Drawn cup needle roller bearings

Matrix for bearing preselection

The matrix gives an overview of the types and design features of drawn cup needle roller bearings.

It can be used to make a preliminary assessment of whether a bearing is fundamentally suitable for the envisaged application.

The additional information provided in the product chapter (see column "detailed information") and in the Technical principles must, however, be observed in addition to this overview in selection of the bearing.

Design features and suitability			Drawn cup needle roller bearings			
+++ extremely suitable ++ highly suitable + suitable (+) suitable with restrictions – not suitable/not applicable ✓ available			open	sealed	full complement, open	detailed information ➤ 886
Load carrying capacity	radial		+++	+++	+++	➤ 889 | 1.2
	axial, one direction		–	–	–	➤ 889 | 1.2
	axial, both directions		–	–	–	➤ 889 | 1.2
	moments		–	–	–	
Compensation of angular misalignments	static		–	–	–	➤ 889 | 1.3
	dynamic		–	–	–	➤ 889 | 1.3
Bearing design	cylindrical bore		✓	✓	✓	➤ 886 | 1.1
	tapered bore		–	–	–	
	separable		–	–	–	➤ 898 | 1.17
Lubrication	greased		–	✓	–[1]	➤ 889 | 1.4
Sealing	open		✓	–	✓	➤ 890 | 1.5
	non-contact		–	–	–	➤ 890 | 1.5
	contact		–	✓	–	➤ 890 | 1.5
Operating temperature in °C	from to		–30 +140[2]	–20 +100	–30 +140	➤ 891 | 1.8
Suitability for	high speeds		+++	+++	+	➤ 891 | 1.6
	high running accuracy		++	++	++	➤ 893 | 1.11 ➤ 114
	low-noise running		+	+	+	➤ 891 | 1.7 ➤ 27
	high rigidity		++	++	++	➤ 54
	reduced friction		+	+	+	➤ 56
	length compensation within bearing		–	–	–	
	non-locating bearing arrangement		++	++	++	➤ 139
	locating bearing arrangement		–	–	–	➤ 139
X-life bearings		X-life	–	–	–	
Enveloping circle diameter F_w in mm	from to		2 60	8 50	8 50	➤ 900
Product tables	from page ➤		900	906	908	

1) Delivery with special grease for mounting only, bearings must be relubricated

2) Valid for open, ungreased bearings with sheet steel cage. With polyamide cage –20 °C to +120 °C

1 Drawn cup needle roller bearings

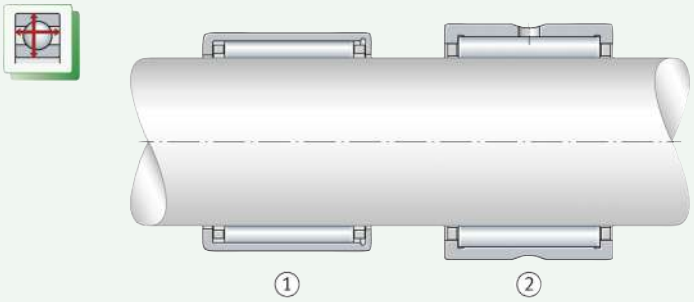
The bearings:

- are particularly suitable for applications with a very small radial section height on account of their very low cross-sectional height ➤*886*|*1*
- are used if the housing bore is not suitable as a raceway for needle roller and cage assemblies
- can support high radial loads (are pure radial bearings) ➤*887*|*3*, ➤*888*|*4*, ➤*888*|*5*, ➤*888*|*6*
- require a considerably smaller radial design envelope than machined needle roller bearings ➤*886*|*1*
- usually run directly on the shaft (no inner ring) ➤*886*|*1*, ➤*889*|*7*
- permit relatively high speeds
- are easy to mount ➤*898*|*1.17*
- require no additional means of axial retention (as a result of which the housing bore is easy to produce) ➤*895*|*1.16*
- can be readily used to close off the shaft ends of bearing positions (drawn cup needle roller bearings with closed end) ➤*888*|*6*
- result in particularly compact, cost-effective and economical bearing arrangements.

For an overview of other product-specific features, see the Matrix for bearing preselection ➤*885*.

1
Comparison of radial design envelope

① *Drawn cup needle roller bearing with open ends and cage*
② *Needle roller bearing with cage*



1.1 Bearing design

Design variants

Drawn cup needle roller bearings with open ends are available as:

- standard drawn cup needle roller bearings with open ends and cage ➤*887*|*3* and ➤*888*|*4*
- full complement drawn cup needle roller bearings with open ends ➤*888*|*5*
- special bearings ➤*888* and ➤*890*.

Drawn cup needle roller bearings with closed end are available as:
- standard drawn cup needle roller bearings with closed end ➤*888*|🗀*6*
- special bearings ➤*888* and ➤*890*
- universal joint bearings ➤*888*.

Drawn cup needle roller bearings

✎ *The outer cups are thin-walled and produced by forming methods*

Drawn cup needle roller bearings are part of the group of radial needle roller bearings. These ready-to-fit bearing arrangement elements are rolling bearings with a very small radial section height. They comprise thin-walled, drawn outer cups and needle roller and cage assemblies which together form a complete unit ➤*887*|🗀*2*, ➤*887*|🗀*3*, ➤*888*|🗀*5*, ➤*888*|🗀*6*. The cage guides the needle rollers parallel to the axis in pockets.

✎ *For bearing arrangements with a very small radial design envelope*

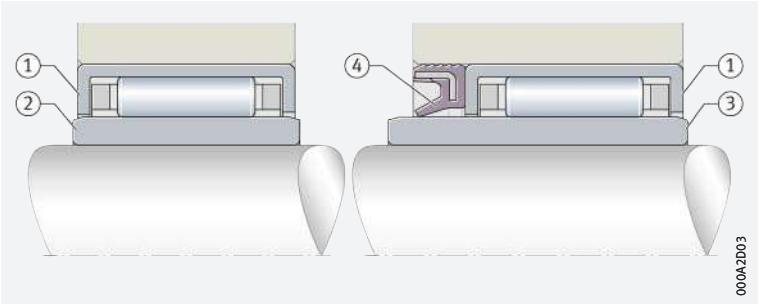
Due to the thin-walled outer cup and the absence of an inner ring, the bearings have a very low cross-sectional height ➤*886*|🗀*1*. As a result, they are particularly suitable for applications with a very small radial design envelope. The majority of the bearings are of a single row design and do not have a lubrication hole.

✎ *Drawn cup needle roller bearings can also be combined with inner rings IR or LR*

Due to the absence of an inner ring, drawn cup needle roller bearings require a hardened and ground bearing raceway on the shaft ➤*895*|*1.16*. If the shaft cannot be produced as a rolling bearing raceway, the bearings can be combined with inner rings IR or LR ➤*887*|🗀*2*. If wider inner rings are used, these can also serve as the running surface for sealing rings G and SD ➤*887*|🗀*2*.

🗀*2*
Drawn cup needle roller bearings with open ends and inner ring

① *Drawn cup needle roller bearing with open ends*
② *Standard inner ring*
③ *Wider inner ring*
④ *Sealing ring G*



Standard drawn cup needle roller bearings with open ends and cage

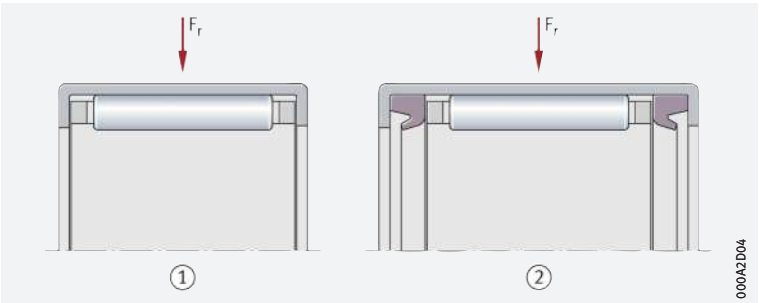
✎ *In contrast to drawn cup needle roller bearings with closed end, the bearings are open*

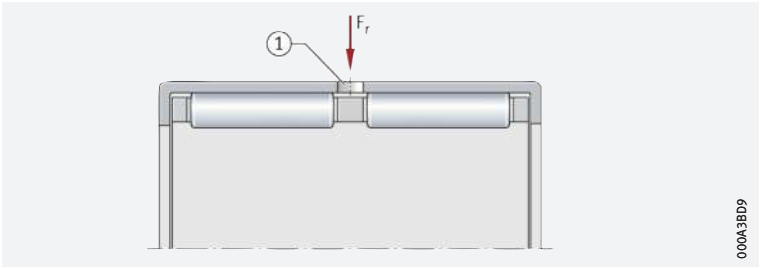
Drawn cup needle roller bearings of this design are open at both ends and have the basic designation HK ➤*887*|🗀*3* and ➤*893*|*1.12*. They are supplied with needle roller and cage assemblies. Bearings with needle roller and cage assemblies allow higher speeds than the full complement designs. The bearings are available in open and sealed versions ➤*887*|🗀*3* and ➤*890*|*1.5*. Double row designs have a lubrication hole in the outer cup and the suffix ZW ➤*888*|🗀*4*.

