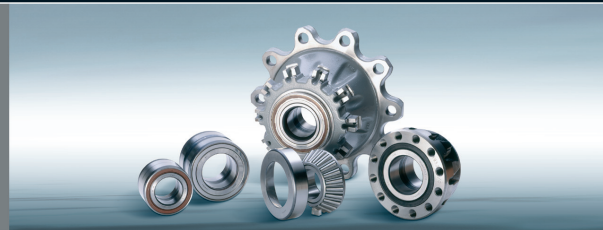
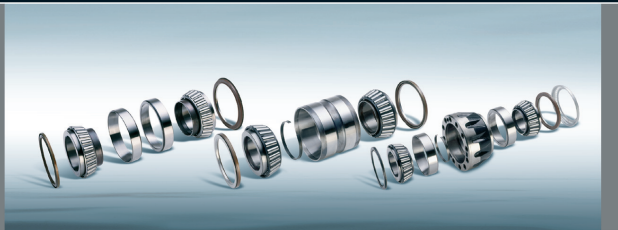




# Failure Diagnosis

## Guide to troubleshooting wheel bearing failures and malfunctions



Commercial Vehicles

**FAG**

## Content

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<p><b>Rolling bearing damage</b></p> <p><b>Causes of failure</b></p> <p>Wheel bearings are designed to achieve a mileage of at least 1,000,000 km without a problem. However, a rolling bearing can be damaged by unusual causes which has a detrimental effect on its service life.</p> <ul style="list-style-type: none"> <li>• 70% of failures are due to poor lubrication: too little or excessive lubrication, inappropriate lubricant etc.</li> <li>• 18% are caused by contamination: intrusion of fluids or solids. This shows the importance of an effective sealing, as a damaged seal will allow lubricant to leak and contaminants to intrude.</li> <li>• 10% are due to incorrect fitting: bearing forced into position, excessive heat, wrong adjustment and incorrect play, tapered sleeve overtightened etc.</li> </ul> <p><b>General types of rolling bearing damage</b></p> <ul style="list-style-type: none"> <li>• Overheating</li> <li>• Fracture of the outer ring</li> <li>• Tipping</li> <li>• Tight fitting</li> <li>• Fatigue</li> <li>• Rolling body indentations</li> <li>• Contamination by dirt</li> <li>• Incorrect lubrication</li> <li>• Corrosion</li> <li>• Lip fracture</li> <li>• Scoring effect damage</li> <li>• Wrong load direction</li> </ul>	<p><b>Diagnosing wheel bearing failures</b></p> <p>Rolling bearings are machine elements found in a wide range of applications. They work reliably even under the most challenging conditions and premature failure is very rare. The first sign of rolling bearing damage is typically an unusual operating behaviour of the bearing.</p> <p>The inspection of faulty bearings reveal a wide and varied range of damages. Examination of the bearings alone is generally not enough to pinpoint the cause of damage, but rather the inspection of the ambient parts, the lubrication and sealing as well as the operating and environmental conditions. An examination procedure facilitates the determination of the failure cause.</p> <p><b>Unusual operating behaviour as signs of damage</b></p> <p>Gradual deterioration of the operating behaviour is typically the first sign of bearing damage. Spontaneous damage caused, for example, by fitting errors or lack of lubrication and resulting in immediate failure rarely occurs. Depending on the operating conditions, a few minutes or, under some circumstances, even a few months may pass from the time damage begins to the moment the bearing actually fails.</p>
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## General remarks

### Diagnosing wheel bearing failures

Rolling bearings are machine elements found in a wide range of applications. They work reliably even under the most challenging conditions and premature failure is very rare. The first sign of rolling bearing damage is typically an unusual operating behaviour of the bearing.

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### Unusual operating behaviour as signs of damage

Gradual deterioration of the operating behaviour is typically the first sign of bearing damage. Spontaneous damage caused, for example, by fitting errors or lack of lubrication and resulting in immediate failure rarely occurs. Depending on the operating conditions, a few minutes or, under some circumstances, even a few months may pass from the time damage begins to the moment the bearing actually fails.

Operating behaviour	Possible causes	Examples
<b>Uneven running</b>	Damaged ring members or rolling bodies	Increased wheel wobble Increased tilting clearance Vibration in the steering system
	Contamination	Intensifying vibrations
	Excessive bearing play	Intensifying knocks
<hr/>		
<b>Unusual running noise</b>		
• Squealing or whistling sound	Insufficient bearing play	
• Rumbling or irregular noise	Excessive bearing play Damaged rolling contact surface Contamination Inappropriate lubricant	
• Gradual change in running noise	Temperature-induced change in bearing play Damaged raceway	
<hr/>		

## General remarks

### Causes of bearing damages and corrective measures

Wheel bearings are among the critical components of a motor vehicle. They make a major contribution to safe and comfortable vehicle handling.

Wheel bearings are subject to a wide variety of stress factors, such as high wheel speeds, hard knocks resulting from bumpy roads, dispersed dirt particles and extreme temperatures.

These may impair the functioning of the wheel bearing causing the bearing to fail or seize under unfavourable conditions.

A seized wheel bearing while driving can lead to dangerous situations and/or accidents.

### Failure diagnosis: Oval deformation of the wheel bearing

1. Dismount the wheel bearing from the locating bore.
2. Check the surface of the wheel bearing outer ring for two dark spots located opposite each other. Examine, whether the two areas located at 90° of the spots are not damaged. If this is the case, the locating bore is deformed and the steering knuckle must be replaced.
3. Disassemble the wheel bearing to make sure the ball raceways of the outer ring are not polished. First remove the seal (e.g. using special pliers), then dismount the assembly consisting of outer and inner ring, cage and balls.
4. Clean the raceways of the outer ring and check for craters corresponding to the dark spots on the outer ring outside. These craters confirm the oval deformation of the steering knuckle.

