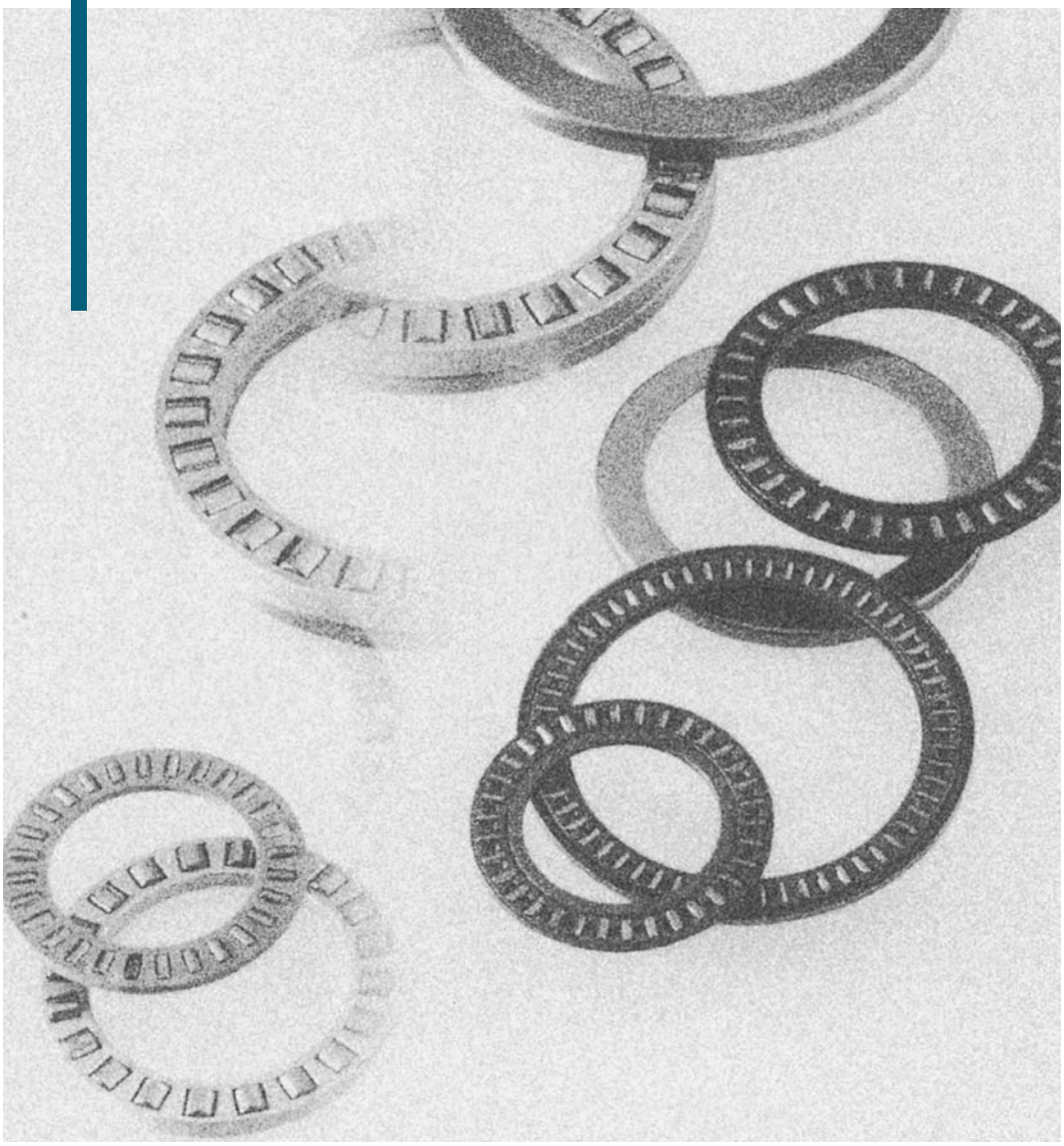
Thrust Roller Bearings

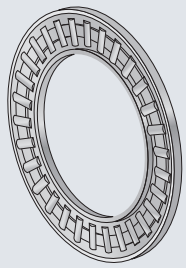
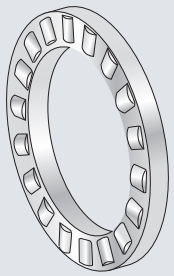
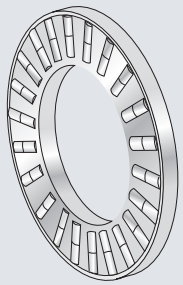
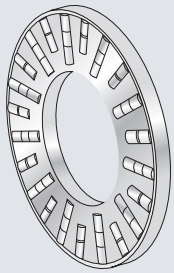


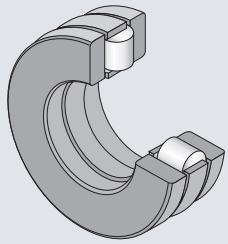
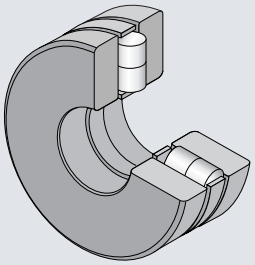
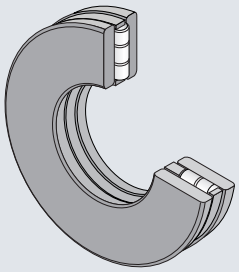
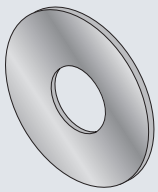
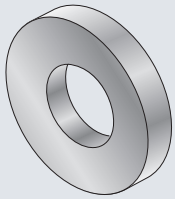
Thrust Roller Bearings

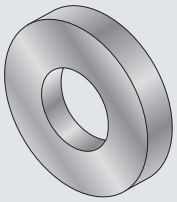
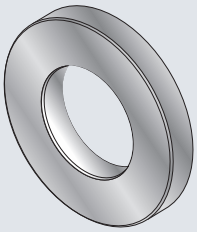
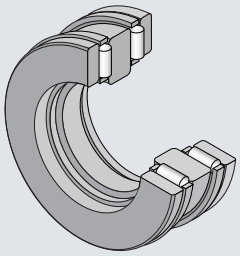
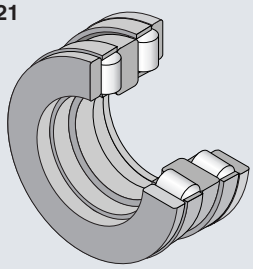
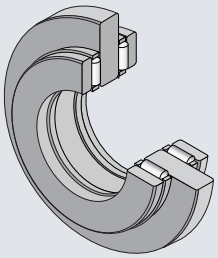
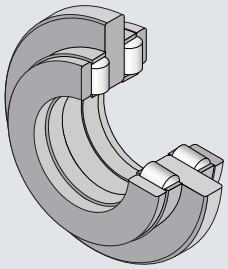
This thrust roller bearing composed of a thrust roller and cage assembly, wherein needle rollers or cylindrical rollers are configured radially in the cage, and a bearing ring of disc form is intended to support one-directional axial load.

In mounting, it is possible to use a shaft or a housing as the direct raceway surface without using the bearing ring, whereby design of a low height and lightweight compact construction is enabled.

This type of thrust roller bearing results in slipping on raceway surface because theoretically it can't roll perfectly, but in most cases it is practically trouble-free and can rotates at comparatively high speed.