🗀*3*
Single row drawn cup needle roller bearings with open ends

F_r = *radial load*

① *Single row drawn cup needle roller bearing with open ends, open version*
② *Single row drawn cup needle roller bearing with open ends, sealed on both sides*





4
Double row drawn cup needle roller bearing with open ends

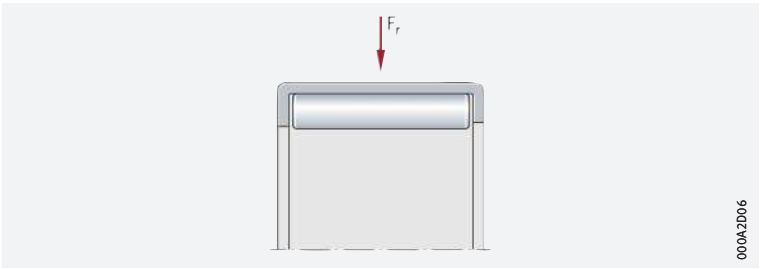
F_r = *radial load*

① *Lubrication hole*

Full complement drawn cup needle roller bearings with open ends

Particularly high load carrying capacity within a very small radial design envelope

Full complement drawn cup needle roller bearings with open ends have the basic designation HN ➤*888*|*5*. As these bearings have the maximum number of needle rollers, they offer extremely high load carrying capacity. However, they do not permit the speeds that are possible when drawn cup needle roller bearings with open ends are used in conjunction with rolling elements retained by a cage.



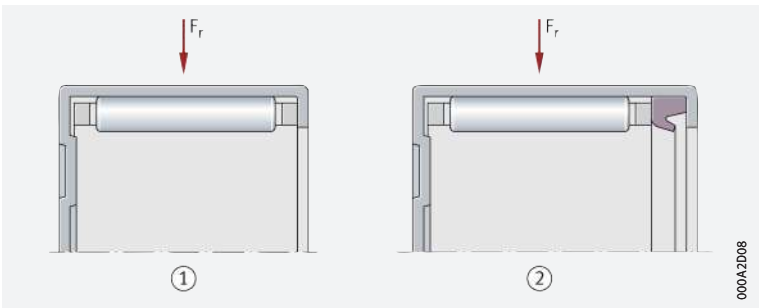
5
Full complement drawn cup needle roller bearing with open ends

F_r = *radial load*

Drawn cup needle roller bearings with closed end

In contrast to drawn cup needle roller bearings with open ends, the bearings are closed at one end

Drawn cup needle roller bearings of this design are closed at one end ➤*888*|*6*. They are thus suitable for closing off the shaft ends of bearing positions. This gives protection against injury by rotating shafts and protects the bearings against contamination and moisture. Depending on the size, the base is either smooth or lock-beaded (stiffened). The profiled base can also support small axial guidance forces. Drawn cup needle roller bearings with closed end are available in open and sealed versions ➤*888*|*6* and ➤*890*|*1.5*.



6
Drawn cup needle roller bearings with closed end

F_r = *radial load*

① *Drawn cup needle roller bearing with closed end, open version*

② *Drawn cup needle roller bearing with closed end, sealed version*

Special bearings

In addition to the standard catalogue range, special designs are available by agreement:

- with enveloping circle F_w from 2 mm to 100 mm
- for special noise requirements (bearings with special noise testing).

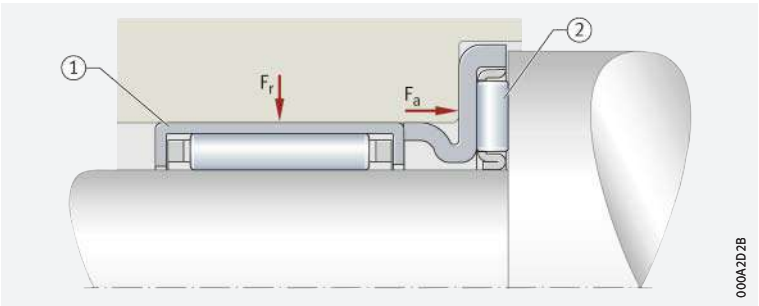
Universal joint bearings

For universal joints, universal joint bearings of series BU and BBU are available by agreement.

1.2 Load carrying capacity

The bearings are pure radial bearings

Drawn cup needle roller bearings can support high radial forces, but may only be subjected to radial load. If the bearing position is also required to support axial forces, the bearings can, for example, be combined with axial needle roller bearings AXW ➤889|7.



7
Drawn cup needle roller bearing with open ends combined with axial needle roller bearing

F_r = *radial load*
F_a = *axial load*

① *Drawn cup needle roller bearing with open ends HK (for supporting radial loads)*
② *Axial needle roller bearing AXW (for supporting axial loads)*

1.3 Compensation of angular misalignments

The bearings are not suitable for the compensation of shaft misalignments relative to the housing

Drawn cup needle roller bearings are not suitable for the compensation of angular misalignments. The extent to which a misalignment of the shaft can be tolerated relative to the housing bore is dependent on factors such as the design of the bearing position, the size of the bearing, the operating clearance and the load. For this reason, it is not possible to give a guide value for misalignment.

In all cases, misalignments cause increased running noise, place increased strain on the cages and have a harmful influence on the operating life of the bearings.

1.4 Lubrication

Greased bearings

Sealed bearings are greased with a lithium complex soap grease to GA08. The grease filling is measured so that it is sufficient for the entire operating life of the bearing. As a result, the bearings are maintenance-free.

Greased bearings should not be washed out or heated to temperatures of > +80 °C prior to mounting.

Ungreased bearings

Ungreased bearings must be lubricated with oil or grease. The majority of single row bearings do not have a lubrication hole.

Compatibility with plastic cages

When using bearings with plastic cages, compatibility between the lubricant and the cage material must be ensured if synthetic oils, lubricating greases with a synthetic oil base or lubricants containing a high proportion of EP additives are used.

Observe oil change intervals

Aged oil and additives in the oil can impair the operating life of plastics at high temperatures. As a result, stipulated oil change intervals must be strictly observed.

Lubrication of full complement drawn cup needle roller bearings with open ends

The needle rollers are retained by a special grease

Since the needle rollers in full complement bearings are not retained by mechanical means (no cage is present), they are retained for transport and fitting by means of a special grease (DIN 51825-K1/2K-30). However, this grease does not have an adequate long term lubrication capacity. Relubrication is therefore recommended after fitting.

If there is any uncertainty regarding relubrication, please consult Schaeffler.

Bearings of special design

The following special designs are available by agreement:

- unsealed bearings, greased using a lithium complex soap grease to GA08 (suffix GA08)
- bearings with a lubrication hole for sizes from HK0609 (suffix AS1).

1.5 Sealing

The bearings are open or sealed

Drawn cup needle roller bearings are available in an open design in accordance with DIN 618:2008 (ISO 3245:2015) and a sealed design in accordance with DIN 618:2008.

Sealed bearings

Integrated seals are particularly space-saving

Under normal operating conditions, contact seals give protection against contamination, spray water and the loss of lubricant. The integration of such seals into the bearing provides a compact, reliable, proven and economical sealing solution.

Unsealed bearings

Provide seals in the adjacent construction

In the case of unsealed bearings, sealing of the bearing position must be carried out in the adjacent construction. This must reliably prevent:

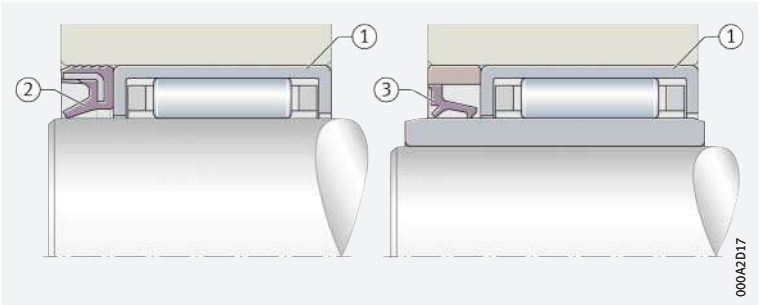
- moisture and contaminants from entering the bearing
- the egress of lubricant from the bearing.

Sealing of the bearing position with sealing rings G or SD

Effective sealing elements for use in sealing open bearings

Bearing positions with open drawn cup needle roller bearings can be sealed economically using sealing rings G or SD. The sealing rings are designed as contact seals and are arranged in front of the bearing ➤887|🗀2, ➤890|🗀8. They are suitable for circumferential velocities at the running surface of up to 10 m/s and protect the bearing position reliably against contamination, spray water and excessive loss of lubricant. The sealing rings are matched to the low radial dimensions of drawn cup needle roller bearings with open ends. They are very easy to fit, since they are simply pressed into the housing bore.

