# CAM FOLLOWERS

NADELLA GROUP

# SUMMARY


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# NADELLA GROUP

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**1.1 THE GROUP**

- Introduction
- Companies, brands and products overview
- Milestones
- Key numbers
- Application sectors

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**1.2 THE NETWORK**

- Introduction
- Worldwide network
- Branches and contacts
- Distributors coverage

NADELLA / nadella.com
DURBAL / durbal.com
CHIAVETTE UNIFICATE / chiavette.com
IPIRANGA / ipirangahusillos.com
SHUTON / shuton.com

## THE SPECIALIST FOR MOTION TECHNOLOGY

Nadella Group is an expert system partner for all areas of motion technology, with specialized manufacturer companies and a worldwide sales network.

Wherever innovative ideas, customized solutions, precision and reliability are required, developers and design engineers rely on products and solutions from the Nadella Group.

## COMPANIES, BRANDS AND PRODUCTS OVERVIEW

NADELLA

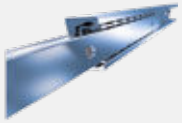
Linear Guide Systems

Linear Modules

Complete Systems

Bearings and Cam Followers

Adjusting Nuts & Rings


Telescopic Rails

durbal
chiavette unificate
TESCUBAL

Rod Ends and Spherical Plain Bearings

Clevises and Ball/Axial Joints

SHUTON
IPIRANGA

Precision Ball Screws

Rolled Ball Screws

## MILESTONES

**1930**
NADELLA foundation in France

**1958**
Founding of NADELLA GMBH in Germany

**1963**
Founding of NADELLA S.P.A. in Italy

**1984**
Start of development and sale of Nadella Linear

**2012**
New Nadella subsidiaries in China and USA

**2014**
Acquisition of DURBAL

**2018**
Acquisition of CHIAVETTE UNIFICATE

**2020**
New Nadella subsidiaries in France and Spain
Founding of Nadella Motion Technology Changxing Co. Ltd.
Acquisition of SHUTON and IPIRANGA

## KEY NUMBERS

**1** Group

**8** manufacturing plants

**14** main locations
Italy, Germany, France, United Kingdom, Spain, United States, China

leading the way in the international markets
in over **60** countries

for **90** years

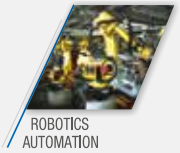
## APPLICATION SECTORS

RAILWAY TECHNOLOGY

WAREHOUSE & LOGISTICS

MEDICAL ENGINEERING

FOUNDRY & IRONWORKS


ROBOTICS AUTOMATION

PACKAGING INDUSTRY

AEROSPACE TECHNOLOGY

PHARMACEUTICAL PRODUCTION

CUTTING & WELDING

HI-TECH PRODUCTION

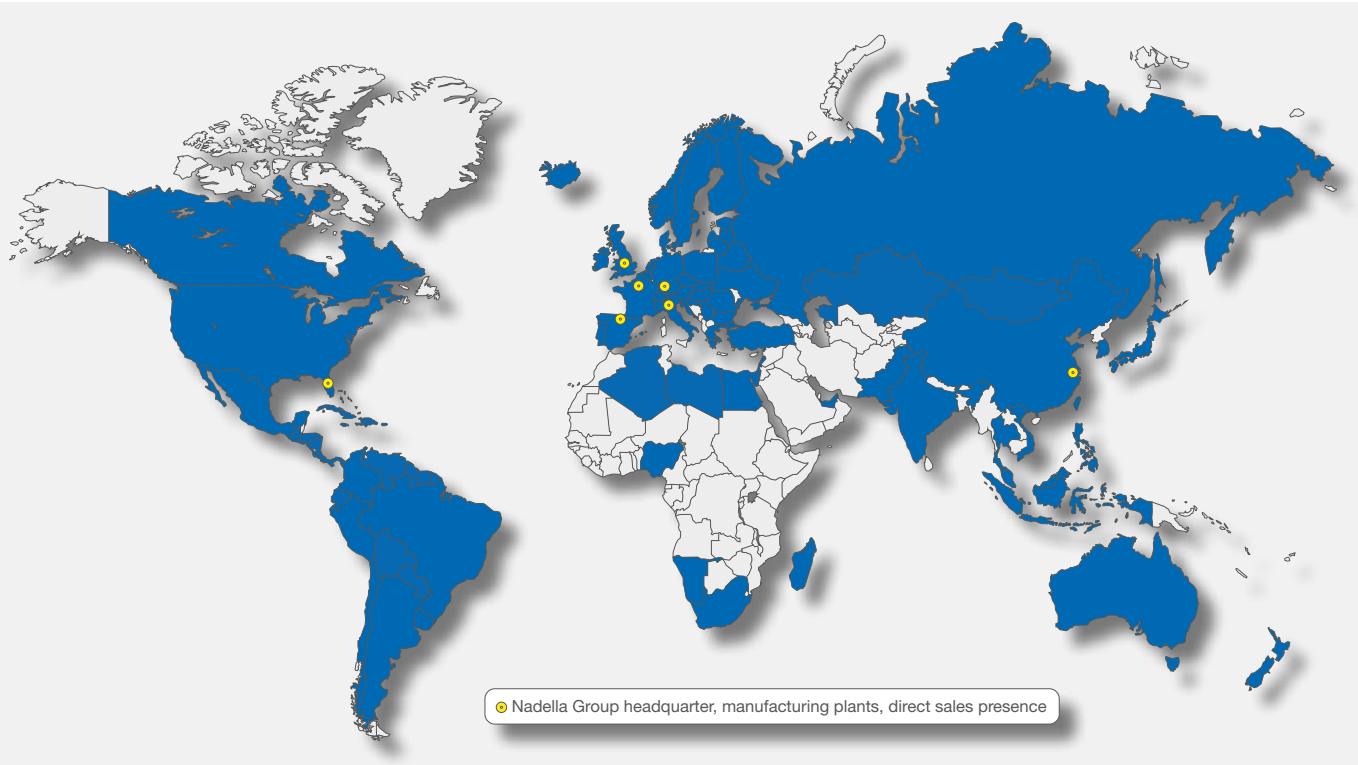
**NADELLA** / nadella.com
**DURBAL** / durbal.com
**CHIAVETTE UNIFICATE** / chiavette.com
**IPIRANGA** / ipirangahusillos.com
**SHUTON** / shuton.com

## THE SPECIALIST FOR MOTION TECHNOLOGY

Our customers' satisfaction is the basis for our success and growth.
That is why we are at your service around the world and always keep your requirements as a priority.

We have a worldwide network of sales engineers and distributors in Europe, Asia and the USA.
This allows us to ensure customer-oriented solutions and best in class delivery and service.

## WORLDWIDE NETWORK




## BRANCHES AND CONTACTS

**NADELLA S.p.A.**
**Italy**

Via Melette, 16
20128 Milano
Tel.: +39 02 27 093
Fax: +39 02 257 64 79
customer.service@nadella.it
www.nadella.it

**NADELLA S.A.**
**Spain**

Polígono Industrial Erratzu
Parcela G3. Pabellón 221 - Apdo.65
E-20130 Urnieta - Gipuzkoa
Tel. +34 943 336 370
ventas@nadella.es
www.nadella.com

**NADELLA GmbH**
**Germany**

Rudolf-Diesel-Str. 28
71154 Nufringen
Tel.: +49 7032 9540-0
Fax: +49 7032 9540-25
info@nadella.de
www.nadella.de

**DURBAL Metallwarenfabrik**
**GmbH - Germany**

Verrenberger Weg 2
74613 Öhringen
Tel.: +49 7941 9460-0
Fax: +49 7941 9460-90
info@durbal.de
www.durbal.de

**NADELLA Inc.**
**United States**

14115 – 63 Way North
Clearwater – Florida 33760-3621
Tel.: +1 844-537-0330 (toll-free)
Fax: +1 844-537-0331
info@nadella.com
www.nadella.com

**CHIAVETTE UNIFICATE S.p.A.**
**Italy**

Via G.Brodolini 6-8-10
40069 Zola Predosa, Bologna
Tel.: +39 051 75 87 67
Fax: +39 051 75 47 80
tescubal@chiavette.it
www.chiavette.com

**NADELLA Linear Shanghai**
**Co. Ltd. – China**

Room D314, No. 245 Xinjunhuan
RoadMinhang, Shanghai 201114
Tel.: +86 21 5068 3835
Fax: +86 21 5038 7725
info@nadellalinear.com
www.nadella.cn.com

**SHUTON S.A.**
**Spain**

Polígono Industrial Goian
C/Subinoa, 5 - 01170 LEGUTIANO
Tel.: +34 945 465 629
Fax: +34 945 465 610
shuton@shuton.com
www.shuton.com

**NADELLA Sarl**
**France**

12 Parvis Colonel Arnaud Beltrame
Hall A 4ème étage
78000 Versailles
Tel.: +33 (0)1 7319 4048
service.client@nadella.fr
www.nadella.fr

**HUSILLOS IPIRANGA**
**Spain**

Polígono Industrial Erratzu
Parcela G3. Pabellón 221 - Apdo.65
E-20130 Urnieta - Gipuzkoa
Tel. +34 943 336 370
info@ipirangahusillos.com
www.ipirangahusillos.com

## DISTRIBUTORS COVERAGE

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Austria | China | France | India | Korea | Portugal | Slovakia | Switzerland |
| Belgium | Czech Republic | Germany | Ireland | Netherlands | Romania | Slovenia | Taiwan |
| Brazil | Denmark | Great Britain | Israel | Norway | Russia | Spain | Turkey |
| Canada | Finland | Hungary | Italy | Poland | Singapore | Sweden | United States |

# PRODUCT OVERVIEW

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| | |
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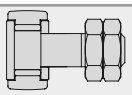
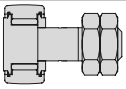
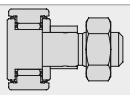
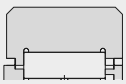
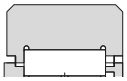
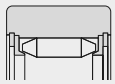
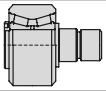
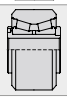
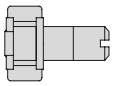
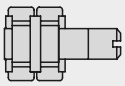
# PRODUCT OVERVIEW

2.1


| CAM FOLLOWERS | | PAGE |
|---|---|---|
| Cam followers with stud GC ..MINI |  | 20 |
| Cam followers with stud GC ..SW |  | 22 |
| Cam followers with stud KR ..EE |  | 24 |
| Full complement rollers GCU | | 25 |
| Small cam followers without stud FP | | 28 |
| Full complement needle rollers FG..SW | | 30 |
| Full complement rollers FGU light series |  | 32 |
| Full complement rollers FGU heavy series |  | 34 |
| Full complement needle rollers RNA 11000 |  | 36 |
| Cam followers with pivot and tapered bearings PK |  | 38 |
| Tapered roller bearings FK |  | 39 |
| Cam followers with heavy stud PFL |  | 40 |
| Double cam followers with stud PFDL |  | 42 |

# CAM FOLLOWERS

2.2

NADELLA cam followers are designed to rotate directly on cams, flat surfaces or guidex. In order to meet the unusual conditions of use - significant loads accompanied by substantial and repeated shocks - these types of bearings have the following characteristics:

- Heavy section outer ring, to support the load and minimise the risk of deformations that reduce the bearing's load-supporting capacity.
- Rolling or cup needle roller bearing, with cage or full complement to guarantee maximum load capacity.
- Outer profiled ring to compensate for parallelism errors between the roller and track or cylindrical ring to reduce contact pressure with the sliding surfacex.
- Lubrication hole with output under the needles to restore the grease through the axle.

The cam followers with stud can be equipped with an eccentric collar to adjust the pre-load during assembly.

The cam followers can be equipped with synthetic or metal seals to retain the grease.

Apart from the products shown in this catalogue, NADELLA produces numerous variants for specific operating conditions.

# Cam followers with stud GC.. MINI

Full complement needle rollers with outer diameter up to 15mm

- Convex (GC..) or cylindrical (GCL..) outer ring
- Screwdriver slot head side to seal in position while blocking the nut

The mini roller which thanks to the needle roller bearing has the highest load/diameter capacity ratio.

See Page 20

# Cam followers with stud GC.. SW

Full complement needle rollers with outer diameter from 16 to 90 mm

New SW version

- Outer ring with optimised profile
- Dimensions compliant with ISO 6278
- More restrictive tolerances compared to ISO 7063
- Built-in hexagonal socket on head side and stud side
- Re-greasing on the head side, stud side and radial on the stud (see tables for restrictions on small sizes)
- Without seals, with plastic (suffix..EE) or metal (suffix...EEM) sliding seals
- With eccentric bearing (GCR..)

This is the classic Nadella cam follower with stud updated with the extension of the adjustment hexagonal socket on each end and for all dimensions. The optimised profile on the outer diameter of the ring was also introduced (see pag. 59 for details)

The full complement of needles guarantees full load capacity and rigidity the careful construction guarantee stricter tolerances compared to the ISO standard, with the tolerances on the outer diameter of the cam follower h6 (instead of h9 in ISO7063).

See Page 22

# Cam followers with stud KR.. EE

Cam followers with roller cage and outer diameter from 16 to 90 mm

- Outer ring with convex profile
- Re-greasing on the head side, stud side and radial on the stud (see tables for restrictions on small sizes)
- With axial drag yoke and plastic seal
- With eccentric bearing (KRE..)

The classic cam follower with cage. The need to re-lubricate the bearing, is reduced thanks to the cage and the axial drag yoke. This kind of bearing is suitable for less demanding applications but with elevated speed.

See Page 24

# Full complement rollers GCU

Full complement needle rollers with outer diameter from 35 to 130 mm

- Dimensions compliant with ISO 6278
- More restrictive tolerances compared to ISO 7063
- Built-in hexagonal socket on head side and stud side
- Re-greasing on the head side, stud side and radial on the stud
- Without seals, or with metal seals (suffix...MM)
- With eccentric bearing (GCUR..)

This is the classic Nadella full complement roller updated with the extension of the adjustment hexagonal socket on both ends and for all dimensions.

The assembly dimensions, for equivalent sizes, are the same as GC..SW. The roller solutions instead of the needles reduces the thickness of the outer ring and the number of rollers. The maximum load is reduced but the dynamic capacity of the cam follower without stud is increased.

The larger dimensions, up to 130 mm, are the solution with the highest load capacity of all the cam followers with stud.

See Page 25

# Mini cam followers without stud FP

Full complement needle rollers with outer diameter from 10 mm to 15 mm

- Convex (FP..) or cylindrical (FPL..) outer ring

The mini roller which thanks to the needle roller bearing has the highest load/diameter capacity ratio.

See Page 28

# Full complement needle rollers FG.. SW

Full complement needle rollers with outer diameter from 16 to 250 mm

**New SW version**

- Outer ring with optimised profile
- Dimensions compliant with ISO 6278
- More restrictive tolerances compared to ISO 7063
- Without seals, with plastic (suffix..EE) or metal (suffix...EEM) sliding seals

The full complement of needle rollers guarantees full load capacity and rigidity. The unusual aspect of this cam roller without stud is the assembly of the axial yokes that are firmly fastened to the inner ring, as if it were one piece.

See Page 30

# Full complement rollers FGU

Full complement rollers with outer diameter from 35 to 300 mm. The heavy series differs from the light series in the thickness of the outer ring, from which a greater outer diameter derives and the ability to sustain more significant loads.

- Dimensions compliant with ISO 6278
- More restrictive tolerances compared to ISO 7063
- Without seals, with metal guards (suffix...MM)

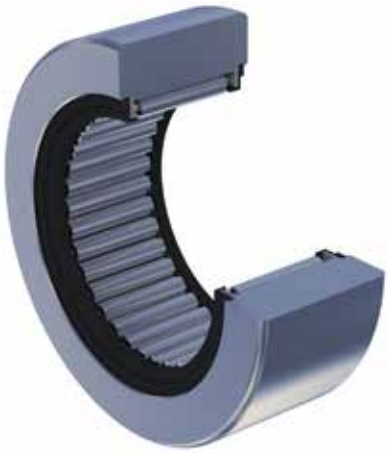
The full complement rollers guarantee full load capacity and rigidity. The assembly dimensions, for equivalent sizes, are the same as GC..SW. The roller solutions instead of the needle followers reduces the thickness of the outer ring and the number of rolling elements. The maximum load is reduced but the dynamic capacity of the cam follower without stud is increased.

