



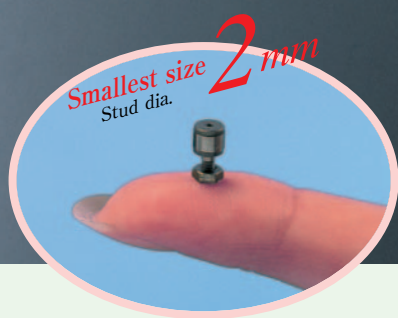
# MINICAM Series

# CF·CFS

CAT-57115C

PATENTED

*MINICAM with Thrust Disk Type is newly introduced !*





# Evolution in MINICAM world

Wide range of variations including the world-smallest cam follower !

## MINICAM SERIES

*Effective for misalignment !*



CFS...W

Thrust Disk Type newly introduced



Smallest size cam follower

**IK** MINICAM Series

# CF·CFS



# IKE MINICAM series are suitable for a wide range of applications.

IKE MINICAM series are compactly designed cam followers with the stud diameter 2 to 6 mm and the outer ring outside diameter 4.5 to 13mm. They are suitable for use as follower bearings in lightly loaded high precision cam mechanisms and linear motion mechanisms, and used widely in applications such as electric parts manufacturing and inspection equipment, precision measuring instruments, and OA equipment. Thrust disk type cam followers reduce wear and heat generation due to axial loads caused by misalignment, etc. Stainless steel made cam followers are highly resistant to corrosion, and best suited for use at places where oil can not be used, in environments exposed to water splashes or in clean rooms.



## Structure of MINICAM series

### Metric series CF

These are small sizes of Metric series **IKE** Cam Followers. Wide variations in size and shape are available. Thrust Disk Type Cam Followers have special resin thrust disks superior in wear and heat resistance assembled between the sliding surfaces of outer ring shoulders, stud head and side plate.



### Miniature series CFS

These are compactly designed bearings, incorporating very thin needle rollers in an outer ring with a smaller outside diameter compared to the standard type with the same stud size. They are used in electronic devices, OA equipment, small-size index devices, etc. Thrust Disk Type Cam Followers have special resin thrust disks superior in wear and heat resistance assembled between the sliding surfaces of outer ring shoulders, stud head and side plate.



(U.S. PATENT No. 5,286,115)


## IKE MINICAM series

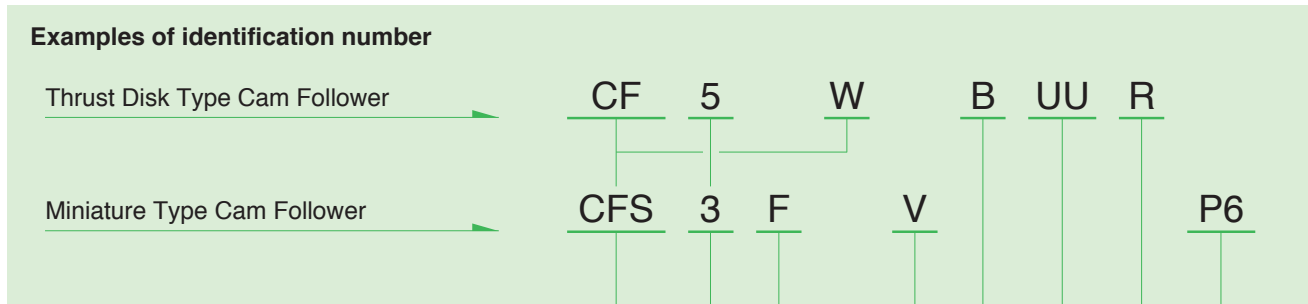
Type of cam follower	Stud head shape	Roller guide type	Material	Outer ring outer face form	Seal structure	Model	
Metric series CF	With hexagon hole	With cage type	High carbon steel made	Crowned outer ring	Shield type	CF... B R	
				Cylindrical outer ring	Sealed type	CF... BUUR	
			Stainless steel made	Crowned outer ring	Shield type	CF... FB R	
	With screw driver slot	With cage type	High carbon steel made	Crowned outer ring	Sealed type	CF... FBUR	
				Cylindrical outer ring	Shield type	CF... FB	
			Stainless steel made	Crowned outer ring	Shield type	CF... FBUR	
NEW Thrust Disk Type Miniature Cam Followers	With hexagon hole	With cage type	High carbon steel made	Crowned outer ring	Shield type	CF... R	
				Cylindrical outer ring	Sealed type	CF... UUR	
			Stainless steel made	Crowned outer ring	Shield type	CF... WB R	
	NEW Miniature Type Cam Follower	With hexagon hole	With cage type	High carbon steel made	Crowned outer ring	Sealed type	CF... WBUUR
					Cylindrical outer ring	Shield type	CF... FB R
				Stainless steel made	Crowned outer ring	Shield type	CF... FWB R
Miniature series CFS	With hexagon hole	Full complement type	High carbon steel made	Cylindrical outer ring	Shield type	CFS	
				Stainless steel made	Cylindrical outer ring	Shield type	CFS... F
			NEW Thrust Disk Type Miniature Cam Follower	With hexagon hole	With cage type	High carbon steel made	Cylindrical outer ring
	Stainless steel made	Cylindrical outer ring					Shield type
	High carbon steel made	Cylindrical outer ring				Shield type	CFS... W
		Stainless steel made	Cylindrical outer ring	Shield type	CFS... FW		