🗀8
Sealing of the bearing position with sealing rings G or SD



① *Drawn cup needle roller bearing with open ends, open version*
② *Sealing ring G*
③ *Sealing ring SD*

1.6 Speeds

Limiting speeds and reference speeds in the product tables

Two speeds are generally indicated in the product tables ➤*900*|▦:

- the kinematic limiting speed n_G
- the thermal speed rating $n_{\vartheta r}$.

Limiting speed

The limiting speed n_G is the kinematically permissible speed of a bearing. Even under favourable mounting and operating conditions, this value should not be exceeded without prior consultation with Schaeffler ➤*64*. The values in the product tables are valid for oil lubrication.

Values for grease lubrication

For the grease lubrication of open cage bearings, 60% of the value stated in the product tables is permissible in each case.

Speeds for full complement bearings

Due to the bearing kinematics and higher temperatures within the bearing, the speeds for full complement bearings are lower than for bearings with a cage.

Reference speeds

$n_{\vartheta r}$ is used to calculate n_ϑ

The thermal speed rating $n_{\vartheta r}$ is not an application-oriented speed limit, but is a calculated ancillary value for determining the thermally safe operating speed n_ϑ ➤*64*.

Bearings with contact seals

For bearings with contact seals, no reference speeds are defined in accordance with DIN ISO 15312:2004. As a result, only the limiting speed n_G is given in the product tables for these bearings.

1.7 Noise

Schaeffler Noise Index

The Schaeffler Noise Index (SGI) is not yet available for this bearing type ➤*69*. The data for these bearing series will be introduced and updated in stages.

Further information:

- ***medias*** ➤*https://medias.schaeffler.com*.

1.8 Temperature range

Limiting values

The operating temperature of the bearings is limited by:

- the dimensional stability of the bearing rings and rolling elements
- the cage
- the lubricant
- the seals.

Possible operating temperatures of drawn cup needle roller bearings ➤*891*|▦ *1*.

▦ **1**
Permissible temperature ranges

Operating temperature	Open drawn cup needle roller bearings		Sealed drawn cup needle roller bearings
	with sheet steel cage or full complement	with polyamide cage PA66	
	–30 °C to +140 °C	–20 °C to +120 °C	–20 °C to +100 °C, limited by the lubricant and seal material

In the event of anticipated temperatures which lie outside the stated values, please contact Schaeffler.

1.9 Cages

Sheet steel cages are used as standard

With only a few exceptions, the cages are made from sheet steel. Bearings with a plastic cage have the suffix TV. Other cage designs are available by agreement. With such cages, however, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for the bearings with standard cages.

For high continuous temperatures and applications with difficult operating conditions, bearings with sheet steel cages should be used. If there is any uncertainty regarding cage suitability, please consult Schaeffler.

1.10 Internal clearance

The enveloping circle diameter F_w applies instead of the radial internal clearance

In the case of bearings without an inner ring, the dimension for the inner enveloping circle diameter F_w is used instead of the radial internal clearance. The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway. Once the bearings are mounted, the inner enveloping circle diameter F_w is approximately in tolerance class F8. The precondition for this is that the bore tolerances are observed for bearings without an inner ring ➤*895*|*1.16*, ➤*896*|▦*6* and ➤*895*|▦*4*.

Checking the enveloping circle diameter F_w

F_w can only be checked in a mounted condition

In the case of drawn cup needle roller bearings, the inner enveloping circle diameter F_w can only be checked once the bearings are mounted. In order to carry out the check, the bearing is pressed into a steel ring gauge, which has a cylindrical bore with the nominal dimension D and lower deviation of tolerance class N6 (in accordance with ISO 286-2). The ring gauge must have a minimum wall thickness of 20 mm, the minimum width must correspond to the width of the bearing. A plug gauge to ISO 1132-2 is used for checking purposes. The tolerance class of the enveloping circle is within the range of values defined in the table ➤*893*|▦*2*.

Example

Example of checking of F_w

For drawn cup needle roller bearing with open ends HK1010 (F_w = 10 mm), F_w must be between 10,013 mm and 10,031 mm, the ring gauge bore must be 13,980 mm (lower deviation = +13 µm, upper deviation = +31 µm) ➤*893*|▦*2*.

Bearings intended for enveloping circle measurements should not be repeatedly pushed in and out of the gauge. Bearings that have been checked in the ring gauge should not be used again.

2
Ring gauge bore and enveloping circle deviations (to DIN 618:2008)

Enveloping circle F_w mm	Outside diameter D mm	Ring gauge bore mm	Enveloping circle deviation Upper µm	Lower µm
2	4,6	4,587	+24	+6
3	6,5	6,484	+24	+6
4	8	7,984	+28	+10
5	9	8,984	+28	+10
6	10	9,984	+28	+10
7	11	10,980	+31	+13
8	12	11,980	+31	+13
9	13	12,980	+31	+13
10	14	13,980	+31	+13
12	16	15,980	+34	+16
12	18	17,980	+34	+16
13	19	18,976	+34	+16
14	20	19,976	+34	+16
15	21	20,976	+34	+16
16	22	21,976	+34	+16
17	23	22,976	+34	+16
18	24	23,976	+34	+16
20	26	25,976	+41	+20
22	28	27,976	+41	+20
25	32	31,972	+41	+20
28	35	34,972	+41	+20
30	37	36,972	+41	+20
32	39	38,972	+50	+25
35	42	41,972	+50	+25
40	47	46,972	+50	+25
45	52	51,967	+50	+25
50	58	57,967	+50	+25
55	63	62,967	+60	+30
60	68	67,967	+60	+30

1.11 Dimensions, tolerances

Dimension standards

The main dimensions of the bearings correspond to DIN 618:2008 and ISO 3245:2015, where standardised. Nominal dimensions of bearings ➤*900*.

Tolerances

The tolerances correspond to DIN 618:2008 (ISO 3245:2015), where standardised. The inner enveloping circle diameter F_w is approximately in tolerance class F8 ➤*892*|*1.10*.

1.12 Suffixes

For a description of the suffixes used in this chapter ➤*893*|*3* and ***medias*** interchange ➤*https://www.schaeffler.de/std/1D52*.

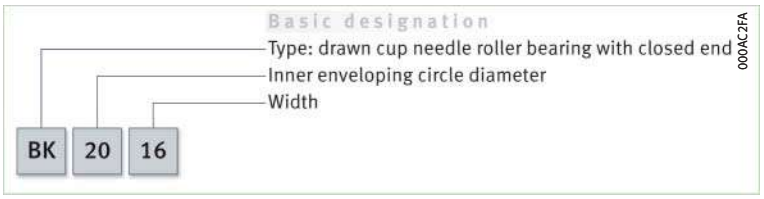
3
Suffixes and corresponding descriptions

Suffix	Description of suffix	
AS1	With lubrication hole from HK0609	Special design, available by agreement
GA08	Unsealed, greased bearings for operating temperatures from –20 °C to +140 °C	
RS	Contact seal on one side	Standard
TV	Cage made from glass fibre reinforced polyamide PA66	
ZW	Double row design, with lubrication hole	
2RS	Contact seal on both sides	

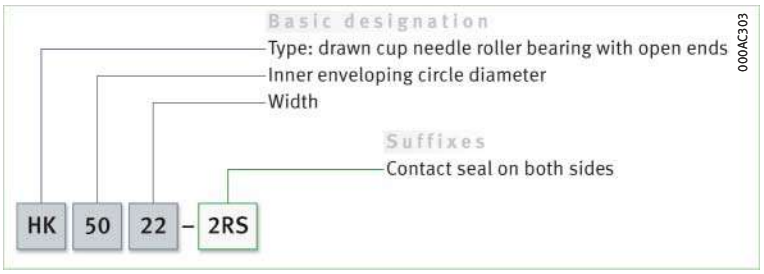
1.13 Structure of bearing designation

The designation of bearings follows a set model.
Examples ➤894| 9 and ➤894| 10. The composition of designations is subject to DIN 623-1 ➤102| 10.

9
Drawn cup needle roller bearing with closed end, open version: designation structure



10
Drawn cup needle roller bearing with open ends, sealed on both sides: designation structure



1.14 Dimensioning

Equivalent dynamic bearing load

✎ *$P = F_r$ under purely radial load of constant magnitude and direction*

The basic rating life equation $L = (C_r/P)^p$ used in the dimensioning of bearings under dynamic load assumes a load of constant magnitude and direction. In radial bearings, this is a purely radial load F_r ➤889| 1.2. The bearing load F_r is therefore used in the rating life equation for P ($P = F_r$) ➤894| 1.

1
Equivalent dynamic load

$$P = F_r$$

Legend

P	N	Equivalent dynamic bearing load
F_r	N	Radial load.

Equivalent static bearing load

For drawn cup needle roller bearings subjected to static load ➤894| 2.

2
Equivalent static load

$$P_0 = F_{0r}$$

Legend

P_0	N	Equivalent static bearing load
F_{0r}	N	Largest radial load present (maximum load).