**In general observe the following:**

Problem	Cause	Remedy
The wheel bearing emits loud noises (rattling) after being fitted and put into operation.	<p>One of the inner rings is damaged:</p> <ol style="list-style-type: none"> <li>1. The wheel hub is off centre because it was too tightly fitted.</li> <li>2. The inner ring was tilted during mounting on the wheel hub – wrong tool used – wedge or sleeve between the pressure plunger and bearing ring abutment area not parallel.</li> <li>3. Excessive oval deformation of the locating bore reduces the radial play of the wheel bearing in the narrow areas of the ovally deformed locating bore.</li> <li>4. Locating bore in steering knuckle damaged.</li> <li>5. Deep scores and indents on both the wheel hub and wheel bearing caused by wrong dismantling technique.</li> </ol>	<p>Replace wheel bearing and hub.</p> <hr/> <p>Replace complete wheel bearing.</p> <hr/> <p>Replace steering knuckle and wheel bearing.</p> <hr/> <p>Remove minor defects on the wheel hub (e.g. by polishing) or replace wheel hub and bearing.</p> <hr/> <p>Remove minor defects on the wheel hub (e.g. by polishing) or replace wheel hub and bearing.</p>
Wheel bearings with little mileage emit noise (500-3.000 km).	Medium oval deformation of steering knuckle locating bore limits the wheel bearing radial play and causes the aforementioned damage.	Replace steering knuckle and wheel bearing.
Excessive heat generation during starting phase.	<ol style="list-style-type: none"> <li>1. Too little axial play of the wheel bearing between wheel hub and steering knuckle. Incorrect adjustment and/or mounting of the components.</li> <li>2. Resulting from incorrect mounting of the wheel bearing into the locating bore, the snap rings are missing in the locating bore causing gradual axial misalignment of the wheel bearing and the hub. The rotating hub rubs against the fixed wheel bearing seat. This generates high friction causing the temperature to rise in the wheel bearing environment. The grease burns and the bearing fails.</li> </ol>	<p>Check the settings of the steering knuckle and wheel hub and re-adjust if required.</p> <hr/> <p>Dismount wheel bearing and make sure that the snap rings are mounted, replace wheel bearing if required.</p>

## Overheating



### Cause

- Extreme heat from an external source
- Insufficient heat dissipation
- Insufficient cooling or lubrication

### Impact

- Discolouration of rings, rolling bodies and cages with colours ranging from yellow to blue
- Temperatures exceeding 200°C detrimentally affect the hardness and resistance of the material and can cause the bearing to fail
- In extreme cases the bearing components will be distorted
- High temperatures can deteriorate or destroy the lubricant

### Remedy

- Temperature or overload monitoring
- Sufficient heat dissipation

## Fracture of the outer ring



### Cause

- Poor support of the rings in the bearing housing
- Axial preload due to incorrect bearing play at high operating temperatures

### Impact

- Typically, the crack spreads evenly in circumferential direction often in conjunction with fractured pieces
- With axial loads, these fractures normally occur a little beyond the middle of the raceway
- The outer ring external surface displays an irregular wear pattern

### Remedy

- Improve the mounting of the bearing.
- Ensure correct bearing play
- Adhere to the fitting instructions of the manufacturer

## Tipping



### Cause

- Bent shafts
- Burrs and dirt on the shaft or housing shoulders
- Shaft threads not located axially parallel to the bearing seat
- Shaft nuts with end faces not matching the thread axle

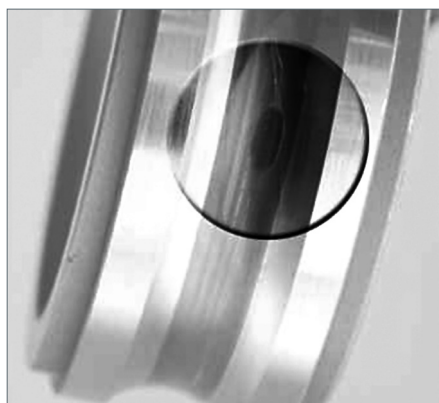
### Impact

- Wear marks running angularly to the raceway edges of the standing ring

### Remedy

- Examine shafts and housing for run-outs at the shoulders and bearing seats
- Machine the thread and bearing seat using a clamp
- Use precise shaft nuts

## Fit too tight



## Cause

- Circumferential running marks on the raceways

## Impact

- Continuous operation under heavy load, poor lubrication and insufficient bearing play cause premature wear and fatigue

## Remedy

- Correct the setting of the bearing play and/ or of the wheel bearing

## Fatigue



## Cause

- Use of wrong bearing (possibly inner design is not matched to the application – not perceptible from the outside)

## Impact

- The so-called flaking is caused by fractures in the running surface and continued abrasion of small particles from the inner and outer ring or the rolling bodies.
- Flaking does not stop, but will, once started, spread further due to continuous operation.
- Is always accompanied by noticeable increase of noise emissions

## Remedy

- Replace the bearing

## Rolling body indentations



## Cause

- Static overload of the bearing
- Heavy impacts on the bearing
- Use of a hammer during mounting
- Bearing or assembled units have been dropped prior to installation
- The bearing has been fitted onto the shaft by applying force on the outer ring

## Impact

- Indentations on the raceways caused by the rolling bodies lead to intensified bearing vibration (noise)
- Advanced indentation can lead to premature failure of the bearing

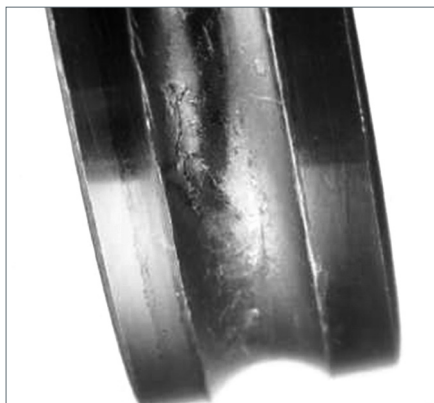
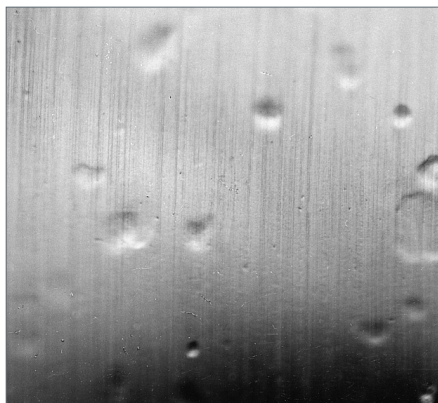
## Remedy