Bearing type	Cage type	Applicable shaft diameter (mm)	Composition of bearing number	Bearing number	Remarks
AXK 	Pressed steel cage	ϕ10—ϕ120	**AXK 11 04** 04: Bore diameter code 11: Dimension series code AXK: Type code	**AXK1104**	The type can be used together with theType AS bearing ring with the lower limit of safety factor So is 3
	High strength brass cage	ϕ130—ϕ160			
K811 K812 	Standard type Polyamide resin cage	**Type K811** ϕ10—ϕ120 **Type K812** ϕ30—ϕ80	**K8 11 10 T2** T2: Suffix 10: Bore diameter code 11: Dimension series code K8: Type code **[Suffix]** T2: resin cage JW: Pressed steel cage	**K81110T2**	The suffix T2 means that this bearing uses a polyamide resin cage. Therefore, use this bearing at a temperature 120˚C or lower; or at 100˚C or lower for continuous operation. Feel free to contact **NTN** for the detail of the pressed steel cage. Possible to use in combination with GS and WS bearing rings. K811 conforms to the Dimension Series 11 specified in JIS B 1512. K812 conforms to the Dimension Series 12 specified in JIS B 1512.
	Aluminum alloy cage	**Type K811** ϕ130—ϕ160 **Type K812** ϕ85—ϕ140			
	Pressed steel cage	ϕ10—ϕ90			
K893 	Aluminum alloy cage	ϕ30—ϕ110	**K8 93 10** 10: Bore diameter code 93: Dimension series code K8: Type code	**K89310**	K893 conforms to the Dimension Series 93 specified in JIS B 1512.
K874 	Aluminum alloy cage	ϕ40—ϕ90	**K8 74 10** 10: Bore diameter code 74: Dimension series code K8: Type code	**K87410**	K893 conforms to the Dimension Series 93 specified in JIS B 1512.

Bearing type	Applicable shaft diameter (mm)	Composition of bearing number	Bearing number	Remarks
811 **812** 	ϕ10—ϕ160	**8 11 10 T2** Suffix Bore diameter code Dimension series code Type code [Suffix] T2: resin cage J: Punched steel plate cage	**81110T2**	The suffix T2 means that this bearing uses a polyamide resin cage. Therefore, use this bearing at a temperature 120˚C or lower; or at 100˚C or lower for continuous operation. WS and GS bearing rings are used in set. 811 conforms to the Dimension Series 11 specified in JIS B 1512. 812 conforms to the Dimension Series 12 specified in JIS B 1512.
893 	ϕ30—ϕ110	**8 93 10** Bore diameter code Dimension series code Type code	**89310**	WS and GS bearing rings are used in set. 893 conforms to the Dimension Series 93 specified in JIS B 1512.
874 	ϕ40—ϕ90	**8 74 10** Bore diameter code Dimension series code Type code	**87410**	WS and GS bearing rings are used in set. 874 conforms to the Dimension Series 74 specified in JIS B 1512.
AS  Pressed steel ring	ϕ10—ϕ160	**AS 11 04** Bore diameter code Dimension series code Type code	**AS1104**	Because of its 1mm thick steel plate ring, this thrust bearing needs adequate rigidity and profile accuracy of machine parts adjacent to the bearing. As an individual, on occasion this thrust bearing results in slight camber, but it is flattened when specific thrust load acts thereon, having no problem in practical use. The lower limit of safety factor So is 3.
WS811 WS893 **WS812 WS874**  Machined type, for inner ring land riding	ϕ10—ϕ160	**WS8 11 04** Bore diameter code Dimension series code Type code	**WS81104**	Higher rigidity and higher running accuracy than AS bearing ring .

