

FAG Wheel Bearing Repair Solution for Light Commercial Vehicles

Mercedes-Benz Sprinter, Viano, Vito
and Volkswagen Crafter – Front Axle



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1 Introduction



Wheel bearings have seen significant technological refinement in the past few years. While the first designs used simple ball or tapered roller bearings, state-of-the-art applications feature double-row angular contact ball bearings or tapered roller bearings in a wide range of layouts. This, along with the incorporation of further components, such as wheel hubs, mounting flanges, ABS encoders and sensors, has evolved the formerly simple designs into highly complex wheel bearing modules.

The development of these ever more sophisticated solutions has resulted in highly durable wheel bearings requiring no maintenance at all. Bearing play adjustment, which used to be an essential step in any repair and maintenance procedure, is now clearly a thing of the past. The development of compact assemblies has finally put an end to defects resulting from incorrect bearing play adjustment.

However, these new designs also require new removal and installation procedures. For example, wheel bearing units with a pre-assembled wheel hub cannot be pressed into the bearing seat via the outer race in

the way it was usually done. Fault-free pressing in of the bearing still remains a critical task in the installation process, to ensure a long service life and to prevent damage to the wheel bearing during installation.

To ensure correct installation the use of appropriate special tools is an absolute must.

This brochure details the removal and installation procedures of a front axle wheel bearing unit on the following rear wheel drive models:

- Mercedes-Benz Sprinter (906)
- Mercedes-Benz Viano (W639)
- Mercedes-Benz Vito (W639)
- Volkswagen Crafter (2E)

Note:

Removal and installation procedures for wheel bearing units on rear wheel drive vehicles differ from the procedures applying to all wheel drive models. Both variants require a special tool. The upgrade kit complementing the basic wheel bearing repair kit can be purchased from specialist toolmaker Gedore.

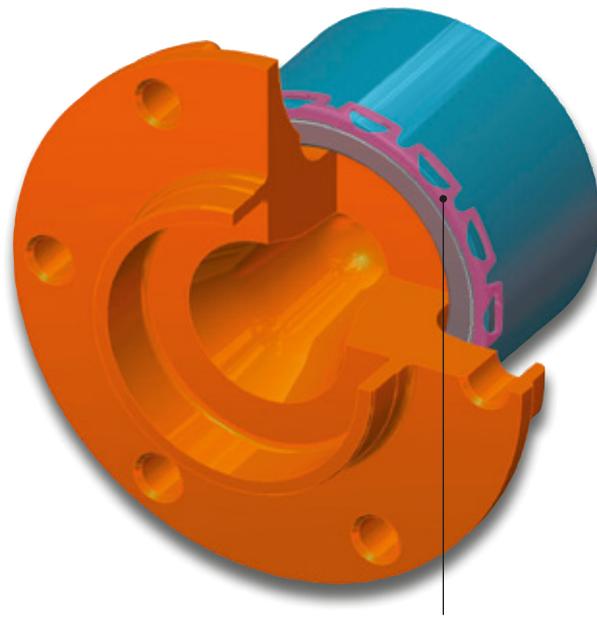
2 FAG Wheel Bearing special features

The wheel bearing unit described in this brochure is an FAG 2.1 Generation wheel bearing. This is a compact double-row angular contact ball bearing unit manufactured by FAG with a defined and preset bearing play, plus lifelong lubrication and sealing. The wheel hub and ABS encoder are incorporated into the bearing design. The bearing also features an innovative snap ring on the wheel hub side which provides for the wheel bearing's axial retention in the bearing housing.

Owing to the design and the way it is mounted on the car, this wheel bearing unit cannot be removed and reinstalled using standard tooling. To ensure correct removal and assembly special tools must be used.

This is why Schaeffler Automotive Aftermarket offers a special removal / reassembly tool designed to achieve fail-safe wheel bearing replacement. The tool ensures that pressure is applied evenly on the wheel bearing outer race during installation, and the snap ring securely latches into the groove.

As very high loads may need to be applied to remove and reinstall a wheel bearing, we recommend using a hydraulic pump with a built-in pressure gauge. The pump is not included in the special tool case, but can be ordered through suppliers such as Gedore if required. If there is a hydraulic pump available at your workshop, please use it. Again, Gedore also offers a wide range of suitable adapters if required.



Snap ring

Note:

When the wheel bearing is removed, the snap ring is destroyed. Therefore, a used wheel bearing unit must not be reinstalled.

Caution:

Failure to use the special tool can destroy the wheel!



