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Precision transmission components
Quality Innovation Service

Cross Roller Bearing | Gonio Way

2018

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01

Cross Roller Bearing

Cross Roller Bearing

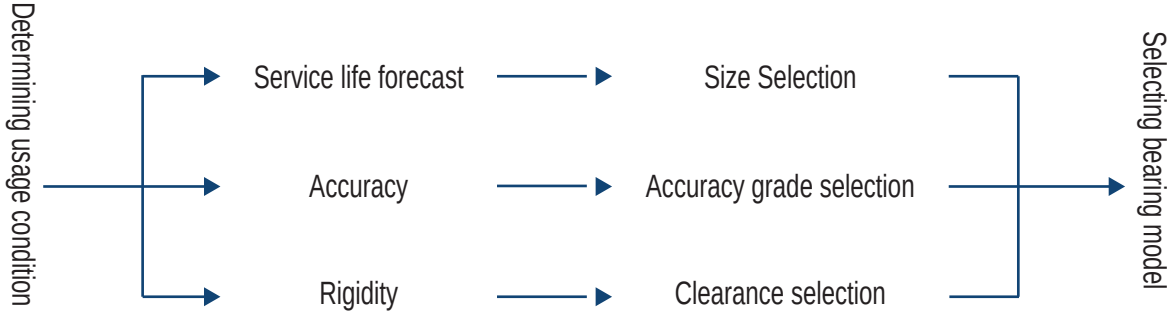
Cross roller bearings consist of inner rings, outer rings, spacer retainers and cylindrical rollers cross arranged on the V-shaped 90° groove between the inner and outer rings. This structure can withstand radial, axial and moment loads in all directions because the rollers' line contact with raceway surfaces achieve a large load-bearing area despite the minimum dimensions. Therefore these bearings are widely used on the rotating parts of industrial robots, machine tools, precision rotary tables, measuring instruments and IC manufacturing machines.

Product Features

- High rigidity
- Large load capacity
- High rotation accuracy
- Compactness
- Easy to install and handle

Cross Roller Bearing selection

The procedures for the selection and usage of cross roller bearings are based on the following figure



Models & Features

SRU Model (One-Piece Inner & Outer Ring)

The single structure with mounting holes on inner and outer rings does not require the use of flange discs or housings; therefore reduces mounting errors, achieves stable rotational accuracy and moment torque. Suitable for inner and outer ring rotation

SRB models (Split Outer Ring model for inner ring rotation)

Standard model with two split outer rings bolted together and a one-piece inner ring suitable for precision inner ring rotation.

SRBE Model (One-Piece Inner & Outer Ring)

The one-piece inner & outer ring structure provides high rigidity, high accuracy and smooth rotation; suitable for inner and outer ring rotation

SRAU Model (One-Piece Inner & Outer Ring)

Super slim type cross roller bearing with three options of bearing width: 5mm, 8mm and 13mm. Rigid and compact design is suitable for limited space and lightweight mechanism.

SSHF Model (One-Piece Inner & Outer Ring)

Specifically designed for SHF type strain wave gears, this cross roller bearing has mounting holes for easy installation.

SCSG Model (Split outer ring)

Specifically designed for CSG type strain wave gears, this cross roller bearing has mounting holes for easy installation.

Basic Rated Life

The 90% of a group of identical Cross Roller Bearings can operate individually under the same conditions without showing material damage such as flaking caused by rolling fatigue. The basic rated life is represented by the total service hours for rotations at a constant rotational speed.

The service life of the cross roller bearing is calculated using the following formula:

L : basic rated life

C : basic dynamic load rating

P : dynamic-equivalent load

The number of revolutions is expressed in the unit of 10^6 (rev)

$$L = \left(\frac{C}{P} \right)^{\frac{10}{3}}$$

Dynamic Equivalent Radial Load : P

The dynamic-equivalent radial load on cross roller bearings is calculated using the following formula:

P : dynamic-equivalent radial load (kN)

Fr : radial load (kN)

Ra : axial load (kN)

M : moment (kN·mm)

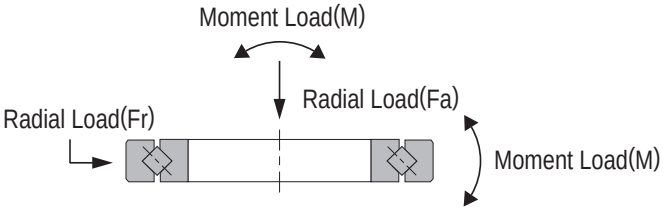
X : dynamic radial coefficient (see table1)

Y : dynamic axial coefficient (see table1)

dw : pitch circle diameter of rollers (mm)

$$P = X \cdot \left(Fr + \frac{2M}{dw} \right) + Y \cdot Fa$$

Dynamic Equivalent Radial Load : P



(table 1)

Dynamic radial and axial coefficients

Categories	X	Y
$\frac{Fa}{Fr+2M/dw} \leq 1.5$	1	0.45
$\frac{Fa}{Fr+2M/dw} > 1.5$	0.67	0.67

An example for rated life calculation

Calculate the rated life when bearings are used under the following conditions

ID ：d=110 (mm)　W1 = 700 (N)　Fr = 2500 (N)

OD ：D=160 (mm)　W2 = 2000 (N)　L = 700 (mm)

Example: Model SRB11020

Pitch circle diameter ：dw = 135 (mm)

Basic dynamic load rating C = 34000N

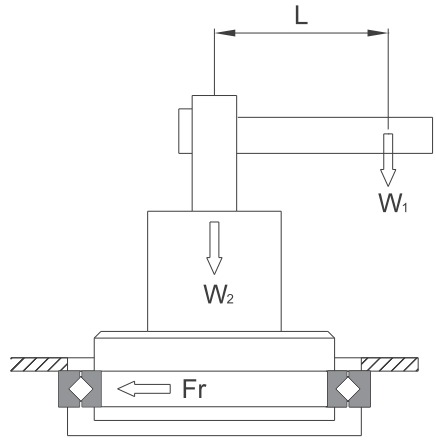
Basic static load rating C_0 =54000N

Radial load ：Fr = 2500 (N)

Axial load ：Fa = W1 + W2 = 700 + 2000 = 2700 (N)

Moment load ：M = W1 x L = 700 x 700 = 490000 (N·mm)

PCD ：dw = (d+D)/2 = (110+160)/2 = 135 (mm)



$$\frac{Fa}{Fr+2M/dw} = \frac{2700}{2500+2x490000/135} \cong 0.2766 < 1.5$$

Hence, if radial load coefficient: x=1, axial load coefficient: y=0.45, then dynamic-equivalent radial load:

$$P=X\cdot(Fr+\frac{2M}{dw})+Y\cdot Fa=1x(2500+\frac{2x490000}{135})+0.45\cdot 2700=10974(N)$$

Basic rated life ：$L=(\frac{C}{P})^{\frac{10}{3}}=(\frac{34000}{10974})^{\frac{10}{3}}=43.35^{6}$ (x10 rev)

Static safety coefficient

This coefficient is determined by the basic static rated load (Co) and static-equivalent radial load (Po). When a load is statically or dynamically applied, the static safety coefficients shown in the following figure should be considered.

fs : static safety coefficient

C_0 : basic static rated load (kN)

P_0 : static equivalent radial load (kN)

$$\frac{C_0}{P_0} = fs$$

(fs) Static safety coefficient

Load conditions	Lower Limit of fs
Normal load	1~2
Impact load	2~3

Static equivalent radial load : P_0

The cross roller bearing's static equivalent radial load is calculated using the following formula.

P_0 : dynamic-equivalent radial load (kN)

Fr : radial load (kN)

Fa : axial load (kN)

M : moment (kN·mm)

X_0 : static radial coefficient (X0=1)

Y_0 : static axial coefficient (Y0=0.44)

dw : pitch circle diameter of rollers (mm)

$$P = X_0 \cdot \left(Fr + \frac{2M}{dw} \right) + Y_0 \cdot Fa$$

Fit

Fitting of Models SRU

Fitting required positioning accuracy, h7 and H7 are recommended.

Fitting of Models SRB

Fitting required positioning accuracy are recommended in the following table.

Fitting for Models SRB

Radial Clearance	Service Conditions		Shaft	Housing
C1	Inner ring rotational load	Normal Load	h5	H7
		Large impact and moment	h5	H7
	Outer ring rotational load	Normal Load	g5	Js7
		Large impact and moment	g5	Js7

Methods and design of the housing and flange disc

Due to the thin wall structure of the cross roller bearings, full consideration must be given to the rigidity of the housing and flange discs. With split type bearings, if the housing or flange disc is not rigid enough, the inner ring or outer ring cannot be evenly held, resulting bearing deformation when moment load is applied. Therefore, the contact area of the rollers will become uneven, causing significant decrease in bearing performance.