## Size variation of IKE MINICAM series

Outer ring outside diameter D (mm)	CF 3	CF 4	CF 5			
Metric series CF	10	12	13			
Stud outside diameter d <sub>1</sub> (mm)	3	4	5			
Outer ring outside diameter D (mm)	CFS 2	CFS 2.5	CFS 3	CFS 4	CFS 5	CFS 6
Miniature series CFS	4.5	5	6	8	10	12

# Identification Number

Examples of identification number of  MINICAM series are shown below.



Model code		
Metric series	CF	Standard Type Cam Follower
CF	CF...W	Thrust Disk Type Cam Follower
Miniature series	CFS	Miniature Type Cam Follower
CFS	CFS...W	Thrust Disk Miniature Type Cam Follower

Size
Stud diameter is indicated.(unit: mm)

Material	
No symbol	High carbon steel made
F	Stainless steel made

Roller guide type	
No symbol	With cage type
V	Full complement type


Stud head shape	
No symbol	With screw driver slot
B	With hexagon socket hole

Seal structure	
No symbol	Shield type
UU	Sealed type

Outer ring outer face form	
No symbol	Cylindrical outer ring
R	Crowned outer ring

Accuracy	
No symbol	Class 0
P6	Class 6
P5	Class 5
P4	Class 4

# Accuracy

Accuracy of  MINICAM series are shown in Tables 1, 2.1 and 2.2.

**Table 1 Tolerance** unit:  $\mu\text{m}$

Item	Metric series CF		Miniature series CFS
	Crowned outer ring	Cylindrical outer ring	
Series			
Outside dia. of outer ring $D$	0 - 50	See Table 2.1.	See Table 2.2.
Stud dia. $d_1$	h7		h6
Width of outer ring $C$	0 - 120		0 - 120

**Table 2.1 Accuracy of outer ring (Metric series CF)** unit:  $\mu\text{m}$

$\Delta D_{mp}$ Single plane mean outside dia. deviation		$VD_p$ Outside dia. variation in a single radial plane (Max.)	$VD_{mp}$ Mean outside dia. variation (Max.)	$K_{ea}$ Radial runout of assembled bearing outer ring (Max.)
High	Low			
0	- 8	10	6	15

**Table 2.2 Accuracy of outer ring (Miniature series CFS)** unit:  $\mu\text{m}$

$\Delta D_{mp}$ Single plane mean outside dia. deviation								$K_{ea}$ Radial runout of assembled bearing outer ring (Max.)			
Class 0		Class 6		Class 5		Class 4		Class 0	Class 6	Class 5	Class 4
High	Low	High	Low	High	Low	High	Low				
0	- 8	0	- 7	0	- 5	0	- 4	15	8	5	4

# Radial internal clearance

Radial internal clearance of  MINICAM series is shown in Table 3.

