	M4	8	9	5	M4	3.5	6	5	78	176	300	27
AK 8R	8		16	10	20	32	26	20	M5	8.5	10	5	M4	3.5	6	5	137	314	300	48
AK10R	10		19	13	26	39	32	27	M6	9.5	15	6	M5	4.5	8	6	157	372	300	94
AK12R	12	+3 −6	20	14	28	40	34	27	M6	9.5	15	6	M5	4.5	8	6	274	588	300	105
AK13R	13		25	15	30	42	43	28	M6	13.5	16	7	M6	5.2	9	7	323	686	300	151
AK16R	16		27	18	36	47	49	32	M6	13	18	7	M6	5.2	9	7	451	882	250	238
AK20R	20	+3 −7	31	21	42	52	54	36	M8	15	18	8	M8	7	11	8	647	1,180	250	328
AK25R	25		37	26	52	69	65	42	M10	17	22	9	M10	8.9	14	10	882	1,860	250	669
AK30R	30		40	29	58	74	71	44	M10	17.5	22	9	M10	8.9	14	10	1,180	2,650	200	856

1N≒0.102kgf

AK-RW TYPE
—Double-Wide Compact Block type—

part number structure

example **AK** **25** **R** **W**

AK-R type
inner contact diameter
double type

part number	inner contact diameter mm	tolerance μm	major dimensions														basic load rating		allowable revolutions per minute	mass
			outer dimensions					mounting dimensions									dynamic	static		
			h	E	W	L	F	L2	S1	f	L1	t	S2	S3	d	H	C	Co		
	mm	μm	mm	mm	mm	mm	mm	mm		mm	mm	mm		mm	mm	mm	N	N	rpm	g
AK 6RW	6	+4 −5	14	8	16	46	22	20	M4	8	30	5	M4	3.5	6	5	126	352	300	48
AK 8RW	8		16	10	20	56	26	30	M5	8.5	42	5	M4	3.5	6	5	222	628	300	89
AK10RW	10		19	13	26	68	32	36	M6	9.5	50	5	M5	4.5	8	6	254	744	300	175
AK12RW	12	+3 −6	20	14	28	70	34	36	M6	9.5	50	6	M5	4.5	8	6	444	1,180	300	196
AK13RW	13		25	15	30	74	43	42	M6	13.5	55	7	M6	5.2	9	7	523	1,370	300	281
AK16RW	16		27	18	36	84	49	52	M6	13	65	7	M6	5.2	9	7	731	1,760	250	450
AK20RW	20	+3 −7	31	21	42	94	54	58	M8	15	70	8	M8	7	11	8	1,050	2,360	250	626
AK25RW	25		37	26	52	128	65	80	M10	17	100	9	M10	8.9	14	10	1,430	3,720	250	1,299
AK30RW	30		40	29	58	138	71	90	M10	17.5	110	9	M10	8.9	14	10	1,910	5,300	200	1,662

1N≒0.102kgf

SLIDE ROTARY BUSH

SMP-R TYPE
―Pillow Block type―

part number structure

example **SMP** **25** **R**

SMP-R type

inner contact diameter

part number	inner contact diameter		major dimensions						
		tolerance	outer dimensions
			h	E	W	L	F	G	M
	mm	μm	mm	mm	mm	mm	mm	mm	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	34	32.5	65	42	62	12	48
SMP25R	25	−7	40	38	76	59	73	12	59
SMP30R	30		45	42.5	85	64	84	15	69
SMP40R	40	+3/−8	60	62	124	80	112	18	86

1N≒0.102kgf
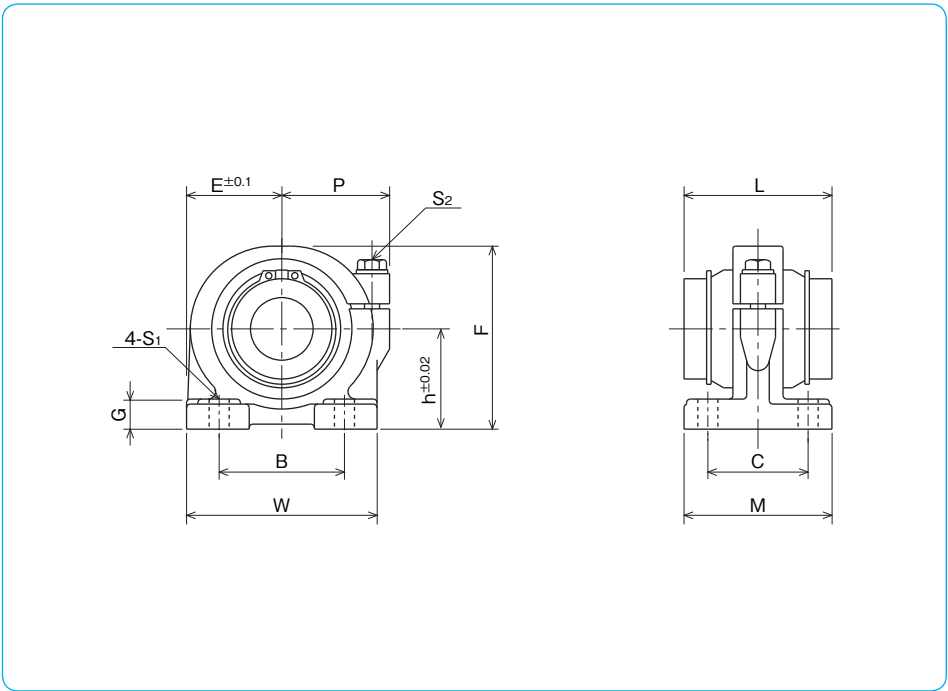
	\multicolumn{3}{c}{mounting dimensions}		adjustment screw size	\multicolumn{2}{c}{basic load rating}	allowable	mass	part number
P	B	C	S₁	S₂	recommended torque	dynamic	static	revolutions per minute		
						C	Co			
mm	mm	mm	mm		N・m	N	N	rpm	g	
30	30	26	7 (M5)	M5	3	323	686	300	266	SMP13R
32	35	29	7 (M5)	M5	3	451	882	250	369	SMP16R
37	40	35	8 (M6)	M6	5.5	647	1,180	250	690	SMP20R
43	50	40	8 (M6)	M6	5.5	882	1,860	250	970	SMP25R
49	58	46	10 (M8)	M8	13.5	1,180	2,650	200	1,420	SMP30R
68	76	64	12 (M10)	M10	29	1,960	4,020	200	3,585	SMP40R