3 FAG Wheel Bearing Repair Solution for Light Commercial Vehicles – The economical solution

Some vehicle manufacturers, like Mercedes-Benz or Volkswagen, offer repair kits containing the steering knuckle with a pre-assembled wheel bearing unit. This means the steering knuckle is replaced along with the wheel bearing, which makes additional axle alignment necessary.

The FAG Wheel Bearing Repair Solution for Light Commercial Vehicles developed by Schaeffler Automotive Aftermarket offers an alternative solution. The steering knuckle remains installed in the car. Using the special tool, only the wheel bearing unit is replaced, thus eliminating the need for axle alignment.

Repair procedure with manufacturer's kit



Time-consuming standard repair procedure

- 1 Car arrives at garage
- 2 Wheel, brake pads, brake caliper and brake disc removed
- 3 All connections to axle bracket removed
- 4 Axle bracket removed
- 5 Axle bracket reinstalled
- 6 All connections to axle bracket reassembled
- 7 Brake caliper, brake pads, brake disc and wheel reinstalled
- 8 Vehicle tested for axle misalignment
- 9 Axle geometries readjusted
- 10 Test drive

Repair procedure with FAG Wheel Bearing Repair Solution for Light Commercial Vehicles



Time-reduced full service repair procedure

- 1 Car arrives at garage
- 2 Wheel, brake pads, brake caliper and brake disc removed
- 3 Wheel bearing removed and reinstalled using special tool
- 4 Brake caliper, brake pads, brake disc and wheel reinstalled
- 5 Test drive

Depending on the vehicle model the FAG Wheel Bearing Repair Solution for Light Commercial Vehicles helps reduce the repair time by up to 60%.

4 Description of the FAG special tool

Using special tools is an absolute necessity to ensure the correct removal and installation of FAG wheel bearing units. It is of utmost importance that press-in force is applied evenly on the wheel bearing outer race during

assembly and that the snap ring clicks into position in the steering knuckle groove. Failure to observe this procedure can destroy the wheel!





Part no. 400 6199 10

- | | |
|---|---|
| 1 Base plate | 11 Pressure nut with pilot pin (w/o O-ring) |
| 2 Pull / pressure plate with bridge (ø 96 mm bearing – Mercedes-Benz Sprinter and VW Crafter) | 12 2 supporting rods 275 mm |
| 3 Closing plate (ø 96 mm bearing) | 13 Supporting rod transverse bore |
| 4 Pull / pressure plate (ø 92 mm bearing) without closing plate | 14 Screw with cone M16 x 1.5 x 80 |
| 5 Closing plate (ø 92 mm bearing) | 15 4 washers ø 19 mm |
| 6 3 knurled screws M14 x 1.5 | 16 3 shoulder nuts M18 |
| 7 2 retaining pins with O-ring | 17 2 hexagon socket screws M14 x 70 |
| 8 Hydraulic cylinder 17t | 18 Reinforcing rail 196 mm |
| 9 Adapter 2 1/4 -14 UNS to M42 x 2 | 19 Reinforcing rail 140 mm |
| 10 Pull / pressure spindle M20 x 600 mm | 20 Steering knuckle mounting bracket |
| | 21 USB stick with removal / installation instructions |

5 FAG Wheel Bearing removal and installation procedures

FAG Wheel Bearing Repair Solution for Light Commercial Vehicles training video

The “FAG Wheel Bearing Repair Solution for Light Commercial Vehicles” training video provides step-by-step instructions for complete wheel bearing removal and reassembly using the FAG special tool.

The training video is also available for download on the REPERT online portal.

5.1 Repair guidelines

These guidelines apply to the replacement of:

Front axle wheel bearings on rear wheel drive vehicles (not 4WD vehicles!)

Using

FAG special tool, reference no. 400 6199 10

Important notes

- Only assign trained and skilled personnel and use appropriate garage equipment to perform repair work.
- Repair procedures or special tools may be subject to change owing to vehicle manufacturers’ continued efforts to refine volume production components.
- Ensure you use up-to-date repair instructions and suitable special tools prior to repair.
- Up-to-date information can be found on the REPERT online portal
- We recommend that you use a hydraulic pump with a pressure gauge for removal and installation.
- If press-out pressure exceeds 17t, the steering knuckle assembly must be replaced along with the wheel bearing unit. Applying excessively high pressure can cause the steering knuckle to deform or crack.
- Ensure the bearing seat is free from grease prior to installation.
- As the wheel bearing seat length exceeds the hydraulic cylinder stroke, the pump must be actuated twice per press-in and press-out process.
- To ensure tight axial retention of the bearing, the snap ring must latch into position during assembly. If the bearing does not fit tightly in the seat, it can work loose during operation.
- Do not carry out repair work without the necessary special tools. The special tools ensure the snap ring securely engages into the steering knuckle groove. It also ensures the press-in force is evenly distributed on the wheel bearing unit’s outer race. Assembling the wheel bearing by applying force to the wheel hub, i.e. the bearing unit’s inner race, significantly reduces the part’s operational reliability and durability.

