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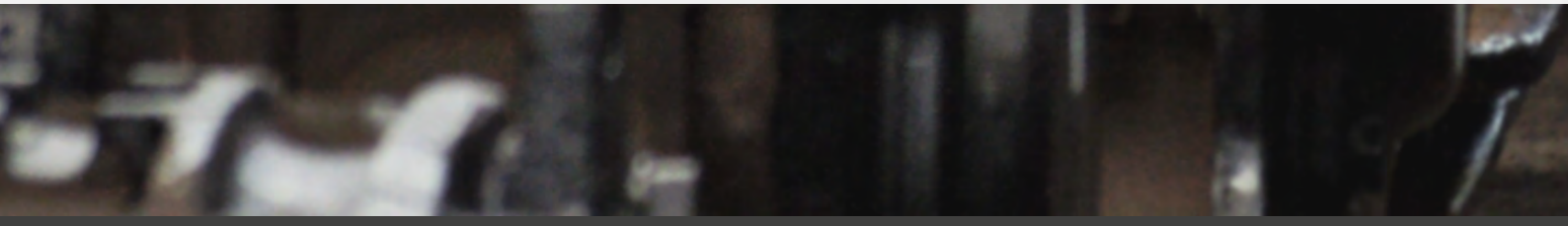
Kugel- und Rollenlagerwerk Leipzig GmbH

Assembly and disassembly instructions

Cylindrical Roller Wheelset Bearings



Contents

1 General information

These instructions provide an overview of the correct assembly of wheel set bearing units consisting of two cylindrical roller bearings. The instructions on the KRW drawings and/or bearing-specific KRW instructions also apply. The contents of these mounting instructions must be communicated to the end user. KRW is not liable for damage caused by faulty mounting, lack of or incorrect maintenance or missing or incomplete forwarding of the contents to third parties. The general industrial safety guidelines must also be observed.

2 Storage and shelf life of bearings

The storage time of rolling bearings is very much influenced by environmental conditions, such as temperature fluctuations or humidity. Therefore, we recommend to keep the storage time for bearings as short as possible. The condition of the bearings must be checked for corrosion and/or damage, if the storage time is exceeded, if there is visible damage to the packaging or inadequate preservation. As a rule, rolling bearings without preservation are susceptible to corrosion. For the removal of the bearings from their original packaging, as well as their handling and mounting, suitable protective gloves must be used. If direct skin contact cannot be avoided, the bearings must then be cleaned and preserved with a suitable corrosion protection agent.
If, in spite of all appropriate precautions, the bearing is contaminated during the assembly process, these liquid or solid contaminants must be thoroughly rinsed out with a suitable agent before mounting. Solid mineral particles in particular may lead to premature failure of the bearing during operation. For greased bearings, the contaminated grease must be completely replaced using suitable aids. KRW will be pleased to assist you with this.

For information on the storage and shelf life of bearings, please see:
www.krw.de/en

2.1 Preservation

Sealed wheel set bearings are greased at the factory by KRW. In addition to packaging, the bearings are treated with an anti-corrosion agent to increase their durability. If there is no contamination, it is strongly discouraged to wash out the rolling bearings before use. The preservative can be removed from the mating surfaces with a clean, lint-free cloth prior to mounting.

2.2 Storage time

Experience has shown that KRW rolling bearings can be stored for up to two years. If the packaged bearing is placed in sturdy wooden box, the storage time increases to up to three years. This storage period starts on the date of factory packing of the bearings and is based on the following storage and transport conditions.

2.3 Storage conditions

The following storage conditions ensure the minimum storage time and provide important information on the proper storage of rolling bearings:

- Storage of bearings on wooden shelves is not permitted.
- The storage location must have a minimum distance of 30 cm from walls, floors, heating and air conditioning systems and their supply and drain pipes.
- Bearings must not be stored in stacks or subjected to constraining forces during storage.
- The storage room may not be subject to severe temperature fluctuations.
- The maximum relative humidity is 65%.
- Rolling bearings must be stored in their unopened original packaging and only removed immediately before mounting.
- No labels or other tags may be removed from the original packaging.
- If the bearing is to be stored after the original packaging has been opened, suitable preservation measures must be taken.
- During storage, the bearing may not be exposed to aggressive or corrosive media such as gases, mists or aerosols.
- Bearings may not be stored in direct sunlight for extended time periods.
- The place of storage must not be exposed to permanent vibrations or shocks in order to prevent premature damage to the bearing (stagnation marks or false brinelling).

2.4 Transport conditions

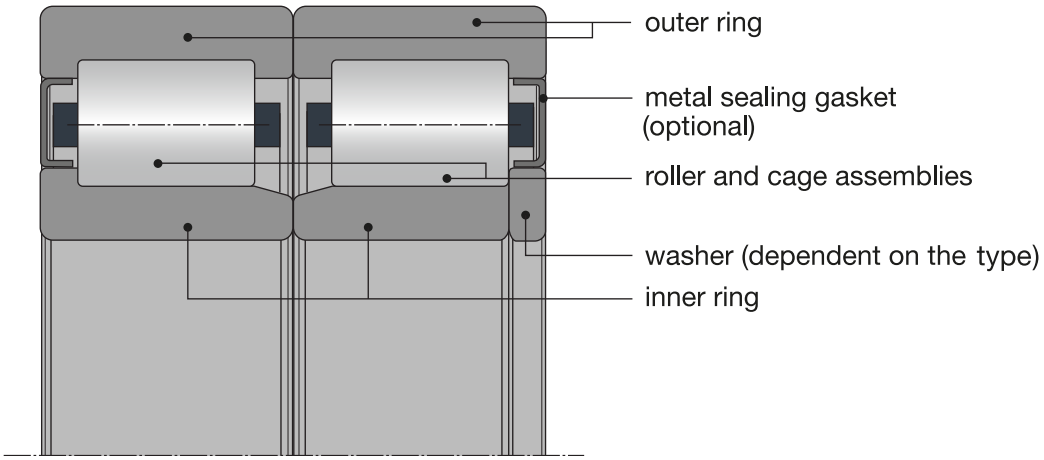
The general rules apply to the transport of bearings:

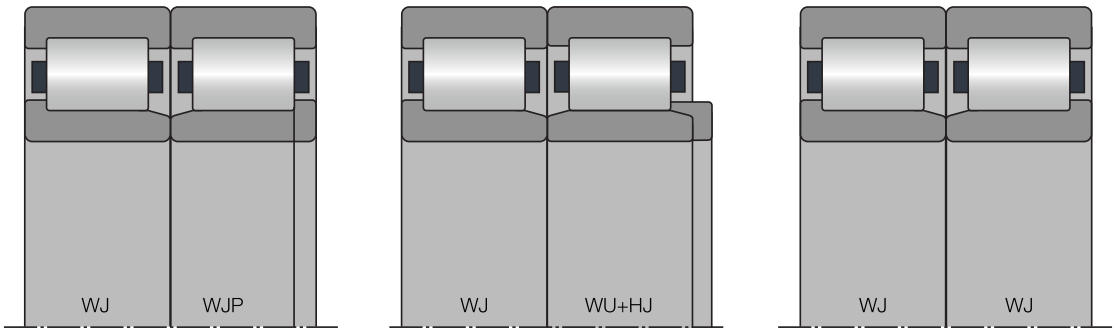
- The original KRW packaging must be used to transport the bearings.
- Do not stack bearings, even in their original packaging. You must observe the instructions on the original packaging.
- Bearings must be protected against environmental influences and transported without exposure to large temperature fluctuations.
- To avoid stagnation marks, transport with low vibration or at least with vibration dampening.

3 Wheel set bearings and their components

A wheel set bearing unit consists of two cylindrical roller bearings. In general, a cylindrical roller bearing consists of an outer ring, an inner ring and a roller and cage assembly with a brass or plastic cage. Type WJ is characterized by a fixed lip on the inner ring. In type WJP the lip is loose. Type WU+HJ bearings have an L-section ring instead of the loose lip. Depending on customer requirements, the wheel set bearing unit is supplied with or without a sheet metal seal. Sealed rolling bearings are greased at the factory by KRW.

The following illustrations show the components of a wheel set bearing using the WJ-WJP pairing as an example, as well as a schematic representation of possible wheel set bearing combinations of the individual designs.





4 Preparations for assembly & disassembly

4.1 General information

The following instructions must be observed and adhered to before and during assembly / disassembly:

- The workplace must be clean, dry, dust-free and well lit.
- Ensure that the surface is light-colored, clean and as free of fibers as possible.
- We recommend a room temperature of 15°C to 25°C.
- All contact surfaces must be cleaned with a lint-free cloth so that they are free of chips and other residues.
- It must be ensured that the surrounding components have the same temperatures as the bearings to be assembled.
- Impact points on contact and functional surfaces must be avoided.
- The bores must be cleaned and deburred using compressed air. Wear protective goggles and hearing protection when doing this.
- The bearings may only be assembled using clean tools and aids.
- The bearings should only be removed from their packaging immediately before assembly in order to avoid contamination. If the bearings are removed prematurely from their original packaging, they must be protected with a suitable cover.

