

PATENT PENDING

IKO

Crossed Roller Bearing

CRB



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CAT-57151

IKO Crossed Roller Bearing

CRBF · CRBH **CRB · CRBS**

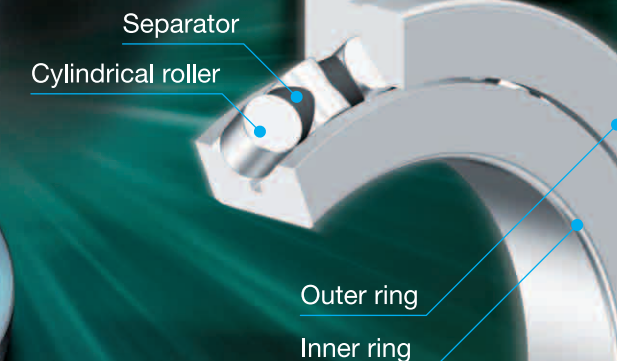
Features of Crossed Roller Bearing

High load capacity and high rigidity.

Taking load of any direction and moment at the same time.

Compactness contributes your space saving.


Wide mounting variations for your best choice.



IKO Crossed Roller Bearings are compact bearings with their rollers alternately crossed at right angles to each other between inner and outer rings. The rollers make line-contact with raceway surfaces, and, therefore, elastic deformation due to bearing loads is very small. They can take loads from any directions at the same time such as radial, thrust and moment loads. It is possible to make your design compact comparing to the usage of taper roller bearing and combination of two ball bearings. These bearings are widely used in the rotating parts of industrial robots, machine tools, medical equipment, etc., which require compactness, high rigidity and high rotational accuracy.

Wide variations

Variations of Mounting Holed Type High Rigidity Crossed Roller Bearing

Type	Guidance of cylindrical roller	Sealing structure	Model code	Shaft diameter
 <p>Mounting Holed Type High Rigidity Crossed Roller Bearing Mounting holes are prepared on outer ring and inner ring providing easy mounting together with high rigidity and high accuracy.</p>	With separator	Sealed type	CRBF...AUU	10-80 mm
		Open type	CRBF...A	10-80 mm

Features of Mounting Holed Type High Rigidity Crossed Roller Bearing

High Rigidity and Accuracy

Both inner ring and outer ring have solid one-piece construction. Can directly mount onto the equipment through prepared mounting holes. Therefore, high accuracy and high rigidity are realized and mounting error can be minimized.

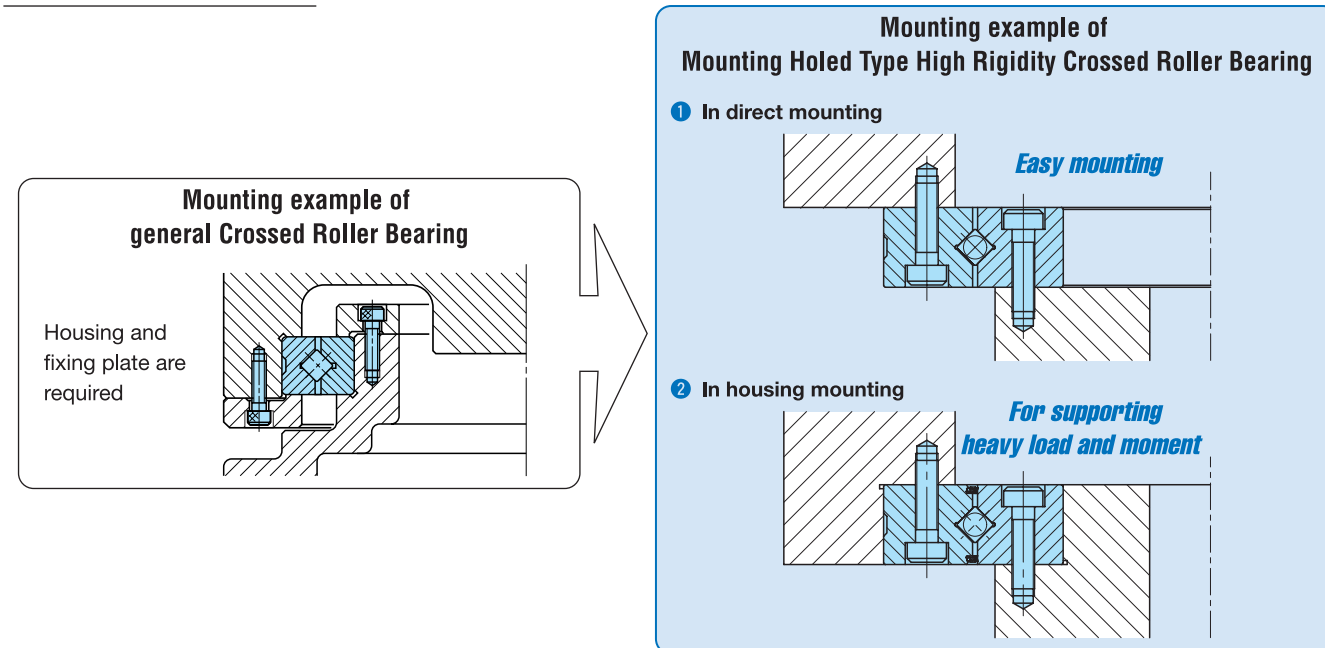
Space Saving

Housing and fixing plate are not necessary for mounting, and the room around the bearing can be minimized.




Smooth Rotation

Special separators are incorporated between cylindrical rollers allowing smooth and high-speed rotation.

Mounting method

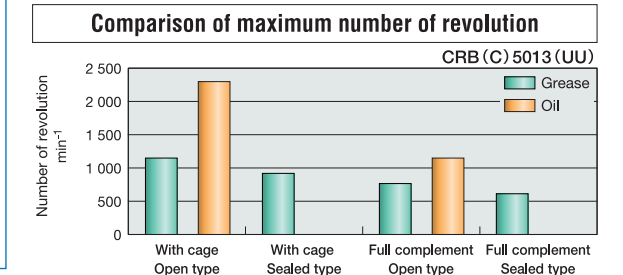
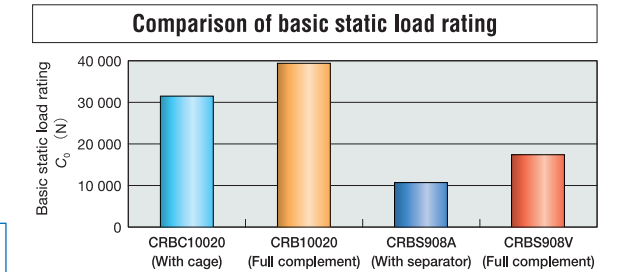
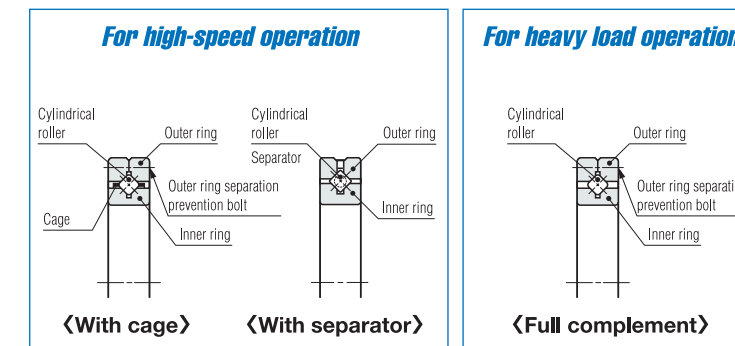


Variation of Crossed Roller Bearings

Type	Guidance of cylindrical roller	Sealing structure	Model code	Shaft diameter
 <p>High Rigidity Type Crossed Roller Bearing Both inner and outer ring have solid one-piece construction. High rigidity and high accuracy together with smooth rotation is provided by separator.</p>	With separator	Sealed type	CRBH...AUU	20-250 mm
		Open type	CRBH...A	20-250 mm
 <p>Standard Crossed Roller Bearing With cage and full complement, open type and sealed type are available. Wide size variations from 30mm to 800mm shaft diameter are available.</p>	With cage	Sealed type	CRBC...UU	30-300 mm
		Open type	CRBC	30-800 mm
	Full complement	Sealed type	CRB...UU	30-300 mm
		Open type	CRB	30-800 mm
 <p>Slim Type Crossed Roller Bearing Very slim bearing having an extremely thin inner and outer rings.</p>	With separator	Sealed type	CRBS...AUU	50-200 mm
	With cage	Open type	CRBS	50-200 mm
	Full complement	Sealed type	CRBS...VUU	50-200 mm
		Open type	CRBS...V	50-200 mm

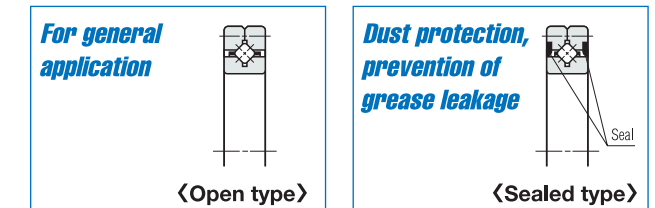
Guidance of cylindrical roller

Separator and cage types suite to the application requires low driving energy and high-speed rotation. Full complement type is suitable to low-speed rotation, heavy load and/or oscillating motion.