5.2 Preparing for wheel bearing repair

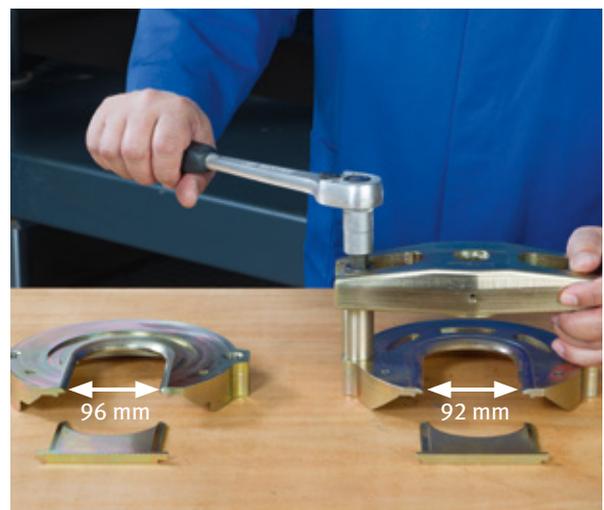
Carry out the following steps according to the vehicle manufacturer's specifications prior to starting wheel bearing replacement as detailed in this brochure:

- Remove front wheel
- Remove brake anchor plate inc. brake caliper and hinge on inner wing panel using binding wire
- Remove brake disc
- Remove tie rod end from steering knuckle

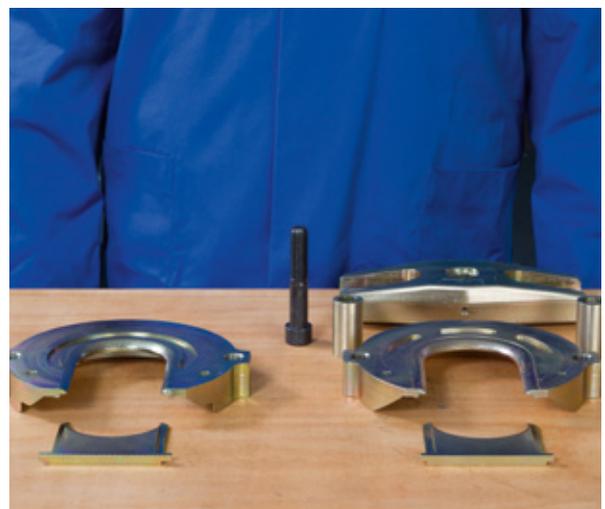
Caution:

The wheel bearing diameter of Mercedes-Benz Vito / Viano models differs from the diameter of the Mercedes-Benz Sprinter / VW Crafter models. Sprinter and VW Crafter wheel bearings have a diameter of 96 mm, with Vito and Viano wheel bearings only 92 mm. Ensure you make the necessary adjustments of the pull / pressure plate and use the corresponding closing plate for assembly!

- Loosen bridge fastening screws



- Remove screws, sleeves and bridge from pull / pressure plate



- Place bridge, sleeves and screws on base plate

Note:

Ensure the rounded side is facing upward (see arrow).



- Torque down fastening screws



5.3 Wheel bearing removal

- Swivel pull / pressure plate into position between wheel hub and steering knuckle

Note:

Remember that there are two different wheel bearing diameters. You may need to adjust the pull / pressure plate to fit the required diameter (see chapter 5.2).



- Position retaining pins



- Mount both supporting rods with reinforcing rails in the brake anchor plate bores and torque down screws

Note:

Reinforcing rails come in two different lengths. Ensure you use the length required for the model in question.