**Table 3 Radial internal clearance** unit:  $\mu\text{m}$

Indetification number (1)		Radial internal clearance	
Metric series CF	Miniature series CFS	Min.	Max.
CF 3 ~ CF 5	CFS 2 ~ CFS 5	3	17
—	CFS 6	5	20

Note (1): Only representative types are shown, but applicable to all types.

# Fit

Mounting hole tolerance for stud is recommended to be H7 for Metric series CF, and H6 for Miniature series CFS. Since Cam Followers are supported in a cantilever position, the mounting hole diameter should be prepared without play between the stud and the mounting hole especially when heavy shock loads are applied.

**Table 4 Tolerance of mounting hole** unit:  $\mu\text{m}$

Nominal outside dia. of stud mm		H6		H7	
over	incl.	High	Low	High	Low
—	3	+ 6	0	+ 10	0
3	6	+ 8	0	+ 12	0

# Maximum Allowable Load

The applicable load on Cam Follower is, in some cases, limited by the bending strength, shear strength of stud, and strength of outer ring instead of the load rating of needle roller bearing, because the Cam Follower is mounted in a cantilever position. Maximum allowable loads shown in dimension tables are the allowable loads limited by the bending strength and shear strength.

## Track capacity

Track capacity is defined as the load which can be continuously applied on a Cam Follower placed on a steel track surface without causing deformation and indentation (dent) on the track surface. The track capacities shown in Table 5 are applicable when the hardness of the mating track surface is HRC40 (Tensile strength 1250N/mm<sup>2</sup>). When the hardness of the mating track surface differs from HRC40, the track capacity is obtained by multiplying the value with a track capacity factor shown in Table 6.

If lubrication between the outer ring and the mating track surface is insufficient, seizure and/or wear may occur depending on the application. Therefore, it is needed to pay attention to lubrication and surface roughness of mating track especially in case of high speed rotation such as cam mechanisms.

**Table 5 Track capacity**

Type (1)	Identification Number Crowned outer ring	Track capacity N	Identification Number Cylindrical outer ring	Track capacity N
Metric series CF	CF 3 R	542	CF 3	1 360
	CF 4 R	712	CF 4	1 790
	CF 5 R	794	CF 5	2 210
Miniature series CFS	—	—	CFS 2	220
	—	—	CFS 2.5	298
	—	—	CFS 3	485
	—	—	CFS 4	799
	—	—	CFS 5	1 210
	—	—	CFS 6	1 680

Note (1): Only representative types are shown, but applicable to all types.

**Table 6 Track capacity factor**

Hardness HRC	Tensile strength N/mm <sup>2</sup>	Track capacity factor	
		Crowned outer ring	Cylindrical outer ring
20	760	0.22	0.37
25	840	0.31	0.46
30	950	0.45	0.58
35	1 080	0.65	0.75
38	1 180	0.85	0.89
40	1 250	1.00	1.00
42	1 340	1.23	1.15
44	1 435	1.52	1.32
46	1 530	1.85	1.51
48	1 635	2.27	1.73
50	1 760	2.80	1.99
52	1 880	3.46	2.29
54	2 015	4.21	2.61
56	2 150	5.13	2.97
58	2 290	6.26	3.39

## Allowable rotational speed

Allowable rotational speeds of IKO MINICAM series are affected by mounting and operating conditions. The  $d_1 n$  values in general operation under pure radial load are shown in Table 7 for reference. It is recommended to use 1/10 of the table values in actual applications taking account of axial loads that may be applied.

**Table 7  $d_1 n$  values of IKO MINICAM series**

Type	Lubricant	Grease
With cage type		84 000
Full complement type		42 000

Note(1):  $d_1 \times n$   
 where,  $d_1$ : Stud diameter, mm  
 $n$ : Number of rotations per minute, rpm

## Lubricant and temperature

A quality lithium-soap base grease is prepacked in IKO MINICAM series. Allowable temperature ranges are shown in Table 8. Relubrication can not be made in these series, because of their structure.