Bearing type	Applicable shaft diameter (mm)	Composition of bearing number	Bearing number	Remarks
GS811 GS893 **GS812 GS874**  Machined type, for outer ring land riding	ϕ10—ϕ160	**GS8 11 04** Bore diameter code Dimension series code Type code	**GS81104**	Higher rigidity and higher running accuracy than AS bearing ring .
ZS (Central washer) 	ϕ10—ϕ160	**ZS 15 34** Outside diameter Dimension series code Type code	**ZS1534**	The central washer is used as an outer ring or inner ring in a double-direction thrust roller bearing. This washer can be used in combination with needle roller and cage thrust assembly AXK, or cylindrical roller and cage thrust assembly K811, or locking ring (outer ring) GS811 for locking the bearing to a housing or locking ring (inner ring) WS811 for locking the bearing to a shaft.
AXA21 	ϕ10—ϕ140 (Central washer)	**AXA21 04** Bore diameter code Type code	**AXA2104**	This is a double-direction thrust roller bearing that comprises two needle roller and cage thrust assemblies AXK, two housing-side locking rings (outer rings) GS811 and one central ring ZS.
ARA821 	ϕ10—ϕ140 (Central washer)	**ARA821 04 T2** Suffix Bore diameter code Type code [Suffix] T2: resin cage	**ARA82104T2**	The suffix T2 means that this bearing uses a polyamide molded cage. Therefore, use this bearing at a temperature 120˚C or lower; or at 100˚C or lower for continuous operation. This is a double-direction thrust cylindrical roller bearing that comprises two cylindrical roller and cage thrust assemblies K811, two housing-side locking rings (outer rings) GS811 and one central ring ZS.
AXB21 	ϕ15—ϕ160 (Central washer)	**AXB21 04** Bore diameter code Type code	**AXB2104**	This is a double-direction thrust needle roller bearing that comprises two needle roller and cage thrust assemblies AXK, two shaft-side locking rings (inner rings) WS811 and one central ring ZS.
ARB821 	ϕ15—ϕ160 (Central washer)	**ARB821 04 T2** Suffix Bore diameter code Type code [Suffix] T2: resin cage	**ARB82104T2**	The suffix T2 means that this bearing uses a polyamide molded cage. Therefore, use this bearing at a temperature 120˚C or lower; or at 100˚C or lower for continuous operation. This is a double-direction thrust cylindrical roller bearing that comprises two cylindrical roller and cage thrust assemblies K811, two shaft-side locking rings (inner rings) WS811 and one central ring ZS.

Bearing accuracy

The dimensional accuracy, profile accuracy and running accuracy of **Types 811, 812, 893** and **874** thrust cylindrical roller bearings shall be as specified in **Table 4.4** in Sec. **4. "Bearing accuracy"** (page A-28).

The thrust roller and cage assembly **Types AXK, K881, K812, K893** and **K874** are machined to the following dimensional tolerances: E11 (or E12 for bearing marked with T2) for bore diameter (D_{c1}); and c12 for outside diameter (D_c) on **Type AXK**, and a13 for **Types K811, K81, K893** and **K874**.

Raceway surface requirements:

Where the plane portion of a shaft/a housing is used as the direct raceway surface of thrust roller and cage assembly, the raceway surface must meet the requirements specified as a guideline in **Table 1**.

Table 1 Raceway surface requirements (recommended)

Characteristics	Specified requirements
Perpendicularity (Max)	IT5 (IT4)
Surface roughness	0.2a
Surface hardness	HRC58～64
Effective case depth	Refer to Formula (8.1) on page A-40.

Reference : The parenthesized value shall be applied for high running accuracy.

Cage guiding

To be able to center a running thrust roller and cage assembly (Type **AXK, K811, K812, K893** or **K874**), it is necessary to guide it on its bore (shaft side) or outside surface (housing side).

In general, the bore-side guide of low relative speed against the cage is mostly used. It should be used particularly for high speed running. The dimensional tolerances for shaft and housing, when the cage is guided thereby, shall be h8 for shaft diameter (bore guide) and H9 for housing bore diameter (outer surface guide) respectively, which of the guide surface shall be fine-finished by grinding.

Bearing fit in bearing ring

Table 2 shows the tolerances for fitting of the thrust bearing rings (**AS**, **WS** and **GS**) on shaft or in housing.