- Plug washers on supporting rods



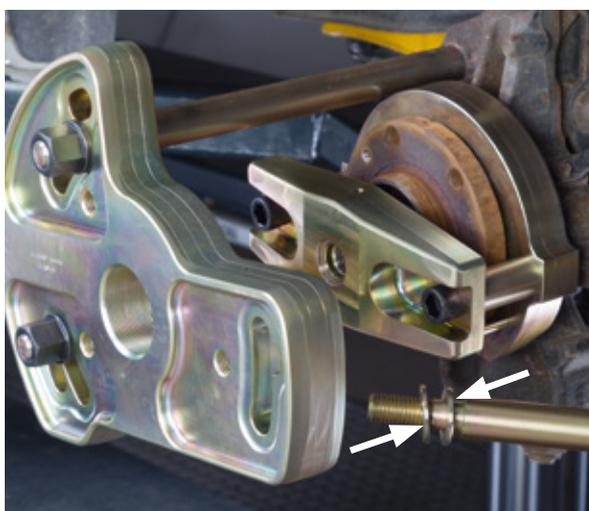
- Slip base plate over supporting rods and ensure that they do not drop using shoulder nuts
- Tighten shoulder nuts loosely



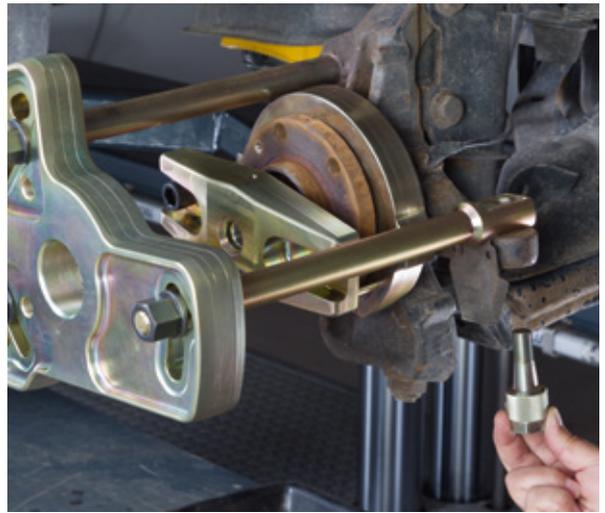
- Insert third supporting rod with pre-assembled washers in base plate
- Tighten shoulder nut loosely

Note:

Use one washer for the Vito and Viano, and both washers supplied in the tool case for the Sprinter and Crafter.



- Mount supporting rod to tie rod end support on steering knuckle
- Torque down screw



- Torque down three base plate shoulder nuts



- Hinge steering knuckle mounting bracket to supporting rod and wishbone



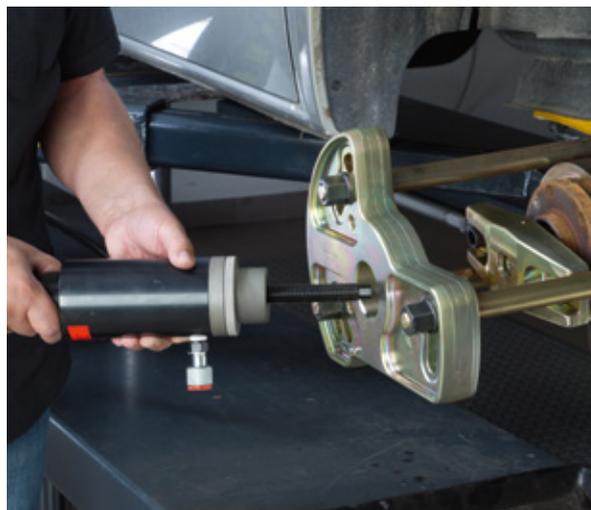
- Screw pull / pressure spindle into hydraulic cylinder until spindle projects 100 mm on the pull side
- Fasten adapter to hydraulic cylinder



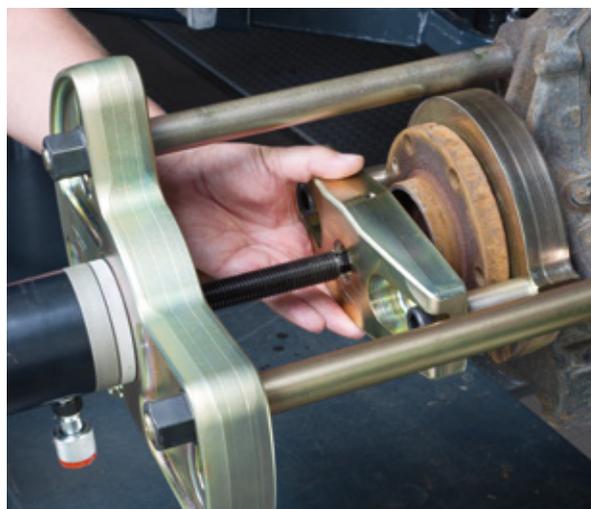
- Screw hydraulic cylinder pull side in base plate

Note:

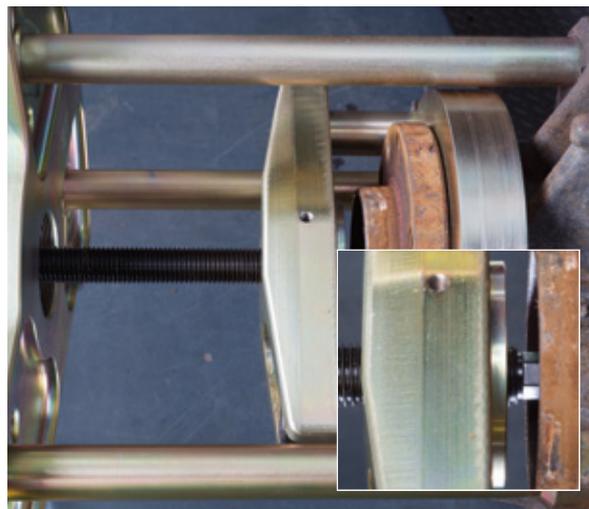
Torque down hydraulic cylinder and adapter to end-stop position and slacken by one turn back. This allows for disassembly of the tool components once the bearing is pressed in.



- Screw pull / pressure spindle in pull / pressure plate



- Thread must project on the reverse of bridge



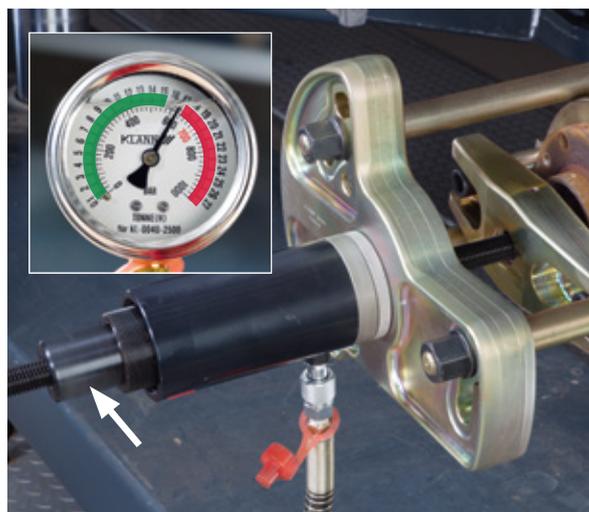
- Connect hydraulic pump to hydraulic cylinder
- Pump to pull wheel bearing unit out of steering knuckle until hydraulic cylinder reaches end-stop position

Note:

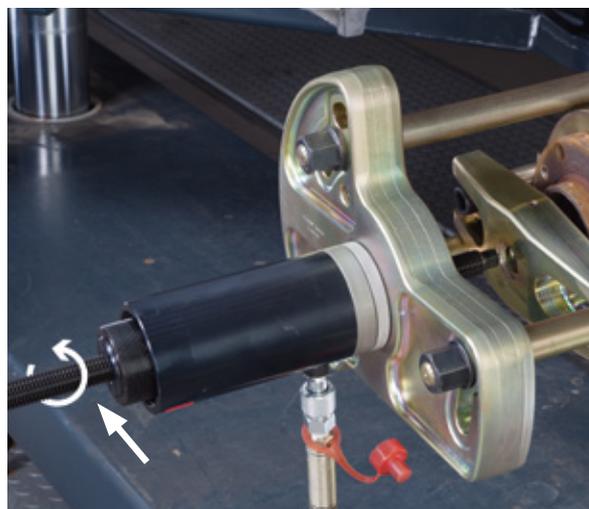
The hydraulic cylinder's stroke is not sufficient to allow the wheel bearing unit to be extracted from the seat in just one step.

Caution:

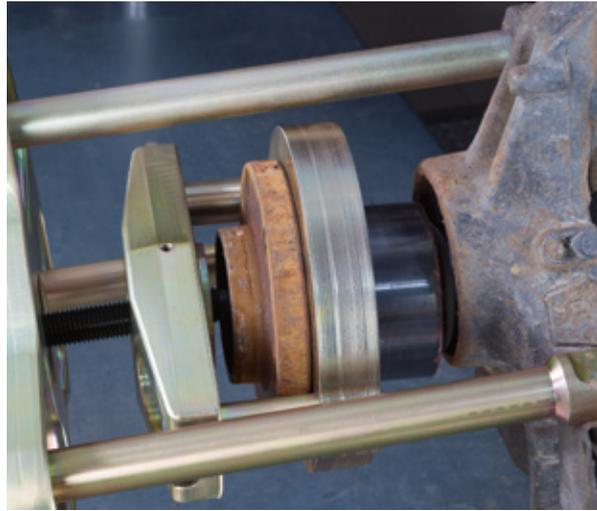
If press-out pressure exceeds 17t, the steering knuckle assembly must be replaced along with the wheel hub / bearing unit!