- Use appropriate tool to mount and dismount the bearing
- Always apply force only to the ring with fixed seating

## Contamination

## Incorrect lubrication

## Corrosion



### Cause

- Unsettled dust, dirt or abrasive substances from dirty work stations
- Dirty hands or tools
- Foreign additives in lubricants or detergents

### Cause

- Insufficient lubrication
- Excessive temperatures

### Cause

- Bearings have been exposed to corrosive fluids or environments
- Faulty seals or inappropriate lubricant

### Impact

- Indentation on rolling bodies and raceways cause vibrations

### Impact

- Discoloured rolling bodies (blue/brown) and rolling body running marks
- Excessive wear of the rolling bodies, ring members and cages are caused by overheating and total failure of the lubrication

### Impact

- Red/brownish discolouration or deposits on rolling bodies, raceways and cage
- Increased vibrations followed by extensive wear
- Increased radial play or loss of preload

### Remedy

- Clean work stations, tools, objects and hands reduce contamination risk
- No grinding in the vicinity of the bearing mounting station
- Keep bearing in the sealed original packaging until fitting it
- Seal bearing mounting station against dirty environment
- Cover open, mounted bearings when interrupting repair work

### Remedy

- Use correct lubricant in the right amount
- Check preload to reduce bearing temperature

### Remedy

- Avoid use of corrosive fluids in the bearing's vicinity
- Use appropriate lubricant with required specifications



## Lip fractures



### Cause

- Axial load exceeds admissible limits, lip insufficiently supported
- Axial shock load
- Incorrect mounting/dismounting

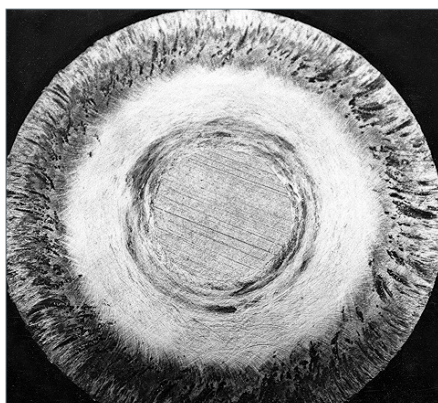
### Impact

- Supporting lips are partially or completely broken off or fractured

### Remedy

- Keep load within admissible limits
- Observe mounting instructions and procedures

## Scoring damage



### Cause

- Bearing poorly lubricated and put under heavy load
- Amount or consistence of lubricant inadequate
- Lack of hydrodynamic lubricant film between roller face area and lip
- Excessive preload due to thermal expansion
- Off-set position of the rollers caused by worn raceway or tilted ring

### Impact

- Partial or large area welding and deep scratches in the lips and roller face areas
- Lubricant coking in this area

### Remedy

- Use appropriate lubricant with required specifications
- Ensure correct bearing preload

## Wrong load direction



### Cause

- Angular contact ball bearings are designed to support loads from just one direction
- If load is applied in reverse direction, the elliptic contact area is cut off by the low shoulder.
- This results in very high loads and temperatures, followed by intensifying vibrations and premature failing.

### Impact

- The balls show a strapped groove wear pattern caused by the balls rotating over the raceway edge

### Remedy

- Ensure the correct fitting of the angular contact ball bearing

## Dismounting and Mounting of a Tapered Roller Bearing

The dismounting and mounting procedures of a tapered roller bearing vary depending on the vehicle make. The following procedure provides general advice and only applies to non-driven axles with disc brakes.

**Generally the instructions and specifications of the manufacturer should always be observed!**

### Checking the wheel bearing for any damages

1. Jack vehicle or relevant axle.  
**Note:** Parking brake must be released.
2. Rotate the wheel slowly and watch out for any signs of rough running or resistance.
3. Rotate the wheel quickly and listen for unusual noises such as knocking or rattling.



### Dismounting and mounting the wheel bearing

1. Loosen wheel nuts one by one and dismount the wheel.



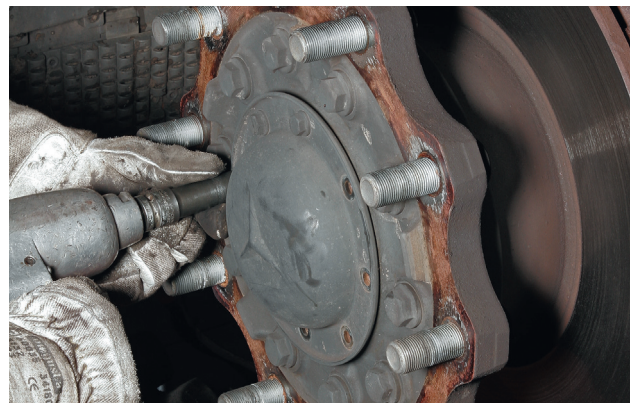
2. Remove brake blocks from calliper.



3. Dismantle calliper from steering knuckle.



4. Remove the hubcap cover.



## Dismounting and Mounting of a Tapered Roller Bearing

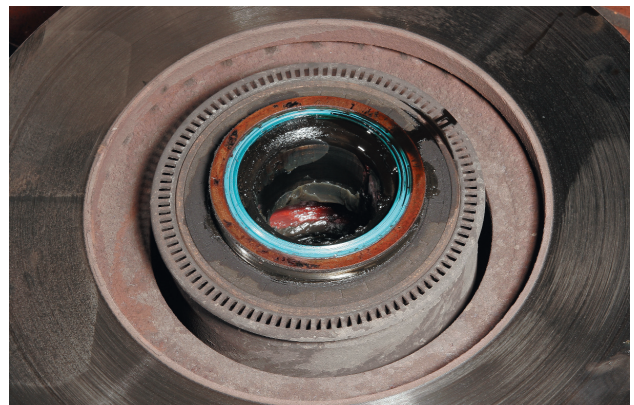
5. Loosen hub nut using appropriate suitable tooling and dismantle it together with the thrust plate.



