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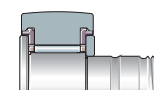
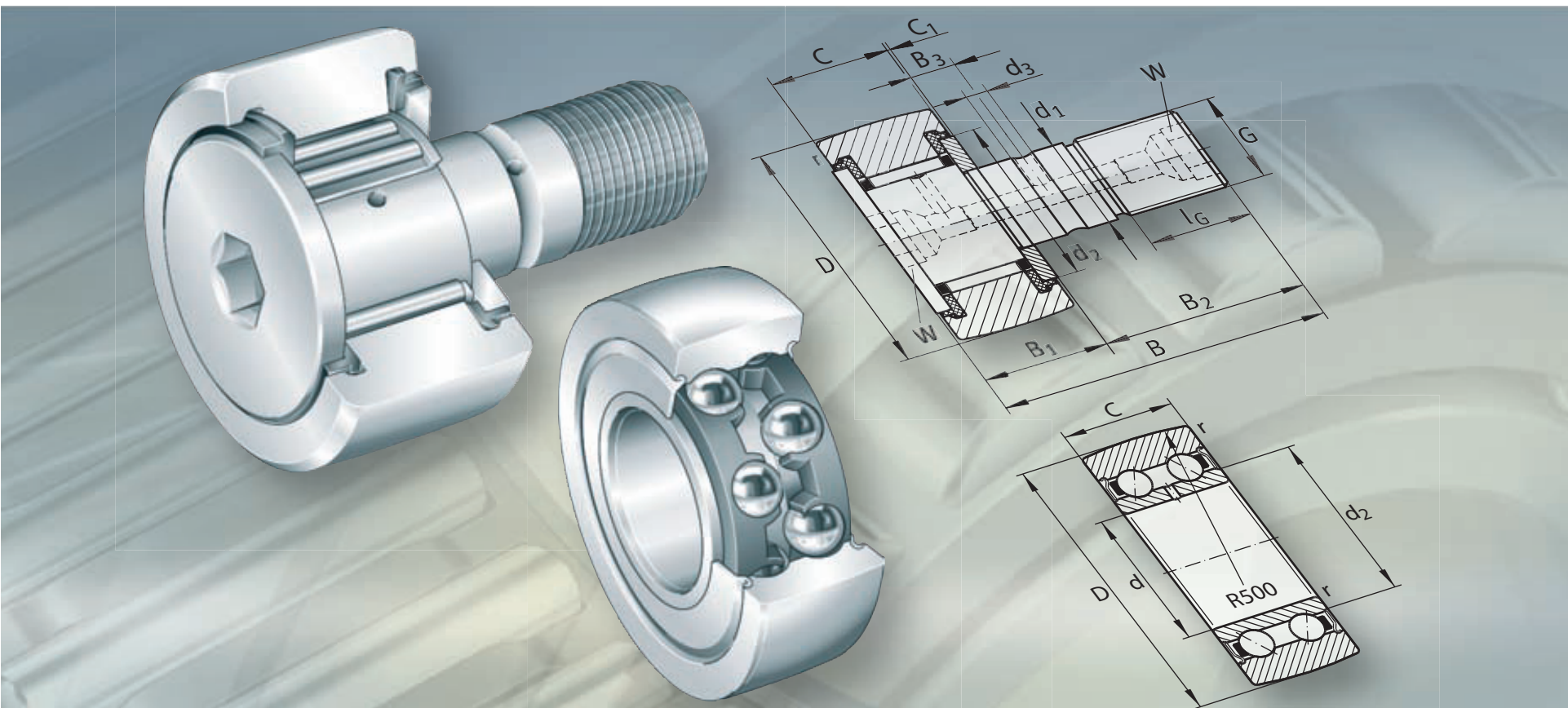
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SCHAEFFLER



FAG



Track rollers

Yoke type track rollers
Stud type track rollers
Ball bearing track rollers

SCHAEFFLER GROUP
INDUSTRIAL

Track rollers

Yoke type track rollers 926

Yoke type track rollers are ready-to-fit needle and cylindrical roller bearings with a particularly thick-walled outer ring and are used in applications such as cam gears, bed ways, conveying equipment and linear guidance systems. In addition to high radial loads, they can also support axial loads which are due, for example, to slight misalignment defects, skewed running or brief contact running impacts.

Yoke type track rollers are available with and without axial guidance of the outer ring and in both sealed and open versions.

The outside surface of the outer rings is crowned and corresponds in the majority of designs to the optimised INA profile. These bearings have lower Hertzian pressure, reduced edge load under tilting and reduced wear of the mating track, giving a longer operating life of the mating track.

Yoke type track rollers are mounted on a shaft or stud and are supplied with or without an inner ring.

Stud type track rollers 926

Stud type track rollers correspond in their design to yoke type track rollers with axial guidance but, in place of the inner ring, they have a heavy-section roller stud. The stud has a fixing thread and, in most cases, a hexagonal socket on both ends. It is also available with a shrink-fitted eccentric collar. Due to the eccentric collar, the outside surface of the outer ring can be adjusted to match the mating track on the adjacent construction.

Stud type track rollers are available with labyrinth, gap or contact seals.

The outside surface of the outer rings is crowned and corresponds in the majority of designs to the optimised INA profile.

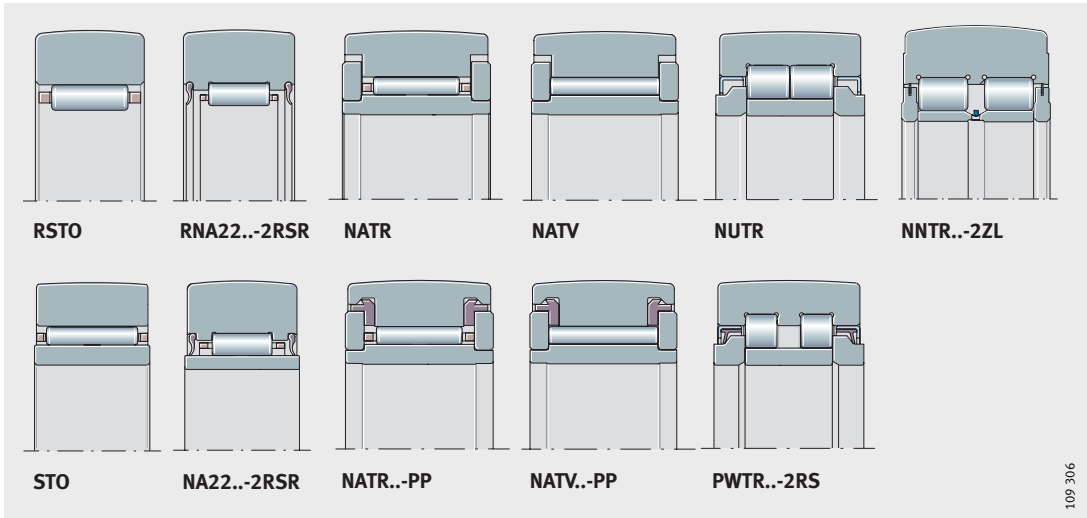
Ball bearing track rollers 984

Ball bearing track rollers correspond in their design to deep groove or angular contact ball bearings but have thick-walled outer rings with a crowned outside surface. They can support high radial forces as well as axial forces in both directions. The bearings are sealed.

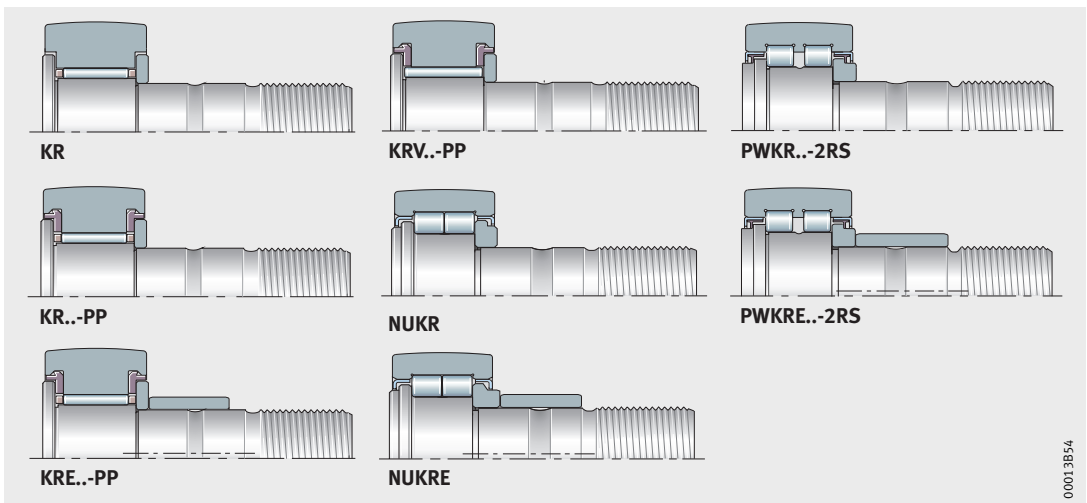
Ball bearing track rollers are available with and without a stud and with a plastic tyre.

Track rollers without a stud are mounted on a shaft or stud.

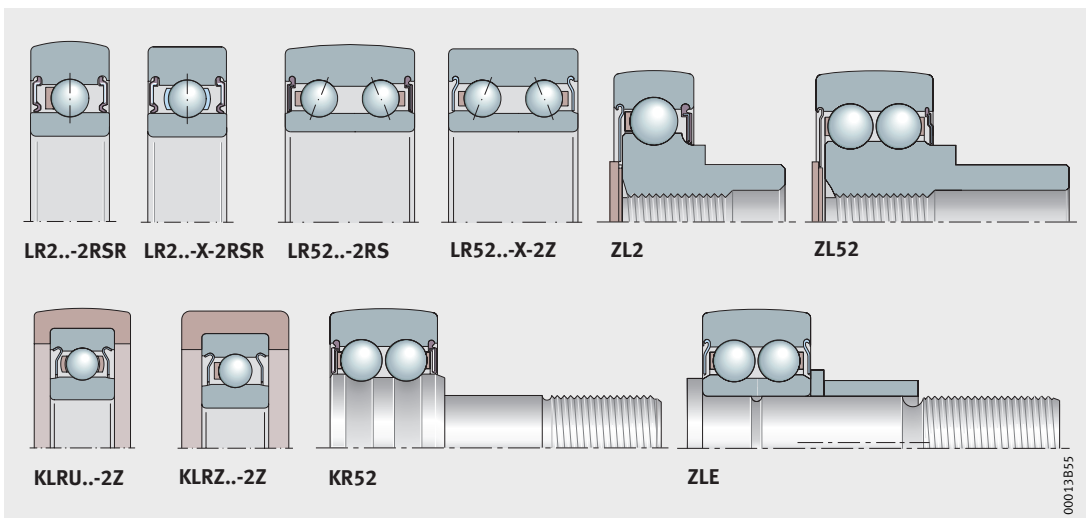
Track rollers with a plastic tyre are used if the bearings are required to run with particularly low noise.



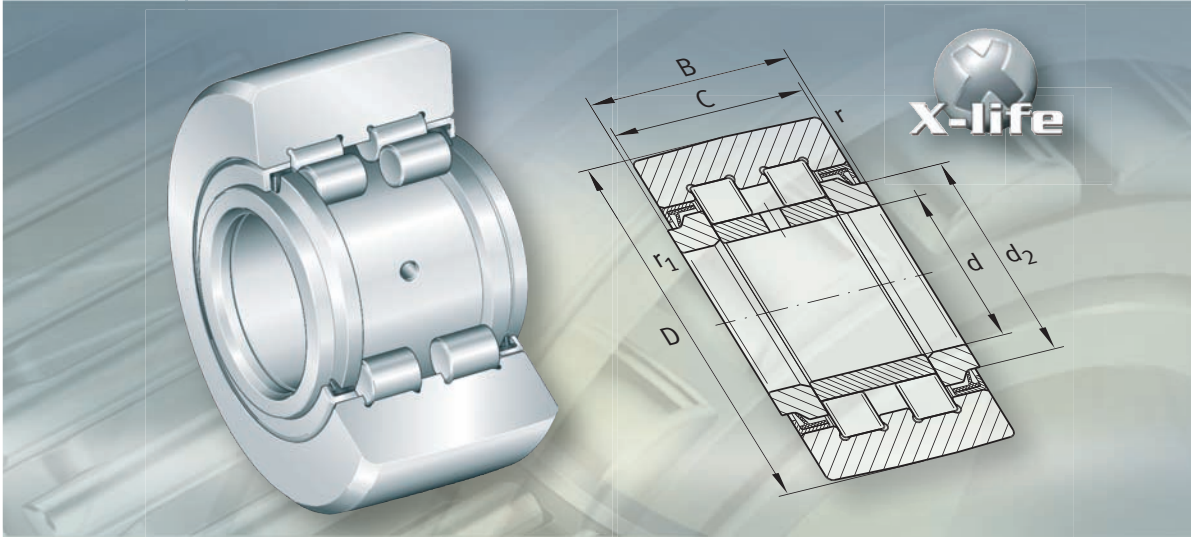
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Yoke type track rollers
Stud type track rollers

Yoke type track rollers, stud type track rollers

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Yoke type track rollers, stud type track rollers

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Product overview Yoke type track rollers

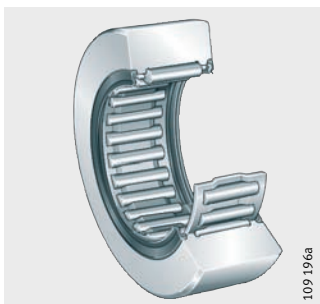
Without axial guidance
Without inner ring

RSTO



Lip seals

RNA22...-2RSR



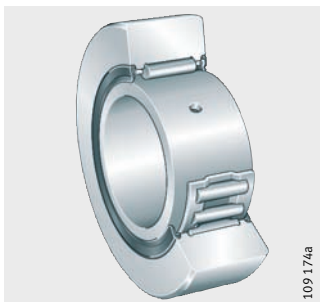
With inner ring

STO



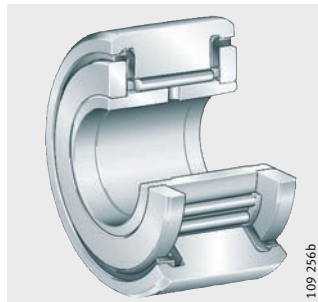
Lip seals

NA22...-2RSR

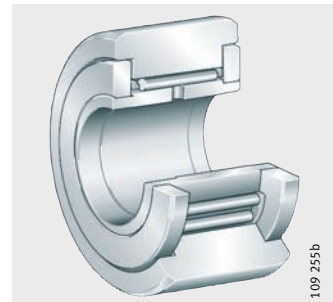


With axial guidance
With cage
 Plastic axial plain washers
 or gap seals

NATR...-PP

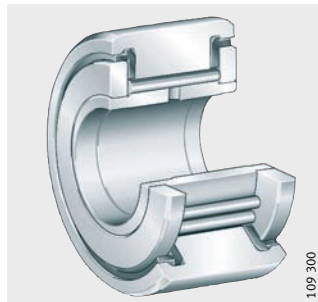


NATR

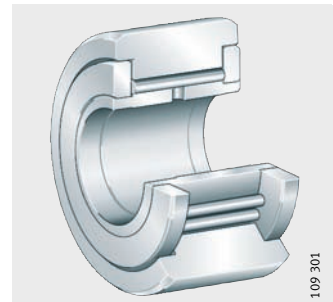


Full complement
needle roller set
 Plastic axial plain washers
 or gap seals

NATV...-PP

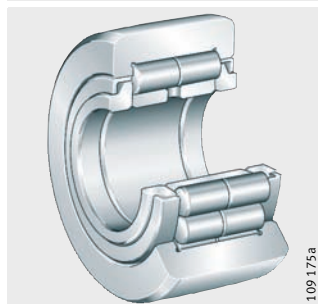


NATV



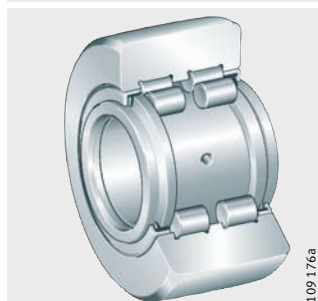
Full complement
cylindrical roller set
 Labyrinth seals

NUTR

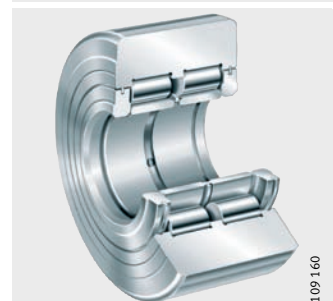


Full complement
cylindrical roller set,
with central rib
 Protected lip seals or
 sealing shields with lamellar ring

PWTR...-2RS



NNTR...-2ZL



Yoke type track rollers

Features

Yoke type track rollers are single or double row units mounted on shafts or studs. They comprise thick-walled outer rings with a profiled outside surface and needle roller and cage assemblies or full complement needle roller or cylindrical roller sets.

Yoke type track rollers can support high radial loads as well as axial loads arising from slight misalignment and skewed running; they are suitable for applications such as cam gears, bed ways and conveying equipment.

The bearings are available with and without an inner ring and in both sealed and open versions.

X-life

Series PWTR is supplied as an X-life design. Due to a modified material and the optimised raceway geometry of the outer rings, the basic rating life has been increased by up to 30%.

The static and dynamic load carrying capacity has also been increased. At the same time, the stress placed on the mating track has been reduced as a result of the optimised lateral surface profile and its improved surface quality.

Due to these measures, highly robust bearing arrangements with an extended operating life can be achieved.

Outside surface profile of the outer ring

Yoke type track rollers with a crowned outside surface are predominantly used in practice since they are often inclined in relation to the mating track and edge stresses must be avoided.

The radius of curvature of the outside surface is $R = 500 \text{ mm}$. In the case of NNTR...-2ZL, the radius is indicated in the dimension table.

The series NATR...-PP, NATV...-PP, NUTR and PWTR...-2RS have an outside surface with the optimised INA profile.

In yoke type track rollers with this curvature profile (*Figure 1, page 942 to Figure 5, page 943*):

- the Hertzian pressure is lower
- edge loading under tilting is lower
- wear of the mating track is reduced
- the operating life of the mating track is extended.

Yoke type track rollers without inner ring	<p>Yoke type track rollers RSTO and RNA22...-2RSR do not have an inner ring. They are particularly compact but require a hardened and ground raceway on the shaft or stud.</p> <p>Series RSTO is not self-retaining. This means that the outer ring and the needle roller and cage assembly can be fitted independently of each other.</p>
With cage, axial guidance of outer ring	<p>In RSTO and RNA22...-2RSR, the rolling elements are guided by a cage. These designs do not have axial guidance of the outer ring. Axial guidance of the outer ring and needle roller and cage assembly must be provided in the adjacent component; see section Adjacent construction for yoke type track rollers, page 955.</p>
Sealing	<p>RSTO is not sealed, series RNA22...-2RSR has lip seals on both sides.</p>
Lubrication	<p>The bearings are greased with a lithium complex soap grease to GA08.</p>
Yoke type track rollers with inner ring	<p>These yoke type track rollers are used if the shaft or stud does not have a hardened and ground raceway.</p> <p>STO is not self-retaining. This means that the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other.</p>
With cage, with full complement needle roller or cylindrical roller set	<p>The series STO, NA22...-2RSR, NATR and NATR...-PP have a cage. The series NATV and NATV...-PP have a full complement needle roller set, while yoke type track rollers NUTR, PWTR...-2RS and NNTR...-2ZL have a full complement cylindrical roller set.</p> <p>Bearings without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided yoke type track rollers.</p>
Axial guidance of outer ring	<p>STO and NA22...-2RSR do not have axial guidance of the outer ring. This must be provided in the adjacent construction; see section Adjacent construction for yoke type track rollers, page 955.</p> <p>In NATR and NATV, axial guidance is provided by contact washers and axial plain washers. In NUTR, the outer ring is guided by the rolling elements, in PWTR...-2RS and NNTR...-2ZL it is guided by the central rib and the rolling elements.</p>



Yoke type track rollers

Anti-corrosion protection Yoke type track rollers PWTR...-2RS-RR are protected against corrosion by the special coating Corrotect®. For a description of the coating, see page 970.

Sealing The seals used in yoke type track rollers are shown in the following table Seals.

Seals

Yoke type track roller	
Series	Seal
STO	Open
NA22...-2RSR	Lip seal
PWTR...-2RS	Protected lip seals on both sides
NATR...-PP NATV...-PP	Three-stage sealing by plastic axial plain washers
NATR NATV	Gap seal
NUTR	Labyrinth seal
NNTR...-2ZL	Sealing shield with lamellar rings

Three-stage seal In the three-stage concept, there is a gap seal between the plastic axial plain washer and the outer ring and a labyrinth seal between the formed seal lip and the undercut in the outer ring. The disc spring shape of the axial plain washers gives a preloaded contact seal as the third stage. It also provides axial sliding contact between the outer ring and contact washers, thus reducing wear and grease consumption.

Lubrication The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the inner ring. Relubrication can be carried out using Arcanol LOAD150.

Operating temperature

Yoke type track rollers can be used at temperatures from –30 °C to +140 °C. In sealed bearings (suffix 2RS and 2RSR) and bearings with a plastic cage (suffix TV), the temperature range is restricted to between –30 °C and +120 °C.

Note the information on the operating temperature range in Technical Principles, Lubrication.



Yoke type track rollers NATR..-PP and NATV..-PP are suitable for operating temperatures from –30 °C to +100 °C, restricted by the grease and the seal material.

