Original instructions

398 2 en 2010-03-17

HYDRAULIC ROCK DRILL HEX1

Operation, maintenance and repair instructions

SANDVIK

Table of Contents

ID: 398 2 en 2010-03-17

ID: 398 2 en 2010-03-17

1. OPERATION AND MAINTENANCE

1.1. General

These instructions describe the primary maintenance procedures to be followed for hydraulic rock drills.
Sandvik Service is always willing to give advice and help with any maintenance-related problems. Use of the expertise of the qualified maintenance staff at Sandvik dealerships and of original Sandvik spare parts will ensure reliable operation of the rock drill.

1.2. Safety precautions

DANGER	
	**Beware of moving and rotating parts. Carry out maintenance and repair work only when the rig is not running. Make sure that the rig cannot be started unintentionally during maintenance work.**

NOTICE **Always follow the safety instructions and perform your work with care.**

Only personnel with specific operation and service training are permitted to perform operation, maintenance and adjustment procedures. Read the operating, maintenance, and safety instructions before using or servicing the rig.

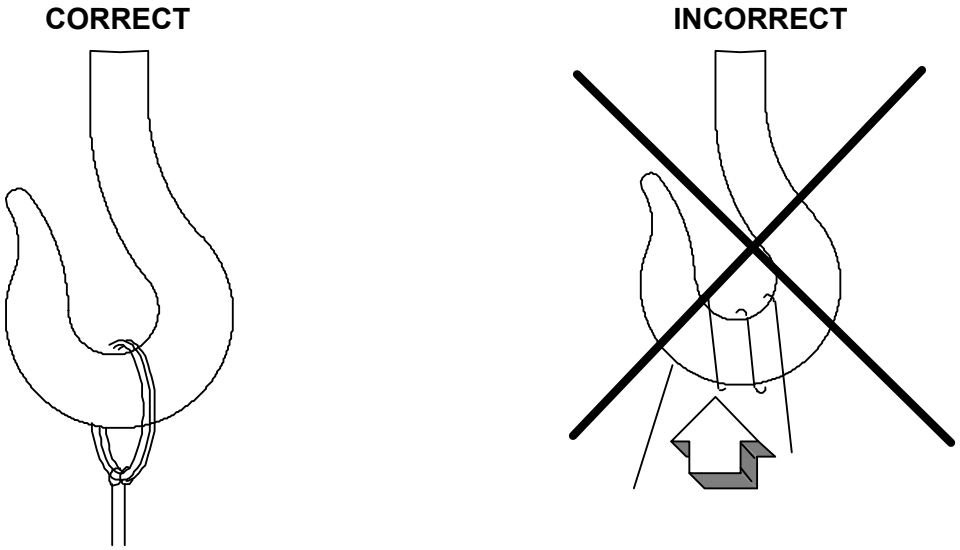
1.3. Taking a new rock drill to use

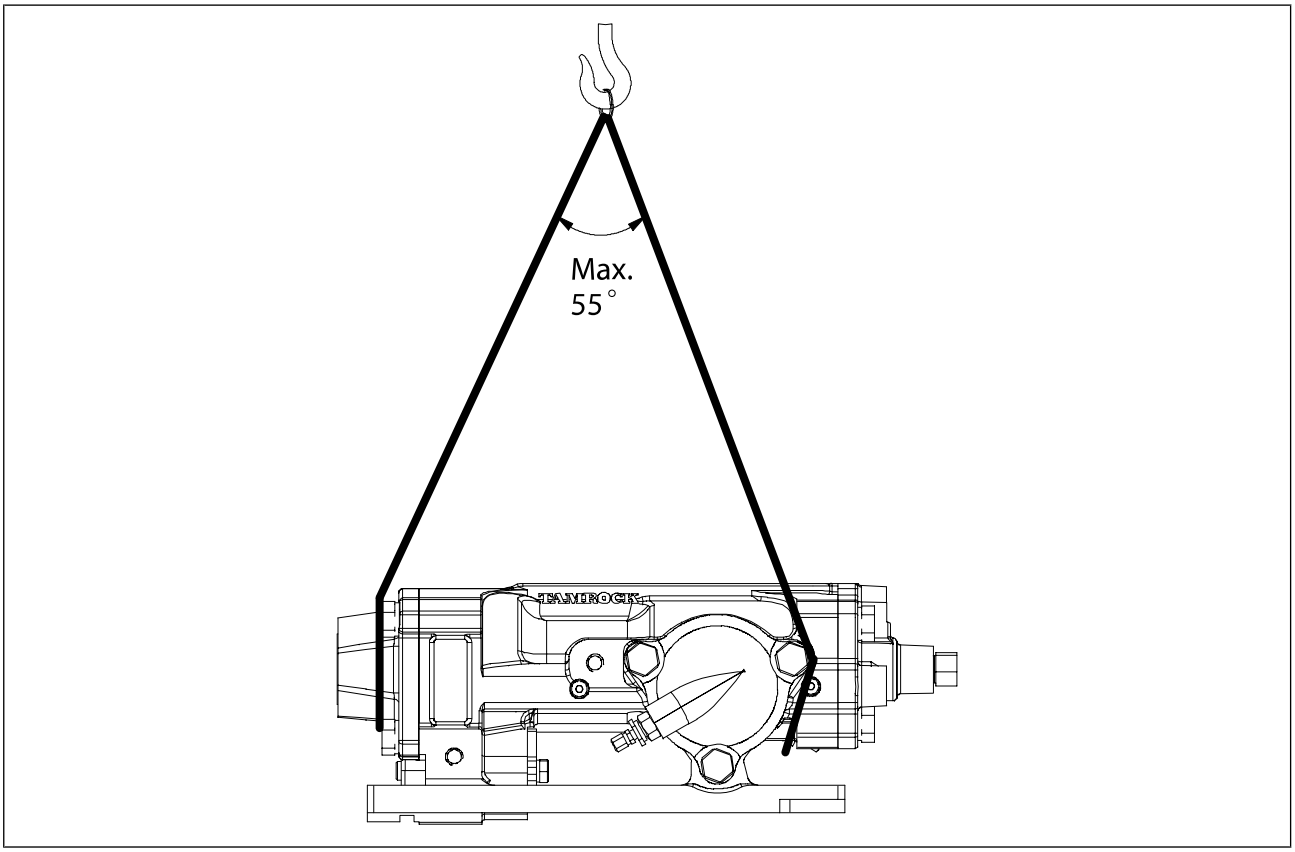
1.3.1. Preparations