Static load safety factor

✎ *$S_0 = C_0/P_0$*

In addition to the basic rating life L (L_{10h}), it is also always necessary to check the static load safety factor S_0 ➤894| 3. For drawn cup needle roller bearings, $S_0 \geqq 3$ is necessary.

3
Static load safety factor

$$S_0 = \frac{C_0}{P_0}$$

Legend

S_0	–	Static load safety factor
C_0	N	Basic static load rating
P_0	N	Equivalent static bearing load.

1.15 Minimum load

In order to prevent damage due to slippage, a minimum radial load of $P > C_{0r}/60$ is required

In order that no slippage occurs between the contact partners, the drawn cup needle roller bearings must be constantly subjected to a sufficiently high load. Based on experience, a minimum radial load of the order of $P > C_{0r}/60$ is thus necessary. In most cases, however, the radial load is already higher than the requisite minimum load due to the weight of the supported parts and the external forces.

If the minimum radial load is lower than indicated above, please consult Schaeffler.

1.16 Design of bearing arrangements

Radial location of bearings

Support outer cup/ inner ring over entire circumference and width

In order to allow full utilisation of the load carrying capacity of the bearings and achieve the requisite rating life, sufficient rigid support must be provided for the thin-walled outer cups in the housing. Due to the thin-walled outside surface, the bearings only adopt their precise geometry once they have a tight fit. The support for the outer cup in the housing bore can be produced as a cylindrical seating surface. The seating surfaces for the outer cup and the raceway for the rolling elements or inner ring (if the bearing arrangement is not produced as a direct bearing arrangement) should not be interrupted by grooves, holes or other recesses. The accuracy of the mating parts must meet specific requirements, the bore tolerances for the housing bore (recommended tolerance classes) are dependent on the housing material ➤*895*|▦ *4*. If the housings are not rigid, tests must be carried out to determine which shaft tolerance the desired operating clearance will be achieved with. Numerical values for IT grades ➤*895*|▦ *5*. For the bearings to be mounted without damage, the shaft must have a lead chamfer of 10° to 15°.

▦ **4** *Tolerance classes and surface design for housings, as a function of the material*

Housing material	Bore tolerance to ISO 286-2	Roundness tolerance max.	Parallelism tolerance max.	Recommended mean roughness value Ramax (Rzmax) µm
Steel or cast iron	N6 Ⓔ	IT5/2	IT5/2	0,8 (4)
Aluminium (Al)	R6 Ⓔ			
Magnesium (Mg)	S6 Ⓔ			

▦ **5** *Numerical values for ISO standard tolerances (IT grades) to ISO 286-1:2010*

IT grade	Nominal dimension in mm						
	over –	**3**	**6**	**10**	**18**	**30**	**50**
	incl. **3**	**6**	**10**	**18**	**30**	**50**	**80**
	Values in µm						
IT3	2	2,5	2,5	3	4	4	5
IT4	3	4	4	5	6	7	8
IT5	4	5	6	8	9	11	13

Axial location of bearings

A tight fit is usually sufficient for axial location

If axial locating elements such as shoulders and snap rings are not used, the housing bore can be produced easily and particularly economically. This also gives simplified mounting of the bearings.

Raceway for bearing arrangements without an inner ring (direct bearing arrangement)

✎ *Produce the raceway as a rolling bearing raceway*

Where drawn cup needle roller bearings run directly on the shaft (without an inner ring), the raceway for the rolling elements must be produced as a rolling bearing raceway (hardened and ground). Design of raceways ➤*896*| ▦ *6*. The values in the table refer to commonly encountered application examples. If the shaft cannot be produced as a raceway, the bearings can be combined with Schaeffler bearing rings. However, the section height of the bearings will then be increased by the thickness of the rings.

▦ ***6***
Tolerance class and surface design for the shaft (direct bearing arrangement)

Shaft tolerance to ISO 286-2	Roundness tolerance max.	Parallelism tolerance max.	Recommended mean roughness value Ramax (Rzmax) µm
h6 Ⓔ	IT3	IT3	0,2 (1)

Steels for the raceway (direct bearing arrangement)

Through hardening steels

Through hardening steels in accordance with ISO 683-17 (e.g. 100Cr6) are suitable as materials for rolling bearing raceways in direct bearing arrangements. These steels can also be surface layer hardened.

Case hardening steels

Case hardening steels normally correspond to ISO 683-17 (such as 17MnCr5, 18CrNiMo7-6) or EN 10084 (such as 16MnCr5).

Steels for inductive surface layer hardening

For flame and induction hardening, steels in accordance with ISO 683-17 (such as C56E2, 43CrMo4) or DIN 17212 (such as Cf53) should be used.

Surface hardness and hardening depth

✎ *Nominal surface hardness: ≧ 670 HV*

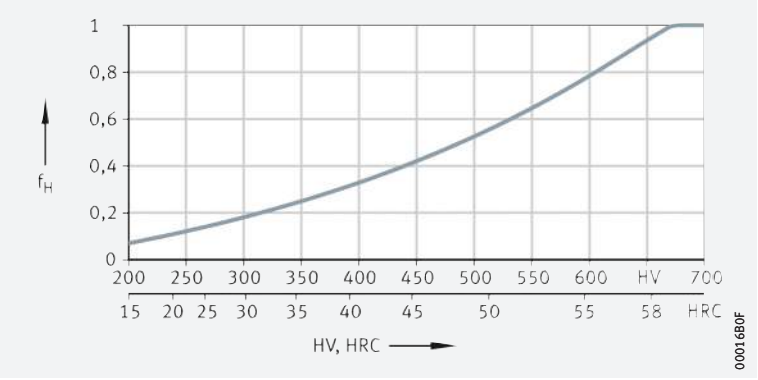
The requisite minimum surface hardness of 670 HV is valid for raceways, axial washers and shaft shoulders. Steels hardened by means of case, flame or induction hardening must have a surface hardness of 670 HV to 840 HV and an adequate hardening depth CHD or SHD.

Raceway softer than 670 HV

If the raceway fulfils the requirements for rolling bearing materials but is softer than 670 HV, the load on the bearing arrangement cannot be as high as the full load carrying capacity of the bearing. In order to determine the dynamic and static load carrying capacity of the bearing arrangement, the basic dynamic load rating C of the bearings must be multiplied by the reduction factor f_H (dynamic hardness factor) and the basic static load rating C_{0r} by the reduction factor f_{H0} (static hardness factor) ➤*896*| 🗗 *11* and ➤*897*| 🗗 *12*.

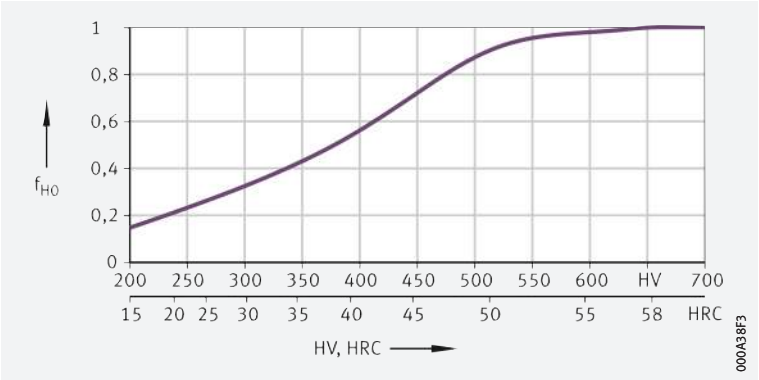
🗗 ***11***
Dynamic hardness factor at reduced hardness of raceways/rolling elements

f_H = *dynamic hardness factor*
HV, HRC = *surface hardness*



12
Static hardness factor at reduced hardness of raceways/rolling elements

f_{H0} = *static hardness factor*
HV, HRC = *surface hardness*



Determining the case hardening depth

Approximation value for case hardening depth

In order to obtain an approximation value for defining the minimum hardening depth, the relationship in accordance with ➤*180*| *5* can be used as a basis. The reference value for the load present is the equivalent stress in accordance with the distortion energy hypothesis (DEH) as a function of the rolling element diameter D_w and the magnitude of the load.

4
Case hardening depth

$$CHD \geqq 0{,}052 \cdot D_w$$

Legend

CHD	mm	Case hardening depth
D_w	mm	Rolling element diameter.

The local hardness must always be above the local requisite hardness, which can be calculated from the equivalent stress.

Determining the surface hardening depth

In these surface hardening methods, the load and contact geometry must be taken into consideration when determining the requisite hardening depth.

Determining the surface hardening depth

The rule of thumb for calculating the surface hardening depth SHD is the relationship in accordance with ➤*181*| *6*.

5
Surface hardening depth

$$SHD \geqq 140 \cdot D_w / R_{p0,2}$$

Legend

SHD	mm	Surface hardening depth
D_w	mm	Rolling element diameter
$R_{p0,2}$	N/mm²	Yield point of base material.