Suffixes

Suffixes for available designs: see table.

Available designs

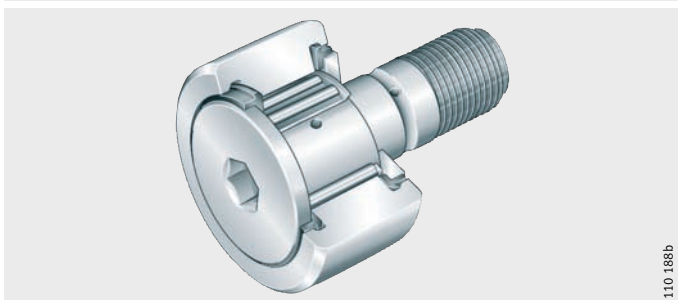
Suffix	Description	Design
PP	Plastic axial plain washer with formed seal lip on both sides of the yoke type track roller, giving a three-stage seal	Standard
RR	Protected against corrosion by Corrotect® special coating	
TV	Plastic cage	
2RS	Protected lip seal on both sides of the yoke type track roller	
2RSR	Radial contact lip seal on both sides of the yoke type track roller	
2ZL	Sealing shield with lamellar rings on both sides of the track roller	



Product overview Stud type track rollers

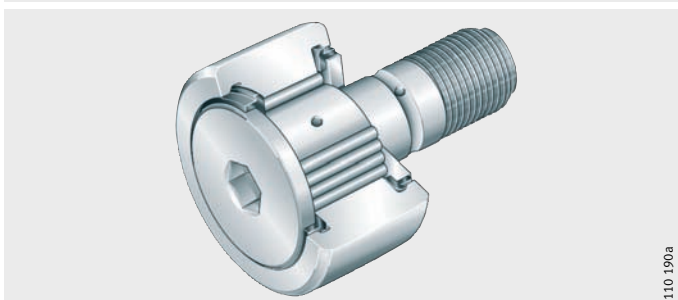
Without eccentric collar
With cage
Plastic axial plain washers
or gap seals

KR...-PP, KR



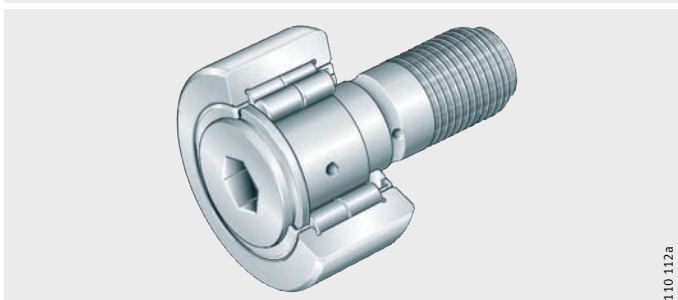
Full complement
needle roller set
Plastic axial plain washers

KRV...-PP



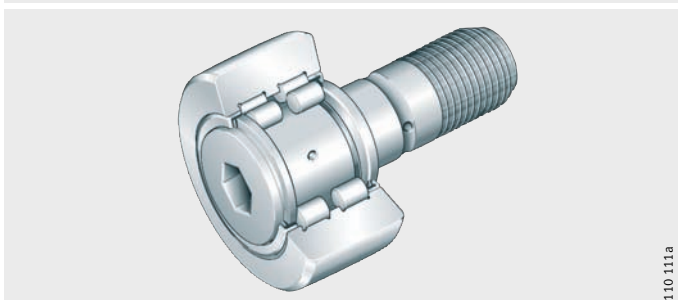
Full complement
cylindrical roller set
Labyrinth seals

NUKR



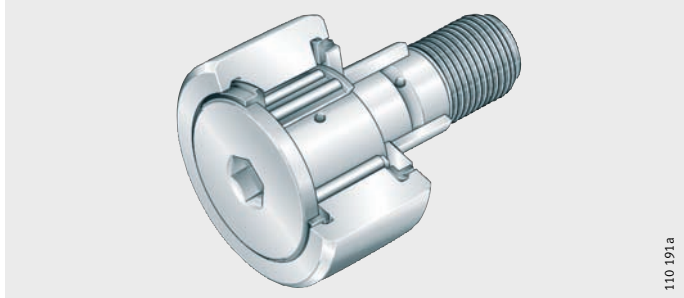
Full complement
cylindrical roller set,
with central rib
Protected lip seals

PWKR...-2RS



With eccentric collar
With cage
 Plastic axial plain washers

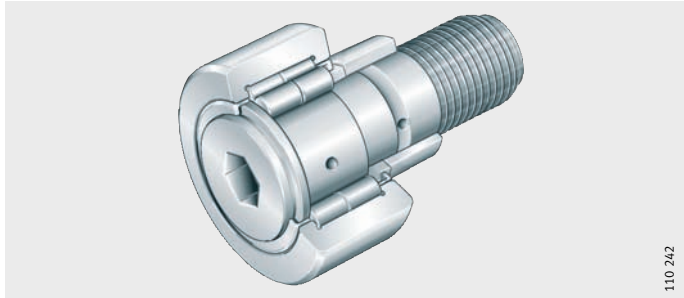
KRE...-PP



110 191a

Full complement
cylindrical roller set
 Labyrinth seals

NUKRE

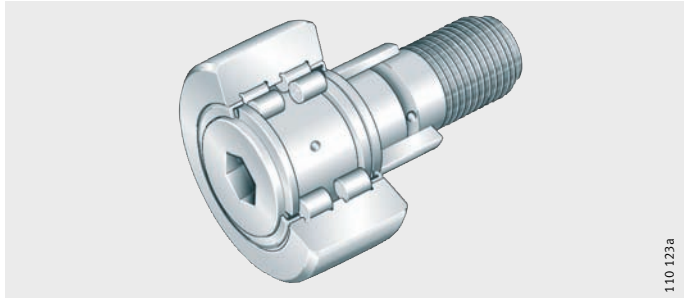


110 242



Full complement
cylindrical roller set,
with central rib
 Protected lip seals

PWKRE...-2RS



110 123a

Stud type track rollers

Features

Stud type track rollers are similar in their construction to single and double row yoke type track rollers, except that the raceway is formed by a heavy-section roller stud with a fixing thread and lubrication hole.

Due to the thick-walled outer ring with profiled outside surface and the rolling element set, they can support high radial loads as well as axial loads arising from slight misalignment and skewed running; they are suitable for applications such as cam gears, bed ways and conveying equipment.

X-life

The series PWKR(E) are supplied in an X-life design.

Due to a modified material and the optimised raceway geometry of the outer rings, the basic rating life has been increased by up to 30%.

The static and dynamic load carrying capacity has also been increased. At the same time, the stress placed on the mating track has been reduced as a result of the optimised lateral surface profile and its improved surface quality.

Due to these measures, highly robust bearing arrangements with an extended operating life can be achieved.

Outside surface profile of the outer ring

Stud type track rollers with a crowned outside surface are predominantly used since they are often inclined in relation to the mating track and edge stresses must be avoided.

In series KR, the radius of curvature is $R = 500 \text{ mm}$.

The series KR...-PP, KRE...-PP, KRV...-PP, NUKR, NUKRE, PWKR...-2RS and PWKRE...-2RS have an outside surface with the optimised INA profile.

In stud type track rollers with this curvature profile (*Figure 1*, page 942 to *Figure 5*, page 943):

- the Hertzian pressure is lower
- edge loading under tilting is lower
- wear of the mating track is reduced
- the operating life of the mating track is extended.

Stud type track rollers are available in several designs as well as with or without an eccentric collar.

Stud type track rollers without eccentric collar

Stud type track rollers without an eccentric collar do not have a defined adjustment facility in relation to the mating track on the adjacent construction.

Stud type track rollers with eccentric collar: see page 940.

With cage, with full complement needle roller or cylindrical roller set

KR, KR..-PP have a cage, while the design KRV..-PP has a full complement needle roller set.

The series NUKR and PWKR..-2RS have a full complement cylindrical roller set.

Stud type track rollers without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided stud type track rollers.

Axial guidance of outer ring

In KR, KR..-PP and KRV..-PP, axial guidance is provided by the contact flange and contact washers.

The outer rings of series NUKR and PWKR..-2RS are guided by the rolling elements and ribs.

Anti-corrosion protection

PWKR..-2RS-RR are protected against corrosion by the special coating Corrotect®. For a description of the coating, see page 970.

Sealing

Stud type track rollers are sealed on both sides. Series KR has gap seals, KR..-PP has a three-stage seal comprising plastic axial plain washers with formed seal lips on both sides of the bearing, NUKR has labyrinth seals and PWKR..-2RS has protected lip seals.

The three-stage PP seal is described on page 934.

Lubrication

The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the roller stud. Relubrication can be carried out using Arcanol LOAD150.



Stud type track rollers

Stud type track rollers with eccentric collar

Designs with an eccentric collar can be adjusted by means of a hexagonal socket on the flanged or threaded side of the roller stud. The outer ring outside surface can thus be adjusted against the mating track; as a result, less accurate manufacturing tolerances on the adjacent construction can be tolerated. Furthermore, this gives improved load distribution when using several stud type track rollers and also allows preloaded linear systems to be easily realised.

The highest point of the eccentric collar is indicated on the roller stud side, the eccentricity e is stated in the dimension tables. This is also the location of the radial relubrication holes which should lie in the unloaded zone of the rolling contact.

With cage or full complement cylindrical roller set

KRE..-PP has a cage, NUKRE and PWKRE..-2RS have a full complement cylindrical roller set.

Bearings without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided stud type track rollers.

Axial guidance of outer ring

In the series KRE..-PP, axial guidance is provided by the contact rib and contact washers. The outer rings of series NUKRE and PWKRE..-2RS are axially guided by the rolling elements and ribs.

Sealing

The stud type track rollers are sealed on both sides. KRE..-PP has a three-stage seal comprising plastic axial plain washers with formed lips on both sides of the bearing, NUKRE has labyrinth seals and PWKRE..-2RS has protected lip seals. For a description of the three-stage PP seal, see page 934.

Lubrication

The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the roller stud. Relubrication can be carried out using Arcanol LOAD150.



The eccentric collar covers the radial lubrication hole in the shank. Relubrication must therefore be carried out via the end faces.

Operating temperature

Stud type track rollers can be used at temperatures from –30 °C to +140 °C.
In sealed bearings (suffix 2RS), the temperature range is restricted to between –30 °C and +120 °C.

Note the information on the operating temperature range in Technical Principles, Lubrication.



Stud type track rollers KR...-PP, KRV...-PP and KRE...-PP are suitable for operating temperatures from –30 °C to +100 °C, restricted by the grease and seal material.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
PP	Plastic axial plain washer with formed seal lip on both sides of the stud type track roller, giving a three-stage seal	Standard
RR	Protected against corrosion by Corrotect® special coating	
SK	Hexagonal socket only on the flange-side end face, no relubrication facility	
2RS	Protected lip seal on both sides of the stud type track roller	



Yoke type track rollers Stud type track rollers

Design and safety guidelines Optimised INA profile

The advantages of the optimised INA profile are:

- lower Hertzian pressure under tilting, *Figure 1* and *Figure 2*
- higher basic rating life of the outer ring and mating track, *Figure 3*
- reduced wear between the outer ring outside surface and the mating track, *Figure 4* and *Figure 5*, page 943
- increased rigidity at the outer ring contact, *Figure 6*, page 943.

Hertzian pressure curve

Comparison: Cylindrical profile/profile R = 500 mm with optimised INA profile ($C_{rw}/P_r = 5$), *Figure 1*.

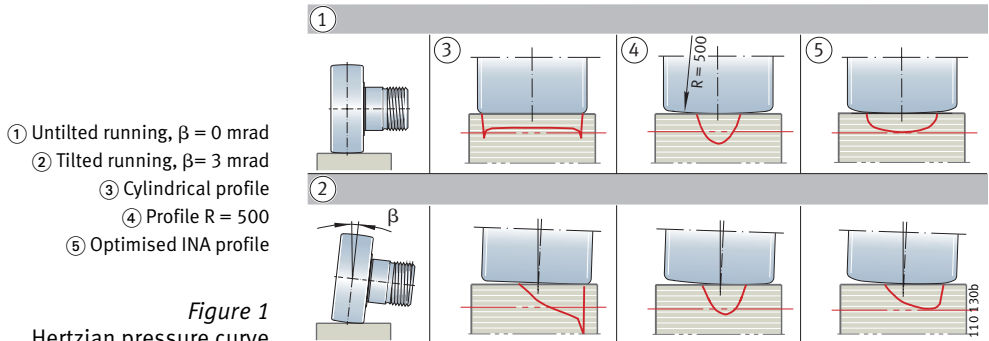


Figure 1

Hertzian pressure curve

Max. Hertzian pressure

Stud type track roller NUKR80, $F_r = 13\,800$ N ($C_{rw}/P_r = 5$), *Figure 2*.

- ① Cylindrical profile
② Profile R = 500
③ Optimised INA profile
 p_H = maximum Hertzian pressure
 β = tilt angle

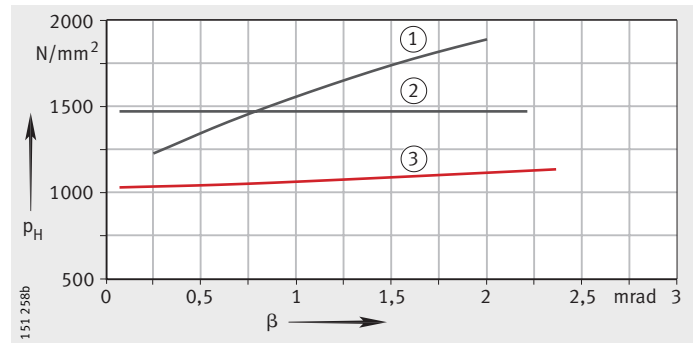


Figure 2

Max. Hertzian pressure

Basic rating life of the mating track

Yoke type track roller NUTR15, mating track made from 42CrMo4V, hardness 350 HV, *Figure 3*.

- ① Crowned outer ring, R = 500
② Optimised INA profile
 L = basic rating life
[millions of overrolling motions]
 F_r = radial load

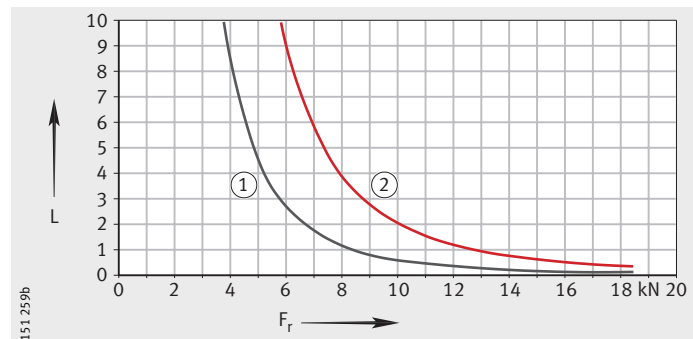


Figure 3

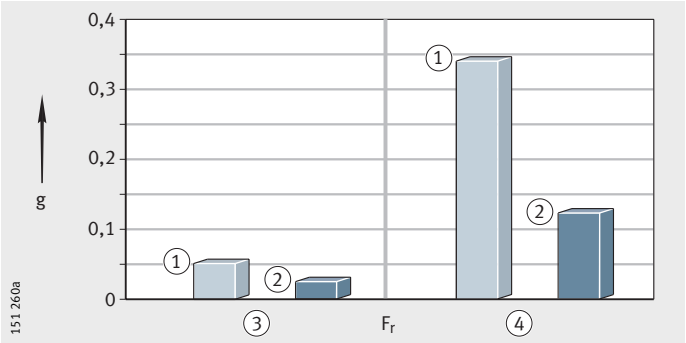
Basic rating life of
the mating track

Wear of mating track

Mating track made from GGG-50.
Mean value from several test runs after 360 000 overrolling motions, Figure 4.

- ① Outer ring with $R = 500$
 - ② Optimised INA profile
 - ③ Low load F_r
 - ④ High load F_r
- g = wear
 F_r = radial load

Figure 4
Wear of mating track

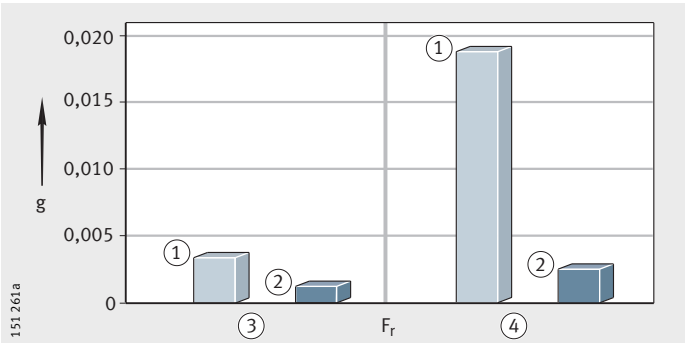


Mating track made from 58CrV4.
Mean value from several test runs after 8 000 000 overrolling motions, Figure 5.



- ① Outer ring with $R = 500$
 - ② Optimised INA profile
 - ③ Low load F_r
 - ④ High load F_r
- g = wear
 F_r = radial load

Figure 5
Wear of mating track

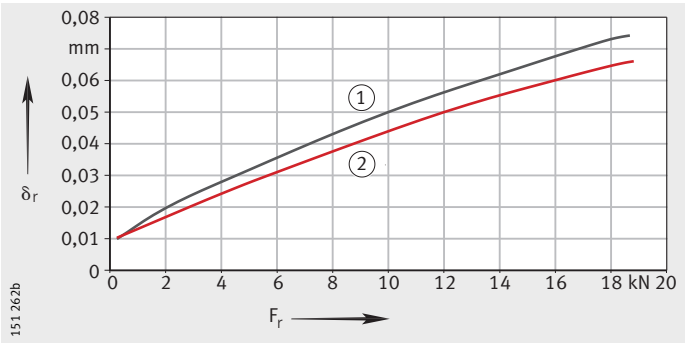


Rigidity in outer ring contact

Yoke type track roller NUTR15.
Radial deflection of the outer ring and rolling element set, Figure 6.

- ① Crowned outer ring, $R = 500$
 - ② Optimised INA profile
- δ_r = radial deflection
 F_r = radial load

Figure 6
Rigidity in outer ring contact



Yoke type track rollers

Stud type track rollers

Installation as yoke or stud type track roller

The thick-walled outer rings can support high radial loads. If these track rollers are used on a flat mating track, the outer rings undergo elastic deformation. Compared to rolling bearings supported in a housing bore, track rollers have the following characteristics:

- modified load distribution in the bearing.
This is taken into consideration by means of the basic load ratings C_{rw} and C_{orw} that are the decisive factors used in life calculation.
- bending stresses in the outer ring.
These are taken into consideration by the permissible radial loads $F_{r\text{ per}}$ and $F_{or\text{ per}}$. The bending stresses must not exceed the permissible strength values of the material.

Permissible radial load under dynamic loading



For rotating bearings under dynamic load, the effective dynamic load rating C_{rw} is used. C_{rw} is used to calculate the basic rating life.

The permissible dynamic radial load $F_{r\text{ per}}$ must not be exceeded. If a value for $F_{r\text{ per}}$ is not given, the effective dynamic load rating C_{rw} is used as a substitute. The radial load acting on the bearing must not exceed this value.

If the basic static load rating C_{orw} is lower than the basic dynamic load rating C_{rw} , then C_{orw} applies.

Permissible radial load under static loading



For bearings under static load, either stationary or with only infrequent rotary motion, the effective static load rating C_{orw} applies. C_{orw} is used to calculate the static load safety factor S_0 .

The permissible static radial load $F_{or\text{ per}}$ must not be exceeded. If a value for $F_{or\text{ per}}$ is not given, the effective static load rating C_{orw} is used as a substitute. The radial load acting on the bearing must not exceed this value.

In addition to the permissible radial load on the bearing, the permissible radial load on the mating track must also be observed, see section Design of mating track, page 958.

Load carrying capacity and life

The methods for calculating the rating life are:

- the basic rating life to DIN ISO 281
- the adjusted basic rating life to DIN ISO 281
- the expanded calculation of the adjusted reference life to DIN ISO 281-4.

These methods are described in the section Load carrying capacity and life, page 40. For yoke type track rollers, stud type track rollers and ball bearing track rollers, the following values must be substituted:

- $C_r, C_{or} = C_{rw}, C_{orw}$
Effective dynamic or static load rating
- $C_{ur} = C_{urw}$
Fatigue limit load as track roller according to the dimension tables.

Other formulae for calculating the rating life, see page 945.

Other formulae for
determining the basic rating life

$$L_s = 0,0314 \cdot D \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

or

$$L_h = 26,18 \cdot \frac{D}{H \cdot n_{osc}} \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

or

$$L_h = 52,36 \cdot \frac{D}{\bar{v}} \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

L_s 10^5 m

Basic rating life in 10^5 m

L_h h

Basic rating life in operating hours

C_{rw} N

Effective dynamic load rating.

C_{rw} is that load of constant magnitude and direction which a sufficiently large group of apparently identical track rollers can endure for a basic rating life of one million revolutions

P_r N

Equivalent dynamic load (radial load)

p –

Life exponent:

$p = 3$ for yoke and stud type track rollers based on balls

$p = 10/3$ for yoke and stud type track rollers based on needle or cylindrical rollers

n min^{-1}

Operating speed

D mm

Outside diameter of track roller

H m

Single stroke length for reciprocating motion

n_{osc} min^{-1}

Number of return strokes per minute

\bar{v} m/min

Mean travel velocity.



