

# 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.

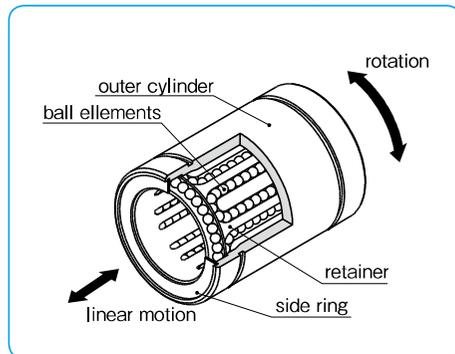
### Smooth Rotation

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
Block Type		Unit	
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		

**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.

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

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

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

- When only linear motion is involved

$$L_h = \frac{L}{600 \cdot S \cdot n_i / (\pi \cdot dm)} \dots \dots \dots (3)$$

$L_h$ : life time (hr) S: stroke length (mm)  $n_i$ : revolutions per minute (rpm)  $n$ : number of cycles per minute (cpm)  
 $dm$ : ball pitch diameter (mm)  $\cong 1.15d_r$  ( $d_r$  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:  $n=15$ rpm Number of cycles per minute:  $n_i=10$ cpm  
 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)

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

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

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

**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

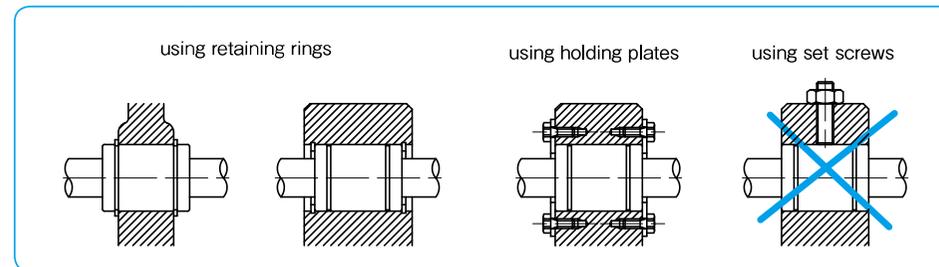
**Housing**

Inner diameter tolerance: H7 recommended

**MOUNTING**

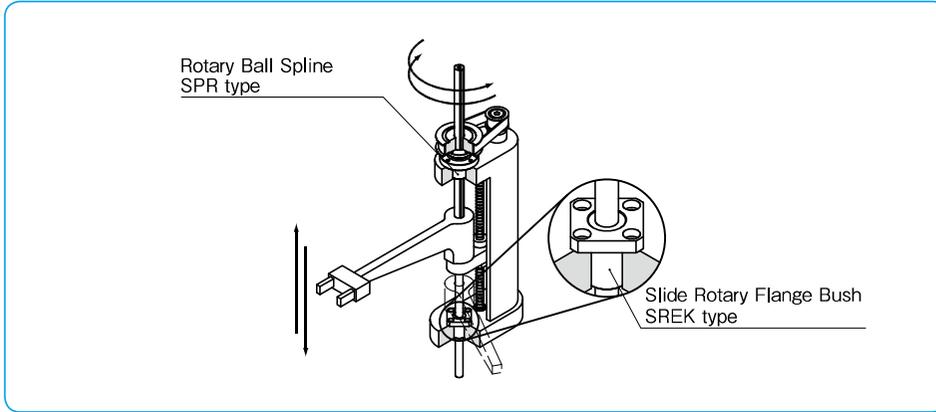
Examples of mounting methods are shown in Figure E-6. Please do not fix outer cylinder by using set screw to avoid deformation.