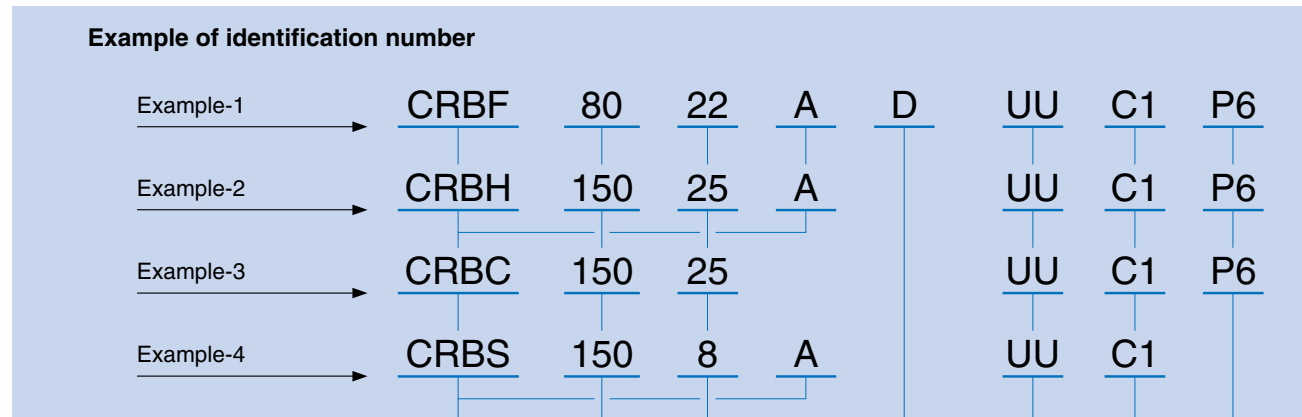
Sealing structure

Open type is suitable to the low energy application due to no sealing friction. Sealed type incorporates seals made of special synthetic rubber that have excellent sealing performance against dust and dirt penetration, also prevent grease leakage.



Identification Number

The identification number of IKO Crossed Roller Bearings consists of a model code, dimensions, any supplemental codes and classification symbols as shown below.



- ① Model code
- ② Bore diameter of bearing
- ③ Width of bearing
- ④ Supplemental code-1
- ⑤ Supplemental code-2
- ⑥ Supplemental code-3
- ⑦ Classification symbol

① Model code	CRBF ... A	Mounting Holed Type High Rigidity Crossed Roller Bearing (With separator)
	CRBH ... A	High Rigidity Crossed Roller Bearing (With separator)
	CRBC	Standard Crossed Roller Bearing (With cage)
	CRB	Standard Crossed Roller Bearing (Full complement)
	CRBS	Slim Type Crossed Roller Bearing (With cage)
	CRBS ... A	Slim Type Crossed Roller Bearing (With separator)
	CRBS ... V	Slim Type Crossed Roller Bearing (Full complement)

② Bore diameter of bearing	Bore diameter of bearing (unit: mm)
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③ Width of bearing	Width of bearing (unit: mm)
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④ Supplemental code-1 (Mounting holes)	T	: With female threaded mounting holes on the inner ring
	No symbol	: With counter-bored mounting holes on both inner ring and outer ring in the same direction.
	D	: With counter-bored mounting holes on both inner ring and outer ring in the opposite direction.
Remark: Applicable to High Rigidity Crossed Roller Bearing only.		

⑤ Supplemental code-2 (Seal specification)

- No symbol : Open type
 - UU : Two sides sealed type
 - U : One side sealed type
 - UD : One side sealed in the opposite direction to counter bored mounting holes on outer ring
- For applicable codes, see Table 1.

Table 1 Seal specification for Crossed Roller Bearing

Mode code	No symbol	UU	U	UD
CRBF ... A	○	○	—	○
CRBH ... A	○	○	○	—
CRBC	○	○	○	—
CRB	○	○	○	—
CRBS	○	—	—	—
CRBS ... A	—	○	○	—
CRBS ... V	○	○	○	—

⑥ Supplemental code-3 (Internal Clearance)

- T1 : T1 clearance
 - C1 : C1 clearance
 - C2 : C2 clearance
 - No symbol : Normal clearance
- For applicable codes, see Table 2.

Table 2 Clearance specifications for Crossed Roller Bearing

Model code	T1	C1	C2	No symbol
CRBF ... A	○	○	○	—
CRBH ... A	○	○	○	—
CRBC	○	○	○	—
CRB	○	○	○	—
CRBS	○	○	—	○
CRBS ... A	○	○	—	○
CRBS ... V	○	○	—	○

⑦ Classification symbol

- No symbol : Accuracy class 0
 - P6 : Accuracy class 6
 - P5 : Accuracy class 5
 - P4 : Accuracy class 4
 - P2 : Accuracy class 2
- For applicable symbols, see Table 3.

Table 3 Accuracy of Crossed Roller Bearing

Model code	No symbol	P6	P5	P4	P2
CRBF ... A	○	○	○	○	○
CRBH ... A	○	○	○	○	○
CRBC	○	○	○	○	○
CRB	○	○	○	○	○
CRBS	○	—	—	—	—
CRBS ... A	○	—	—	—	—
CRBS ... V	○	—	—	—	—

Load Rating and Life

Basic dynamic load rating C

The basic dynamic load rating is defined as a constant radial load both in direction and magnitude under which a group of identical bearings are individually operated and 90% of the bearings in the group can rotate 1 million revolutions free from material damage due to rolling contact fatigue.

Life

The basic rating life of IKO Crossed Roller Bearings is obtained from the following formula.

$$L_{10} = \left(\frac{C}{P_r}\right)^{10/3} \quad (1)$$

where, L_{10} : Basic rating life, 10^6 rev.
 C : Basic dynamic load rating, N
 P_r : Dynamic equivalent radial load, N

If the number of revolutions per minute is known, the rating life in hours can be obtained from the following formula.

$$L_h = \frac{10^6 L_{10}}{60n} \quad (2)$$

where, L_h : Basic rating life in hours, h
 n : Number of revolutions per minute, rpm

Life in oscillating motion

When a bearing is used in oscillating motion, the life can be obtained from the following formula.

$$L_{oc} = \frac{90}{\theta} \left(\frac{C}{P_r}\right)^{10/3} \quad (3)$$

where, L_{oc} : Basic rating life in oscillating motion, 10^6 cycle
 2θ : Oscillating angle, degrees (Refer to Fig.1.)
 P_r : Dynamic equivalent radial load, N

If the number of oscillations per minute n_1 cpm is given, the rating life in hours can be obtained from Formula (2) by substituting n_1 for n .

When the oscillating angle 2θ is very small, oil film may not be formed between the rolling elements and the raceways, and fretting corrosion may occur. In this case, please consult IKO.

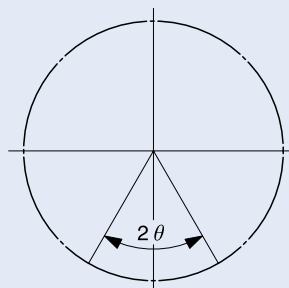


Fig.1 Oscillating motion

Limitations of life formulae

The above life formulae are applicable when the mounting and lubrication of bearing are normal and the bearing is used without intrusion of foreign matters under a normal operating condition and not under extreme severe condition.

If these conditions are not satisfied, the actual life may decrease rapidly.

For example, it is necessary to consider the additional factors, such as deformation of bearing by miss-mounting, large deformation of housing/shaft, large preload and use of unsuitable grease.

Furthermore, when the dynamic equivalent radial load exceeds 1/2 of the basic dynamic load rating, the life calculation formulae may not be used.

Dynamic equivalent radial load

The dynamic equivalent radial load of IKO Crossed Roller Bearings can be obtained from the following formula.

$$P_r = X\left(F_r + \frac{2M}{D_{pw}}\right) + YF_a \quad (4)$$

where, P_r : Dynamic equivalent radial load, N
 F_r : Radial load, N
 F_a : Axial load, N
 M : Moment, N·mm
 D_{pw} : Pitch circle diameter, mm ($D_{pw} \approx \frac{d+D}{2}$)
 X : Radial load factor (Refer to Table 2.)
 Y : Axial load factor (Refer to Table 2.)