4.2 Tools and aids

4.2.1 Assembly

The following work equipment must be provided before assembly.
Preparation of the shaft / housing:

- Outside micrometer or micrometer
- Inside micrometer

Assembly of cylindrical roller bearings:

- Induction heating device, oil bath, heating plate or hydraulic press
- Mounting sleeve for inner rings
- Rubber mallet
- Steel triangle
- Torque wrench
- Clamping elements
- Fixation tools

Assembly of the wheel set housing:

- Wheel set bearing grease for ungreased bearings
- Torque wrench
- Flexible sling for the crane
- Mounting sleeve for housing with outer ring and roller set

4.2.2 Disassembly

The following work equipment must be provided prior to disassembly:

- Wrench / socket wrench / torque wrench
- Mounting sleeve for inner rings
- Flexible sling for the crane
- Flexible / fixed inductor or hydraulic press and extraction tool
- Extraction out tools for disassembly of the bearing from the housing

5 Assembly

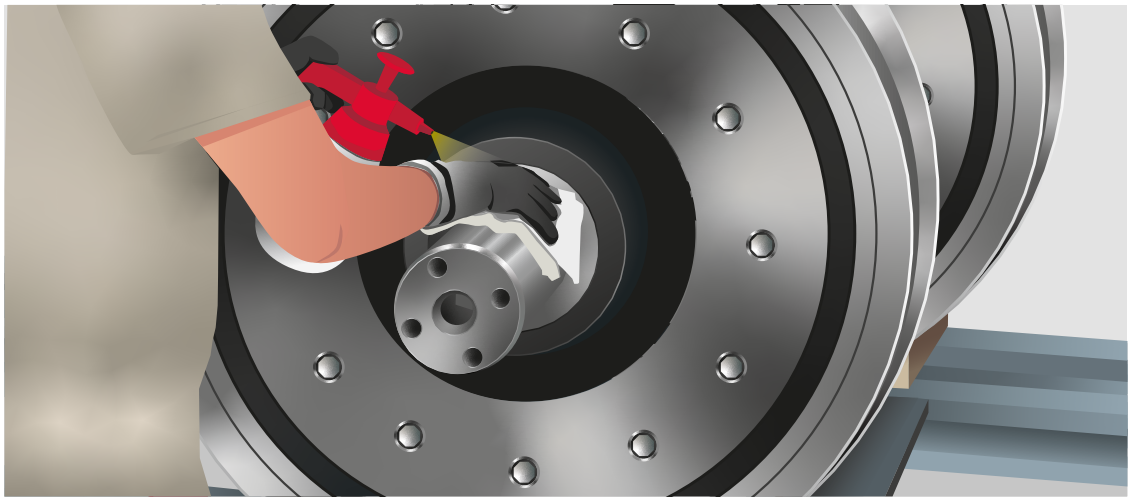
The wheel set bearing units can be assembled in cold or warmed-up condition. By default, the WJ+WJP and WJ+WU+HJ wheel set bearing combinations are installed thermally in a warmed-up condition, while the WJ+WJ pairing is installed hydraulically in a cold condition.

Important note: Impacts on the rolling bearing components or their surrounding structures as well as force transmission via the rolling elements must be avoided at all costs.

5.1 Checking the shaft and housing

The shaft journal and housing must be inspected before assembly. Proceed as follows:

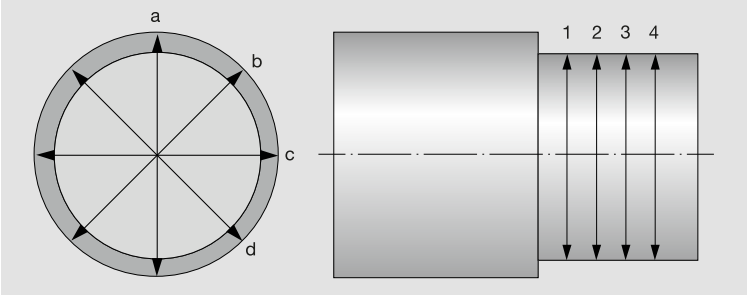
1) Clean and inspect the bearing seating, corner radii and shoulder for the labyrinth seal.



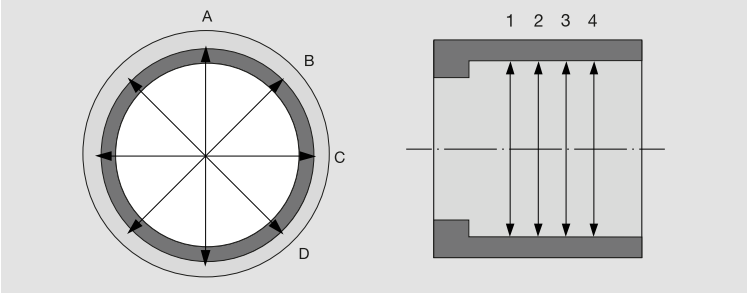
2) Any burrs, scratches or imperfections must be removed. Ensure that the threads for the pressure cap fastening screws are clean and deburred.

3) Measurement forms (appendix) must be used for measurement and further documentation.

4) Check that the mating parts are within the dimensional and positional tolerances. To do this, measure the cylindrical shaft seat with an outside micrometer in four positions in four planes. The following figure shows the measuring points.



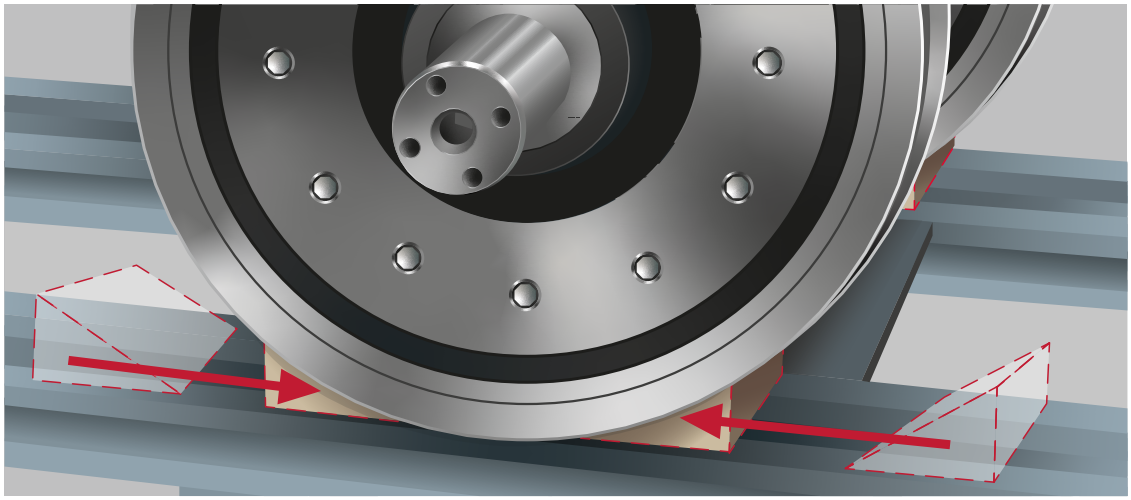
5) The diameter of the cylindrical housing seat is checked with an inside micrometer in four positions in four planes. The following figure shows the measuring points.



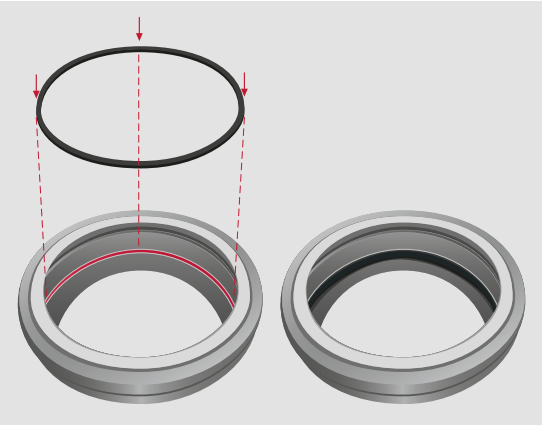
6) After the check is completed, the shaft journal and housing are wiped with a lint-free cloth for assembly.

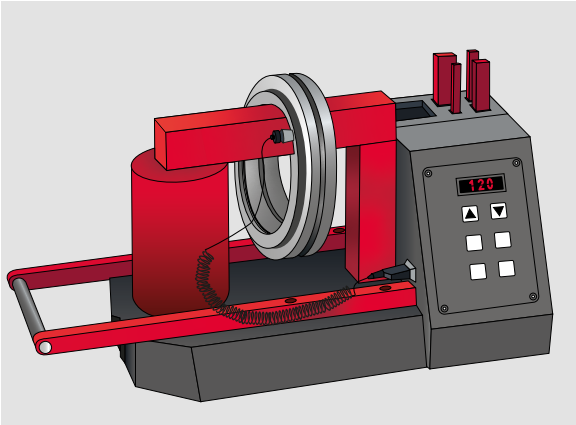
5.2 Thermal assembly

The following steps must be followed for the thermal assembly of wheel set bearings:

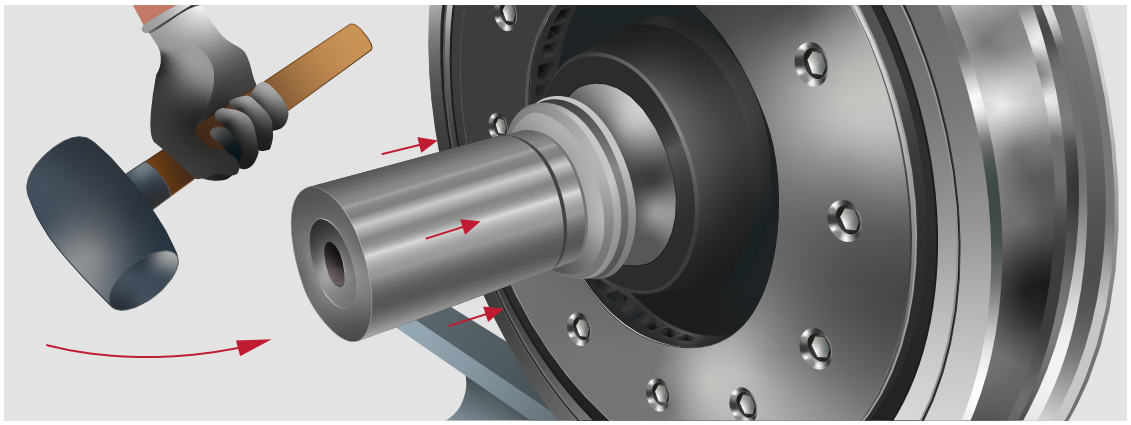


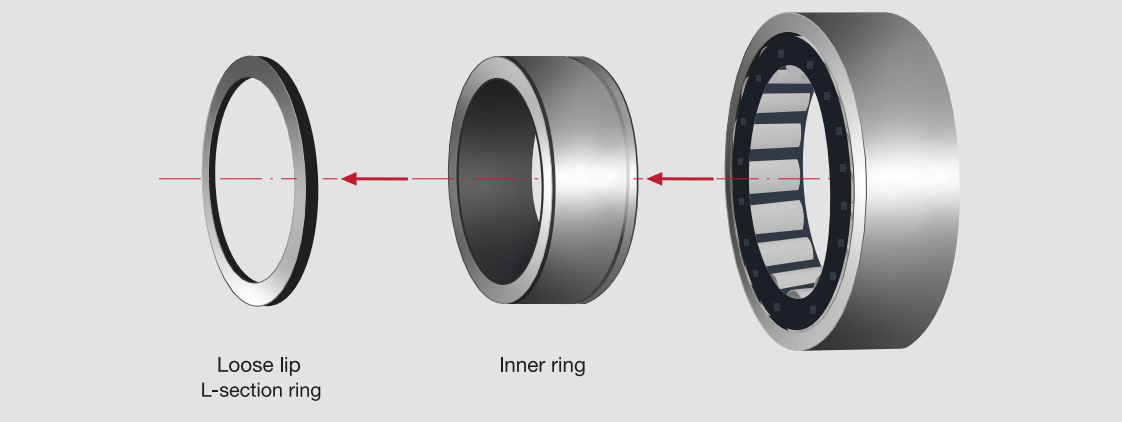
Step 1: Wheel sets shall be locked in place prior to bearing installation.