To prevent this from occurring, it is recommended to design the housing and flange discs by the following methods:

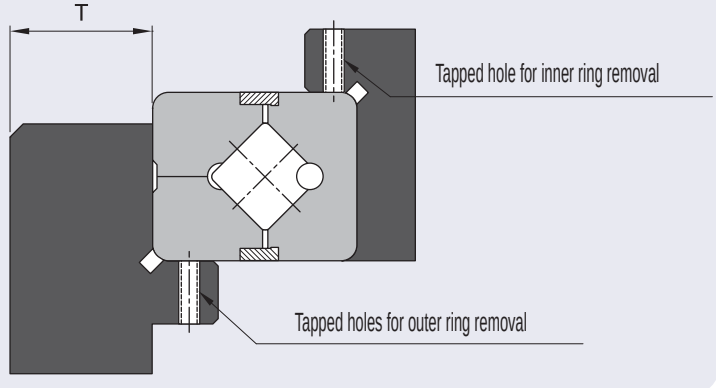
Housing: at least 60% of the sectional height of the cross roller bearing

Housing wall thickness : $$T = \frac{(D-d)}{2} \times 0.6$$ or greater

(D: outer diameter of the outer ring; d: inner diameter of the inner ring)

Tapped hole for bearing removal

Alternatively, tapped holes for removing bearings may be set up on the housing; when it is necessary to remove the bearings from housing, the screws may be locked into the tapped holes to push the bearing out without incurring any damage.



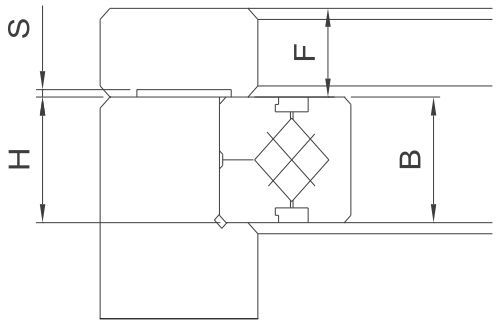
Flange discs and locking screws

The values of the wall thickness (F) or the clearance (S) of the flange discs may be designed per the following formula. As for the quantity of locking screws, it may be configured at equal intervals by using the quantity shown in table (1).

$F = B \times 0.5 \sim B \times 1.2$

$H = B\,{}^{0}_{-01}$

$S = 0.5$ mm



It is recommended to secure the flange discs using materials made of iron. It is advised to firmly lock the screws using torque wrenches. See table (2) for the locking torques of supporting seats or supported flange discs which are made of medium hardness steel.

Table 1. Number of locking screws and size.

Unit : mm

Outer diameter of the outer ring (D)		Number of screws	Screw size (base value)
Above	Below		
-	100	8 or more	M3~M5
100	200	12 or more	M4~M8
200	500	16 or more	M5~M12
500	-	24 or more	M12 or thicker

Table 2. Screw locking torque

Unit : N-m

Screw model	Locking torque	Screw model	Locking torque
M3	2.1	M10	72
M4	3.9	M12	122
M5	9	M16	201
M6	13	M20	392
M8	31	M22	531

Installation steps

Please follow below steps when installing cross roller bearings:

1. Checking each part and component before installing

Clean the housing and other installation components, remove dirt and make sure there are no burrs.

2. Installing the cross roller bearings into housing or onto shaft

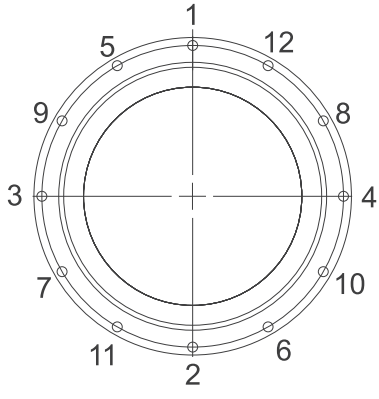
The cross roller bearing is easily tilted due to its thin wall structure. To install, level one side, and gradually insert the bearing by evenly and cautiously hammering along the perimeter using a rubber hammer or similar tool until the sound of the ring come in full contact with the mounting surface.

3. Installing the flange disc

(1) Place the disc into position, shake it along its circumference back and forth several times to match the bolt holes.

(2) Install screws. When manually turning the screws, make sure that the screw is fully aligned with the screw hole.

(3) Tighten the screws in the order on the diagonal repeatedly as shown in the following figure, and fasten the disc from loose to tighten in three to four steps. When tightening the split type inner or outer rings, slightly turn the one-piece inner or outer rings to correct the misalignment between the ring and body.



Other precautions

Instructions on lubrication

(1) Each cross roller bearings are pre-lubricated with high quality lithium soap grease No. 2. However, the bearings need lubricating on a regular basis and users are required to reapply same type of grease at a minimum interval ranging from 6 to 12 months to enable the distribution of grease within the entire internal structure of the bearing; the actual interval depends on the machine or usage.

(2) Avoid mixing various kinds of lubrication grease.

(3) When the bearings are used under such special conditions as high vibration, clean rooms, vacuum, low and high temperature, it may be impossible to use general-purpose lubrication grease and please contact us before using special type grease.

Precautions on use

(1) Foreign objects entering the interior of the bearings may damage the revolution path of the rollers or disable their functions; take caution to prevent foreign objects entering the bearing.

(2) If bearings are used at an ambient temperature above 80℃, contact us first.

(3) When foreign objects enter the interior of bearings, apply lube oil again after cleaning the product.

(4) Do not attempt to remove the screws and nuts on the split type bearings.

Accuracy Standards

SRU、SRB、SRBE inner diameter dimensional accuracy

Unit : μm

Inner ring diameter (d) Nominal dimension (mm)		Tolerance dm					
		Grade 0、P5、P4、P2		Grade PS5		Grade PS4、PS2	
Above	Below	Above	Below	Above	Below	Above	Below
18	30	0	-10	0	-6	0	-5
30	50	0	-12	0	-8	0	-6
50	80	0	-15	0	-9	0	-7
80	120	0	-20	0	-10	0	-8
120	150	0	-24	0	-12	0	-9
150	180	0	-24	0	-12	0	-10
180	250	0	-30	0	-14	0	-12
250	315	0	-34	0	-17	-	-

SRU、SRB、SRBE outer diameter dimensional accuracy

Unit : μm

Outer ring diameter (D) Nominal dimension (mm)		Tolerance dm					
		Grade 0、P5、P4、P2		Grade PS5		Grade PS4、PS2	
Above	Below	Above	Below	Above	Below	Above	Below
30	50	0	-11	0	-7	0	-6
50	80	0	-13	0	-9	0	-7
80	120	0	-15	0	-10	0	-8
120	150	0	-18	0	-10	0	-9
150	180	0	-24	0	-12	0	-9
180	250	0	-30	0	-15	0	-10
250	315	0	-34	0	-18	0	-12

SRAU ID and OD dimensional accuracy

Unit : μm

Inner ring diameter (d) Nominal dimension (mm)		SRAU Inner Ring		SRAU Outer Ring	
Above	Below	Above	Below	Above	Below
-	18	0	-8	-	-
18	30	0	-10	0	-9
30	50	0	-12	0	-11
50	80	0	-15	0	-13
80	120	0	-20	0	-15
120	150	0	-25	0	-18
150	180	0	-25	0	-25
180	315	0	-30	0	-30

SRU inner ring rotational accuracy

Unit : μm

Model	Inner ring radial/axial run-out tolerance		
	Grade P5	Grade P4	Grade P2
SRU42	4	3	2.5
SRU66	5	4	2.5
SRU85	5	4	2.5
SRU124	5	4	2.5
SRU148	6	5	2.5
SRU178	6	5	2.5
SRU228	8	6	5

SRU outer ring rotational accuracy

Unit : μm

Model	Outer ring radial/axial run-out tolerance		
	Grade P5	Grade P4	Grade P2
SRU42	8	5	4
SRU66	10	6	5
SRU85	10	6	5
SRU124	12	8	5
SRU148	15	10	7
SRU178	15	10	7
SRU228	18	11	7

SRB inner ring rotational accuracy

Unit : μm

Inner ring diameter (d) Nominal dimension (mm)		Inner ring radial run-out tolerance				Inner ring axial run-out tolerance			
Above	Below	Grade P0	Grade P5	Grade P4	Grade P2	Grade P0	Grade P5	Grade P4	Grade P2
18	30	12	4	3	2.5	12	4	3	2.5
30	50	12	5	4	2.5	13	5	4	2.5
50	80	15	5	4	2.5	15	5	4	2.5
80	120	20	6	5	2.5	20	6	5	2.5
120	150	20	8	6	2.5	20	8	6	2.5
150	180	25	8	6	5	25	8	6	5
180	250	25	10	8	5	25	10	8	5
250	315	35	13	10	-	35	13	10	-

SRBE inner ring rotational accuracy

Unit : μm

Inner ring diameter (d) Nominal dimension (mm)		Inner ring radial run-out tolerance					Inner ring axial run-out tolerance				
		P0	P6	P5	P4	P2	P0	P6	P5	P4	P2
Above	Below	Maximum					Maximum				
-	20	13	8	4	3	2.5	13	8	4	3	2.5
20	30	15	10	5	4	2.5	15	10	5	4	2.5
30	35	15	10	5	4	2.5	15	10	5	4	2.5
35	50	20	10	5	4	2.5	20	10	5	4	2.5
50	65	20	10	5	4	2.5	20	10	5	4	2.5
65	80	25	13	6	5	2.5	25	13	6	5	2.5
80	100	25	13	6	5	2.5	25	13	6	5	2.5
100	120	30	18	8	6	2.5	30	18	8	6	2.5