See Page 32 (light series) and Page 34 (heavy series)

# Full complement needle rollers RNA 11000

Ring with full complement of needle rollers, mechanically fastened and separate inner ring. Outer diameter from 19 to 90 mm

See Page 36



# Cam followers with pivot and tapered bearings PK

Cam followers without stud with high load capacity and tapered roller bearings. Outer diameter from 52 to 110 mm

- Version with eccentric stud PKR
- Standard drag seal in NBR
- Possibility of Viton seal for high temperature
- Also available in stainless steel NX

The tapered bearings absorb the axial thrusts due to the misalignments between the cam follower without stud and rolling track without compromising the function of the cam follower without stud. The width of the sleeve allows for the strain to be distributed on a wide contact surface with the rolling track. The amount of grease is sufficient for a life-long greasing of the cam follower without stud. The result is a robust, reliable component.

See Page 38

# Guide wheels FK

Cam followers without stud with high load capacity and tapered roller bearings. Outer diameter from 52 to 110 mm

- Standard drag seal in NBR
- Possibility of Viton seal for high temperature
- Also available in stainless steel NX

The tapered bearings absorb the axial thrusts due to the misalignments between the cam follower without stud and rolling track without compromising the function of the cam follower without stud. The width of the sleeve allows for the strain to be distributed on a wide contact surface with the rolling track. The amount of grease is sufficient for a life-long greasing of the cam follower without stud. The result is a robust, reliable component.

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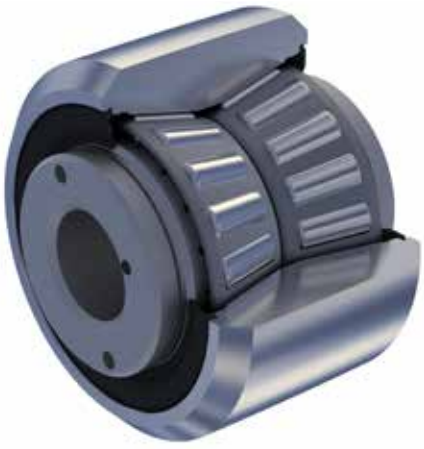

# Cam followers with heavy stud PFL

Cam followers without stud with high precision and load capacity. Outer diameter of cam follower without stud from 10 to 22 mm

Cam follower with heavy stud and careful construction for use on automatic machinery, positioners and cam movements.

See Page 40

# Double cam followers with stud PFDL

For assembly on double contact cam movements. Outer diameter of cam follower without stud from 24 to 32 mm

This is the ideal solution in the applications in which the cam is strained in alternating direction

- Elimination of play between the cam and cam follower without stud in the loading inversion points.
- Elimination of the rotation inversion due to dragging and wear.

See Page 42

# PRODUCT DETAILS

3


| | | |
|---|---|---|
| PAGE 20 | 3.1 | CAM FOLLOWERS WITH STUD GC ..MINI |
| PAGE 22 | 3.2 | CAM FOLLOWERS WITH STUD GC ..SW |
| PAGE 24 | 3.3 | CAM FOLLOWERS WITH STUD KR ..EE |
| PAGE 26 | 3.4 | FULL COMPLEMENT ROLLERS GCU |
| PAGE 28 | 3.5 | SMALL CAM ROLLERS FP |
| PAGE 30 | 3.6 | FULL COMPLEMENT ROLLERS FG..SW |
| PAGE 32 | 3.7 | COMBINED ROLLER FOLLOWERS FGU LIGHT SERIES |
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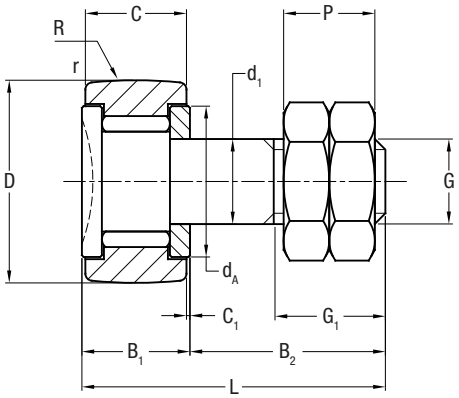
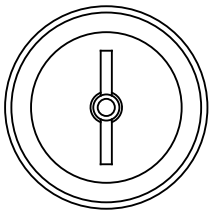
| PAGE 38 | 3.10 | CAM FOLLOWERS WITH PIVOT AND TAPERED BEARINGS PK |
| PAGE 39 | 3.11 | GUIDE WHEELS FK |
| PAGE 40 | 3.12 | CAM FOLLOWERS WITH HEAVY STUD PFL |
| PAGE 42 | 3.13 | DOUBLE CAM FOLLOWERS WITH STUD PFDL |

# CAM FOLLOWERS WITH STUD
## TYPE GC ..MINI

Full complement needle rollers with outer diameter to 15mm.

GC, GCL series without seal.



| ∅ outer D mm | Designation [1] GC, GCL | $d_1$ [2] mm | L mm | $B_1$ mm | $B_2$ mm | Threading G mm | $G_1$ mm | C mm | $C_1$ mm | $d_A$ mm | r mm | R [3] mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 10 | 4 | 19.5 | 8.5 | 11 | M4x0.7 | 6 | 8 | 0.25 | 8.4 | 0.2 | 130 |
| 11 | 11 | 4 | 19.5 | 8.5 | 11 | M4x0.7 | 6 | 8 | 0.25 | 8.4 | 0.2 | 130 |
| 12 | 12 | 5 | 22.5 | 9.5 | 13 | M5x0.8 | 7 | 9 | 0.25 | 10.3 | 0.2 | 130 |
| 13 | 13 | 5 | 22.5 | 9.5 | 13 | M5x0.8 | 7 | 9 | 0.25 | 10.3 | 0.2 | 130 |
| 14 | 14 | 6 | 26 | 10 | 16 | M6x1 | 8 | 9 | 0.25 | 11.8 | 0.3 | 130 |
| 15 | 15 | 6 | 26 | 10 | 16 | M6x1 | 8 | 9 | 0.25 | 11.8 | 0.3 | 130 |

*1) Cam follower with stud designation*
*GC.. Concentric cam follower with stud with convex outer ring*
*GCL.. Concentric cam follower with stud with cylindrical outer ring*
*2) Hole diameter for assembly $d_1$ H7*
*3) Convex radius for GC version..*

# CAM FOLLOWERS WITH STUD

## GC ..MINI

| P | Load coefficients (N) | | | Speed limit with grease ($min^{-1}$) | Weight | Clamping torque | ∅ outer D |
|---|---|---|---|---|---|---|---|
| mm | $C_w$ | Din. $F_r$ | Stat. $F_{or}$ | | Kg | Nm | mm |
| 6 | 2100 | 520 | 960 | 7500 | 0.006 | 0.9 | 10 |
| 6 | 2400 | 520 | 960 | 7400 | 0.007 | 0.9 | 11 |
| 5.4 | 2900 | 900 | 1700 | 6000 | 0.011 | 1.8 | 12 |
| 5.4 | 3200 | 900 | 1700 | 6000 | 0.011 | 1.8 | 13 |
| 6.4 | 3400 | 1500 | 2800 | 5500 | 0.016 | 3 | 14 |
| 6.4 | 3600 | 1500 | 2800 | 5500 | 0.018 | 3 | 15 |

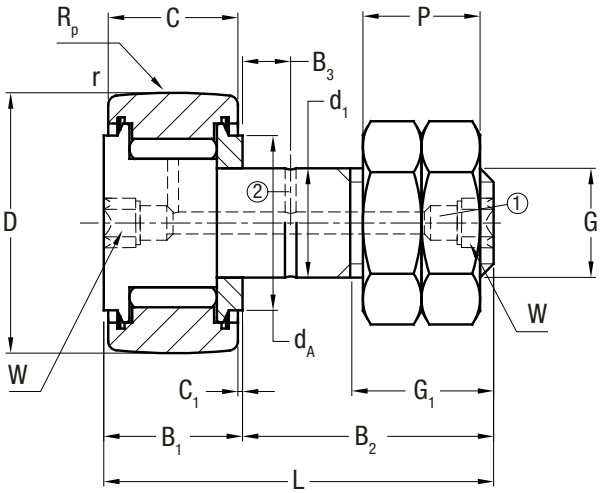
*The concentric cam followers with stud in the GC Mini series are supplied with two clamping nuts.*

# CAM FOLLOWERS WITH STUD
## TYPE GC .. SW

3.2

Full complement needle rollers with outer diameter from 16 to 90 mm

See page 47 for details on stainless steel versions.




Bore hole ① starting from D=22 mm
Bore hole ② starting from D=30 mm

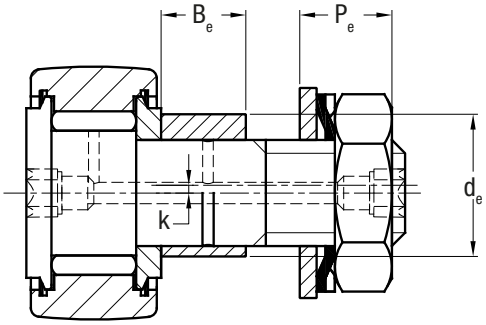
| ∅ outer D mm | Designation [1] GC .. SW | $d_1$ [2] mm | L mm | $B_1$ mm | $B_2$ mm | Threading G mm | $G_1$ mm | C mm | $C_1$ mm | $d_A$ mm | $B_3$ mm | r mm | $R_p$ [3] mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 16 | 6 | 28,2 | 12,2 | 16,5 | M6x1 | 8 | 11 | 0,6 | 13,3 | | 0,3 | 500 |
| 19 | 19 | 8 | 32,2 | 12,2 | 20,5 | M8x1.25 | 10 | 11 | 0,6 | 15,3 | | 0,3 | 500 |
| 22 | 22 | 10 | 36,2 | 13,2 | 23,5 | M10x1.25 | 12 | 12 | 0,6 | 18,2 | | 0,3 | 600 |
| 24 | 24 | 10 | 36,2 | 13,2 | 23,5 | M10x1.25 | 12 | 12 | 0,6 | 18,2 | | 0,3 | 600 |
| 26 | 26 | 10 | 36,2 | 13,2 | 23,5 | M10x1.25 | 12 | 12 | 0,6 | 20,8 | | 0,3 | 600 |
| 28 | 28 | 10 | 36,2 | 13,2 | 23,5 | M10x1.25 | 12 | 12 | 0,6 | 20,8 | | 0,3 | 600 |
| 30 | 30 | 12 | 40,2 | 15,2 | 25,5 | M12x1.5 | 13 | 14 | 0,6 | 24,8 | 6 | 0,6 | 700 |
| 32 | 32 | 12 | 40,2 | 15,2 | 25,5 | M12x1.5 | 13 | 14 | 0,6 | 24,8 | 6 | 0,6 | 700 |
| 35 | 35 | 16 | 52,2 | 19,6 | 33 | M16x1.5 | 17 | 18 | 0,8 | 28,8 | 8 | 0,6 | 800 |
| 40 | 40 | 18 | 58,1 | 21,6 | 37 | M18x1.5 | 19 | 20 | 0,8 | 33,8 | 8 | 1 | 1000 |
| 47 | 47 | 20 | 66,1 | 25,6 | 41 | M20x1.5 | 21 | 24 | 0,8 | 38,7 | 9 | 1 | 1200 |
| 52 | 52 | 20 | 66,1 | 25,6 | 41 | M20x1.5 | 21 | 24 | 0,8 | 38,7 | 9 | 1 | 1200 |
| 62 | 62 | 24 | 80,1 | 30,6 | 50 | M24x1.5 | 25 | 29 | 0,8 | 52 | 11 | 1 | 1500 |
| 72 | 72 | 24 | 80,1 | 30,6 | 50 | M24x1.5 | 25 | 29 | 0,8 | 52 | 11 | 1 | 1500 |
| 80 | 80 | 30 | 100 | 37 | 63,5 | M30x1.5 | 32 | 35 | 1 | 68 | 15 | 1 | 1700 |
| 85 | 85 [9] | 30 | 100 | 37 | 63,5 | M30x1.5 | 32 | 35 | 1 | 68 | 15 | 1 | 1700 |
| 90 | 90 | 30 | 100 | 37 | 63,5 | M30x1.5 | 32 | 35 | 1 | 68 | 15 | 1 | 1700 |

*1) Cam follower with stud designation*
*GC..SW Concentric cam follower with stud optimised profile outer ring*
*GCL..SW Concentric cam follower with stud cylindrical outer ring (product available on request)*
*GCR.. Cam follower with stud with eccentric collar*
*No suffix Without seal*
*Suffix ..EE With plastic seal, ex. GC40EESW*
*Suffix ..EEM With metal seal, ex. GC40EEMSW*
*2) Hole diameter for assembly of concentric cam follower without stud: $d_1$ H7*
*3) Convex radius in the central part to contact pressure calculation*

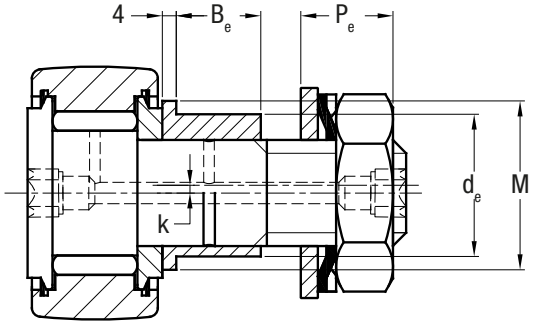
# CAM FOLLOWERS WITH STUD
## TYPE GC .. SW

3.2

See page 47 for details on stainless steel versions.




from GCR16SW to GCR52SW



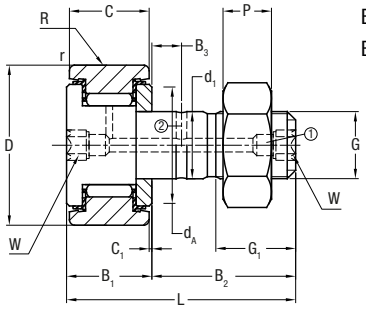

from GCR62SW to GCR90SW

| W mm | P [7] mm | Eccentric bearing | | | | | Load coefficients (N) [6] | | | Greasing speed limit with grease ($min^{-1}$) | Weight with nuts and washers Kg | Clamping torque Nm | ∅ outer D mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $d_e$ [4] [5] mm | k [5] mm | M [5] mm | $B_e$ [5] mm | $P_e$ [8] mm | $C_w$ | Din. $F_r$ | Stat. $F_{or}$ | | | | |
| 4 | 6,4 | 9 | 0,5 | | 8 | 5,6 | 4900 | 1200 | 2300 | 5000 | 0,024 | 3 | 16 |
| 4 | 8 | 11 | 0,5 | | 10 | 6,4 | 5600 | 2900 | 5400 | 4100 | 0,039 | 8 | 19 |
| 4 | 10 | 14 | 1 | | 11 | 7,9 | 6900 | 5300 | 9400 | 3400 | 0,057 | 20 | 22 |
| 4 | 10 | 14 | 1 | | 11 | 7,9 | 7600 | 5300 | 9800 | 3400 | 0,072 | 20 | 24 |
| 4 | 10 | 14 | 1 | | 11 | 7,9 | 8600 | 5300 | 9800 | 3000 | 0,08 | 20 | 26 |
| 4 | 10 | 14 | 1 | | 11 | 7,9 | 9200 | 5300 | 9800 | 3000 | 0,088 | 20 | 28 |
| 6 | 12 | 16 | 1 | | 11 | 9,5 | 13000 | 7900 | 15000 | 2600 | 0,118 | 26 | 30 |
| 6 | 12 | 16 | 1 | | 11 | 9,5 | 13000 | 7900 | 15000 | 2600 | 0,126 | 26 | 32 |
| 10 | 16 | 21 | 1,5 | | 14 | 12,2 | 18000 | 14000 | 23000 | 2100 | 0,22 | 64 | 35 |
| 12 | 18 | 24 | 1,5 | | 16 | 13,4 | 22000 | 19000 | 34000 | 1800 | 0,321 | 90 | 40 |
| 14 | 20 | 27 | 2 | | 17,5 | 14,4 | 27000 | 22000 | 35000 | 1500 | 0,5 | 120 | 47 |
| 14 | 20 | 27 | 2 | | 17,5 | 14,4 | 33000 | 22000 | 40000 | 1500 | 0,568 | 120 | 52 |
| 12 | 24 | 36 | 3 | 44 | 18 | 17,5 | 42000 | 31000 | 58000 | 1200 | 1,035 | 220 | 62 |
| 12 | 24 | 36 | 3 | 44 | 18 | 17,5 | 46000 | 31000 | 58000 | 1200 | 1,278 | 220 | 72 |
| 14 | 30 | 42 | 3 | 50 | 27 | 20,6 | 58000 | 50000 | 93000 | 900 | 2,074 | 450 | 80 |
| 14 | 30 | 42 | 3 | 50 | 27 | 20,6 | 61000 | 50000 | 93000 | 900 | 2,235 | 450 | 85 |
| 14 | 30 | 42 | 3 | 50 | 27 | 20,6 | 63000 | 50000 | 93000 | 900 | 2,435 | 450 | 90 |