Yoke type track rollers

Stud type track rollers

Operating life

The operating life is the life actually achieved by a rolling bearing. This can deviate significantly from the calculated basic rating life. This may be due to wear and/or fatigue as a result of:

- deviating operating conditions
- misalignment between the track roller and mating track
- insufficient or excessive operating clearance
- contamination of the track roller
- inadequate lubrication
- excessive operating temperature
- oscillating bearing motion with very small swivel angles, leading to false brinelling
- wear between the outer ring outside surface and the mating track
- high vibration and false brinelling
- very high shock loads, static overloading
- prior damage during installation.

Due to the variety of installation and operating conditions, it is not possible to precisely predetermine the operating life. The most reliable way of arriving at a close estimate is by comparison with similar applications.

Static load safety factor

The parameter for the static load is the static load safety factor S_0 . It indicates the security against impermissible permanent deformation of the bearing:

$$S_0 = \frac{C_{0r\ w}}{F_{0r}}$$

S_0 – Static load safety factor
 $C_{0r\ w}$ N Effective radial static load rating, see dimension tables
 F_{0r} N Maximum static radial load on track roller.

Track rollers are regarded as highly loaded at a static load safety factor $S_0 < 8$.



Static load safety factors $S_0 < 1$ cause plastic deformation of the rolling elements and the raceways, which can impair smooth running. This is only permissible for bearings with small rotary motions or in secondary applications.
For a static load safety factor $S_0 < 2$, please contact us.

Minimum load

In order to ensure that the outer ring is driven and no slippage occurs or the track roller does not lift from the mating track, track rollers must be subjected to a minimum load in dynamic operation. In general, the minimum load is calculated using the ratio $C_{0r\ w}/F_r < 60$.

Skewed running

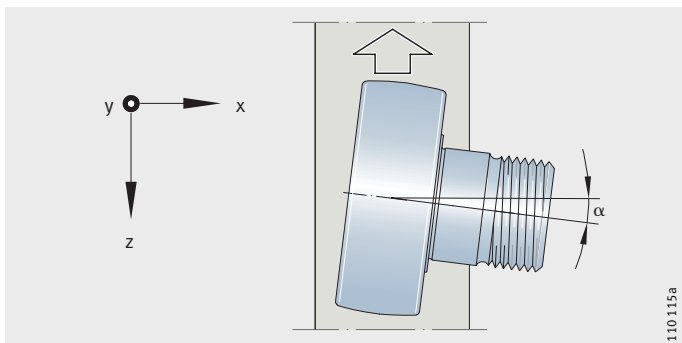
Skewed running leads to additional axial load on the rolling bearing and axial slippage in the rolling contact between the outer ring and mating track, *Figure 7*. Depending on the skewed running angle α and the lubrication, wear can occur in these cases.



A complete loss of adhesive friction between the outer ring and raceway, with correspondingly severe wear, is to be expected with a skewed running angle $\alpha \geq 1,4 \cdot 10^{-4} \cdot p_H$ (°) or $\alpha \geq 2,5 \cdot 10^{-3} \cdot p_H$ (mrad).

α = skewed running angle

Figure 7
Skewed running



Tilting

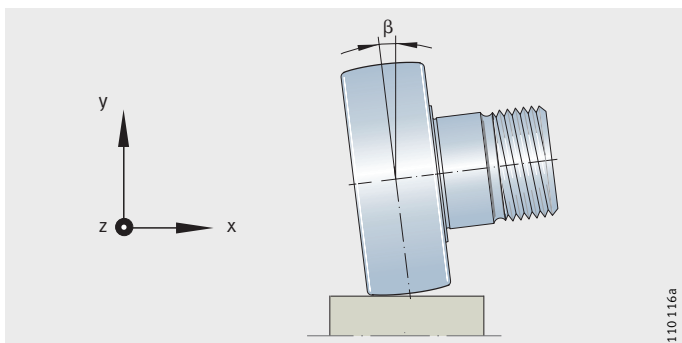
If tilting occurs during running, increased edge stresses occur, especially in track rollers with cylindrical outer rings.

Track rollers with a crowned outer ring are less sensitive to tilting and should therefore be used in preference.

In practice, track rollers with a cylindrical outside surface and a tilting angle of $\beta > 0,1^\circ$ (1,7 mrad) and track rollers with a crowned outside surface and a tilting angle of $\beta > 0,25^\circ$ (4,4 mrad) have proved susceptible to damage, *Figure 8*.

β = tilting angle

Figure 8
Tilting



Yoke type track rollers

Stud type track rollers

Speeds	<p>The maximum permissible speed for track rollers is essentially determined by the permissible operating temperature of the rolling bearings.</p> <p>The temperature thus depends on the type of bearing, the load, the lubrication conditions and the cooling conditions.</p>																
Speed during continuous operation	<p>The speeds n_{DG} in the dimension tables are guide values. They were determined for:</p> <ul style="list-style-type: none"> ■ grease lubrication ■ loads during continuous operation of $< 0,05 \cdot C_{0rw}$ ■ skewed running angles of $\alpha < 0,03^\circ$ ($< 0,5 \text{ mrad}$) ■ an ambient temperature of $+20 \text{ }^\circ\text{C}$ ■ outer ring temperatures of $+70 \text{ }^\circ\text{C}$ ■ lubricated mating tracks and ■ no external axial load. <p>The speeds must be reduced under the following conditions:</p> <ul style="list-style-type: none"> ■ loads $> 0,05 \cdot C_{0rw}$ ■ additional axial forces (skewed running) ■ insufficient heat dissipation. <p>Higher speeds can be achieved with intermittent operation and oil impulse lubrication.</p>																
Speed with lip seals	<p>The speed of track rollers with lip seals is additionally restricted by the permissible sliding speed at the seal lip.</p>																
Frictional torque	<p>The frictional torque M_R of a track roller is dependent on many influencing factors such as load, speed and track roller type, as well as the lubrication conditions and seal friction. Due to the wide range of these influencing factors, the frictional torque can only be calculated in approximate terms.</p> <p>For track rollers without contact seals, the frictional torque can be calculated under normal operating conditions and moderate speed range using the following formula:</p> <div> $M_R = f \cdot F_r \cdot \frac{d_M}{2}$ </div> <table> <tr> <td>M_R</td><td>Nmm</td></tr> <tr> <td>Frictional torque of track roller</td><td></td></tr> <tr> <td>f</td><td>–</td></tr> <tr> <td>Coefficient of friction, see table, page 949</td><td></td></tr> <tr> <td>F_r</td><td>N</td></tr> <tr> <td>Radial load</td><td></td></tr> <tr> <td>d_M</td><td>mm</td></tr> <tr> <td>Mean bearing diameter of track roller $(d + D)/2$.</td><td></td></tr> </table>	M_R	Nmm	Frictional torque of track roller		f	–	Coefficient of friction, see table, page 949		F_r	N	Radial load		d_M	mm	Mean bearing diameter of track roller $(d + D)/2$.	
M_R	Nmm																
Frictional torque of track roller																	
f	–																
Coefficient of friction, see table, page 949																	
F_r	N																
Radial load																	
d_M	mm																
Mean bearing diameter of track roller $(d + D)/2$.																	



The values in the table Coefficient of friction f are valid for track rollers under radial load and without seals.

If sealed track rollers are used, higher values must be expected.

Additional axial forces, such as those occurring under large skewed running angles, can lead to a substantial increase in the values, especially in the case of track rollers based on needle rollers.

Track rollers based on balls can support axial loads without a significant change in friction.

Coefficient of friction f

Type of track roller	Factor f
Ball bearing, single row	0,0015 to 0,002
Ball bearing, double row	0,002 to 0,003
Cylindrical roller bearing, full complement	0,002 to 0,003
Needle roller bearing, with cage	0,003 to 0,004
Needle roller bearing, full complement	0,005 to 0,007

Displacement resistance

When a track roller rolls on a track, it must overcome not only the friction within the bearing but also the rolling friction between the outer ring and the track.

The displacement resistance F_v is determined according to the following formula:

$$F_v = \frac{2 \cdot (f_R \cdot F_r + M_R)}{D}$$

F_v Displacement resistance

f_R Coefficient of rolling friction for tracks made from hardened steel:

$f_R = 0,05$ mm

F_r Radial load

M_R Frictional torque of track roller

D Outside diameter of track roller.



Yoke type track rollers

Stud type track rollers

Two contact zones in track rollers

For track rollers, two contact zones must be lubricated and considered separately:

- the rolling elements and the rolling element raceway
- the outside surface of the track roller and the mating track.

The contact zone between the rolling elements and the rolling element raceway is covered in the section Technical Principles, Lubrication.

Lubrication of the bearing

Yoke and stud type track rollers based on ball bearings are greased using a lithium soap grease with a mineral oil base to GA13.

For yoke and stud type track rollers based on needle and cylindrical rollers, a lithium complex soap grease with a mineral oil base and EP additives to GA08 is used. Greases for initial greasing are listed in the section Lubrication, page 76.

Arcanol rolling bearing greases for relubrication

Arcanol grease	Designation to DIN 51 825	Type of grease	Track roller
LOAD150	KP2N-20	Lithium soap grease with mineral oil base	Yoke and stud type track rollers based on rollers
LOAD220	KP2N-20	Lithium-calcium soap grease with mineral oil base	Yoke and stud type track rollers based on rollers
MULTI3	KP3K-30	Lithium soap grease with mineral oil base	Yoke and stud type track rollers based on balls

Lubrication of the mating track

For lubrication of the mating track, all lubricants suitable for rolling bearing lubrication may be used. However, there are applications in which the mating track must not be lubricated.



If the contact point cannot be lubricated, wear must be expected, especially under high loads and at high speeds.

Oil lubrication

For oil lubrication, oils of type CLP to DIN 51 517 are recommended.

Grease lubrication

For grease lubrication, lithium soap greases to DIN 51 825 should be used. Relubrication intervals can only be determined under operating conditions.

Relubrication must be carried out at the latest when fretting corrosion first occurs; it can be identified by a reddish discolouration of the mating track or the outer ring.

Solid lubricants, anti-friction coatings

These substances are suitable for lubrication. At high traverse or rotational speeds, however, they provide effective lubrication for a significantly shorter period than oil or grease lubrication.

Central lubrication adapter for stud type track rollers

If a central lubrication system is to be used, a patented central lubrication adapter can be used to connect the standard roller stud of stud type track rollers with hexagonal sockets on both sides, *Figure 9*. This comprises a connection adapter with a hexagonal end and a rapid-fit connection cartridge.

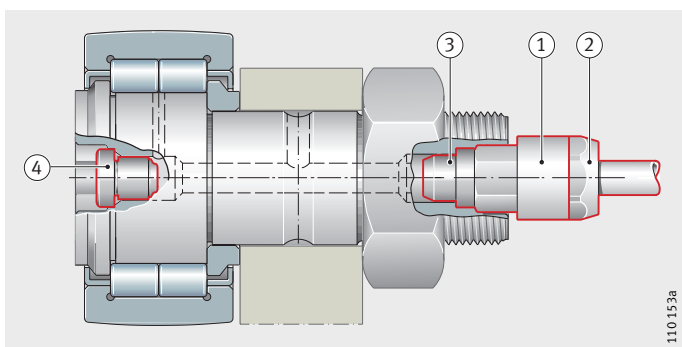
The connection adapter is connected to the roller stud on one end of the stud type track roller by replacing the funnel type lubrication nipple with the fitting cylinder. The hexagonal end prevents rotation of the adapter. The other end of the stud type track roller is closed off by means of the funnel type lubrication nipple, *Figure 9*.

The connection adapter has a M10×1 internal thread. This is used for screw mounting and sealing of the rapid-fit connection cartridge. The cartridge gives firm retention and sealing of the plastic tube. It is therefore no longer necessary to screw the pipe and adapter on to each other.

For dimensions of the adapters, see table and *Figure 10*, page 952.

- ① Connection adapter with M10×1 internal thread
- ② Rapid-fit connection cartridge
- ③ Fitting cylinder
- ④ Funnel type lubrication nipple

Figure 9
Central lubrication adapter
and funnel type lubrication nipple



Yoke type track rollers

Stud type track rollers

Dimensions of adapter

Central lubrication adapter Designation	W	L	l ₁ max.	l ₂	l ₃ approx.	For polyamide pipe DIN 73 378 d ₁ ×s _{nom} ¹⁾
AP8	8	27	16	22	4	4×0,75
AP10	10	27	15	22	5	4×0,75
AP14	14	25	8	20	6	4×0,75

1) Hard PA pipes should preferably be used.
 Note the operating limits according to DIN 73 378 and manufacturer's guidance.
 Maximum excess pressure for pipes made from PA 11/12 at +23 °C:
 31 bar to 62 bar.
 Maximum excess pressure when using other screw-in connectors: 80 bar.

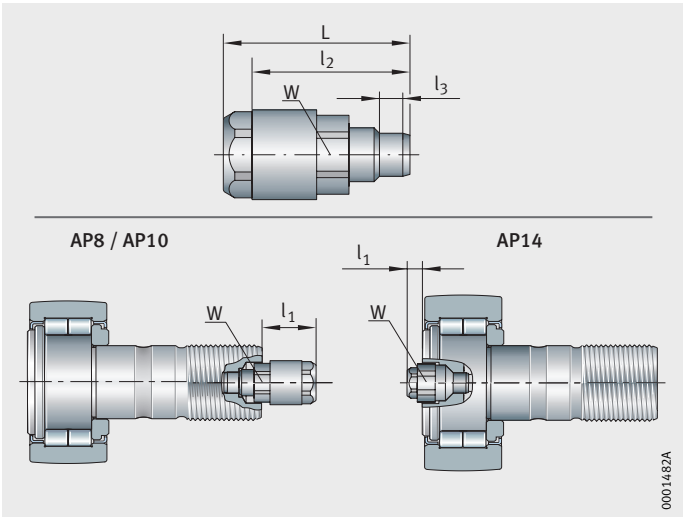


Figure 10
 Dimensions of
 central lubrication adapters

**Simplified calculation of
relubrication intervals**

The table Allocation to stud type track rollers shows the relubrication quantity for central lubrication using flowable grease and its conversion to the number of relubrication impulses for conventional metering nipple sizes.

The data are valid for a lithium soap flowable grease with EP additives and mineral oil base of classes ISO-VG 100 to ISO-VG 220 and NLGI classes 00 or 000.

**Allocation to
stud type track rollers**

Series ¹⁾	Outside diameter D mm	Central lubrication adapter Designation	Relubrication quantity g ²⁾	Relubrication impulses for metering nipple of size	
				30 mm ³	50 mm ³
NUKR, NUKRE	35 and 40	AP8	1,1	40	24
	47 and 52	AP10	2,4	89	53
	62 to 90	AP14	7,3	271	163
KR, KRE	35 and 40	AP8	1,2	44	27
	47 and 52	AP10	1,6	60	36
	62 to 90	AP14	6	222	133
KRV, KRVE	35 and 40	AP8	0,7	26	16
	47 and 52	AP10	1	37	22
	62 to 90	AP14	3,2	120	72

- ¹⁾ For stud type track rollers with hexagonal socket on both sides.
- ²⁾ Relubrication quantity and relubrication intervals for central lubrication using flowable grease for the majority of applications.
The quantity required to fill the feed lines must also be taken into consideration.



Yoke type track rollers

Stud type track rollers

Relubrication periods

The approximate relubrication periods for single shift operation and the majority of load cases are shown in the table Relubrication period for calculating the relubrication intervals. The data are valid for single shift operation; the relubrication quantity and relubrication intervals are valid for the majority of applications. They are based on approximate calculation of the relubrication interval t_{FR} ; relubrication interval: see section Lubrication, page 76. Within these periods, the number of relubrication impulses derived from the table Allocation to stud type track rollers, page 953, should be evenly distributed.

Relubrication period for calculating the relubrication intervals

Load ratio C_{0rw}/P_r	Maximum operating speed n_{max} in % of n_{DG}			
	10	25	50	100
$5 > C_{0rw}/P_r \geq 3$	$1/2$ yearly	–	–	–
$10 > C_{0rw}/P_r \geq 5$	yearly	4 months	monthly	–
$C_{0rw}/P_r \geq 10$	yearly	8 months	2 months	14 days

Periods in single shift operation

Months	Weeks	Working days	Working hours
$1/2$	2	10	80
1	4	20	160
2	8	40	320
4	16	80	640
6	24	120	960
8	32	160	1 280
12	48	240	1 920

Fitting of central lubrication adapter



The stud type track roller must be mounted before fitting the adapter. The unused relubrication hole in the roller stud must be closed off using the funnel type lubrication nipple supplied.

Only the lubrication nipples supplied should be used.

The central lubrication adapter should preferably be pressed in using a manual lever press under low, uniform pressure or carefully driven into the unused hexagonal socket of the roller stud by means of light blows with a plastic hammer; pay attention to the press-in depth l_3 and the position of the hexagon, *Figure 10* and table Dimensions of adapter, page 952.

The plastic pipe must be cut off straight across and inserted into the cartridge until it stops.

Only use polyamide pipe to DIN 73 378. Check the seating of the pipe. Note maximum pressures, maximum temperatures and minimum bending radius. The maximum pipe length up to the distributor is 1 m.

**Adjacent construction
for yoke type track rollers**

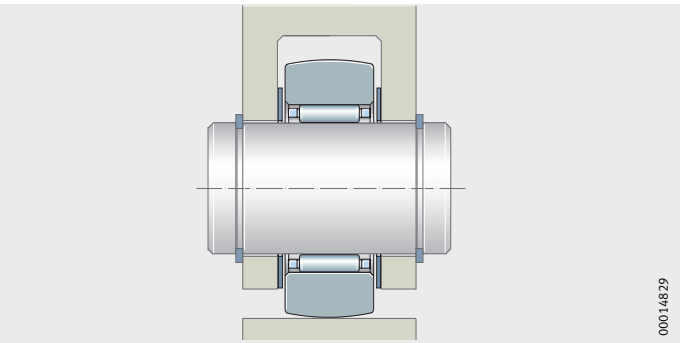
For yoke type track rollers without an inner ring, the rolling element raceway on the shaft or stud must be hardened and ground, see table.
The surface hardness must be 670 HV + 170 HV and the hardening depth CHD or SHD must be sufficiently large.

**Tolerances and surface
for the shaft or stud raceway**

Diameter tolerance of shafts or studs		Roughness	Roundness	Parallelism
Without inner ring	With inner ring	max.	max.	max.
k5	g6 (with point load)	R _a 0,4 (R _z 2)	25% of diameter tolerance	50% of diameter tolerance

**Location of yoke type track rollers
without axial guidance**

For yoke type track rollers without axial guidance, the outer ring and needle roller and cage assembly must be laterally guided, *Figure 11*.
The axial contact surfaces for the outer rings must be precision machined (R_a2 recommended), wear-resistant and lubricated.
Yoke type track rollers without axial guidance are not self-retaining. The outer ring and the needle roller and cage assembly are matched to each other and must not be interchanged during fitting with components from other bearings of the same size.
The inner rings are matched to the enveloping circle tolerance F6 and can be interchanged within their accuracy class (used in different combinations).



RSTO

Figure 11
Lateral guidance of outer ring and
needle roller and cage assembly

00014629

Yoke type track rollers

Stud type track rollers

Location of yoke type track rollers with axial guidance

Yoke type track rollers with axial guidance must be axially clamped in place.

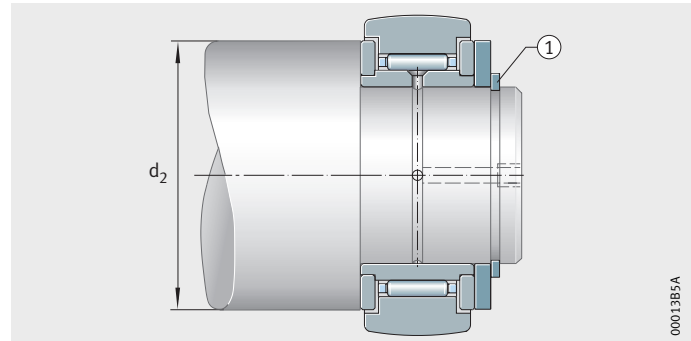
The thrust washers must be axially supported if axial loads occur. The dimension d_2 in the dimension tables must be observed, *Figure 12*.

Yoke type track rollers NATR and NATV can be located using conventional fasteners such as snap rings, *Figure 12*.

NATR

① Snap ring
 d_2 = abutment diameter

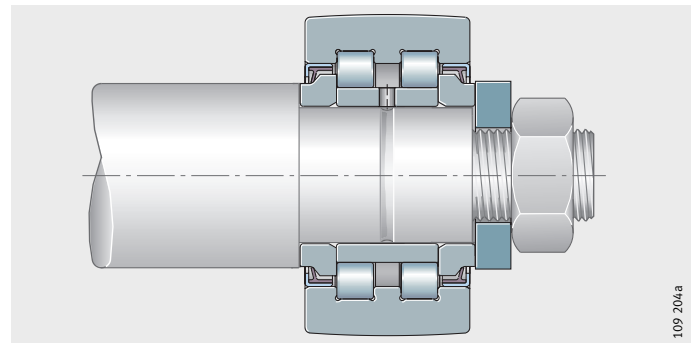
Figure 12
Location by snap ring



For NNTR...2ZL, NUTR, PWTR...2RS, the inner ring and thrust rib must be axially located, *Figure 13*.

PWTR...2RS

Figure 13
Clamping of
inner rings and thrust washers



Adjacent construction for stud type track rollers

The bore tolerance H7 produces a clearance fit since the stud tolerance is h7 without an eccentric collar and h9 with an eccentric collar.