NOTICE **The new rock drill is supplied with unpressurised accumulators and plugged hose connections.**

1. Follow the instructions when pressurising the accumulators. See ‘Repair instructions for pressure accumulators’.
2. With a new rock drill, a hydraulic check and system flushing must be performed according to the instructions before the rock drill is installed.

1.3.2. Hydraulic rock drill HEX 1 lifting instructions





HEX 1 . . . . . 48 kg

ID: 398 2 en 2010-03-17

1.3.3. Test run

Test run the rock drill and make sure that it operates properly before beginning production drilling.
During the test run, monitor:

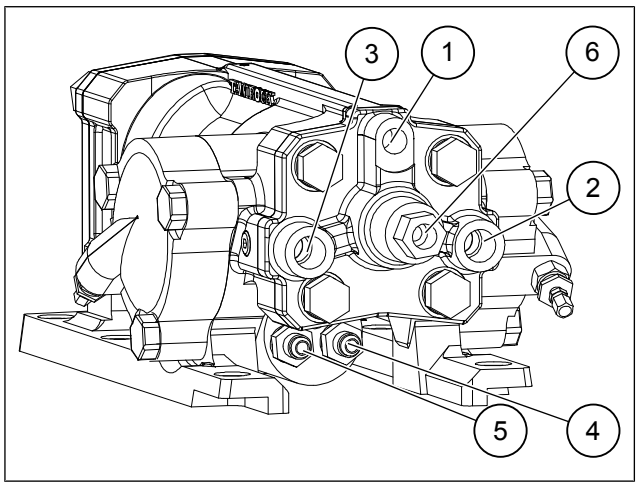
- the operation of the shank lubrication
- the pressures and the temperature
- the flushing operation
- any possible oil leaks

NOTICE

Avoid using full percussion pressure. When the drill bit is not in contact with the rock, full percussion pressure strains the accumulator membranes and causes unnecessary wear of the flushing housing and cavitation in the percussion mechanism. Such 'idle drilling' is especially dangerous when drilling upward and cleaning holes by pumping.

1.4. Hose connections

1. Shank lubrication
2. Percussion mechanism, pressure side (H.P.)
3. Percussion mechanism, return side (L.P.)
4. Rotation pressure (H.P.) (rotation clockwise)
5. Rotation return (L.P.)
6. Flushing