**Table 8 Allowable temperature range**

Stud dia. $d_1$ mm	Type	With cage type		Full complement type
		Shield type	Sealed type	
Metric series CF	3,4	- 20°C ~ + 110°C(1)	- 20°C ~ + 80°C	—
	5	- 20°C ~ + 120°C	- 20°C ~ + 80°C	—
Miniature series CFS	2	- 20°C ~ + 120°C(1)	—	- 20°C ~ + 120°C
	2.5 ~ 6	- 20°C ~ + 120°C	—	- 20°C ~ + 120°C

Note(1): For continuous operation, the maximum operating temperature is 100 °C.

## Oil hole

The position of oil hole on the "Standard Type Cam Followers with screwdriver slot", CF5R, CF5, CF5UUR, and CF5UU is shown in Fig. 1. Grease should be supplied gently with a straight type grease gun as specified by JIS B 9808:1991, which is to be applied carefully to the nipple head from the front. "Standard Type Cam Followers with screwdriver slot" of other sizes, "Metric series CF with hexagon hole", and "Miniature series CFS" cannot be re-lubricated.

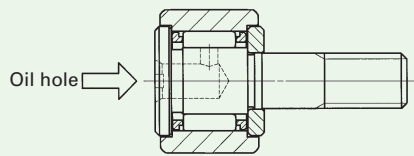


Fig.1 Position of oil hole

## Accessories

A nut is appended to the Miniature Type Cam Followers. And a grease nipple (Refer to Fig.2.) and a plug (Refer to Fig.3.) are appended to the Standard Type Cam Followers with screwdriver slot, CF5R, CF5, CF5UUR, and CF5UU.

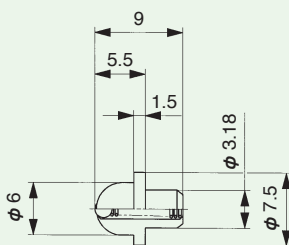


Fig.2 Grease nipple

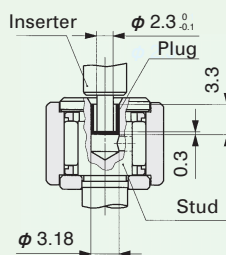


Fig.3 Plug and inserter

## Mounting

① Make the center axis of mounting hole perpendicular to the moving direction of the Cam Follower and match the side shoulder accurately with the seating surface indicated by dimension "f" in the dimension tables (Refer to Fig.4.). Then fix the Cam Follower with the nut. DO NOT hit the flange head of Cam Follower directly with a hammer, etc. It may lead to bearing failures such as irregular rotation and crack.

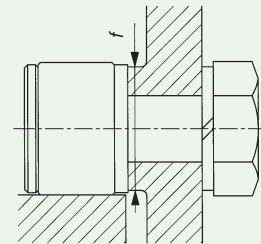



Fig.4 Mounting example

② The  mark on the stud flange head of the Cam Followers with oil hole indicates the position of oil hole on the raceway. Avoid locating the oil hole within the loading zone. It may lead to short bearing life. (Refer to Fig.5.)

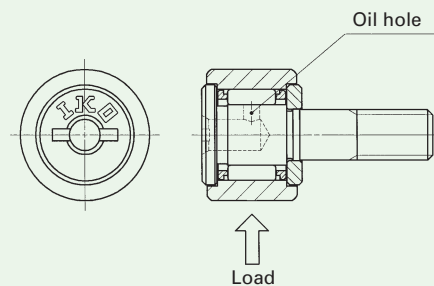
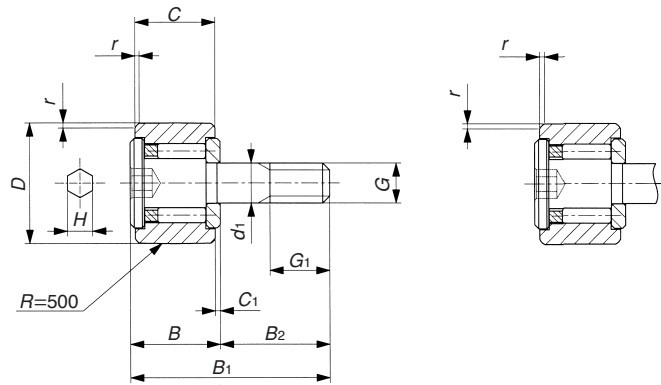


Fig.5 Oil hole position and loading direction

③ When tightening the nut, the tightening torque should not exceed the values shown in the dimension tables. If the tightening torque is too large, it is possible that the threaded portion of stud will be broken. When there are possibilities of loosening, a special nut such as a lock nut, a spring washer or a self-locking nut should be used.