Figure E-6 Mounting Method

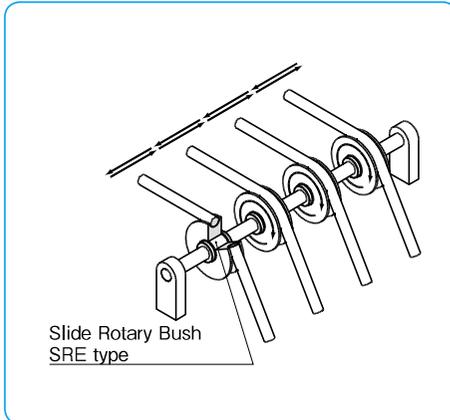


APPLICATION EXAMPLES

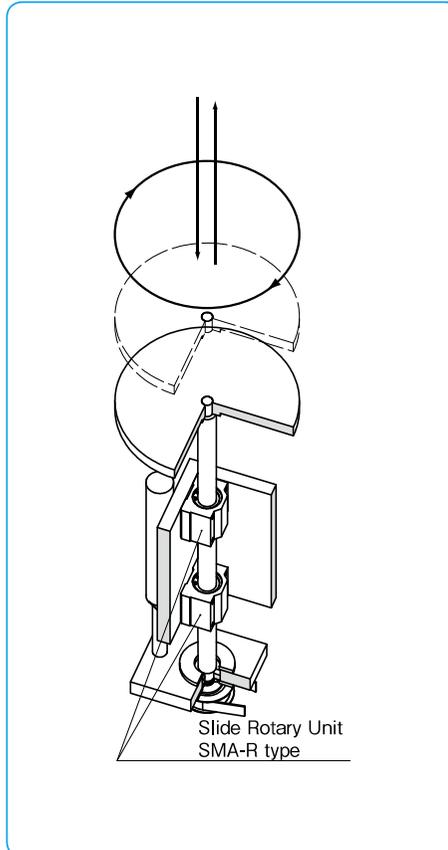
Application Example 1 Vertical Shaft Robot Arm



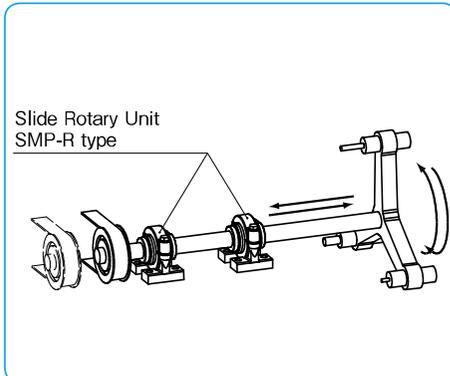
Application Example 2 Multiple Gearing Idler



Application Example 4 Turntable



Application Example 3 Tool Changer



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  $-20^{\circ}\text{C}$  to  $110^{\circ}\text{C}$ . In case of operation at a temperature outside this range, please contact NB.

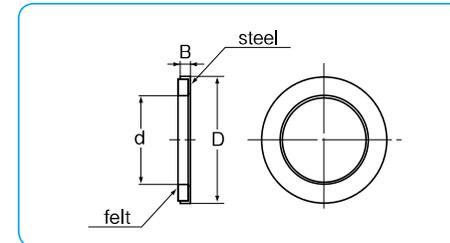
Retainer Material

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.