*4) Hole diameter for assembly of the eccentric cam follower without stud: $d_e$ H7*
*5) Dimensions of the eccentric bearing.*
*6) Fr and For load for cam follower without stud, with no eccentric collar.*
*7) The GC concentric cam followers with stud are supplied with two clamping nuts.*
*8) GCR eccentric cam followers with stud are supplied with eccentric bearing already fitted, clamping nut, cogged washer and support surface washer.*
*9) Product available on request*

# CAM FOLLOWERS WITH STUD
## TYPE KR..EE

Cam followers with stud, with roller cage and outer diameter from 16 to 90 mm

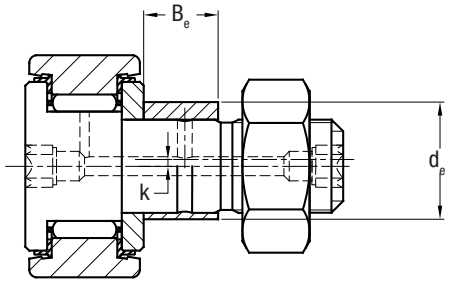



Bore hole ① starting from D=22 mm
Bore hole ② starting from D=30 mm

| ∅ outer D mm | Designation 1) KR, KR..EE | $d_1$ 2) mm | L mm | $B_1$ mm | $B_2$ mm | Threading G mm | $G_1$ mm | C mm | $C_1$ mm | $d_A$ mm | $B_3$ mm | r mm | R 4) mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | KR16 3) | 6 | 28 | 12.2 | 16 | M6x1 | 8 | 11 | 0.6 | 12.5 | - | 0.15 | 500 |
| | KR16EE 3) | 6 | 28 | 12.2 | 16 | M6x1 | 8 | 11 | 0.6 | 12.5 | - | 0.15 | 500 |
| 19 | KR19 3) | 8 | 32 | 12.2 | 20 | M8x1.25 | 10 | 11 | 0.6 | 15 | - | 0.15 | 500 |
| | KR19EE 3) | 8 | 32 | 12.2 | 20 | M8x1.25 | 10 | 11 | 0.6 | 15 | - | 0.15 | 500 |
| 22 | KR22 | 10 | 36 | 13.2 | 23 | M10x1 | 12 | 12 | 0.6 | 17.5 | - | 0.3 | 500 |
| | KR22EE | 10 | 36 | 13.2 | 23 | M10x1 | 12 | 12 | 0.6 | 17.5 | - | 0.3 | 500 |
| 26 | KR26 | 10 | 36 | 13.2 | 23 | M10x1 | 12 | 12 | 0.6 | 17.5 | - | 0.3 | 500 |
| | KR26EE | 10 | 36 | 13.2 | 23 | M10x1 | 12 | 12 | 0.6 | 17.5 | - | 0.3 | 500 |
| 30 | KR30 | 12 | 40 | 15.2 | 25 | M12x1.5 | 13 | 14 | 0.6 | 23 | 6 | 0.6 | 500 |
| | KR30EE | 12 | 40 | 15.2 | 25 | M12x1.5 | 13 | 14 | 0.6 | 23 | 6 | 0.6 | 500 |
| 32 | KR32 | 12 | 40 | 15.2 | 25 | M12x1.5 | 13 | 14 | 0.6 | 23 | 6 | 0.6 | 500 |
| | KR32EE | 12 | 40 | 15.2 | 25 | M12x1.5 | 13 | 14 | 0.6 | 23 | 6 | 0.6 | 500 |
| 35 | KR35 | 16 | 52 | 19.6 | 32.5 | M16x1.5 | 17 | 18 | 0.8 | 27.6 | 8 | 0.6 | 500 |
| | KR35EE | 16 | 52 | 19.6 | 32.5 | M16x1.5 | 17 | 18 | 0.8 | 27.6 | 8 | 0.6 | 500 |
| 40 | KR40 | 18 | 58 | 21.6 | 36.5 | M18x1.5 | 19 | 20 | 0.8 | 31.5 | 8 | 1 | 500 |
| | KR40EE | 18 | 58 | 21.6 | 36.5 | M18x1.5 | 19 | 20 | 0.8 | 31.5 | 8 | 1 | 500 |
| 47 | KR47 | 20 | 66 | 25.6 | 40.5 | M20x1.5 | 21 | 24 | 0.8 | 36.5 | 9 | 1 | 500 |
| | KR47EE | 20 | 66 | 25.6 | 40.5 | M20x1.5 | 21 | 24 | 0.8 | 36.5 | 9 | 1 | 500 |
| 52 | KR52 | 20 | 66 | 25.6 | 40.5 | M20x1.5 | 21 | 24 | 0.8 | 36.5 | 9 | 1 | 500 |
| | KR52EE | 20 | 66 | 25.6 | 40.5 | M20x1.5 | 21 | 24 | 0.8 | 36.5 | 9 | 1 | 500 |
| 62 | KR62 | 24 | 80 | 30.6 | 49.5 | M24x1.5 | 25 | 29 | 0.8 | 44 | 11 | 1 | 500 |
| | KR62EE | 24 | 80 | 30.6 | 49.5 | M24x1.5 | 25 | 29 | 0.8 | 44 | 11 | 1 | 500 |
| 72 | KR72 | 24 | 80 | 30.6 | 49.5 | M24x1.5 | 25 | 29 | 0.8 | 44 | 11 | 1.1 | 500 |
| | KR72EE | 24 | 80 | 30.6 | 49.5 | M24x1.5 | 25 | 29 | 0.8 | 44 | 11 | 1.1 | 500 |
| 80 | KR80 | 30 | 100 | 37 | 63 | M30x1.5 | 32 | 35 | 1 | 53 | 15 | 1.1 | 500 |
| | KR80EE | 30 | 100 | 37 | 63 | M30x1.5 | 32 | 35 | 1 | 53 | 15 | 1.1 | 500 |
| 90 | KR90 | 30 | 100 | 37 | 63 | M30x1.5 | 32 | 35 | 1 | 53 | 15 | 1.1 | 500 |
| | KR90EE | 30 | 100 | 37 | 63 | M30x1.5 | 32 | 35 | 1 | 53 | 15 | 1.1 | 500 |

*1) Cam follower with stud designation*
*KR.. Cam follower with stud, with no seals, KR..EE Cam follower with stud with axial drag discs and seals, KRE.. Cam follower with stud with no seals, with eccentric collar, KRE.. EE Cam follower with stud with axial drag discs and seals and with eccentric collar.*
*2) Hole diameter for assembly of concentric cam follower without stud: $d_1$ H7*
*3) For 16 and 19 mm diameter the standard cam followers with stud on the head side are supplied with screwdriver slot and grease nipple. The version with built-in hexagonal socket and no grease nipple is identifiable by the SK suffix*

# CAM FOLLOWERS WITH STUD
## TYPE KR..EE

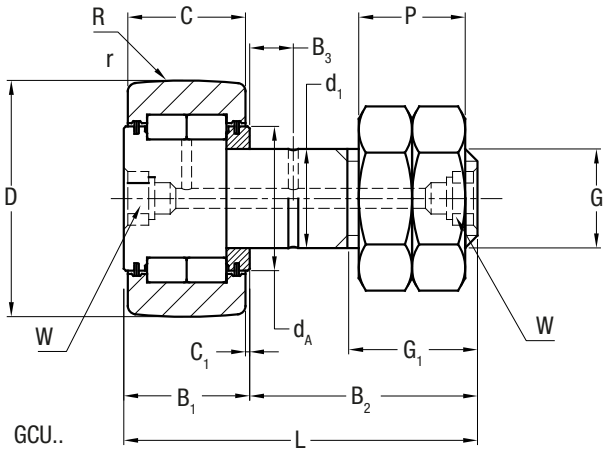



| W mm | P mm | Eccentric bearing | | | Load coefficients (N) [6] | | | Speed limit greasing ($min^{-1}$) | Weight of nut and washers Kg | Clamping torque Nm | ∅ outer D mm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $d_e$ [5] [6] mm | k [6] mm | $B_e$ [5] mm | $C_w$ | Din. $F_r$ | Stat. $F_{or}$ | | | | |
| - | 3.2 | 9 | 0.5 | 7 | 3150 | 450 | 3350 | 14000 | 0,02 | 3 | 16 |
| - | 3.2 | 9 | 0.5 | 7 | 3150 | 450 | 3350 | 14000 | 0,02 | 3 | |
| - | 4 | 11 | 0.5 | 9 | 3500 | 540 | 4000 | 11000 | 0,032 | 8 | 19 |
| - | 4 | 11 | 0.5 | 9 | 3500 | 540 | 4000 | 11000 | 0,032 | 8 | |
| 5 | 5 | 13 | 0.5 | 10 | 4550 | 730 | 5300 | 8000 | 0,047 | 15 | 22 |
| 5 | 5 | 13 | 0.5 | 10 | 4550 | 730 | 5300 | 8000 | 0,047 | 15 | |
| 5 | 5 | 13 | 0.5 | 10 | 5100 | 840 | 6400 | 8000 | 0,062 | 15 | 26 |
| 5 | 5 | 13 | 0.5 | 10 | 5100 | 840 | 6400 | 8000 | 0,062 | 15 | |
| 6 | 6 | 15 | 0.5 | 11 | 6800 | 1220 | 8600 | 5500 | 0,093 | 22 | 30 |
| 6 | 6 | 15 | 0.5 | 11 | 6800 | 1220 | 8600 | 5500 | 0,093 | 22 | |
| 6 | 6 | 15 | 0.5 | 11 | 7100 | 1290 | 9200 | 5500 | 0,104 | 22 | 32 |
| 6 | 6 | 15 | 0.5 | 11 | 7100 | 1290 | 9200 | 5500 | 0,104 | 22 | |
| 8 | 8 | 20 | 1 | 14 | 9700 | 1830 | 14300 | 3600 | 0,177 | 58 | 35 |
| 8 | 8 | 20 | 1 | 14 | 9700 | 1830 | 14300 | 3600 | 0,177 | 58 | |
| 8 | 9 | 22 | 1 | 16 | 10900 | 2090 | 15800 | 2900 | 0,255 | 87 | 40 |
| 8 | 9 | 22 | 1 | 16 | 10900 | 2090 | 15800 | 2900 | 0,255 | 87 | |
| 10 | 10 | 24 | 1 | 18 | 15400 | 3400 | 26000 | 2400 | 0,4 | 120 | 47 |
| 10 | 10 | 24 | 1 | 18 | 15400 | 3400 | 26000 | 2400 | 0,4 | 120 | |
| 10 | 10 | 24 | 1 | 18 | 16600 | 3800 | 29000 | 2400 | 0,473 | 120 | 52 |
| 10 | 10 | 24 | 1 | 18 | 16600 | 3800 | 29000 | 2400 | 0,473 | 120 | |
| 14 | 12 | 28 | 1 | 22 | 26000 | 6800 | 48000 | 1900 | 0,798 | 220 | 62 |
| 14 | 12 | 28 | 1 | 22 | 26000 | 6800 | 48000 | 1900 | 0,798 | 220 | |
| 14 | 12 | 28 | 1 | 22 | 28000 | 7200 | 53000 | 1900 | 1,038 | 220 | 72 |
| 14 | 12 | 28 | 1 | 22 | 28000 | 7200 | 53000 | 1900 | 1,038 | 220 | |
| 14 | 15 | 35 | 1.5 | 29 | 38500 | 11000 | 77000 | 1300 | 1,665 | 450 | 80 |
| 14 | 15 | 35 | 1.5 | 29 | 38500 | 11000 | 77000 | 1300 | 1,665 | 450 | |
| 14 | 15 | 35 | 1.5 | 29 | 40500 | 11700 | 83000 | 1300 | 2,032 | 450 | 90 |
| 14 | 15 | 35 | 1.5 | 29 | 40500 | 11700 | 83000 | 1300 | 2,032 | 450 | |

*4) Convex radius in the standard version. The version with cylindrical outer ring is identifiable by the X suffix. E.g. KR40EEX*
*5) Hole diameter for assembly of the eccentric cam follower without stud: $d_e$ H7*
*6) Dimensions of the eccentric bearing.*
*7) Fr and For load for cam follower without stud and no eccentric collar*
*The KR concentric cam followers with stud are supplied with one clamping nut.*
*The KRE eccentric cam followers with stud are supplied with an eccentric bearing already fitted and one clamping nut.*

# CAM FOLLOWERS WITH THREADED STUD
## TYPE GCU

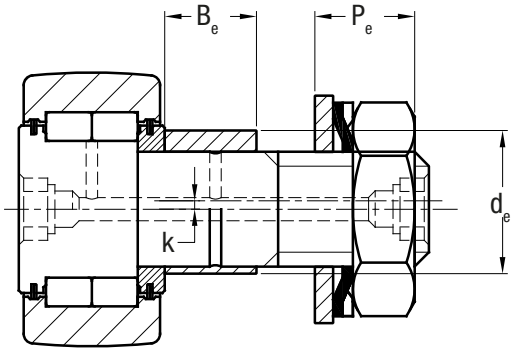
Full complement needle followers
with outer diameter from 35 to 130 mm



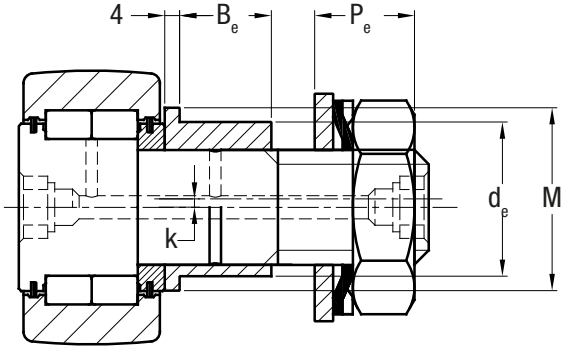

| ∅ outer D mm | Designation 1) GCU, GCU..MM | $d_1$ 2) mm | L mm | $B_1$ mm | $B_2$ mm | Threading G mm | $G_1$ mm | C mm | $C_1$ mm | $d_A$ mm | $B_3$ mm | r mm | R 3) mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35 | 35 | 16 | 52.5 | 19.7 | 32.8 | M16x1.5 | 17 | 18 | 0.85 | 26 | 8 | 0.6 | 320 |
| 40 | 40 | 18 | 58.5 | 21.7 | 36.8 | M18x1.5 | 19 | 20 | 0.85 | 28.6 | 8 | 1 | 400 |
| 47 | 47 | 20 | 66.5 | 25.7 | 40.8 | M20x1.5 | 21 | 24 | 0.85 | 33.6 | 9 | 1 | 500 |
| 52 | 52 | 20 | 66.5 | 25.7 | 40.8 | M20x1.5 | 21 | 24 | 0.85 | 33.6 | 9 | 1 | 500 |
| 62 | 62 | 24 | 80.5 | 30.7 | 49.8 | M24x1.5 | 25 | 29 | 0.85 | 38.9 | 11 | 1 | 640 |
| 72 | 72 | 24 | 80.5 | 30.7 | 49.8 | M24x1.5 | 25 | 29 | 0.85 | 38.9 | 11 | 1.1 | 640 |
| 80 | 80 | 30 | 100.5 | 37.2 | 63.3 | M30x1.5 | 32 | 35 | 1.1 | 51.8 | 15 | 1.1 | 800 |
| 85 | 85 9) | 30 | 100.5 | 37.2 | 63.3 | M30x1.5 | 32 | 35 | 1.1 | 51.8 | 15 | 1.1 | 800 |
| 90 | 90 | 30 | 100.5 | 37.2 | 63.3 | M30x1.5 | 32 | 35 | 1.1 | 51.8 | 15 | 1.1 | 800 |
| 100 | 100 | 36 | 117.5 | 42.2 | 75.3 | M36x3 | 38 | 40 | 1.1 | 61 | 20 | 2 | 1000 |
| 110 | 110 | 36 | 117.5 | 42.2 | 75.3 | M36x3 | 38 | 40 | 1.1 | 61 | 20 | 2 | 1000 |
| 120 | 120 | 42 | 136.5 | 48.2 | 88.3 | M42x3 | 44 | 46 | 1.1 | 71 | 24 | 2 | 1200 |
| 130 | 130 | 42 | 136.5 | 48.2 | 88.3 | M42x3 | 44 | 46 | 1.1 | 71 | 24 | 2 | 1200 |

*1) Cam follower with stud designation*
*GCU.. Concentric cam follower with stud and convex outer ring*
*GCUL.. Concentric cam follower with stud and cylindrical outer ring*
*GCUR.. Eccentric cam follower with stud and convex outer ring*
*GCURL.. Eccentric cam follower with stud and cylindrical outer ring*
*No suffix Without guards*
*Suffix..MM With metal guards*
*2) Hole diameter for assembly of concentric cam follower without stud: $d_1$ H7*
*3) Convex radius in the standard version GCU.*

# CAM FOLLOWERS WITH THREADED STUD
## TYPE GCU




from GCUR35.. to GCUR52..




from GCUR62.. to GCUR130..