# IKO Standard Type Cam Followers with Hexagon Hole

CF... B With cage type  
 CF... FB With cage type. Stainless steel made



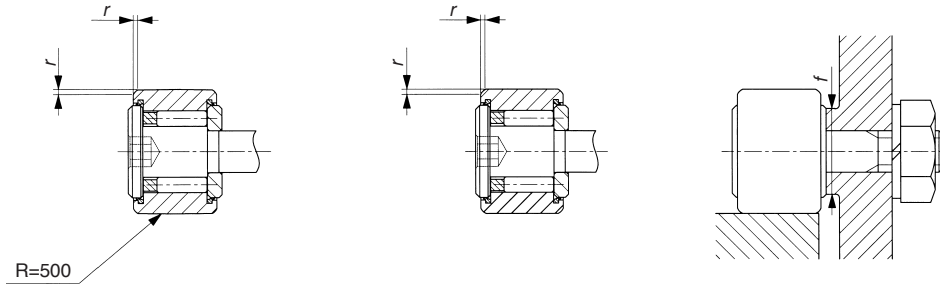
CF... BR  
 CF...FBR

CF... B  
 CF...FB

Stud dia. mm	Identification number				Mass (Ref.) g	Boundary dimensions mm				
	Shield type		Sealed type			D	C	d <sub>1</sub>	G	G <sub>1</sub>
	With crowned outer ring	With cylindrical outer ring	With crowned outer ring	With cylindrical outer ring						
3	CF 3 BR	CF 3 B	CF 3 BUUR	CF 3 BUU	4.3	10	7	3	M3 × 0.5	5
	CF 3 FBR	CF 3 FB	CF 3 FBUUR	CF 3 FBUU						
4	CF 4 BR	CF 4 B	CF 4 BUUR	CF 4 BUU	7.4	12	8	4	M4 × 0.7	6
	CF 4 FBR	CF 4 FB	CF 4 FBUUR	CF 4 FBUU						
5	CF 5 BR	CF 5 B	CF 5 BUUR	CF 5 BUU	10.3	13	9	5	M5 × 0.8	7.5
	CF 5 FBR	CF 5 FB	CF 5 FBUUR	CF 5 FBUU						

Note(1): Minimum allowable value of chamfer "r"





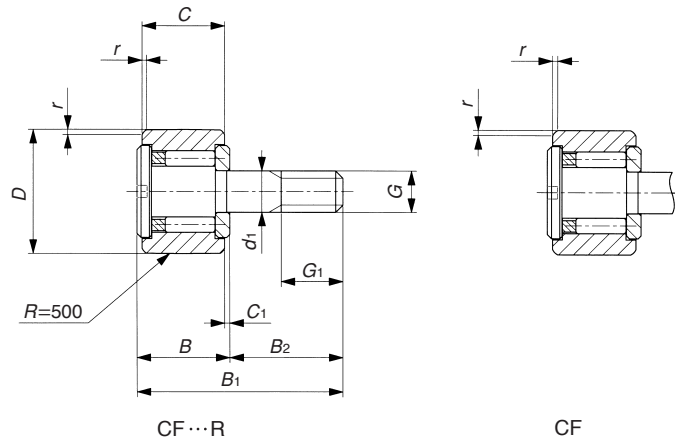
CF... BUUR  
CF... FBUUR

CF... BUU  
CF... FBUU

						Mounting dimension	Maximum tightening torque	Basic dynamic load rating	Basic static load rating	Maximum allowable load
<i>B</i>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>2</sub>	<i>C</i> <sub>1</sub>	<i>H</i>	<i>r</i> <sub>smin(1)</sub>	<i>f</i> Min. mm	N·m	<i>C</i> N	<i>C</i> <sub>0</sub> N	N
8	17	9	0.5	2	0.2	6.8	0.29	1 500	1 020	384
								1 200	813	384
9	20	11	0.5	2.5	0.3	8.3	0.78	2 070	1 590	834
								1 650	1 270	834
10	23	13	0.5	3	0.3	9.3	2.3	2 520	2 140	1 260
								1 930	1 730	1 260