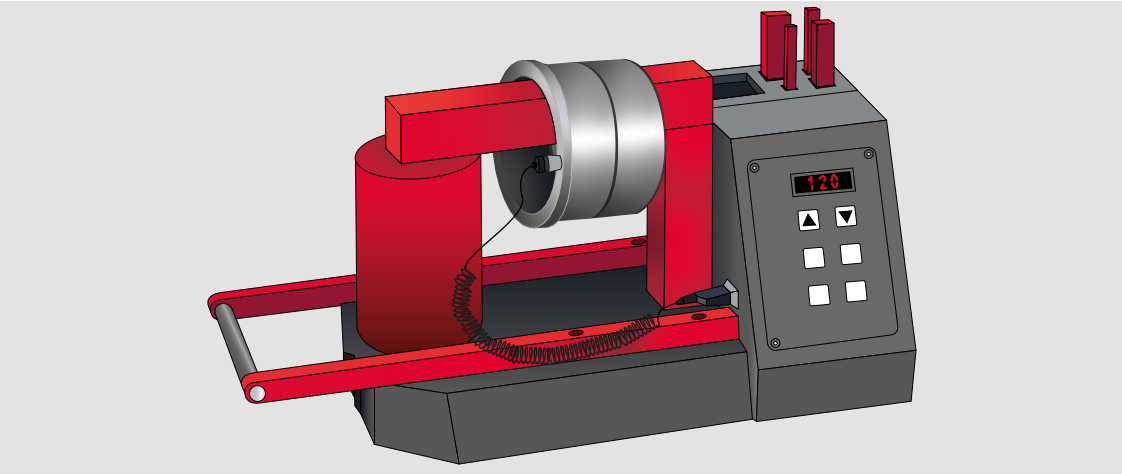


Step 2: Before the assembly of the wheel set bearings, the labyrinth ring is pulled onto the shaft. If an O-ring is available, it must be inserted into the labyrinth ring. The labyrinth ring is inductively heated to approx. 120°C and then pushed onto the shaft. There, it is brought into the correct position with the aid of a stop sleeve. The ring is then allowed to cool for approx. 10 minutes.





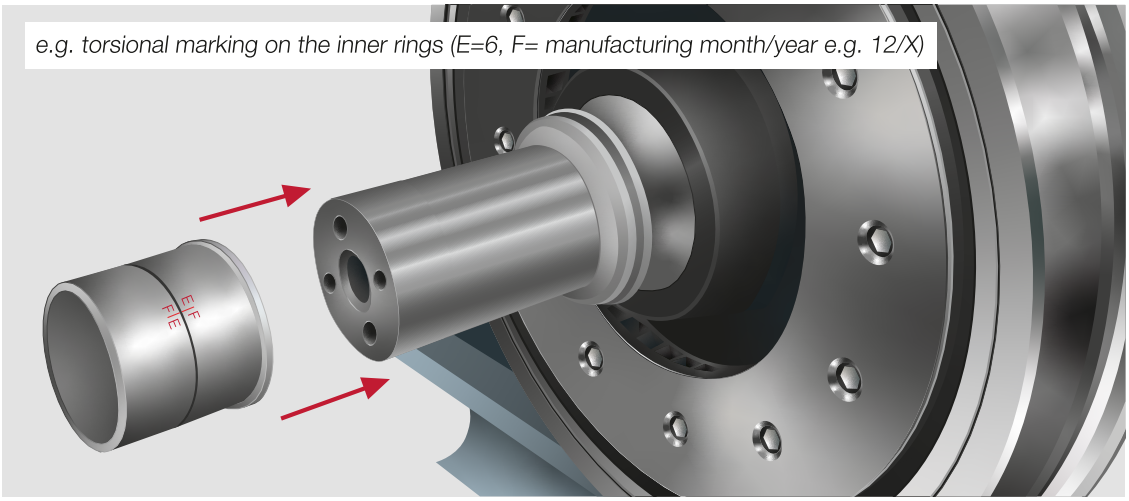
Step 3: The inner rings are removed from the bearings by turning them slightly. If there is a loose lip or an L-section ring on one side of the bearings, these must be re-moved beforehand and repositioned in the same place during the installation of the outer ring / roller and cage assembly. In the case of sealed rolling bearings, ensure that the seals are not damaged and that only small quantities of grease escape from the bearing during inner ring removal.



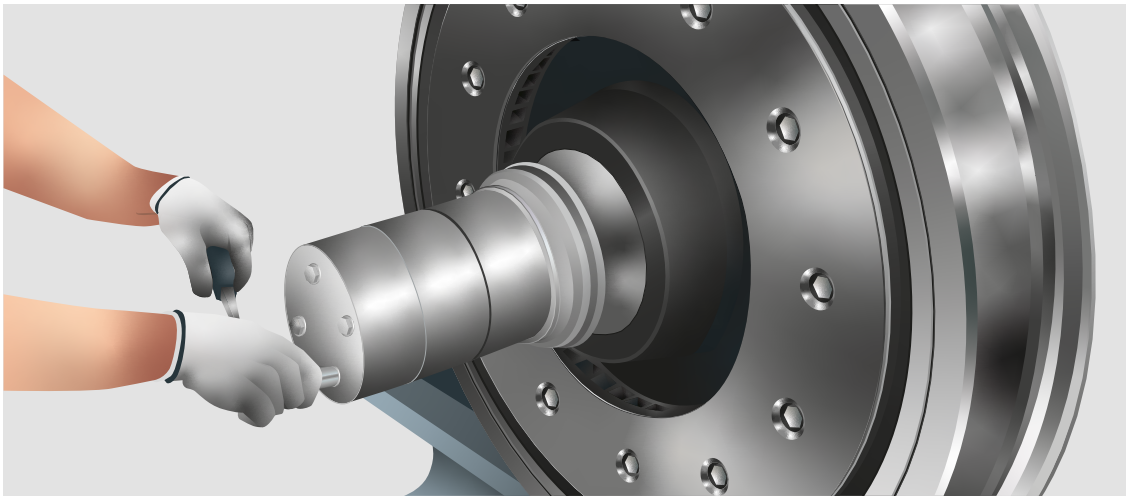
Step 4: The inner rings are heated evenly to a maximum of 120°C using an induction heating device or a heating plate. To prevent an overheating of the bearing parts, the heating temperature must be controlled. Inductively mounted bearing parts must be demagnetized.

Heating the inner rings by means of an open flame is not permitted.
It is recommended that the torsion marks of both inner rings are already aligned with each other on the heating device and that the two inner rings are mounted as a whole.

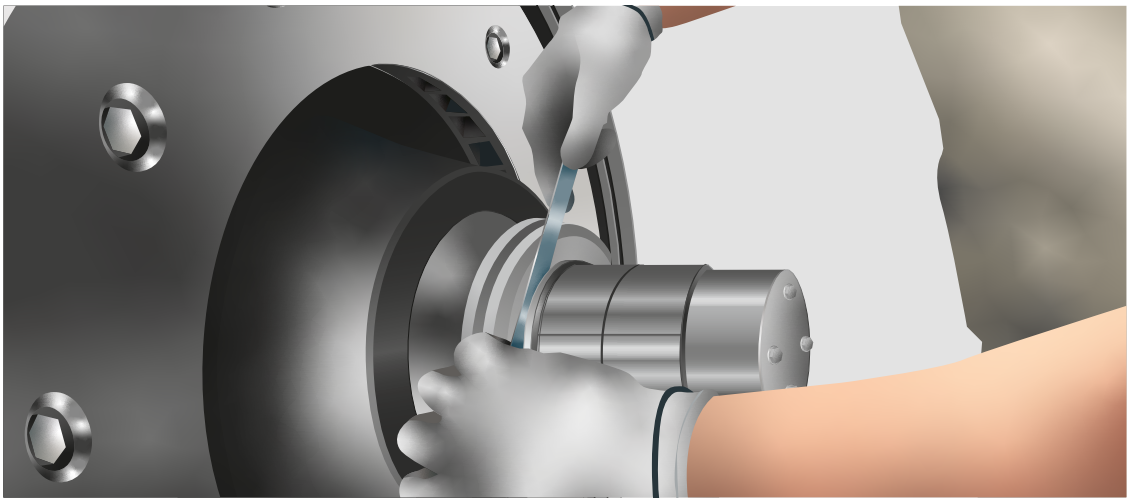
In the case of ungreased bearings, the oil bath can also be used for heating. Make sure that the bearing does not lie on the ground. However, for health, safety and environmental reasons, this method is not recommended.



