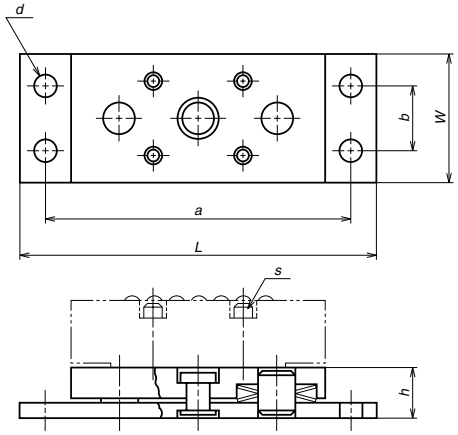
Preload pad Model: PRP



Unit: mm

Model No.	Applicable linear roller bearing	Height (no-load) *h* max	Compressed height *h* min	h min Load when fully compressed (N)	*W*	*L*	*d*	*a*	*b*	*s* Hex. Socket cap screw
PRP 14×53	LRB 14×53	10.23	9.53	1570	26	72	ϕ4.5	62	14	M3×16
PRP 19×69	LRB 19×69	11.53	11.10	2650	30	96	ϕ4.5	86	18	M3×19
PRP 29×92	LRB 29×92	13.13	12.70	6450	41	120	ϕ4.5	110	27	M3×25
PRP 38×132	LRB 38×132	16.28	15.88	12000	51	157	ϕ4.5	147	35	M5×38

A-Ⅲ-5 Cam Follower

A-Ⅲ-5.1 Structure and Characteristics

The outer ring of the bearing functions as a rolling ring (Fig. Ⅲ-5•1). This rolling ring is thick and tough. The rollers are crowned needle rollers, and have a large load carrying capacity. This provides high impact load resistance. The surface of the stud is core-hardened to provide durability against wear, and toughness.

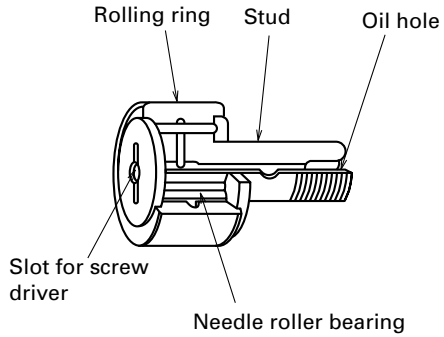


Fig. Ⅲ-5.1 Structure of Cam follower

A-Ⅲ-5.2 Types

(1) Bearing models

There are four models: With/ without a retainer and oil/grease lubricant (Table Ⅲ-5•1).

Table Ⅲ-5.1. Bearing models

Bearing model	Description
FCR	Full complement of rollers, no seal (oil is supplied later)
FCRS	Full complement of rollers, with seal (grease is sealed in)
FCJ	With retainer, no seal (oil is supplied later)
FCJS	With retainer, with seal (grease is sealed in)

(2) Appearances

Specifications of the exterior appearance include: Shape of the slot for the "screw driver" on the end of the stud; With/without an eccentric bush to be secured to the stud; Oil hole; Shape of outer surface of the rolling ring.

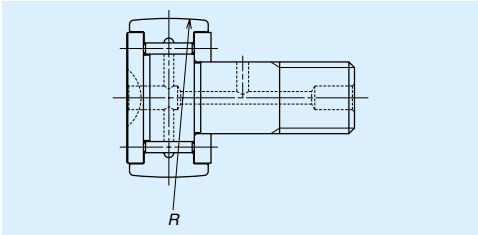


Fig. Ⅲ-5•2 Cam follower with sphere shaped outer surface

Table Ⅲ-5•2 Exterior appearances

Deference in appearance	Code for appearance	Description
Screw driver slot at the end of stud	(no code)	Hole for cross recessed screwdriver
	B	Hole for hexagonal socket screw keys
Eccentric bush to be secured to the stud	(no code)	No eccentric bush
	E	With eccentric bush
Oil hole	(no code)	Simple round hole
	P	Pipe tap for oil hole
Rolling ring outer surface	(no code)	Cylindrical shaped outer surface
	R	Sphere shape: Sphere radius 500 m (Fig. Ⅲ-5•2)

(3) Accessories

A blind plug comes with order. Nut, spring washer, and grease fitting are available on request. Table Ⅲ-5•3 shows accessory codes.

Table Ⅲ-5•3 Accessory codes

	Nut	Spring washer	Grease nipple
Code	I	N	Z

(4) Special products

Please consult NSK for the following items manufactured by NSK.

- Items in inch sizes
- Items with black film coating on exposed surface.
- Items in special shape.