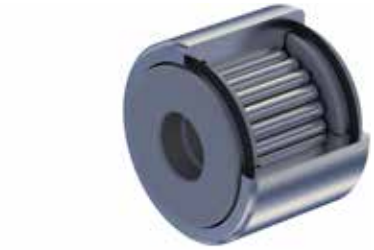
| W mm | P [7] mm | Eccentric bearing | | | | | Load coefficients (KN) [6] | | | Greasing speed limit with grease ($min^{-1}$) | Weight of nut and washers Kg | Clamping torque Nm | ∅ outer D mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $d_e$ [4] [5] mm | k [5] mm | M [5] mm | $B_e$ [5] mm | $P_e$ [8] mm | $C_w$ | Din. $F_r$ | Stat. For | | | | |
| 8 | 16 | 21 | 1.5 | | 14 | 12.2 | 15.4 | 7.25 | 13.1 | 2200 | 0.215 | 64 | 35 |
| 8 | 18 | 24 | 1.5 | | 16 | 13.4 | 18.7 | 12.1 | 21.8 | 2200 | 0.313 | 90 | 40 |
| 10 | 20 | 27 | 2 | | 17.5 | 14.4 | 30.6 | 21.2 | 38.2 | 1600 | 0.5 | 120 | 47 |
| 14 | 20 | 27 | 2 | | 17.5 | 14.4 | 30.6 | 21.2 | 38.2 | 1600 | 0.555 | 120 | 52 |
| 12 | 24 | 36 | 3 | 44 | 18 | 17.5 | 44.1 | 30.9 | 55.6 | 1400 | 1.035 | 220 | 62 |
| 12 | 24 | 36 | 3 | 44 | 18 | 17.5 | 50.8 | 52.7 | 84.1 | 1400 | 1.278 | 220 | 72 |
| 14 | 30 | 42 | 3 | 50 | 27 | 20.6 | 66.8 | 43.8 | 78.8 | 1000 | 2.07 | 450 | 80 |
| 14 | 30 | 42 | 3 | 50 | 27 | 20.6 | 75.8 | 68.1 | 122 | 1000 | 2.23 | 450 | 85 |
| 14 | 30 | 42 | 3 | 50 | 27 | 20.6 | 75.8 | 68.1 | 122 | 1000 | 2.47 | 450 | 90 |
| 17 | 36 | 48 | 3 | 56 | 32 | 24.6 | 82.1 | 76.6 | 135 | 840 | 3.38 | 740 | 100 |
| 17 | 36 | 48 | 3 | 56 | 32 | 24.6 | 89.7 | 107 | 161 | 840 | 3.86 | 740 | 110 |
| 19 | 42 | 54 | 3 | 62 | 39 | 26.8 | 124 | 107 | 193 | 740 | 5.1 | 1200 | 120 |
| 19 | 42 | 54 | 3 | 62 | 39 | 26.8 | 133 | 142 | 228 | 740 | 5.59 | 1200 | 130 |

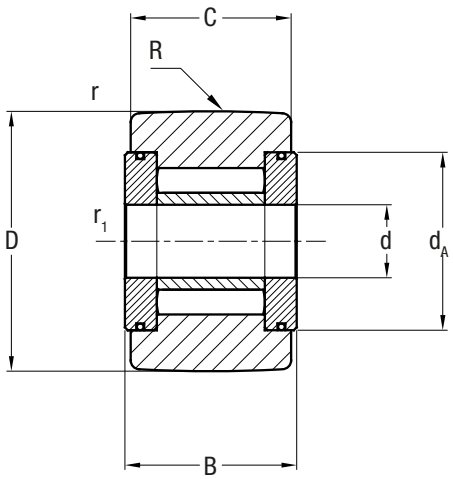
*4) Hole diameter for assembly of the eccentric cam follower without stud: $d_e$ H7*
*5) Dimensions of the pivot with eccentric collar*
*6) Fr and For load for cam follower without stud and no eccentric collar*
*7) The GCU concentric cam followers with stud are supplied with double clamping nut.*
*8) The GCUR eccentric cam followers with stud are supplied with eccentric bearing already fitted, clamping nut, cogged washer and support surface washer*
*9) Product available on request*

# SMALL CAM ROLLERS WITHOUT STUD

## FP

Full complement needle followers
with outer diameter from 10 to 15mm






| ∅ outer D<br>mm | Designation 1)<br>FP, FPL | d 2)<br>mm | B<br>mm | C<br>mm | $d_A$<br>mm | r<br>mm | $r_1$<br>mm | R 3)<br>mm |
|---|---|---|---|---|---|---|---|---|
| 10 | 3 10 | 3 | 8.7 | 8 | 8.5 | 0.2 | 0.15 | 130 |
| 11 | 3 11 4) | 3 | 8.7 | 8 | 8.5 | 0.2 | 0.15 | 130 |
| 12 | 4 12 | 4 | 9.7 | 9 | 9.9 | 0.2 | 0.15 | 130 |
| 13 | 4 13 4) | 4 | 9.7 | 9 | 9.9 | 0.2 | 0.15 | 130 |
| 14 | 4 14 4) | 4 | 10.2 | 9 | 11.8 | 0.3 | 0.15 | 130 |
| 15 | 4 15 | 4 | 10.2 | 9 | 11.8 | 0.3 | 0.15 | 130 |

*1) Designation*
*FP outer convex ring*
*FPL outer cylindrical ring*
*2) Diameter of the pivot to insert in the recommended hole: h5*
*3) Version FP convex radius*
*4) Product available on request*

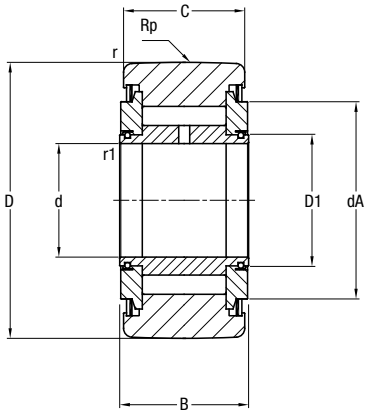
# SMALL CAM ROLLERS WITHOUT STUD

## FP

| Load coefficients (N) | | | Grease speed limit ($min^{-1}$) | Weight Kg |
|---|---|---|---|---|
| $C_w$ | Din $F_r$ | Stat. $F_{or}$ | | |
| 2200 | 2200 | 2200 | 8200 | 0.004 |
| 2300 | 2300 | 2300 | 8200 | 0.005 |
| 3100 | 3500 | 3500 | 6800 | 0.006 |
| 3200 | 3800 | 3800 | 6800 | 0.008 |
| 3300 | 3900 | 3900 | 6800 | 0.010 |
| 3300 | 3900 | 3900 | 6800 | 0.011 |

# FULL COMPLEMENT NEEDLE ROLLERS
## FG ..SW

Full complement needle followers
with outer diameter from 16 to 270 mm




| ∅ outer D mm | Designation [1] FG ..SW | d [2] mm | B mm | C mm | $D_1$ mm | $d_A$ [3] mm | r mm | $r_1$ mm | $R_p$ [4] mm |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 5 16 | 5 | 12 | 11 | 7,1 | 10,4 | 0,3 | 0,3 | 500 |
| 19 | 6 19 | 6 | 12 | 11 | 8,1 | 12,6 | 0,3 | 0,3 | 500 |
| 24 | 8 24 | 8 | 13 | 12 | 10,8 | 15,5 | 0,3 | 0,3 | 600 |
| | 8 24 15 | 8 | 15 | 14 | 10,8 | 15,5 | 0,3 | 0,3 | 600 |
| 30 | 10 30 | 10 | 15 | 14 | 13,8 | 22 | 0,6 | 0,3 | 700 |
| 32 | 12 32 | 12 | 15 | 14 | 14,6 | 22 | 0,6 | 0,3 | 700 |
| 35 | 15 35 | 15 | 19 | 18 | 18,7 | 26 | 0,6 | 0,3 | 800 |
| 40 | 17 40 | 17 | 21 | 20 | 21,1 | 31 | 0,6 | 0,3 | 1000 |
| 47 | 20 47 | 20 | 25 | 24 | 25,7 | 35 | 1 | 0,3 | 1200 |
| 52 | 25 52 | 25 | 25 | 24 | 29,5 | 35 | 1 | 0,3 | 1200 |
| 62 | 30 62 | 30 | 29 | 28 | 34,8 | 45 | 1 | 0,3 | 1500 |
| 72 | 35 72 | 35 | 29 | 28 | 39,9 | 45 | 1 | 0,6 | 1500 |
| 80 | 40 80 | 40 | 32 | 30 | 46,6 | 61,1 | 1 | 0,6 | 1700 |
| 85 | 45 85 [5] | 45 | 32 | 30 | 51 | 61,1 | 1 | 0,6 | 1700 |
| 90 | 50 90 | 50 | 32 | 30 | 59 | 71 | 1 | 0,6 | 1700 |
| 100 | 55 100 | 55 | 36 | 34 | 61,3 | 71 | 1,5 | 0,6 | 2000 |
| 110 | 60 110 | 60 | 36 | 34 | 67 | 77 | 1,5 | 0,6 | 2000 |
| 120 | 65 120 | 65 | 42 | 40 | 74 | 83 | 1,5 | 0,6 | 2500 |
| 125 | 70 125 [5] | 70 | 42 | 40 | 80 | 91 | 1,5 | 0,6 | 2500 |
| 130 | 75 130 [5] | 75 | 42 | 40 | 82 | 94 | 1,5 | 0,6 | 2500 |
| 140 | 80 140 | 80 | 48 | 46 | 87 | 100 | 2 | 1 | 2800 |
| 150 | 85 150 [5] | 85 | 48 | 46 | 94 | 105 | 2 | 1 | 2800 |
| 160 | 90 160 [5] | 90 | 54 | 52 | 100,9 | 115 | 2 | 1 | 3000 |
| 170 | 95 170 | 95 | 54 | 52 | 107 | 120 | 2 | 1 | 3000 |
| 180 | 100 180 | 100 | 65 | 63 | 112 | 128 | 2 | 1,5 | 4000 |
| 200 | 110 200 [5] | 110 | 65 | 63 | 122,5 | 138 | 2 | 1,5 | 4000 |
| 215 | 120 215 [5] | 120 | 65 | 63 | 130,1 | 145 | 2 | 1,5 | 4000 |
| 230 | 130 230 [5] | 130 | 78 | 75 | 150 | 168 | 3 | 1,5 | 4500 |
| 250 | 140 250 [5] | 140 | 78 | 75 | 162 | 183 | 3 | 1,5 | 4500 |
| 270 | 150 270 [5] | 150 | 78 | 75 | 168 | 188 | 3 | 1,5 | 4500 |

# FULL COMPLEMENT NEEDLE ROLLERS

## FG ..SW

| Load coefficients (N) | | | Speed limit greasing ($min^{-1}$) | Weight Kg | Designation FG ..SW |
|---|---|---|---|---|---|
| $C_w$ | Din $F_r$ | Stat. $F_{or}$ | | | |
| 4900 | 4900 | 5300 | 5000 | 0,016 | 5 16 |
| 5600 | 5800 | 6600 | 4100 | 0,019 | 6 19 |
| 7600 | 10000 | 10000 | 3400 | 0,037 | 8 24 |
| 9200 | 13000 | 13000 | 3400 | 0,044 | 8 24 15 |
| 13000 | 12000 | 15000 | 2600 | 0,066 | 10 30 |
| 12000 | 17000 | 18000 | 2500 | 0,077 | 12 32 |
| 17000 | 15000 | 24000 | 2000 | 0,103 | 15 35 |
| 22000 | 21000 | 34000 | 1800 | 0,155 | 17 40 |
| 27000 | 22000 | 35000 | 1500 | 0,295 | 20 47 |
| 29000 | 33000 | 54000 | 1400 | 0,31 | 25 52 |
| 38000 | 43000 | 69000 | 1100 | 0,49 | 30 62 |
| 43000 | 56000 | 87000 | 1000 | 0,67 | 35 72 |
| 52000 | 66000 | 110000 | 870 | 0,89 | 40 80 |
| 54000 | 68000 | 110000 | 810 | 0,97 | 45 85 [5] |
| 49000 | 57000 | 93000 | 710 | 1,04 | 50 90 |
| 66000 | 100000 | 150000 | 670 | 1,35 | 55 100 |
| 71000 | 120000 | 170000 | 620 | 1,65 | 60 110 |
| 81000 | 140000 | 210000 | 560 | 2,35 | 65 120 |
| 84000 | 140000 | 220000 | 530 | 2,5 | 70 125 [5] |
| 84000 | 140000 | 220000 | 510 | 2,65 | 75 130 [5] |
| 110000 | 190000 | 280000 | 480 | 3,4 | 80 140 |
| 110000 | 200000 | 300000 | 440 | 4 | 85 150 [5] |
| 130000 | 320000 | 340000 | 420 | 5,3 | 90 160 [5] |
| 130000 | 250000 | 390000 | 390 | 6 | 95 170 |
| 180000 | 280000 | 460000 | 360 | 8,05 | 100 180 |
| 200000 | 380000 | 550000 | 340 | 10 | 110 200 [5] |
| 220000 | 460000 | 620000 | 320 | 11,5 | 120 215 [5] |
| 250000 | 340000 | 560000 | 280 | 15,5 | 130 230 [5] |
| 280000 | 410000 | 670000 | 260 | 18,5 | 140 250 [5] |
| 300000 | 540000 | 860000 | 250 | 22 | 150 270 [5] |

*1) Cam follower without stud designation*
*FG..SW Cam follower without stud with optimised outer profile ring without seal*
*Suffix..EE With plastic seals available up to outer diameter of 90 mm e.g. FG40EESW*
*Suffix ..EEM With metal seals e.g. FG40EEMSW*
*FGL..SW Cam follower with cylindrical outer ring*

*2) Recommended diameter for pivot: h5*

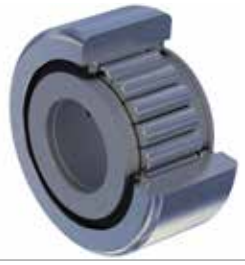
*3) Minimum recommended abutment support diameter in the event of excessive axial load or if there are vibrations*

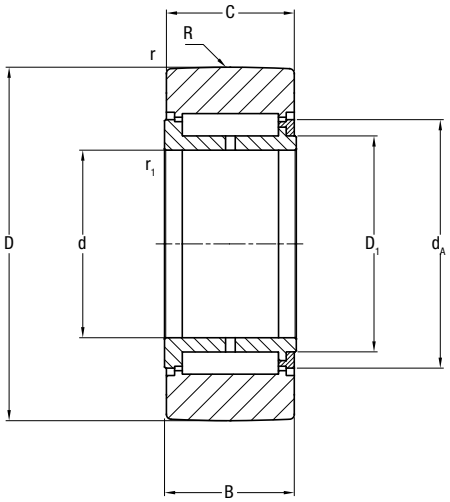
*4) Convex radius in the central part to contact pressure calculation*