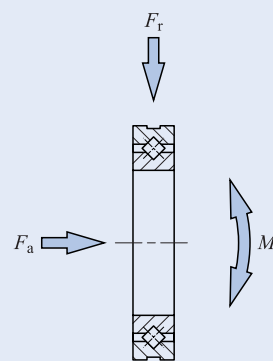


Fig.2 Load direction

Table 2 Radial load factor and axial load factor

Conditions	X	Y
$\frac{F_a}{F_r + 2M/D_{pw}} \leq 1.5$	1	0.45
$\frac{F_a}{F_r + 2M/D_{pw}} > 1.5$	0.67	0.67

Basic static load rating C_0

Basic static load rating is defined as a static load which gives a prescribed contact stress at the center of contact area between rolling elements and raceways on which the maximum load is applied.

Static safety factor

The static safety factor, f_s , of IKO Crossed Roller Bearings can be obtained from the following formula, and general values of this factor are shown in Table 3.

$$f_s = \frac{C_0}{P_{0r}} \quad (5)$$

where, f_s : Static safety factor
 C_0 : Basic static load rating, N
 P_{0r} : Static equivalent radial load (maximum load), N

Table 3 Static safety factors

Operating conditions	f_s
When high rotational accuracy is required.	≥ 3
Normal operation	≥ 1.5
When smooth rotation is not important under normal operation. Rotation without vibration. When bearing rotation is very little or none	≥ 1

Static equivalent radial load

The static equivalent radial load of IKO Crossed Roller Bearings can be obtained from the following formula.

$$P_{0r} = F_r + \frac{2M}{D_{pw}} + 0.44F_a \quad (6)$$

where, P_{0r} : Static equivalent radial load, N
 F_r : Radial load, N
 F_a : Axial load, N
 M : Moment, N·mm
 D_{pw} : Pitch circle diameter, mm ($D_{pw} \approx \frac{d+D}{2}$)

Load factor

Actual loads applied to the Crossed Roller Bearing sometimes exceed the theoretically calculated load due to the vibration and shocks caused by machine operation. The life is calculated from the following formula while considering the load factor shown in Table 4.

$$F = f_w F_c \quad (7)$$

where, F : Load for life calculation, N
 f_w : Load factor (See Table 4)
 F_c : Theoretical calculated load, N

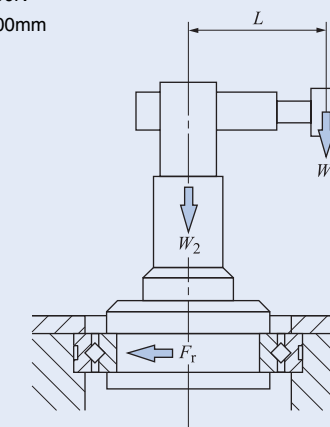
Table 4 Load factor

condition	f_w
Smooth operation free from vibration and/or shocks	1 ~ 1.2
Normal operation	1.2 ~ 1.5
Operation with shock loads	1.5 ~ 3

Life calculation example

BearingCRBH15025A
 Bore diameter $d = 150$ mm
 Outside diameter $D = 210$ mm
 Basic dynamic load rating $C = 84300$ N
 Basic static load rating $C_0 = 138000$ N

$W_1 = 400$ N
 $W_2 = 2000$ N
 $F_r = 2800$ N
 $L = 700$ mm



Calculate the life and the static safety factor under the above conditions.

Radial load : $F_r = 2800$ (N)
 Axial load : $F_a = W_1 + W_2 = 400 + 2000 = 2400$ (N)
 Moment : $M = W_1 L = 400 \times 700 = 280000$ (N·mm)

Pitch circle diameter : $D_{pw} \approx \frac{d+D}{2} = \frac{150+210}{2} = 180$ (mm)

$$\frac{F_a}{F_r + 2M/D_{pw}} = \frac{2400}{2800 + 2 \times 280000/180} \approx 0.406 < 1.5$$

Therefore ; $X = 1$, $Y = 0.45$

The theoretically calculated dynamic equivalent radial load P_r is ;

$$P_r = X\left(F_r + \frac{2M}{D_{pw}}\right) + YF_a = 1 \times \left(2800 + \frac{2 \times 280000}{180}\right) + 0.45 \times 2400 \approx 6990$$
 (N)

And the theoretically calculated static equivalent radial load P_{0r} is ;

$$P_{0r} = F_r + \frac{2M}{D_{pw}} + 0.44F_a = 2800 + \frac{2 \times 280000}{180} + 0.44 \times 2400 \approx 6970$$
 (N)

Therefore, the basic rating life L_{10} is ;

$$L_{10} = \left(\frac{C}{P_r}\right)^{10/3} = \left(\frac{84300}{6990}\right)^{10/3} \approx 4023$$
 ($\times 10^6$ rev.)

And the static safety factor f_s considering the load factor is ;

$$f_s = \frac{C_0}{P_{0r}} = \frac{138000}{6970} \approx 19.8$$

1N=0.102kgf=0.2248lbs.
 1mm=0.03937inch

Table 9 Accuracy of Slim Type Crossed Roller Bearings

unit: μm

d Nominal bore diameter mm	Δd_{mp} Single plane mean bore diameter deviation		ΔD_{mp} Single plane mean outside diameter deviation		ΔB_s and ΔC_s Deviations of a single inner ring width and outer ring width		K_{ia} and S_{ia} Radial and axial run-out of assembled bearing inner ring	K_{ea} and S_{ea} Radial and axial run-out of assembled bearing outer ring
	high	low	high	low	high	low		
50	0	-15	0	-13	0	-127	13	13
60	0	-15	0	-13	0	-127	13	13
70	0	-15	0	-15	0	-127	15	15
80	0	-20	0	-15	0	-127	15	15
90	0	-20	0	-15	0	-127	15	15
100	0	-20	0	-15	0	-127	15	15
110	0	-20	0	-20	0	-127	20	20
120	0	-25	0	-20	0	-127	20	20
130	0	-25	0	-25	0	-127	25	25
140	0	-25	0	-25	0	-127	25	25
150	0	-25	0	-25	0	-127	25	25
160	0	-25	0	-25	0	-127	25	25
170	0	-25	0	-30	0	-127	25	25
180	0	-30	0	-30	0	-127	30	30
190	0	-30	0	-30	0	-127	30	30
200	0	-30	0	-30	0	-127	30	30

Clearance

The radial internal clearances of IKO Crossed Roller Bearing are shown in Table 10.1. The radial internal clearances of High Rigidity Crossed Roller Bearing and those of Slim Type Crossed Roller Bearings are shown in Table 10.2 and 10.3.

Table 10.1 Radial internal clearance

unit: μm

d Nominal bore diameter of bearing mm	Radial internal clearances						
	T1		C1		C2		
over	incl.	Min.	Max.	Min.	Max.	Min.	Max.
-	30	-10	0	0	10	10	20
30	40	-10	0	0	10	10	20
40	50	-10	0	0	10	10	25
50	65	-10	0	0	10	10	25
65	80	-10	0	0	15	15	30
80	100	-10	0	0	15	15	35
100	120	-15	0	0	15	15	35
120	140	-15	0	0	20	20	45
140	160	-15	0	0	20	20	50
160	200	-15	0	0	20	20	50
200	250	-20	0	0	25	25	60
250	315	-20	0	0	25	25	60
315	400	-25	0	0	30	30	70
400	500	-30	0	0	40	40	85
500	630	-30	0	0	50	50	100
630	710	-30	0	0	60	60	120
710	800	-40	0	0	70	70	140

Remark: This table is not applicable to High Rigidity Mounting Holed Crossed Roller Bearing and Slim Type Crossed Roller Bearings.

Table 10.2 Radial internal clearance for High Rigidity Mounting Holed Crossed Roller bearing

unit: μm

d Nominal bore diameter of bearing mm	Radial internal clearances						
	T1		C1		C2		
over	incl.	Min.	Max.	Min.	Max.	Min.	Max.
-	20	-10	0	0	10	10	20
20	25	-10	0	0	10	10	20
25	35	-10	0	0	10	10	25
35	65	-10	0	0	15	15	30
65	80	-10	0	0	15	15	35

Table 10.3 Radial internal clearance

unit: μm

d Nominal bore diameter of bearing mm	Radial internal clearances					
	T1		C1		Normal	
	Min.	Max.	Min.	Max.	Min.	Max.
50	-8	0	0	15	30	56
60	-8	0	0	15	30	56
70	-8	0	0	15	30	56
80	-8	0	0	15	41	66
90	-8	0	0	15	41	66
100	-8	0	0	15	41	66
110	-8	0	0	15	41	66
120	-8	0	0	15	51	76
130	-8	0	0	15	51	76
140	-8	0	0	15	51	76
150	-8	0	0	15	51	76
160	-10	0	0	20	51	76
170	-10	0	0	20	51	76
180	-10	0	0	20	61	86
190	-10	0	0	20	61	86
200	-10	0	0	20	61	86

Fit

The standard fits of IKO Crossed Roller Bearings are shown in Table 11.1.