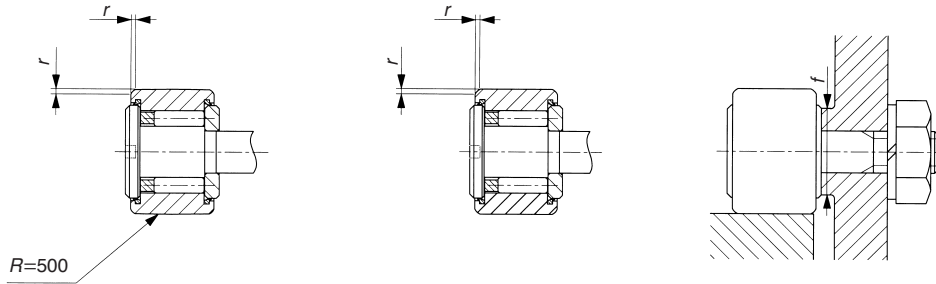
# IKO Standard Type Cam Followers with Screwdriver Slot

## CF With cage type



Stud dia. mm	Identification number				Mass (Ref.) g	Boundary dimensions mm				
	Shield type		Sealed type			D	C	d <sub>1</sub>	G	G <sub>1</sub>
	With crowned outer ring	With cylindrical outer ring	With crowned outer ring	With cylindrical outer ring						
<b>3</b>	<b>CF 3 R</b>	<b>CF 3</b>	<b>CF 3 UUR</b>	<b>CF 3 UU</b>	4.3	10	7	3	M3 × 0.5	5
<b>4</b>	<b>CF 4 R</b>	<b>CF 4</b>	<b>CF 4 UUR</b>	<b>CF 4 UU</b>	7.4	12	8	4	M4 × 0.7	6
<b>5</b>	<b>CF 5 R</b>	<b>CF 5</b>	<b>CF 5 UUR</b>	<b>CF 5 UU</b>	10.3	13	9	5	M5 × 0.8	7.5

Note(1): Minimum allowable value of chamfer "r"



CF...UUR

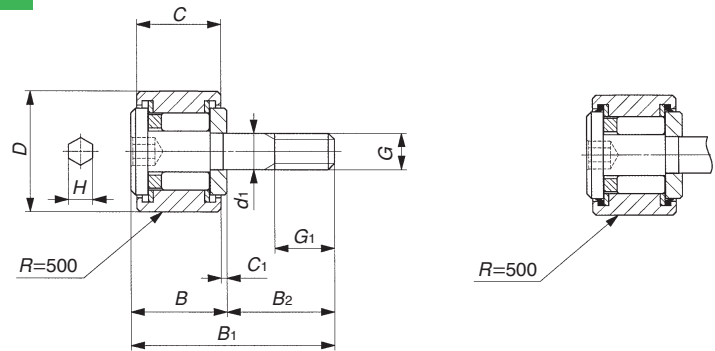
CF...UU

B	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	r <sub>smin</sub> ( <sup>1</sup> )	Mounting dimension	Maximum tightening	Basic dynamic	Basic static	Maximum
					f	torque	load rating	load rating	allowable load
					Min. mm	N·m	C N	C <sub>0</sub> N	N
8	17	9	0.5	0.2	6.8	0.29	1 500	1 020	384
9	20	11	0.5	0.3	8.3	0.78	2 070	1 590	834
10	23	13	0.5	0.3	9.3	2.3	2 520	2 140	1 260



# IKO Thrust Disk Type Cam Followers with Hexagon Hole

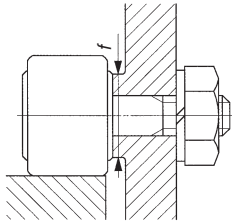
CF...WB With cage type  
 CF...FWB With cage type, Stainless steel made