*5) Product available on request*

# FULL COMPLEMENT ROLLERS
## FGU LIGHT SERIES

Full complement rollers with outer diameter from 35 to 270 mm






| ∅ outer D mm | Designation 1) FGU, FGU ..MM | d 2) mm | B mm | C mm | $D_1$ mm | $d_A$ 3) mm | r mm | $r_1$ mm | R 4) mm |
|---|---|---|---|---|---|---|---|---|---|
| 35 | 15 35 | 15 | 19 | 18 | 19 | 25.4 | 1 | 0.3 | 320 |
| 40 | 17 40 | 17 | 21 | 20 | 22 | 28 | 1 | 0.3 | 400 |
| 47 | 20 47 | 20 | 25 | 24 | 25.8 | 33.5 | 1 | 0.3 | 500 |
| 52 | 25 52 | 25 | 25 | 24 | 30 | 38.2 | 1 | 0.3 | 500 |
| 62 | 30 62 | 30 | 29 | 28 | 36.8 | 45.9 | 1 | 0.3 | 640 |
| 72 | 35 72 5) | 35 | 29 | 28 | 44 | 53.6 | 1 | 0.6 | 640 |
| 80 | 40 80 5) | 40 | 32 | 30 | 49.5 | 59.3 | 1 | 0.6 | 800 |
| 85 | 45 85 5) | 45 | 32 | 30 | 54 | 63.1 | 1.5 | 0.6 | 800 |
| 90 | 50 90 5) | 50 | 32 | 30 | 59.5 | 68.8 | 1.5 | 0.6 | 800 |
| 100 | 55 100 5) | 55 | 36 | 34 | 64 | 75.8 | 1.5 | 0.6 | 800 |
| 110 | 60 110 5) | 60 | 36 | 34 | 69.5 | 81.5 | 1.5 | 0.6 | 800 |
| 120 | 65 120 5) | 65 | 42 | 40 | 74.5 | 86.7 | 2 | 0.6 | 900 |
| 125 | 70 125 | 70 | 42 | 40 | 79.6 | 91.8 | 2 | 0.6 | 900 |
| 130 | 75 130 5) | 75 | 42 | 40 | 84 | 97 | 2 | 0.6 | 900 |
| 140 | 80 140 5) | 80 | 48 | 46 | 90 | 102 | 2 | 1 | 1000 |
| 150 | 85 150 5) | 85 | 48 | 46 | 94 | 108.5 | 2 | 1 | 1000 |
| 160 | 90 160 5) | 90 | 54 | 52 | 100 | 114.7 | 2 | 1 | 1200 |
| 170 | 95 170 5) | 95 | 54 | 52 | 106.7 | 121.2 | 2 | 1 | 1200 |
| 180 | 100 180 5) | 100 | 65 | 63 | 113 | 127.6 | 2 | 1.5 | 1400 |
| 200 | 110 200 5) | 110 | 65 | 63 | 122 | 137 | 3 | 1.5 | 1400 |
| 215 | 120 215 5) | 120 | 65 | 63 | 132 | 149.3 | 3 | 1.5 | 1400 |
| 230 | 130 230 5) | 130 | 78 | 75 | 143 | 160.6 | 3 | 1.5 | 1600 |
| 250 | 140 250 5) | 140 | 78 | 75 | 151 | 168 | 3 | 1.5 | 1600 |
| 270 | 150 270 5) | 150 | 78 | 75 | 162 | 179.5 | 3 | 1.5 | 1600 |

*1) Cam follower without stud designation:*
*FGU.. Cam follower without stud with optimised outer profile ring and no seals*
*FGU ..MM With metal seals (e.g. FGU 35 72 MM)*
*FGUL.. Cam follower with cylindrical outer ring*

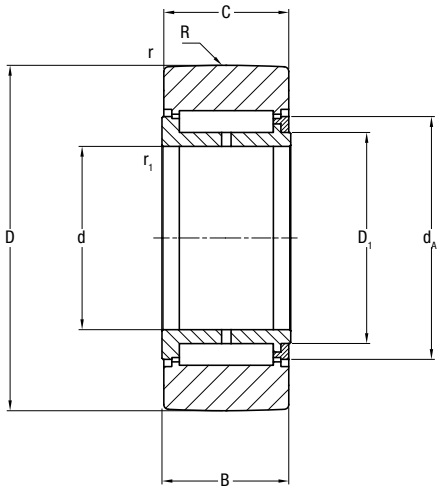
# FULL COMPLEMENT ROLLERS
## FGU LIGHT SERIES

| Load coefficients (N) | | | Speed limit greasing ($min^{-1}$) | Weight Kg | Designation [1] |
|---|---|---|---|---|---|
| $C_w$ | Din. $F_r$ | Stat. $F_{or}$ | | | FGU, FGU ..MM |
| 15000 | 8100 | 13000 | 2200 | 0.099 | 15 35 |
| 19000 | 15000 | 21000 | 2000 | 0.142 | 17 40 |
| 28000 | 25000 | 30000 | 1800 | 0.239 | 20 47 |
| 27000 | 17000 | 28000 | 1500 | 0.276 | 25 52 |
| 41000 | 22000 | 36000 | 1200 | 0.461 | 30 62 |
| 52000 | 46000 | 67000 | 1100 | 0.629 | 35 72 [5] |
| 59000 | 50000 | 72000 | 1000 | 0.831 | 40 80 [5] |
| 59000 | 38000 | 62000 | 890 | 0.895 | 45 85 [5] |
| 61000 | 38000 | 62000 | 830 | 0.963 | 50 90 [5] |
| 72000 | 37000 | 60000 | 730 | 1.35 | 55 100 [5] |
| 90000 | 70000 | 110000 | 700 | 1.672 | 60 110 [5] |
| 110000 | 89000 | 140000 | 640 | 2.364 | 65 120 [5] |
| 110000 | 84000 | 140000 | 600 | 2.48 | 70 125 |
| 110000 | 79000 | 130000 | 670 | 2.611 | 75 130 [5] |
| 140000 | 120000 | 190000 | 540 | 3.52 | 80 140 [5] |
| 140000 | 130000 | 200000 | 500 | 4.077 | 85 150 [5] |
| 180000 | 160000 | 260000 | 480 | 5.227 | 90 160 [5] |
| 190000 | 180000 | 290000 | 460 | 5.943 | 95 170 [5] |
| 240000 | 240000 | 390000 | 430 | 8.178 | 100 180 [5] |
| 260000 | 290000 | 470000 | 390 | 10.343 | 110 200 [5] |
| 280000 | 320000 | 510000 | 370 | 11.782 | 120 215 [5] |
| 350000 | 340000 | 550000 | 340 | 15.859 | 130 230 [5] |
| 380000 | 400000 | 650000 | 310 | 19.034 | 140 250 [5] |
| 430000 | 590000 | 810000 | 310 | 20.014 | 150 270 [5] |

*2) Recommended diameter for pivot: h5*
*3) Minimum recommended abutment support diameter in the event of excessive axial load or if there are vibrations*
*4) Convex radius in the central part to contact pressure calculation*
*5) Product available on request*

# FULL COMPLEMENT ROLLERS
## FGU HEAVY SERIES

Full complement rollers with outer diameter from 42 to 320 mm.




| ∅ outer D mm | Designation [1] FGU, FGU ..MM | d [2] mm | B mm | C mm | $D_1$ mm | $d_A$ [3] mm | r mm | $r_1$ mm | R [4] mm |
|---|---|---|---|---|---|---|---|---|---|
| 42 | 15 42 | 15 | 19 | 18 | 19 | 25.4 | 1 | 0.3 | 320 |
| 47 | 17 47 | 17 | 21 | 20 | 22 | 28 | 1 | 0.3 | 400 |
| 52 | 20 52 | 20 | 25 | 24 | 25.8 | 33.5 | 1 | 0.3 | 500 |
| 62 | 25 62 | 25 | 25 | 24 | 30 | 38.2 | 1 | 0.3 | 500 |
| 72 | 30 72 | 30 | 29 | 28 | 36.8 | 45.9 | 1 | 0.3 | 640 |
| 80 | 35 80 | 35 | 29 | 28 | 44 | 53.6 | 1 | 0.6 | 640 |
| 90 | 40 90 [5] | 40 | 32 | 30 | 49.5 | 59.3 | 1 | 0.6 | 800 |
| 100 | 45 100 | 45 | 32 | 30 | 54 | 63.1 | 1.5 | 0.6 | 800 |
| 110 | 50 110 | 50 | 32 | 30 | 59.5 | 68.8 | 1.5 | 0.6 | 800 |
| 120 | 55 120 | 55 | 36 | 34 | 64 | 75.8 | 1.5 | 0.6 | 800 |
| 130 | 60 130 | 60 | 36 | 34 | 69.5 | 81.5 | 1.5 | 0.6 | 800 |
| 140 | 65 140 | 65 | 42 | 40 | 74.5 | 86.7 | 2 | 0.6 | 900 |
| 150 | 70 150 | 70 | 42 | 40 | 79.6 | 91.8 | 2 | 0.6 | 900 |
| 160 | 75 160 [5] | 75 | 42 | 40 | 84 | 97 | 2 | 0.6 | 900 |
| 170 | 80 170 | 80 | 48 | 46 | 90 | 102 | 2 | 1 | 1000 |
| 180 | 85 180 [5] | 85 | 48 | 46 | 94 | 108.5 | 2 | 1 | 1000 |
| 190 | 90 190 [5] | 90 | 54 | 52 | 100 | 114.7 | 2 | 1 | 1200 |
| 200 | 95 200 | 95 | 54 | 52 | 106.7 | 121.2 | 2 | 1 | 1200 |
| 215 | 100 215 | 100 | 65 | 63 | 113 | 127.6 | 2 | 1.5 | 1400 |
| 240 | 110 240 [5] | 110 | 65 | 63 | 122 | 137 | 3 | 1.5 | 1400 |
| 260 | 120 260 [5] | 120 | 65 | 63 | 132 | 149.3 | 3 | 1.5 | 1400 |
| 280 | 130 280 [5] | 130 | 78 | 75 | 143 | 160.6 | 3 | 1.5 | 1600 |
| 300 | 140 300 | 140 | 78 | 75 | 151 | 168 | 3 | 1.5 | 1600 |
| 320 | 150 320 [5] | 150 | 78 | 75 | 162 | 179.5 | 3 | 1.5 | 1600 |

*1) Cam follower without stud designation*
*FGU.. Cam follower without stud with optimised outer profile ring and no seals*
*FGU ..MM With metal seals e.g. FGU 35 80 MM*
*FGUL.. Cam follower without stud with cylindrical outer ring*

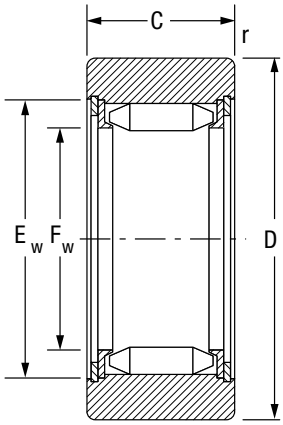
# FULL COMPLEMENT ROLLERS
## FGU HEAVY SERIES

| Load coefficients (N) | | | Speed limit greasing ($min^{-1}$) | Weight Kg | Designation [1] |
|---|---|---|---|---|---|
| $C_w$ | Din $F_r$ | Stat. $F_{or}$ | | | FGU, FGU ..MM |
| 23000 | 26000 | 26000 | 2200 | 0.16 | 15 42 |
| 25000 | 30000 | 30000 | 2000 | 0.22 | 17 47 |
| 34000 | 40000 | 40000 | 1800 | 0.31 | 20 52 |
| 39000 | 50000 | 50000 | 1500 | 0.45 | 25 62 |
| 58000 | 70000 | 76000 | 1200 | 0.7 | 30 72 |
| 64000 | 88000 | 88000 | 1100 | 0.73 | 35 80 |
| 74000 | 98000 | 98000 | 1000 | 1.13 | 40 90 [5] |
| 83000 | 120000 | 120000 | 890 | 1.4 | 45 100 |
| 90000 | 130000 | 130000 | 830 | 1.7 | 50 110 |
| 110000 | 150000 | 160000 | 730 | 2.27 | 55 120 |
| 120000 | 180000 | 180000 | 700 | 2.68 | 60 130 |
| 140000 | 220000 | 220000 | 640 | 3.6 | 65 140 |
| 150000 | 240000 | 240000 | 600 | 4.17 | 70 150 |
| 150000 | 260000 | 260000 | 570 | 4.75 | 75 160 [5] |
| 180000 | 330000 | 330000 | 540 | 6.16 | 80 170 |
| 190000 | 350000 | 350000 | 500 | 6.87 | 85 180 [5] |
| 240000 | 400000 | 400000 | 480 | 8.57 | 90 190 [5] |
| 250000 | 420000 | 420000 | 460 | 9.5 | 95 200 |
| 310000 | 570000 | 570000 | 430 | 13.54 | 100 215 |
| 330000 | 630000 | 630000 | 390 | 13.95 | 110 240 [5] |
| 350000 | 670000 | 670000 | 370 | 21.19 | 120 260 [5] |
| 460000 | 860000 | 860000 | 340 | 27.63 | 130 280 [5] |
| 480000 | 910000 | 910000 | 310 | 31.73 | 140 300 |
| 500000 | 930000 | 930000 | 310 | 35.97 | 150 320 [5] |

*2) Recommended diameter for pivot: h5*
*3) Minimum recommended abutment support diameter in the event of excessive axial load or if there are vibrations*
*4) Convex radius in the central part to contact pressure calculation*
*5) Product available on request*

# FULL COMPLEMENT NEEDLE ROLLERS
## RNA 11000

Ring with full complement needle rollers, mechanically fastened and separate inner ring. Outer diameter from 19 to 90 mm

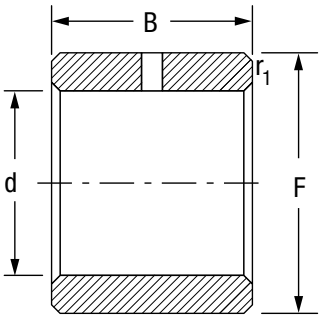



| ∅ outer D mm | Designation RNA ..B6 | $F_w$ [2] mm | D [1] mm | C nom. mm | C tol. mm | $E_W$ mm | r min. mm | Weight g | Load coefficients (N) [2] $C_w$ |
|---|---|---|---|---|---|---|---|---|---|
| 19 | 11005 B6 | 7.3 | 19 | 12 | 0<br>-0.10 | 7.3 | 0.35 | 19 | 5100 |
| 22 | 11007 B6 | 9.7 | 22 | 12 | 0<br>-0.10 | 14.7 | 0,35 | 25 | 6000 |
| 24 | 14601 B6 | 12.1 | 24 | 12 | 0<br>-0.10 | 17.1 | 0.35 | 27 | 6200 |
| 28 | 11009 B6 | 12.1 | 28 | 12 | -0.20<br>-0.30 | 17.1 | 0.35 | 42 | 7400 |
| 32 | 11012 B6 | 17.6 | 32 | 15 | -0.20<br>-0.30 | 22.6 | 0.35 | 57 | 10800 |
| 35 | 11015 B6 | 20.8 | 35 | 15 | -0.20<br>-0.30 | 25.8 | 0.65 | 62 | 10800 |
| 42 | 11017 B6 | 23.9 | 42 | 15 | -0.20<br>-0.30 | 28.9 | 0.65 | 98 | 13400 |
| 47 | 11020 B6 | 28.7 | 47 | 18 | -0.20<br>-0.30 | 34.7 | 0.65 | 133 | 16800 |
| 52 | 11025 B6 | 33.5 | 52 | 18 | -0.20<br>-0.30 | 39.5 | 0.65 | 152 | 17200 |
| 62 | 11030 B6 | 38.2 | 62 | 22 | -0.20<br>-0.30 | 44.2 | 0.65 | 275 | 28500 |
| 72 | 11035 B6 | 44 | 72 | 22 | -0.22<br>-0.34 | 50 | 0.65 | 370 | 32000 |
| 80 | 11040 B6 | 49.7 | 80 | 22 | -0.22<br>-0.34 | 55.7 | 0.85 | 450 | 34000 |
| 85 | 11045 B6 | 55.4 | 85 | 22 | -0.22<br>-0.34 | 62.4 | 0.85 | 480 | 33500 |
| 90 | 11050 B6 | 62.1 | 90 | 24 | -0.22<br>-0.34 | 68.1 | 0.85 | 540 | 32500 |

*1) Tolerances on the D dimension: h7*
*2) Recommended tolerance per $F_w$ diameter of the pivot without the use of inner ring: h5*
*3) Misalignment permitted for convexing the B6 ring: 1.5/1000*