A-Ⅲ-5.3 Reference Number for Ordering

Codes for (1) Bearing models, (2) Appearances, (3) Accessories constitute a reference number to be used in ordering. If accessory is not required, omit codes after the "+" sign.

Reference number composition

Bearing model (Table Ⅲ-5•1) | Appearance (Table Ⅲ-5•2) | Accessory (Table Ⅲ-5•3)

FCRS B E P – 16 R + I N Z

- FCRS — Bearing
  - FCR : Full complement rollers, no seal (oil is supplied later)
  - FCRS : Full complement of rollers, with seal (grease is sealed in)
  - FCJ : With retainer, no seal (oil is supplied later)
  - FCJS : With retainer, with seal (grease is sealed in)
- B — (omitted): Hole for Philip's screwdriver; B: Hexagonal hole for socket head keys
- E — (omitted): No eccentric bush; E: With eccentric bush
- P — (omitted): Oil hole (round); P: Pipe tap for oil hole
- 16 — Out side diameter (unit: mm)
- R — (omitted): Cylindrical outer surface; R: Sphere shaped surface (sphere radius 500 mm)
- I — Nut
- N — Spring washer
- Z — Grease fitting

(Example) FCJSP-16RZ: With retainer and seal (grease is sealed in); Pipe tap for oil hole; Outer diameter 16 mm, its face forms an arc; With grease nipple
FCRS-16-N: Full complement of rollers; With a hole for screwdriver; With eccentric bush; Outer diameter 16 mm; With spring washer

A-Ⅲ-5.4 Accuracy

Table Ⅲ-5.4 shows the dimensional tolerances of cam follower.
Running accuracy grade is the same as JIS 0 Grade.

Table Ⅲ-5•4 Dimensional tolerance of cam follower

Unit: μm

Model code	Tolerance of stud diameter Δd_{mp} Fit tolerance grade	Variation of single plane mean outside diameter ΔD_{mp}				Variation of outer ring width ΔC_s	
		Cylindrical outer surface		Sphere-shaped outer surface			
		Upper	Lower	Upper	Lower	Upper	Lower
FCR, FCRS FCJ, FCJS	h7	Same as JIS 0 Grade		0	–50	Same as JIS 0 Grade	

A-Ⅲ-5.5 Permissible Load

(1) Permissible load of cam follower

Maximum radial load the cam follower can support is determined by the stud strength to bending or shearing force. Maximum values are shown in the dimension table.

(2) Permissible load of the rail track

Permissible load of the rail track where the bearing ring rolls are determined by the surface hardness, roughness, and state of lubrication of the rail surface. Table Ⅲ-5.5 shows load factors that correspond to the hardness of the track surface when the surface of the track is lubricated. Multiply the track's permissible load value shown in the dimension table by the coefficient that corresponds to the hardness. Hardness of HRC40 is the standard for these values.

Table Ⅲ-5.5 Permissible load factor of the track

Hardness (HRC)	Load factor
20	0.4
25	0.5
30	0.6
35	0.8
40 (Standard)	1.0
45	1.4
50	1.9
55	2.6
58	3.2

A-Ⅲ-5.6 Lubrication

A lithium soap based grease is sealed inside the cam follower which has seals. The range of temperature to use this grease is -10 to 110 °C. (Cam follower without seal uses oil lubrication, and does not have grease inside.)
Keep the lubricated track surface free of foreign mattersa.

A-Ⅲ-5.7 Permissible Rotational Speed

Cam followers with seal are suitable for high rotational operation. Table Ⅲ-5•6 shows their permissible rotational speed. Permissible rotational speed of full complement roller bearings are 1/3 of those with retainer. For grease lubrication, permissible rotational speed is 60% of the values shown in the Table.

Table Ⅲ-5•6 Permissible rotational speed of the bearing with retainer

Reference No.	Permissible rotational speed (min^{-1})
FCJB-10	34000
FCJ-12	26000
FCJ-16	16000
FCJ-19	12000
FCJ-22	10000
FCJ-26	10000
FCJ-30	7500
FCJ-32	7500
FCJ-35	6000
FCJ-40	5300
FCJ-47	4800
FCJ-52	4800
FCJ-62	3800
FCJ-72	3800
FCJ-80	3000
FCJ-85	3000
FCJ-90	3000

A-Ⅲ-5.8 Precautions for Installation

(1) Fits

The stud of cam follower is held on one side fixed. Fit between the stud and the bore where the stud enters must be in close tolerance.
Table Ⅲ-5•7 shows a recommended fit value.
The chamfer of the bore where the stud enters should be as small as possible, and the surface should be free of burrs.
When the fit is to be interference, press the stud into the hole, pushing the center of the end face.
To make the support face sufficiently large for the side plate, the surface diameter of the support end should be larger than *F* shown in the dimension table.