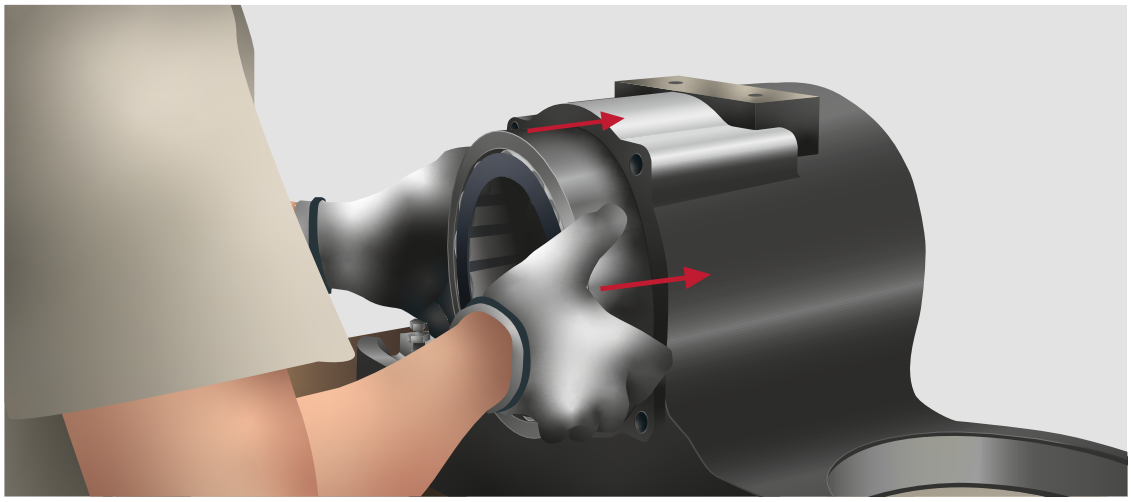
Step 5: During the mounting of the inner ring, the line markings on the chamfers or the overrolling-free section of both inner rings must be precisely aligned (torsion marking E/F). The WJ bearing with the fixed lip must be mounted first.



Step 6: During cooling, brace the rings with a dummy end cap. Tighten it with the nominal tightening torque (pre-tightening and final tightening torque) of the final end cap.

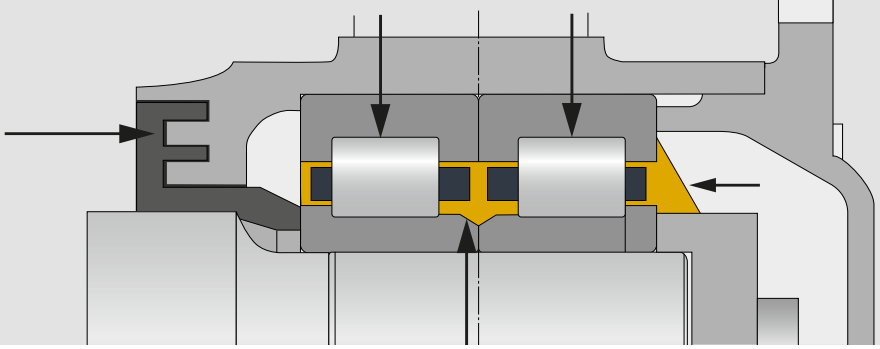


Step 7: After a cooling time of approx. 10 minutes (i.e. in a cooled state), the bearing inner ring gaps are checked with a feeler gauge of 0.01 mm. Note that the feeler gauge cannot be inserted circumferentially.

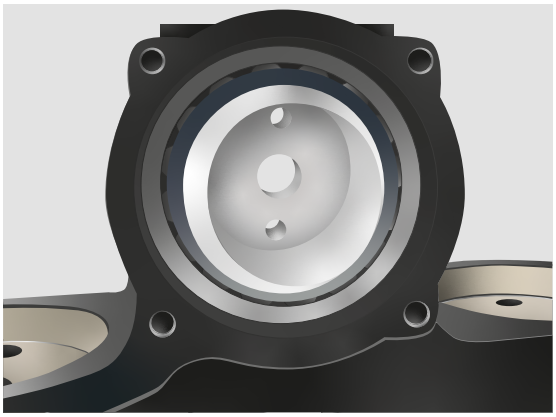


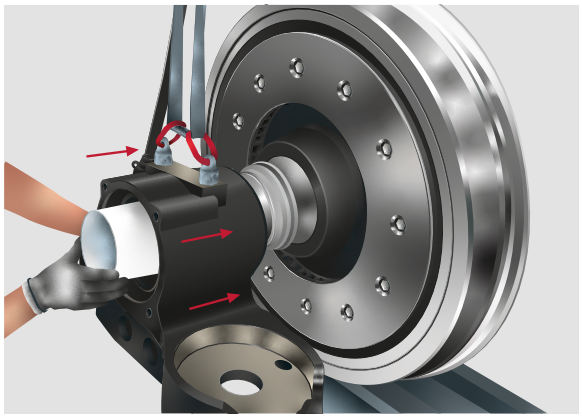
Step 8: The two bearing outer rings are pressed into the housing without using force. Light plastic hammer blows on the outer ring are permissible. The housing must not be heated in the process.

Example of grease distribution in cylindrical roller wheelset bearings

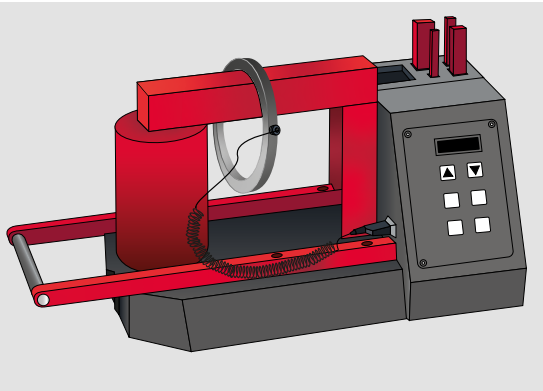


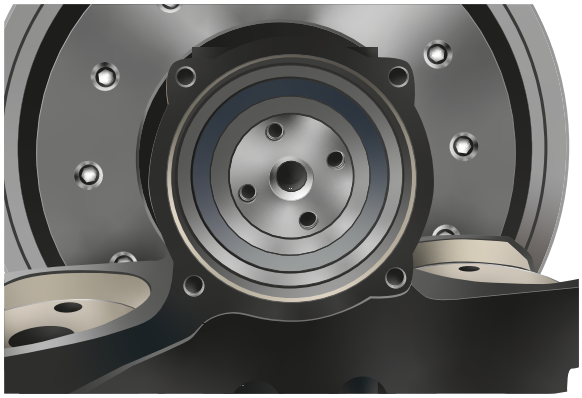
Step 9: Ungreased bearings must be filled with grease before the housing is pushed onto the shaft. Make sure that the grease is distributed according to the illustration. The arrows indicate the positions for greasing.



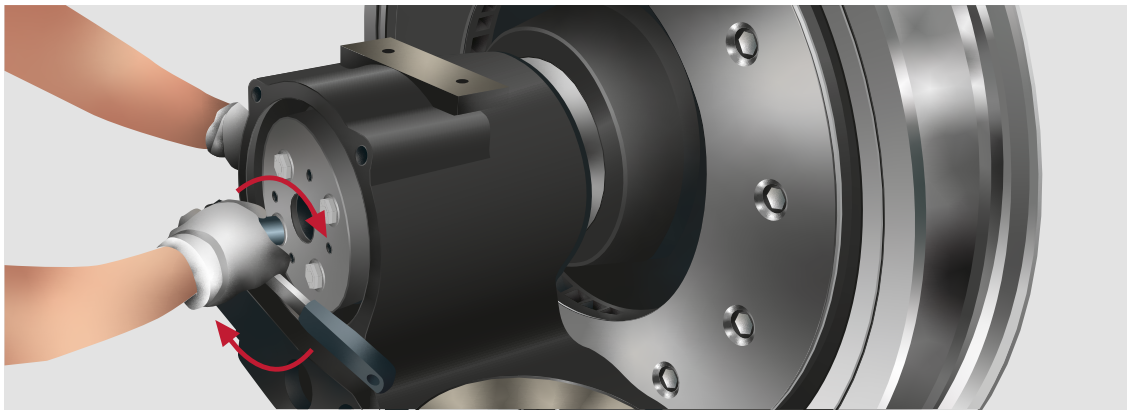


Step 10: Use a mounting sleeve for pushing the housing onto the shaft. It is essential to avoid tilting so that no scrape marks are made on the inner rings. Therefore, use appropriate lifting devices. The mounting sleeve is then removed again.

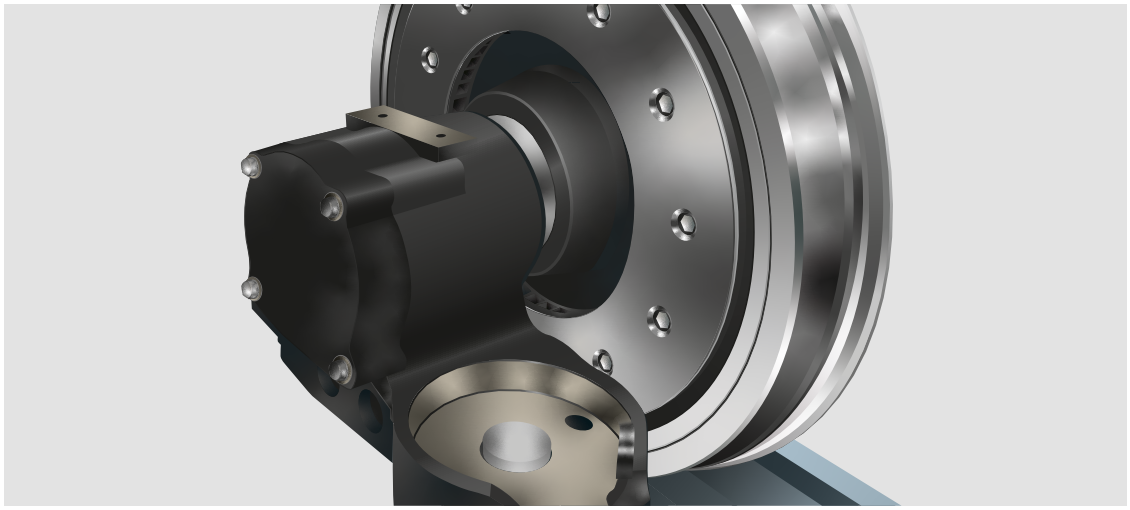




Step 11 (for types WJ+WJP & WJ+WU+HJ): For easier assembly of the loose lip or the L-section ring, heating to approx. 60°C is recommended. Make sure that the markings remain visible during assembly.