CF...WBR  
 CF...FWBR

CF...WBUUR  
 CF...FWBUUR

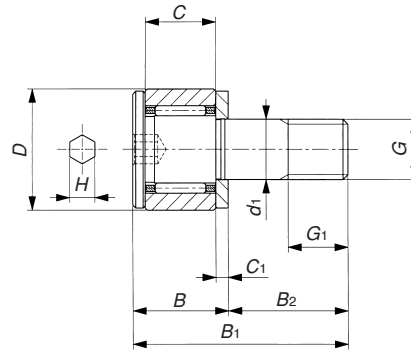
Stud dia. mm	Identification number		Mass (Ref.) g	Boundary dimensions mm					
	Shield type (with crowned outer ring)	Sealed type (with crowned outer ring)		D	C	d <sub>1</sub>	G	G <sub>1</sub>	B
3	CF 3 WBR	CF 3 WBUUR	4.3	10	7	3	M3 × 0.5	5	8
	CF 3 FWBR	CF 3 FWBUUR							
4	CF 4 WBR	CF 4 WBUUR	7.4	12	8	4	M4 × 0.7	6	9
	CF 4 FWBR	CF 4 FWBUUR							
5	CF 5 WBR	CF 5 WBUUR	10.3	13	9	5	M5 × 0.8	7.5	10
	CF 5 FWBR	CF 5 FWBUUR							



$B_1$	$B_2$	$C_1$	$H$	Mounting dimension	Maximum tightening torque	Basic dynamic load rating	Basic static load rating	Maximum allowable load
				$f$ Min. mm	N·m	$C$ N	$C_0$ N	N
17	9	0.5	2	6.8	0.34	1 500	1 020	384
						1 200	813	384
20	11	0.5	2.5	8.3	0.78	2 070	1 590	834
						1 650	1 270	834
23	13	0.5	3	9.3	1.6	2 520	2 140	1 260
						1 930	1 730	1 260

# IKO Miniature Type Cam Followers

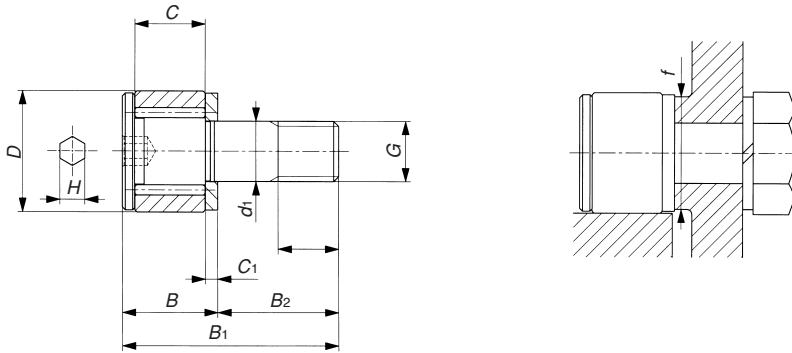
**CFS** With cage type  
**CFS...V** Full complement type  
**CFS...F** With cage type Stainless steel made  
**CFS...FV** Full complement type Stainless steel made



CFS  
 CFS...F

Stud dia. mm	Identification number		Mass (Ref.) g	Boundary dimensions mm					
	With cage type	Full complement		D	C	d <sub>1</sub>	G	G <sub>1</sub>	B
2	CFS 2 —	— CFS 2 V	0.6	4.5	2.5	2	M2 × 0.4	2	4
	CFS 2 F —	— CFS 2 FV							
2.5	CFS 2.5 —	— CFS 2.5 V	1	5	3	2.5	M2.5 × 0.45	2.5	4.5
	CFS 2.5 F —	— CFS 2.5 FV							
3	CFS 3 —	— CFS 3 V	2	6	4	3	M3 × 0.5	3	5.5
	CFS 3 F —	— CFS 3 FV							
4	CFS 4 —	— CFS 4 V	4	8	5	4	M4 × 0.7	4	7
	CFS 4 F —	— CFS 4 FV							
5	CFS 5 —	— CFS 5 V	7	10	6	5	M5 × 0.8	5	8
	CFS 5 F —	— CFS 5 FV							
6	CFS 6 —	— CFS 6 V	13	12	7	6	M6 × 1	6	9.5
	CFS 6 F —	— CFS 6 FV							