# FULL COMPLEMENT NEEDLE ROLLERS

## RNA 11000

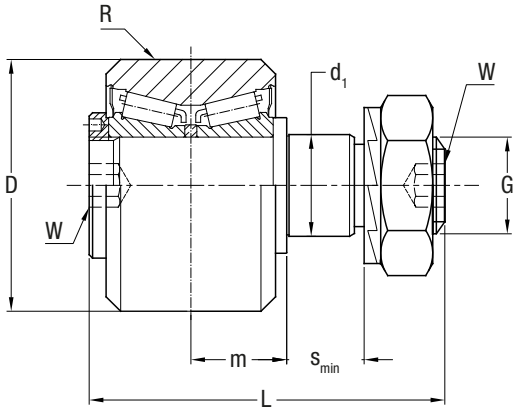



| Load coefficients (N) [2] | | Speed limit with greasing ($min^{-1}$) | Inner rings | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Shaft ∅ | Designation | d | F | B | | $r_1$ min | Weight | For cam follower | ∅ outer D |
| Din $F_r$ | Stat. $F_{or}$ | | mm | BIC series | mm | mm | nom. mm | tol. mm | mm | g | type | mm |
| 4050 | 4050 | 8700 | - | - | - | - | - | - | - | - | - | 19 |
| 5100 | 5200 | 7000 | - | - | - | - | - | - | - | - | - | 22 |
| 4700 | 5600 | 5800 | - | - | - | - | - | - | - | - | - | 24 |
| 7100 | 7100 | 5800 | - | - | - | - | - | - | - | - | - | 28 |
| 9100 | 12700 | 4200 | 12 | BIC 1012 | 12 | 17.6 | 15 | 0 -0.10 | 0.35 | 16 | 11012 | 32 |
| 9100 | 13400 | 3650 | 15 | BIC 1015 | 15 | 20.8 | 15 | 0 -0.10 | 0.65 | 18 | 11015 | 35 |
| 13900 | 18500 | 3200 | 17 | BIC 1017 | 17 | 23.9 | 15 | 0 -0.10 | 0.65 | 26 | 11017 | 42 |
| 15400 | 23000 | 2700 | 20 | BIC 1020 | 20 | 28.7 | 18 | 0 -0.10 | 0.65 | 46 | 11020 | 47 |
| 16500 | 24700 | 2330 | 25 | BIC 1025 | 25 | 33.5 | 18 | 0 -0.10 | 0.65 | 54 | 11025 | 52 |
| 31500 | 49500 | 2050 | 30 | BIC 2030 | 30 | 38.2 | 22 | 0 -0.10 | 0.65 | 74 | 11030 | 62 |
| 41000 | 61000 | 1800 | 35 | BIC 2035 | 35 | 44 | 22 | 0 -0.12 | 0.65 | 93 | 11035 | 72 |
| 47000 | 68000 | 1620 | 40 | BIC 2040 | 40 | 49.7 | 22 | 0 -0.12 | 0.85 | 115 | 11040 | 80 |
| 47500 | 69000 | 1450 | 45 | BIC 2045 | 45 | 55.4 | 22 | 0 -0.12 | 0.85 | 139 | 11045 | 85 |
| 51000 | 68000 | 1300 | 50 | BIC 11050 | 50 | 62.1 | 24 | 0 -0.12 | 0.85 | 196 | 11050 | 90 |

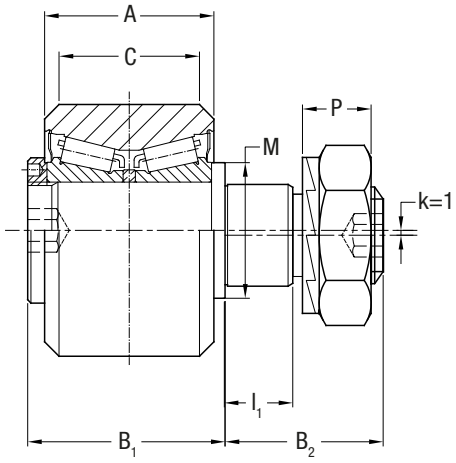
# CAM FOLLOWERS WITHOUT STUD WITH PIVOT AND TAPERED BEARINGS PK

3.10

High load capacity cam followers with tapered roller bearings. Outer diameter from 52 to 110 mm




Eccentric PK




Concentric PKR

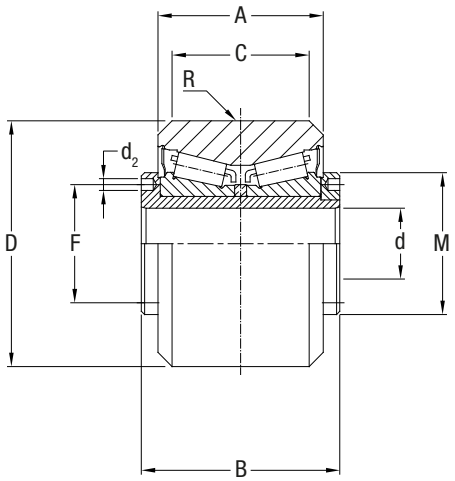
| Type concentric | Type eccentric | Dimensions (mm) | | | | | | | | | | | | | | | Load coefficient (N) | | | | Clamping | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D | $d_1$ 1) | L | A | $B_1$ | $B_2$ | m | C | R | G | $l_1$ | $S_{min}$ | M | W | P | Cw 2) | Cw 3) | Din. $F_r$ | Stat. $F_{or}$ | Nm | Kg |
| PK 52C | PKR 52C | 52 | 21 | 73 | 35 | 41 | 32 | 19.8 | 29 | 800 | M 20 x 1,5 | 14 | 15 | 28 | 8 | 13.4 | 36000 | 42000 | 11900 | 22000 | 80 | 6 |
| PK 62C | PKR 62C | 62 | 27 | 83 | 37 | 44 | 39 | 20.8 | 29 | 800 | M 24 x 1,5 | 18 | 19 | 35 | 10 | 15.4 | 39000 | 48000 | 22100 | 40000 | 160 | 9 |
| PK 72C | PKR 72C | 72 | 36 | 100 | 45 | 55 | 45 | 27 | 33 | 1.2 | M 30 x 1,5 | 18 | 19 | 44 | 12 | 21.6 | 54000 | 69000 | 31300 | 58000 | 300 | 16 |
| PK 90C | PKR 90C | 90 | 38 | 115 | 53 | 62 | 53 | 30 | 45 | 1.2 | M 36 x 1,5 | 23 | 24 | 50 | 14 | 24.6 | 98000 | 134000 | 43800 | 80000 | 450 | 28 |
| PK 110C | PKR 110C | 110 | 42 | 135 | 60 | 70 | 65 | 34 | 48 | 1.2 | M 36 x 1,5 | 32 | 33 | 56 | 14 | 24.6 | 131000 | 190000 | 55600 | 100000 | 450 | 49 |

*1) Recommended tolerance of the clamping hole in the support: H7*
*2) Coefficient of the calculation for the duration with base 1 million revs*
*3) Coefficient of the calculation for the duration with base 100 km*
*4) AISI 440 stainless steel version available (suffix NX). Inner rolling elements in steel for standard bearing (not stainless)*
*5) Version with Viton seals available (suffix V). Up to and inclusive of diameter size 90*

*The concentric and eccentric cam followers with stud are supplied complete with self-locking washer and hexagonal nut (DIN 439b)*

# GUIDE WHEELS
## FK

High load capacity cam followers without stud
with tapered roller bearings.
Outer diameter from 52 to 110 mmc

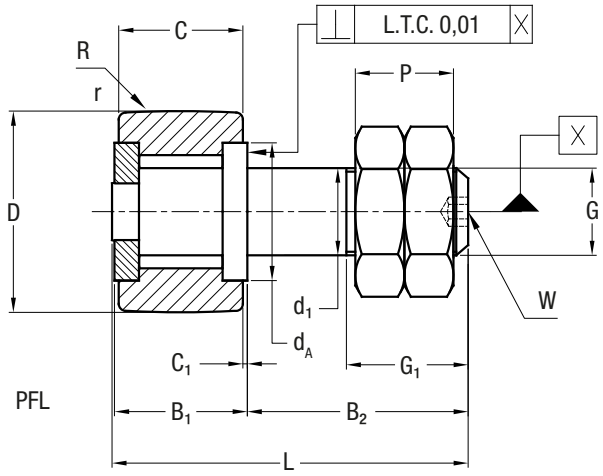



| Type | Dimensions (mm) | | | | | | | | | Load coefficient (N) | | Load limit | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D | d [1] | B | A | C | M | F | $d_2$ | R | Cw [2] | Cw [3] | Din. Fr | Stat For | Kg |
| FK 52C | 52 | 15 | 42 | 35 | 29 | 25 | 2.5 | 30 | 800 | 36000 | 42000 | 11900 | 22000 | 0.5 |
| FK 62C | 62 | 20 | 45 | 37 | 29 | 29 | 3 | 35 | 800 | 39000 | 48000 | 22100 | 40000 | 0.6 |
| FK 72C | 72 | 25 | 56 | 45 | 33 | 37 | 4 | 44 | 1200 | 54000 | 69000 | 31300 | 58000 | 1.2 |
| FK 90C | 90 | 28 | 64 | 53 | 45 | 42 | 4 | 49 | 1200 | 98000 | 134000 | 43800 | 80000 | 2.3 |
| FK 110C | 110 | 35 | 72 | 60 | 48 | 52 | 4 | 59 | 1200 | 131000 | 190000 | 55600 | 100000 | 3.9 |

*1) Recommended tolerance of the clamping pivot: h7 (free coupling)*
*2) Coefficient of the calculation for the duration with base 1 million revs*
*3) Coefficient of the calculation for the duration with base 100 km*
*4) AISI 440 stainless steel version available (suffix NX). Inner rolling elements in steel for standard bearing (not stainless)*
*5) Version with Viton seals available (suffix V). Up to and inclusive of diameter size 90*

# CAM FOLLOWERS
## WITH HEAVY STUD PFL

Cam followers with high precision and load capacity.
Outer diameter of cam follower without stud from 10 to 22 mm




| ∅ outer D mm | Designation [1] PF.. PFL.. | $d_1$ [2] mm | L mm | $B_1$ mm | $B_2$ mm | Threading G mm | $G_1$ mm | C mm | $C_1$ mm | $d_A$ mm | r mm | R [3] mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 10 | 6 | 26.5 | 10 | 16 | M6 x 1 | 8 | 9 | 0.5 | 8.5 | 0.5 | 800 |
| 11 | 11 | 6 | 26.5 | 10 | 16 | M6 x 1 | 8 | 9 | 0.5 | 8.5 | 0.5 | 800 |
| 12 | 12 | 6 | 26.5 | 10 | 16 | M6 x 1 | 8 | 9 | 0.5 | 9.9 | 0.5 | 800 |
| 13 | 13 | 6 | 26.5 | 10 | 16 | M6 x 1 | 8 | 9 | 0.5 | 9.9 | 0.05 | 800 |
| 14 | 14 | 8 | 31.5 | 11 | 20 | M8 x 1.25 | 10 | 10 | 0.5 | 11.8 | 0.5 | 800 |
| 15 | 15 | 8 | 31.5 | 11 | 20 | M8 x 1.25 | 10 | 10 | 0.5 | 11.8 | 0.5 | 800 |
| 16 | 16 | 8 | 32.5 | 12 | 20 | M8 x 1.25 | 10 | 11 | 0.5 | 13.3 | 1 | 800 |
| 19 | 19 | 10 | 36.5 | 13 | 23 | M10 x 1.25 | 12 | 12 | 0.5 | 15.3 | 1 | 800 |
| 22 | 22 | 10 | 36.5 | 13 | 23 | M10 x 1.25 | 12 | 12 | 0.5 | 18.2 | 1 | 800 |

*1) Designation PFL: cam follower with stud and outer cylindrical ring*
*Designation PF: cam follower with stud and outer convex ring R=800 mm*
*2) The diameter of the stud is calculated with h6 tolerance. Greasing holes are not foreseen.*
*3) Convex radius for PF version*

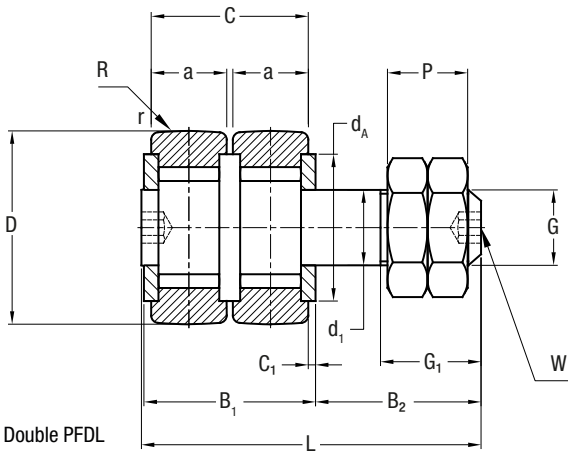
# CAM FOLLOWERS
## WITH HEAVY STUD PFL

3.12

| W mm | P mm | Load coefficients (N) | | | Speed limit with grease ($min^{-1}$) | Weight Kg | Clamping torque Nm | ∅ outer D mm |
|---|---|---|---|---|---|---|---|---|
| | | $C_w$ | Din. $F_r$ | Stat. $F_{or}$ | | | | |
| 3 | 6.4 | 2400 | 1500 | 2600 | 13000 | 0.011 | 3 | PFL 10 |
| 3 | 6.4 | 2900 | 1500 | 2800 | 13000 | 0.013 | 3 | PFL 11 |
| 3 | 6.4 | 3000 | 1500 | 2800 | 11400 | 0.014 | 3 | PFL 12 |
| 3 | 6.4 | 3300 | 1500 | 2800 | 11400 | 0.015 | 3 | PFL 13 |
| 3 | 8 | 4200 | 3200 | 4200 | 10100 | 0.025 | 8 | PFL 14 |
| 3 | 8 | 4700 | 3200 | 4900 | 10100 | 0.027 | 8 | PFL 15 |
| 3 | 8 | 4900 | 2900 | 5400 | 9300 | 0.031 | 8 | PFL 16 |
| 4 | 10 | 6300 | 5300 | 7900 | 7600 | 0.046 | 20 | PFL 19 |
| 4 | 10 | 6200 | 5300 | 8100 | 6300 | 0.06 | 20 | PFL 22 |

# CAM FOLLOWERS
## DOUBLE PFDL

For assembling on double contact cam movements.
Outer diameter of cam follower without stud from 24 to 32 mm



Double PFDL

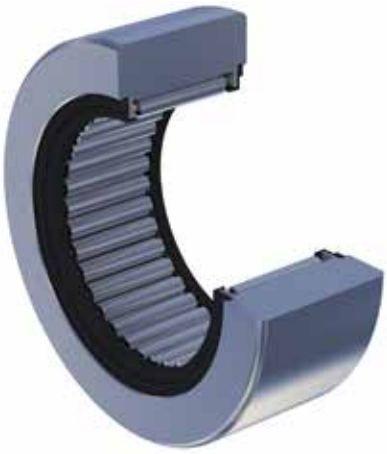
| ∅ outer D mm | Designation [1] PFDL | $d_1$ [2] mm | L mm | $B_1$ mm | $B_2$ mm | Threading G mm | $G_1$ mm | C mm | a mm | $C_1$ mm | $d_A$ mm | r mm | R [3] mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | PFDL 24.10 | 10 | 45 | 23 | 21.5 | M10 x 1.25 | 12.5 | 21 | 10 | 1 | 17.9 | 1.6 | 200 |
| 28 | PFDL 28.10 | 12 | 45 | 22 | 22.5 | M12 x 1.5 | 13.5 | 21 | 10 | 0.5 | 20.5 | 1.6 | 200 |
| 32 | PFDL 32.10 | 12 | 45 | 22 | 22.5 | M12 x 1.5 | 13.5 | 21 | 10 | 0.5 | 24.5 | 1.8 | 250 |
| 32 | PFDL 32.14 | 12 | 60 | 30 | 29.5 | M12 x 1.5 | 19 | 29 | 14 | 0.5 | 24.5 | 1.8 | 250 |

*1) Designation PFDL, cam follower with outer cylindrical ring*
*Designation PFD.. cam follower with stud and outer convex rings*
*2) The diameter of the stud is calculated with h6 tolerance*
*3) Convex radius for the PFD version*

# CAM FOLLOWERS
## DOUBLE PFDL

| W mm | P mm | Load coefficients (N) | | | Speed limit with grease ($min^{-1}$) | Weight Kg | Clamping torque Nm | ∅ outer D mm |
|---|---|---|---|---|---|---|---|---|
| | | Din $C_w$ 4) | Din. $F_r$ 5) | Stat. $F_{or}$ 5) | | | | |
| 4 | 10 | 6900 | 2000 | 3700 | 6300 | 0.086 | 20 | PFDL 24.10 |
| 5 | 12 | 5000 | 2800 | 4500 | 5300 | 0.116 | 26 | PFDL 28.10 |
| 5 | 12 | 5000 | 2800 | 4500 | 4900 | 0.144 | 26 | PFDL 32.10 |
| 5 | 12 | 4300 | 1900 | 3000 | 4800 | 0.199 | 26 | PFDL 32.14 |

*4) The load coefficient refers to each cam follower without stud of the two cam follower with stud components*
*5) With load applied to the opposite cam follower on the stud side*



# SPECIAL APPLICATIONS

4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**4.1 SPECIAL APPLICATIONS**

- Cam followers without stud with special connections to the greasing system
- Cam followers without stud for cams and indexers
- Anti-corrosion cam followers without stud
- Other products with special shape
- Cam followers without stud for high/low temperature
- Cam followers without stud for vacuum
- Wear-resistant materials
- Mirror finishing

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**4.2 OTHER PRODUCTS WITH SPECIAL SHAPE**

# SPECIAL
# APPLICATIONS

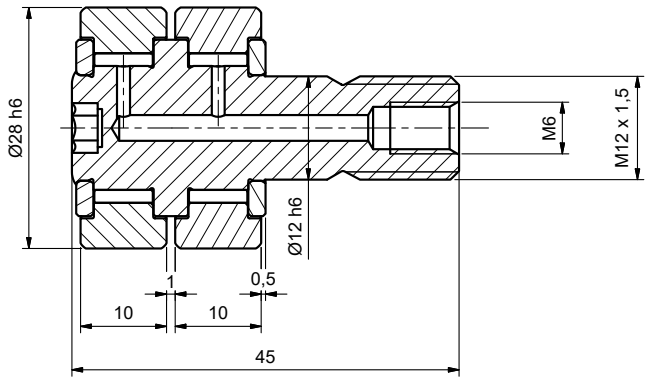
4.1

As well as the products in the catalogue, Nadella also designs and manufactures special needle and roller cam followers for specific applications. There can be variations on standard products or completely special products. Here are some examples:

## CAM FOLLOWER WITHOUT STUD WITH SPECIAL CONNECTIONS TO THE GREASING SYSTEM

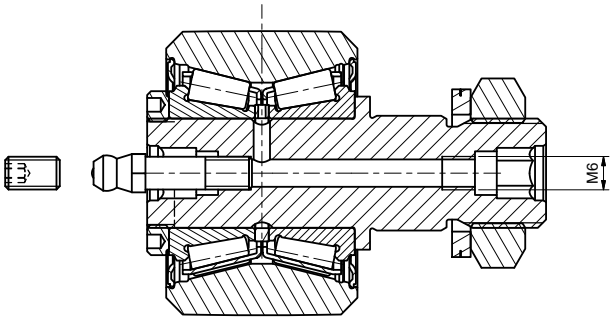
**PFDL28.10 with threaded hole to connect to the grease dispensing system.**

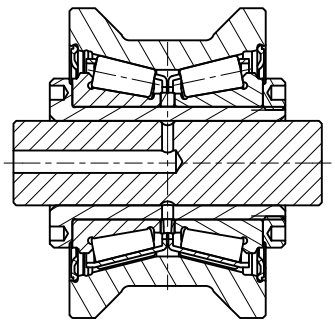
The full complement needle follower generally requires periodical greasing or, for more load and speed strained applications, the oil-filled function. An additional threaded hole in the stud was added to simplify periodical re-greasing connecting the cam roller to a centralised dispensing system.