1.17 Mounting and dismounting

Ensure that the bearings are not damaged during mounting

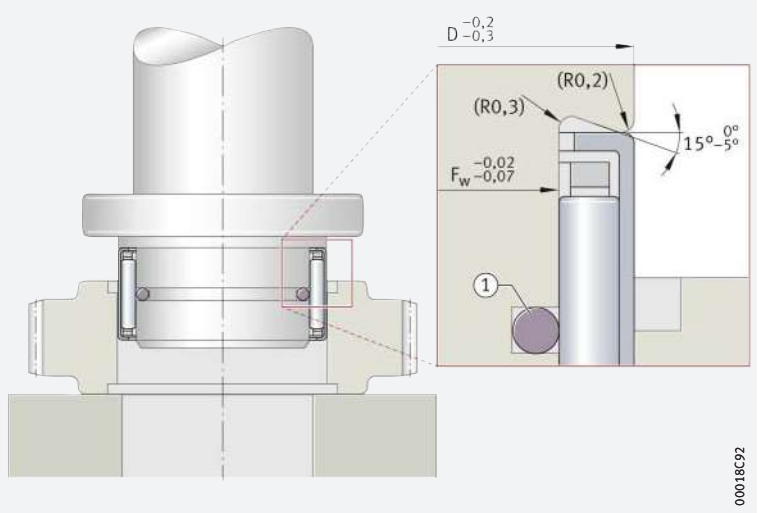
The bearings are self-retaining (not separable). They are mounted using a special fitting mandrel ➤898| 13. The shoulder of the fitting mandrel must rest against the marked end face (designation) of the bearing. A toroidal ring should be used to retain the bearing. The length and oversize of the ring must be matched by the customer to the dimensions and mass of the bearing. The press-in forces occurring during mounting are dependent on several factors. Mounting must be carried out so that the bearing rib on the end face is not deformed. If the application requires a mounting procedure different from the one described, mounting trials must be carried out in order to ensure that the bearings can be mounted correctly and without causing damage.

Drawn cup needle roller bearings must not be tilted during pressing-in, as this may damage the bearing. If grease lubrication is to be used, the bearings should be lubricated with grease before mounting.

13
Mounting of a drawn cup needle roller bearing with open ends using a fitting mandrel: design of the fitting mandrel

General tolerances to ISO 2768-1

F_w = *inner enveloping circle diameter*
D = *bearing outside diameter*
R = *radii of fitting mandrel*
① *Toroidal ring*



Schaeffler Mounting Handbook

Rolling bearings must be handled with great care

Rolling bearings are well-proven precision machine elements for the design of economical and reliable bearing arrangements, which offer high operational security. In order that these products can function correctly and achieve the envisaged operating life without detrimental effect, they must be handled with care.

The Schaeffler Mounting Handbook MH 1 gives comprehensive information about the correct storage, mounting, dismounting and maintenance of rotary rolling bearings ➤*https://www.schaeffler.de/std/1D53*. It also provides information which should be observed by the designer, in relation to the mounting, dismounting and maintenance of bearings, in the original design of the bearing position. This book is available from Schaeffler on request.

1.18 Legal notice regarding data freshness

✎ The further development of products may also result in technical changes to catalogue products

Of central interest to Schaeffler is the further development and optimisation of its products and the satisfaction of its customers. In order that you, as the customer, can keep yourself optimally informed about the progress that is being made here and with regard to the current technical status of the products, we publish any product changes which differ from the printed version in our electronic product catalogue.

We therefore reserve the right to make changes to the data and illustrations in this catalogue. This catalogue reflects the status at the time of printing. More recent publications released by us (as printed or digital media) will automatically precede this catalogue if they involve the same subject. Therefore, please always use our electronic product catalogue to check whether more up-to-date information or modification notices exist for your desired product.

Link to electronic product catalogue

The following link will take you to the Schaeffler electronic product catalogue: ➤ *https://medias.schaeffler.com*.

1.19 Further information

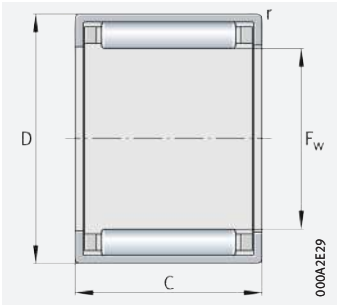
In addition to the data in this chapter, the following chapters in Technical principles must also be observed in the design of bearing arrangements:

- Determining the bearing size ➤ *34*
- Rigidity ➤ *54*
- Friction and increases in temperature ➤ *56*
- Speeds ➤ *64*
- Bearing data ➤ *97*
- Lubrication ➤ *70*
- Sealing ➤ *182*
- Design of bearing arrangements ➤ *139*
- Mounting and dismounting ➤ *191*.

Drawn cup needle roller bearings with open ends

Drawn cup needle roller bearings with closed end

Unsealed



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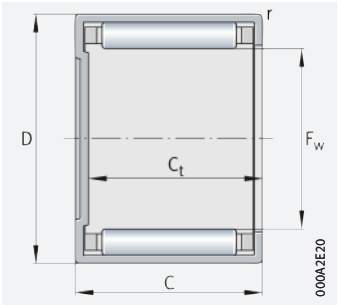


BK

F_w = 2 – 16 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearings with closed end	
F_w	D	C	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	Mass m	Designation ➤*893 | 1.12* ➤*894 | 1.13*	Mass m	Designation ➤*893 | 1.12* ➤*894 | 1.13*
		–0,3	N	N	N	min^{-1}	min^{-1}	≈ g		≈ g	
2	4,6	5	465	265	28,5	58 000	93 000	0,3	**HK0205-TV**[1]	–	–
3	6,5	6	1 230	840	85	48 000	57 000	1	**HK0306-TV**[1]	1	**BK0306-TV**[1]
4	8	8	1 780	1 310	144	42 500	44 500	1,5	**HK0408**[1]	1,6	**BK0408**[1]
5	9	9	2 400	1 990	239	39 000	36 500	2	**HK0509**[1]	2,1	**BK0509**[1]
6	10	6	1 610	1 220	167	36 500	31 500	1,5	**HK0606**[1]	–	–
	10	8	2 030	1 650	184	36 500	31 500	2,1	**HK0608**[1]	–	–
	10	9	2 850	2 600	310	36 500	30 500	2,5	**HK0609**	2,6	**BK0609**
7	11	9	3 100	2 950	355	33 000	26 500	2,6	**HK0709**	2,9	**BK0709**
8	12	8	2 750	2 600	290	29 500	23 800	2,7	**HK0808**	3	**BK0808**
	12	10	3 800	3 950	500	29 500	23 200	3	**HK0810**	3,4	**BK0810**
9	13	8	3 550	3 750	440	26 500	20 600	3	**HK0908**	–	–
	13	10	4 250	4 650	600	26 500	20 600	4	**HK0910**	4,3	**BK0910**
	13	12	5 300	6 300	860	26 500	20 200	4,6	**HK0912**	4,9	**BK0912**
10	14	10	4 400	5 100	650	24 300	18 700	4,1	**HK1010**	4,3	**BK1010**
	14	12	5 500	6 800	930	24 300	18 400	4,8	**HK1012**	5	**BK1012**
	14	15	6 800	8 800	1 210	24 300	18 200	6	**HK1015**	6,2	**BK1015**
12	16	10	4 950	6 200	800	20 700	15 700	4,6	**HK1210**	5,2	**BK1210**
	18	12	6 500	7 300	860	20 000	15 500	9	**HK1212**	10	**BK1212**
	18	16	9 300	11 500	1 420	20 000	15 100	13	**HK1216**	–	–
13	19	12	6 800	7 900	940	18 700	14 400	10	**HK1312**	11	**BK1312**
14	20	12	7 100	8 500	1 010	17 500	13 500	10,5	**HK1412**	12	**BK1412**
15	21	12	7 900	9 400	1 150	16 300	12 300	11	**HK1512**	13	**BK1512**
	21	16	10 500	14 400	1 780	16 500	12 300	15	**HK1516**	17	**BK1516**
	21	22	13 400	19 500	2 380	16 500	12 300	20	**HK1522-ZW**	–	–
16	22	12	7 600	9 700	1 160	15 600	11 900	12	**HK1612**	14	**BK1612**
	22	16	10 900	15 300	1 900	15 600	11 600	16	**HK1616**	18	**BK1616**
	22	22	13 100	19 400	2 310	15 600	11 700	22	**HK1622-ZW**	24	**BK1622-ZW**

medias ➤ *https://www.schaeffler.de/std/1F15*

[1] Not available with lubrication hole.

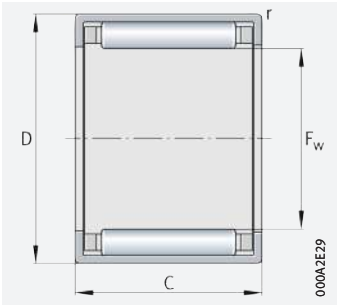
[2] For unsealed drawn cup needle roller bearings, dimensionally matched sealing rings of series G or SD can be used to provide protection against contamination.