Those of Slim Type Crossed Roller Bearings with normal clearance are shown in Table 11.2. For large bearings, fit based on the actual measured dimensions of the bearings is recommended, and fit allowance should be chosen as small as possible in accordance with the tolerance class given in Table 11.1. When complex loads and / or shock loads are applied or when high rotational accuracy and rigidity of the bearing are required, it is recommended to use a slight interference fit adjusted to the actual measured dimensions for both inner and outer rings.

For the interference fit, the radial internal clearance after the fit is decreased by approximately 70% to 90% of the interference amount. To avoid excessive preload due to fit, it is recommended to use a slight interference fit adjusted to the actual measured dimensions for both T1 and C1 clearances.

Allowable rotational speed

Allowable rotational speeds of Crossed Roller bearings are affected by mounting and operating conditions. The values in general operation are shown in Table 12.

Table 12 $d_m n$ values⁽¹⁾ of Crossed Roller bearings

Type	Lubricant		Grease	Oil
	Open type	Sealed type		
With cage or separator	Open type	Sealed type	75 000	150 000
	Sealed type	Open type	60 000	—
Full complement	Open type	Sealed type	50 000	75 000
	Sealed type	Open type	40 000	—

Note(1): $d_m n$ Value = $d_m \times n$

where, d_m : Mean values of bearing bore and outside diameters, mm
 n : Number of rotations per minutes, rpm

Table 11.1 Recommended fits for Crossed Roller Bearings under normal load

Radial internal clearance	Inner ring rotating load		Outer ring rotating load	
	Shaft	Housing bore	Shaft	Housing bore
C1 clearance	h5	H7	g5	J7 ⁽¹⁾
C2 clearance	j5	H7	g5	J7 ⁽¹⁾

Note(1): It is recommended that a slight interference fit adjusted to the actual measured dimensions of the bearing is used.

Table 11.2 Recommended fits for Slim Type Crossed Roller bearings with normal clearances (Dimensional tolerances of shaft and housing bore)

unit: μ m

Nominal bore diameter d mm	Inner ring rotational load				Outer ring rotational load			
	Shaft		Housing bore		Shaft		Housing bore	
	High	Low	High	Low	High	Low	High	Low
50	+15	0	+13	0	-15	-30	-13	-25
60	+15	0	+13	0	-15	-30	-13	-25
70	+15	0	+15	0	-15	-30	-15	-30
80	+20	0	+15	0	-20	-40	-15	-30
90	+20	0	+15	0	-20	-40	-15	-30
100	+20	0	+15	0	-20	-40	-15	-30
110	+20	0	+20	0	-20	-40	-20	-40
120	+25	0	+20	0	-25	-50	-20	-40
130	+25	0	+25	0	-25	-50	-25	-50
140	+25	0	+25	0	-25	-50	-25	-50
150	+25	0	+25	0	-25	-50	-25	-50
160	+25	0	+25	0	-25	-50	-25	-50
170	+25	0	+30	0	-25	-50	-30	-60
180	+30	0	+30	0	-30	-60	-30	-60
190	+30	0	+30	0	-30	-60	-30	-60
200	+30	0	+30	0	-30	-60	-30	-60

Rotational torque

Rotational torque of IKO Crossed Roller Bearings is lower than that of plain bearings and the difference between the static torque and the dynamic (kinetic) torque is small. Therefore, this bearing minimizes power consumption and operating temperature rise of machinery and increases the overall efficiency of the machine.

The rotational torque is affected by many factors, and the following formula is used.

$$T = \mu P_{0r} \frac{D_{pw}}{2}$$

where, T : Rotational torque, N·mm

μ : Friction coefficient (Approx. 0.010)

P_{0r} : Static equivalent radial load, N

D_{pw} : Pitch circle diameter, mm ($D_{pw} \approx \frac{d+D}{2}$)

If the radial clearance after mounting is a large minus value, consult IKO.

Lubrication

These bearings are generally lubricated with grease. In re-lubrication, grease can be supplied through the clearance between the outer ring and inner ring.

In the sealed type bearings, ALVANIA EP grease 2 (SHELL) is prepacked as standard.

For the bearings supplied without lubricant, customer is supposed to apply lubricant. Operating without grease or oil will increase the wear of the rolling contact surfaces and cause a short bearing life.

When using special grease, carefully examine the grease properties and contents such as base oil viscosity and extreme pressure additives. In this case, please contact IKO.

Oil hole

For Crossed Roller Bearings, oil holes and oil grooves can be provided by request. When an oil hole is required on the outer ring, attach "-OH" before the clearance symbol in the identification number. When an oil hole and oil groove are required on the outer ring, attach "-OG" in the same manner. For an oil hole on the inner ring, attach "/OH", and for an oil hole and oil groove on the inner ring, attach "/OG", in the same manner as well. High Rigidity Type Crossed Roller Bearings have an oil groove and two oil holes on the outer ring as standard. Table 13 shows availability of oil holes for each bearing type.

Table 13 Oil holes

Bearing type	Oil hole code			
	/nOH	/nOG	-nOH	-nOG
CRBF	—	—	—	— ⁽²⁾
CRBH	○	○	—	— ⁽²⁾
CRB	○	○	○	○
CRBC	○	○	○	○
CRBS	○	—	○	—

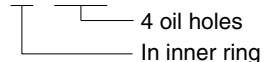
Note(1): Only representative types are shown in the table, but this table is applicable to all Crossed Roller Bearings.

(2): CRBH and CRBF are provided with an oil groove and two oil holes on the outer ring.

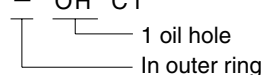
Remark: n denotes the number of oil holes not exceeding 4. For one oil hole, number is not indicated.

When preparing multiple oil holes, please consult IKO.

Example 1 In case of 4 oil holes in the inner ring

CRBC 10020 / 4OH C1


Example 2 In case of 1 oil hole in the outer ring

CRBC 10020 - OH C1


Operating temperature range

The operating temperature range for Crossed Roller bearings is -20°C to +120°C. However, the maximum allowable temperature for those with separator and with seal is +110°C, and +100°C when they are in continuous use under such temperature.

Mounting

When the rigidity of the mounting parts is not sufficient, stress concentration will occur at the contact area between the rollers and raceways, and the bearing performance will be deteriorated significantly.

Therefore, it is necessary to carefully examine the rigidity of housing and the strength of fixing bolts when a large moment will be applied.

The shoulder height diameters (d_a and D_a) that are related to mounting should certainly satisfy the values shown in the dimension tables. When these dimensions are incorrect, deformations of inner and outer rings will occur and the bearing performance will be deteriorated remarkably.

1. For Mounting Holed Type High Rigidity Crossed Roller Bearing

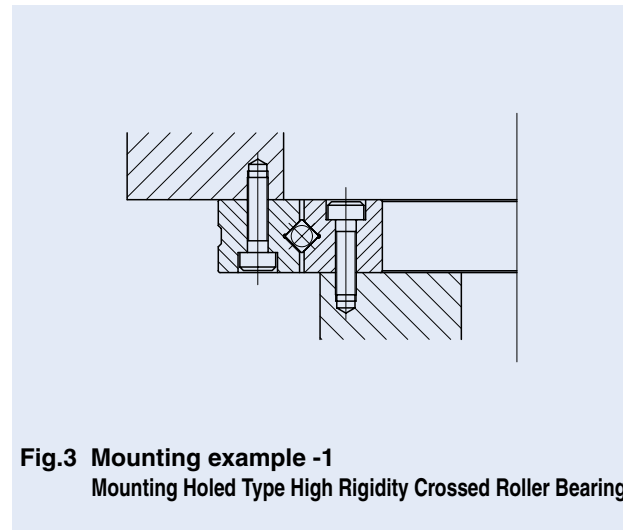


Fig.3 Mounting example -1
Mounting Holed Type High Rigidity Crossed Roller Bearing

① Mounting Holed Type High Rigidity Crossed Roller Bearing can be mounted directly to the mounting surface by fixing bolts. (See Fig.3)

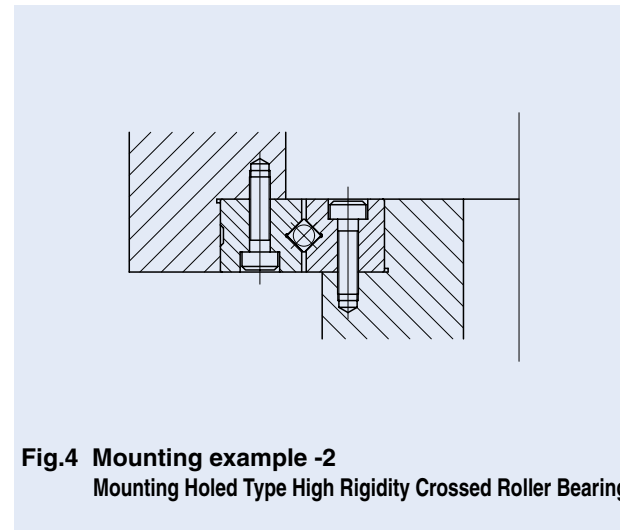


Fig.4 Mounting example -2
Mounting Holed Type High Rigidity Crossed Roller Bearing

② If large number of radial load and/or moment is expected, it is recommended to prepare flange part. (See Fig.4)

③ Mounting Holed Type High Rigidity Crossed Roller Bearing has a plug for hole for inserting cylindrical rollers. When mounting the bearings, locate the plug at a position that is not included in the maximum loading zone. The plug location can be found by the pin that is at the side of the outer ring.