The locating surfaces for stud type track rollers must be flat, perpendicular and of sufficient height. The strength of the nut locating surface must be sufficiently high. The dimension must not be less than the dimension d_2 in the dimension tables.

The entry chamfer on the locating bore must not be more than $0,5 \times 45^\circ$.

Axial location

Stud type track rollers must be axially secured using a hexagonal nut. The nuts of grade 8 to ISO 4 032 (M6, M8), ISO 8 673, are not included in the delivery and must be ordered separately.

If heavy vibration occurs, the stud type track rollers can be located using self-locking nuts to DIN 985 or special locking washers.



For self-locking nuts, a higher tightening torque must be observed; the advice given by the nut manufacturer must be followed.

Position of lubrication hole

The position of the radial lubrication hole is indicated on the flanged side of the roller stud, *Figure 14*. This must not be positioned in the loaded zone.



NUKR

① Marking

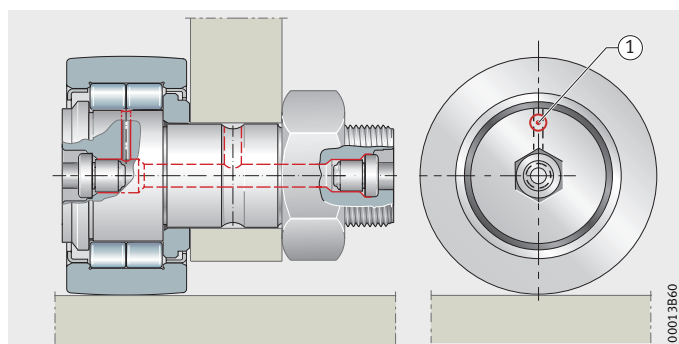


Figure 14
Position of lubrication hole

Yoke type track rollers

Stud type track rollers

Design of mating track

In the design of the mating track (material and strength, heat treatment, surface), the Hertzian pressure p_H must be taken into consideration. This is dependent on the load, the contact geometry (point contact or line contact) and the modulus of elasticity of the materials.

Nomogram

The Hertzian pressure can be read from the nomogram, *Figure 16*, page 959, or calculated.

The nomogram is valid for mating tracks made from steel.

For other materials, the correction factor k must be taken into consideration, see table Correction factor k , page 960.

Other conditions:

- Point contact
- Radius of curvature $R = 500$; for $R > 500$, see page 960
- Mating track flat in the direction of the track roller axis
- Signs according to *Figure 15*.

Example

- Stud type track roller NUKR35 with optimised INA profile, $D = 35$ mm
- Outer ring width $C = 18$ mm
- Radial load $F_r = 2\,500$ N
- Cam plate, radius $r_L = 80$ mm.

Curvature sum

$$\frac{1}{r_L} + \frac{2}{D} = \frac{1}{80} + \frac{2}{35} = 0,07 \text{ mm}^{-1}$$

$$p_{H500} = 1\,250 \text{ N/mm}^2$$

$$p_{H\text{opt. INA profile}} \approx 1\,250 \text{ N/mm}^2 \cdot k_{pH}$$

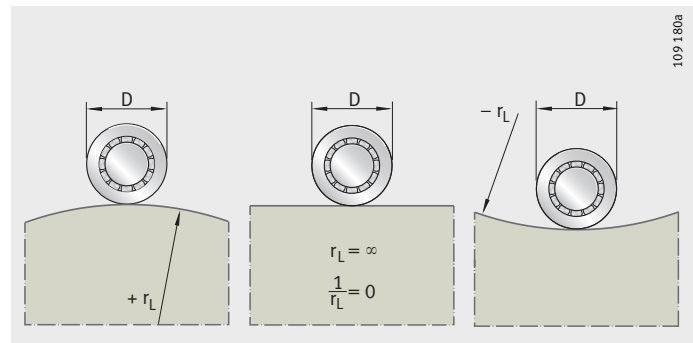
$$= 1\,250 \text{ N/mm}^2 \cdot 0,85$$

$$= 1\,063 \text{ N/mm}^2$$

(1 025 N/mm² from calculation program BEARINX[®]), k_{pH} see page 960.

D = outside diameter of track roller
 r_L = raceway radius

Figure 15
 Raceway radii and signs



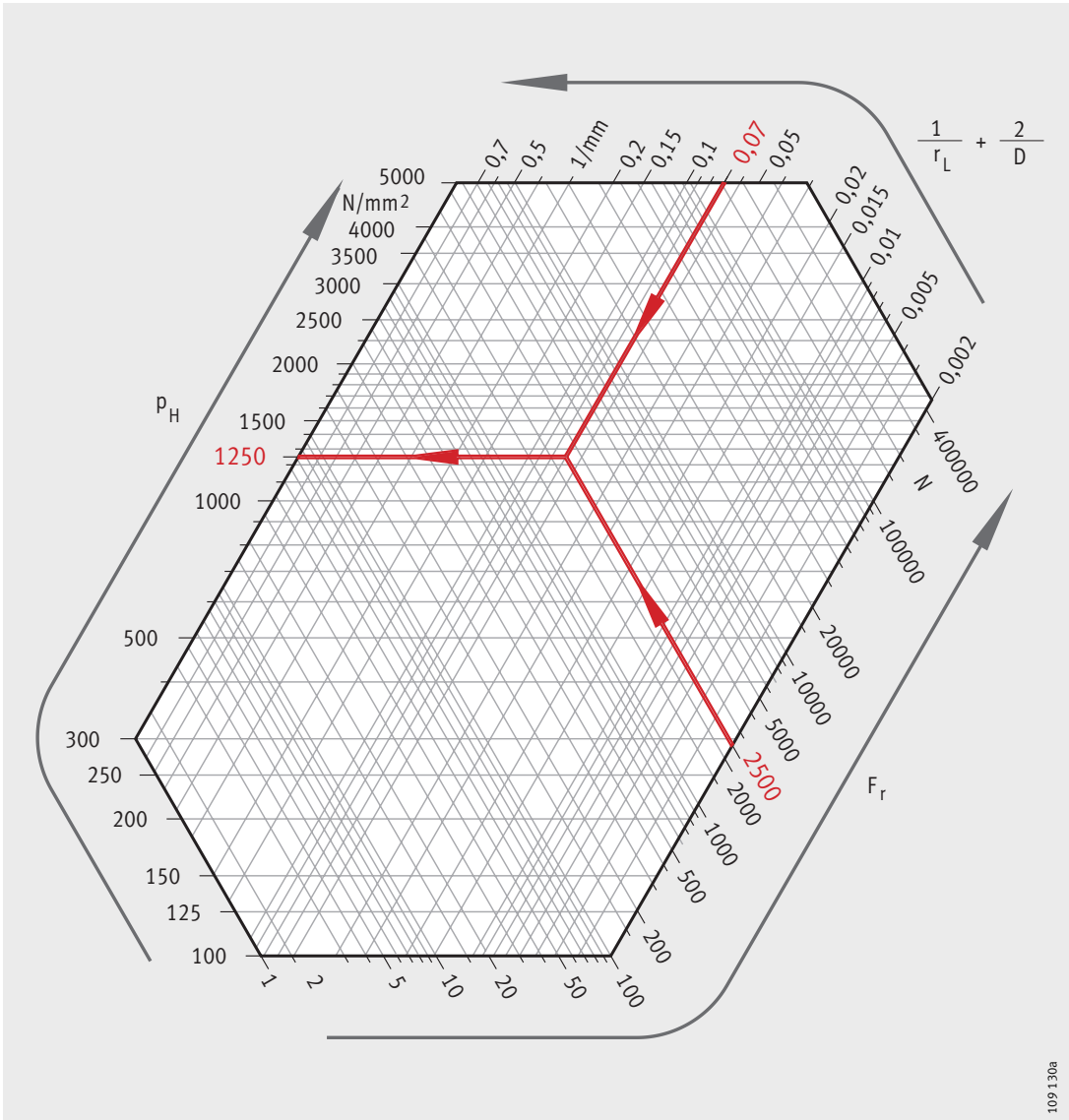


Figure 16
 Nomogram for
 determining the Hertzian pressure;
 calculation example (red)

Yoke type track rollers

Stud type track rollers

Track rollers with optimised INA profile

For the optimised INA profile, the following calculation provides sufficiently precise values, k_{pH} see table:

$$P_{Hopt. INA profile} \approx k_{pH} \cdot P_{H500}$$

Pressure factor k_{pH}

Outer ring width C mm	Pressure factor k_{pH}
10 incl. 15	1
over 15 incl. 20	0,85
over 20 incl. 30	0,83
over 30 incl. 35	0,8

Radius of curvature $R > 500$

For $R > 500$ mm, the following applies:

$$P_{HR} = P_{H500} \cdot \left(\frac{500}{R} \right)^{0,185}$$

Materials for mating track

The mating track is subjected to high load during overrolling. This produces high Hertzian contact pressures. The strength and surface hardness of the material must be matched to this load. For raceways subjected to high loads, through hardened steels, case hardened steels and steels for flame or induction hardening are recommended. For raceways subjected to low loads, construction steels and cast steel or cast iron materials can be used, see table.

$$p_H = k \cdot p_H (\text{steel/steel})$$

Correction factor k

Material	Material no.	Correction factor for mating track with	
		Point contact	Line contact
GG-20	0.6020	0,74	0,8
GG-30	0.6030	0,81	0,85
GG-40	–	0,85	0,88
GGG-40	0.7040	0,92	0,94
GGG-60	0.7060	0,94	0,96
GGG-80	0.7080	0,96	0,97

Guide values for permissible Hertzian pressure

The table Materials and guide values for permissible Hertzian pressure gives a selection of materials with the associated values. The values were determined on steel test specimens; loadings of 10⁷ were achieved.

On a similar basis to the calculation of the load carrying capacity of rolling bearings, this gives:

- p_{H stat} for predominantly static load
- p_{H dyn} for predominantly dynamic load.

Materials and guide values for permissible Hertzian pressure

Material		Material no.	Hertzian pressure		Proof stress of material R _{p0.2} N/mm ²
			p _{H stat} N/mm ²	p _{H dyn} N/mm ²	
Cast iron	GG-15	0.6015	850	340	120
	GG-20	0.6020	1 050	420	150
	GG-25	0.6025	1 200	480	190
	GG-30	0.6030	1 350	540	220
	GG-35	0.6035	1 450	580	250
	GG-40	–	1 500	600	280
Spheroidal graphite cast iron	GGG-40	0.7040	1 000	490	250
	GGG-50	0.7050	1 150	560	320
	GGG-60	0.7060	1 400	680	380
	GGG-70	0.7070	1 550	750	440
	GGG-80	0.7080	1 650	800	500
Cast steel	GS-38	1.0420	780	380	200
	GS-45	1.0446	920	450	230
	GS-52	1.0552	1 050	510	260
	GS-60	1.0558	1 250	600	300
	GS-62	–	1 300	630	350
	GS-70	–	1 450	700	420
Construction steel	St 37-2	1.0037	690	340	235
	St 44-2	1.0044	860	420	275
	St 52-3	1.0570	980	480	355
Quenched and tempered steel	C 45 V	1.0503	1 400	670	500
	Cf 53 V	1.1213	1 450	710	520
	Cf 56 V	–	1 550	760	550
	C 60 V	1.0601	1 600	780	580
	46 Cr 2 V	1.7006	1 750	850	650
	42 CrMo 4 V	1.7225	2 000	980	900
	50 CrV 4 V	1.8159	2 000	980	900
Hardened steel	100 Cr 6 H	1.3505	4 000	1 500	1 900
	16 MnCr 5 E	1.7131	4 000	1 500	770
	Cf 53 Hl	1.1213	4 000	1 500	730
	Cf 56 Hl	–	4 000	1 500	760



Yoke type track rollers

Stud type track rollers

Hardenable materials

The following materials with a purity level corresponding to that of alloyed construction steels may be used:

- through hardening steels to ISO 683-17 such as 100Cr6. In special cases, surface hardening is possible.
- case hardening steels to ISO 683-17 such as 17MnCr5 or EN 10 084 such as 16MnCr5. In addition to the hardenability, the core strength must also be taken into consideration. For case hardening, a fine grained hardening structure and a case hardening depth CHD according to the formula below is necessary.
- steels for flame or induction hardening to ISO 683-17 such as Cf54 or DIN 17 212 such as Cf53. For flame or induction hardening, only the parts of the machine component used as raceways must be hardened. The material should be quenched and tempered before hardening. The surface hardening depth SHD is determined using the formula below.

Heat treatment of the mating track

The following apply for hardened mating tracks:

- a surface hardness of 670 HV + 170 HV
- CHD, SHD according to the formulae, page 962
 - in accordance with DIN 50 190, the depth of the hardened surface zone at which there is still a hardness of 550 HV
- hardness curves according to *Figure 17* and *Figure 18*, page 963
- a hardening depth of $\geq 0,3$ mm.

The formulae are based on the hardness curves normally achieved with skilled heat treatment.

Case hardening:

$$CHD \geq 2,73 \cdot 10^{-5} \cdot \frac{p_H}{\left(\frac{1}{r_L} + \frac{2}{D} \right)}$$

Flame and induction hardening:

$$SHD \geq 10^{-5} \cdot \frac{\left(4,4 \cdot \frac{p_H^2}{R_{p0,2}} - 3,5 \cdot p_H \right)}{\left(\frac{1}{r_L} + \frac{2}{D} \right)}$$

p_H N/mm²

Max. Hertzian pressure

CHD mm

Case hardening depth

SHD mm

Surface hardening depth

D mm

Outside diameter of track roller

$R_{p0,2}$ N/mm²

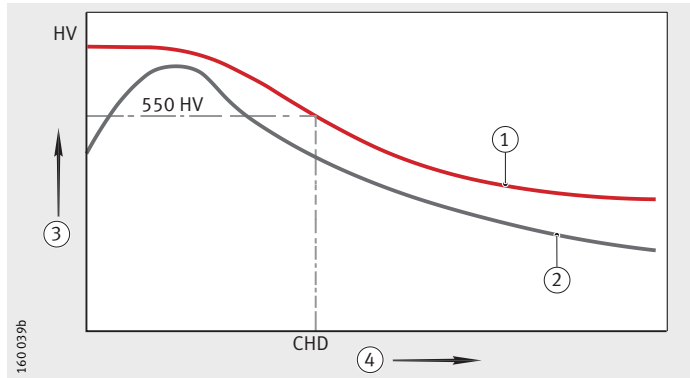
Proof stress of mating track material, see table, page 961

r_L mm

Radius of mating track – the raceway must be flat in the direction of the track roller axis, *Figure 15*, page 958.

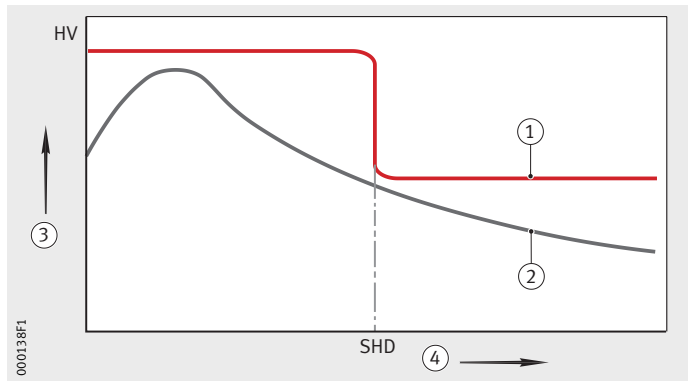
- ① Case hardening
 - ② Required hardness
 - ③ Hardness
 - ④ Distance from surface
- CHD = case hardening depth with hardness 550 HV

Figure 17
Case hardening depth CHD, hardness curve



- ① Flame or induction hardening
 - ② Required hardness
 - ③ Hardness
 - ④ Distance from surface
- SHD = surface hardening depth

Figure 18
Surface hardening depth SHD, hardness curve



INA guideways as mating tracks

These guideways are ready-to-fit units from the INA linear range. They are to the appropriate grade Q20 for yoke and stud type track rollers and correspond to the dimensions of standard profiles:

- parallelism 20 $\mu\text{m}/\text{m}$
- surface quality $R_a 0,8$
- hardness 58 HRC to 62 HRC
- angular misalignment between the raceways max. 1 mrad (1 $\mu\text{m}/\text{mm}$)
- deviations of the guideway cross-section +0,015/+0,05
- length tolerance of the individual guideway +1 mm/m.

Enquiries

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Yoke type track rollers

Stud type track rollers

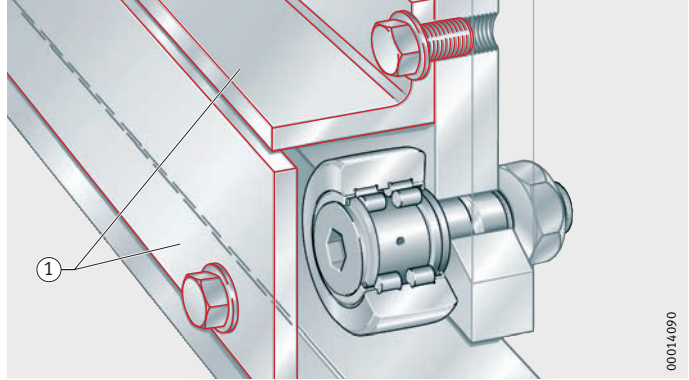
Protection of mating track



The mating track must be protected against contamination. Where necessary, covers and wipers preferably made from felt should be placed ahead of the track roller, *Figure 19*.

① Covers

Figure 19
Protection of mating track
against contamination



Fitting



Track rollers are precision machine elements. These products must be very carefully handled before and during fitting. Their trouble-free operation depends largely on the care taken during fitting.

The products must be protected against dust, contaminants and moisture. Contaminants have a detrimental influence on the running and operating life of rolling bearings.

Do not cool the bearings excessively. Moisture due to condensation can lead to corrosion in the bearings and bearing seats.

Yoke type track rollers RSTO and STO are not self-retaining. The outer ring and the needle roller and cage assembly are matched to each other and must not be interchanged during fitting with components from other bearings of the same size.

The assembly area must be kept clean and free from dust.

Check the seat of the axis for dimensional and geometrical accuracy and cleanliness.

Lightly oil the bearing ring seating surfaces or rub with solid lubricant.

After fitting, the bearings must be supplied with lubricant.

Finally, check the correct functioning of the bearing arrangement.

Fitting tools

Depending on the application, the following are suitable:

- induction heaters;
note the manufacturer's guidance on grease and seals
- heating cupboard; heating up to +80 °C
- mechanical or hydraulic presses;
use fitting sleeves that cover the whole circumference of the bearing ring end faces
- hammer and fitting sleeves;
blows should only be applied concentrically to the sleeve.



Fitting forces must never be directed through the rolling elements. Direct blows on the bearing rings must be avoided. Ensure that the seals are not damaged during fitting.

Guidelines for dismantling

Dismantling should be taken into consideration in the original design of the bearing position.

If the bearing is to be reused:

- do not apply direct blows to the bearing rings
- do not apply dismantling forces through the rolling elements
- carefully clean the bearings after dismantling
- do not use a concentrated or "hard" flame.



Yoke type track rollers

Stud type track rollers

Fitting and dismantling of yoke type track rollers (needle and cylindrical roller types)

Lubrication hole

If the tolerances are unfavourable, the yoke type track roller should be pressed onto the shaft or stud using a press, *Figure 20*. The inner ring must be fitted such that the pressing-in force is distributed uniformly on the end face of the inner ring.

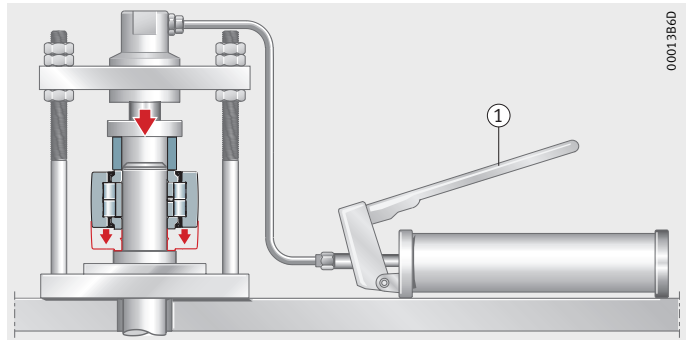
The bearings should be fitted such that the lubrication holes are positioned in the unloaded zone. For yoke type track rollers PWTR and NNTR, there is no need for defined positioning of the lubrication hole.

NUTR

① Fitting press

Figure 20
Fitting of yoke type track roller using a fitting press

Axial location

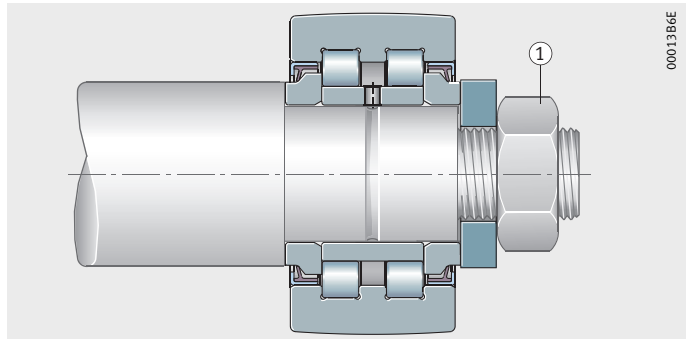


Yoke type track rollers NUTR, PWTR and NNTR must be axially clamped in place, *Figure 21*.

PWTR..-2RS

① Hexagon nut

Figure 21
Axial location



**Fitting and dismantling of
stud type track rollers
(needle and cylindrical roller types)**



Stud type track rollers should be fitted using a press if possible (similar to *Figure 20*, page 966).