(2) Maximum tightening torque of the stud

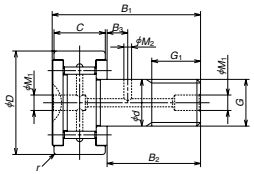
Stud receives bending and tensile stress from the load to the bearing. Therefore, a screw tightening torque must not exceed values in the dimension table. (These values are when oil is applied to the screw section. Double the value when dry.)

Table Ⅲ-5.7 Recommended fitt for stud installation

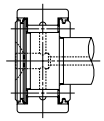
Model code	Fit tolerance, class and grade of installation hole
FCR, FCJ, FCRS, FCJS	JS7(J7)

Cam follower

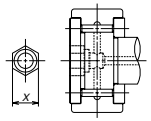
FCR : **Full complement of rollers**
FCRS : **Full complement of rollers, with seal and thrust washer**
FCJ : **With retainer**
FCJS : **With retainer, seal, and thrust washer**



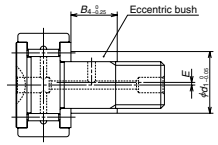
FCR



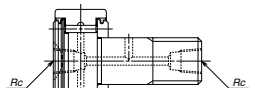
FCRS



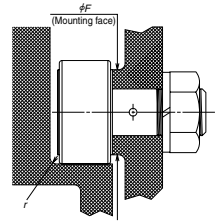
FCRB



FCRE



FCRSP



Unit: mm

Model No.		Main dimension			Detail dimension							
FCR FCJ	FCRS FCJS	D	C	d	Thread G	G_1	B_1	B_2	B_3	M_2	M_1	$Y_{(2)}$ (Min.)
FCJB-10	—	**10**	7	3	M3×0.5	5	17	9	—	—	—	0.3
FCJ-12	—	**12**	8	4	M4×0.7	6	20	11	—	—	—	0.3
FCJB-12	—		8	4	M4×0.7	6	20	11	—	—	—	0.3
FCR-16	**FCRS-16**	**16**	11	6	M6×1.0	8	28	16	—	—	4(1)	0.3
FCJ-16	**FCJS-16**		11	6	M6×1.0	8	28	16	—	—	4(1)	0.3
FCR-19	**FCRS-19**	**19**	11	8	M8×1.25	10	32	20	—	—	4(1)	0.3
FCJ-19	**FCJS-19**		11	8	M8×1.25	10	32	20	—	—	4(1)	0.3
FCR-22	**FCRS-22**	**22**	12	10	M10×1.25	12	36	23	—	—	4(1)	0.3
FCJ-22	**FCJS-22**		12	10	M10×1.25	12	36	23	—	—	4(1)	0.3
FCR-26	**FCRS-26**	**26**	12	10	M10×1.25	12	36	23	—	—	4(1)	0.3
FCJ-26	**FCJS-26**		12	10	M10×1.25	12	36	23	—	—	4(1)	0.3
FCR-30	**FCRS-30**	**30**	14	12	M12×1.5	13	40	25	6	3	6	0.6
FCJ-30	**FCJS-30**		14	12	M12×1.5	13	40	25	6	3	6	0.6
FCR-32	**FCRS-32**	**32**	14	12	M12×1.5	13	40	25	6	3	6	0.6
FCJ-32	**FCJS-32**		14	12	M12×1.5	13	40	25	6	3	6	0.6
FCR-35	**FCRS-35**	**35**	18	16	M16×1.5	17	52	32.5	8	3	6	0.6
FCJ-35	**FCJS-35**		18	16	M16×1.5	17	52	32.5	8	3	6	0.6
FCR-40	**FCRS-40**	**40**	20	18	M18×1.5	19	58	36.5	8	3	6	1
FCJ-40	**FCJS-40**		20	18	M18×1.5	19	58	36.5	8	3	6	1
FCR-47	**FCRS-47**	**47**	24	20	M20×1.5	21	66	40.5	9	4	8	1
FCJ-47	**FCJS-47**		24	20	M20×1.5	21	66	40.5	9	4	8	1
FCR-52	**FCRS-52**	**52**	24	20	M20×1.5	21	66	40.5	9	4	8	1
FCJ-52	**FCJS-52**		24	20	M20×1.5	21	66	40.5	9	4	8	1
FCR-62	**FCRS-62**	**62**	29	24	M24×1.5	25	80	49.5	11	4	8	1
FCJ-62	**FCJS-62**		29	24	M24×1.5	25	80	49.5	11	4	8	1
FCR-72	**FCRS-72**	**72**	29	24	M24×1.5	25	80	49.5	11	4	8	1
FCJ-72	**FCJS-72**		29	24	M24×1.5	25	80	49.5	11	4	8	1
FCR-80	**FCRS-80**	**80**	35	30	M30×1.5	32	100	63	15	4	8	1
FCJ-80	**FCJS-80**		35	30	M30×1.5	32	100	63	15	4	8	1
FCR-85	**FCRS-85**	**85**	35	30	M30×1.5	32	100	63	15	4	8	1
FCJ-85	**FCJS-85**		35	30	M30×1.5	32	100	63	15	4	8	1
FCR-90	**FCRS-90**	**90**	35	30	M30×1.5	32	100	63	15	4	8	1
FCJ-90	**FCJS-90**		35	30	M30×1.5	32	100	63	15	4	8	1