Step 12: The pressure cap is fitted and screwed on crosswise. The maximum tightening torque can be found in the manufacturer‘s instructions. Secure the pressure cap according to these specifications.



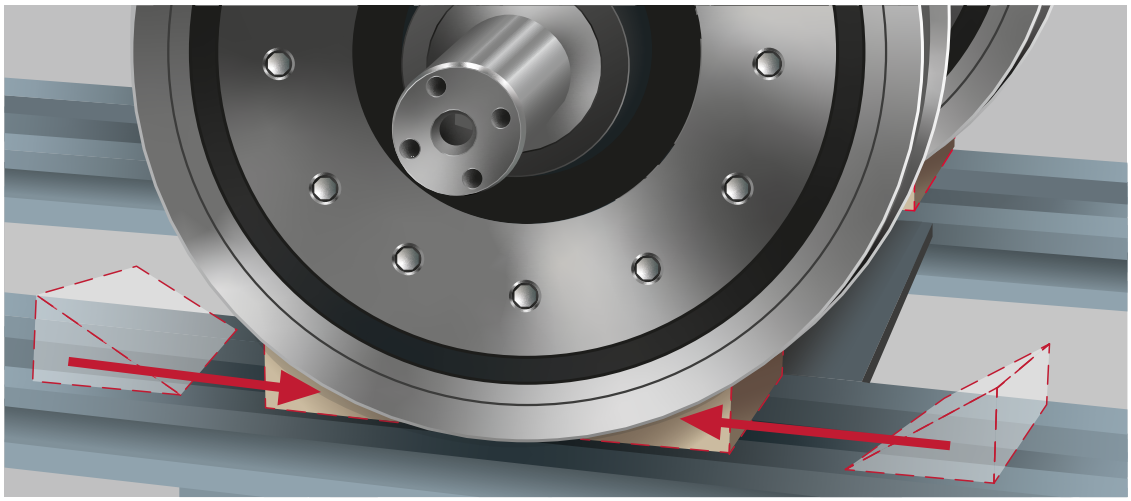
Step 13: The cap is also fitted and secured according to the housing manufacturer‘s instructions. Pay attention to any seals. There must be a gap between the cap and the housing.

Step 14: Finally, check whether the bearing has been mounted correctly. To do this, check the axial clearance and the smooth running by axial shifting and rotation. If irregularities occur, the bearing must be disassembled from the shaft and the cause determined.

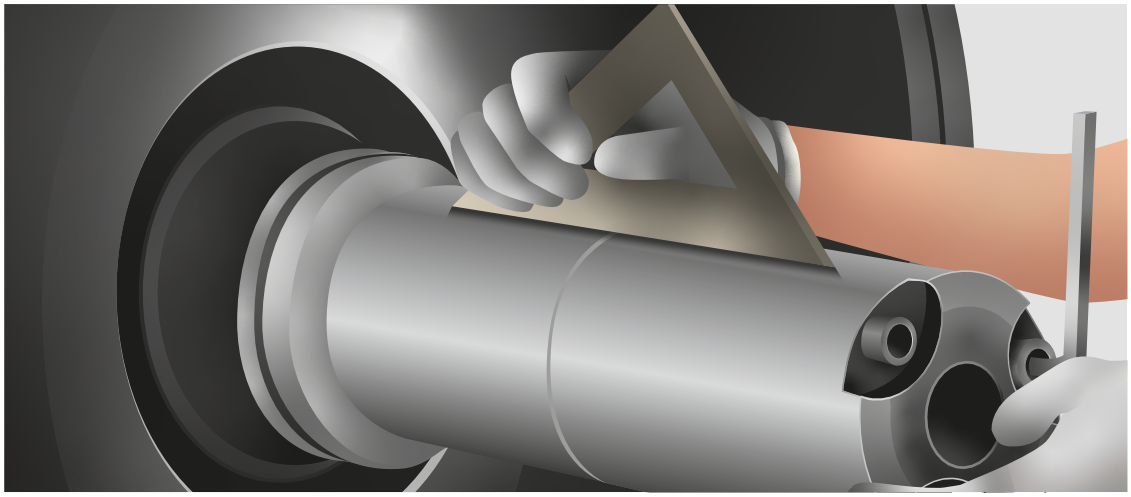
Wipe the rear sealing area. It is essential to avoid contact with the labyrinth ring because of the risk of hot running.
If the bearing has already been greased and sealed by the manufacturer, there is no need to check the axial clearance, as this has already been measured at the factory and specified in the test report.

5.3 Hydraulic assembly

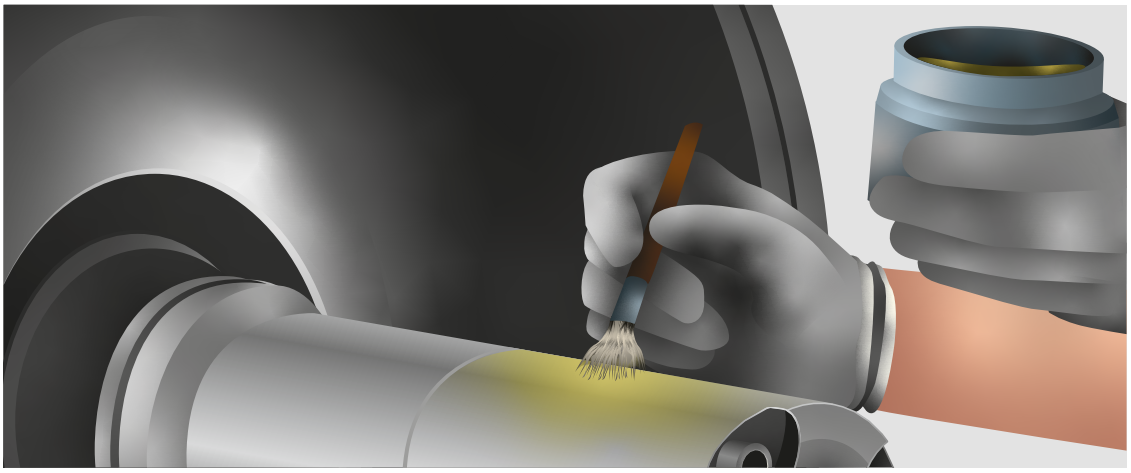
The following steps must be observed for the hydraulic assembly of wheel set bearings:



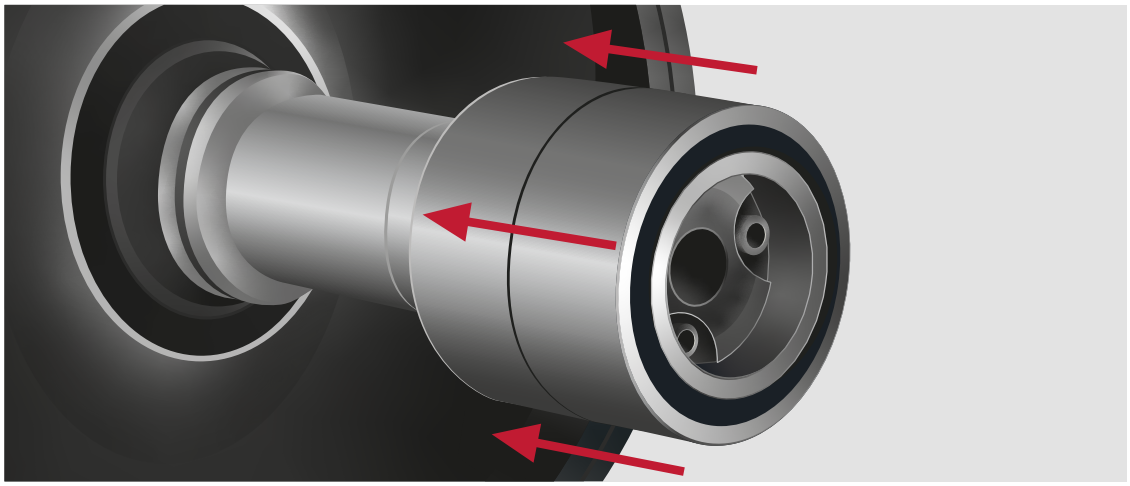
Step 1: Wheel sets shall be locked in place prior to bearing installation.



Step 2: Before hydraulically assembling the wheel set bearing unit, attach a mounting sleeve to the shaft and check for its accurate alignment.

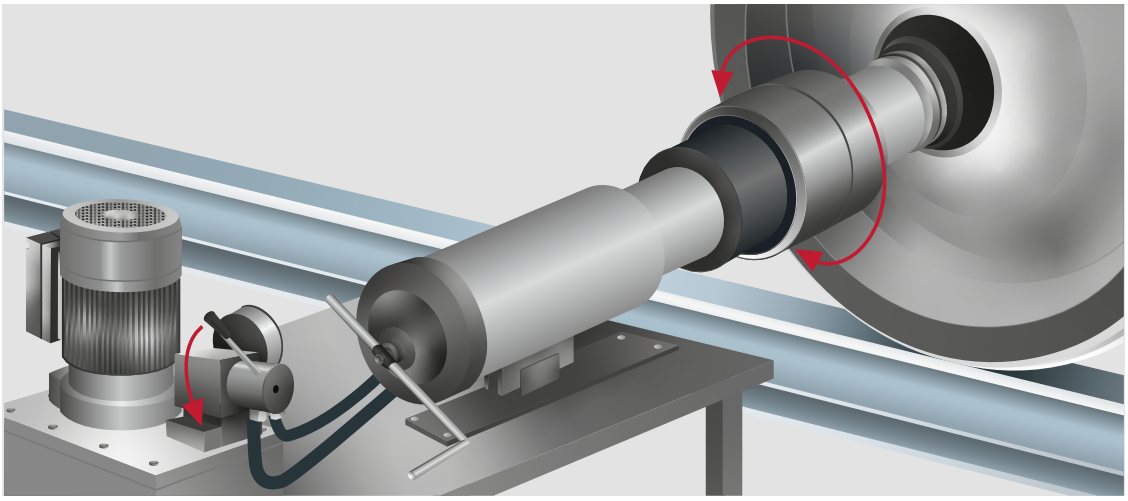


Step 3: Apply a thin film of oil to the wheel set shaft to prevent scoring when mounting the bearing.