Figure E-7 Felt Seal



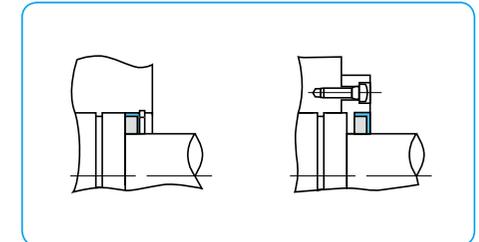
Installation

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



# SRE TYPE

— Standard type —

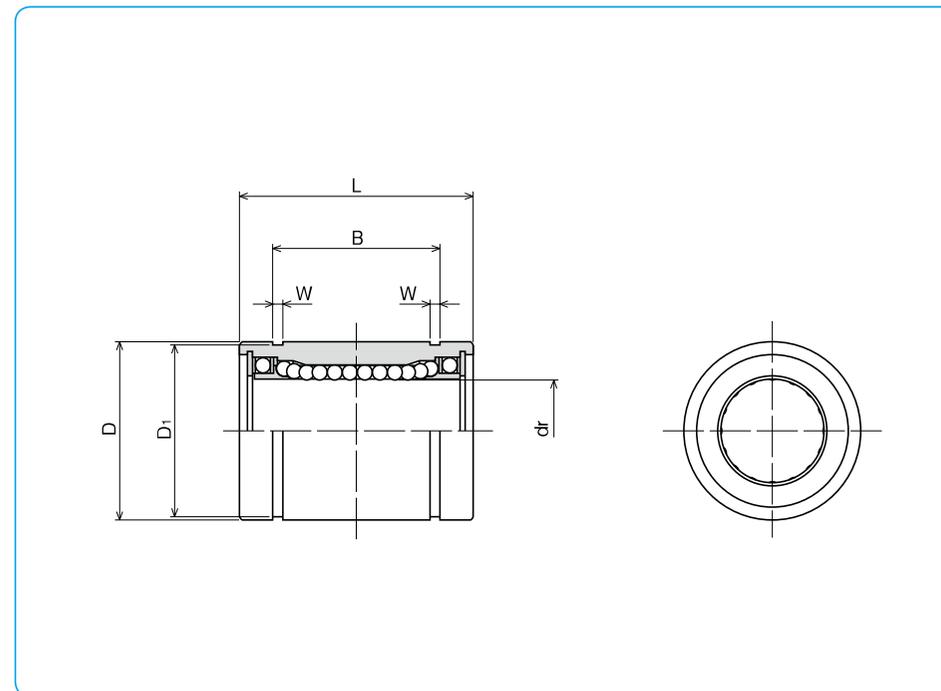


## part number structure

example **SRE 25**

SRE type

inner contact diameter (dr)



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

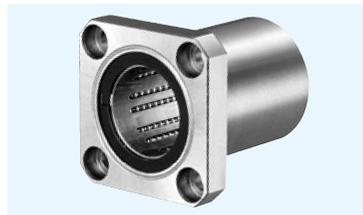
※If the inner contact diameter exceeds 40 mm, please contact NB.

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

1N $\approx$ 0.102kgf

# SREK TYPE

— Square Flange type —

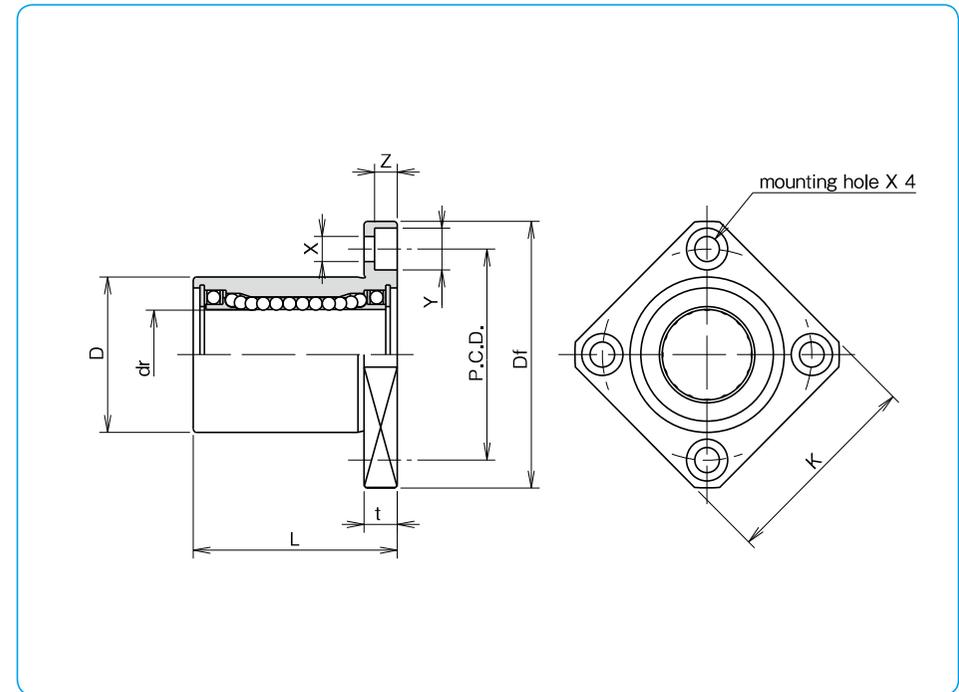


## part number structure

example **SREK 25**

SREK type

inner contact diameter (dr)