Dimensions			Suitable inner rings ➤*992*		Suitable sealing rings[2] ➤*1026*	
F_w	C_t min.	r min.	LR designation	IR designation		
2		0,3	–	–	–	–
3	5,2	0,3	–	–	–	–
4	6,4	0,3	–	–	**GR4×8×2**	–
5	7,4	0,4	–	–	**GR5×9×2**	–
6	–	0,4	–	–	**GR6×10×2**	–
	–	0,4	–	–	**GR6×10×2**	–
	7,4	0,4	–	–	**GR6×10×2**	–
7	7,4	0,4	–	–	**GR7×11×2**	–
8	6,4	0,4	–	–	–	**G8×12×3**
	8,4	0,4	–	**IR5×8×12-XL**	–	**G8×12×3**
9	–	0,4	–	–	**GR9×13×3**	**G9×13×3**
	8,4	0,4	–	–	**GR9×13×3**	**G9×13×3**
	10,4	0,4	–	**IR6×9×12-XL**	**GR9×13×3**	**G9×13×3**
10	8,4	0,4	**LR7×10×10,5**	**IR7×10×10,5-XL**	**GR10×14×3**	**G10×14×3**
	10,4	0,4	–	**IR7×10×12-XL**	**GR10×14×3**	**G10×14×3**
	13,4	0,4	–	**IR7×10×16-XL**	**GR10×14×3**	**G10×14×3**
12	8,4	0,4	**LR8×12×10,5**	**IR8×12×10,5-XL**	**SD12×18×3**	**G12×18×3**
	9,3	0,8	**LR8×12×12,5**	**IR8×12×12,5-XL**	**SD12×18×3**	**G12×18×3**
	–	0,8	–	**IR9×12×16-XL**	**SD12×18×3**	**G12×18×3**
13	9,3	0,8	**LR10×13×12,5**	**IR10×13×12,5-XL**	–	**G13×19×3**
14	9,3	0,8	–	**IR10×14×13-XL**	**SD14×20×3**	**G14×20×3**
15	9,3	0,8	**LR12×15×12,5**	**IR12×15×12-XL**	**SD15×21×3**	**G15×21×3**
	13,3	0,8	**LR12×15×16,5**	**IR12×15×16-XL**	**SD15×21×3**	**G15×21×3**
	–	0,8	**LR12×15×22,5**	**IR12×15×22,5-XL**	**SD15×21×3**	**G15×21×3**
16	9,3	0,8	–	**IR12×16×13-XL**	**SD16×22×3**	**G16×22×3**
	13,3	0,8	–	**IR12×16×16-XL**	**SD16×22×3**	**G16×22×3**
	19,3	0,8	–	**IR12×16×22-XL**	**SD16×22×3**	**G16×22×3**

Drawn cup needle roller bearings with open ends

Drawn cup needle roller bearings with closed end

Unsealed



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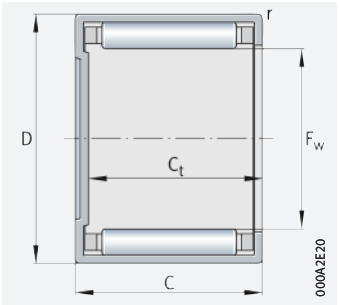


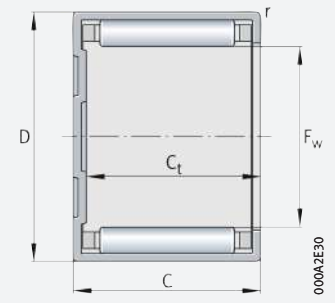
BK with F_w < 25 mm

F_w = 17 – 30 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearings with closed end	
F_w	D	C	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	Mass m	Designation ➤*893 | 1.12* ➤*894 | 1.13*	Mass m	Designation ➤*893 | 1.12* ➤*894 | 1.13*
		–0,3	N	N	N	min^{-1}	min^{-1}	≈ g		≈ g	
17	23	12	7 900	10 300	1 230	14 700	11 200	12	**HK1712**	–	–
18	24	12	8 100	10 900	1 300	14 000	10 700	13	**HK1812**	15	**BK1812**
	24	16	11 600	17 300	2 140	14 000	10 400	18	**HK1816**	20	**BK1816**
20	26	10	6 300	8 100	1 010	12 700	10 000	12	**HK2010**	–	–
	26	12	8 600	12 100	1 450	12 700	9 700	14	**HK2012**	–	–
	26	16	12 700	20 100	2 500	12 700	9 300	19	**HK2016**	22	**BK2016**
	26	20	15 700	26 000	3 500	12 700	9 300	24	**HK2020**	27	**BK2020**
	26	30	21 800	40 000	5 000	12 700	9 200	35	**HK2030-ZW**	–	–
22	28	10	7 500	10 500	1 360	11 700	9 000	13	**HK2210**	–	–
	28	12	9 100	13 400	1 600	11 700	8 900	15	**HK2212**	18	**BK2212**
	28	16	13 400	22 100	2 800	11 700	8 500	21	**HK2216**	24	**BK2216**
	28	20	16 500	29 000	3 850	11 700	8 500	26	**HK2220**	–	–
25	32	12	11 000	15 200	1 990	10 200	7 800	20	**HK2512**	–	–
	32	16	15 600	24 000	3 150	10 200	7 500	27	**HK2516**	32	**BK2516**
	32	20	19 900	33 000	4 200	10 200	7 400	33	**HK2520**	38	**BK2520**
	32	26	25 500	45 000	6 200	10 200	7 300	44	**HK2526**	48	**BK2526**
	32	38	34 000	66 000	8 400	10 200	7 300	64	**HK2538-ZW**	68	**BK2538-ZW**
28	35	16	16 400	26 500	3 450	9 200	6 800	29	**HK2816**	–	–
	35	20	20 900	36 000	4 650	9 200	6 700	36	**HK2820**	–	–
30	37	12	12 100	18 200	2 390	8 600	6 600	23	**HK3012**	28	**BK3012**
	37	16	17 200	29 000	3 750	8 600	6 400	31	**HK3016**	38	**BK3016**
	37	20	22 000	39 500	5 100	8 600	6 300	39	**HK3020**	47	**BK3020**
	37	22	24 800	46 000	6 100	8 600	6 200	42	**HK3022**	–	–
	37	26	28 000	54 000	7 400	8 600	6 200	51	**HK3026**	58	**BK3026**
	37	38	37 500	79 000	10 100	8 600	6 200	76	**HK3038-ZW**	84	**BK3038-ZW**

medias ➤ *https://www.schaeffler.de/std/1F16*

[1] For unsealed drawn cup needle roller bearings, dimensionally matched sealing rings of series G or SD can be used to provide protection against contamination.



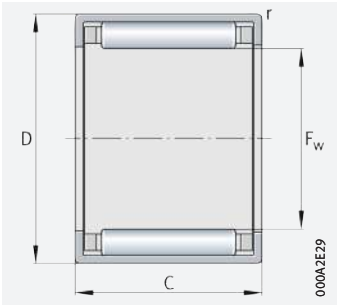
BK with F_w ≧ 25 mm

Dimensions			Suitable inner rings ➤*992*		Suitable sealing rings[1)] ➤*1026*	
F_w	C_t min.	r min.	LR designation	IR designation		
17	–	0,8	–	–	**SD17×23×3**	**G17×23×3**
18	9,3	0,8	**LR15×18×12,5**	–	**SD18×24×3**	**G18×24×3**
	13,3	0,8	**LR15×18×16,5**	**IR15×18×16-XL**	**SD18×24×3**	**G18×24×3**
20	–	0,8	–	–	**SD20×26×4**	**G20×26×4**
	–	0,8	–	**IR15×20×13-XL**	**SD20×26×4**	**G20×26×4**
	13,3	0,8	**LR17×20×16,5**	**IR17×20×16-XL**	**SD20×26×4**	**G20×26×4**
	17,3	0,8	**LR17×20×20,5**	**IR17×20×20-XL**	**SD20×26×4**	**G20×26×4**
	–	0,8	**LR17×20×30,5**	**IR17×20×30,5-XL**	**SD20×26×4**	**G20×26×4**
22	–	0,8	–	–	**SD22×28×4**	**G22×28×4**
	9,3	0,8	–	**IR17×22×13-XL**	**SD22×28×4**	**G22×28×4**
	13,3	0,8	–	**IR17×22×16-XL**	**SD22×28×4**	**G22×28×4**
	–	0,8	–	**IR17×22×23-XL**	**SD22×28×4**	**G22×28×4**
25	–	0,8	**LR20×25×12,5**	–	**SD25×32×4**	**G25×32×4**
	13,3	0,8	**LR20×25×16,5**	**IR20×25×17-XL**	**SD25×32×4**	**G25×32×4**
	17,3	0,8	**LR20×25×20,5**	**IR20×25×20-XL**	**SD25×32×4**	**G25×32×4**
	23,3	0,8	**LR20×25×26,5**	**IR20×25×26,5-XL**	**SD25×32×4**	**G25×32×4**
	35,3	0,8	**LR20×25×38,5**	**IR20×25×38,5-XL**	**SD25×32×4**	**G25×32×4**
28	–	0,8	–	**IR22×28×17-XL**	**SD28×35×4**	**G28×35×4**
	–	0,8	**LR22×28×20,5**	**IR22×28×20-XL**	**SD28×35×4**	**G28×35×4**
30	9,3	0,8	**LR25×30×12,5**	–	**SD30×37×4**	**G30×37×4**
	13,3	0,8	**LR25×30×16,5**	**IR25×30×17-XL**	**SD30×37×4**	**G30×37×4**
	17,3	0,8	**LR25×30×20,5**	**IR25×30×20-XL**	**SD30×37×4**	**G30×37×4**
	–	0,8	–	–	**SD30×37×4**	**G30×37×4**
	23,3	0,8	**LR25×30×26,5**	**IR25×30×26,5-XL**	**SD30×37×4**	**G30×37×4**
	35,3	0,8	**LR25×30×38,5**	**IR25×30×38,5-XL**	**SD30×37×4**	**G30×37×4**