**PK52CNX LB cam followers without stud.**

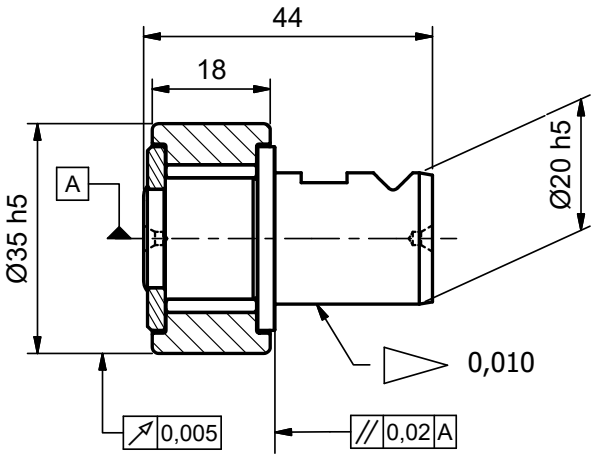
The PK series cam followers without stud with tapered bearings are normally considered greased for life. In some environments, for example, where there is a high humidity level, the grease might deteriorate over time and it is, therefore, advisable to take into consideration the possibility of having to top up the grease. The LB option for guide wheels with stud allows you to connect the nipple or plug screw to the threaded hole. For cam followers without stud and with through hole, this allows the grease to be inserted from the pivot (create hole and circular groove on the assembly pivot).

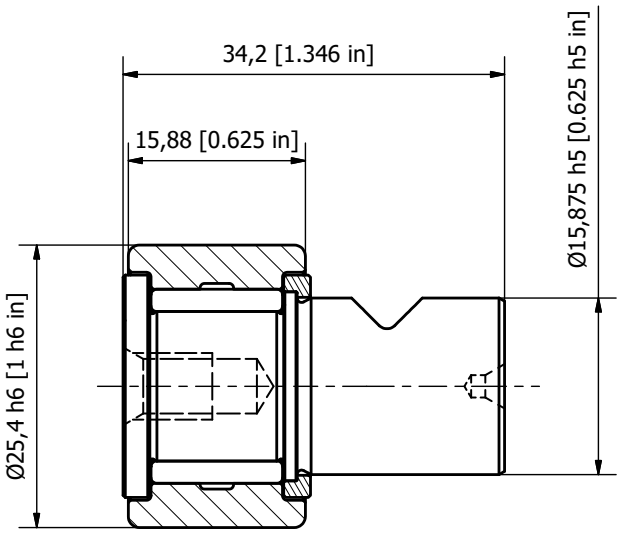


## CAM FOLLOWERS FOR CAMS AND INDEXERS

In the case of more complex mechanical applications, cam followers without stud are manufactured with materials, processing cycles, finishings, dimensional tolerances and radial play that are optimised to increase rigidity, load capacity and precision as much as possible.



## ANTI-CORROSION CAM FOLLOWERS WITHOUT STUD

The  cam followers without stud and full complement needle followers can be supplied in anti-corrosion NX version. Nadella offers stainless steel or protected cam followers without stud with surface treatments. The stainless steel used is AISI 400 and achieves a hardness comparable to steel for bearings but has a limited resistance to corrosion. The inner needles can be in stainless steel or more commonly in 100Cr6 steel. In this case the corrosion protection of the needles is entrusted to grease (NSF H1 classified grease for alimentary use and resistant to humidity). Nuts and washers are supplied in A2 stainless steel, the greasing nipple in raw brass or stainless steel.

As an alternative to the stainless steel versions hard nickel or hard chrome treatments can be used.

Different solutions can be configured based on the environment in which it is applied

- **NX-11:** this is the most common version that has outer parts in stainless steel, chromium-plated metal shields, inner needles or rollers in standard bearing steel.
- **NX-12**: outer ring in stainless steel, remaining external components nickel-plated, inner needles or rollers in standard bearing steel.
- **NX-17:** entirely in stainless steel.
- **NX-18:** hard chromium-plated components, needles in standard bearing steel. This is the best option for small production batches.

## CAM FOLLOWERS WITHOUT STUD FOR HIGH/LOW TEMPERATURE

These require suitable grease and stabilisation of the material for expected operating temperature.

## CAM FOLLOWERS WITHOUT STUD FOR VACUUM

Entirely in stainless steel and slow evaporating grease.

## WEAR-RESISTANT MATERIALS

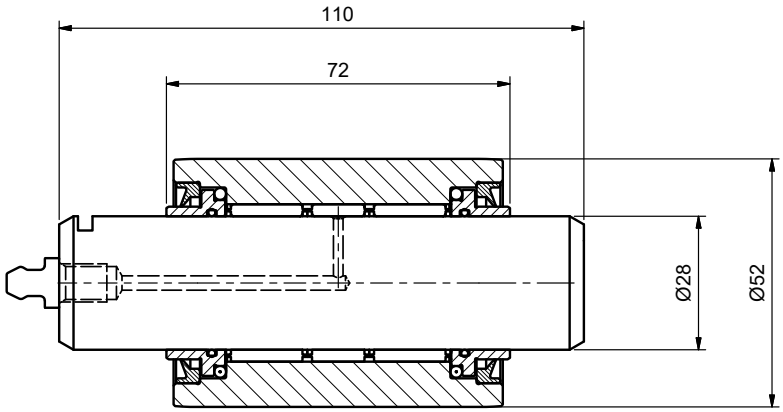
Cam followers without stud with stainless outer ring for wear-resistant tools.

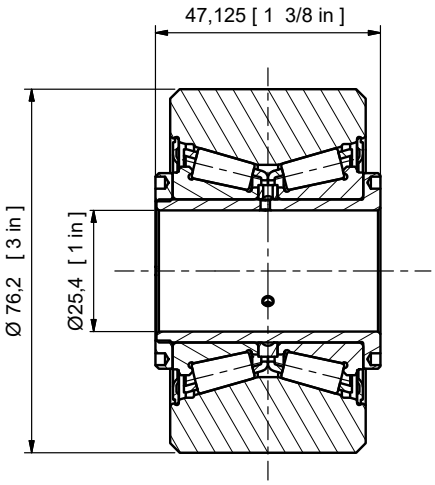
## SURFACE FINISHINGS

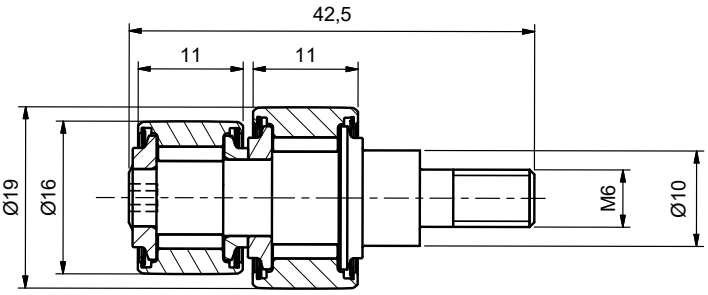
Mirror polishing and oxidisation to add the colour black.

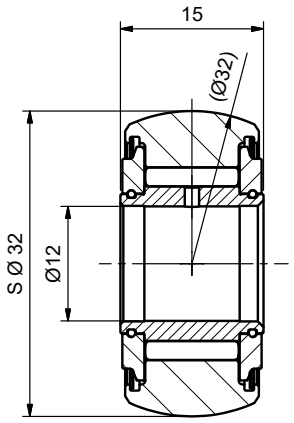
# OTHER PRODUCTS
## WITH SPECIAL SHAPE

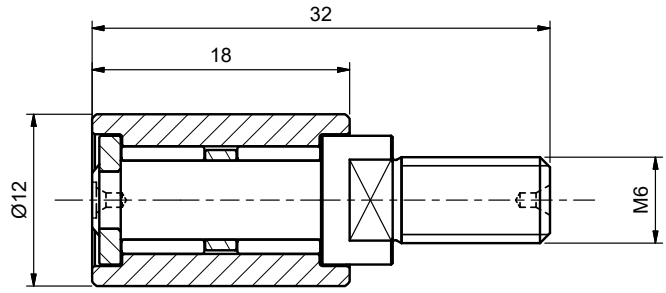
4.2

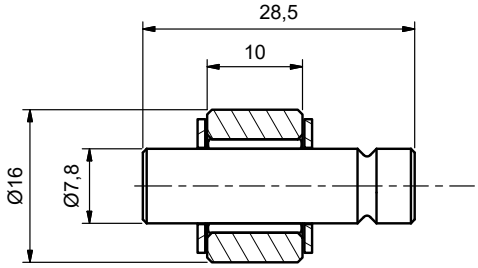


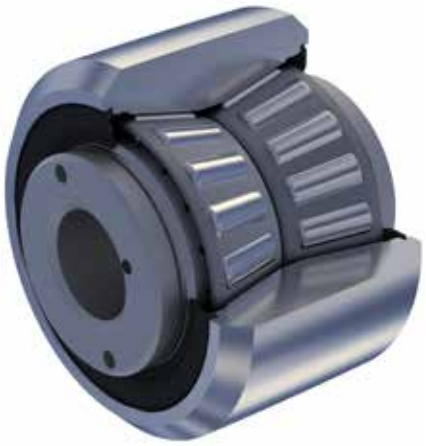



# NOTES



# ACCESSORIES

5

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5.1 ACCESSORIES FOR CAM FOLLOWERS WITH STUD

- Eccentric collars
- Nut and washer
- Nipple and greasing plug
- Greasing injector

# ACCESSORIES
# FOR CAM FOLLOWERS

## ECCENTRIC COLLARS

In order to allow for the cam follower with stud bearing position to be adjusted with respect to the hole, eccentric collars slipped onto the stud with interference are used. This way the position of the bearing can be regulated for the value ± k, that is the eccentricity.

The eccentric collar obstructs the greasing hole on the shank of the stud; collars adapted to allow the eccentric cam followers without stud to be greased through the hole in the stud are supplied on request.

The eccentric collars are supplied already fitted to the pivots of the cam follower without stud GCR, GCUR and KRE.

## CLAMPING NUT

The cam followers with stud are supplied with nut and washer for assembly. See pages relative to the supply detail.

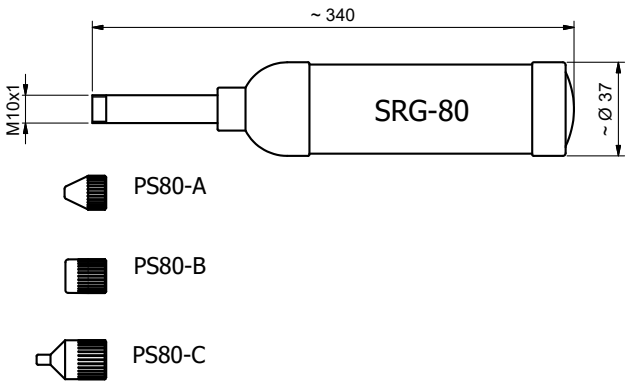
## NIPPLE AND GREASING PLUG

The full complement needle rollers in the GCU and GC..SW series complete with holes for re-greasing and built-in hexagonal socket at both ends. They are supplied with greasing plug and nipple. Insert one or the other in the specific ends depending on which side the re-greasing will be done.

## GREASING INJECTOR

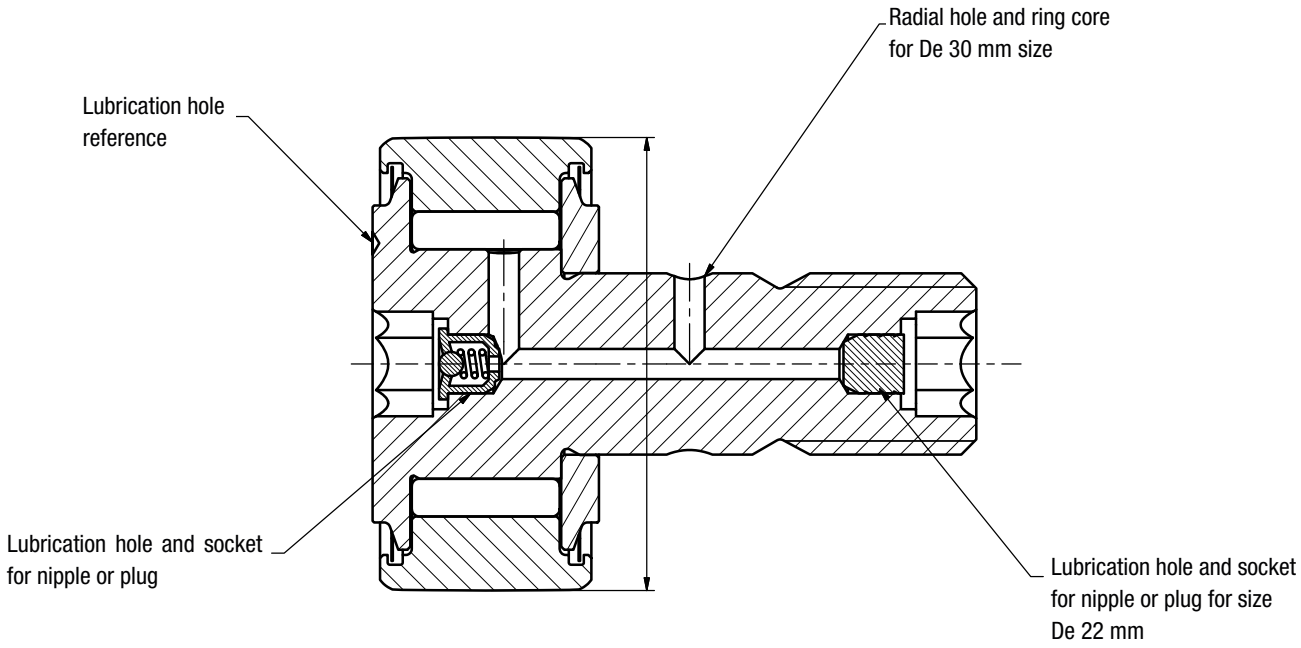
The SRG-80 pump with 150 cc capacity can be used to manually re-grease the cam followers.

It should be fitted with a tip suited to the nipple being used.