part number	dr		D		major dimensions			
	mm	tolerance μm	mm	tolerance μm	L ±0.3 mm	Df mm	K mm	flange t mm
<b>SREK 6</b>	6		12	0	19	28	22	5
<b>SREK 8</b>	8	+4	15	-13	24	32	25	5
<b>SREK 10</b>	10	-5	19		29	40	30	6
<b>SREK 12</b>	12		21	0	30	42	32	6
<b>SREK 13</b>	13	+3	23	-16	32	43	34	6
<b>SREK 16</b>	16	-6	28		37	48	37	6
<b>SREK 20</b>	20		32	0	42	54	42	8
<b>SREK 25</b>	25	+3	40	-19	59	62	50	8
<b>SREK 30</b>	30	-7	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	<b>SREK 6</b>
24	3.5 × 6 × 3.1		137	314	300	33	<b>SREK 8</b>
29	4.5 × 7.5 × 4.1		157	372	300	61	<b>SREK 10</b>
32	4.5 × 7.5 × 4.1		274	588	300	67	<b>SREK 12</b>
33	4.5 × 7.5 × 4.1		323	686	300	83	<b>SREK 13</b>
38	4.5 × 7.5 × 4.1		451	882	250	126	<b>SREK 16</b>
43	5.5 × 9 × 5.1	15	647	1,180	250	178	<b>SREK 20</b>
51	5.5 × 9 × 5.1		882	1,860	250	355	<b>SREK 25</b>
60	6.6 × 11 × 6.1		1,180	2,650	200	483	<b>SREK 30</b>

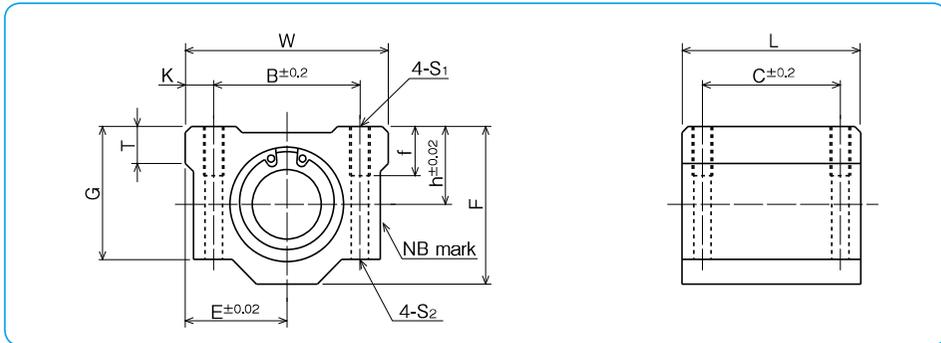
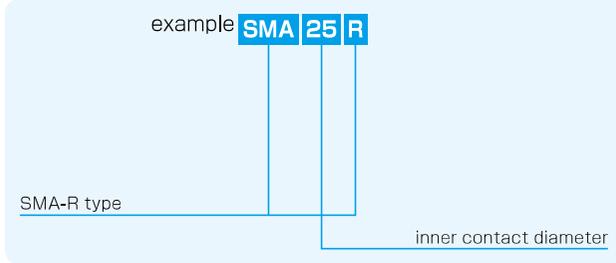
1N≒0.102kgf

# SMA-R TYPE

-Block type-



## part number structure



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

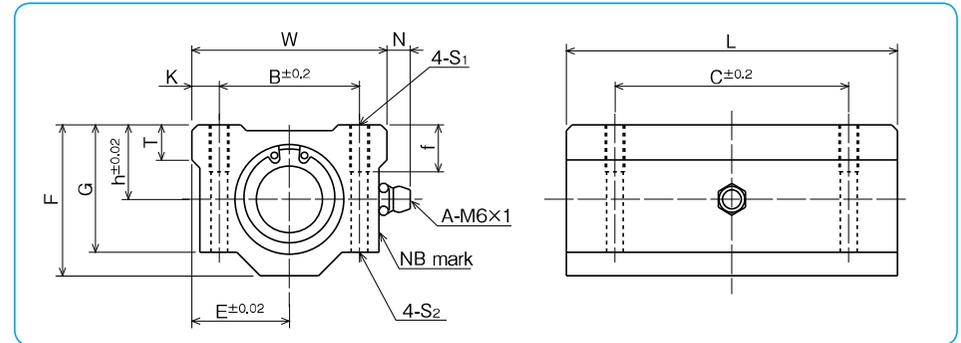
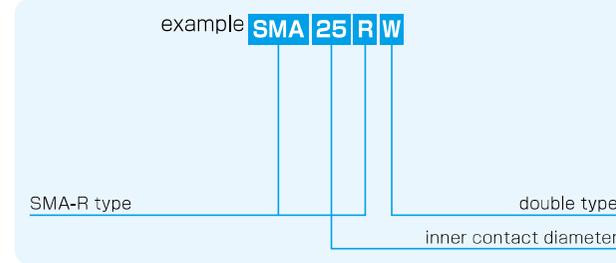
1N=0.102kgf