Blows on the flange of the roller stud must be avoided.
The position of the radial lubrication hole is indicated on the flanged side of the roller stud. It must not be positioned in the loaded zone, *Figure 14*, page 957.

**Drive fit lubrication nipples for
stud type track rollers**



Stud type track rollers are supplied with loose drive fit lubrication nipples that must be pressed in correctly before fitting the bearings, *Figure 22*.

For lubrication of stud type track rollers using the central lubrication adapter, *Figure 24*, page 969.

Only the lubrication nipples supplied may be used, see table.
If relubrication is to be carried out via the locating bore, the axial lubrication holes in the stud type track roller must be closed off using the lubrication nipples before fitting, *Figure 22*.

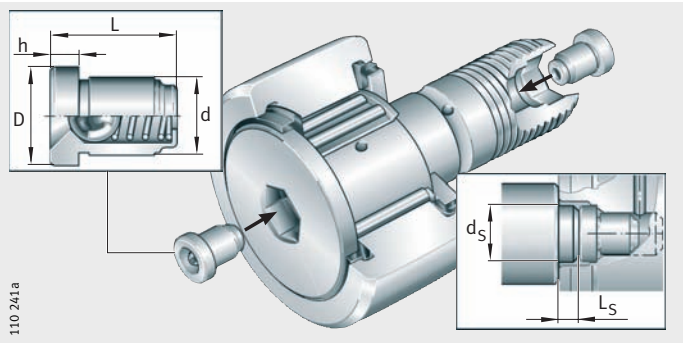


Figure 22
Stud type track roller with
drive fit lubrication nipple and
dimensions for pressing mandrel

Drive fit lubrication nipples

Lubrication nipple	Dimensions in mm						Suitable for outside diameter D
	D	d	L	h	d _s ±0,1	L _s	
NIPA1	6	4	6	1,5 ¹⁾	–	–	16 and 19
NIPA1×4,5	4,7	4	4,5	1	4,5	5	22 to 32
NIPA2×7,5	7,5	6	7,5	2	7,5	6	35 to 52
NIPA3×9,5	10	8	9,5	3	10	9	62 to 90

¹⁾ Projection of lubrication nipple, see dimension tables.

Yoke type track rollers

Stud type track rollers

Axial location of stud type track rollers



Stud type track rollers must be axially secured using a hexagon nut. The slot or hexagonal socket on the ends of the roller stud can be used to hold the bearing by means of a key while tightening the fixing nut and to adjust the eccentric collar, *Figure 23*.

If heavy vibration occurs, self-locking nuts to DIN 985 or special locking washers can be used.

The tightening torque for the fixing nuts stated in the dimension tables must be observed. It is only in this way that the permissible radial load can be ensured.

If this cannot be adhered to, an interference fit is required.

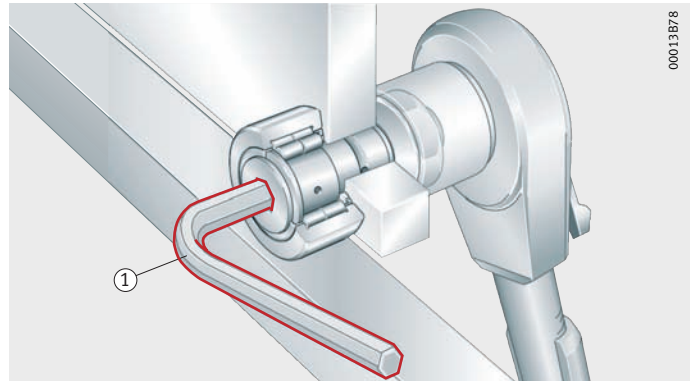
For self-locking nuts, the higher tightening torque must be observed; the advice given by the nut manufacturer must be followed.

① Allen key

Figure 23
Holding the bearing using an
Allen key

Stud type track rollers with eccentric collar

The highest point on the eccentric collar is indicated on the roller stud side, *Figure 14*, page 957.



Initial operation and relubrication

Stud type track rollers have a lubrication hole for relubrication:

- on the flange side of the roller stud
- on the thread-side end face, from an outside diameter of 22 mm
- on the shank of the roller stud from an outside diameter of 30 mm with an additional lubrication groove.



Stud type track rollers with an eccentric collar cannot be relubricated via the stud. The eccentric collar covers the lubrication hole.

For lubrication, only grease guns with needle point nozzles may be used that have an opening angle $\leq 60^\circ$, *Figure 24*.

Before initial operation, the lubrication holes and feed pipes must be filled with grease in order to ensure protection against corrosion; lubrication can be carried out at the same time.

Lubrication will be more difficult if a rolling element is located over the radial lubrication hole. Relubrication should therefore be carried out with the bearing still warm from operation and rotating if safe to do so, before the bearing comes to rest if safe to do so and before extended breaks in operation.

The grease used for relubrication must be the same as that used for initial greasing. If this is not possible, the miscibility and compatibility of the greases should be checked, see page 950.

Relubrication should continue until a fresh collar of grease appears at the seal gaps. The old grease must be able to leave the bearing unhindered.



① Needle point nozzle, opening angle $\leq 60^\circ$

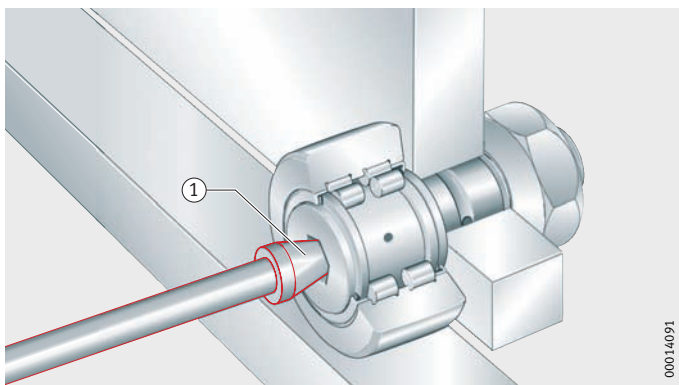


Figure 24
Relubrication using a grease gun

00014091

Yoke type track rollers

Stud type track rollers

Anti-corrosion protection by Corrotect® coating

Track rollers are often subjected to aggressive media. In such applications, corrosion protection is therefore a decisive factor in achieving a long operating life of the bearings.

In principle, corrosion-resistant steels may be used for track rollers. In many applications, however, the special coating Corrotect® is more cost-effective. For a comprehensive description of the coating, see section Anti-corrosion protection, page 119.

Corrotect®

Corrotect® is an extremely thin, electroplated surface coating with a thickness of 0,5 µm to 3 µm.

The coating is effective against moisture, contaminated water, salt spray and weakly alkaline and weakly acidic cleaning agents.

Yoke type track rollers PWTR and stud type track rollers PWKR with the suffix RR have the CR(VI)-free Corrotect® coating as standard. Other yoke and stud type track rollers with Corrotect® coating are treated as special designs.

Figure 25 shows an uncoated and a coated stud type track roller after the salt spray test.

Fitting of coated track rollers

In order to reduce the press-in force required, the surface should be lightly greased; the tolerances are increased by the thickness of the coating.



Before track rollers with the Corrotect® coating are fitted, compatibility with the media should always be checked.

Figure 25
Uncoated and coated
stud type track roller
after salt spray test



Accuracy The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620, for KR(E) and KRV to ISO 7 063.

The following deviations from DIN 620 apply:

- the diameter tolerance of the profiled outside surface 0/−0,05 mm
- for NNTR, the diameter tolerance to h10
- for NATR, NATV, NUTR, PWTR...-2RS, the tolerance of the width B to h12
- for NATR, NATV, the roundness of the inner ring
- for stud type track rollers, the tolerance of the shank diameter h7 and the eccentric collar diameter h9.

For PWTR...-2RS-RR and PWKR...-2RS-RR , the tolerances are increased by the thickness of the Corrotect® special coating.

Radial internal clearance The radial internal bearing clearance corresponds approximately to class C2 and in the case of STO and NA22...-2RSR to class CN in accordance with DIN 620-4.



Radial internal clearance

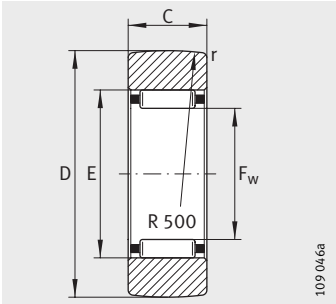
Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	0	25	20	45	35	60	50	75
24	30	0	25	20	45	35	60	50	75
30	40	5	30	25	50	45	70	60	85
40	50	5	35	30	60	50	80	70	100
50	65	10	40	40	70	60	90	80	110
65	80	10	45	40	75	65	100	90	125
80	100	15	50	50	85	75	110	105	140
100	120	15	55	50	90	85	125	125	165
120	140	15	60	60	105	100	145	145	190

Enveloping circle For RSTO and RNA22...-2RSR, the needle roller enveloping circle F_w is in the tolerance zone F6.

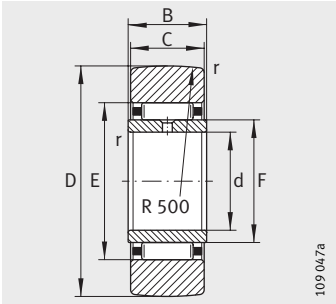
The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the adjacent construction.

Yoke type track rollers

Without axial guidance
Open



RSTO



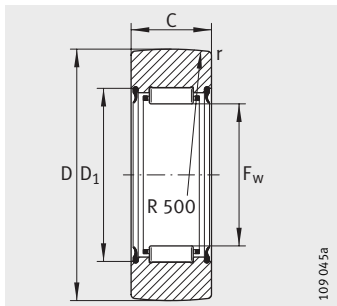
STO

Dimension table · Dimensions in mm														
Without inner ring Designation	Mass	With inner ring Designation	Mass	Dimensions							Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
	m ≈g		m ≈g	D	d	C	B	F ¹⁾ F _w	E	r min.	dyn. C _{rw} N	stat. C _{0rw} N		
RST05-TV	8,5	—	—	16	—	7,8	—	7	10	0,3	2 550	2 600	330	16 000
RST06-TV	12,5	ST06-TV	17	19	6	9,8	10	10	13	0,3	3 750	4 550	650	10 000
RST08-TV	21	ST08-TV	26	24	8	9,8	10	12	15	0,3	4 200	5 500	780	8 000
RST010	42	ST010	49	30	10	11,8	12	14	20	0,3	8 400	9 300	1 370	5 500
RST012	49	ST012	57	32	12	11,8	12	16	22	0,3	9 000	10 300	1 530	4 500
RST015	50	ST015	63	35	15	11,8	12	20	26	0,3	9 100	10 900	1 640	3 300
RST017	88	ST017	107	40	17	15,8	16	22	29	0,3	14 200	17 900	2 550	2 800
RST020	130	ST020	152	47	20	15,8	16	25	32	0,3	16 100	21 700	3 050	2 400
RST025	150	ST025	177	52	25	15,8	16	30	37	0,3	16 400	23 200	3 300	1 800
RST030	255	ST030	308	62	30	19,8	20	38	46	0,6	23 100	35 000	4 700	1 300
RST035	375	ST035	441	72	35	19,8	20	42	50	0,6	25 000	40 500	5 400	1 100
RST040	420	ST040	530	80	40	19,8	20	50	58	1	23 700	39 500	5 900	850
RST045	453	ST045	576	85	45	19,8	20	55	63	1	25 000	43 500	5 900	750
RST050	481	ST050	617	90	50	19,8	20	60	68	1	25 500	46 000	6 300	650

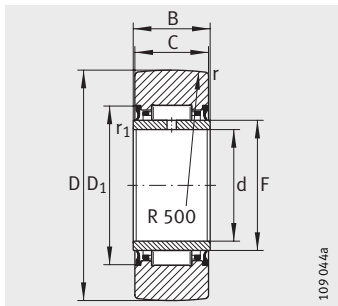
1) F = raceway diameter of the inner ring.
F_w = needle roller enveloping circle in tolerance zone F6.

Yoke type track rollers

Without axial guidance
Sealed



RNA22...-2RSR



NA22...-2RSR

Dimension table · Dimensions in mm

Without inner ring Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C_{urw} N	Speed n_{DG} min^{-1}
		D	C	$F_w^{1)}$	D_1 min.	r min.	dyn. C_{rw} N	stat. C_{0rw} N		
RNA22/6-2RSR	18	19	11,8	10	16	0,3	3 900	3 700	485	9 000
RNA22/8-2RSR	29	24	11,8	12	18	0,3	4 800	4 300	630	7 000
RNA2200-2RSR	52	30	13,8	14	20	0,6	7 000	6 900	1 090	5 500
RNA2201-2RSR	57	32	13,8	16	22	0,6	7 500	8 300	1 270	4 700
RNA2202-2RSR	60	35	13,8	20	26	0,6	7 600	9 800	1 370	3 400
RNA2203-2RSR	94	40	15,8	22	28	1	9 900	14 000	1 840	3 000
RNA2204-2RSR	152	47	17,8	25	33	1	14 000	19 100	2 650	2 300
RNA2205-2RSR	179	52	17,8	30	38	1	14 400	20 800	2 900	1 800
RNA2206-2RSR	284	62	19,8	35	43	1	17 100	26 000	3 550	1 400
RNA2207-2RSR	432	72	22,7	42	50	1,1	21 500	36 000	5 200	1 100
RNA2208-2RSR	530	80	22,7	48	57	1,1	26 000	41 000	5 300	850



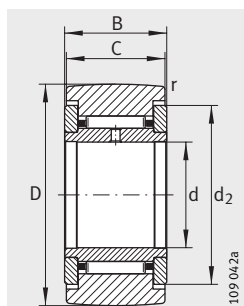
Dimension table · Dimensions in mm

With inner ring Designation	Mass m ≈g	Dimensions								Basic load ratings		Fatigue limit load C_{urw} N	Speed n_{DG} min^{-1}
		D	d	C	B	$F^{1)}$	D_1 min.	r min.	r_1 min.	dyn. C_{rw} N	stat. C_{0rw} N		
NA22/6-2RSR	22	19	6	11,8	12	10	16	0,3	0,3	3 900	3 700	485	9 000
NA22/8-2RSR	34	24	8	11,8	12	12	18	0,3	0,3	4 800	4 300	630	7 000
NA2200-2RSR	60	30	10	13,8	14	14	20	0,6	0,3	7 000	6 900	1 090	5 500
NA2201-2RSR	67	32	12	13,8	14	16	22	0,6	0,3	7 500	8 300	1 270	4 700
NA2202-2RSR	75	35	15	13,8	14	20	26	0,6	0,3	7 600	9 800	1 370	3 400
NA2203-2RSR	112	40	17	15,8	16	22	28	1	0,3	9 900	14 000	1 840	3 000
NA2204-2RSR	177	47	20	17,8	18	25	33	1	0,3	14 000	19 100	2 650	2 300
NA2205-2RSR	209	52	25	17,8	18	30	38	1	0,3	14 400	20 800	2 900	1 800
NA2206-2RSR	324	62	30	19,8	20	35	43	1	0,3	17 100	26 000	3 550	1 400
NA2207-2RSR	505	72	35	22,7	23	42	50	1,1	0,6	21 500	36 000	5 200	1 100
NA2208-2RSR	628	80	40	22,7	23	48	57	1,1	0,6	26 000	41 000	5 300	850
NA2210-2RSR	690	90	50	22,7	23	58	68	1,1	0,6	26 000	43 000	5 600	650

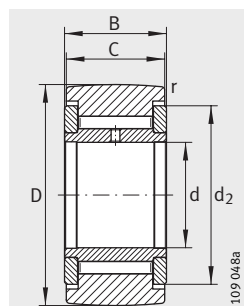
¹⁾ F = raceway diameter of the inner ring.
 F_w = needle roller enveloping circle in tolerance zone F6.

Yoke type track rollers

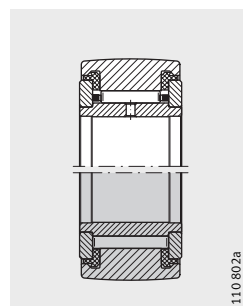
With axial guidance
Gap seals or axial plain washers



NATR
(R = 500 mm)



NATV
(R = 500 mm)



NATR..-PP (optimised
NATV..-PP INA profile)

Dimension table - Dimensions in mm

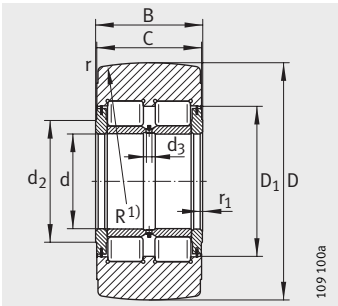
Designation ¹⁾	Mass m ≈g	Designation ²⁾	Mass m ≈g	Dimensions						Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{D G} min ⁻¹
				D	d	B	C	d ₂	r min.	dyn. C _{rw} N	stat. C _{0rw} N		
NATR5	14	NATR5-PP	14	16	5	12	11	12,5	0,15	3 150	3 350	450	14 000
NATV5	15	NATV5-PP	15	16	5	12	11	12,5	0,15	4 900	6 600	950	3 800
NATR6	20	NATR6-PP	19	19	6	12	11	15	0,15	3 500	4 000	540	11 000
NATV6	21	NATV6-PP	21	19	6	12	11	15	0,15	5 400	8 000	1 170	3 100
NATR8	41	NATR8-PP	38	24	8	15	14	19	0,3	5 500	6 600	930	7 500
NATV8	42	NATV8-PP	41	24	8	15	14	19	0,3	7 800	11 600	1 590	2 500
NATR10	64	NATR10-PP	61	30	10	15	14	23	0,6	6 800	8 600	1 220	5 500
NATV10	65	NATV10-PP	64	30	10	15	14	23	0,6	9 500	14 900	2 050	2 100
NATR12	71	NATR12-PP	66	32	12	15	14	25	0,6	7 000	9 000	1 290	4 500
NATV12	72	NATV12-PP	69	32	12	15	14	25	0,6	9 700	15 700	2 170	1 800
NATR15	104	NATR15-PP	95	35	15	19	18	27,6	0,6	9 700	14 300	1 830	3 600
NATV15	109	NATV15-PP	101	35	15	19	18	27,6	0,6	12 600	23 100	3 200	1 600
NATR17	144	NATR17-PP	139	40	17	21	20	31,5	1	10 900	15 800	2 090	2 900
NATV17	152	NATV17-PP	147	40	17	21	20	31,5	1	14 700	26 500	3 500	1 400
NATR20	246	NATR20-PP	236	47	20	25	24	36,5	1	15 400	26 000	3 400	2 400
NATV20	254	NATV20-PP	245	47	20	25	24	36,5	1	20 300	42 000	5 900	1 300
NATR25	275	NATR25-PP	271	52	25	25	24	41,5	1	15 300	27 000	3 550	1 800
NATV25	285	NATV25-PP	281	52	25	25	24	41,5	1	20 200	44 000	6 200	1 000
NATR30	470	NATR30-PP	444	62	30	29	28	51	1	23 200	39 000	5 200	1 300
NATV30	481	NATV30-PP	468	62	30	29	28	51	1	30 000	62 000	8 800	850
–	–	NATR35-PP	547	72	35	29	28	58	1,1	24 800	44 500	5 900	1 000
–	–	NATV35-PP	630	72	35	29	28	58	1,1	32 500	71 000	10 100	750
–	–	NATR40-PP	795	80	40	32	30	66	1,1	32 000	58 000	8 300	850
–	–	NATV40-PP	832	80	40	32	30	66	1,1	40 000	88 000	13 000	650
–	–	NATR50-PP	867	90	50	32	30	76	1,1	31 000	59 000	8 400	650
–	–	NATV50-PP	969	90	50	32	30	76	1,1	39 000	92 000	13 600	550

¹⁾ Bearings with gap seals and radius of curvature of R = 500 mm.

²⁾ Bearings with plastic axial plain washers and optimised INA profile.
Permissible operating temperature: –30 °C to +100 °C (continuous operation).