6. Pull wheel hub with brake disc forward until the outer tapered roller bearing can be dismounted.
7. Remove wheel hub with brake disc completely.
8. Clean steering knuckle and cover with a clean cloth until the wheel hub is mounted.



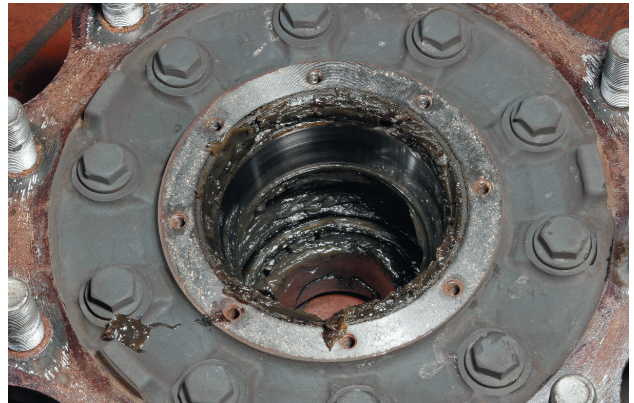
9. Remove shaft seal ring and ABS sensor ring (if existing) from wheel hub.
10. Remove inner tapered roller bearing from wheel hub.



11. Drive out outer rings from the wheel hub using an appropriate tool (e.g. brass punch).



12. Clean wheel hub on the inside, ensure that old grease is entirely removed.



13. Lubricate new tapered roller bearing.

**Important:** Make sure to use the correct grease with the required specifications!

*FAG offers a complete range of lubricants and special tools to suit every application.*

## Dismounting and Mounting of a Tapered Roller Bearing

The following graphics show how to correctly lubricate a new tapered roller bearing. Take the tapered roller bearing into one hand and press the grease from one side through all tapered rollers ...



... until the lubricant pours out on the reverse side of the bearing.

Then apply a grease film on the tapered roller bearing. It is now ready to be installed.

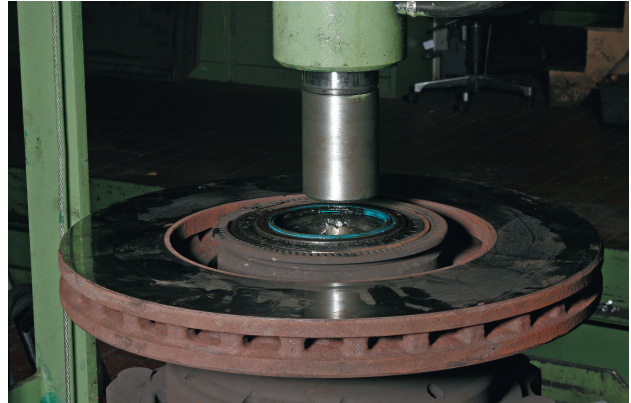


14. Press both new outer rings into the hub.

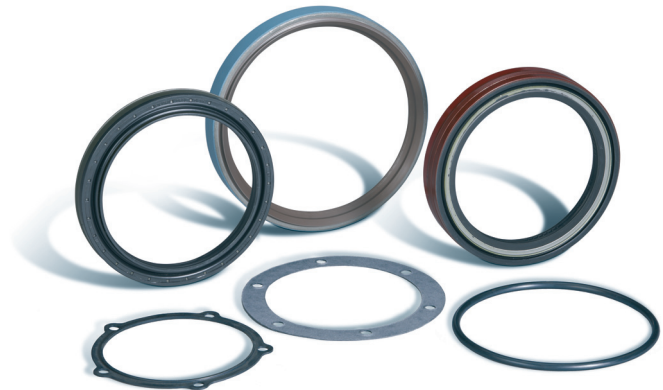
**Important:** The plunger must be positioned on the outer ring face side only! Ensure flush mounting of the outer ring with the housing shoulders!



15. Mount inner tapered roller bearing.
16. Press on new shaft seal ring.
17. Press on ABS sensor ring using an appropriate tool.



*The FAG also offers a complete range of seal kits.*



18. Lubricate steering knuckle.
19. Position wheel hub and brake disc on steering knuckle.

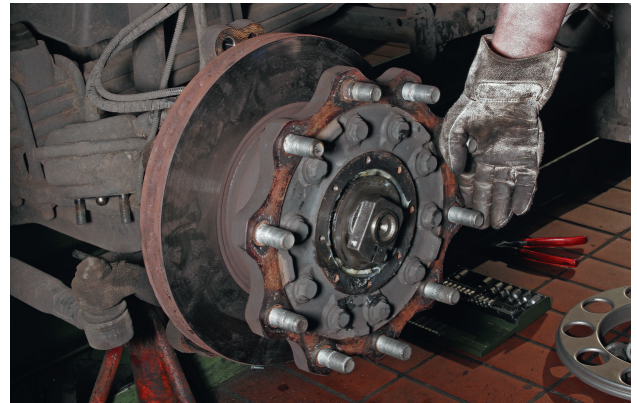
**Important:** Make sure the wheel hub is not tilted as this may damage the seals causing the wheel hub to leak.

## Dismounting and Mounting of a Tapered Roller Bearing

20. Mount outer tapered roller bearing in the hub.
21. Install thrust plate.
22. Torque down wheel hub nut while rotating the wheel hub, ...



... until the wheel hub can hardly be turned.





23. Loosen hub nut for so much as to allow the hub to rotate easily again.

**Important:** Adhere to the specifications of the manufacturer.

24. Check the wheel bearing play.

Plug a dial gauge with appropriate holding fixture onto the wheel hub. The point of the measuring pin must bear against the face side of the steering knuckle with a slight preload.

**Note:** Make sure that the pivot joints or other parts of the suspension do not falsify the test result.

25. Turn the wheel in both directions in axial alignment to the dial gauge.

**Note:** Turn the Wheel approximately 30-40° back and forth.

The bearing clearance corresponds to the dial gauge pointer deflection.

Rated value for wheel bearings on non-driven axles: 0.025-0.15 mm.