SRBE outer ring rotational accuracy

Unit : μm

Outer ring diameter (D) Nominal dimension (mm)		Outer ring radial run-out tolerance					Outer ring axial run-out tolerance				
		P0	P6	P5	P4	P2	P0	P6	P5	P4	P2
Above	Below	Maximum					Maximum				
50	60	20	10	7	5	2.5	20	10	7	5	2.5
60	80	25	13	8	5	4	25	13	8	5	4
80	95	25	13	8	5	4	25	13	8	5	4
95	120	35	18	10	6	5	35	18	10	6	5
120	140	35	18	10	6	5	35	18	10	6	5
140	150	40	20	11	7	5	40	20	11	7	5
150	165	40	20	11	7	5	40	20	11	7	5
165	180	45	23	13	8	5	45	23	13	8	5
180	210	45	23	13	8	5	45	23	13	8	5
200	240	50	25	15	10	7	50	25	15	10	7

SRAU inner ring rotational accuracy

Unit : μm

Inner ring diameter (d) Nominal dimension (mm)		Inner ring radial run-out tolerance				Inner ring axial run-out tolerance			
Above	Below	P0	P6	P5	P4	P0	P6	P5	P4
-	18	10	-	-	-	10	-	-	-
18	40	13	-	-	-	13	-	-	-
40	65	13	10	5	4	13	10	5	4
65	80	15	10	5	4	15	10	5	4
80	100	15	13	6	5	15	13	6	5
100	120	20	13	6	5	20	13	6	5
120	140	25	18	8	6	25	18	8	6
140	180	25	18	8	6	25	18	8	6
180	200	30	20	10	8	30	20	10	8

SRAU outer ring rotational accuracy

Unit : μm

Outer ring diameter (d) Nominal dimension (mm)		Outer ring radial run-out tolerance			Outer ring axial run-out tolerance		
Above	Below	P0	P5	P4	P6	P5	P4
-	65	13	-	-	13	-	-
65	80	13	8	5	13	8	5
80	100	15	10	6	15	10	6
100	120	15	10	6	15	10	6
120	140	20	11	7	20	11	7
140	180	25	11	7	25	11	7
180	200	25	15	10	25	15	10
200	250	30	15	10	30	15	10

Inner & Outer ring width tolerances

SRU Inner & Outer ring width tolerances

Unit : μm

Model	Tolerances	
	Above	Below
SRU42	0	-70
SRU66	0	-70
SRU85	0	-70
SRU124	0	-70
SRU148	0	-70
SRU178	0	-80
SRU228	0	-80

SRB Inner & Outer ring width tolerances (for all grades)

Unit : μm

Inner ring diameter (d) Nominal dimension (mm)		Tolerances		Tolerances	
		Inner Ring		Outer Ring	
Above	Below	Above	Below	Above	Below
18	30	0	-70	0	-90
30	50	0	-70	0	-90
50	80	0	-70	0	-90
80	120	0	-70	0	-90
120	150	0	-80	0	-100
150	180	0	-80	0	-100
180	250	0	-80	0	-100
250	315	0	-80	0	-130

SRBE Inner & Outer ring width tolerances

Tolerances	
Above	Below
0	-75

SRAU Inner & Outer ring width tolerances

Tolerances	
Above	Below
0	-120

Radial Clearances

SRU model radial clearance

Unit : μm

Model	S1 Radial Clearance		C1 Radial Clearance	
	Minimum	Maximum	Minimum	Maximum
SRU42	-8	0	0	24
SRU66	-8	0	0	28
SRU85	-8	0	0	38
SRU124	-12	0	0	38
SRU148	-12	0	0	38
SRU178	-12	0	0	48
SRU228	-12	0	0	58

SRB、SRBE model radial clearance

Unit : μm

Roller Pitch Circle Diameter (dp) (mm)		S1 Radial Clearance		C1 Radial Clearance	
Above	Below	Minimum	Maximum	Minimum	Maximum
18	30	-8	0	0	14
30	50	-8	0	0	24
50	80	-8	0	0	28
80	120	-8	0	0	38
120	140	-8	0	0	38
140	160	-10	0	0	38
160	180	-10	0	0	48
180	200	-10	0	0	48
200	225	-10	0	0	58
225	250	-10	0	0	58
250	280	-14	0	0	78
280	315	-14	0	25	98
315	355	-14	0	25	108

SRAU radial clearance

Unit : μm

Roller Pitch Circle Diameter (dp) (mm)		S1 Radial Clearance		C1 Radial Clearance	
Above	Below	Minimum	Maximum	Minimum	Maximum
-	18	-	-	0	15
18	30	-	-	0	15
30	50	-	-	0	15
50	80	-8	0	0	15
80	120	-8	0	0	15
120	140	-8	0	0	15
140	160	-8	0	0	15
160	180	-10	0	0	20
180	200	-10	0	0	20
200	225	-10	0	0	20

SRU (One piece inner & outer ring)

Accuracy mark (P.15)

Radial clearance mark (P.19)

SRU124 UU S1 P2 B G X -N

Model number

Seal mark

If no mark is available : no seal
UU : seal on both sides
U : seal on outer ring counterbore hole side
UT : seal on outer ring opposite counterbore hole side

Accuracy symbol

If no mark is available : inner ring rotational accuracy
R : outer ring rotational accuracy
B : inner & outer ring rotational accuracy

Inner ring mounting hole symbol

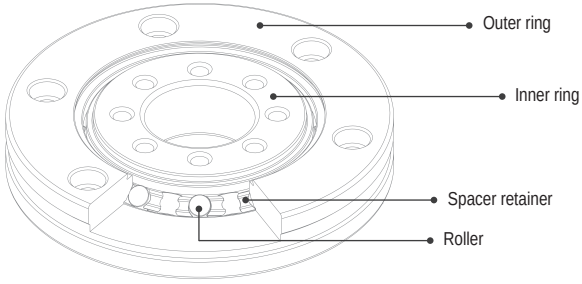
【For models : SRU124~SRU228】 No mark : counterbore hole on the inner ring.
Tapped holes (through holes)

Option symbol

No mark : no nozzle attached
N : nozzle attached
SRU42~SRU178 : NP3.2×3.5
SRU228 : NP6×5

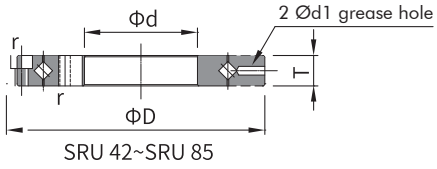
Mounting hole orientation

【For models : SRU124~SRU228 (except X models)】
No mark : the counterbore holes on inner and outer rings are in the same direction
G : The counterbore holes on inner and outer rings are in reverse direction

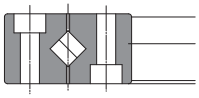


Unit : mm

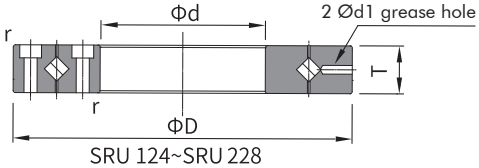
Shaft Diameter	Model Number	Main Dimensions					Shoulder Height		Basic Load Rating (Radial)		Mass
		Inner Diameter d	Outer Diameter D	Width T	Greasing Hole d1	Chamfer r_{min}	da	Dh	C kN	C_0 kN	kg
20	SRU42	20	70	12	3	0.5	36	46	7.3	8.33	0.28
35	SRU66	35	95	15	3	0.5	58	75	17.53	22.31	0.6
55	SRU85	55	120	15	3	0.5	78	94	20.31	29.55	1.1
80	SRU124(G) SRU124X	80	165	22	3	1	115	133	33	50.85	2.61
90	SRU148(G) SRU148X	90	210	25	3	1.5	134	161	49	76.83	4.95
115	SRU178(G) SRU178X	115	240	28	3	1.5	162	194	80.32	134.9	6.78
160	SRU228(G) SRU228X	160	295	35	6.1	2	207	247	103.5	172.8	10.5