# SMA-RW TYPE

-Double-Wide Block type-



## part number structure



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

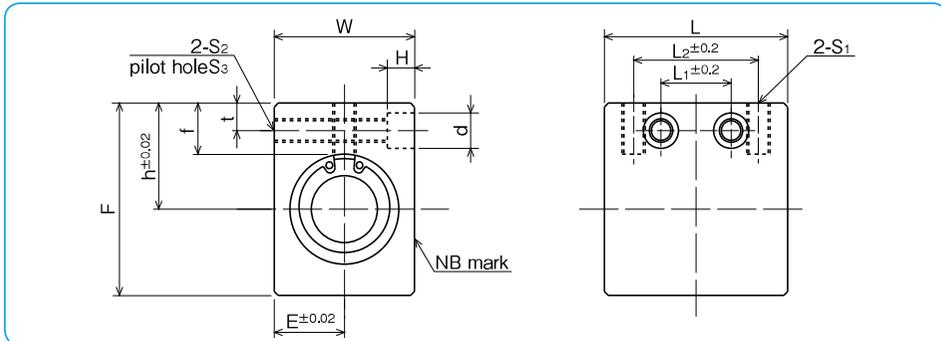
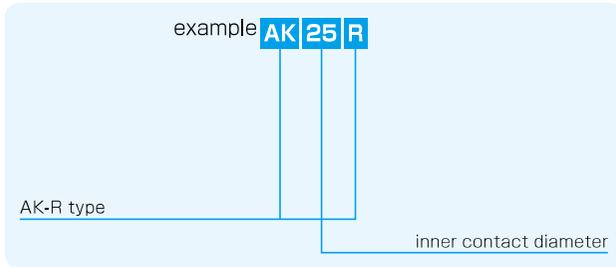
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# AK-R TYPE

-Compact Block type-



## part number structure



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

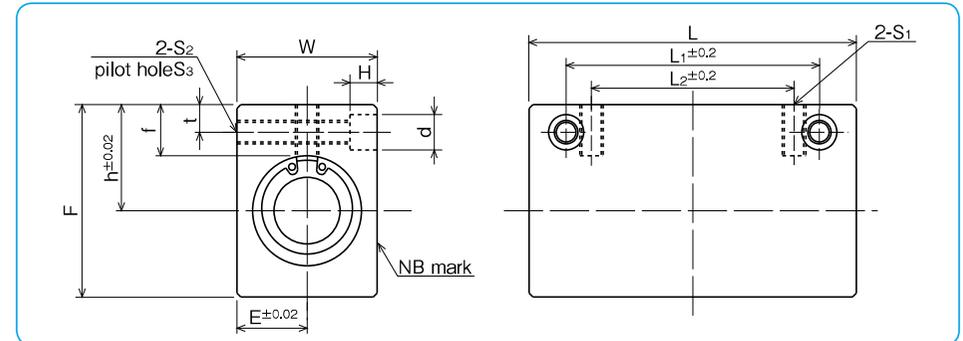
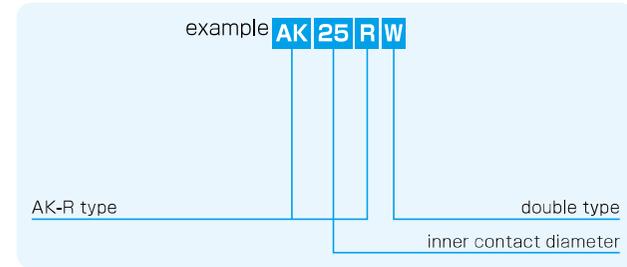
1N≒0.102kgf