2. For other Crossed Roller Bearings

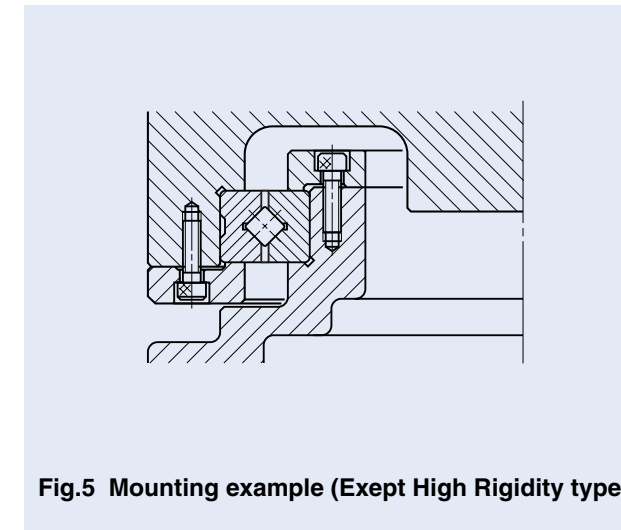


Fig.5 Mounting example (Exept High Rigidity type)

① The inner and outer rings should be securely fixed in the axial direction by using fixing plates, etc. Recommended thickness of the fixing plate is 1/2 or more of the bearing width (B). The dimensions in axial direction of the housing bore and the fixing plates should be decided to get a secure fixing while considering the actual dimension of bearing width which is zero/minus-tolerance. (See Fig.5)

② The depth of housing bore is recommended to be the same to or larger than the bearing width.

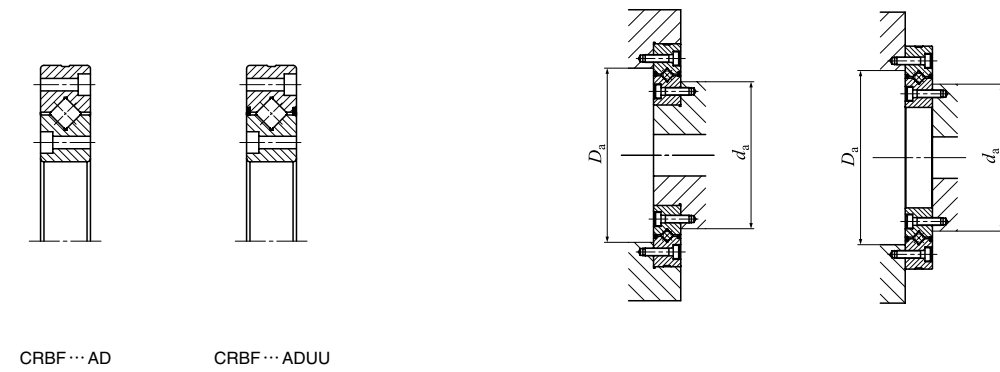
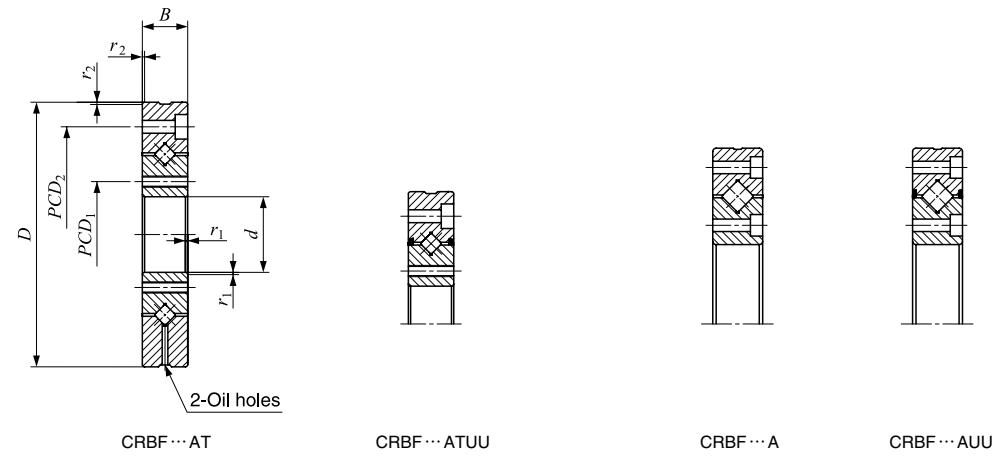
③ Separation prevention bolts for the outer ring are provided to prevent separation of the two halves of the outer ring during transportation or mounting. When mounting, they should be loosened slightly.

④ High Rigidity Crossed Roller Bearing has a plug for hole for inserting cylindrical rollers. When mounting the bearings, locate the plug at a position that is not included in the maximum loading zone. The plug location can be found by the pin that is at the side of the outer ring.

Mounting Holed Type High Rigidity Open type with separator

Crossed Roller Bearings

Two sides sealed type with separator



Shaft diameter mm	Identification number		Weight (Ref.) kg	Boundary dim. mm				
	Open type	Two side seals type		d	D	B	r _{1min} ⁽¹⁾	r _{2min} ⁽¹⁾
10	CRBF 108 AT	CRBF 108 AT UU	0.12	10	52	8	0.3	0.3
20	CRBF 2012 AT	CRBF 2012 AT UU	0.31	20	70	12	0.3	0.3
25	CRBF 2512 AT	CRBF 2512 AT UU	0.40	25	80	12	0.6	0.6
35	CRBF 3515 AT	CRBF 3515 AT UU	0.66	35	95	15	0.6	0.6
55	CRBF 5515 AT	CRBF 5515 AT UU	0.96	55	120	15	0.6	0.6
80	CRBF 8022 AT	CRBF 8022 AT UU	2.63	80	165	22	0.6	1
	CRBF 8022 A	CRBF 8022 A UU	2.60					
	CRBF 8022 AD	CRBF 8022 AD UU						

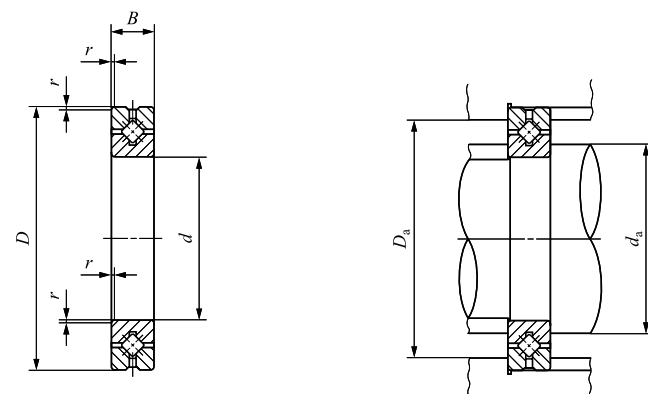
PCD ₁	Mounting holes mm		PCD ₂	Mounting dimensions mm		Basic dynamic load rating C N	Basic static load rating C ₀ N
	Inner ring Mounting holes	Outer ring Mounting holes		d _a	D _a		
16	4-M3 through	6-φ 3.4 through φ 6.5 counter bore depth 3.3	42	24	31	2 910	2 430
28	6-M3 through	6-φ 3.4 through φ 6.5 counter bore depth 3.3	57	36.5	48.5	7 600	8 370
35	6-M3 through	6-φ 3.4 through φ 6.5 counter bore depth 3.3	67	46.5	58.5	8 610	10 600
45	8-M4 through	8-φ 4.5 through φ 8 counter bore depth 4.4	83	56	74	17 300	20 900
65	8-M5 through	8-φ 5.5 through φ 9.5 counter bore depth 5.4	105	76	94	20 100	27 700
97	10-M5 through	10-φ 5.5 through φ 9.5 counter bore depth 5.4	148	107	137	51 100	72 000
	10-φ 5.5 through φ 9.5 counter bore depth 5.4						

Note(1): Minimum allowable single value of chamfer r₁ and r₂.