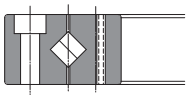
SRU 42~SRU 85



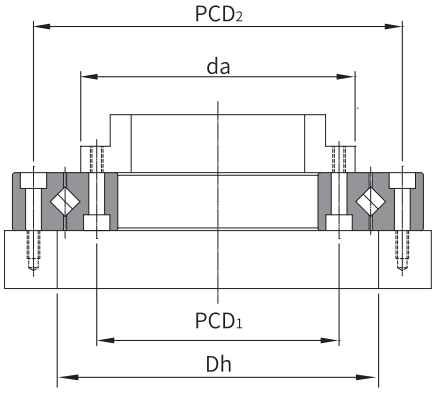
SRU 124G~SRU228

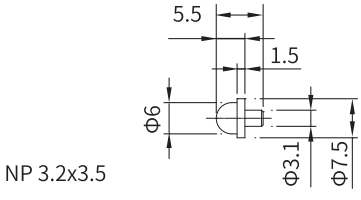


SRU 124~SRU 228

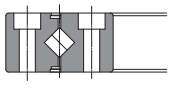


SRU 124X~SRU 228

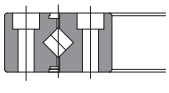




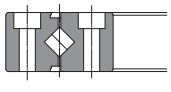
NP 3.2x3.5



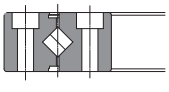
SRU



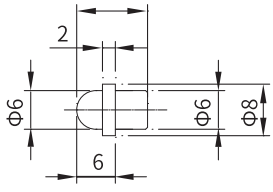
SRU…U



SRU…UU



SRU…UT



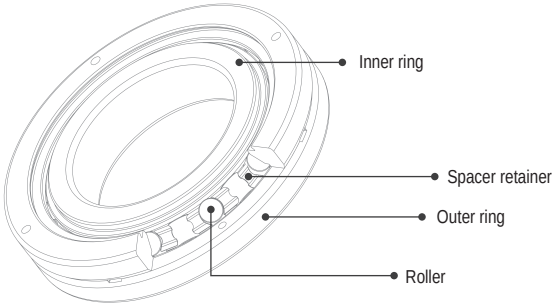
NP 6x5

Mounting Hole Specification			
Inner Ring		Outer Ring	
PCD1	Mounting Hole	PCD2	Mounting Hole
28	6-M3 Through	57	6-Ø3.5 Through，Ø6 hole depth 3.5
45	8-M4 Through	83	8-Ø4.5 Through，Ø8 hole depth 4.5
65	8-M5 Through	105	8-Ø5.5 Through，Ø10 hole depth 5.5
97	10-Ø5.5 Through，Ø10 hole depth 5.5 10-M5 Through	148	10-Ø5.5 Through，Ø10 hole depth 5.5
112	12-Ø9.0 Through，Ø14 hole depth 8.5 12-M8 Through	187	12-Ø9.0 Through，Ø14 hole depth 8.5
139	12-Ø9.0 Through，Ø14 hole depth 8.5 12-M8 Through	217	12-Ø9.0 Through，Ø14 hole depth 8.5
184	12-Ø11 Through，Ø18 hole depth 10.5 12-M10 Through	270	12-Ø11 Through，Ø18 hole depth 40.5

SRB Model (Split Outer Ring model for inner ring rotation)

SRB20030 UU S1 P2

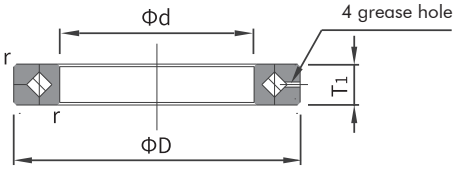
- **SRB20030** — Model number
- **UU** — Seal mark
  - If no mark is available: no seal
  - UU : seal on both sides
  - U : seal on either side
- **S1** — Radial clearance mark (P.19)
  - S1 : Preloaded (negative clearance)
  - C1 : No preload (positive clearance)
- **P2** — Accuracy mark (P.15)
  - if no mark is available: ordinary grade (0 grade)
  - P5 : rotating accuracy grade 5
  - PS5 : rotating accuracy grade 5+size accuracy grade 5
  - P4 : rotating accuracy grade 4
  - PS4 : rotating accuracy grade 4 +size accuracy grade 4
  - P2 : rotating accuracy grade 2
  - PS2 : rotating accuracy grade 2 + size accuracy grad 2

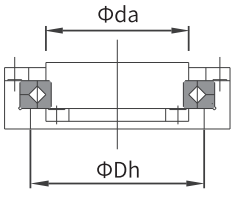


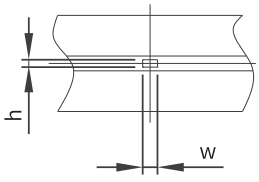
Unit : mm

Shaft Diameter	Model Number	Main Dimensions						Shoulder Height		Basic Load Rating (Radial)		Mass
		Inner Diameter d	Outer Diameter D	Width T1	Greasing Hole w	Greasing Hole h	Chamfer rmin	da	Dh	C kN	C0 kN	kg
20	SRB2008	20	36	8	2.1	0.7	0.5	24	30	3.2	3.1	0.06
25	SRB2508	25	41	8	2.1	0.7	0.5	29	35	3.6	3.8	0.07
30	SRB3010	30	55	10	2.6	0.8	0.6	37.5	46.5	7.4	8.4	0.14
35	SRB3510	35	60	10	2.6	0.8	0.6	41.5	51	7.6	9.1	0.12
40	SRB4010	40	65	10	2.6	0.8	0.6	47	58	8.3	10.8	0.18
45	SRB4510	45	70	10	2.6	0.8	0.6	51.5	61	8.6	11.1	0.15
50	SRB5013	50	80	13	2.6	1.5	0.6	57	72.5	16.6	20.7	0.28
60	SRB6013	60	90	13	2.6	1.5	0.6	67.5	82.5	18	24.1	0.32
70	SRB7013	70	100	13	2.6	1.5	0.6	78.5	91.5	19.5	27.9	0.37
80	SRB8016	80	120	16	3.1	1.5	0.8	91.5	110	30	42	0.72
90	SRB9016	90	130	16	3.1	1.5	1.0	98.8	117	31.3	45.1	0.77
100	SRB10016	100	140	16	3.6	1.5	1.0	110	128	31.8	48.8	0.82
100	SRB10020	100	150	20	3.6	1.5	1.0	117	132	33	51	1.47
110	SRB11012	110	135	12	2.6	0.8	0.6	118	126	12.6	24	0.42
110	SRB11015	110	145	15	3.6	1.5	0.6	123	135	23.8	41.8	0.76
110	SRB11020	110	160	20	3.6	1.5	1.0	121	139	34	54	1.58
120	SRB12016	120	150	16	3.6	1.5	0.8	128	140	24.3	43.4	0.74
120	SRB12025	120	180	25	3.6	2.1	1.5	134	163	66.8	100.2	2.62

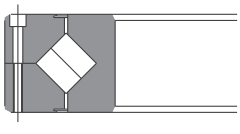
Note) (w) and (h) greasing hole dimensions in the detailed view are reference values.



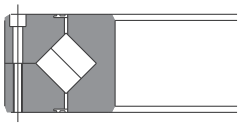




grease hole detailed view



SRB



SRB…UU

Unit : mm

Shaft Diameter	Model Number	Main Dimensions						Shoulder Height		Basic Load Rating (Radial)		Mass
		Inner Diameter d	Outer Diameter D	Width T_1	Greasing Hole w	Greasing Hole h	Chamfer r_{min}	da	Dh	C kN	C_0 kN	kg
130	SRB13015	130	160	15	3.6	1.5	0.8	136	151	25	46.9	0.74
130	SRB13025	130	190	25	3.6	2.1	1.2	144	173	69.7	107.3	2.8
140	SRB14016	140	175	16	2.6	1.5	0.8	148	163	26	50.3	1.1
140	SRB14025	140	200	25	3.6	2.1	1.2	155	184	74.7	121	2.98
150	SRB15013	150	180	13	2.6	1.5	0.5	158	171	27.1	53.7	0.66
150	SRB15025	150	210	25	3.6	2.1	1.2	165	193	76.5	128	3.18
150	SRB15030	150	230	30	4.6	3.1	1.5	174	210	100	156	5.2
160	SRB16025	160	220	25	3.6	2.1	1.2	172	205	81.6	135	3.12
170	SRB17020	170	220	20	3.6	1.5	1.2	185	197	29.2	62	2.2
180	SRB18025	180	240	25	3.6	1.8	1.2	196	224	84.3	143	3.41
190	SRB19025	190	240	25	3.6	1.5	0.8	203	221	41.8	82.7	2.97
200	SRB20025	200	260	25	3.6	1.8	1.8	214	246	84.1	157	4.2
200	SRB20030	200	280	30	4.6	2.8	1.8	222	257	113	202	6.8
200	SRB20035	200	295	35	5.1	2.8	1.8	224	271	151	251	9.8
220	SRB22025	220	280	25	3.6	1.8	1.8	236	264	92.1	173	4
240	SRB24025	240	300	25	3.6	1.8	2.2	255	282	68.4	146	4.7
250	SRB25025	250	310	25	3.6	1.8	2.2	264	291	69.2	152	5.2

Note) (w) and (h) greasing hole dimensions in the detailed view are reference values.

SRBE Model (One piece inner & outer ring)

SRBE20030 **UU** **S1** **P2**

Model number

Seal mark

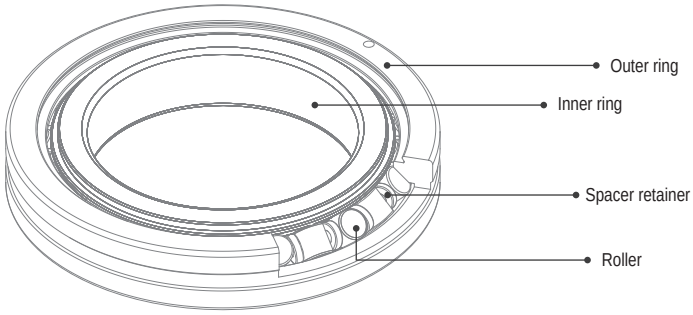
If no mark is available : no seal
UU : seal on both sides
U : seal on either side

Radial clearance mark (P.19)

S1 : Preloaded (negative clearance)
C1 : No preload (positive clearance)

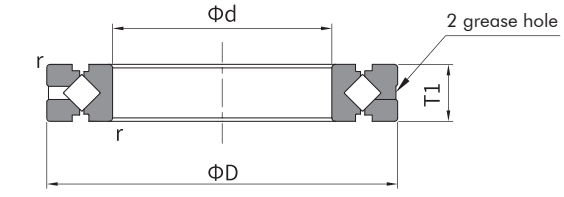
Accuracy mark (P.16)