Basic dynamic load rating C_r	Permissible maximum load Pmax	Permissible track load	Weight (kg)	Hexagon socket hole (width across flat)	Eccentric bush			Tap hole for lubrication pipe	Diameter, supporting surface	Thread tightening torque(4)
(N)	(N)	(N)	(Reference only)	X	B_4	d_1	E	P_r	F (Min.)	(N · cm) (Max.)
1390	590	1320	0.005	2.5	—	—	—	—	7.5	28
1970	1050	1860	0.008	—	—	—	—	—	9	64
1970	1050	1860	0.008	2.5	—	—	—	—	9	64
5800	2360	3350	0.020	4	8	9	0.5	M6×0.75(3)	11	226
2830	2360	3350	0.018	4	8	9	0.5	M6×0.75(3)	11	226
6600	4200	4150	0.031	4	10	11	0.5	M6×0.75(3)	13	550
3450	4200	4150	0.030	4	10	11	0.5	M6×0.75(3)	13	550
8550	6550	5300	0.047	5	11	13	0.5	M6×0.75(3)	15	1060
4350	6550	5300	0.045	5	11	13	0.5	M6×0.75(3)	15	1060
8550	6550	6000	0.060	5	11	13	0.5	M6×0.75(3)	15	1060
4350	6550	6000	0.058	5	11	13	0.5	M6×0.75(3)	15	1060
12500	9250	7800	0.088	6	12	17	1	M6×0.75(3)	20	1450
7200	9250	7800	0.086	6	12	17	1	M6×0.75(3)	20	1450
12500	9250	8050	0.099	6	12	17	1	M6×0.75(3)	20	1450
7200	9250	8050	0.096	6	12	17	1	M6×0.75(3)	20	1450
18600	17000	11800	0.17	10	15.5	22	1	Rc 1/8	24	4000
9700	17000	11800	0.165	10	15.5	22	1	Rc 1/8	24	4000
20500	21700	14300	0.25	10	17.5	24	1	Rc 1/8	26	5950
10300	21700	14300	0.24	10	17.5	24	1	Rc 1/8	26	5950
28200	26400	20800	0.39	12	19.5	27	1	Rc 1/8	31	8450
19200	26400	20800	0.38	12	19.5	27	1	Rc 1/8	31	8450
28200	26400	22900	0.47	12	19.5	27	1	Rc 1/8	31	8450
19200	26400	22900	0.455	12	19.5	27	1	Rc 1/8	31	8450
40000	38500	34000	0.80	14	24.5	34	1	Rc 1/8	45	15200
24900	38500	34000	0.79	14	24.5	34	1	Rc 1/8	45	15200
40000	38500	38000	1.05	14	24.5	34	1	Rc 1/8	45	15200
24900	38500	38000	1.05	14	24.5	34	1	Rc 1/8	45	15200
60500	61000	52000	1.55	17	31	40	1.5	Rc 1/8	52	30500
39000	61000	52000	1.55	17	31	40	1.5	Rc 1/8	52	30500
60500	61000	55500	1.75	17	31	40	1.5	Rc 1/8	52	30500
39000	61000	55500	1.75	17	31	40	1.5	Rc 1/8	52	30500
60500	61000	59000	1.95	17	31	40	1.5	Rc 1/8	52	30500
39000	61000	59000	1.95	17	31	40	1.5	Rc 1/8	52	30500

Note (1) Oil hole is only on the front face of the head.
(2) Use a value larger than γ (minimum).
(3) Pipe tap screw for oil supply is only on the front face of the head.
(4) Values are when oil is applied to the screw section. Double (approx.) the value when dry.
Remarks : Grease is sealed in for the cam follower with seals. Cam follower without seal does not have grease.