# AK-RW TYPE

-Double-Wide Compact Block type-



## part number structure



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

# SMP-R TYPE

—Pillow Block type—

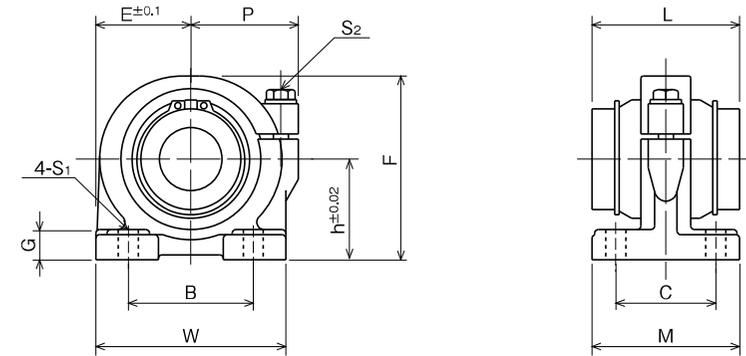


## part number structure

example **SMP 25 R**

SMP-R type

inner contact diameter



part number	inner contact diameter		major dimensions						
	mm	tolerance μm	h mm	E mm	W mm	outer dimensions			
						L mm	F mm	G mm	M mm
<b>SMP13R</b>	13	+3	25	25	50	32	46	8	36
<b>SMP16R</b>	16	-6	29	27.5	55	37	53	10	40
<b>SMP20R</b>	20	+3 -7	34	32.5	65	42	62	12	48
<b>SMP25R</b>	25		40	38	76	59	73	12	59
<b>SMP30R</b>	30	+3/-8	45	42.5	85	64	84	15	69
<b>SMP40R</b>	40		60	62	124	80	112	18	86

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

1N≒0.102kgf

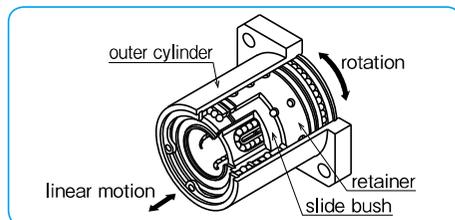
# SLIDE ROTARY BUSH RK TYPE

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



## 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

## Life Calculation

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

L: rated life (km) f<sub>H</sub>: hardness coefficient  
 f<sub>T</sub>: temperature coefficient f<sub>C</sub>: contact coefficient  
 f<sub>W</sub>: applied load coefficient  
 C: basic dynamic load rating (N) P: applied load (N)  
 ※Refer to page Eng-5 for the coefficients.

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.

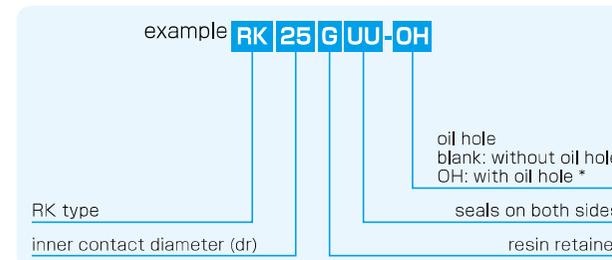
### Housing

Inner diameter tolerance is not requested. Please insert into an installation bore which is slightly larger than the outer cylinder.

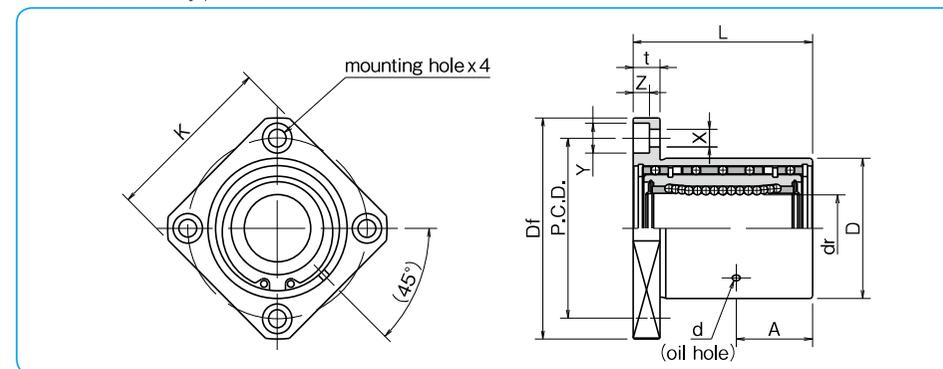
## RK TYPE



### part number structure



\*Oil hole is for rotary-portion lubrication.



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

1N=0.102kgf