Table 2 Bearing ring fit in shaft and housing (recommended)

Bearing ring		Shaft	Housing
Type AS	Locking to shaft	h10	Clearance to housing
	Locking to housing	Clearance to shaft	H11
Type WS (inner ring)		h6	—
Type GS (outer ring)		—	H7
Type ZS (central ring)	Locking to shaft	h6	—
	Locking to housing	—	H7

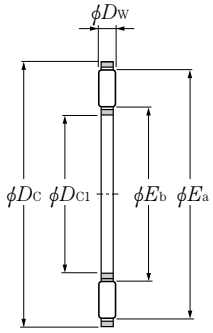
Mounting related dimensions

The mounting dimensions for bearing ring **Types WS, GS** and **ZS** relative to a shaft or housing are listed in the relevant dimension table.

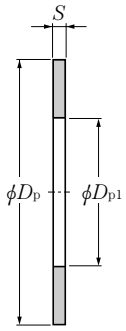
The fitting surface of **AS** bearing ring must be flat and have the rigidity sufficient to support thrust load throughout its entire surface.

The bearing ring has to be installed in correct orientation so that its raceway surface is seated onto the rolling elements. (As shown in the diagram in the relevant dimension table, the narrower chamfering on the bearing ring marks the raceway surface.)

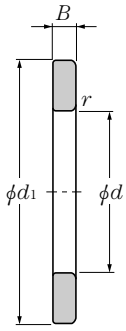
Type AXK11
Type AS11
Type WS811
Type GS811



Type AXK (Thrust needle roller and cage assy)



AS bearing ring (washer)

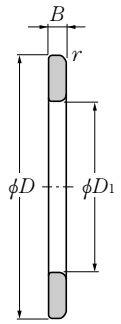


WS bearing ring (Inner ring)

D_{c1} 10～140mm

Boundary dimensions mm											Basic load ratings dynamic / static N		dynamic / static kgf	
D_{c1} E11	D_c c12	D_w 0 -0.01	D_p e13	D_{p1} E12	S 2) 0.05	d	d_1 -0.2 -0.5	D	D_1 +0.5 +0.2	B	$r_{s\,min}$ 1)	C_a	C_{oa}	C_a	C_{oa}
10	24	2	24	10	1	10	24	24	10	2.75 $^{0}_{-0.060}$	0.3	9 150	25 300	935	2 580
12	26	2	26	12	1	12	26	26	12	2.75 $^{0}_{-0.060}$	0.3	9 850	28 900	1 010	2 940
15	28	2	28	15	1	15	28	28	16	2.75 $^{0}_{-0.060}$	0.3	11 300	36 000	1 150	3 700
17	30	2	30	17	1	17	30	30	18	2.75 $^{0}_{-0.060}$	0.3	11 900	39 500	1 220	4 050
20	35	2	35	20	1	20	35	35	21	2.75 $^{0}_{-0.060}$	0.3	13 200	46 500	1 340	4 750
25	42	2	42	25	1	25	42	42	26	3 $^{0}_{-0.060}$	0.6	14 600	58 000	1 490	5 900
30	47	2	47	30	1	30	47	47	32	3 $^{0}_{-0.060}$	0.6	16 300	69 500	1 660	7 100
35	52	2	52	35	1	35	52	52	37	3.5 $^{0}_{-0.075}$	0.6	17 800	81 500	1 820	8 300
40	60	3	60	40	1	40	60	60	42	3.5 $^{0}_{-0.075}$	0.6	27 400	110 000	2 790	11 300
45	65	3	65	45	1	45	65	65	47	4 $^{0}_{-0.075}$	0.6	29 800	128 000	3 050	13 100
50	70	3	70	50	1	50	70	70	52	4 $^{0}_{-0.075}$	0.6	31 500	143 000	3 250	14 500
55	78	3	78	55	1	55	78	78	57	5 $^{0}_{-0.075}$	0.6	38 000	186 000	3 850	19 000
60	85	3	85	60	1	60	85	85	62	4.75 $^{0}_{-0.075}$	1	44 500	234 000	4 550	23 900
65	90	3	90	65	1	65	90	90	67	5.25 $^{0}_{-0.075}$	1	46 500	254 000	4 750	25 900
70	95	4	95	70	1	70	95	95	72	5.25 $^{0}_{-0.075}$	1	53 500	253 000	5 500	25 800
75	100	4	100	75	1	75	100	100	77	5.75 $^{0}_{-0.075}$	1	55 000	266 000	5 650	27 100
80	105	4	105	80	1	80	105	105	82	5.75 $^{0}_{-0.075}$	1	56 500	279 000	5 750	28 400
85	110	4	110	85	1	85	110	110	87	5.75 $^{0}_{-0.075}$	1	57 500	291 000	5 850	29 700
90	120	4	120	90	1	90	120	120	92	6.5 $^{0}_{-0.090}$	1	70 500	390 000	7 200	39 500
100	135	4	135	100	1	100	135	135	102	7 $^{0}_{-0.090}$	1	90 000	550 000	9 200	56 500
110	145	4	145	110	1	110	145	145	112	7 $^{0}_{-0.090}$	1	93 500	590 000	9 550	60 500
120	155	4	155	120	1	120	155	155	122	7 $^{0}_{-0.090}$	1	99 000	650 000	10 100	66 500
130	170	5	170	130	1	130	170	170	132	9 $^{0}_{-0.090}$	1	140 000	900 000	14 300	92 000
140	180	5	180	140	1	140	178	180	142	9.5 $^{0}_{-0.090}$	1	145 000	960 000	14 800	97 500