Tip for greasing injector

| | |
|---|---|
| Cam followers with stud, in the series GCU and GC..SW with GC35 size concave greaser included. | PS80-A |
| Cam followers with stud, in the series GC..SW with GC16 and GC32 size concave greaser included. | PS80-C |
| Cam followers without stud with convex head greaser with option ..LB | PS80-B |



# NOTES

16 EWV
PR
mm/inch
ON

# TECHNICAL SPECIFICATIONS

6

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6.1 TECHNICAL SPECIFICATIONS

- Reference standards
- Load capacity
- Precision
- Radial play
- Selection of seal type
- Greasing operating temperature
- Optimised profile
- Alignment tolerance permitted between roller and track
- Assembly instructions

# TECHNICAL SPECIFICATIONS

## REFERENCE STANDARDS

The cam followers in the series GC, KR, FG, GCU and FGU comply with standards:

ISO 6278 – Contrast rollers – Bulk dimensions
ISO 7063 – Contrast rollers – Tolerances

## LOAD CAPACITY

The cam follower is generally used as a wheel that runs on a guide or cam. The load is applied to the cam follower without stud at the contact point with the race track and, unlike a bearing, the outer ring is not kept in the case and is free to deform. The elastic deformation of the outer ring affects the load distribution between the rolling bearing elements reducing the capacity calculated in compliance with ISO standards for bearings.

The dimensional tables show the load values

- The $C_w$ load coefficient to be used to calculate the duration t. Keep in mind the bearing's load capacity C in compliance with ISO281 based on the rigidity of the outer ring.

$$L_{10} = \left( \frac{C_w}{f_w \cdot P_r} \right)^{10/3}$$

$$L_h = \frac{10^6 \cdot L_{10}}{60 \cdot n}$$

$$L_{km} = L_{10} \cdot \pi \cdot D$$

$C_w$ : dynamic load coefficient of the cam follower without stud for $10^6$ revs
$f_w$ : overload factor
$P_r$ : radial load applied in N
$L_{10}$ : duration calculated in millions of revs
$L_h$ : duration in hours
$L_{km}$ : duration in km
n : average speed in revs/minute

**Overload factor $f_w$**

| | |
|---|---|
| 1.0 - 1.2 | low speed functioning with regular load |
| 1.2 - 1.5 | functioning under normal conditions |
| 1.5 - 2.0 | functioning with minor shocks and vibrations |
| 2.0 - 4.0 | high speed, shocks and vibrations |

The maximum load applicable to the cam followers without stud takes into consideration the acceptable load from the bearing ($C_0$ in accordance with ISO 76 reduced on the basis of the rigidity of the outer ring), the resistance of the outer ring and, for cam followers with stud, the resistance of the stud's resistance. The tables show the applicable limit load.

- Dynamic load limit $F_r$: this is the load which should not be exceeded when the cam followers without stud are subject to repeated strain.
- Static load limit $F_{or}$: this is the static resistance limit that the cam follower without stud can bear under exceptional conditions and should never be exceeded.

The safety coefficient $f_s$ can be calculated as

$f_s = F_r / P_r$

$F_r$: Product dynamic limit load

In any event, the applied load $P_r$ needs to be lower than the product's static load $F_{or}$.

**Safety factor $f_s$ minimum recommended**

| | |
|---|---|
| >=3 | in the event of shocks or vibrations, applications with a need for gentle rolling |
| >=1.5 | functioning under normal conditions |
| >=1 | almost static applications, without the need for gentle rolling |

The load limit $F_r$ and $F_{or}$ for the cam followers with stud in the product tables refers to the concentric version. Assessment will need to be made as to whether the eccentric load can rotate the pivot in its seating, if the GCR or GCUR or KRE eccentric version is used.

Furthermore, the rolling track resistance needs to be taken into consideration. The assessment method adopted is based on the calculation of the Hertz pressure compared to the pressure accepted by the cam material.

The product catalogue data refers to the standard steel version. The stainless steel products or those stabilised by high temperature have a reduced load capacity.

Contact Nadella Technical Assistance for more details.

# TECHNICAL
# SPECIFICATIONS



## PRECISION

Cam followers with stud in the series GC, GCU, FG, FGU, KR refer to the dimensions in standard ISO 6278.
The reference standard for the same products is ISO 7063.
The cam follower manufacturing tolerance given in the tables below are generally more restrictive compared to the reference standard, but in any event, still compliant with the standard.
In particular, the outer diameter of the cam followers without stud is produced in h6 or h7 tolerance even for the versions with profiled or convex outer ring

## RADIAL PLAY

The radial play of the standard cam followers without stud normally falls into category C2 established for needle roller bearings in compliance with standard ISO 5753-1.

### Cam follower without stud outer diameter tolerance D
### GC / PF / FG / FL / PFDL / GCU / FGU

| | |
|---|---|
| Up to diameter 32 inclusive | h6 |
| Beyond diameter 32 | h7 |

### Max error on rotation
### GC / PF / FG / FL / PFDL / GCU / FGU

| Diameter d | | Kea um |
|---|---|---|
| 10 | 18 | 15 |
| 18 | 30 | 15 |
| 30 | 50 | 20 |
| 50 | 80 | 25 |
| 80 | 120 | 35 |
| 120 | 150 | 40 |
| 150 | 180 | 45 |
| 180 | 240 | 50 |

### Diameter tolerance on cam follower stud $d_1$
### GC / PF / PFDL / GCU

| | |
|---|---|
| All dimensions | h6 |

### Cam follower hole tolerance d (Micron)
### GC / PF / PFDL / GCU

| Diameter d | | Tolerance um | |
|---|---|---|---|
| from | up to | upper | lower |
| 3 | 10 | 0 | -8 |
| 10 | 18 | 0 | -8 |
| 18 | 30 | 0 | -10 |
| 30 | 50 | 0 | -12 |
| 50 | 80 | 0 | -15 |
| 80 | 120 | 0 | -20 |
| 120 | 180 | 0 | -25 |

# TECHNICAL
# SPECIFICATIONS

## SELECTION OF SEAL TYPE

The key function of the seals is to protect the bearing from its surrounding environment and treat the grease inside.

- The cam followers with no seal are shown in the applications with oil greasing coming from outside the cam follower without stud (typically high load and speed cams) where it is essential to allow for the entry of the oil in the bearing for greasing and cooling.

- The cam followers with stud in series GC and FG with a diameter of 16 inclusive can fit seals:

    - EEM type, of metal guards, are mechanically resistant and suited to any temperature.

    - EE type seal is manufactured with a Teflon ring in contact with the moving parts. The seal's maximum operating temperature is 220°C.

- Cam followers with stud in the GCU series can be fitted with MM type seals that act as labyrinth metal guards and are suited to any temperature.

- Cam followers without stud in the FGU series can be fitted with MM type seals that act as metal guards and are suited to any temperature.

- The cam followers without stud in the KK..EE series are fitted with plastic seals (not Teflon) integrated with the outer ring's axial containment abutment.

- The cam followers without stud in the PK and FK series fitted with RS type seals in NBR, can be used up to a temperature of 80°C. For temperatures in excess of this, the cam followers without stud up to and including size 90 can be fitted with Viton seals (suffix V). The acceptable temperature of the seal is 200°C.

## OPERATIONAL GREASING AND SEAL

The type of cam followers shown in this catalogue, with the exception of the RNA type cam followers without stud are supplied with a grease that permits an operating temperature from -20°C to 120°C. The stainless steel cam followers without stud use a category NSF H1 grease for alimentary purposex.

The RNA 11000 type cam followers without stud are supplied with a protection compatible to a lithium soap based grease. As with bearings, the protection is unsuited for greasing the cam followers without stud. The maximum operating temperature depends on the grease used.

For cam followers and full complement needle followers GC, GCU and derivatives, with metal or plastic seals (EE - Teflon), the operating temperature limit depends on the grease and in the case of standard cam followers without stud, is between -20°C and 120°C.

For full complement needle rollers with cage, the operating temperature is between -20°C and 80°C.

The cam followers without stud with tapered bearings type PK and FK are supplied already greased and in the standard version can operate between -20°C and 80°C (standard seals in NBR) or 120°C (seals in Viton). a suitable grease needs to be used for a higher temperature.

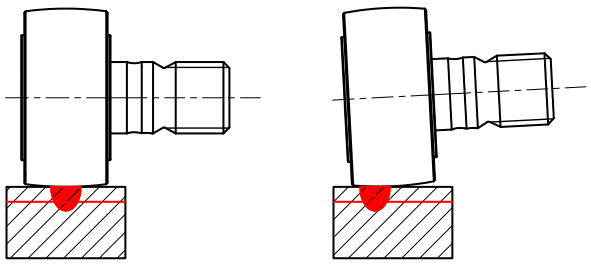
Greased bearings can be provided with suitable grease at high or low temperatures, or with no grease.

For high temperatures starting at 150°C, the products need to undergo stabilising heat treatment which involves a reduction of hardness and load capacity.

## OPTIMISED PROFILE

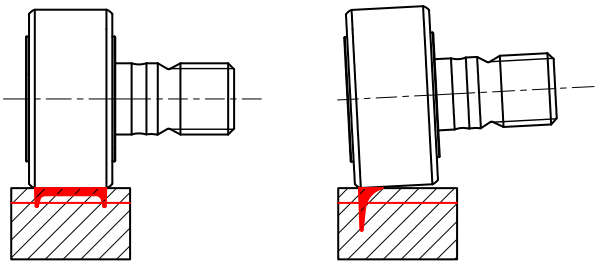
Cam rollers are generally used in contact with the cams or sliding guidex. The contact between the surface of the guide or cam and cam follower without stud is selected on the basis of the application considering the strain caused on the material and the consequences of any misalignments.

Cam followers without stud with **constant radius convex outer ring**. The theoretical point of contact under the effect of elastic deformations caused by the load converts into a surface, the contact pressure is calculated with the classic Hertz formulae and has a parabolic tendency with maximum strain in the centre of the contact area. The maximum value is taken as reference for the resistance assessment requested of the rolling track. As the diameter of the cam follower without stud and the convex radius expands, the contact pressure drops. Any misalignment of the cam follower without stud moves the contact zone without modifying dimension or strain. This is a solution suited to the application with an average load and relatively inexact geometries, typically applications for a linear movement.



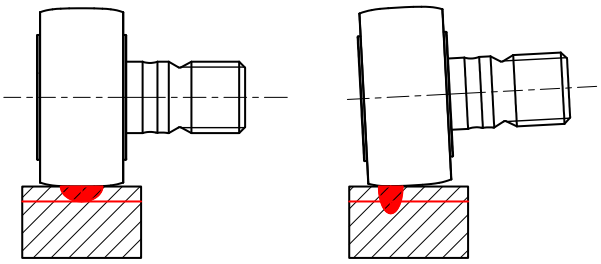
*Rollers with convex outer ring with constant radius*

Cam followers without stud with **cylindrical outer ring**. The theoretical contact line under the effect of the contact load opens onto a vast surface reducing the average and maximum pressure. As an initial estimate according to the Hertz formulae with equal load, the strain and deformation are considerably lower compared to the contact with the convex cam roller without stud but two important considerations need to be made: 1) at the ends of the contact line, due to the edge, there is a peak in the strain which, in practical terms, reduces the difference compared to the previous case 2) the effect of a misalignment, even a minor one, moves the contact to an extreme prejudicing the contact itself and even the load which weighs on the bearing below. This is a solution suited to applications with a high load and which require the machine to make careful mechanical processings to avoid misalignments.



*Rollers with cylindrical outer ring*

Cam followers without stud with **optimised profile outer ring**. The profile of the cam follower without stud is created with a wide radius in the central part of the sleeve that decreases by moving away from the central line of the cam follower without stud. When the cam follower without stud is properly aligned, the wide radius allows for a vast contact area and excellent distribution of the load; in the event of misalignment between the track and cam follower without stud, the contact moves in a similar fashion to the convex cam followers without reaching the edge of the strip, thus protecting the track and inner bearing against abnormal strain. This is a solution suited both to applications that require a high level of load accuracy and rigidity as well as to applications with misalignments. The cam followers without stud with optimised profile are identified by the SW suffix.

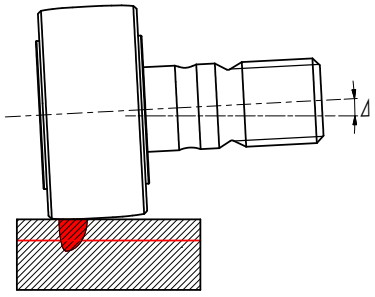


*Rollers with convex outer ring with optimised radius.*

## ALIGNMENT TOLERANCE PERMITTED BETWEEN ROLLER AND TRACK

Cam followers without stud with convex outer ring or optimised profile allow for an inclination compared to the surface of the track, up to a maximum as shown in the table.

| Cam follower without stud type | Inclination Δ |
|---|---|
| RNA 11 000 B6 | 1.5 per 1000 |
| Cam followers FG, GC, GCU with convex outer ring or optimised profile | 7 per 1000 |



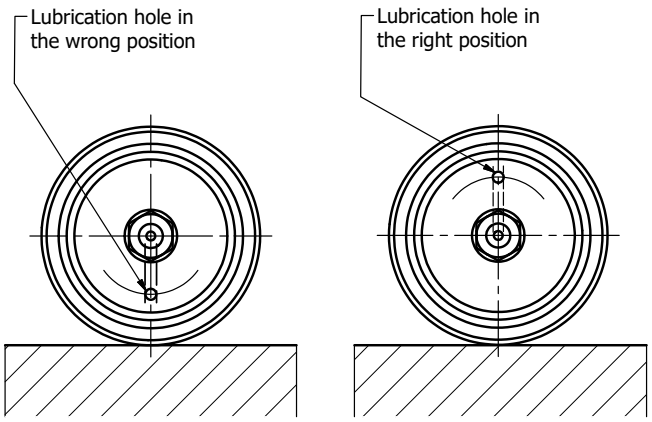
# TECHNICAL
# SPECIFICATIONS

## ASSEMBLY INSTRUCTIONS

**Direction of the greasing radial hole**

In the case of use with heavy loads, shocks or vibrations, it is best to avoid the greasing hole ending up in the area in which the load weighs down on the needles, which is the side in contact with the cam or rolling track.

The position of the hole in question in the cam followers with stud that is not visible from the outside, is indicated by a reference on the head of the cam follower with stud.




**Side rest for the cam followers**

In the event of relevant axial loads or functioning in the presence of vibrations, we recommend the outer diameter of the rest be at least equal to the $d_A$ quota in the dimensions tablex.

**Assembly hole diameter**

The recommended tolerance for the slot hole in the cam follower with stud is $d_1$ H7.

**Assembly pivot diameter**

The recommended tolerance for the pivot to be inserted in the cam followers hole in the FG and FGU series is h5.

**Nut clamping**

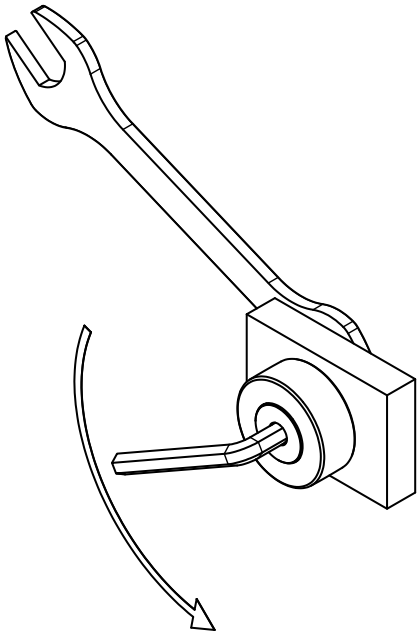
The clamping torque given in the table allows the pivot to be clamped securely in the housing. An upper clamping torque can damage the product.

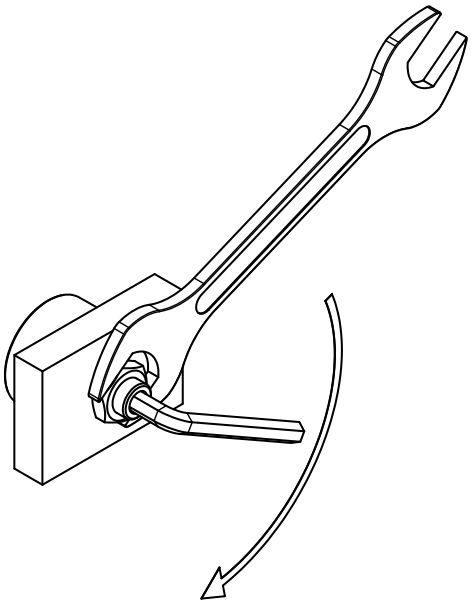
The clamping torques are taken for non-greased threads; for greased threads, multiply the value of the torque in the table by 0.8.

For products in the GC and GCU series supplied with two nuts, clamp the first nut with the recommended torque and then the second one.

**Cam followers without stud with eccentric collar**

The load applied to the cam follower without stud with eccentric collar generates a clamp that tends to rotate the stud in its housing. In order to avoid this effect generating a movement that could slacken the nut, adjust the eccentricity so that the cam follower is alongside the rolling track by rotating the stud in the same direction as the nut clamping.





# NOTES

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**NADELLA** / nadella.com
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