Yoke type track rollers

With axial guidance
Sealed



NNTR...2ZL

Dimension table · Dimensions in mm											
Designation ¹⁾	Mass m ≈kg	Dimensions						Mounting dimensions			Number of lubrication holes
		D h10	d	B	C	r min.	r ₁ min.	d ₂	D ₁	d ₃	
NNTR50X130X65-2ZL	5,2	130	50	65	63	3	2	63	80	3	3
NNTR55X140X70-2ZL	6,4	140	55	70	68	3	2	73	91	4	3
NNTR60X150X75-2ZL	7,8	150	60	75	73	3	2	78	97	4	3
NNTR65X160X75-2ZL	8,8	160	65	75	73	3	2	82	103	5	3
NNTR70X180X85-2ZL	13	180	70	85	83	3	2	92	115	5	3
NNTR80X200X90-2ZL	16,8	200	80	90	88	4	2	102	127	5	3
NNTR90X220X100-2ZL	22,5	220	90	100	98	4	2,5	119	146	5	3
NNTR100X240X105-2ZL	28	240	100	105	103	4	2,5	132	160	6	6
NNTR110X260X115-2ZL	35,6	260	110	115	113	4	2,5	143	174	6	6
NNTR120X290X135-2ZL	52,8	290	120	135	133	4	3	155	191	8	6
NNTR130X310X146-2ZL	65,2	310	130	146	144	5	3	165	204	8	6

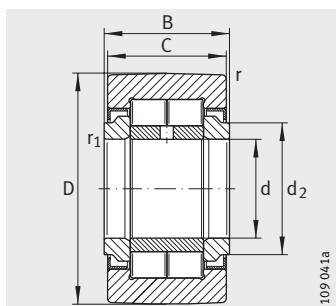


Dimension table (continued)						
Designation ¹⁾	Basic load ratings				Fatigue limit load C _{ur w} N	Speed n _{D G} min ⁻¹
	dyn. C _{r w} N	stat. C _{or w} N	dyn. F _{r per} N	stat. F _{or per} N		
NNTR50X130X65-2ZL	193 000	265 000	265 000	265 000	37 000	1 100
NNTR55X140X70-2ZL	226 000	315 000	280 000	315 000	44 500	850
NNTR60X150X75-2ZL	255 000	365 000	330 000	365 000	53 000	800
NNTR65X160X75-2ZL	280 000	395 000	350 000	395 000	56 000	700
NNTR70X180X85-2ZL	355 000	510 000	465 000	510 000	75 000	600
NNTR80X200X90-2ZL	415 000	610 000	550 000	610 000	87 000	500
NNTR90X220X100-2ZL	500 000	750 000	600 000	750 000	104 000	400
NNTR100X240X105-2ZL	560 000	870 000	710 000	870 000	118 000	340
NNTR110X260X115-2ZL	670 000	1 050 000	820 000	1 050 000	143 000	300
NNTR120X290X135-2ZL	880 000	1 400 000	1 110 000	1 400 000	187 000	260
NNTR130X310X146-2ZL	1 010 000	1 630 000	1 280 000	1 630 000	216 000	240

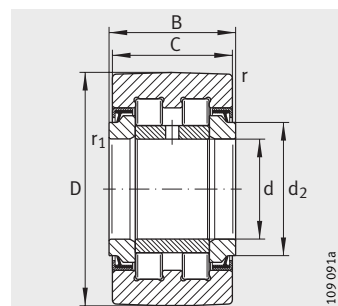
¹⁾ Radius of curvature R = 10 000 for NNTR50X130X65-2ZL to NNTR110X260X115-2ZL
R = 15 000 for NNTR120X290X135-2ZL and NNTR130X310X146-2ZL.

Yoke type track rollers

With axial guidance
Sealed



NUTR
(optimised INA profile)



PWTR...-2RS
(optimised INA profile)

Dimension table - Dimensions in mm

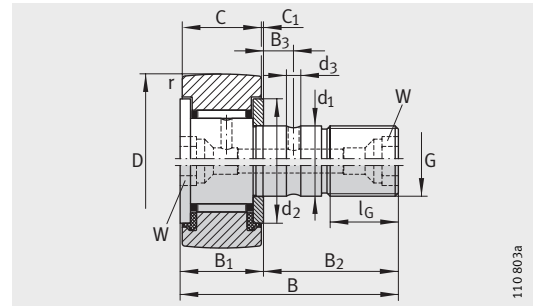
Designation	X-life	Mass m ≈ g	Dimensions							Basic load ratings				Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
			D	d	B	C	d ₂	r min.	r ₁ min.	dyn. C _{rw} N	stat. C _{0rw} N	dyn. F _{r per} N	stat. F _{0r per} N		
NUTR15	–	99	35	15	19	18	20	0,6	0,3	15 300	18 700	8 500	16 800	2 430	6 500
PWTR15-2RS	XL	99	35	15	19	18	20	0,6	0,3	12 600	14 600	10 700	14 600	1 760	6 000
NUTR17	–	147	40	17	21	20	22	1	0,5	18 700	24 900	13 000	24 900	3 150	5 500
PWTR17-2RS	XL	147	40	17	21	20	22	1	0,5	14 300	17 900	16 500	17 900	2 160	5 000
NUTR1542	–	158	42	15	19	18	20	0,6	0,3	18 300	24 300	24 300	24 300	3 100	6 500
PWTR1542-2RS	XL	158	42	15	19	18	20	0,6	0,3	14 700	16 200	16 200	16 200	2 140	6 000
NUTR1747	–	220	47	17	21	20	22	1	0,5	21 600	30 500	30 500	30 500	3 850	5 500
PWTR1747-2RS	XL	220	47	17	21	20	22	1	0,5	15 900	18 400	18 400	18 400	2 440	5 000
NUTR20	–	245	47	20	25	24	27	1	0,5	28 500	37 500	16 200	32 500	4 850	4 200
PWTR20-2RS	XL	245	47	20	25	24	27	1	0,5	24 500	30 500	20 700	30 500	3 750	3 800
NUTR2052	–	321	52	20	25	24	27	1	0,5	32 000	44 000	38 000	44 000	5 700	4 200
PWTR2052-2RS	XL	321	52	20	25	24	27	1	0,5	27 000	35 000	31 000	35 000	4 250	3 800
NUTR25	–	281	52	25	25	24	31	1	0,5	29 000	40 500	17 100	34 000	5 300	4 200
PWTR25-2RS	XL	281	52	25	25	24	31	1	0,5	25 000	33 000	21 800	33 000	4 100	3 800
NUTR2562	–	450	62	25	25	24	31	1	0,5	35 500	54 000	54 000	54 000	6 900	4 200
PWTR2562-2RS	XL	450	62	25	25	24	31	1	0,5	30 000	42 500	42 500	42 500	5 200	3 800
NUTR30	–	465	62	30	29	28	38	1	0,5	40 000	55 000	23 400	46 000	7 300	2 600
PWTR30-2RS	XL	465	62	30	29	28	38	1	0,5	35 000	45 500	29 000	45 500	5 800	2 200

Dimension table (continued) - Dimensions in mm

Designation	X-life	Mass m ≈g	Dimensions							Basic load ratings				Fatigue limit load	Speed
			D	d	B	C	d ₂	r min.	r ₁ min.	dyn. C _{rw} N	stat. C _{0rw} N	dyn. F _{r per} N	stat. F _{0r per} N	C _{urw} N	n _{D G} min ⁻¹
NUTR3072	–	697	72	30	29	28	38	1	0,5	48 000	70 000	68 000	70 000	9 200	2 600
PWTR3072-2RS	XL	697	72	30	29	28	38	1	0,5	41 000	56 000	54 000	56 000	7 200	2 200
NUTR35	–	630	72	35	29	28	44	1,1	0,6	45 000	65 000	31 500	63 000	8 700	2 100
PWTR35-2RS	XL	630	72	35	29	28	44	1,1	0,6	38 500	54 000	39 000	54 000	6 900	1 800
NUTR3580	–	836	80	35	29	28	44	1,1	0,6	51 000	78 000	76 000	78 000	10 300	2 100
PWTR3580-2RS	XL	836	80	35	29	28	44	1,1	0,6	43 500	63 000	59 000	63 000	8 100	1 800
NUTR40	–	816	80	40	32	30	50,5	1,1	0,6	56 000	80 000	31 000	60 000	11 000	1 600
PWTR40-2RS	XL	816	80	40	32	30	50,5	1,1	0,6	45 000	61 000	39 500	61 000	7 900	1 500
NUTR45	–	883	85	45	32	30	55,2	1,1	0,6	56 000	83 000	32 000	62 000	11 500	1 400
PWTR45-2RS	XL	883	85	45	32	30	55,2	1,1	0,6	45 500	63 000	41 000	63 000	8 200	1 300
NUTR4090	–	1 129	90	40	32	30	50,5	1,1	0,6	66 000	101 000	84 000	101 000	13 900	1 600
PWTR4090-2RS	XL	1 129	90	40	32	30	50,5	1,1	0,6	52 000	75 000	67 000	75 000	9 600	1 500
NUTR50	–	950	90	50	32	30	59,8	1,1	0,6	56 000	86 000	32 500	63 000	11 900	1 300
PWTR50-2RS	XL	950	90	50	32	30	59,8	1,1	0,6	46 000	66 000	42 000	66 000	8 500	1 100
NUTR45100	–	1 396	100	45	32	30	55,2	1,1	0,6	72 000	115 000	106 000	115 000	15 800	1 400
PWTR45100-2RS	XL	1 396	100	45	32	30	55,2	1,1	0,6	56 000	85 000	85 000	85 000	10 900	1 300
NUTR50110	–	1 690	110	50	32	30	59,8	1,1	0,6	76 000	128 000	128 000	128 000	17 600	1 300
PWTR50110-2RS	XL	1 690	110	50	32	30	59,8	1,1	0,6	59 000	94 000	94 000	94 000	12 100	1 100



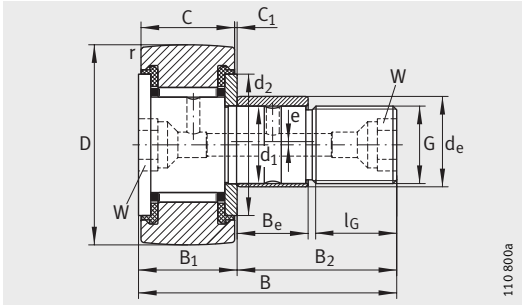
With axial guidance
Open or sealed

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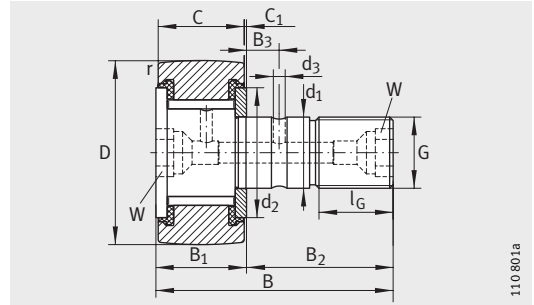
Dimension table · Dimensions in mm

Designation	Mass	With eccentric collar Designation	Mass	Dimensions										
	m ≈g		m ≈g	D	d ₁	B	B ₁	B ₂	B ₃	C	C ₁	r	d ₂	d ₃
					h7		max.						min.	
KR16³⁾	19	–	–	16	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR16-PP³⁾	18	KRE16-PP³⁾	20	16	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR16-SK-PP⁴⁾	19	–	–	16	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KRV16-PP³⁾	19	–	–	16	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR19³⁾	29	–	–	19	8	32	12,2	20	–	11	0,6	0,15	15	–
KR19-PP³⁾	29	KRE19-PP³⁾	32	19	8	32	12,2	20	–	11	0,6	0,15	15	–
KR19-SK-PP⁴⁾	29	–	–	19	8	32	12,2	20	–	11	0,6	0,15	15	–
KRV19-PP³⁾	31	–	–	19	8	32	12,2	20	–	11	0,6	0,15	15	–
KR22	45	–	–	22	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR22-PP	43	KRE22-PP	47	22	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KRV22-PP	45	–	–	22	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR26	59	–	–	26	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR26-PP	57	KRE26-PP	62	26	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KRV26-PP	59	–	–	26	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR30	92	–	–	30	12	40	15,2	25	6	14	0,6	0,6	23	3
KR30-PP	88	KRE30-PP	93	30	12	40	15,2	25	6	14	0,6	0,6	23	3
KRV30-PP	91	–	–	30	12	40	15,2	25	6	14	0,6	0,6	23	3
KR32	103	–	–	32	12	40	15,2	25	6	14	0,6	0,6	23	3
KR32-PP	98	KRE32-PP	104	32	12	40	15,2	25	6	14	0,6	0,6	23	3
KRV32-PP	101	–	–	32	12	40	15,2	25	6	14	0,6	0,6	23	3

- 1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.
- 2) Nominal dimension for hexagonal socket.
- 3) Relubrication hole only on the flange-side end face with slot for countertensioning during fitting.
- 4) Hexagonal socket only on the flange-side end face. No relubrication facility.

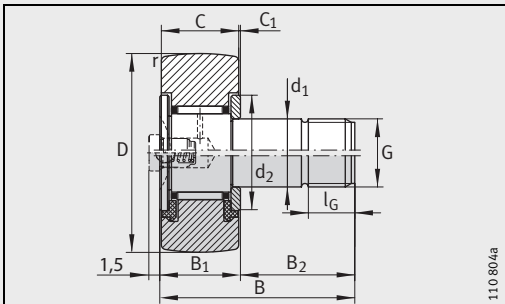


from D = 22 mm KRE..-PP (optimised INA profile)

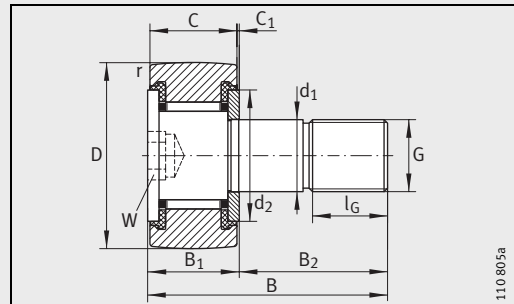


from D = 22 mm KRV..-PP (optimised INA profile)

G	l _G	W ²⁾	Eccentric collar			Drive fit lubrication nipple ¹⁾	Nut tightening torque M _A Nm	Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{D G} min ⁻¹
			d _e h9	B _e	e			dyn. C _{r w} N	stat. C _{0 r w} N		
M6(X1)	8	—	—	—	—	NIPA1	3	3 150	3 350	450	14 000
M6(X1)	8	—	9	7	0,5	NIPA1	3	3 150	3 350	450	14 000
M6(X1)	8	4	—	—	—	—	3	3 150	3 350	450	14 000
M6(X1)	8	—	—	—	—	NIPA1	3	4 900	6 600	950	3 800
M8(X1,25)	10	—	—	—	—	NIPA1	8	3 500	4 000	540	11 000
M8(X1,25)	10	—	11	9	0,5	NIPA1	8	3 500	4 000	540	11 000
M8(X1,25)	10	4	—	—	—	—	8	3 500	4 000	540	11 000
M8(X1,25)	10	—	—	—	—	NIPA1	8	5 400	8 000	1 170	3 100
M10X1	12	5	—	—	—	NIPA1X4,5	15	4 550	5 300	730	8 000
M10X1	12	5	13	10	0,5	NIPA1X4,5	15	4 550	5 300	730	8 000
M10X1	12	5	—	—	—	NIPA1X4,5	15	6 200	9 200	1 210	2 600
M10X1	12	5	—	—	—	NIPA1X4,5	15	5 100	6 400	840	8 000
M10X1	12	5	13	10	0,5	NIPA1X4,5	15	5 100	6 400	840	8 000
M10X1	12	5	—	—	—	NIPA1X4,5	15	7 300	11 500	1 500	2 600
M12X1,5	13	6	—	—	—	NIPA1X4,5	22	6 800	8 600	1 220	5 500
M12X1,5	13	6	15	11	0,5	NIPA1X4,5	22	6 800	8 600	1 220	5 500
M12X1,5	13	6	—	—	—	NIPA1X4,5	22	9 500	14 900	2 050	2 100
M12X1,5	13	6	—	—	—	NIPA1X4,5	22	7 100	9 200	1 290	5 500
M12X1,5	13	6	15	11	0,5	NIPA1X4,5	22	7 100	9 200	1 290	5 500
M12X1,5	13	6	—	—	—	NIPA1X4,5	22	10 000	16 100	2 200	2 100



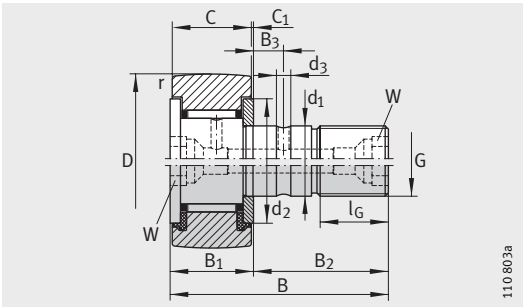
KR16, KR19
KR16-PP, KR19-PP (KRV16-PP, KRV19-PP)



KR16-SK-PP, KR19-SK-PP

Needle roller stud type track rollers

With axial guidance
Open or sealed

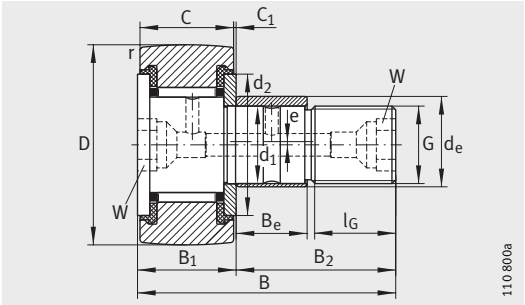


KR (R = 500 mm)
KR...-PP (optimised INA profile)

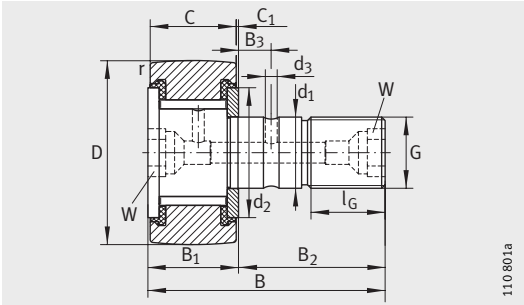
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈g	With eccentric collar Designation	Mass m ≈g	Dimensions										
				D	d ₁	B	B ₁	B ₂	B ₃	C	C ₁	r	d ₂	d ₃
					h7		max.					min.		
KR35	173	–	–	35	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KR35-PP	164	KRE35-PP	177	35	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KRV35-PP	166	–	–	35	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KR40	247	–	–	40	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KR40-PP	239	KRE40-PP	255	40	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KRV40-PP	247	–	–	40	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KR47-PP	381	KRE47-PP	400	47	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KRV47-PP	390	–	–	47	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KR52-PP	454	KRE52-PP	473	52	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KRV52-PP	463	–	–	52	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KR62-PP	770	KRE62-PP	798	62	24	80	30,6	49,5	11	29	0,8	1	44	4
KRV62-PP	787	–	–	62	24	80	30,6	49,5	11	29	0,8	1	44	4
KR72-PP	1 010	KRE72-PP	1 038	72	24	80	30,6	49,5	11	29	0,8	1,1	44	4
KRV72-PP	1 027	–	–	72	24	80	30,6	49,5	11	29	0,8	1,1	44	4
KR80-PP	1 608	KRE80-PP	1 665	80	30	100	37	63	15	35	1	1,1	53	4
KRV80-PP	1 636	–	–	80	30	100	37	63	15	35	1	1,1	53	4
KR90-PP	1 975	KRE90-PP	2 032	90	30	100	37	63	15	35	1	1,1	53	4
KRV90-PP	2 003	–	–	90	30	100	37	63	15	35	1	1,1	53	4

- 1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.
- 2) Nominal dimension for hexagonal socket.
Suitable central lubrication adapter for connection to a central lubrication system, see page 951.