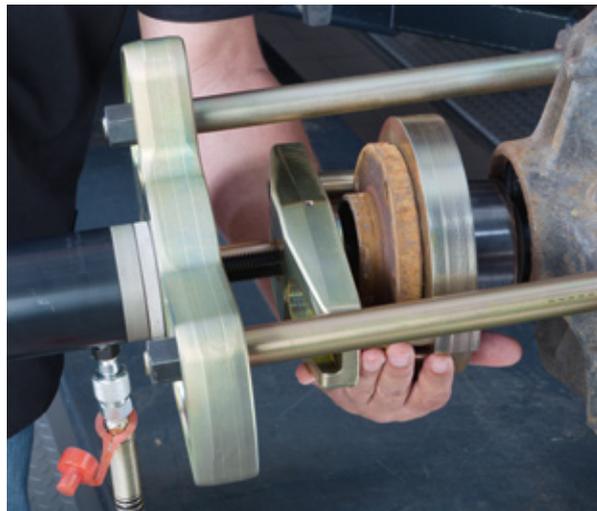
- Release pressure on hydraulic pump
- Rotate pull / pressure spindle while pump valve is open to return hydraulic cylinder to home position
- Close valve and screw pull / pressure spindle again in pull / pressure plate, if required



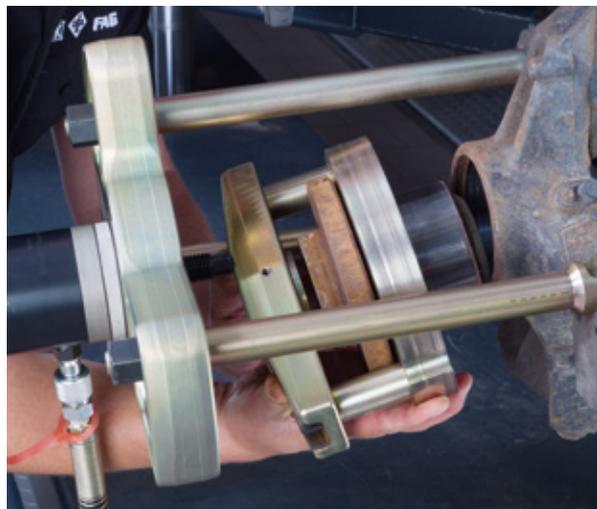
- Activate pump again to pull wheel bearing unit fully from steering knuckle



- Unscrew pull / pressure spindle from pull / pressure plate. Hold pull / pressure plate with one hand to prevent dropping



- Uninstall wheel bearing unit and pull / pressure plate and place to one side
- Unscrew hydraulic cylinder from base plate and remove adapter



- Remove pull / pressure plate from uninstalled wheel bearing unit



- Remove residue of used snap ring and clean wheel bearing seat thoroughly



Note:

Check wheel bearing ovality and contact profile for safety reasons.