1.5. TEST RUN

General

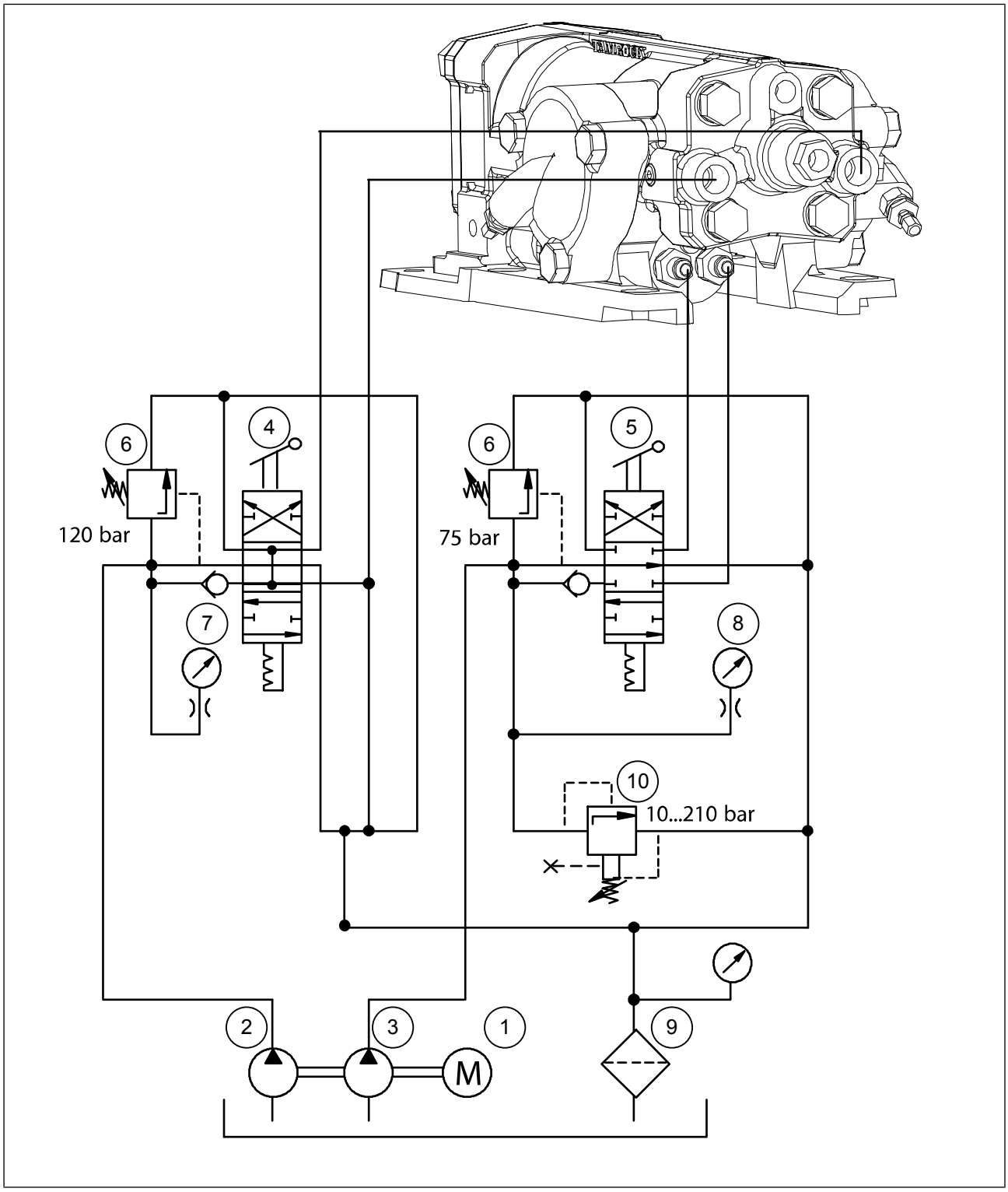
After maintenance is complete, the rock drill can be tested in the Sandvik Service Container using the hydraulic power pack. The test run can be carried out on the floor of the service container with the rock drill lying on a piece of cushion rubber, for instance.
The purpose of the test run is to check the operation of the percussion and rotation mechanisms of the rock drill, and to detect any possible leaks.

Wear hearing protectors when the power pack is running!

ID: 398 2 en 2010-03-17

1.5.1. Before the test run

1. Using a double nipple, connect the hoses of the power pack to make a loop so that the lines of both pumps form their own closed circuits.
2. Turn on the power pack.
3. Pull the levers of both control valves into operating position, whereby oil starts flowing through the systems in free circulation.
4. Allow the power pack to run for about 3 minutes, after which it is ready for the test run.



1.	Electric motor	6.	Pressure--relief valve
2.	Pump, percussion (30 -- 45 l/min)	7.	Pressure gauge (percussion)
3.	Pump, rotation (15 -- 20 l/min)	8.	Pressure gauge (rotation)
4.	Control valve (percussion)	9.	Return filter
5.	Control valve (rotation)	10.	Differential pressure valve

1.5.2. Performing test run

1. Connect the rock drill according to the hydraulic flowchart.
2. Make sure that
   a. there is enough oil in the tank (1)
   b. the control valve (4) and (5) levers are in neutral position
3. Start the powerpack.
4. Start percussion by pulling the control valve (4) lever towards yourself.
5. Start rotation by pulling the control valve (5) lever towards yourself. You can change the direction of rotation by pushing the lever to the other extreme position.
6. Continue the test run for about 5 minutes, and observe possible leaks.