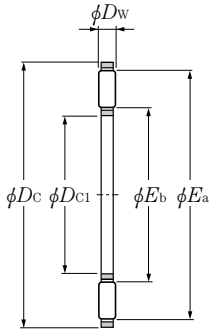
Note 1) Allowable minimum chamfer dimension r.
2) Subject to measured thrust load of 20kg or more.



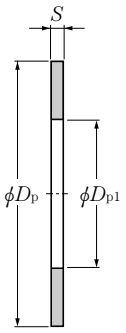
GS bearing ring (Outer ring)

Limiting speeds min^{-1}		Bearing numbers				Reference dimensions mm		Mass kg (approx.)		
grease	oil	thrust needle roller and cage assembly	washer	inner ring	outer ring	E_b	E_a	AXK11	AS11	WS811 GS811
3 500	14 000	**AXK1100**	**AS1100**	**WS81100**	**GS81100**	12.3	21.7	0.0028	0.003	0.008
3 300	13 000	**AXK1101**	**AS1101**	**WS81101**	**GS81101**	14.3	23.7	0.003	0.0033	0.009
2 800	11 000	**AXK1102**	**AS1102**	**WS81102**	**GS81102**	17.2	26.5	0.0035	0.0035	0.01
2 500	10 000	**AXK1103**	**AS1103**	**WS81103**	**GS81103**	19.2	28.5	0.004	0.0038	0.011
2 100	8 500	**AXK1104**	**AS1104**	**WS81104**	**GS81104**	21.3	31.3	0.005	0.0051	0.014
1 800	7 000	**AXK1105**	**AS1105**	**WS81105**	**GS81105**	29.5	39.4	0.007	0.007	0.021
1 500	6 000	**AXK1106**	**AS1106**	**WS81106**	**GS81106**	34.5	44.4	0.008	0.008	0.025
1 400	5 500	**AXK1107**	**AS1107**	**WS81107**	**GS81107**	39.5	49.4	0.01	0.0091	0.033
1 200	4 700	**AXK1108**	**AS1108**	**WS81108**	**GS81108**	44.2	56.2	0.0185	0.0123	0.044
1 100	4 300	**AXK1109**	**AS1109**	**WS81109**	**GS81109**	50.5	62.4	0.0205	0.0136	0.055
1 000	3 900	**AXK1110**	**AS1110**	**WS81110**	**GS81110**	55.5	67.4	0.0235	0.0148	0.06
900	3 500	**AXK1111**	**AS1111**	**WS81111**	**GS81111**	61.0	74.9	0.0308	0.0189	0.095
800	3 200	**AXK1112**	**AS1112**	**WS81112**	**GS81112**	66.0	81.9	0.0390	0.0223	0.101
750	3 000	**AXK1113**	**AS1113**	**WS81113**	**GS81113**	71.0	86.9	0.04	0.0239	0.125
750	2 900	**AXK1114**	**AS1114**	**WS81114**	**GS81114**	75.5	91.4	0.06	0.0254	0.134
700	2 700	**AXK1115**	**AS1115**	**WS81115**	**GS81115**	80.5	96.4	0.061	0.027	0.155
650	2 600	**AXK1116**	**AS1116**	**WS81116**	**GS81116**	84.4	100.3	0.063	0.0284	0.163