1N≒0.102kgf

SLIDE ROTARY BUSH | RK TYPE

NB's RK type slide rotary bush is a highly accurate and high load capacity bearing providing smooth continuous linear and rotational motions. Its structure imposes no constraints on linear and rotational motions. It is much more compact than a standard slide bush with separate rotational bearing.
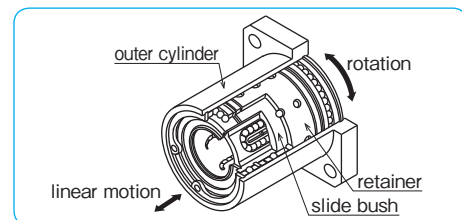
STRUCTURE AND ADVANTAGES

The RK type slide rotary bush uses a retainer similar to that used in the SR type stroke bush. This retainer gives a smooth motion in a high rotational application.
SM type slide bush is incorporated, providing the stable and smooth linear motion.
Relatively large ball elements are used for high load capacity.

Figure E-9 Structure of RK Slide Rotary Bush

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 large load.

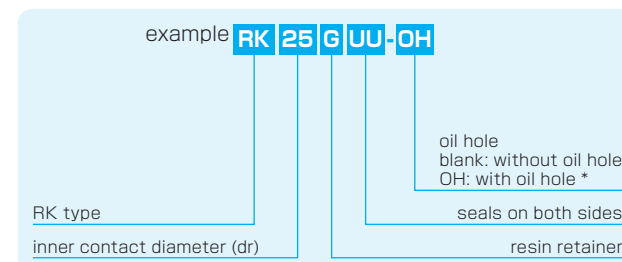※For best performance, please select tolerance of h5 for the shaft.

FIT

Shaft
In order to ensure high accuracy motion of Slide Rotary Bush RK type, it is essential to select a high quality shaft. In selecting a shaft, please take note of:
Outer diameter tolerance: h5 recommended
Surface hardness: 58HRC or higher
    For a shaft with surface hardness less than 58HRC, make a correction in life calculation by adding hardness coefficient.
Surface roughness: lower than Ra0.4 or better

Housing
Inner diameter tolerance is not requested. Please insert into an installation bore which is slightly larger than the outer cyliner.
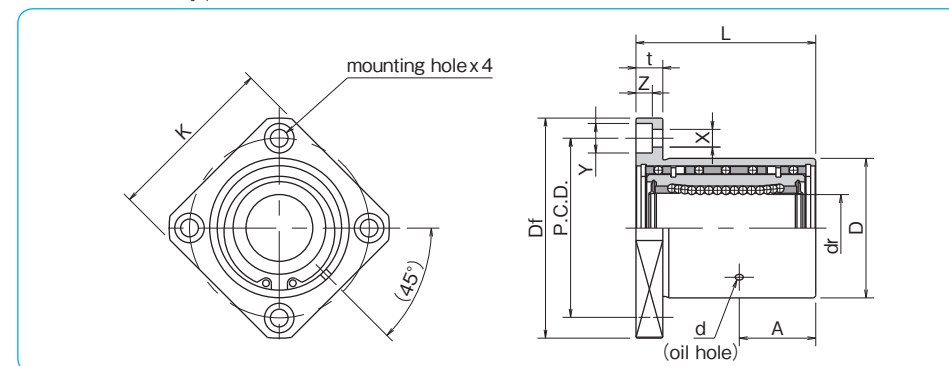
LIFE CALCULATION

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

L: rated life (km)   fH: hardness coefficient
fT: temperature coefficient   fc: contact coefficient
fW: applied load coefficient
C: basic dynamic load rating (N)   P: applied load (N)
※Refer to page Eng-5 for the coefficients.

RK TYPE

part number structure

example RK 25 G UU-OH

oil hole
blank: without oil hole *
OH: with oil hole *

RK type

inner contact diameter (dr)

seals on both sides

resin retainer

＊Oil hole is for rotary-portion lubrication.

mounting hole x 4

(45°)

(oil hole)

part number	dr		D		L		A	d	flange					basic load rating		allowable revolutions per minute	mass
		tolerance		tolerance		tolerance			Df	K	t	P.C.D.	X×Y×Z	dynamic C	static Co		
	mm	μm	mm	μm	mm	mm	mm	mm	mm	mm	mm	mm	mm	N	N	rpm	g
RK12GUU	12	0	32	0	36		15	2	54	42	8	43	5.5×9×5.1	510	784	500	180
RK16GUU	16	− 9	40	−25	45		19.5	2	62	50	8	51	5.5×9×5.1	774	1,180	500	280
RK20GUU	20	0	45		50	±0.3	21.5	3	74	58	10	60	6.6×11×6.1	882	1,370	400	420
RK25GUU	25	−10	52	0	67		28.5	3	82	64	10	67	6.6×11×6.1	980	1,570	400	680
RK30GUU	30		60	−30	74		31	3	96	75	13	78	9×14×8.1	1,570	2,740	400	990

1N≒0.102kgf

SLIDE ROTARY BUSH