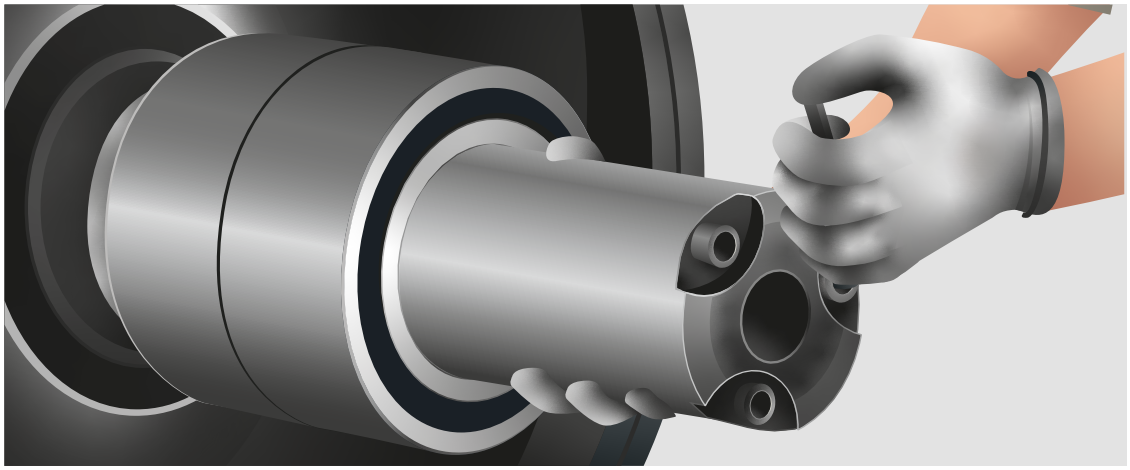


Step 4: Slide the wheel set bearing unit, labyrinth ring first, to the end of the mounting sleeve without canting. Slight turning can prevent the formation of scrape marks. For sealed rolling bearings, make sure the sealing ring does not slip out of the seal cap.

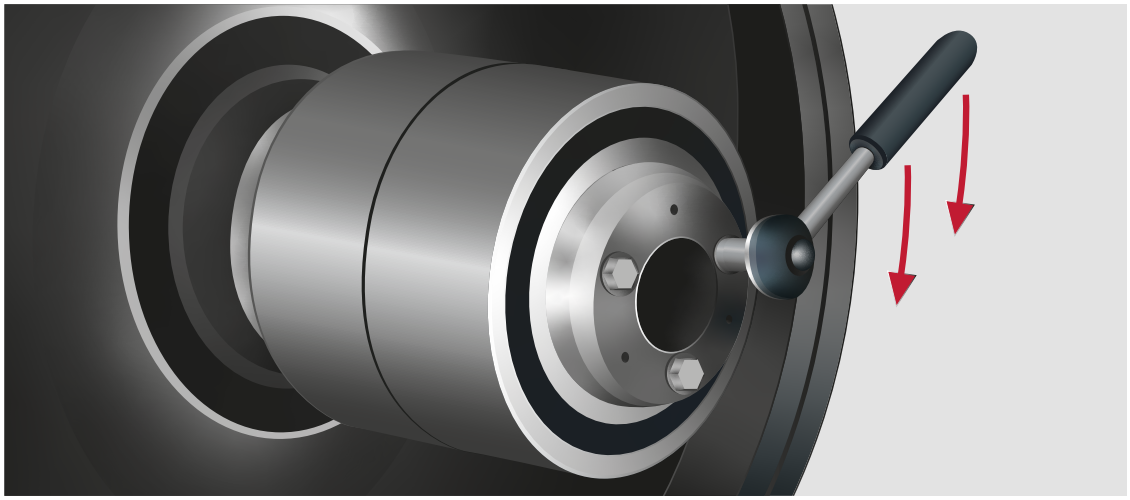
Step 5: Prepare and align the hydraulic press.



Step 6: During the pressing process, the outer ring must be turned by hand to prevent scrape marks on the inner rings.

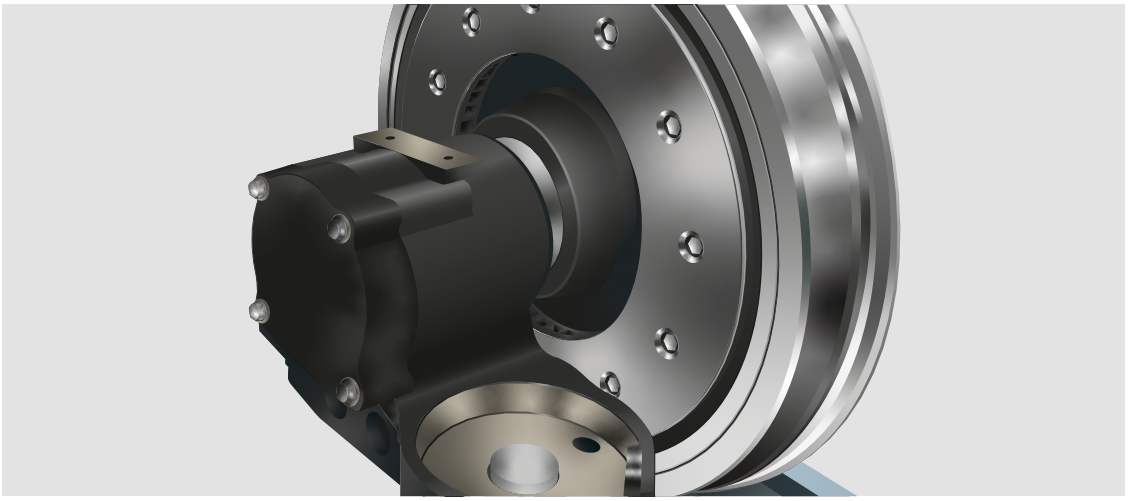


Step 7: After the bearing has been pushed completely onto the shaft, the mounting sleeve can be removed.



Step 8: The pressure cap is fitted and screwed on. The maximum tightening torque can be found in the manufacturer‘s instructions. Secure the pressure cap according to the manufacturer‘s specifications.

Step 9: The housing is pulled onto the bearing without tilting using appropriate lifting devices. The cap is also fitted and secured according to the housing manufacturer‘s instructions. Pay attention to any seals. There must be a gap between the cap and the housing.



Step 10: Finally, check whether the bearing has been mounted correctly. For this purpose, smooth running is checked by axial shifting and rotation. If irregularities occur, the bearing must be disassembled from the shaft and the cause determined.

Wipe the rear sealing area. It is essential to avoid contact with the labyrinth ring because of the risk of hot running.

6 Disassembly

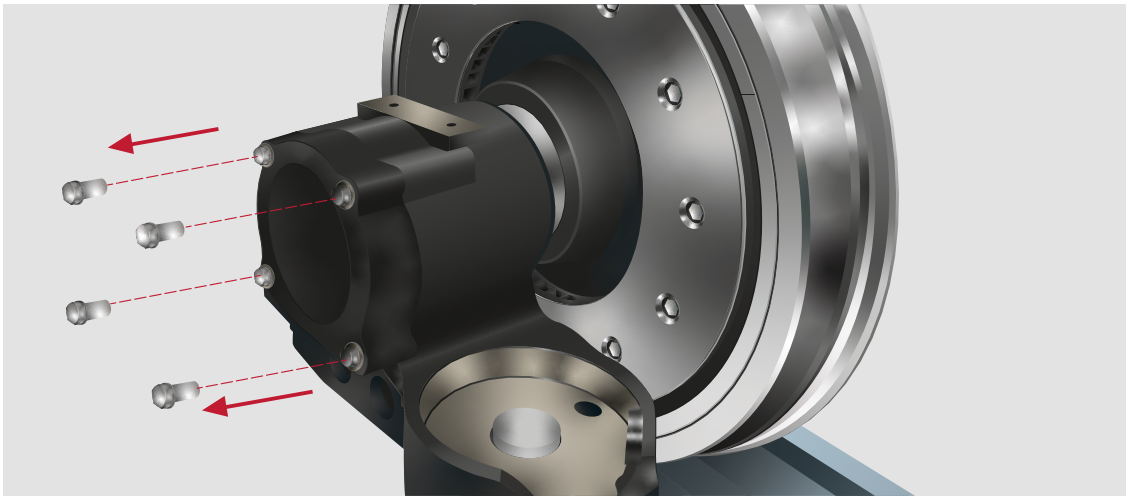
If the wheel set bearing must be disassembled due to abnormalities, use the following instructions for securing the bearing:

KRW instructions for securing conspicuous bearings

A grease sample should always be taken during disassembly.
Like assembly, disassembly can also be carried out thermally or hydraulically. Thermal disassembly is recommended, since hydraulic disassembly is more likely to result in scrape marks on the shaft.