KRE..-PP (optimised INA profile)



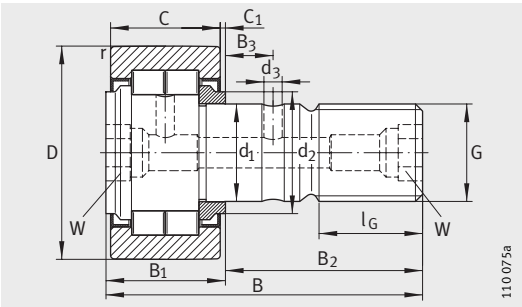
KRV..-PP (optimised INA profile)

						Drive fit lubrication nipple ¹⁾	Nut tightening torque M _A Nm	Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{D G} min ⁻¹
G	l _G	W ²⁾	Eccentric collar					dyn. C _{r w} N	stat. C _{0r w} N		
			d _e h9	B _e	e						
M16X1,5	17	8	—	—	—	NIPA2X7,5	58	9 700	14 300	1 830	3 600
M16X1,5	17	8	20	14	1	NIPA2X7,5	58	9 700	14 300	1 830	3 600
M16X1,5	17	8	—	—	—	NIPA2X7,5	58	12 600	23 100	3 200	1 600
M18X1,5	19	8	—	—	—	NIPA2X7,5	87	10 900	15 800	2 090	2 900
M18X1,5	19	8	22	16	1	NIPA2X7,5	87	10 900	15 800	2 090	2 900
M18X1,5	19	8	—	—	—	NIPA2X7,5	87	14 700	26 500	3 500	1 400
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	15 400	26 000	3 400	2 400
M20X1,5	21	10	—	—	—	NIPA2X7,5	120	20 300	42 000	5 900	1 300
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	16 600	29 000	3 800	2 400
M20X1,5	21	10	—	—	—	NIPA2X7,5	120	22 300	48 000	6 700	1 300
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	26 000	48 000	6 800	1 900
M24X1,5	25	14	—	—	—	NIPA3X9,5	220	33 500	75 000	11 200	1 100
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	28 000	53 000	7 200	1 900
M24X1,5	25	14	—	—	—	NIPA3X9,5	220	36 500	85 000	12 600	1 100
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	38 500	77 000	11 000	1 300
M30X1,5	32	14	—	—	—	NIPA3X9,5	450	48 500	117 000	17 400	850
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	40 500	83 000	11 700	1 300
M30X1,5	32	14	—	—	—	NIPA3X9,5	450	52 000	129 000	19 000	850



Cylindrical roller stud type track rollers

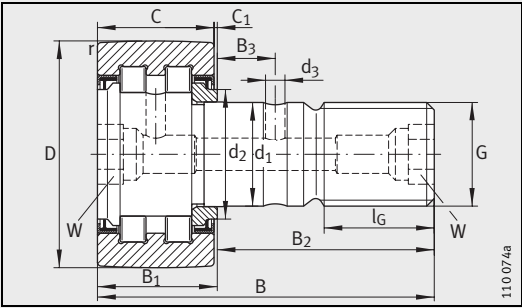
With axial guidance



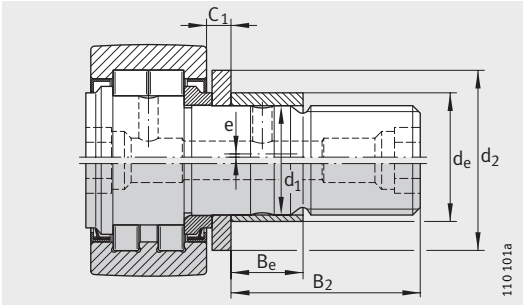
NUKR (optimised INA profile)

Dimension table · Dimensions in mm															
Without eccentric collar Designation	Mass	With eccentric collar Designation	Mass	X-life	Dimensions										
	m		m		D	d ₁	B	B ₁	B ₂	B ₃	C	C ₁	r	d ₂	d ₃
	≈g		≈g			h7		max.					min.		
NUKR35	164	–	–	–	35	16	52	19,6	32,5	7,8	18	0,8	0,6	20	3
–	–	NUKRE35	177	–	35	16	52	22,6	29,5	–	18	3,8	0,6	27,6	–
PWKR35-2RS	164	–	–	XL	35	16	52	19,6	32,5	7,8	18	0,8	0,6	20	3
–	–	PWKRE35-2RS	177	XL	35	16	52	22,6	29,5	–	18	3,8	0,6	27,6	–
NUKR40	242	–	–	–	40	18	58	21,6	36,5	8	20	0,8	1	22	3
–	–	NUKRE40	258	–	40	18	58	24,6	33,5	–	20	3,8	1	30	–
PWKR40-2RS	242	–	–	XL	40	18	58	21,6	36,5	8	20	0,8	1	22	3
–	–	PWKRE40-2RS	258	XL	40	18	58	24,6	33,5	–	20	3,8	1	30	–
NUKR47	380	NUKRE47	400	–	47	20	66	25,6	40,5	9	24	0,8	1	27	4
PWKR47-2RS	380	PWKRE47-2RS	400	XL	47	20	66	25,6	40,5	9	24	0,8	1	27	4
NUKR52	450	NUKRE52	470	–	52	20	66	25,6	40,5	9	24	0,8	1	31	4
PWKR52-2RS	450	PWKRE52-2RS	470	XL	52	20	66	25,6	40,5	9	24	0,8	1	31	4
NUKR62	795	NUKRE62	824	–	62	24	80	30,6	49,5	11	28	1,3	1	38	4
PWKR62-2RS	795	PWKRE62-2RS	824	XL	62	24	80	30,6	49,5	11	28	1,3	1	38	4
NUKR72	1 020	NUKRE72	1 050	–	72	24	80	30,6	49,5	11	28	1,3	1,1	44	4
PWKR72-2RS	1 020	PWKRE72-2RS	1 050	XL	72	24	80	30,6	49,5	11	28	1,3	1,1	44	4
NUKR80	1 600	NUKRE80	1 670	–	80	30	100	37	63	15	35	1	1,1	47	4
PWKR80-2RS	1 600	PWKRE80-2RS	1 670	XL	80	30	100	37	63	15	35	1	1,1	47	4
NUKR90	1 960	NUKRE90	2 020	–	90	30	100	37	63	15	35	1	1,1	47	4
PWKR90-2RS	1 960	PWKRE90-2RS	2 020	XL	90	30	100	37	63	15	35	1	1,1	47	4

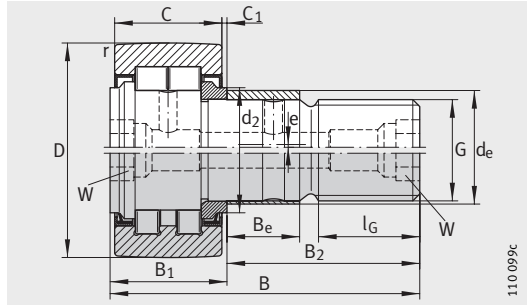
- 1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.
- 2) Nominal dimension for hexagonal socket.
Suitable central lubrication adapter for connection to a central lubrication system, see page 951.



PWKR...2RS (optimised INA profile)



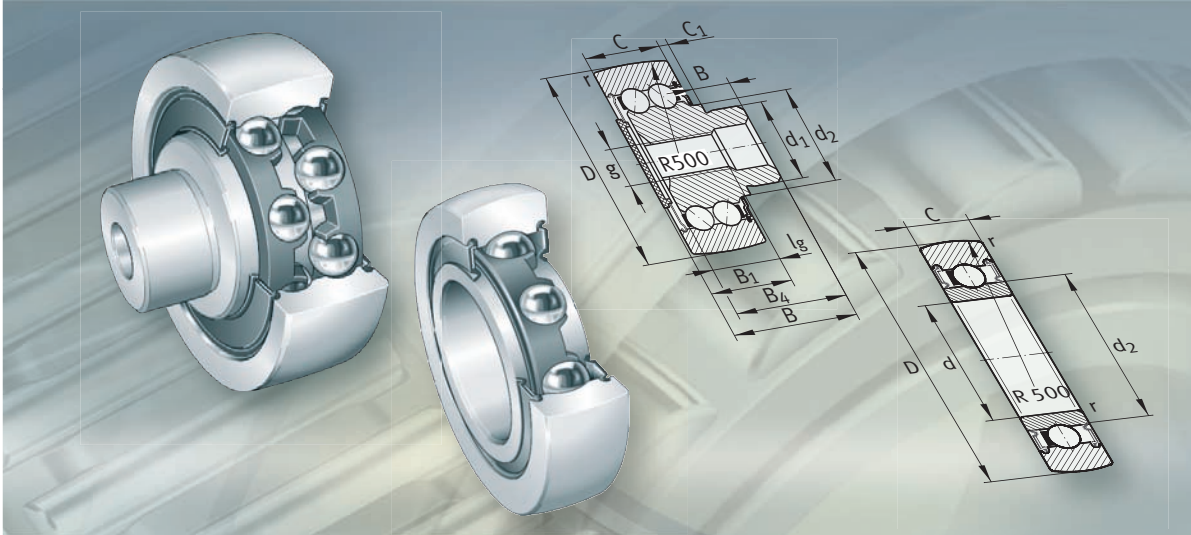
NUKRE35/NUKRE40
PWKRE35-2RS/PWKRE40-2RS
(optimised INA profile)



NUKRE
PWKRE...-2RS
(optimised INA profile)

						Drive fit lubrication nipple ¹⁾	Nut tightening torque M _A Nm	Basic load ratings				Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
G	l _G	W ²⁾	Eccentric collar					dyn.	stat.	dyn.	stat.		
			d _e h9	B _e	e			C _{rw} N	C _{0rw} N	F _{r per} N	F _{0r per} N		
M16X1,5	17	8	–	–	–	NIPA2X7,5	58	15 300	18 700	8 500	16 800	2 430	6 500
M16X1,5	17	8	20	12	1	NIPA2X7,5	58	15 300	18 700	8 500	16 800	2 430	6 500
M16X1,5	17	8	–	–	–	NIPA2X7,5	58	12 600	14 600	10 700	14 600	1 760	6 000
M16X1,5	17	8	20	12	1	NIPA2X7,5	58	12 600	14 600	10 700	14 600	1 760	6 000
M18X1,5	19	8	–	–	–	NIPA2X7,5	87	18 700	24 900	13 000	24 900	3 150	5 500
M18X1,5	19	8	22	14	1	NIPA2X7,5	87	18 700	24 900	13 000	24 900	3 150	5 500
M18X1,5	19	8	–	–	–	NIPA2X7,5	87	14 300	17 900	16 500	17 900	2 160	5 000
M18X1,5	19	8	22	14	1	NIPA2X7,5	87	14 300	17 900	16 500	17 900	2 160	5 000
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	28 500	37 500	16 200	32 500	4 850	4 200
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	24 500	30 500	20 700	30 500	3 750	3 800
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	29 000	40 500	17 100	34 000	5 300	4 200
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	25 000	33 000	21 800	33 000	4 100	3 800
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	40 000	55 000	23 400	46 000	7 300	2 600
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	35 000	45 500	29 000	45 500	5 800	2 200
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	45 000	65 000	31 500	63 000	8 700	2 600
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	38 500	54 000	39 000	54 000	6 900	2 200
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	69 000	104 000	47 500	95 000	14 100	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	56 000	79 000	60 000	79 000	10 600	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	78 000	123 000	76 000	123 000	16 700	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	62 000	92 000	92 000	92 000	12 200	1 800





Ball bearing track rollers

Ball bearing track rollers

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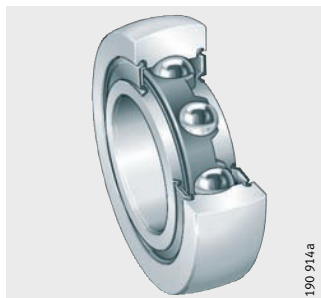


Product overview **Ball bearing track rollers**

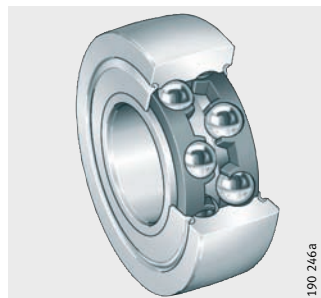
Yoke type track rollers

Single row and double row
Lip seals or
sealing shields

LR6, LR60, LR2



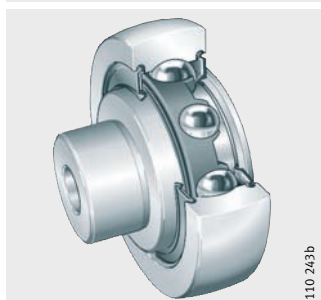
LR50, LR52, LR53



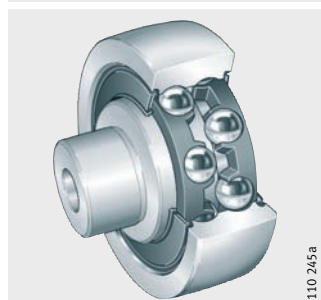
Stud type track rollers

Single row and double row
Lip seals or
sealing shield and cover

ZL2...-DRS

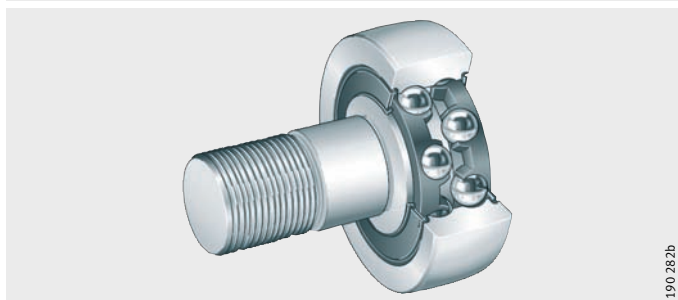


ZL52...-DRS



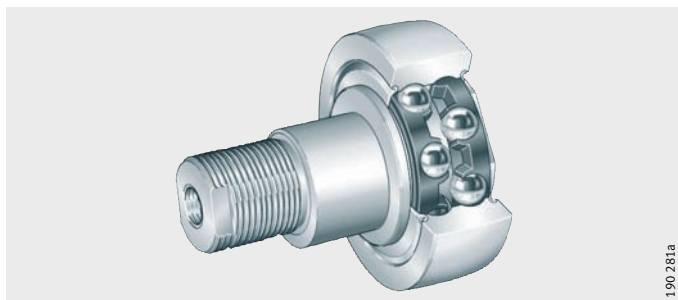
Lip seals

KR52...-2RS



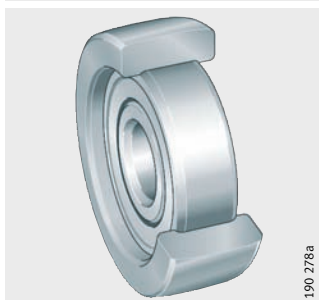
With eccentric collar
Sealing shields

ZLE52...-2Z

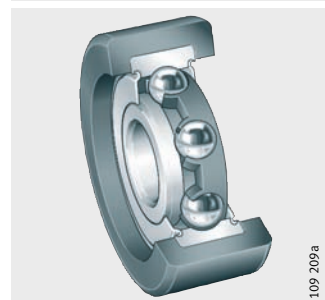


Track rollers with plastic outer tyre
 Cylindrical or crowned outside surface
 Lip seals or sealing shields

KLRU

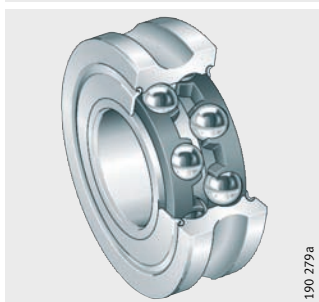


KLRZ




Other products
 Track rollers with profiled outer ring

LFR5



Ball bearing track rollers

Features	<p>Ball bearing track rollers are self-retaining, single or double row ball bearings with particularly thick-walled outer rings. In addition to high radial forces, these bearings can also support axial forces in both directions.</p> <p>The outer rings have a crowned or cylindrical outside surface. Designs with a crowned outside surface are used where they are inclined in relation to the mating track and edge stresses must be avoided.</p> <p>Ball bearing track rollers are available with an inner ring, with a stud and with a plastic tyre on the outer ring.</p>
Outside surface profile of the outer ring	<p>Yoke type track rollers with a crowned outside surface and stud type track rollers have a radius of curvature of $R = 500 \text{ mm}$.</p> <p>Yoke type track rollers with a cylindrical outside surface have the suffix X.</p>
Yoke type track rollers	<p>Yoke type track rollers have outer rings with a crowned or cylindrical outside surface, inner rings and ball and cage assemblies with plastic cages. They are similar in construction to deep groove or angular contact ball bearings and are mounted on shafts or studs.</p> <p>Yoke type track rollers LR6, LR60 and LR2 are single row units, LR50, LR52 and LR53 are double row units.</p>
Anti-corrosion protection	<p>Where an increased level of anti-corrosion protection is required, ball bearing track rollers are available by agreement and as a special design with the special coating Corrotect[®], see Anti-corrosion protection by Corrotect[®] coating, page 970.</p>
Sealing	<p>Yoke type track rollers with the suffix 2RSR have lip seals on both sides. In some sizes, RS seals are fitted for reasons of space.</p> <p>Double row yoke type track rollers with the suffix 2Z have sealing shields on both sides, bearings with the suffix 2RS have lip seals on both sides.</p>
Lubrication	<p>The yoke type track rollers are greased using a lithium soap grease to GA13. Double row yoke type track rollers can in some cases be relubricated via the inner ring.</p>
Stud type track rollers	<p>Stud type track rollers have outer rings with a crowned outside surface, heavy-section roller studs and ball and cage assemblies with plastic cages. The stud type track rollers are available with and without an eccentric collar.</p> <p>For ease of fitting, the roller stud has a thread or a threaded bore. For countertensioning during fitting, there is a slot, hexagonal socket or a flat area on the external thread.</p> <p>Track rollers ZL2 are single row units, ZL52, ZLE52 and KR52 are double row units.</p>

Without eccentric collar	Stud type track rollers without an eccentric collar are suitable for applications where a defined requirement for adjustment in relation to the mating track on the adjacent construction is not required.
With eccentric collar	<p>Stud type track rollers ZLE52 have an eccentric collar. The eccentric collar can be used to set the outside surface of the outer ring clearance-free against the mating track. This gives optimum geometrical locking between the track roller and mating track. Furthermore, larger manufacturing tolerances can be tolerated in the adjacent construction. In addition, more uniform load distribution is achieved when using more than one stud type track roller.</p> <p>For countertensioning during fitting, this series has flat areas on both sides of the roller stud.</p>
Sealing	<p>Stud type track rollers ZL2 and ZL52 have lip seals on the stud side and the suffix DRS.</p> <p>The opposite side can be sealed using the plastic cover supplied.</p> <p>Series KR52 is sealed on both sides by lip seals and has the suffix 2RS.</p> <p>Stud type track rollers ZLE52 have sealing shields on both sides and the suffix 2Z.</p>
Lubrication	The stud type track rollers are greased using a lithium soap grease to GA13; ZLE52 can be lubricated via the roller stud.
Track rollers with plastic outer tyre	<p>Track rollers KLRU and KLRZ comprise single row deep groove ball bearings with a shrink-fitted polyamide outer ring (PA). Polyamide can tolerate higher specific contact pressures than elastomer and is relatively resistant to abrasion.</p> <p>These track rollers are mounted on shafts or studs and are used where low loads are present and the bearings are required to run particularly quietly.</p>
Outside surface profile of the outer ring	<p>Track rollers KLRU have an outer ring with a crowned outside surface. The radius of curvature is indicated in the dimension table.</p> <p>Series KLRZ has a cylindrical outside surface.</p>
Maximum radial load	<p> The maximum radial load is determined by the permissible contact pressure; $F_{r\text{ per}}$ must not be exceeded.</p>
Sealing	The track rollers have gap seals on both sides (suffix 2Z) or lip seals (suffix 2RSR).
Lubrication	They are greased using a lithium soap grease to GA13 and cannot be relubricated.



Ball bearing track rollers

Operating temperature

Track rollers are suitable for temperatures from $-20\text{ }^{\circ}\text{C}$ to $+120\text{ }^{\circ}\text{C}$, restricted by the grease, cage material and sealing ring material. The information on the operating temperature range in the section Lubrication, page 76, must be observed.



Track rollers with plastic tyre KLRU and KLRZ are suitable for operating temperatures from $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$, restricted by the grease, cage material, sealing ring material and the plastic tyre.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
DRS	Lip seal on the stud side	Standard
RR	Protected against corrosion by Corrotect [®] special coating	Special design, available by agreement
X	Cylindrical outside surface	Standard
2RS	Lip seals on both sides, giving axial sealing action	
2RSR	Lip seals on both sides, giving radial sealing action	
2Z	Sealing shields on both sides	

Other products

Schaeffler also supplies profiled track rollers LFR5 in which the outer ring has a gothic arch profile.

These profiled track rollers are preferably used with a shaft or circular section mating track.

Enquiries

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Design and safety guidelines



For reliable and problem-free operation of track rollers, it is essential that attention is paid to the following items:

- Installation as yoke or stud type track roller, see page 944
- Permissible radial load under dynamic or static loading, see page 944
- Load carrying capacity and life, see page 944
- Operating life, see page 946
- Minimum load, see page 946
- Skewed running and tilting, see page 947
- Speeds, see page 948
- Lubrication, see page 950.

Adjacent construction for yoke type track rollers

The abutment surfaces for the bearings must be flat and perpendicular. Due to the contact pressure occurring, they must not be less than the dimension d_2 , see dimension table.

Yoke type track rollers LR can be axially clamped or located by means of conventional fasteners such as snap rings.



Shaft tolerances

In general, yoke type track rollers have point load on the inner ring. In order to ensure adequate support and to avoid fretting corrosion as far as possible, the shaft should be in the tolerance zone h6.

Adjacent construction for stud type track rollers

The abutment surfaces for the track rollers must be flat and perpendicular. Due to the contact pressure occurring, they must not be less than the dimension d_2 , see dimension table.

The lead chamfer on the locating bore must not be more than $0,5 \times 45^\circ$.



Stud type track rollers ZL and KR must be axially clamped.

The nut contact surface must have sufficiently high strength and the tightening torque M_A for the fixing nut must be observed, see dimension table. The roller stud can only transmit the permissible radial load if the correct tightening torque is applied.

If the tightening torque cannot be adhered to, an interference fit is required.

Bore tolerance

Suitable stud and bore tolerances, see table.

Stud and bore tolerances

Track roller Series	Tolerance	
	Stud	Bore (recommended)
ZL2	r6	H7
ZL52	r6	
KR52	h7	
ZLE52	h9	

Ball bearing track rollers

Fitting

Yoke type track rollers

If the tolerances are unfavourable, the yoke type track roller should be pressed onto the shaft or stud using a press, *Figure 1*.

The inner ring must be fitted such that the pressing-in force is distributed uniformly on the end face of the inner ring.



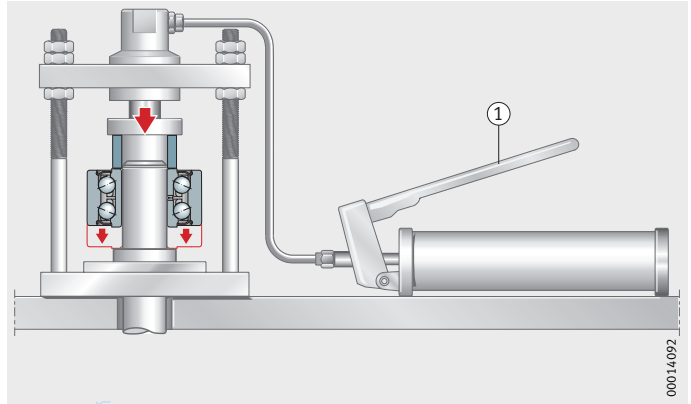
Fitting forces must never be directed through the rolling elements. Ensure that the seals are not damaged.

The yoke type track rollers must be secured axially.

LR50, LR52, LR53

① Fitting press

Figure 1
Fitting of the yoke type track roller
using a fitting press



Stud type track rollers

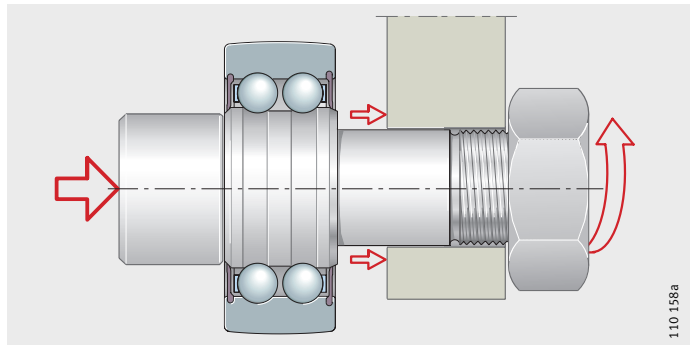
Stud type track rollers are fitted and dismantled by methods to those used for yoke type track rollers, *Figure 2*.