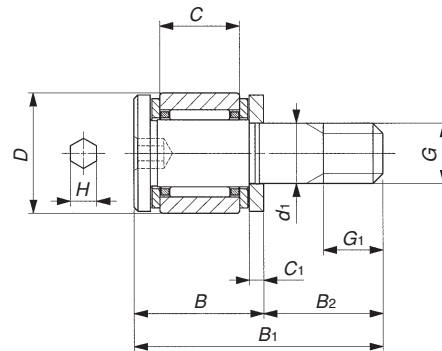


CFS...V  
CFS...FV

				Mounting dimension	Maximum tightening torque	Basic dynamic load rating	Basic static load rating	Maximum allowable load
$B_1$	$B_2$	$C_1$	$H$	$f$ Min. mm	N-cm	$C$ N	$C_0$ N	N
8	4	0.7	0.9	4.3	9.1	288	202	202
						768	734	229
						230	161	161
						614	587	161
9.5	5	0.7	0.9	4.8	18.7	428	351	351
						1 000	1 080	360
						342	281	281
						800	862	360
11.5	6	0.7	1.3	5.8	33.5	629	611	484
						1 420	1 790	484
						504	488	484
						1 140	1 430	484
15	8	1.0	1.5	7.7	77.7	1 120	1 120	919
						2 370	3 000	919
						897	894	894
						1 900	2 400	919
18	10	1.0	2	9.6	158	1 570	1 850	1 570
						3 180	4 700	1 570
						1 250	1 480	1 480
						2 540	3 760	1 570
21.5	12	1.2	2.5	11.6	268	2 090	2 200	2 150
						4 610	6 250	2 150
						1 670	1 760	1 760
						3 690	5 000	2 150

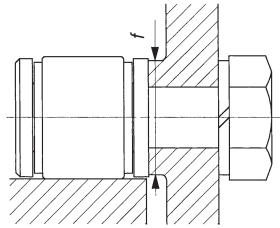
# IKO Thrust Disk Type Miniature Cam Followers

CFS... W With cage type  
 CFS...FW With cage type. Stainless steel made



CFS... W  
 CFS...FW

Stud dia. mm	Identification number	Mass (Ref.) g	Boundary dimensions mm						
			D	C	d <sub>1</sub>	G	G <sub>1</sub>	B	B <sub>1</sub>
2	CFS 2 W	0.6	4.5	2.5	2	M2 × 0.4	2	4.5	8.5
	CFS 2 FW								
2.5	CFS 2.5 W	1	5	3	2.5	M2.5 × 0.45	2.5	5	10
	CFS 2.5 FW								
3	CFS 3 W	2	6	4	3	M3 × 0.5	3	6.5	12.5
	CFS 3 FW								
4	CFS 4 W	4	8	5	4	M4 × 0.7	4	8	16
	CFS 4 FW								
5	CFS 5 W	7	10	6	5	M5 × 0.8	5	9	19
	CFS 5 FW								
6	CFS 6 W	13	12	7	6	M6 × 1	6	10.5	22.5
	CFS 6 FW								



$B_2$	$C_1$	$H$	Mounting dimension	Maximum tightening torque	Basic dynamic load rating	Basic static load rating	Maximum allowable load
			$f$ Min. mm	N-cm	$C$ N	$C_0$ N	N
4	0.7	0.9	4.3	9.1	288	202	194
					230	161	161
5	0.7	0.9	4.8	18.7	428	351	313
					342	281	281
6	0.7	1.3	5.8	33.5	629	611	399
					504	488	399
8	1.0	1.5	7.7	77.7	1 120	1 120	785
					897	894	785
10	1.0	2	9.6	158	1 570	1 850	1 370
					1 250	1 480	1 370
12	1.2	2.5	11.6	268	2 090	2 200	1 920
					1 670	1 760	1 760





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