26. Adjust bearing clearance to match the rated value and secure hub nut.

27. Assemble dismantled parts in reverse order.

**Important:** Adhere to the specifications of the manufacturer!

## Mounting Tool Kit



**FAG**  
Mounting Tool Kit

The FAG mounting tool kit allows for a cost-effective and safe mounting of rolling bearings with bore diameters of up to 50 mm. It can also be used to fit sleeves, intermediate rings, seals and similar parts.

Use a suitable mounting sleeve and hit with a hammer to drive tightly fitting inner rings onto the shaft or outer rings into the housing bore. Using a mounting sleeve helps to prevent mounting forces being transferred via the rolling bodies and raceways which could damage the parts severely.

The FITTING.TOOL.ALU.SET10-50 comprises mounting sleeves made from aluminium and mounting rings made from plastic. The tools are easy to handle and available at low cost.

**FITTING.TOOL.ALU.SET10-50**

Part no. 400 6001 10

Contents of:

FITTING.TOOL.ALU.SET10-50

33 mounting rings

for bore diameters of 10-50 mm

and outer diameters of up to 110 mm

3 mounting sleeves

Nonrecoil hammer, 1 kg

Suitcase dimensions: 440~350~95 mm

Overall weight of the set: 4.5 kg

Components also available as individual parts.

## Socket Wrench for Mounting and Disassembling



**FAG**  
Socket Wrenches

For locknuts KM0 to KM20. The socket wrenches FAG LOCKNUT.SOCKET... allow for a simple tightening and loosening of locknut on shafts, adapter and extraction sleeves.

They require less space on the locknut circumference than hook wrenches and enable ratchets and torque wrenches to be used. For increased work safety, socket wrenches should be secured using a locking pin or rubber washer. FAG socket wrenches therefore have a bore to apply the locking pin and a groove to attach the rubber washer. Locking pin and rubber washer are included with the socket wrench.

Ordering example for an FAG socket wrench suitable for locknut KM5:

**LOCKNUT.SOCKET.KM5**

Part no. 400 6063 10

## Hook and Pin Wrenches for Mounting and Disassembling



**FAG Flexible  
Head Hook Wrench**

For locknuts KM0 to KM40 and precision nuts ZMo6 to ZM150 and ZMA15/33 to ZMA 100/140

The FAG flexible head hook wrenches of the LOCKNUT.FLEXI-HOOK... series allow for the tightening and loosening of locknuts (precision nuts) on shafts and adapter and extractor sleeves if no torque is specified. The flexible head hook wrench of the series LOCKNUT.FLEXI-HOOK allows for the mounting and dismounting of locknuts with different diameters.

Ordering example for an FAG flexible head hook wrench suitable for locknuts KM14 to KM24:

**LOCKNUT.FLEXI-HOOK.KM14-24**

Part no. 400 6089 10



**FAG Flexible  
Head Pin Wrench**

For precision locknuts AM15 to AM90

The FAG flexible head pin wrenches of the LOCKNUT.FLEXI-PIN... series allow for the tightening and loosening of precision nuts on shafts if no torque is specified. Using FAG flexible head pin wrenches allows for the mounting of small bearings onto tapered shaft seats. The bearings are tightened via radially arranged holes.

Ordering example for an FAG flexible head pin wrench suitable for locknuts AM35 to AM60:

**LOCKNUT.FLEXI-PIN.AM35-60**

Part no. 400 6094 10



**FAG Flexible  
Head Face Pin Wrench**

For precision locknuts LNP017 to LNP170

The FAG flexible head face pin wrenches of the LOCKNUT.FACE-PIN... series allow for the tightening and loosening of precision nuts on shafts if no torque is specified. Using FAG flexible head face pin wrenches allows for the mounting of small bearings onto tapered shaft seats. The bearings are tightened via axially arranged holes.

Ordering example for an FAG flexible head face pin wrench suitable for locknuts LNP017 to LPNo25:

**LOCKNUT.FACE-PIN.LNP17-25**

Part no. 400 6079 10

## Hook and Pin Wrenches for Mounting and Disassembling



**FAG Double  
Hook Wrench Kit**

This service kit includes a service-case containing a double hook wrench, a torque wrench and a user manual. The torque wrench allows for the precise definition of the initial mounting position at a defined tightening torque.

**LOCKNUT.DOUBLEHOOK.KM5.KIT**

Part no. 400 6107 10

**LOCKNUT.DOUBLEHOOK.KM13.KIT**

Part no. 400 6106 10



**FAG Double  
Hook Wrench Sets**

(former FAG designation 173556 and 173557). The sets include four or five double-hook wrenches. The remaining items in the case are identical to the kit.

**LOCKNUT.DOUBLEHOOK.KM5-8.SET**

Part no. 400 6096 10

**LOCKNUT.DOUBLEHOOK.KM9-13.SET**

Part no. 400 6097 10



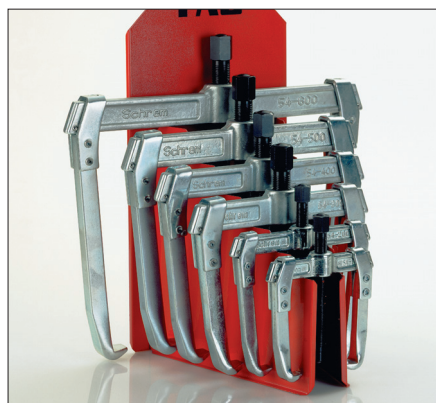
**Individual Double  
Hook Wrenches**

(former FAG designation DHN5 to DHN13). Double-hook wrenches are also available individually. Each double hook wrench is engraved with the torsion angles for the self-aligning ball bearings to be mounted using this particular wrench, so that the sliding distance and reduction in radial clearance can be precisely set.

**LOCKNUT.DOUBLEHOOK.KM13**

Part no. 400 6115 10

## Mechanical Extractors



### Mechanical Extractors

Mechanical extractors are used to dismount small rolling bearings with bore diameters of up to 100 mm that are tightly fitted on the shaft or in the housing.

The bearing can be dismounted gently if the extractor grips onto the tightly fitted bearing ring.

With mechanical FAG extractors, the dismounting force is generally applied via threaded spindles.