The tightening torques given in the dimension tables must be observed. It is only in this way that the permissible radial load can be ensured.

Screws and nuts of grade 8.8 or better must be used.

Figure 2
Fitting of stud type track roller



Accuracy The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

In a deviation from DIN 620, the diameter tolerance of the profiled outside surface is 0/−0,05 mm.

Stud tolerance for stud type track rollers and bore tolerances, see tables, page 991.

Radial internal clearance The radial internal clearance corresponds to class CN in accordance with DIN 620-4.

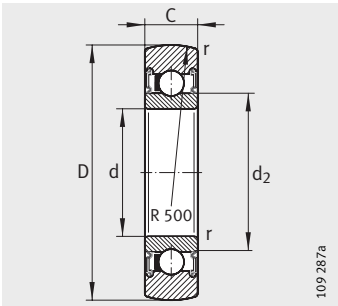
Radial internal clearance

Bore		Radial internal clearance									
d mm		C2 μm		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90



Yoke type track rollers

Single row
Sealed



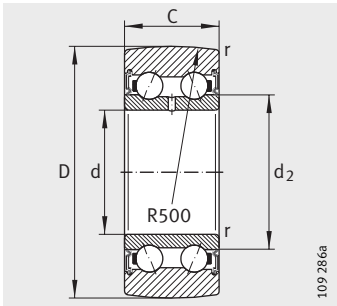
LR6...-2RSR, LR2...-2RSR,
LR2...-X-2RSR¹⁾

Dimension table - Dimensions in mm										
Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load	Speed
		D	d	C	d ₂	r min.	dyn. C _{rw} N	stat. C _{0rw} N	C _{urw} N	n _{D G} min ⁻¹
LR604-2RSR	10	13	4	4	6,1	0,2	870	350	18,1	24 000
LR605-2RSR	10	16	5	5	7,5	0,2	1 220	510	25,5	23 000
LR606-2RSR	10	19	6	6	8,7	0,3	1 840	790	39,5	22 000
LR607-2RSR	10	22	7	6	9	0,3	2 120	880	42,5	20 000
LR608-2RSR	20	24	8	7	10	0,3	2 750	1 240	63	19 000
LR6000-2RSR	20	28	10	8	14,6	0,3	4 550	2 500	128	16 000
LR6001-2RSR	30	30	12	8	16,6	0,3	4 750	2 800	144	15 000
LR200-2RS	50	32	10	9	16,6	0,6	4 850	2 310	117	13 000
LR200-X-2RS ¹⁾	50	32	10	9	16,6	0,6	4 850	2 310	117	13 000
LR201-2RSR	50	35	12	10	18,3	0,6	5 600	2 750	137	12 000
LR201-X-2RSR ¹⁾	50	35	12	10	18,3	0,6	5 600	2 750	137	12 000
LR202-2RSR	70	40	15	11	21	0,6	6 600	3 350	170	11 000
LR202-X-2RSR ¹⁾	70	40	15	11	21	0,6	6 600	3 350	170	11 000
LR203-2RSR	110	47	17	12	24	0,6	8 500	4 450	223	9 000
LR203-X-2RSR ¹⁾	110	47	17	12	24	0,6	8 500	4 450	223	9 000
LR204-2RSR	150	52	20	14	29	1	10 600	5 700	295	8 000
LR204-X-2RSR ¹⁾	150	52	20	14	29	1	10 600	5 700	295	8 000
LR205-2RSR	230	62	25	15	33,5	1	12 500	7 100	360	7 000
LR205-X-2RSR ¹⁾	230	62	25	15	33,5	1	12 500	7 100	360	7 000
LR206-2RS	330	72	30	16	37,4	1	16 600	9 700	500	5 500
LR206-X-2RS ¹⁾	330	72	30	16	37,4	1	16 600	9 700	500	5 500
LR207-2RS	400	80	35	17	42,4	1,1	20 400	12 100	640	4 500
LR207-X-2RS ¹⁾	400	80	35	17	42,4	1,1	20 400	12 100	640	4 500
LR209-2RS	500	90	45	19	53,2	1,1	22 400	13 700	730	3 600
LR209-X-2RS ¹⁾	500	90	45	19	53,2	1,1	22 400	13 700	730	3 600

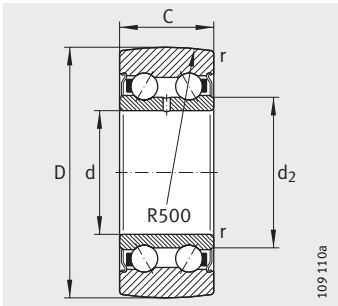
1) Track roller with cylindrical outside surface.

Yoke type track rollers

Double row
Sealed



LR50..-2RSR



LR52..-2Z,
LR52..-X-2Z¹⁾

Dimension table · Dimensions in mm										
Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
		D	d	C	d ₂	r min.	dyn. C _{rw} N	stat. C _{0rw} N		
LR50/5-2RSR	10	17	5	7	8,2	0,2	1 690	940	48,5	12 000
LR50/6-2RSR	20	19	6	9	9,3	0,3	2 700	1 370	66	11 000
LR50/7-2RSR	20	22	7	10	10,5	0,3	3 300	1 700	81	10 000
LR50/8-2RSR ²⁾	30	24	8	11	10,5	0,3	4 300	2 390	119	10 000
LR5000-2RS	30	28	10	12	13,5	0,3	4 750	2 850	145	9 000
LR5001-2RS	30	30	12	12	15,5	0,3	5 100	3 100	161	8 500
LR5200-2Z	70	32	10	14	15,4	0,6	6 800	4 100	208	11 000
LR5200-X-2Z ¹⁾	70	32	10	14	15,4	0,6	6 800	4 100	208	11 000
LR5200-2RS	70	32	10	14	15,4	0,6	6 800	4 100	208	8 000
LR5002-2RS	50	35	15	13	20,4	0,3	6 500	4 150	217	7 000
LR5201-2Z	80	35	12	15,9	17,1	0,6	8 700	5 200	260	10 000
LR5201-X-2Z ¹⁾	80	35	12	15,9	17,1	0,6	8 700	5 200	260	10 000
LR5201-2RS	80	35	12	15,9	17,1	0,6	8 700	5 200	260	7 500
LR5003-2RS	70	40	17	14	21,6	0,3	7 800	5 300	270	6 000
LR5202-2Z	110	40	15	15,9	20	0,6	10 000	6 300	320	10 000
LR5202-X-2Z ¹⁾	110	40	15	15,9	20	0,6	10 000	6 300	320	10 000
LR5202-2RS	110	40	15	15,9	20	0,6	10 000	6 300	320	7 000

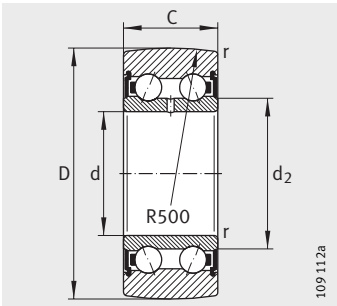
1) Track roller with cylindrical outside surface.

2) Without lubrication hole.

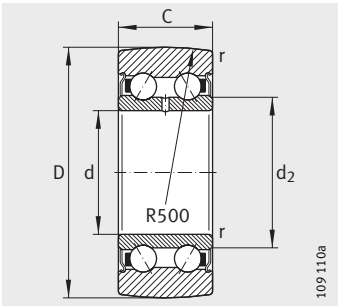


Yoke type track rollers

Double row
Sealed



LR500..-2RS, LR520..-2RS,
LR530..-2RS



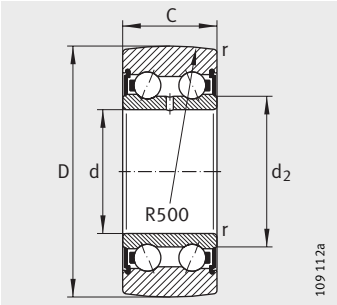
LR520..-2Z, LR530..-2Z,
LR520..-X-2Z¹⁾

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{D G} min ⁻¹
		D	d	C	d ₂	r min.	dyn. C _{rw} N	stat. C _{0rw} N		
LR5004-2RS	120	47	20	16	25,2	0,6	11 700	7 700	400	5 500
LR5203-2Z	170	47	17	17,5	22,5	0,6	12 800	8 400	420	7 500
LR5203-X-2Z ¹⁾	170	47	17	17,5	22,5	0,6	12 800	8 400	420	7 500
LR5203-2RS	170	47	17	17,5	22,5	0,6	12 800	8 400	420	5 500
LR5005-2RS	150	52	25	16	29,8	0,6	11 800	8 200	440	4 700
LR5204-2Z	230	52	20	20,6	26,5	1	16 100	10 700	550	7 000
LR5204-X-2Z ¹⁾	230	52	20	20,6	26,5	1	16 100	10 700	550	7 000
LR5204-2RS	230	52	20	20,6	26,5	1	16 100	10 700	550	5 000
LR5303-2RS	210	52	17	22,2	23,5	1	17 500	11 300	560	4 700
LR5006-2RS	250	62	30	19	35,5	1	16 100	11 900	630	4 000
LR5205-2Z	340	62	25	20,6	30,3	1	18 800	13 200	670	6 500
LR5205-X-2Z ¹⁾	340	62	25	20,6	30,3	1	18 800	13 200	670	6 500
LR5205-2RS	340	62	25	20,6	30,3	1	18 800	13 200	670	4 500
LR5304-2Z	340	62	20	22,2	29	1,1	21 500	14 800	740	6 500
LR5304-2RS	340	62	20	22,2	29	1,1	21 500	14 800	740	4 500
LR5007-2RS	300	68	35	20	41,7	1	17 800	13 300	720	4 300

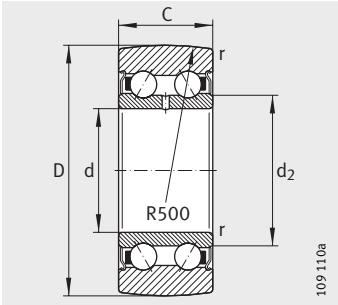
¹⁾ Track roller with cylindrical outside surface.

Yoke type track rollers

Double row
Sealed



LR52..-2RS, LR53..-2RS



LR52..-2Z, LR53..-2Z,
LR52..-X-2Z¹⁾

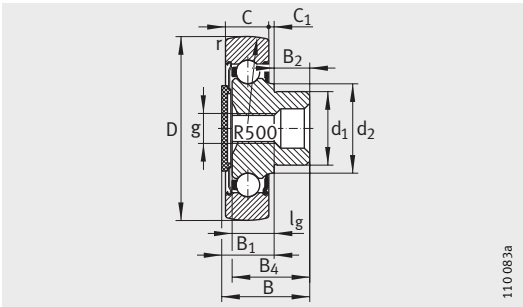
Dimension table (continued) - Dimensions in mm											
Designation	Mass m ≈g	Dimensions					Basic load ratings			Fatigue limit load C _{urw} N	Speed n _{D G} min ⁻¹
		D	d	C	d ₂	r min.	dyn. C _{rw} N	stat. C _{0rw} N	F _{r per} N		
LR5206-2Z	510	72	30	23,8	37,4	1	25 000	18 000	–	930	5 000
LR5206-X-2Z ¹⁾	510	72	30	23,8	37,4	1	25 000	18 000	–	930	5 000
LR5206-2RS	510	72	30	23,8	37,4	1	25 000	18 000	–	930	3 500
LR5305-2Z	500	72	25	25,4	34,4	1,1	28 000	19 900	–	1 000	5 500
LR5305-2RS	500	72	25	25,4	34,4	1,1	28 000	19 900	–	1 000	3 900
LR5207-2Z	660	80	35	27	42,4	1,1	31 000	22 800	–	1 200	3 900
LR5207-X-2Z ¹⁾	660	80	35	27	42,4	1,1	31 000	22 800	–	1 200	3 900
LR5207-2RS	660	80	35	27	42,4	1,1	31 000	22 800	–	1 200	2 800
LR5306-2Z	670	80	30	30,2	41,4	1,1	35 500	25 500	–	1 330	4 300
LR5306-2RS	670	80	30	30,2	41,4	1,1	35 500	25 500	–	1 330	3 100
LR5208-2Z	750	85	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	3 500
LR5208-X-2Z ¹⁾	750	85	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	3 500
LR5208-2RS	750	85	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	2 500
LR5307-2Z	970	90	35	34,9	47,7	1,5	44 000	32 500	–	1 670	3 600
LR5307-2RS	970	90	35	34,9	47,7	1,5	44 000	32 500	–	1 670	2 500
LR5308-2Z	1 200	100	40	36,5	52,4	1,5	54 000	40 500	–	2 100	3 300
LR5308-2RS	1 200	100	40	36,5	52,4	1,5	54 000	40 500	–	2 100	2 300

¹⁾ Track roller with cylindrical outside surface.



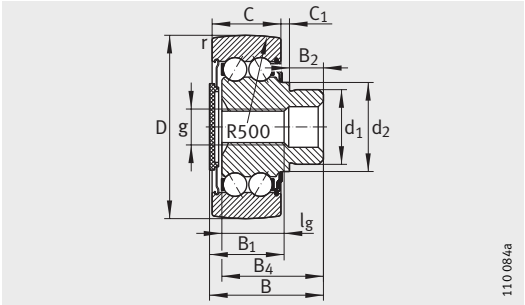
Stud type track rollers

Sealed

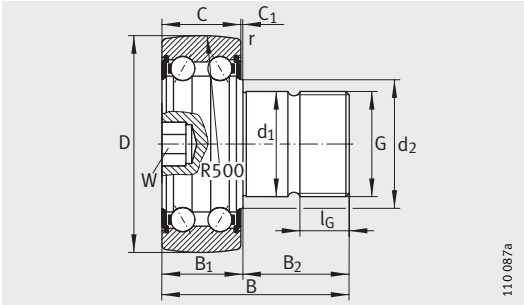


ZL2...-DRS

Dimension table - Dimensions in mm												
Designation	Mass m ≈g	Dimensions										
		D	d ₁	B	B ₁ max.	B ₂	B ₄	C	C ₁	d ₂	r min.	G
ZL5201-DRS	90	35	14	33,2	19,5	14	31	15,9	2,6	17,1	0,6	–
KR5201-2RS	120	35	12	49,2	17	32,5	–	15,9	0,8	17,1	0,6	M12X1,5
ZL202-DRS	80	40	16	23,8	14	10	21,5	11	2	20	0,6	–
ZL5202-DRS	120	40	16	36,2	20,5	16	34	15,9	3,5	20	0,6	–
KR5202-2RS	190	40	16	53,2	17	36,5	–	15,9	0,8	20	0,6	M16X1,5
ZL203-DRS	120	47	18	26,5	14,5	12	24,5	12	2	22,9	0,6	–
ZL5203-DRS	190	47	18	39,5	21,5	18	37,5	17,5	3,5	22,9	0,6	–
KR5203-2RS	290	47	18	58,8	18,5	40,5	–	17,5	0,8	22,9	0,6	M18X1,5
ZL204-DRS	170	52	20	30,7	17	14	28,5	14	2	26,8	1	–
ZL5204-DRS	250	52	20	45,3	25,5	20	43	20,6	4	26,8	1	–
KR5204-2RS	380	52	20	63,6	22,5	41,5	–	20,6	1,5	26,8	1	M20X1,5
ZL205-DRS	250	62	25	33,8	18	16	31	15	2	30,3	1	–
ZL5205-DRS	380	62	25	50,4	25,5	25	47,5	20,6	4	30,3	1	–
KR5205-2RS	580	62	24	70,9	21,5	49,5	–	20,6	0,8	30,3	1	M24X1,5
ZL5206-DRS	550	72	30	59	29	30	56,5	23,8	4,5	37,3	1	–
KR5206-2RS	800	72	24	74,1	25	49,5	–	23,8	0,8	37,3	1	M24X1,5
ZL5207-DRS	710	80	35	69,2	33,5	36	66,5	27	5,5	42,4	1,1	–
KR5207-2RS	1 200	80	30	91	28	63	–	27	1	42,4	1,1	M30X1,5



ZL52...-DRS

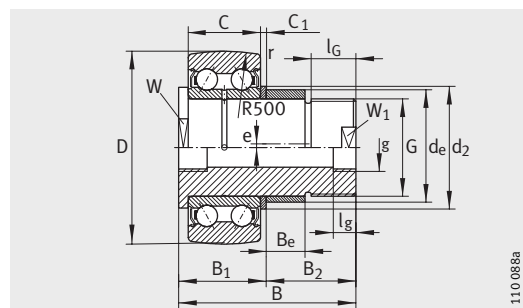


KR52...-2RS

				Tightening torque M _A Nm	Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
l _G	g	l _g	W		dyn. C _{rw} N	stat. C _{0rw} N		
–	M8	14	–	–	8 700	5 200	260	7 500
17	–	–	6	45	8 700	5 200	260	7 500
–	M8	15	–	–	6 600	3 350	170	8 500
–	M8	15	–	–	10 000	6 300	320	7 000
19	–	–	8	70	10 000	6 300	320	7 000
–	M8	16	–	–	8 500	4 450	223	6 500
–	M8	15	–	–	12 800	8 400	420	5 500
21	–	–	8	115	12 800	8 400	420	5 500
–	M10	18	–	–	10 600	5 700	295	6 000
–	M10	18	–	–	16 100	10 700	550	5 000
21	–	–	10	160	16 100	10 700	550	5 000
–	M10	19	–	–	12 500	7 100	360	5 500
–	M10	18	–	–	18 800	13 200	670	4 500
25	–	–	10	290	18 800	13 200	670	4 500
–	M16	20	–	–	25 000	18 000	930	3 500
25	–	–	10	290	25 000	18 000	930	3 500
–	M16	20	–	–	31 000	22 800	1 200	2 800
32	–	–	12	600	31 000	22 800	1 200	2 800



With eccentric collar
Sealed



ZLE52..-2Z

Dimension table · Dimensions in mm

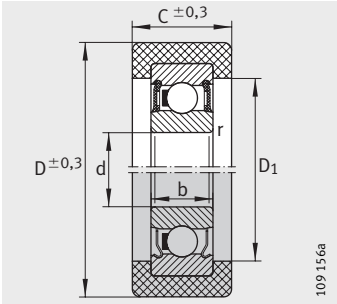
Designation	Mass	Dimensions										
	m	D	d _e	B	B ₁	B ₂	C	C ₁	d ₂	r	W	W ₁
	≈g				max.					min.		
ZLE5201-2Z	250	35	18	65,5	20,5	45	15,9	2	25	0,6	15	9
ZLE5202-2Z	350	40	22	66,5	21,5	45	15,9	2,5	27	0,6	17	10
ZLE5204-2Z	460	52	24	76	26	50	20,6	2,5	30	1	22	17
ZLE5205-2Z	640	62	24	88	32	56	20,6	8	30	1	22	17
ZLE5207-2Z	1 300	80	35	99	35	64	27	3	45	1,1	40	27

						Tightening torque	Basic load ratings		Fatigue limit load	Speed
e	B _e	g	l _g	G	l _G min.	M _A Nm	dyn. C _{r w} N	stat. C _{0 r w} N	C _{u r w} N	n _{D G} min ⁻¹
1	18	M6	6	M12X1,5	24	30	8 700	5 200	260	10 000
1	16	M8X1	8	M14	25	40	10 000	6 300	320	10 000
1	18	M8X1	8	M20X1,5	29	150	16 100	10 700	550	7 000
1	25	M8X1	8	M20X1,5	28	150	18 800	13 200	670	6 500
1,5	29	M8X1	8	M30X1,5	32	540	31 000	22 800	1 200	3 900

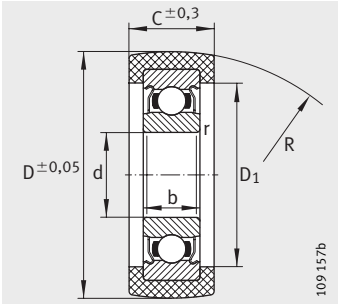


Track rollers

With plastic outer tyre
Sealed



KLRZ..-2RSR
KLRZ..-2Z



KLRU..-2Z

Dimension table - Dimensions in mm												
Designation	Mass	Dimensions							Basic load ratings of track roller ¹⁾ $F_{r\ per}$ N	Deep groove ball bearing fitted	Basic load ratings of deep groove ball bearing	
	m ≈g	D	d	C	b	D ₁	R	r min.			dyn. C_r N	stat. C_{0r} N
KLRU08X28X11-2Z	16	27,5	8	11	7	20	500	0,3	250	608-2Z	3 200	1 250
KLRZ10X30X10-2Z	50	30	10	10	8	24	—	0,3	250	6000-2Z	4 600	1 970
KLRU12X35X12-2Z	30	34,8	12	12	8	26	300	0,3	340	6001-2Z	5 100	2 370
KLRZ12X41X16-2RSR	50	41	12	16	10	29,5	—	0,6	500	6201-2RSR	7 100	3 100
KLRU12X47X20-2Z	45	46,8	12	20	10	28,5	300	0,6	500	6201-2Z	7 100	3 100
KLRU15X47X20-2Z	50	46,8	15	20	11	31,5	300	0,6	500	6202-2Z	7 700	3 500

¹⁾ Valid for installation as track roller.
The values apply for operating temperatures up to max. +40 °C.