Drawn cup needle roller bearings with open ends

Drawn cup needle roller bearings with closed end

Unsealed



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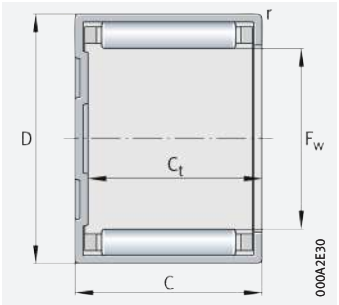


BK

F_w = 32 – 60 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearings with closed end	
F_w	D	C	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	Mass m	Designation ➤*893|1.12* ➤*894|1.13*	Mass m	Designation ➤*893|1.12* ➤*894|1.13*
		–0,3	N	N	N	min^{-1}	min^{-1}	≈ g		≈ g	
32	39	20	23 000	42 500	5 500	8 100	5 900	40,6	**HK3220**	–	–
	39	24	27 500	54 000	7 300	8 100	5 900	49	**HK3224**	–	–
35	42	12	13 100	21 300	2 800	7 500	5 800	27	**HK3512**	–	–
	42	16	18 700	33 500	4 400	7 500	5 600	36	**HK3516**	–	–
	42	20	23 800	46 000	5 900	7 500	5 500	44	**HK3520**	53	**BK3520**
40	47	12	14 000	24 300	3 200	6 600	5 200	30	**HK4012**	–	–
	47	16	20 000	38 500	5 000	6 600	5 000	39	**HK4016**	–	–
	47	20	25 500	52 000	6 800	6 600	4 900	54	**HK4020**	62	**BK4020**
45	52	12	14 900	27 500	3 600	5 900	4 650	33	**HK4512**	–	–
	52	16	21 300	43 000	5 700	5 900	4 550	46	**HK4516**	–	–
	52	20	27 000	59 000	7 600	5 900	4 450	56	**HK4520**	72	**BK4520**
50	58	20	31 000	63 000	8 200	5 300	4 050	70	**HK5020**	–	–
	58	25	38 500	84 000	11 700	5 300	4 000	90	**HK5025**	109	**BK5025**
55	63	20	31 500	67 000	8 700	4 850	3 800	74	**HK5520**	–	–
	63	28	44 000	103 000	14 700	4 850	3 700	105	**HK5528**	–	–
60	68	12	17 400	32 000	4 250	4 450	3 750	49	**HK6012**	–	–
	68	20	33 500	75 000	9 800	4 450	3 500	81	**HK6020**	–	–
	68	32	53 000	135 000	19 700	4 450	3 400	136	**HK6032**	–	–

medias ➤ *https://www.schaeffler.de/std/1F17*

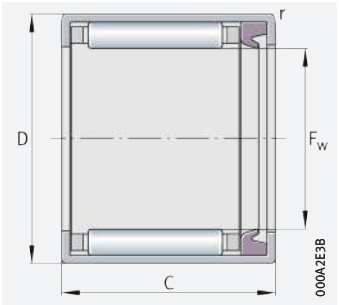
[1] For unsealed drawn cup needle roller bearings, dimensionally matched sealing rings of series G or SD can be used to provide protection against contamination.

Dimensions			Suitable inner rings ➤*992*		Suitable sealing rings[1] ➤*1026*	
F_w	C_t min.	r min.	LR designation	IR designation		
32	–	0,8	–	**IR28×32×20-XL**	–	–
	–	0,8	–	–	–	–
35	–	0,8	**LR30×35×12,5**	**IR30×35×13-XL**	**SD35×42×4**	**G35×42×4**
	–	0,8	**LR30×35×16,5**	**IR30×35×16-XL**	**SD35×42×4**	**G35×42×4**
	17,3	0,8	**LR30×35×20,5**	**IR30×35×20-XL**	**SD35×42×4**	**G35×42×4**
40	–	0,8	**LR35×40×12,5**	–	**SD40×47×4**	**G40×47×4**
	–	0,8	**LR35×40×16,5**	**IR35×40×17-XL**	**SD40×47×4**	**G40×47×4**
	17,3	0,8	**LR35×40×20,5**	**IR35×40×20-XL**	**SD40×47×4**	**G40×47×4**
45	–	0,8	–	–	**SD45×52×4**	**G45×52×4**
	–	0,8	**LR40×45×16,5**	**IR40×45×17-XL**	**SD45×52×4**	**G45×52×4**
	17,3	0,8	**LR40×45×20,5**	**IR40×45×20-XL**	**SD45×52×4**	**G45×52×4**
50	–	0,8	**LR45×50×20,5**	–	**SD50×58×4**	**G50×58×4**
	22,3	0,8	–	**IR45×50×25-XL**	**SD50×58×4**	**G50×58×4**
55	–	0,8	**LR50×55×20,5**	–	**SD55×63×5**	**G55×63×5**
	–	0,8	–	–	**SD55×63×5**	**G55×63×5**
60	–	0,8	–	–	–	–
	–	0,8	–	–	–	–
	–	0,8	–	–	–	–

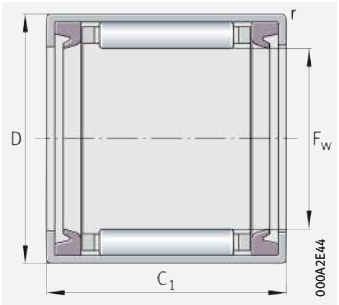
Drawn cup needle roller bearings with open ends