Alongside two-arm, three-arm and four-arm devices and a hydraulic pressure device, FAG also offers special extractors.

### Two-Arm Extractors

- Allow for the dismounting of complete rolling bearings with tightly fitted inner rings and other parts, such as ring gears.
- Span: 80-350 mm, depth: 100-250 mm; available in a set (stand with 6 extractors) or as individual extractors.

#### **ABZIEHER54.SET**

Part no. 400 6118 10

#### **ABZIEHER54.100**

Part no. 400 6119 10

#### **ABZIEHER54.200**

Part no. 400 6120 10

#### **ABZIEHER54.300**

Part no. 400 6121 10

#### **ABZIEHER54.400**

Part no. 400 6122 10

#### **ABZIEHER54.500**

Part no. 400 6123 10

## Mechanical Extractors



Three-Arm  
Extractors

- For the dismantling of complete rolling bearings or tightly fitting inner rings
- Span: 85-640 mm, depth 65-300 mm

**ABZIEHER52.085**

Part no. 400 6126 10

**ABZIEHER52.130**

Part no. 400 6127 10

**ABZIEHER52.230**

Part no. 400 6128 10

**ABZIEHER52.295**

Part no. 400 6129 10



Hydraulic  
Pressure Tools

- Used together with mechanical extractors to loosen tightly fitting parts
- The tool considerably facilitates bearing extraction as it provides axial forces of 80 or 150 kN; the larger tool has a hydraulic return mechanism

**ABZIEHER44.080**

Part no. 400 6130 10

**ABZIEHER44.150**

Part no. 400 6131 10



Extractors  
for Ball Bearings

- For dismantling complete radial ball bearings
- For tightly fitting outer ring
- For bearing without radial access
- Three kits with different sets of claws available

**ABZIEHER56.020.SET**

Part no. 400 6132 10

**ABZIEHER56.120.SET**

Part no. 400 6133 10

**ABZIEHER56.220.SET**

Part no. 400 6134 10

## Mechanical Extractors



### Special Extractors for Bearings

- For radial bearings (deep groove ball bearings, self-aligning ball bearings, cylindrical, tapered and self-aligning roller bearings); indicate bearing manufacturer.
- For tightly fitting inner and/or outer ring

#### **ABZIEHER64.400**

Part no. 400 6135 10

#### **ABZIEHER64.500**

Part no. 400 6136 10

#### **ABZIEHER64.600**

Part no. 400 6137 10

#### **ABZIEHER64.700**

Part no. 400 6138 10

#### **ABZIEHER64A..., ~64B..., ~64C..., ~64D**

Part no. 400 6139 10



### Extracting Devices

- For all types of rolling bearings. For the dismantling of complete rolling bearings or tightly fitting inner rings. The extracting and separating devices are available in 5 different sizes with spans of up to 210 mm.
- Especially suitable when the bearing inner ring is adjacent to a shoulder on the shaft without extraction slots. Good radial access to the bearing location is required.

#### **ABZIEHER49.100.060**

Part no. 400 6150 10

#### **ABZIEHER49.100.075**

Part no. 400 6151 10

#### **ABZIEHER49.200.115**

Part no. 400 6152 10

#### **ABZIEHER49.300.150**

Part no. 400 6153 10

#### **ABZIEHER49.400.210**

Part no. 400 6154 10



### Internal Extractor Set

- For deep groove ball bearings and angular contact ball bearings. The internal extractor set includes nine extractors and can be used on bearing holes with diameters of 5-70 mm.
- For tightly fitting outer ring
- The inner ring hole must be freely accessible.

#### **ABZIEHER62.SET**

Part no. 400 6140 10

#### **ABZIEHER62.100.005**

Part no. 400 6141 10

#### **ABZIEHER62.100.007**

Part no. 400 6142 10

#### **ABZIEHER62.100.010**

Part no. 400 6143 10

#### **ABZIEHER62.100.014**

Part no. 400 6144 10

#### **ABZIEHER62.100.020**

Part no. 400 6145 10

#### **ABZIEHER62.100.030**

Part no. 400 6146 10

#### **ABZIEHER62.200.040**

Part no. 400 6147 10

#### **ABZIEHER62.200.050**

Part no. 400 6148 10

#### **ABZIEHER62.200.060**

Part no. 400 6149 10

## Mechanical Extractors

## Hydraulic Extractors



Internal  
Extractor Set

- For standard deep groove ball bearings. The set consisting of six sets of extracting jaws and two threaded spindles can be used on bore diameters of 10-100 mm.
- For tightly fitting outer ring
- No dismounting of the shaft required

<b>PULLER.INTERNAL.SET10-100</b> Part no. 400 6155 10
<b>PULLER.INTERNAL.ARM-A1</b> Part no. 400 6156 10
<b>PULLER.INTERNAL.ARM-A2</b> Part no. 400 6157 10
<b>PULLER.INTERNAL.ARM-A3</b> Part no. 400 6158 10
<b>PULLER.INTERNAL.ARM-A4</b> Part no. 400 6159 10
<b>PULLER.INTERNAL.ARM-A5</b> Part no. 400 6160 10
<b>PULLER.INTERNAL.ARM-A6</b> Part no. 400 6161 10
<b>PULLER.INTERNAL.SPINDEL.M12</b> Part no. 400 6162 10
<b>PULLER.INTERNAL.SPINDEL.M16</b> Part no. 400 6163 10
<b>PULLER.INTERNAL.SUITCASE</b> Part no. 400 6164 10
<b>PULLER.INTERNAL.INLAY</b> Part no. 400 6165 10



Hydraulic Standard Extractor with  
Integrated Hand Pump

Compact extractors generating dismounting forces of up to 80kN. Supplied with safety net in a sturdy case.

Ordering designation Extractor	Extracting force kN	Span mm	Depth mm	Lift mm	Weight kg
<b>400 6166 10</b> 400 6167 10 JAW	40	150	152	55	4,5
<b>400 6168 10</b> 400 6169 10 XL 400 6170 10 JAW 400 6171 10 Long JAW	60	200	152 (190*)	82	4,9
<b>400 6172 10</b> 400 6173 10 XL 400 6174 10 JAW 400 6175 10 Long JAW	80	250	190 (229*)	82	6,6

\* optionally with longer extracting arms; spare parts available individually



## Three-Section Extraction Plate



FAG Three-Section  
Extraction Plate

For hydraulic and mechanical extractors.