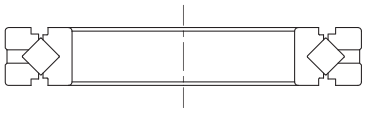
if no mark is available : ordinary grade (0 grade)
P5 : rotating accuracy grade 5
PS5 : rotating accuracy grade 5+size accuracy grade 5
P4 : rotating accuracy grade 4
PS4 : rotating accuracy grade 4 +size accuracy grade 4
P2 : rotating accuracy grade 2
PS2 : rotating accuracy grad 2 + size accuracy grad 2



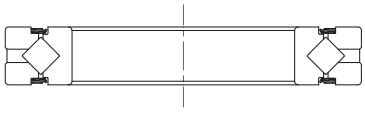
Unit : mm

Shaft Diameter	Model Number	Main Dimensions					Shoulder Height		Basic Load Rating (Radial)		Mass
		Inner Diameter d	Outer Diameter D	Width T_1	Greasing Hole	Chamfer r_{min}	da	Dh	C kN	C_0 kN	kg
20	SRBE2008	20	36	8	2-Φ2	0.5	24	30	3.2	3.1	0.06
25	SRBE2508	25	41	8	2-Φ2	0.5	29	35	3.6	3.8	0.07
30	SRBE3010	30	55	10	2-Φ2	0.6	37.5	46.5	7.4	8.4	0.14
35	SRBE3510	35	60	10	2-Φ2	0.6	41.5	51	7.6	9.1	0.12
40	SRBE4010	40	65	10	2-Φ2	0.6	47	58	8.3	10.8	0.18
45	SRBE4510	45	70	10	2-Φ2	0.6	51.5	61	8.6	11.1	0.15
50	SRBE5013	50	80	13	2-Φ3	0.6	57	72.5	16.6	20.7	0.28
60	SRBE6013	60	90	13	2-Φ3	0.6	67.5	82.5	18	24.1	0.32
70	SRBE7013	70	100	13	2-Φ3	0.6	78.5	91.5	19.5	27.9	0.37
80	SRBE8016	80	120	16	2-Φ3	0.8	91.5	110	30	42	0.72
90	SRBE9016	90	130	16	2-Φ3	1.0	98.8	117	31.3	45.1	0.77
100	SRBE10016	100	140	16	2-Φ3	1.0	110	128	31.8	48.8	0.82
100	SRBE10020	100	150	20	2-Φ3	1.0	117	132	33	51	1.47
110	SRBE11012	110	135	12	2-Φ3	0.6	118	126	12.6	24	0.42
110	SRBE11015	110	145	15	2-Φ3	0.6	123	135	23.8	41.8	0.76
110	SRBE11020	110	160	20	2-Φ3	1.0	121	139	34	54	1.58
120	SRBE12016	120	150	16	2-Φ3	0.8	128	140	24.3	43.4	0.74
120	SRBE12025	120	180	25	2-Φ3	1.5	134	163	66.8	100.2	2.62

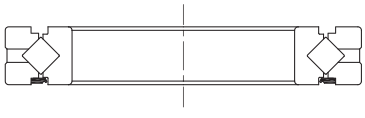




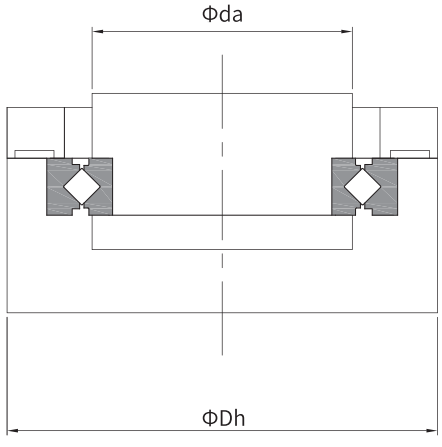
SRBE



SRBE - UU



SRBE - U



Unit : mm

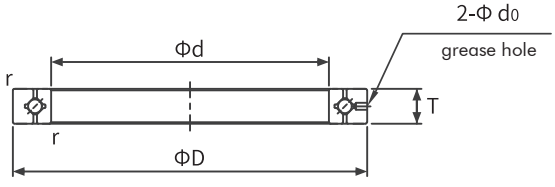
Shaft Diameter	Model Number	Main Dimensions					Shoulder Height		Basic Load Rating (Radial)		Mass
		Inner Diameter d	Outer Diameter D	Width T_1	Greasing Hole	Chamfer r_{min}	da	Dh	C kN	C_0 kN	kg
130	SRBE13015	130	160	15	2-Φ3	0.8	136	151	25	46.9	0.74
130	SRBE13025	130	190	25	2-Φ3	1.2	144	173	69.7	107.3	2.8
140	SRBE14016	140	175	16	2-Φ3	0.8	148	163	26	50.3	1.1
140	SRBE14025	140	200	25	2-Φ3	1.2	155	184	74.7	121	2.98
150	SRBE15013	150	180	13	2-Φ3	0.5	158	171	27.1	53.7	0.66
150	SRBE15025	150	210	25	2-Φ3	1.2	165	193	76.5	128	3.18
150	SRBE15030	150	230	30	2-Φ3	1.5	174	210	100	156	5.2
160	SRBE16025	160	220	25	2-Φ3	1.2	172	205	81.6	135	3.12
170	SRBE17020	170	220	20	2-Φ3	1.2	185	197	29.2	62	2.2
180	SRBE18025	180	240	25	2-Φ3	1.2	196	224	84.3	143	3.41
190	SRBE19025	190	240	25	2-Φ3	0.8	203	221	41.8	82.7	2.97
200	SRBE20025	200	260	25	2-Φ3	1.8	214	246	84.1	157	4.2
200	SRBE20030	200	280	30	2-Φ3	1.8	222	257	113	202	6.8
200	SRBE20035	200	295	35	2-Φ3	1.8	224	271	151	251	9.8
220	SRBE22025	220	280	25	2-Φ3	1.8	236	264	92.1	173	4
240	SRBE24025	240	300	25	2-Φ3	2.2	255	282	68.4	146	4.7
250	SRBE25025	250	310	25	2-Φ3	2.2	264	291	69.2	152	5.2

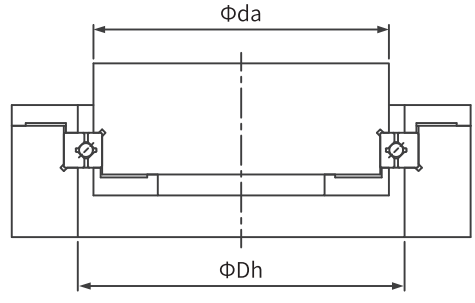
SRAU Model (One piece inner & outer ring)

SRAU8008 UU S1 P5 B

- **SRAU8008** — Model number
- **UU** — Seal mark
  If no mark is available: no seal
  UU : seal on both sides
  U : seal on either side
- **S1** — Radial clearance mark (P.19)
  S1 : Preloaded (negative clearance)
  C1 : No preload (positive clearance)
- **P5** — Accuracy mark (P.17)
  if no mark is available: ordinary grade (0 grade)
  P6 : rotating accuracy grade 6
  P5 : rotating accuracy grade 5
  P4 : rotating accuracy grade 4
- **B** — Accuracy symbol
  If no mark is available: inner ring rotational accuracy
  R : outer ring rotational accuracy
  B : inner & outer ring rotational accuracy

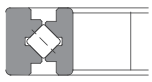
Width:5mm



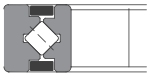


Unit : mm

Shaft Diameter	Model Number	Main Dimensions						Shoulder Height		Basic Load Rating (Radial)		Mass
		ID d	OD D	Pitch Circle Diameter dp	Width T	Greasing Hole d0	Chamfer rmin	da	Dh	C kN	C0 kN	kg
20	SRAU2005	20	31	24.7	5	1	0.15	22.5	27	1.49	1.4	0.015
30	SRAU3005	30	41	34.7	5	1	0.15	32.5	37	1.89	2.14	0.021
40	SRAU4005	40	51	44.7	5	1	0.15	42.5	47	2.14	2.74	0.027
50	SRAU5005	50	61	54.7	5	1	0.15	52.5	57	2.43	3.49	0.032
60	SRAU6005	60	71	64.7	5	1	0.15	62.5	67	2.63	4.09	0.038
70	SRAU7005	70	81	74.7	5	1	0.15	72.5	77	2.81	4.68	0.044
80	SRAU8005	80	91	84.7	5	1	0.15	82.5	87	3.05	5.43	0.5
90	SRAU9005	90	101	94.5	5	1	0.15	92.5	97	3.19	6.03	0.056
100	SRAU10005	100	111	104.7	5	1	0.15	102.5	107	3.37	6.63	0.061