6.1 Thermal disassembly

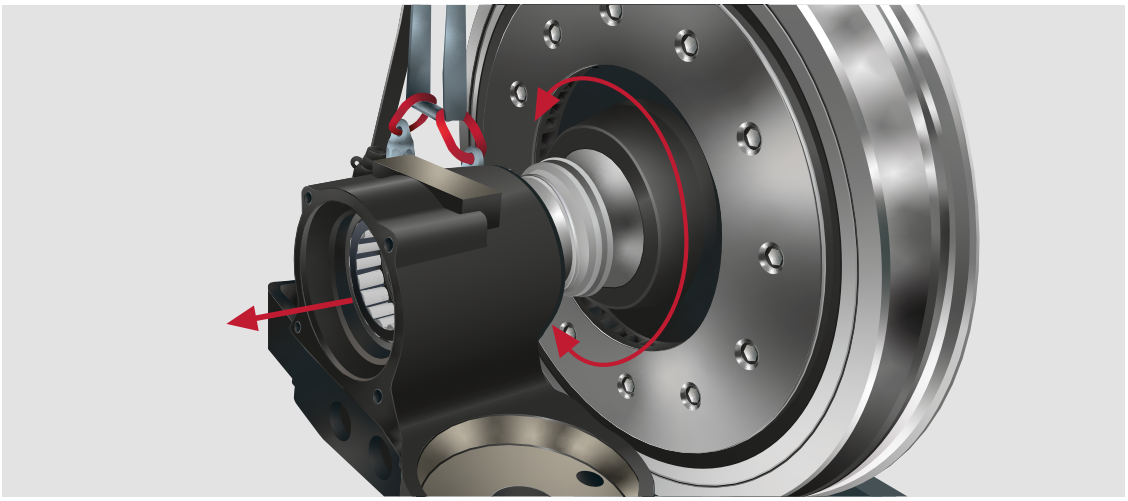
Before starting the disassembly, clean the bearing and its mating parts.



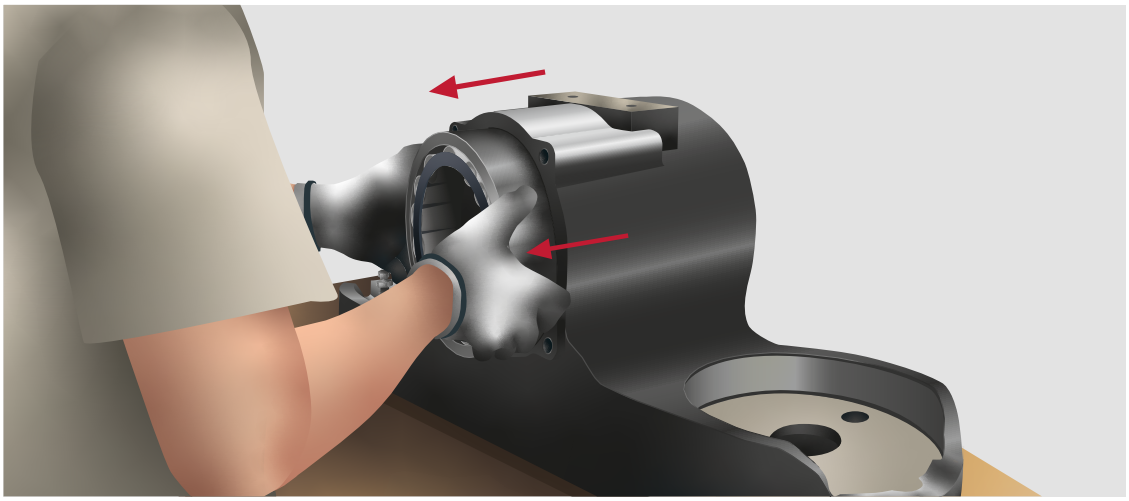
Step 1: Remove the housing cap.

Step 2: Remove the pressure cap retainer and the pressure cap. The seal must not be damaged in the process.

Step 3: Before disassembling the housing, remove the loose lip or the L-section ring.

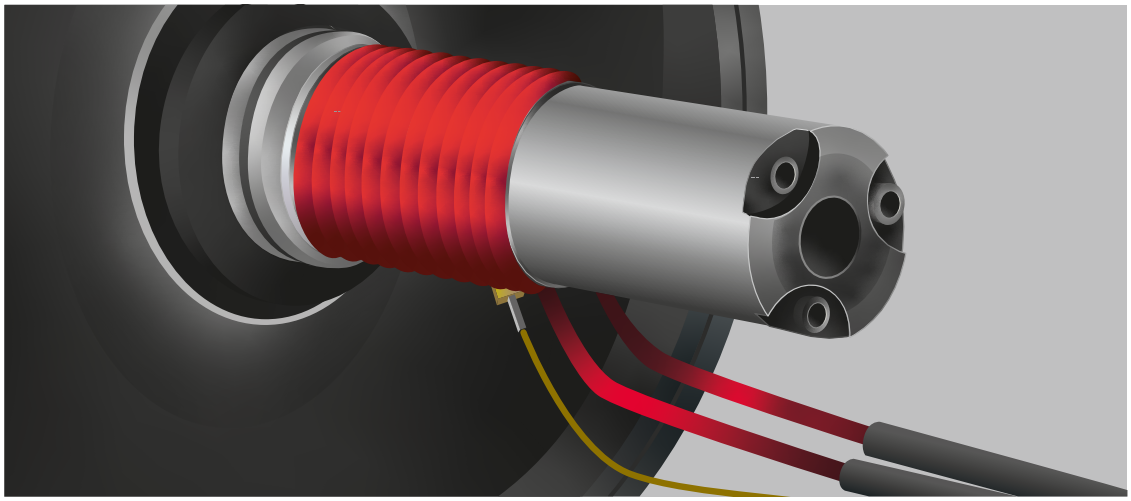


Step 4: The housing is pulled from the bearing using an appropriate lifting device. The housing, including the outer ring and the roller and cage assembly, is pulled off the shaft using appropriate lifting equipment. To avoid scrape marks, turn the housing to the left and right by hand during this process.

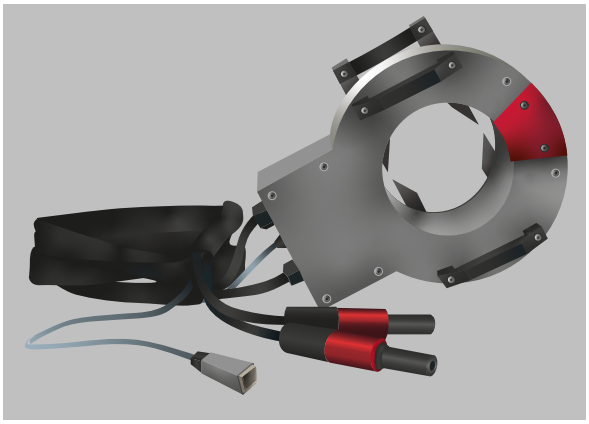


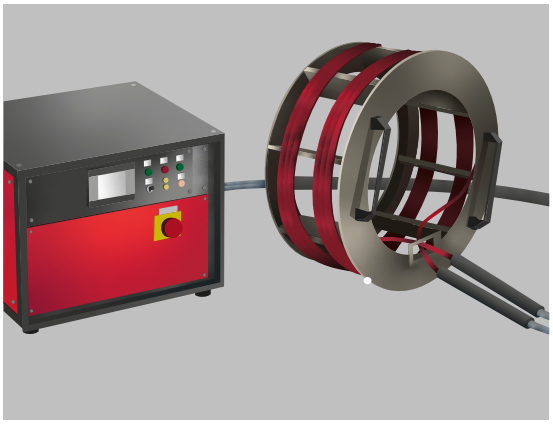
Step 5: Push the outer rings with the roller complement out of the housing. If extraction tools are used for this purpose, make sure that they do not damage either the rolling elements or the cage. The disassembly forces must not be transmitted via the rolling elements.

Step 6: The inner rings shrunk onto the shaft and the labyrinth ring are pulled off the shaft by inductive heating. For an even heating to a maximum of 150°C flexible or fixed inductors are used so that no local overheating occurs. Use suitable protective equipment.



Heating the inner rings by means of an open flame is not permitted.



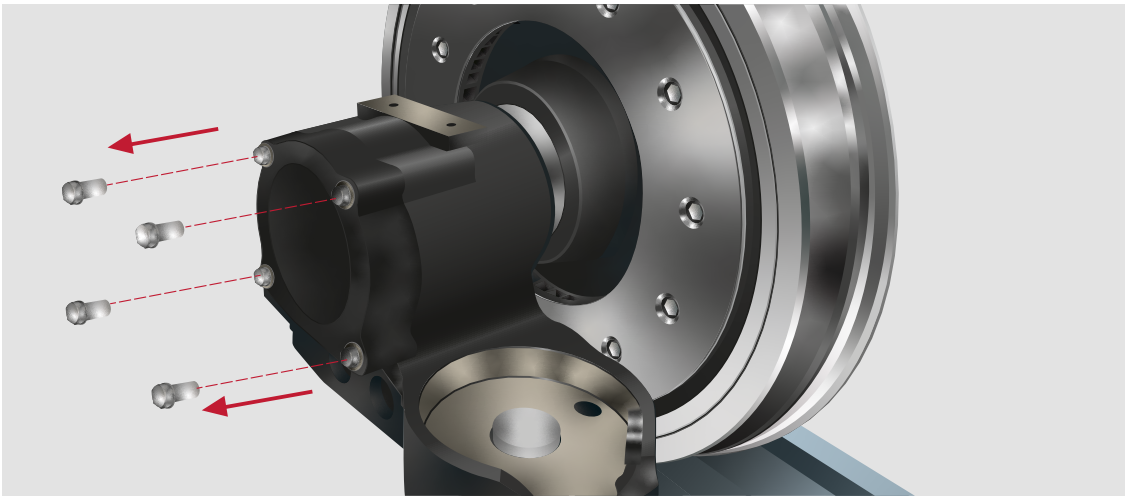


Step 7: After grease removal, the parts and mating components of the wheel set bearing should preferably be cleaned in a high-pressure cold water washing system. Make sure to wash the bearing separately from the mating parts.

Step 8: Before storing the disassembled bearing parts, they must be treated with a water-displacing anti-corrosion agent.

6.2 Hydraulic disassembly

Before starting disassembly, clean the bearing and its mating parts.