They facilitate the dismounting of bearings, tightly fitting inner rings and other parts.

Its load carrying capacity and extraction force generation are precisely synchronised. The SPIDER extraction hooks are attached right behind the extractor tie bolts and allow for evenly applied extraction forces.

This prevents deformation or tilting of even the most tightly fitting parts. The high extraction forces are solely applied to e.g. the bearing inner ring. Normally, bearing and shaft remain intact and can be re-used.

The field-proven extractors can be mounted with little effort behind the bearing.

### **PULLER.TRISECTION50**

Part no. 400 6176 10

### **PULLER.TRISECTION100**

Part no. 400 6177 10

## Electrical Heating Plate



FAG Electric  
Heating Plate

Cylindrical bearing seats meant to fit tightly on the shaft must be heated prior to mounting. Sufficient thermal expansion is achieved at 80 to 100°C. Temperature must not under no circumstances exceed 120°C to make sure that the material structure and hardness characteristics do not change.

The FAG heating plate HEATER.PLATE with controlled temperature can be used to heat rolling bearings. Cover the bearing with a metal sheet and turn it regularly to ensure the bearing is uniformly heated.

Alongside rolling bearings (max. 120°C), the heating plates are also suitable to heat labyrinth, shrink and seal rings.

### **HEATER.PLATE**

Part no. 400 6179 10

## Induction Heating Device



FAG Induction  
Heating Device

Many rolling bearings and other rotationally symmetric steel parts are tightly fitted on the shaft. Especially larger parts can be fitted much easier if they are heated prior to mounting.

The quick and clean process of induction heating is superior to the traditional methods and is therefore particularly well suited for the use in volume mounting. Induction heating can be used on complete bearings, rings of cylindrical roller bearings or needle bearings, and rotationally symmetric steel parts, such as labyrinth rings, roll couplings, wraps etc.

### **Advantages**

- Fast, energy-saving working
- Suitable for rolling bearings and other ring-shaped steel parts
- Advanced safety
- Environmentally friendly, oil-free
- Uniform, controlled heating
- Simple handling
- Automatic demagnetisation
- Improved efficiency, as the best suitable size can be selected for every application

### **HEATER10**

Part no. 400 6178 10

## Gloves



FAG Heat-Insulated  
Gloves

The FAG heat-insulated gloves are particularly well suited for the handling of rolling bearings or other parts heated prior to mounting or dismounting.

The outside material is hard-wearing polyester, heat resistant to temperatures up to 150°C.

The inside material is non-irritant cotton.

**Special characteristics:**

- Resistant to temperatures up to 150°C
- Lint-free
- Non-asbestos
- Comfortable
- Cut-resistant

**HANDSCHUH1**

Part no. 400 6180 10



Heat and Oil  
Resistant Gloves

The FAG heat and oil resistant gloves are particularly well suited for the handling of rolling bearings or other parts heated and lubricated prior to mounting or dismounting.

Their outstanding properties derive from a multiple-layer structure made of different fibres.

**Special characteristics:**

- Resistant to temperatures up to 250°C
- Not flammable
- Heat resistant even when wet
- Admitted for protection against mechanical (DIN EN 388) and thermal (DIN EN 407) influences
- Cotton-free
- Cut-resistant

**HANDSCHUH2**

Part no. 400 6181 10

## Feeler Gauges



FAG  
Feeler Gauges

Feeler gauges are used to measure the radial bearing clearance, especially when mounted on tapered shaft seats and adapter and extracting sleeves.

**FEELER.GAUGE100**

Part no. 400 6182 10

**FEELER.GAUGE300**

Part no. 400 6183 10

## Mounting Paste



FAG  
Mounting Paste

This mounting and multiple-purpose paste has proven especially valuable for the mounting of rolling bearings. It facilitates the mounting of bearing rings and prevents stick-slip, scoring marks, wear and fretting corrosion. In addition, the mounting paste protects the bearing against corrosion.

It is pale in colour and does not soil. The mounting paste is applied in a thin layer so that the metallic lustre turns slightly dull. The admissible operating temperature ranges between  $-30^{\circ}\text{C}$  and  $+150^{\circ}\text{C}$ . The paste is resistant to water, steam and a variety of alkaline and acid agents.

Product range:

70g tube

250g tube

400g cartridge

1 kg can

**ARCA.MOUNTINGPASTE.70G**

Part no. 400 6194 10

**ARCA.MOUNTINGPASTE.250G\*10**

Part no. 400 6195 10

## Anti-Corrosion Oil



FAG  
Anti-Corrosion Oil

The anti-corrosion oil is particularly well suited for unpacked rolling bearings. But it can also be applied to bare metal surfaces of equipment, machines and machine components stored indoors to provide long-term protection against corrosion.

Normally, it is not necessary to wash anti-corrosion oil out of rolling bearings, as the oil behaves neutrally towards all conventional rolling bearing greases and oils. It can easily and reliably be removed using alkaline solvents or neutral cleaning agents.

Product range:

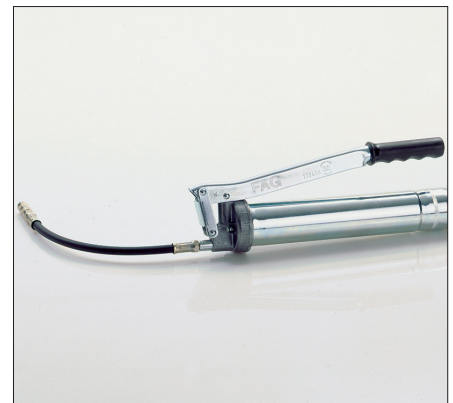
0.4 l spray can with ozone-safe propellant  $\text{CO}_2$ .