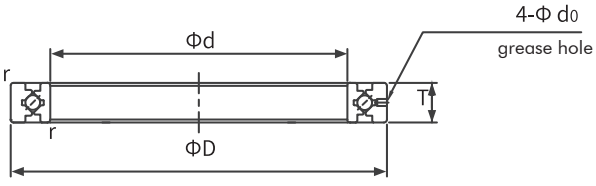


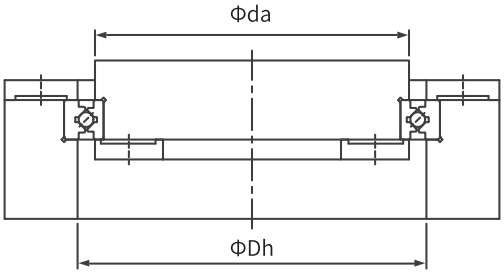
SRAU Model



SRAU...UU Model

Width:8mm.13mm





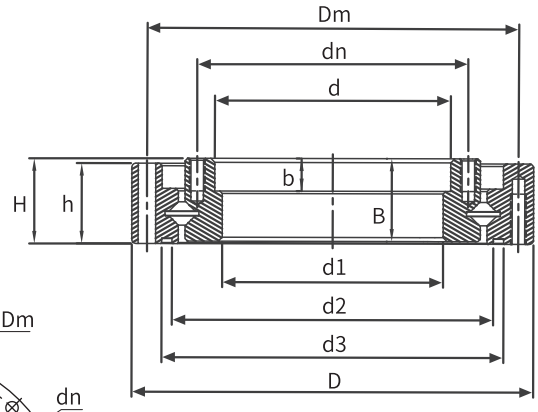
Unit : mm

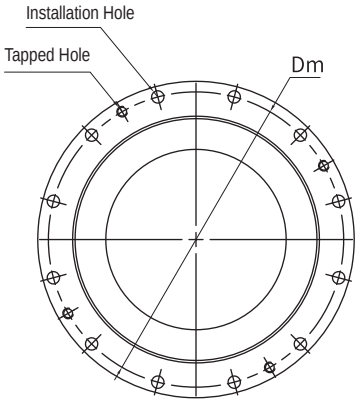
Shaft Diameter	Model Number	Main Dimensions						Shoulder Height		Basic Load Rating (Radial)		Mass
		ID d	OD D	Pitch Circle Diameter dp	Width T	Greasing Hole d0	Chamfer rmin	da	Dh	C kN	C0 kN	kg
50	SRAU5008	50	66	57	8	1.5	0.5	53.5	60.5	5.1	7.19	0.08
60	SRAU6008	60	76	67	8	1.5	0.5	63.5	70.5	5.68	8.68	0.09
70	SRAU7008	70	86	77	8	1.5	0.5	73.5	80.5	5.98	9.8	0.1
80	SRAU8008	80	96	87	8	1.5	0.5	83.5	90.5	6.37	11.3	0.11
90	SRAU9008	90	106	97	8	1.5	0.5	93.5	100.5	6.76	12.4	0.12
100	SRAU10008	100	116	107	8	1.5	0.5	103.5	110.5	7.15	13.9	0.14
110	SRAU11008	110	126	117	8	1.5	0.5	113.5	120.5	7.45	15	0.15
120	SRAU12008	120	136	127	8	1.5	0.5	123.5	130.5	7.84	16.5	0.17
130	SRAU13008	130	146	137	8	1.5	0.5	133.5	140.5	7.94	17.6	0.18
140	SRAU14008	140	156	147	8	1.5	0.5	143.5	150.5	8.33	19.1	0.19
150	SRAU15008	150	166	157	8	1.5	0.5	153.5	160.5	8.82	20.6	0.2
160	SRAU16013	160	186	172	13	2	0.8	165	179	23.3	44.9	0.59
170	SRAU17013	170	196	182	13	2	0.8	175	189	23.5	46.5	0.64
180	SRAU18013	180	206	192	13	2	0.8	185	199	24.5	49.8	0.68
190	SRAU19013	190	216	202	13	2	0.8	195	209	24.9	51.5	0.69
200	SRAU20013	200	226	212	13	2	0.8	205	219	25.8	54.5	0.71

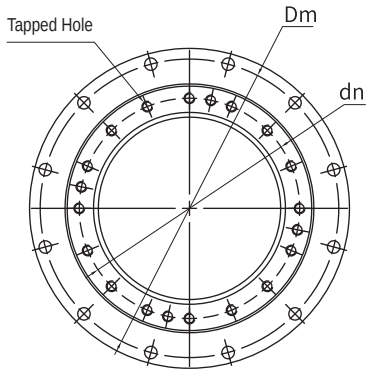
SSHF Model (One piece inner & outer ring)

SSHF14

Model number







Unit : mm

Model Number	Main Dimensions								
	D	d	d1	d2	d3	H	h	B	b
SSHF14	70	38	36	53	57	15.1	14.1	14.7	5
SSHF17	80	47	45.5	64	68.1	17	16	16.5	6.5
SSHF20	90	54	51.3	72.6	78	18.5	17.5	17.5	7
SSHF25	110	67	64.2	90	94.8	20.7	19.7	19.7	7.5
SSHF32	142	88	84	117.5	123	24.4	23.4	22.9	8

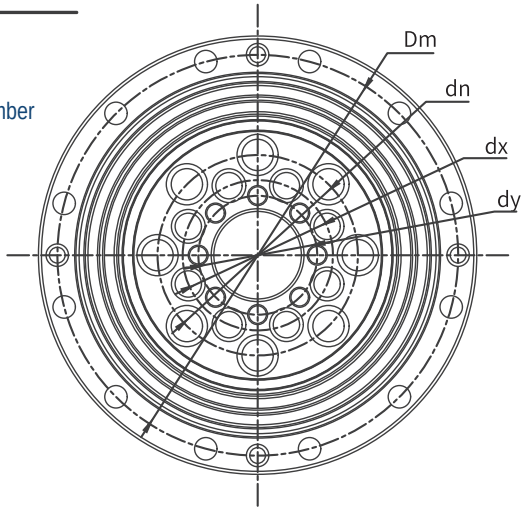
Unit : mm

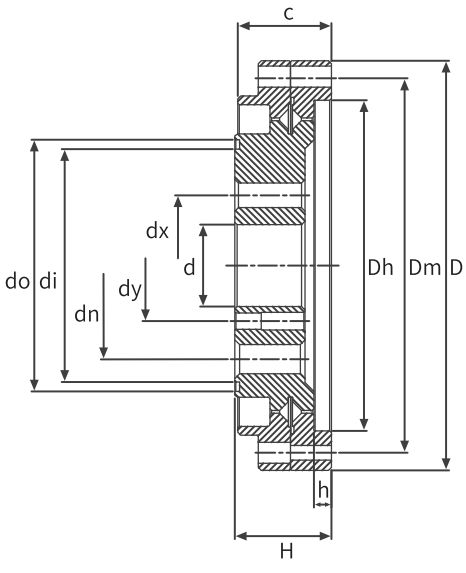
Model Number	Installation Hole Dimension (PCD&PEC)					Basic Load Rating (Radial)		Mass
	Inner Ring			Outer Ring		C kN	C0 kN	kg
	Dm	Installation Hole	Tapped Hole	dn	Tapped Hole			
SSHF14	64	8-Φ3.5	2-M3	44	12-M3	6	14	0.1
SSHF17	74	12-Φ3.5	4-M3	54	20-M3	9.5	16.3	0.34
SSHF20	84	12-Φ3.5	4-M3	62	4-M3 16-M3	20	31	0.45
SSHF25	102	12-Φ4.5	4-M3	77	4-M3 16-M4	28.7	45.3	0.7
SSHF32	132	12-Φ5.5	4-M4	100	8-M4 16-M5	47.5	77.1	1.55

SCSG Model (Split outer ring)

SCSG14

Model number





Unit : mm

Model Number	Main Dimensions								Basic Load Rating (Radial)		Mass
	D	Dh	d	do	di	H	h	C	Cr kN	Cor kN	kg
SCSG14	55	41.8	11	29.7	28.3	16.5	2.5	16	7	9	0.13
SCSG17	62	49	10	36	33.8	16.5	2.7	16	7.4	10.5	0.22
SCSG20	70	56.5	14	43	39.8	16.5	3	16	8.6	13.5	0.2
SCSG25	85	68	20	55.4	52.5	18.5	2	18	13.6	21.5	0.45
SCSG32	112	90	26	74.1	68.4	22.5	3	21.5	12.5	36.5	0.88

Unit : mm

Model Number	Installation Hole Size (PCD&PEC)							
	Outer Ring		Inner Ring					
	Dm	Installation Hole	dn	Tapped Hole	dx	Tapped Hole	dy	Hole Size
SCSG14	49	8-Φ3.5	23	6-M4	17	6-M4	15	6-Φ2.5
SCSG17	56	10-Φ3.5	27	6-M5	19	6-M5	15	6-Φ3
SCSG20	64	12-Φ3.5	32	8-M6	24	8-M5	19	8-Φ3
SCSG25	79	16-Φ3.5	42	8-M8	30	8-M6	26	8-Φ3
SCSG32	104	16-Φ4.5	55	8-M10	40	8-M8	34	4-Φ5

MEMO

02

Gonio Way

Gonio way

SFT Gonio Way is a non-circulating, curved cross roller slide way, and the precision rollers that have extremely low friction resistance provide a stable arc movement. They are mainly used in high-precision positioning where rotation centers remain unchanged and accurate tilting angles are required. They are widely used to meet the purposes of optical instruments and measuring devices.

Product features

- High rigidity and load capacity
- Same rotation centers
- Low friction and accurate movement
- Easy installation
- Low noise

Accuracy

SFT Gonio Way accuracy is measured by the method shown in the following figure which measures the mutual dimensional deviations of the four rails along their full length.