600	2 400	**AXK1117**	**AS1117**	**WS81117**	**GS81117**	90.5	106.4	0.0668	0.0301	0.175
600	2 300	**AXK1118**	**AS1118**	**WS81118**	**GS81118**	96.5	116.4	0.086	0.0388	0.25
500	2 000	**AXK1120**	**AS1120**	**WS81120**	**GS81120**	107.5	131.4	0.112	0.0505	0.35
480	1 900	**AXK1122**	**AS1122**	**WS81122**	**GS81122**	115.5	139.4	0.122	0.0549	0.385
430	1 700	**AXK1124**	**AS1124**	**WS81124**	**GS81124**	125.5	149.4	0.131	0.0592	0.415
400	1 600	**AXK1126**	**AS1126**	**WS81126**	**GS81126**	136.0	164.0	0.205	0.074	0.663
380	1 500	**AXK1128**	**AS1128**	**WS81128**	**GS81128**	146.0	174.0	0.219	0.079	0.749

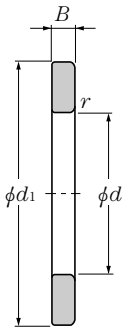
Type AXK11
Type AS11
Type WS811
Type GS811



Type AXK (Thrust needle roller and cage assy)



AS bearing ring (washer)

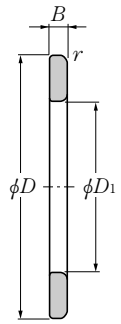


WS bearing ring (Inner ring)

D_{c1} 150～160mm

Boundary dimensions mm											Basic load ratings N		kgf	
											dynamic	static	dynamic	static
D_{c1}	D_c	D_w	D_p	D_{p1}	S 2)	d	d_1	D	D_1	B $r_{s\,min}$ 1)	C_a	C_{oa}	C_a	C_{oa}
E11	c12	$^{0}_{-0.01}$	e13	E12	0.05		$^{-0.2}_{-0.5}$		$^{+0.5}_{+0.2}$					
150	190	5	190	150	1	150	188	190	152	$9.5\,^{0}_{-0.090}$ 1	149 000	1 020 000	15 200	104 000
160	200	5	200	160	1	160	198	200	162	$9.5\,^{0}_{-0.090}$ 1	154 000	1 070 000	15 700	110 000

Note 1) Allowable minimum chamfer dimension r.
2) Subject to measured thrust load of 20kg or more.



GS bearing ring
(Outer ring)

Limiting speeds min^{-1}		Bearing numbers				Reference dimensions mm		Mass kg (approx.)		
grease	oil	thrust needle roller and cage assembly	washer	inner ring	outer ring	E_b	E_a	AXK11	AS11	WS811 GS811
350	1 400	**AXK1130**	**AS1130**	**WS81130**	**GS81130**	156.0	184.2	0.232	0.084	0.796
330	1 300	**AXK1132**	**AS1132**	**WS81132**	**GS81132**	166.0	194.2	0.246	0.089	0.842