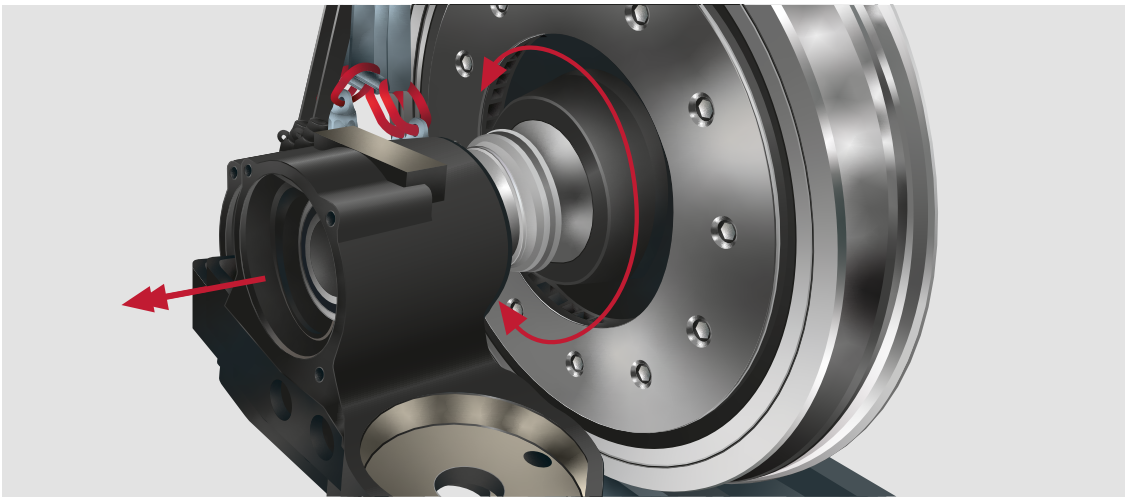


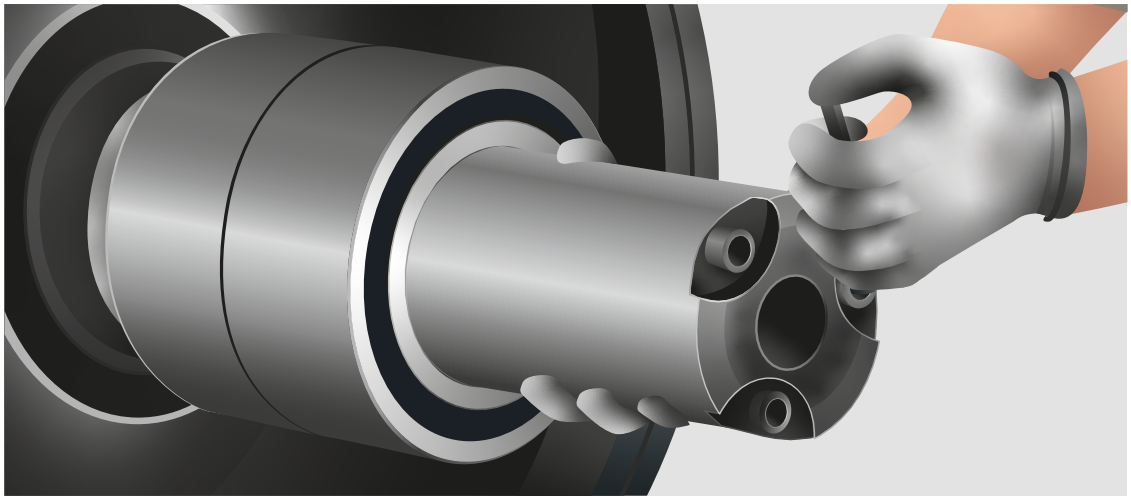
Step 1: Remove the housing cap.

Step 2: Remove the pressure cap retainer and the pressure cap. The seal must not be damaged in the process.

Step 3: Before disassembling the housing, remove the loose lip or L-section ring.

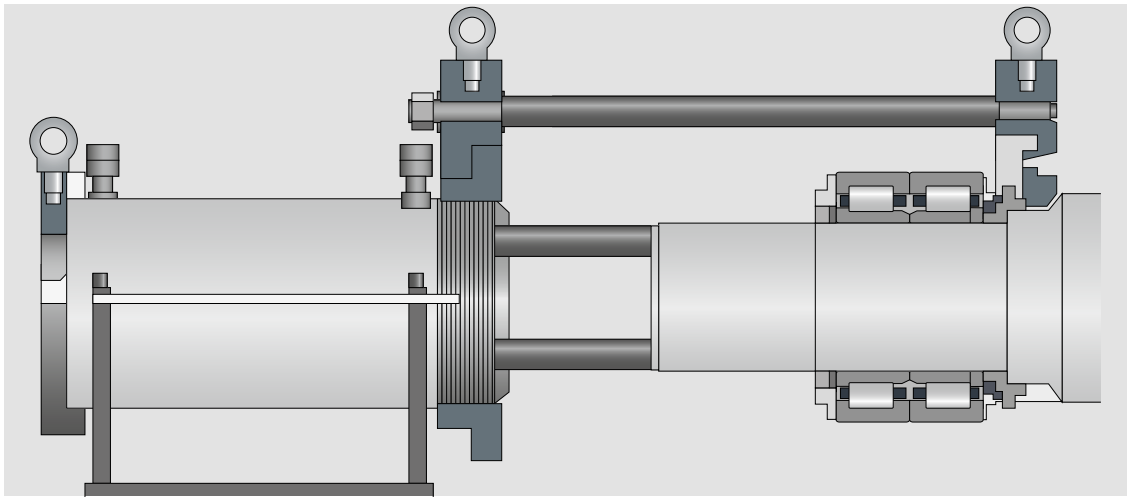
Step 4: The housing is pulled from the bearing using an appropriate lifting device.



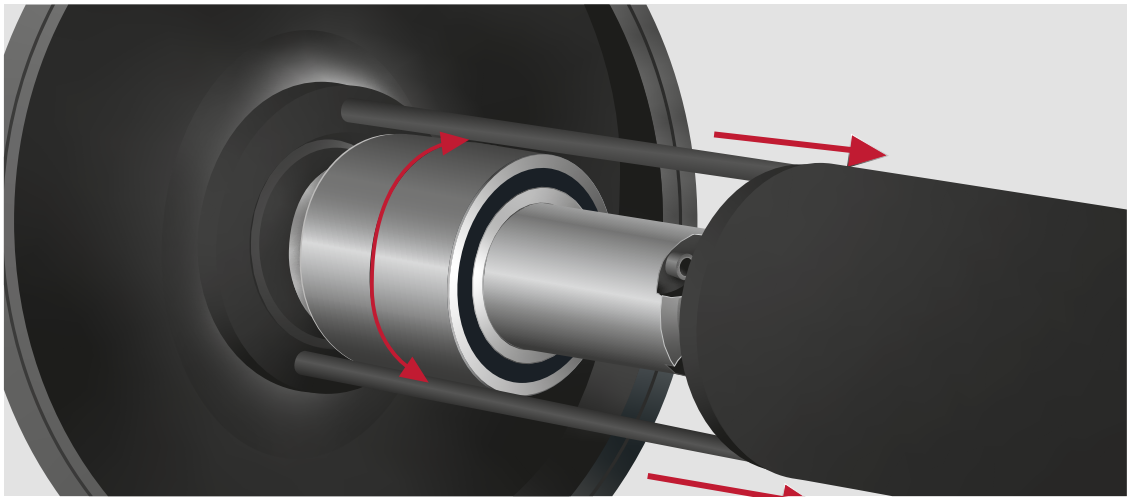


Step 5: Before the hydraulic disassembly of the bearing, the mounting sleeve is screwed to the shaft.

Step 6: The hydraulic press is prepared and aligned with the appropriate extraction tool.



Step 7: Position the extraction tool behind the labyrinth ring.



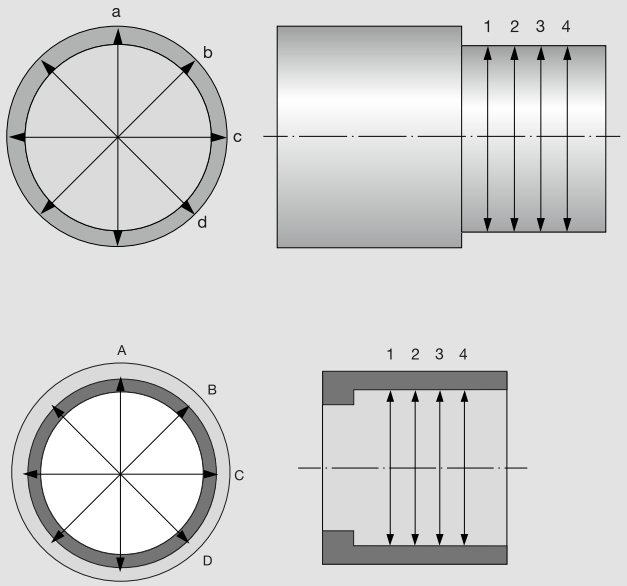
Step 8: The complete bearing and the labyrinth ring are pulled off the shaft hydraulically.

Step 9: After grease removal, the parts and mating components of the wheel set bearing should preferably be cleaned in a high-pressure cold water washing system. Make sure to wash the bearing separately from the mating parts.

Step 10: Before storing the disassembled bearing parts, they must be treated with a water-displacing anti-corrosion agent.

KRW - Measuring form

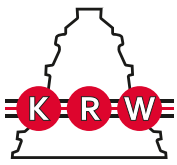
Bearing identification:	Order number:
Bearing position:	



Test number of the outside micrometer / micrometers:
Calibration date of the outside micrometer / micrometers:
Test number of the inside micrometer:
Calibration date of the inside micrometer:

Measuring direction	Shaft				Housing			
	a_i	b_i	c_i	d	A	B	C	D
	Diameter d [mm]				Diameter D [mm]			
1								
2								
3								
4								
	Average value according to equation e.g.: $(a_1+a_2+a_3+a_4)/4$				Average value according to equation e.g.: $(A_1+A_2+A_3+A_4)/4$			

Notes:	
Date:	Signature:



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