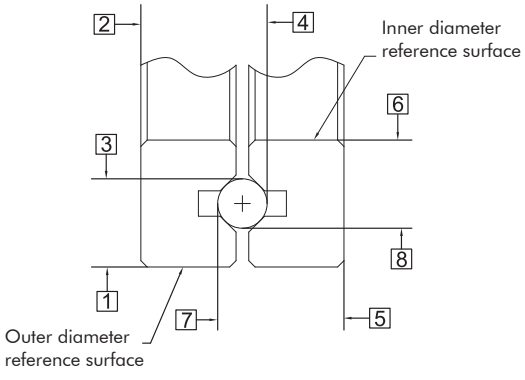
Accuracy measurement method

Unit : μm

Model Number	Accuracy
SRV0240-50	10
SRV0260-60	
SRV0370-90	
SRV0370-110	
SRV03100-160	

Unit : μm

Model Number	Accuracy
SCRV0240-51	10
SCRV0240-70	
SCRV0240-89.5	
SCRV0260-65	
SCRV0260-89	
SCRV0260-113.5	
SCRV0260-138.5	



Rated life

The rated life of SFT Gonio Ways is calculated using the following formula.

Lf : Rated Life (10^6 cycle)

θ : Rotational angle (degree)

C : Basic dynamic load rating (N)

F : Applied load (N)

ft : Temperature coefficient

fL : Applied load coefficient

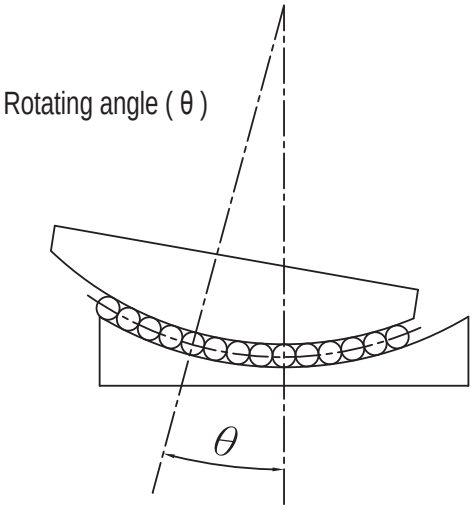
$$Lf = \frac{90}{\theta} \times \left(\frac{f_t}{f_L} \times \frac{C}{F} \right)^{\frac{10}{3}}$$

Life time

Lt : life time (hr)

r : number of rotation per minute (rpm)

$$L_t = \frac{L_f \times 10^6}{60 \times r}$$



Usage precautions

- Lubrication :
  Use lithium soap based lubricating grease.

- Retainer Deviation :
  Retainers will deviate from their correct positions when SFT Gonio Way are used under conditions such as high-speed, vibrations and unbalanced loads. To minimize this deviation, maintain additional travel distance, avoid excessive pre-load and cycle the rails to return the cage to its central position.

- Dust prevention :
  SFT Gonio ways may not realize their ideal performance due to dust or foreign objects likely to enter the interior depending on operating environment; it is recommended to protect SFT Gonio Way by using external dustproof covers if they are to be used in extreme environments.

- End Pieces :
  End pieces are installed to the end the SFT Gonio Way to prevent the roller cage from falling off the track.

- Working Environment :
  It is recommended to operate SFT Gonio ways with temperature range from -20°C to 110°C.

- Paired Usage :
  SFT Gonio Way accuracy is based on a complete set in order to realize a precise control. Combining different Gonio ways sets will affect accuracy; please exercise caution when assembling SFT Gonio Ways.

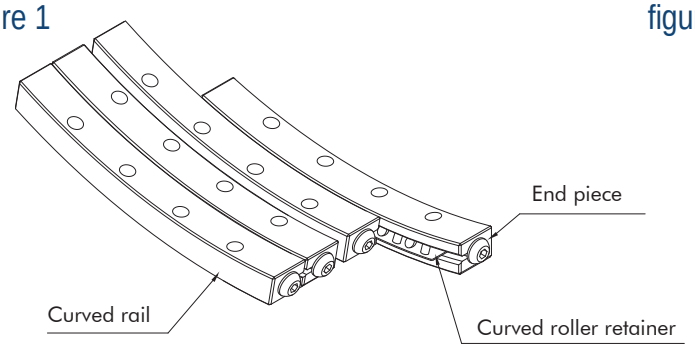
- Adjustments :
  Inaccurate installation on the mounting surface or improper preload adjustment will reduce motion accuracy; thus causing the rail to skew and reduce performance and service life; exercise extreme caution during adjustment.

- Allowable Load :
  Allowable load is defined as a guaranteed smooth roller movement under which a small enough total elastic deformation of the rolling element and the raceway in the contact area that receives maximum-contact stress. Please use the product within the allowable load to ensure high accuracy and smooth-motion.

Gonio way structure

SRV models (figure 1.) of SFT Gonio Ways are made up of precisely ground V-shaped track and curved roller cages

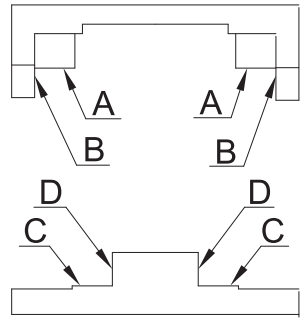
figure 1



Installing gonio ways

Accuracy of the mounting surface
As shown in (figure 2), the accuracy of surfaces A-D will directly affect the motion accuracy.

figure 2



Installation sequence

1.Thoroughly clean the slideways and the mounting surface on the table to prevent the entry of foreign objects during installation.

2.Apply lube oil with low viscosity onto each mounting surface and lock gonio ways a, b, c and each surface using the suggested torque (figure 3-1).

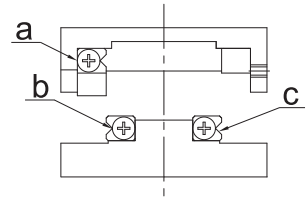
3.Temporarily lock gonio way d (figure 3-2).

4.Remove the end pieces from one end and insert the curved roller cages to the central position of the gonio way; upon the completion, re-attach the end pieces to its original position. (figure 3-3).

5.Move the table horizontally to its maximum traveling end and adjust the curved roller cage to its central position.

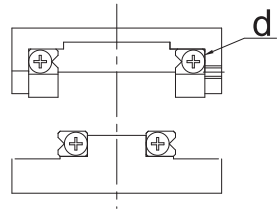
Figure 3 Installation method

figure 3-1



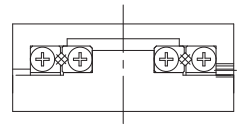
Fix gonio ways a~c

figure 3-2



Temporarily lock gonio way d

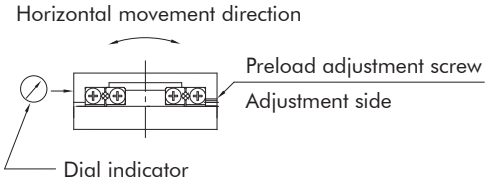
figure 3-3



Insert curved roller retainers

6.Install a dial gauge at the side of the slideway base level as reference.(figure 3-4).

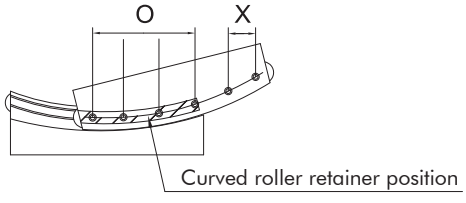
figure 3-4



7.Move the slideway to one travel end and slightly lock adjustment screw above the curved roller cage. (figure 3-5).

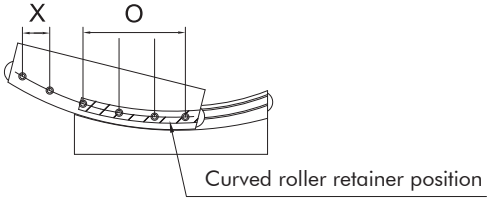
figure 3-5

○: adjustment screw can be tightened.
×: adjustment screw may not be tightened.



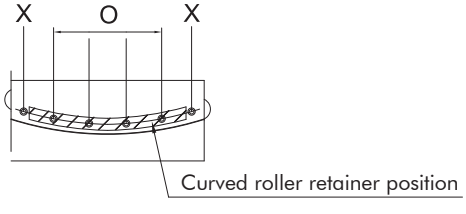
8.Move the sliding way fully to the other end and slightly lock adjustment screw. (figure3-6).

figure 3-6



9.Move the slideway to the central position and slightly lock the adjustment screw at the central position (figure 3-7).

figure 3-7



10.Repeat steps from (7) to (9) until there is no clearance with dial gauge showing minimum variation. Caution against applying excessive preloads

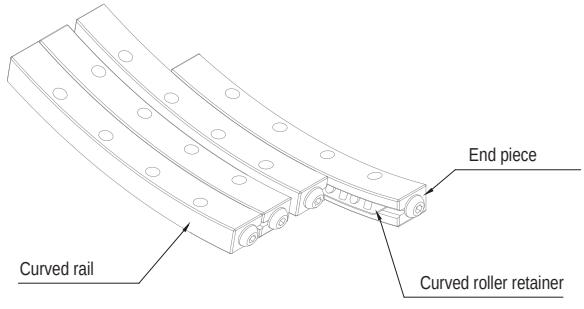
11.Once there is no clearance in the horizontal direction; carry out final preload calibration by repeating operations from (7) to (9) using the recommended torque force for locking screws.

12.Tighten the gonio way d (figure 3-2) by tightening the mounting screws sequentially in the same way as the adjustment screws.