Remarks 1. Outer ring has an oil groove and two oil holes.

2. Open type is supplied without grease. Perform proper lubrication. Grease is pre-packed in tow sides sealed type.

High Rigidity Crossed Roller Bearings Open type with separator

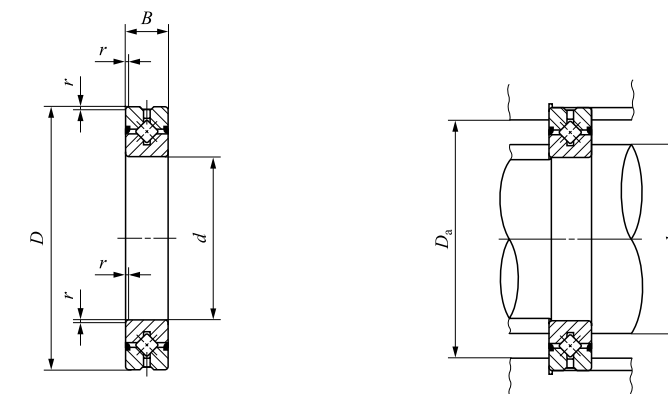


CRBH...A

Shaft diameter mm	Identification number	Weight (Ref.) kg	Boundary dim. mm				Mounting dimensions mm		Basic dynamic load rating C N	Basic static load rating C ₀ N
			d	D	B	r ⁽¹⁾ r _{min}	d _a	D _a		
20	CRBH 208 A	0.04	20	36	8	0.3	24	31	2 910	2 430
25	CRBH 258 A	0.05	25	41	8	0.3	29	36	3 120	2 810
30	CRBH 3010 A	0.12	30	55	10	0.3	36.5	48.5	7 600	8 370
35	CRBH 3510 A	0.13	35	60	10	0.3	41.5	53.5	7 900	9 130
40	CRBH 4010 A	0.15	40	65	10	0.3	46.5	58.5	8 610	10 600
45	CRBH 4510 A	0.16	45	70	10	0.3	51.5	63.5	8 860	11 300
50	CRBH 5013 A	0.29	50	80	13	0.6	56	74	17 300	20 900
60	CRBH 6013 A	0.33	60	90	13	0.6	66	84	18 800	24 300
70	CRBH 7013 A	0.38	70	100	13	0.6	76	94	20 100	27 700
80	CRBH 8016 A	0.74	80	120	16	0.6	88	112	32 100	43 400
90	CRBH 9016 A	0.81	90	130	16	0.6	98	122	33 100	46 800
100	CRBH 10020 A	1.45	100	150	20	0.6	110	140	50 900	72 200
110	CRBH 11020 A	1.56	110	160	20	0.6	120	150	52 400	77 400
120	CRBH 12025 A	2.62	120	180	25	1	132	168	73 400	108 000
130	CRBH 13025 A	2.82	130	190	25	1	142	178	75 900	115 000
140	CRBH 14025 A	2.96	140	200	25	1	152	188	81 900	130 000
150	CRBH 15025 A	3.16	150	210	25	1	162	198	84 300	138 000
200	CRBH 20025 A	4.0	200	260	25	1	212	248	92 300	169 000
250	CRBH 25025 A	4.97	250	310	25	1.5	262	298	102 000	207 000

Note(1): Minimum allowable single value of chamfer r.
 Remarks 1. Outer ring has an oil groove and two oil holes.
 2. Open type is supplied without grease. Perform proper lubrication.

High Rigidity Crossed Roller Bearings Two sides sealed type with separator



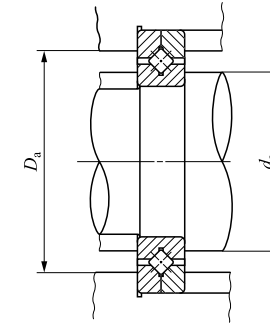
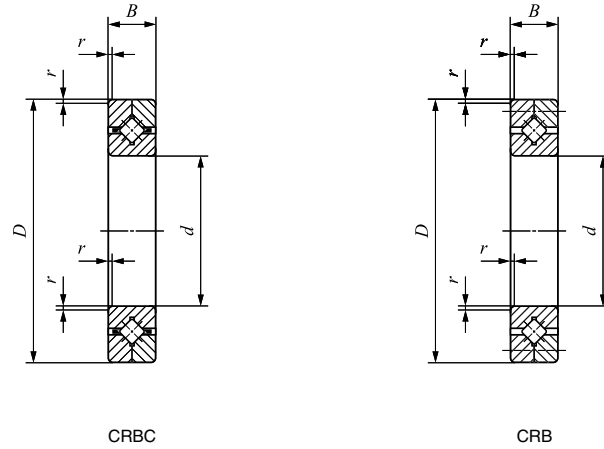
CRBH...AUU

Shaft diameter mm	Identification number	Weight (Ref.) kg	Boundary dim. mm				Mounting dimensions mm		Basic dynamic load rating C N	Basic static load rating C ₀ N
			d	D	B	r ⁽¹⁾ r _{min}	d _a	D _a		
20	CRBH 208 A UU	0.04	20	36	8	0.3	24	31	2 910	2 430
25	CRBH 258 A UU	0.05	25	41	8	0.3	29	36	3 120	2 810
30	CRBH 3010 A UU	0.12	30	55	10	0.3	36.5	48.5	7 600	8 370
35	CRBH 3510 A UU	0.13	35	60	10	0.3	41.5	53.5	7 900	9 130
40	CRBH 4010 A UU	0.15	40	65	10	0.3	46.5	58.5	8 610	10 600
45	CRBH 4510 A UU	0.16	45	70	10	0.3	51.5	63.5	8 860	11 300
50	CRBH 5013 A UU	0.29	50	80	13	0.6	56	74	17 300	20 900
60	CRBH 6013 A UU	0.33	60	90	13	0.6	66	84	18 800	24 300
70	CRBH 7013 A UU	0.38	70	100	13	0.6	76	94	20 100	27 700
80	CRBH 8016 A UU	0.74	80	120	16	0.6	88	112	32 100	43 400
90	CRBH 9016 A UU	0.81	90	130	16	0.6	98	122	33 100	46 800
100	CRBH 10020 A UU	1.45	100	150	20	0.6	110	140	50 900	72 200
110	CRBH 11020 A UU	1.56	110	160	20	0.6	120	150	52 400	77 400
120	CRBH 12025 A UU	2.62	120	180	25	1	132	168	73 400	108 000
130	CRBH 13025 A UU	2.82	130	190	25	1	142	178	75 900	115 000
140	CRBH 14025 A UU	2.96	140	200	25	1	152	188	81 900	130 000
150	CRBH 15025 A UU	3.16	150	210	25	1	162	198	84 300	138 000
200	CRBH 20025 A UU	4.0	200	260	25	1	212	248	92 300	169 000
250	CRBH 25025 A UU	4.97	250	310	25	1.5	262	298	102 000	207 000

Note(1): Minimum allowable single value of chamfer r.
 Remarks 1. Outer ring has an oil groove and two oil holes.
 2. Grease is pre-packed.

Standard Crossed Roller Bearings

Standard type (With cage)
Standard type (Full complement)