Drawn cup needle roller bearings with closed end

Sealed



HK..-RS

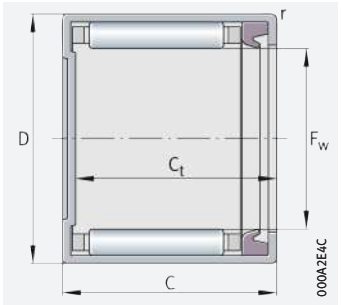


HK..-2RS

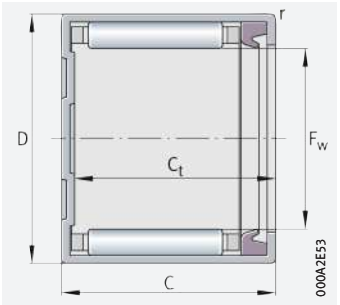
F_w = 8 – 50 mm

Main dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Drawn cup needle roller bearings with open ends			
								Sealed on one side		Sealed on both sides	
F_w	D	C	C_1	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease	Mass m	Designation ➤*893|1.12* ➤*894|1.13*	Mass m	Designation ➤*893|1.12* ➤*894|1.13*
		–0,3	–0,3	N	N	N	min^{-1}	≈ g		≈ g	
8	12	10	10	2 180	1 930	265	17 700	–	–	3,2	**HK0810-2RS**
	12	12	12	2 750	2 600	290	17 700	3	**HK0810-RS**	3,3	**HK0812-2RS**
	12	12	–	3 800	3 950	500	17 700	3,1	**HK0812-RS**	–	–
10	14	10	10	2 410	2 330	320	14 600	–	–	4	**HK1010-2RS**
	14	12	12	3 200	3 350	380	14 600	–	–	4,3	**HK1012-2RS**
	14	14	14	4 400	5 100	650	14 600	4,2	**HK1012-RS**	4,6	**HK1014-2RS**
12	16	14	14	4 950	6 200	800	12 400	–	–	11	**HK1214-2RS**
	18	16	16	6 500	7 300	860	12 000	10	**HK1214-RS**	11	**HK1216-2RS**
14	20	16	16	7 100	8 500	1 010	10 500	12	**HK1414-RS**	13	**HK1416-2RS**
15	21	16	16	7 800	9 800	1 190	9 900	12	**HK1514-RS**	15	**HK1516-2RS**
	21	20	20	10 500	14 400	1 780	9 900	16	**HK1518-RS**	18	**HK1520-2RS**
16	22	16	16	7 600	9 700	1 160	9 300	13	**HK1614-RS**	14	**HK1616-2RS**
	22	20	20	10 900	15 300	1 900	9 300	–	–	18	**HK1620-2RS**
18	24	16	16	8 100	10 900	1 300	8 400	14	**HK1814-RS**	15	**HK1816-2RS**
20	26	16	16	8 600	12 100	1 450	7 600	–	–	18	**HK2016-2RS**
	26	20	20	12 700	20 100	2 500	7 600	21	**HK2018-RS**	23	**HK2020-2RS**
22	28	16	16	9 100	13 400	1 600	7 000	16	**HK2214-RS**	18	**HK2216-2RS**
	28	20	20	13 400	22 100	2 800	7 000	24	**HK2218-RS**	26	**HK2220-2RS**
25	32	16	16	11 000	15 200	1 990	6 100		–	27	**HK2516-2RS**
	32	20	20	15 600	24 000	3 150	6 100	29	**HK2518-RS**	31	**HK2520-2RS**
	32	24	24	19 900	33 000	4 200	6 100	–	–	40	**HK2524-2RS**
	32	30	30	25 500	45 000	6 200	6 100	–	–	47	**HK2530-2RS**
28	35	20	20	16 400	26 500	3 450	5 500	31	**HK2818-RS**	34	**HK2820-2RS**
30	37	16	16	12 100	18 200	2 390	5 200	–	–	31	**HK3016-2RS**
	37	20	20	17 200	29 000	3 750	5 200	37	**HK3018-RS**	36	**HK3020-2RS**
	37	24	24	22 000	39 500	5 100	5 200	–	–	44	**HK3024-2RS**
35	42	16	16	13 100	21 300	2 800	4 500	–	–	32	**HK3516-2RS**
	42	20	20	18 700	33 500	4 400	4 500	39	**HK3518-RS**	41	**HK3520-2RS**
40	47	16	16	14 000	24 300	3 200	3 950	–	–	37	**HK4016-2RS**
	47	20	20	20 000	38 500	5 000	3 950	45	**HK4018-RS**	48	**HK4020-2RS**
45	52	20	20	21 300	43 000	5 700	3 550	50	**HK4518-RS**	54	**HK4520-2RS**
50	58	24	24	31 000	63 000	8 200	3 150	76	**HK5022-RS**	81	**HK5024-2RS**

medias ➤ *https://www.schaeffler.de/std/1F18*



BK..-RS with F_w < 25 mm

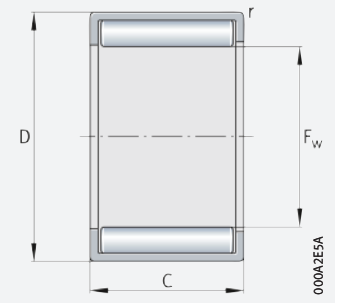


BK..-RS with F_w ≧ 25 mm

	Drawn cup needle roller bearings with closed end		Dimensions		Suitable inner rings ➤*992*		
	Sealed				for HK..-RS and HK..-2RS		for BK..-RS
F_w	Mass m ≈ g	Designation ➤*893* | *1.12* ➤*894* | *1.13*	C_t min.	r min.	LR designation	IR designation	Designation
8	–	–	–	0,4	**–**	**–**	–
	–	–	–	0,4	**–**	**IR5×8×12-XL**	–
	–	–	–	0,4	**–**	**IR5×8×12-XL**	–
10	–	–	–	0,4	**LR7×10×10,5**	**IR7×10×10,5-XL**	–
	4,3	**BK1012-RS**	10,4	0,4	**–**	**IR7×10×12-XL**	–
	–	–	–	0,4	**–**	**–**	–
12	–	–	–	0,8	**–**	**–**	–
	–	–	–	0,8	**–**	**IR9×12×16-XL**	–
14	13	**BK1414-RS**	11,3	0,8	**–**	**–**	–
15	14	**BK1514-RS**	11,3	0,8	**LR12×15×16,5**	**IR12×15×16-XL**	–
	–	–	–	0,8	**–**	**–**	–
16	15	**BK1614-RS**	11,3	0,8	**–**	**IR12×16×16-XL**	**IR12×16×13-XL**
	–	–	–	0,8	**–**	**IR12×16×20-XL**	–
18	–	–	–	0,8	**LR15×18×16,5**	**IR15×18×16-XL**	–
20	–	–	–	0,8	**LR17×20×16,5**	**IR17×20×16-XL**	–
	24	**BK2018-RS**	15,3	0,8	**LR17×20×20,5**	**IR17×20×20-XL**	–
22	–	–	–	0,8	**–**	**IR17×22×16-XL**	–
	–	–	–	0,8	**–**	**IR17×22×23-XL**	–
25	–	–	–	0,8	**LR20×25×16,5**	**IR20×25×17-XL**	–
	34	**BK2518-RS**	15,3	0,8	**LR20×25×20,5**	**IR20×25×20-XL**	**LR20×25×20,5**
	–	–	–	0,8	**–**	**–**	–
	–	–	–	0,8	**–**	**IR20×25×30-XL**	–
28	–	–	–	0,8	**LR22×28×20,5**	**IR22×28×20-XL**	–
30	–	–	–	0,8	**LR25×30×16,5**	**IR25×30×17-XL**	–
	–	–	–	0,8	**LR25×30×20,5**	**IR25×30×20-XL**	–
	–	–	–	0,8	**–**	**–**	–
35	–	–	–	0,8	**LR30×35×16,5**	**IR30×35×16-XL**	–
	–	–	–	0,8	**LR30×35×20,5**	**IR30×35×20-XL**	–
40	–	–	–	0,8	**LR35×40×16,5**	**IR35×40×17-XL**	–
	–	–	–	0,8	**LR35×40×20,5**	**IR35×40×20-XL**	–
45	–	–	–	0,8	**LR40×45×20,5**	**IR40×45×20-XL**	–
50	–	–	–	0,8	**–**	**IR45×50×25-XL**	–

Drawn cup needle roller bearings with open ends

Full complement
Unsealed



HN

F_w = 8 – 50 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation ➤*893*|*1.12* ➤*894*|*1.13*
F_w	D	C	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease	$n_{\vartheta r}$	m	
			N	N	N	min^{-1}	min^{-1}	≈ g	
8	12	8	5 000	6 700	870	12 700	18 000	3	**HN0808**
12	16	10	8 000	13 400	1 850	8 900	11 900	5,3	**HN1210**
	18	12	10 200	15 200	1 950	8 600	12 000	10,5	**HN1212**
14	20	12	11 000	17 500	2 260	7 500	10 400	12	**HN1412**
15	21	16	15 400	27 500	3 600	7 100	9 600	14	**HN1516**
16	22	12	12 000	20 300	2 600	6 700	9 200	13	**HN1612**
18	24	16	17 000	32 500	4 250	6 000	8 000	20	**HN1816**
20	26	20	22 400	48 000	6 600	5 400	7 200	29,5	**HN2020**
25	32	20	28 000	59 000	7 900	4 350	5 800	39,6	**HN2520**
28	35	20	30 000	67 000	9 000	3 950	5 200	44	**HN2820**
35	42	20	33 500	83 000	11 100	3 200	4 250	54	**HN3520**
40	47	20	36 000	95 000	12 700	2 800	3 750	60,5	**HN4020**
45	52	20	38 500	108 000	14 500	2 500	3 400	66	**HN4520**
	52	25	47 000	139 000	19 500	2 500	3 350	85	**HN4525**
50	58	20	44 500	119 000	16 200	2 260	3 100	85,3	**HN5020**
	58	25	54 000	152 000	21 700	2 260	3 050	107	**HN5025**

medias ➤ *https://www.schaeffler.de/std/1F19*

Dimensions		Suitable inner rings ➤*992*	
F_w	r min.	LR designation	IR designation
8	0,4	–	–
12	0,4	**LR8×12×10,5**	**IR8×12×10,5-XL**
	0,8	**LR8×12×12,5**	**IR8×12×12,5-XL**
14	0,8	–	**IR10×14×13-XL**
15	0,8	**LR12×15×16,5**	**IR12×15×16-XL**
16	0,8	–	**IR12×16×13-XL**
18	0,8	**LR15×18×16,5**	**IR15×18×16-XL**
20	0,8	**LR17×20×20,5**	**IR17×20×20-XL**
25	0,8	**LR20×25×20,5**	**IR20×25×20-XL**
28	0,8	**LR22×28×20,5**	**IR20×28×20-XL**
35	0,8	**LR30×35×20,5**	**IR30×35×20-XL**
40	0,8	**LR35×40×20,5**	**IR32×40×20-XL**
45	0,8	**LR40×45×20,5**	**IR40×45×20-XL**
	0,8	–	–
50	0,8	**LR45×50×20,5**	–
	0,8	**LR45×50×25,5**	**IR45×50×25-XL**