SRV Model

SRV 03 70 - 110 - 10G

- SRV: Model number
- 03: Roller diameter
- 70: Rail length
- 110: Radius from rotation center
- 10G: Number of rollers



◆ One set contains 4 rails, 2 curved roller retainers and 8 end pieces.

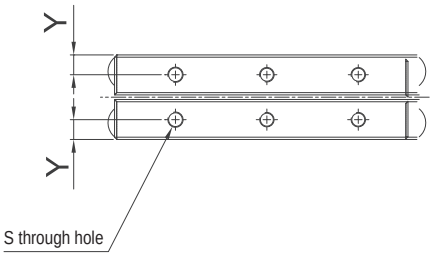
unit: mm

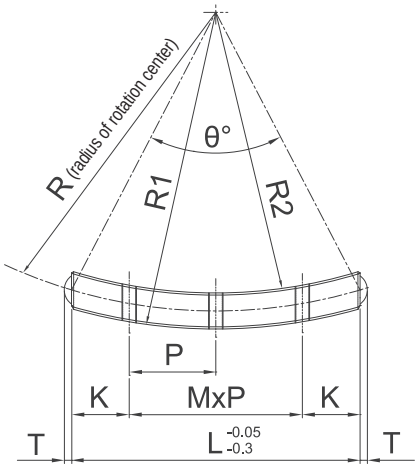
Model Number	Rotation range	Roller diameter (D)	Roller quantity (G)	Main dimensions						
				L	R	R1	R2	A	B	C
SRV0240-50-7G	±10°	2	7	40	50	53	47	15	6	7.25
SRV0260-60-12G	±10°	2	12	60	60	63	57	15	6	7.25
SRV0370-90-11G	±10°	3	11	70	90	94	86	18	8	8.5
SRV0370-110-10G	±10°	3	10	70	110	114	106	18	8	8.5
SRV03100-160-14G	±10°	3	14	100	160	164	156	18	8	8.5

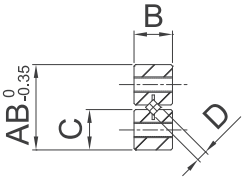
unit: mm

Model Number	Weight per set (g)	Allowable load (F)(N)	Basic load rating		θ°	T	S	Y	K	MxP
			Static (C_0)(N)	Dyanmic (C)(N)						
SRV0240-50-7G	47	480	1420	800	47.1°	1.5	M3	2.5	7.5	2x12.5
SRV0260-60-12G	78	930	2870	1430	59.9°	1.5	M3	2.5	11.25	3x12.5
SRV0370-90-11G	135	1820	5480	2620	45.7°	1.9	M3	3	12.5	3x15
SRV0370-110-10G	131	1800	5600	2420	37°	1.9	M3	3	12.5	3x15
SRV03100-160-14G	191	2600	7870	2480	36.3°	1.9	M3	3	12.5	5x15

SCRV Model







unit: mm

Model Number	Rotation range	Roller diameter (D)	Roller quantity (G)	Main dimensions						
				L	R	R1	R2	A	B	C
SCRV0240-51-7G	±8°	2	7	40	51	53.5	48.5	11.3	5	5.25
SCRV0240-70-7G	±6°	2	7	40	70	72.5	67.5	11.3	5	5.25
SCRV2040-89.5-7G	±5°	2	7	40	89.5	92	87	11.3	5	5.25
SCRV0260-65-11G	±8°	2	11	60	65	68	62	16	6	7.6
SCRV0260-89-11G	±8°	2	11	60	89	92	86	16	6	7.6
SCRV0260-113.5-11G	±6°	2	11	60	113.5	116.5	110.5	16	6	7.6
SCRV0260-138.5-9G	±5°	2	9	60	138.5	141.5	135.5	16	6	7.6

unit: mm

Model Number	Weight per set (g)	Allowable load (F)(N)	Basic load rating		θ°	T	S	Y	K	MxP
			Static (C_0)(N)	Dyanmic (C)(N)						
SCRV0240-51-7G	29	480	1420	800	46.2°	1.5	M2	2.0	8	2x12
SCRV0240-70-7G	29	480	1420	800	33.2°	1.5	M2	2.0	8	2x12
SCRV0240-89.5-7G	29	480	1420	800	25.8°	1.5	M2	2.0	8	2x12
SCRV0260-65-11G	79	853	2629	1320	55°	1.5	M3	2.5	11.25	3x12.5
SCRV0260-89-11G	77	853	2629	1320	39.4°	1.5	M3	2.5	11.25	3x12.5
SCRV0260-113.5-11G	77	853	2629	1320	30.7°	1.5	M3	2.5	11.25	3x12.5
SCRV0260-138.5-9G	77	853	2629	1320	25 °	1.5	M3	2.5	11.25	3x12.5

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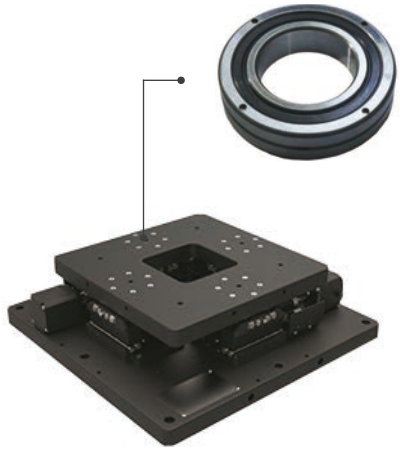
03

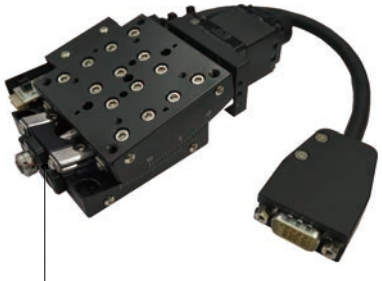
Applications

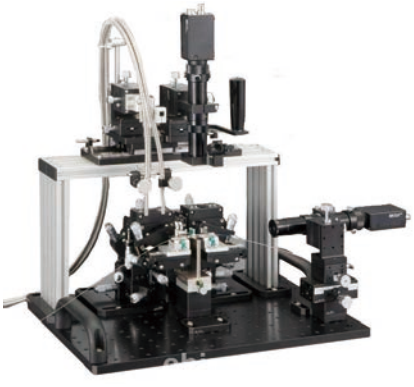
Application examples

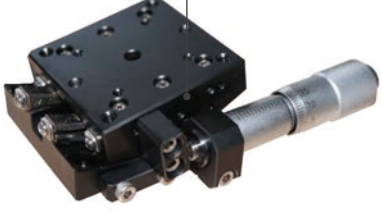
Cross roller bearings

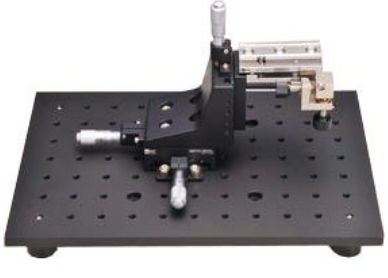


Gonio ways

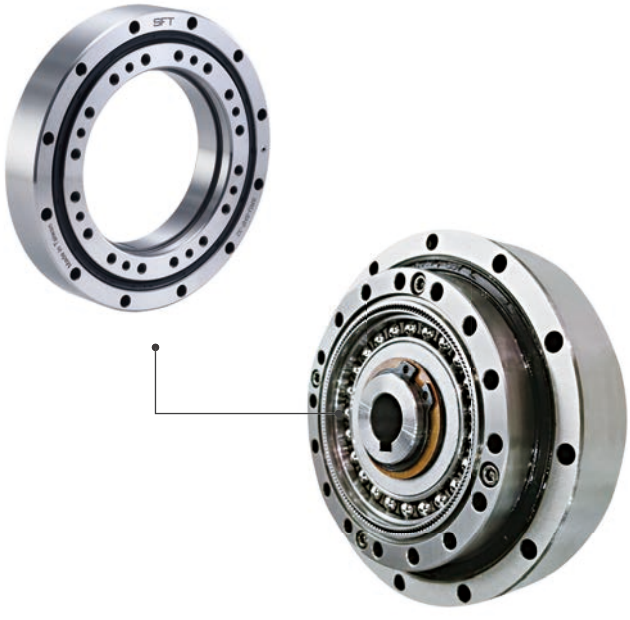


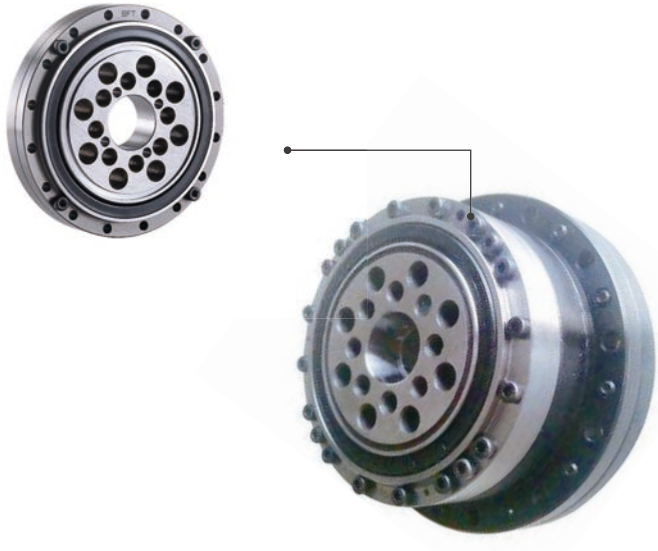






Strain wave gear cross roller bearings





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