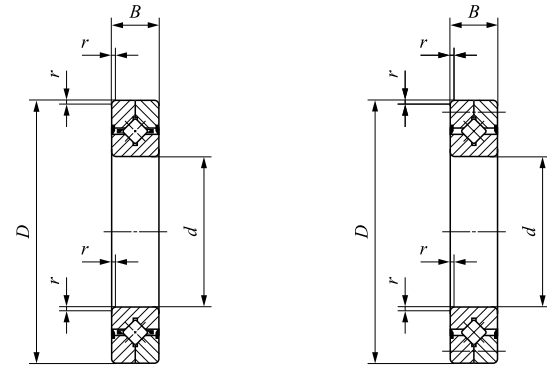
Shaft diameter mm	Identification number		Weight (Ref.) kg	Boundary dim. mm				Mounting dimensions mm		CRBC		CRB	
	With cage	Full complement		d	D	B	$r_{min}^{(1)}$	d_a	D_a	Basic dynamic load rating	Basic static load rating	Basic dynamic load rating	Basic static load rating
										C	C_0	C	C_0
30	CRBC 3010	CRB 3010	0.12	30	55	10	0.3	34	44	3 830	4 130	5 290	6 350
40	CRBC 4010	CRB 4010	0.15	40	65	10	0.3	44	54	4 280	5 140	5 980	8 040
50	CRBC 5013	CRB 5013	0.29	50	80	13	0.6	55	71	10 700	12 600	14 200	18 400
60	CRBC 6013	CRB 6013	0.33	60	90	13	0.6	64	81	11 600	14 600	15 400	21 500
70	CRBC 7013	CRB 7013	0.38	70	100	13	0.6	75	91	12 300	16 700	17 000	25 500
80	CRBC 8016	CRB 8016	0.74	80	120	16	0.6	86	107	18 200	25 500	24 300	37 500
90	CRBC 9016	CRB 9016	0.81	90	130	16	1	98	118	19 400	28 600	25 900	42 100
100	CRBC 10020	CRB 10020	1.45	100	150	20	1	108	134	31 500	45 100	39 400	61 100
110	CRBC 11020	CRB 11020	1.56	110	160	20	1	118	144	33 500	50 700	41 200	66 700
120	CRBC 12025	CRB 12025	2.62	120	180	25	1.5	132	164	47 700	70 500	59 900	95 400
130	CRBC 13025	CRB 13025	2.82	130	190	25	1.5	140	172	49 200	74 800	61 000	99 800
140	CRBC 14025	CRB 14025	2.96	140	200	25	1.5	151	183	50 700	79 200	64 100	108 000
150	CRBC 15025	CRB 15025	3.16	150	210	25	1.5	160	192	53 800	87 700	65 000	113 000
	CRBC 15030	CRB 15030	5.3	150	230	30	1.5	166	202	69 200	108 000	85 900	144 000
200	CRBC 20025	CRB 20025	4.0	200	260	25	2	208	239	60 200	110 000	75 300	148 000
	CRBC 20030	CRB 20030	6.7	200	280	30	2	218	262	108 000	178 000	133 000	234 000
	CRBC 20035	CRB 20035	9.58	200	295	35	2	221	274	137 000	215 000	168 000	282 000
250	CRBC 25025	CRB 25025	4.97	250	310	25	2.5	259	290	67 200	136 000	83 900	183 000
	CRBC 25030	CRB 25030	8.1	250	330	30	2.5	265	310	116 000	208 000	146 000	283 000
	CRBC 25040	CRB 25040	14.8	250	355	40	2.5	271	330	179 000	299 000	215 000	382 000

Shaft diameter mm	Identification number		Weight (Ref.) kg	Boundary dim. mm				Mounting dimensions mm		CRBC		CRB	
	With cage	Full complement		d	D	B	$r_{min}^{(1)}$	d_a	D_a	Basic dynamic load rating	Basic static load rating	Basic dynamic load rating	Basic static load rating
										C	C_0	C	C_0
300	CRBC 30025	CRB 30025	5.88	300	360	25	2.5	310	341	73 800	162 000	91 900	217 000
	CRBC 30035	CRB 30035	13.4	300	395	35	2.5	318	372	163 000	299 000	205 000	408 000
	CRBC 30040	CRB 30040	17.2	300	405	40	2.5	321	381	194 000	351 000	235 000	451 000
400	CRBC 40035	CRB 40035	14.5	400	480	35	2.5	414	457	133 000	300 000	165 000	400 000
	CRBC 40040	CRB 40040	23.5	400	510	40	2.5	423	483	222 000	455 000	270 000	590 000
	CRBC 40070	CRB 40070	72.4	400	580	70	2.5	430	532	470 000	811 000	576 000	1 060 000
500	CRBC 50040	CRB 50040	26.0	500	600	40	2.5	517	573	212 000	497 000	259 000	648 000
	CRBC 50050	CRB 50050	41.7	500	625	50	2.5	531	592	247 000	561 000	306 000	747 000
	CRBC 50070	CRB 50070	86.1	500	680	70	2.5	530	633	536 000	1 020 000	653 000	1 330 000
600	CRBC 60040	CRB 60040	30.6	600	700	40	3	621	676	231 000	581 000	287 000	774 000
	CRBC 60070	CRB 60070	102	600	780	70	3	630	734	591 000	1 230 000	700 000	1 540 000
	CRBC 600120	CRB 600120	274	600	870	120	3	643	817	1 250 000	2 210 000	1 490 000	2 800 000
700	CRBC 70045	CRB 70045	46.5	700	815	45	3	730	785	250 000	681 000	313 000	917 000
	CRBC 70070	CRB 70070	115	700	880	70	3	731	834	630 000	1 390 000	766 000	1 810 000
	CRBC 700150	CRB 700150	478	700	1 020	150	3	751	953	1 660 000	3 010 000	1 980 000	3 820 000
800	CRBC 80070	CRB 80070	109	800	950	70	4	831	907	417 000	1 090 000	513 000	1 440 000
	CRBC 800100	CRB 800100	247	800	1 030	100	4	840	972	936 000	2 040 000	1 140 000	2 640 000

Note⁽¹⁾: Minimum allowable single value of chamfer r .
Remarks 1. Oil hole is not provided.
2. Grease is not pre-packed. Perform proper lubrication.

Standard Crossed Roller Bearings Two sides sealed type (With cage)

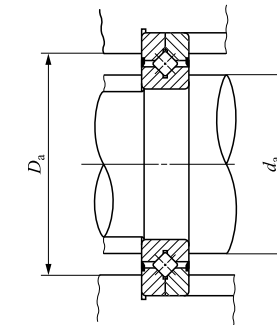
Two sides sealed type (Full complement)



CRBC...UU

CRB...UU

Shaft diameter mm	Identification number		Weight (Ref.) kg	Boundary dim. mm				Mounting dimensions mm		CRBC...UU		CRB...UU	
	With cage	Full complement		d	D	B	r _{min} ⁽¹⁾	d _a	D _a	Basic dynamic load rating C N	Basic static load rating C ₀ N	Basic dynamic load rating C N	Basic static load rating C ₀ N
30	CRBC 3010 UU	CRB 3010 UU	0.12	30	55	10	0.3	34	44	3 830	4 130	5 290	6 350
40	CRBC 4010 UU	CRB 4010 UU	0.15	40	65	10	0.3	44	54	4 280	5 140	5 980	8 040
50	CRBC 5013 UU	CRB 5013 UU	0.29	50	80	13	0.6	55	71	10 700	12 600	14 200	18 400
60	CRBC 6013 UU	CRB 6013 UU	0.33	60	90	13	0.6	64	81	11 600	14 600	15 400	21 500
70	CRBC 7013 UU	CRB 7013 UU	0.38	70	100	13	0.6	75	91	12 300	16 700	17 000	25 500
80	CRBC 8016 UU	CRB 8016 UU	0.74	80	120	16	0.6	86	107	18 200	25 500	24 300	37 500
90	CRBC 9016 UU	CRB 9016 UU	0.81	90	130	16	1	98	118	19 400	28 600	25 900	42 100
100	CRBC 10020 UU	CRB 10020 UU	1.45	100	150	20	1	108	134	31 500	45 100	39 400	61 100
110	CRBC 11020 UU	CRB 11020 UU	1.56	110	160	20	1	118	144	33 500	50 700	41 200	66 700



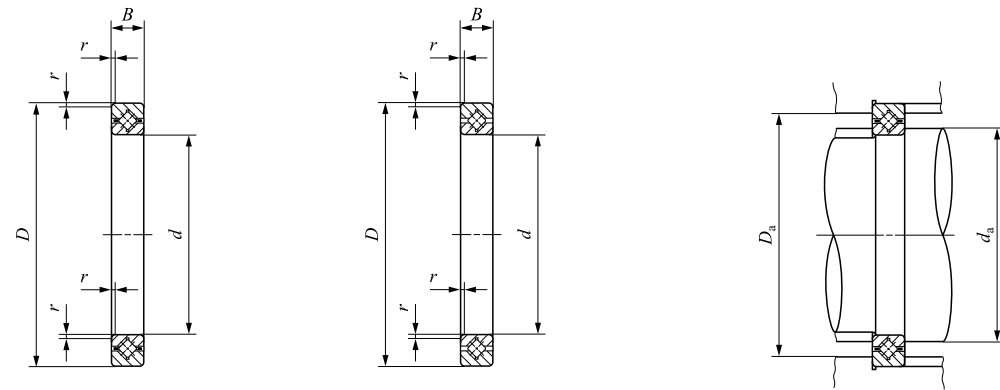
Shaft diameter mm	Identification number		Weight (Ref.) kg	Boundary dim. mm				Mounting dimensions mm		CRBC...UU		CRB...UU	
	With cage	Full complement		d	D	B	r _{min} ⁽¹⁾	d _a	D _a	Basic dynamic load rating C N	Basic static load rating C ₀ N	Basic dynamic load rating C N	Basic static load rating C ₀ N
120	CRBC 12025 UU	CRB 12025 UU	2.62	120	180	25	1.5	132	164	47 700	70 500	59 900	95 400
130	CRBC 13025 UU	CRB 13025 UU	2.82	130	190	25	1.5	140	172	49 200	74 800	61 000	99 800
140	CRBC 14025 UU	CRB 14025 UU	2.96	140	200	25	1.5	151	183	50 700	79 200	64 100	108 000
150	CRBC 15025 UU	CRB 15025 UU	3.16	150	210	25	1.5	160	192	53 800	87 700	65 000	113 000
	CRBC 15030 UU	CRB 15030 UU	5.3	150	230	30	1.5	166	202	69 200	108 000	85 900	144 000
200	CRBC 20025 UU	CRB 20025 UU	4.0	200	260	25	2	208	239	60 200	110 000	75 300	148 000
250	CRBC 25025 UU	CRB 25025 UU	4.97	250	310	25	2.5	259	290	67 200	136 000	83 900	183 000
300	CRBC 30025 UU	CRB 30025 UU	5.88	300	360	25	2.5	310	341	73 800	162 000	91 900	217 000

Note⁽¹⁾: Minimum allowable single value of chamfer r.