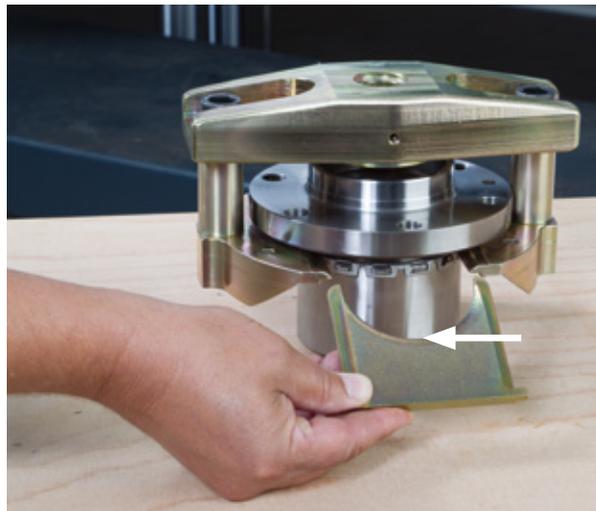


5.4 Wheel bearing reassembly

- Swivel pull / pressure plate into new wheel bearing unit



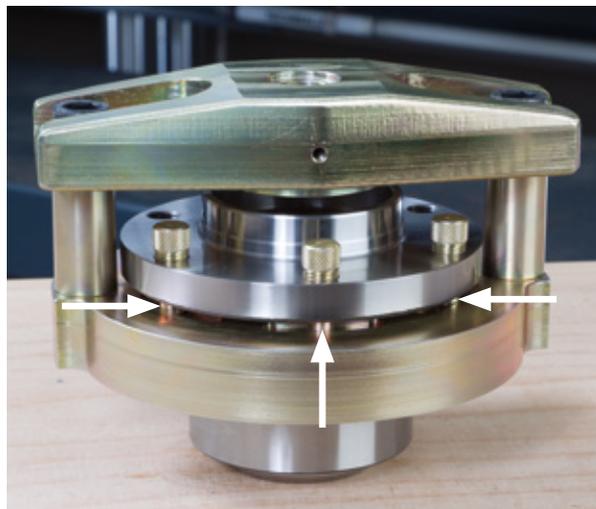
- Slip on closing plate. Ensure rounded side is facing upward towards wheel hub



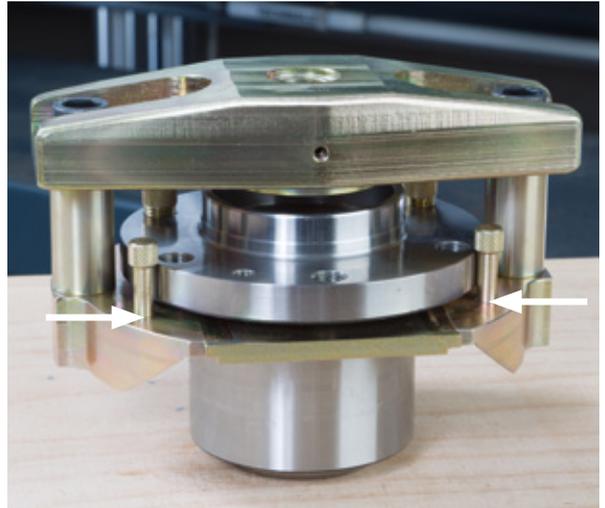
- Screw three knurled screws in wheel bolt thread to where they fit snugly in three pull / pressure plate grooves, so that the pull / pressure plate is centered on the wheel hub

Note:

Mount knurled screws opposite closing plate only.



- Position retaining pins in pull / pressure plate until they reach the end-stop position



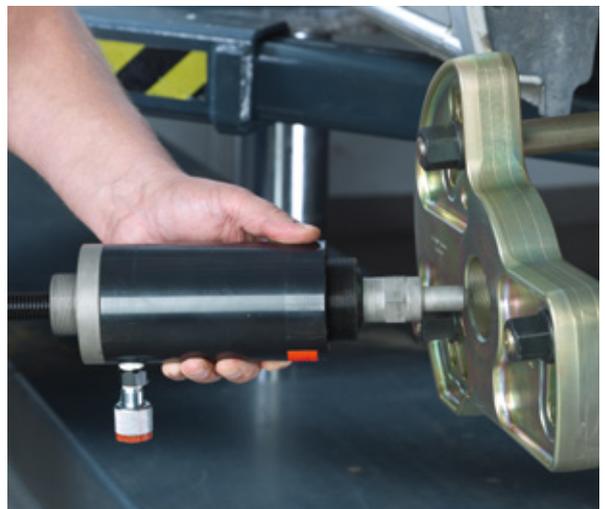
- Screw pressure nut on pull / pressure spindle and fasten spindle on hydraulic cylinder as illustrated



- Screw hydraulic cylinder push side into base plate

Note:

Torque down hydraulic cylinder to end-stop position and slacken by one turn back. This allows for disassembly of the tool components once the bearing is pressed in.



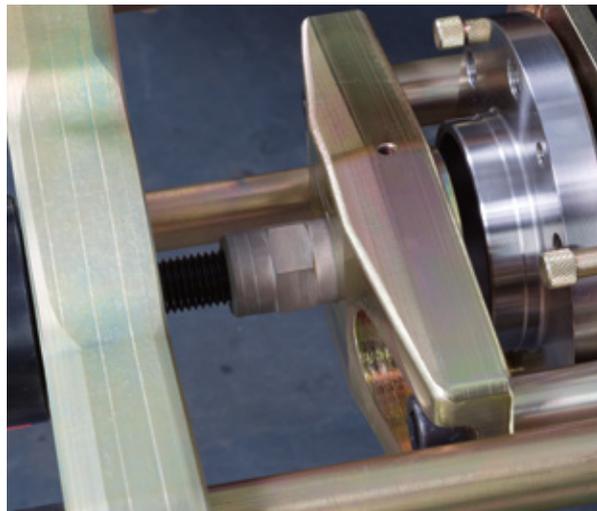
- Place pull / pressure plate with wheel bearing unit over steering knuckle

Note:

Closing plate must face upward.