**ARCA.ANTICORROSIONOIL.400G\*12**

Part no. 400 6193 10

## Rolling Bearing Greases 1.5 kg and 10 kg Containers

## Grease Gun



### Arcanol MULTITOP

**DIN 51825**

**Thickener**

**Base oil**

**Base oil viscosity at 40°C**

**Consistence (NLGI class)**

**Operating temperature (°C)**

**Max. long-term operation temperature (°C)**

**Typical fields of application**

**Low temperatures**

**High temperatures**

**Low friction**

**High speeds**

**High loads**

**Low speeds**

**Vibration**

**Support for seals**

**Re-lubrication**

**KPSN-40**

Lithium soap with EP additives

Mineral oil + ester

**85** [mm<sup>2</sup>/s]

**2**

-40 to +150

80

Universal grease **for ball and roller bearings** used in rolling mills, construction machines, motor vehicles, splining and grinding spindles which are subject to increased speeds, high loads, high and low temperatures

**Extremely suitable**

**Suitable**

**Very suitable**

**Very suitable**

**Very suitable**

**Very suitable**

**Very suitable**

**Suitable**

**Extremely suitable**

### FAG Grease Gun with Armoured Hose

Under challenging operating conditions or in harsh environments, rolling bearings often require re-lubrication via grease nipples. This work can be performed easily, cleanly and quickly using the FAG grease gun with attached armoured hose. All parts comply with DIN 1283.

#### Grease Gun

Reservoir diameter: 56 mm, overall length of the gun: 390mm, delivery capacity: 2 cm<sup>3</sup>/stroke, pressure: max. 800 bar. The gun is filled with either bulk grease or a cartridge according to DIN 1284.

- Reservoir capacity for bulk grease: 500 cm<sup>3</sup>
- 400g cartridge as per DIN 1284 (diameter 53.5 mm, length 235mm), connection thread: GB/i, weight: approx. 1.5 kg

#### ARCA.GREASE-GUN

Part no. 400 6191 10

#### Armoured Hose

Length: 300 mm, connection thread: GB/i, equipped with hydraulic grip coupling for tapered lubrication nipples according to DIN 71412. Instead of the hydraulic grip coupling, sliding couplings for button head lubricating nipples according to DIN 3404 or other nozzles can be used. These connectors are available in specialist retail stores.

#### ARCA.GREASE-GUN.HOSE

Part no. 400 6192 10

		Part no.
ARCA.GREASE.MULTITOP.1KG	1 kg	400 6188 10
ARCA.GREASE.MULTITOP.5KG	5 kg	400 6189 10
ARCA.GREASE.MULTITOP.10KG	10 kg	400 6190 10

## Temperature Measuring Devices



FAG Infrared Thermometer TempCheck PLUS

The FAG infrared thermometer TempCheck PLUS measures the infrared radiation emitted by an object and uses this to calculate the surface temperature. The contact-free process allows for the temperature measurement of objects which are difficult to reach or that are moving.

The device is very light (it only weighs 150g) and can therefore be taken practically anywhere it is needed. The FAG infrared thermometer TempCheck PLUS covers a measuring range of  $-32^{\circ}\text{C}$  to  $+530^{\circ}\text{C}$ . It can be used for thermal monitoring of machine components.

Summary of the advantages of the TempCheck PLUS:

- Quick and precise temperature measurement
- State-of-the-art infrared measurement technology
- Easy to handle
- Reduction of unplanned down-time periods
- Low purchase cost

### TEMP.CHECK.PLUS

Part no. 400 6186 10

Contains: measuring device with battery, strap, user manual and carrying case

## Digital Hand Tachometer



FAG Digital Hand Tachometer

The tachometer provides for two operation modes:

- Direct speed measurement with adapter, track wheel and measuring tips
- Contact-free optical measurement using a reflecting mark

### Direct speed measurement

Plug on the adapter supplied with the measuring device. Through contact with the component, the rubber tip measures the rotational speed or the tracking wheel the surface speed.

### TACHOMETER

Part no. 400 6184 10 contains:

Digital hand tachometer, adapter for direct 1:1 measurement, tracking wheel 1/10 mm, tracking wheel 6in, rubber tip, 10 reflecting marks, user manual, carrying case

### Contact-free speed measurement

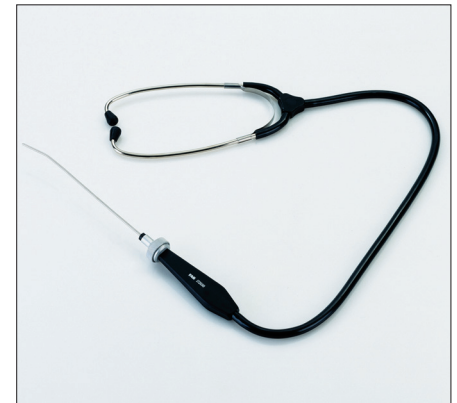
Apply a reflecting mark on the machine component to be measured. This mark is detected by photoelectric means using visible red light. The device displays the revolutions per minute.

### TACHOMETER.REFLEX.MARKS

Part no. 400 6185 10

Contains: 10 reflecting marks

## Sonar Device



FAG Sonar Device

The sonar device allows for the quick, easy and reliable control of rolling bearing noise. Changes in noise caused by wear, pitting formation or distortion of the bearing can thus be detected at an early stage if inspection is carried out regularly. This helps to avoid unexpected interruptions in operation and more serious machine damage. The device works like a doctor's stethoscope.

The tips of the earpiece are placed in the ear channels to provide insulation against background noise. The insulating grip is held like a pencil between thumb and index finger and the sensing tip is placed firmly on the part to be measured. If a noise is heard, the sensor is moved until the noise reaches its maximum volume.

### SOUND.CHECK

Part no. 400 6187 10





					
	✓	✓	✓	✓	✓
	✓	✓			
	✓	✓	✓	✓	
	✓	✓	✓	✓	
	✓	✓			
	✓	✓	✓	✓	
	✓	✓			
	✓	✓	✓	✓	

Phone: +49 (0) 1801-753-333\*  
 Fax: +49 (0) 6103-753-297

FAG-AS@Schaeffler.com  
 www.LuK-AS.com

\*4,6 ct/Min aus dem deutschen Festnetz