Remarks 1. Oil hole is not provided.

2. Grease is not pre-packed. Perform proper lubrication.

Slim Type Crossed Roller Bearings Open type (With cage)
Open type (Full complement)



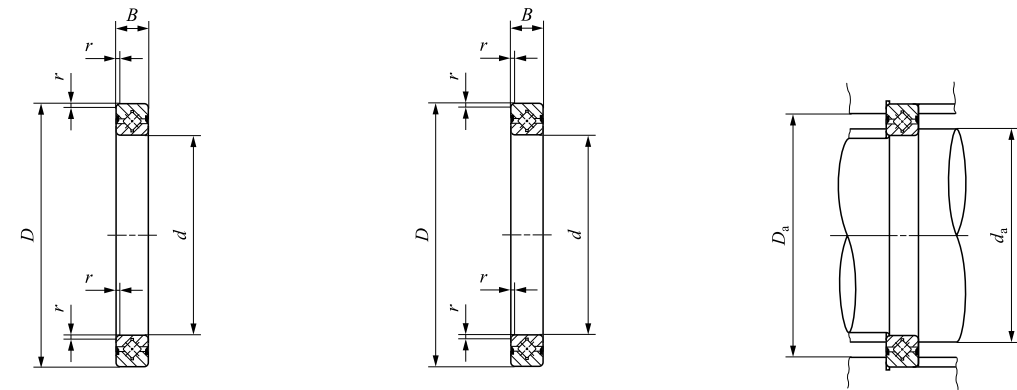
CRBS

CRBS...V

Shaft diameter mm	Identification number		Weight (Ref.) kg	Boundary dim. mm				Mounting dimensions mm		CRBS		CRBS...V	
	With cage	Full complement		d	D	B	r _{min} ⁽¹⁾	d _a	D _a	Basic dynamic load rating	Basic static load rating	Basic dynamic load rating	Basic static load rating
										C N	C ₀ N	C N	C ₀ N
50	CRBS 508	CRBS 508 V	84	50	66	8	0.4	54	61	4 900	6 170	6 930	9 800
60	CRBS 608	CRBS 608 V	94	60	76	8	0.4	64	71	5 350	7 310	7 600	11 700
70	CRBS 708	CRBS 708 V	108	70	86	8	0.4	74	81	5 740	8 440	8 190	13 600
80	CRBS 808	CRBS 808 V	122	80	96	8	0.4	84	91	6 130	9 590	8 790	15 500
90	CRBS 908	CRBS 908 V	135	90	106	8	0.4	94	101	6 490	10 700	9 310	17 400
100	CRBS 1008	CRBS 1008 V	152	100	116	8	0.4	104	111	6 850	11 900	9 850	19 300
110	CRBS 1108	CRBS 1108 V	163	110	126	8	0.4	114	121	7 160	13 000	10 300	21 200
120	CRBS 1208	CRBS 1208 V	184	120	136	8	0.4	124	131	7 530	14 100	10 900	23 000
130	CRBS 1308	CRBS 1308 V	199	130	146	8	0.4	134	141	7 860	15 300	11 200	24 600
140	CRBS 1408	CRBS 1408 V	205	140	156	8	0.4	144	151	8 060	16 400	11 700	26 800
150	CRBS 1508	CRBS 1508 V	220	150	166	8	0.4	154	161	8 350	17 500	12 100	28 700
160	CRBS 16013	CRBS 16013 V	620	160	186	13	0.6	166	179	20 300	39 900	26 900	58 200
170	CRBS 17013	CRBS 17013 V	675	170	196	13	0.6	176	189	20 900	42 200	27 800	61 600
180	CRBS 18013	CRBS 18013 V	710	180	206	13	0.6	186	199	21 500	44 600	28 600	65 200
190	CRBS 19013	CRBS 19013 V	740	190	216	13	0.6	196	209	22 100	46 900	29 300	68 600
200	CRBS 20013	CRBS 20013 V	780	200	226	13	0.6	206	219	22 500	49 300	30 000	72 200

Note(1): Minimum allowable single value of chamfer r.
Remarks 1. Oil hole is not provided.
2. Grease is not pre-packed. Perform proper lubrication.

Slim Type Crossed Roller Bearings Two sides sealed type (With cage)
Two sides sealed type (Full complement)



CRBS...AUU

CRBS...VUU

Shaft diameter mm	Identification number		Weight (Ref.) kg	Boundary dim. mm				Mounting dimensions mm		CRBS...A UU		CRBS...V UU	
	With cage	Full complement		d	D	B	r _{min} ⁽¹⁾	d _a	D _a	Basic dynamic load rating	Basic static load rating	Basic dynamic load rating	Basic static load rating
										C N	C ₀ N	C N	C ₀ N
50	CRBS 508 A UU	CRBS 508 V UU	84	50	66	8	0.4	54	61	4 680	5 810	6 930	9 800
60	CRBS 608 A UU	CRBS 608 V UU	94	60	76	8	0.4	64	71	5 350	7 310	7 600	11 700
70	CRBS 708 A UU	CRBS 708 V UU	108	70	86	8	0.4	74	81	5 740	8 440	8 190	13 600
80	CRBS 808 A UU	CRBS 808 V UU	122	80	96	8	0.4	84	91	6 130	9 590	8 790	15 500
90	CRBS 908 A UU	CRBS 908 V UU	135	90	106	8	0.4	94	101	6 490	10 700	9 310	17 400
100	CRBS 1008 A UU	CRBS 1008 V UU	152	100	116	8	0.4	104	111	6 530	11 100	9 850	19 300
110	CRBS 1108 A UU	CRBS 1108 V UU	163	110	126	8	0.4	114	121	6 850	12 300	10 300	21 200
120	CRBS 1208 A UU	CRBS 1208 V UU	184	120	136	8	0.4	124	131	7 070	13 000	10 900	23 000
130	CRBS 1308 A UU	CRBS 1308 V UU	199	130	146	8	0.4	134	141	7 270	13 800	11 200	24 600
140	CRBS 1408 A UU	CRBS 1408 V UU	205	140	156	8	0.4	144	151	7 510	14 900	11 700	26 800
150	CRBS 1508 A UU	CRBS 1508 V UU	220	150	166	8	0.4	154	161	7 810	16 000	12 100	28 700
160	CRBS 16013 A UU	CRBS 16013 V UU	620	160	186	13	0.6	166	179	19 400	37 700	26 900	58 200
170	CRBS 17013 A UU	CRBS 17013 V UU	675	170	196	13	0.6	176	189	20 000	39 900	27 800	61 600
180	CRBS 18013 A UU	CRBS 18013 V UU	710	180	206	13	0.6	186	199	21 900	45 700	28 600	65 200
190	CRBS 19013 A UU	CRBS 19013 V UU	740	190	216	13	0.6	196	209	22 900	49 200	29 300	68 600
200	CRBS 20013 A UU	CRBS 20013 V UU	780	200	226	13	0.6	206	219	23 300	51 600	30 000	72 200

Note(1): Minimum allowable single value of chamfer r.
Remarks 1. Oil hole is not provided.
2. Grease is not pre-packed. Perform proper lubrication.

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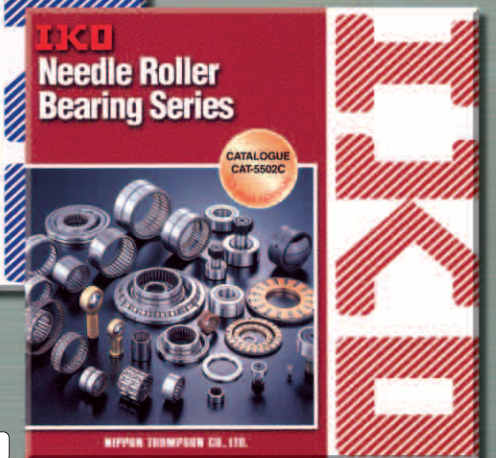
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