- Screw spindle with pressure nut in pull / pressure plate
- Connect hydraulic pump to hydraulic cylinder



Note:

Ensure closing plate fits correctly.

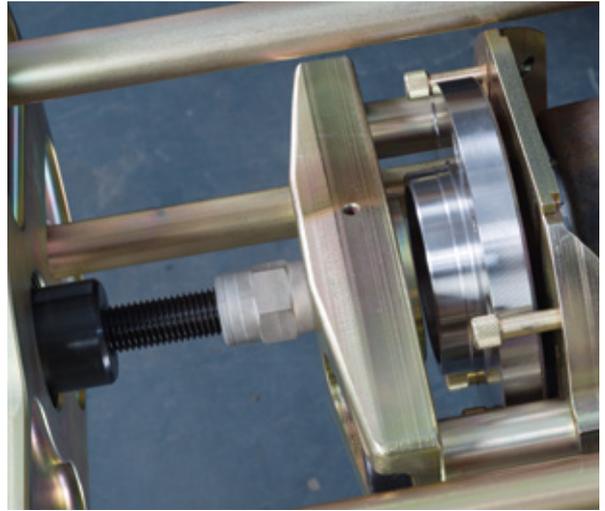
✗ incorrect



✓ correct



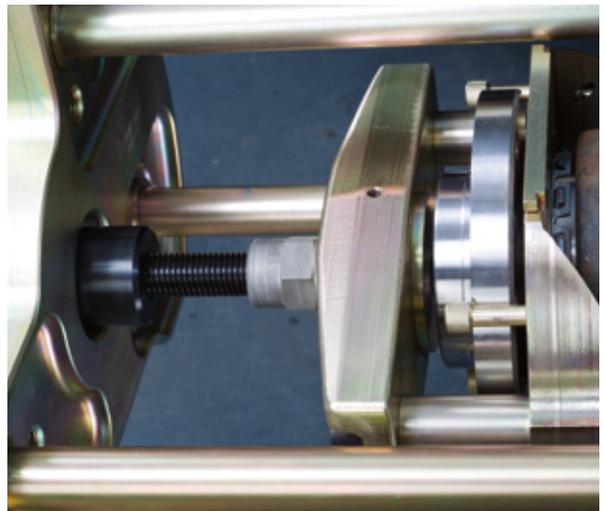
- Activate the hydraulic pump to press wheel bearing unit into steering knuckle



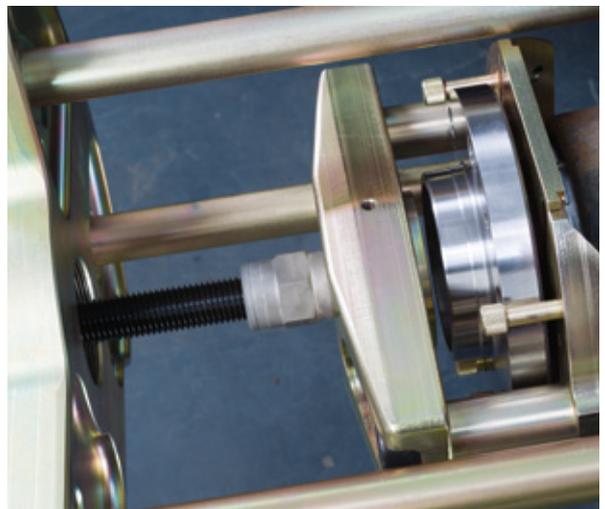
- When hydraulic cylinder has reached end-stop position, release pressure from pump until cylinder piston has returned to home position

Note:

The hydraulic cylinder's stroke is not sufficient to allow the wheel bearing unit to be assembled in the seat in just one step.



- Adjust pull / pressure spindle to where pressure nut again rests against pull / pressure plate
- Close hydraulic pump valve



- Activate pump to fully press in wheel bearing

Note:

The wheel bearing is securely installed when the snap ring clicks into position and hydraulic pump pressure increases noticeably.

- Release pump pressure and uninstall tools



- Ensure snap ring fits tightly in groove and is mounted flush with steering knuckle



5.5 Post-replacement work

Carry out the following steps according to the vehicle manufacturer's specifications after the wheel bearing has been replaced:

- Mount tie rod end on steering knuckle (new fastening screw included in the FAG wheel set)
- Mount brake disc
- Mount brake anchor plate (new fastening screws included in the FAG wheel set)
- Mount brake caliper and pads
- Mount front wheel