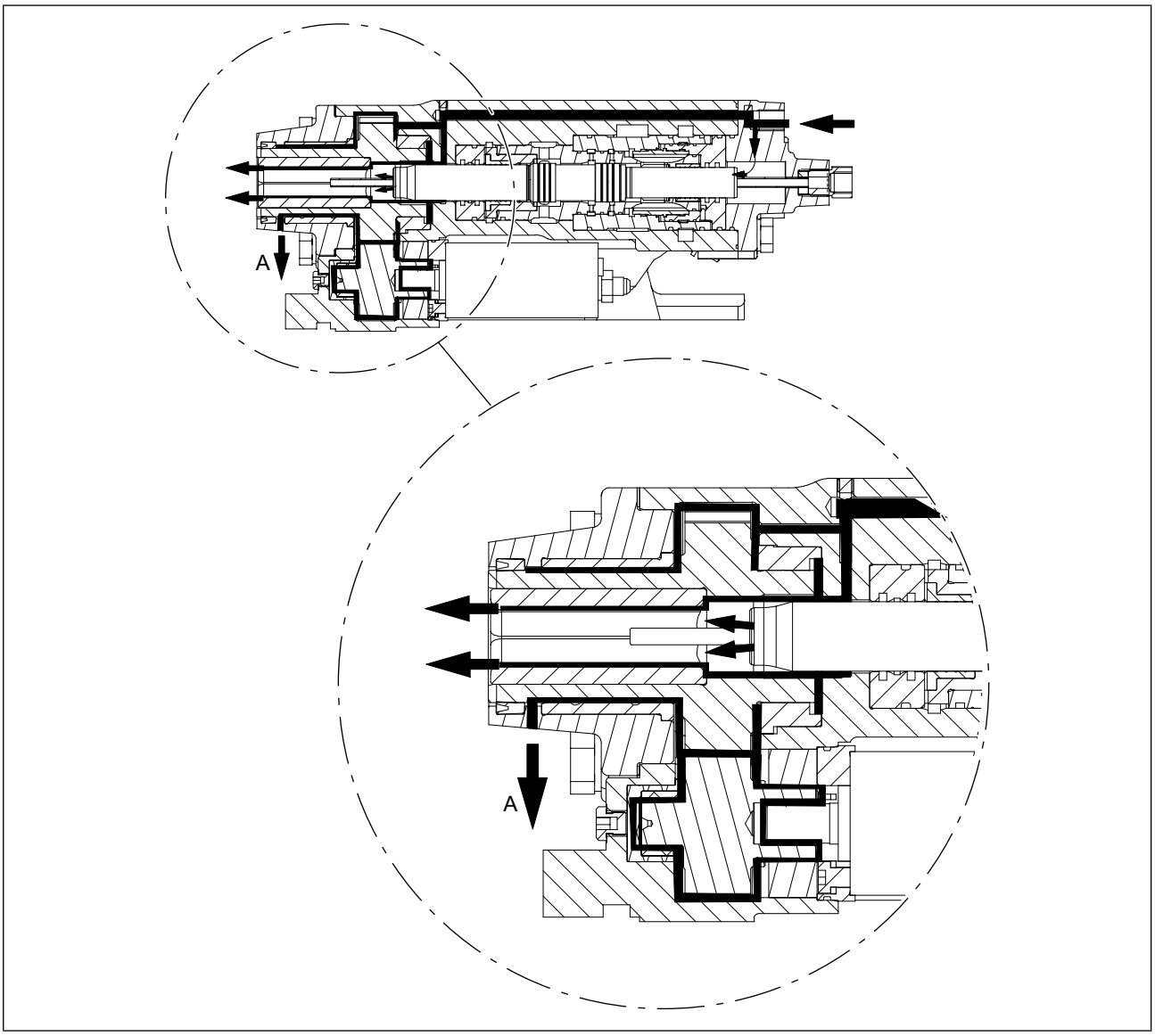
1.6. LUBRICATION CIRCULATION

The percussion mechanism and the rotationmotor of the rock drill are lubricated using the hydraulic oil that flows through them.

1.6.1. Shank lubrication circulation

The rotation mechanism and the chuck are lubricated with oil mist lubrication. The lubrication hose from the shank lubrication device is attached to the rear end of the rock drill. The oil mist is led from the rear end to the front end where it lubricates the rotation mechanism, its bearings, and the chuck. A part of oil mist is led to space in the rear cover to keep it clean.

Check that there is oil mist coming out of the hole (A) under the front cover so that the shank and the chuck receive oil during drilling.



NOTICE

Proper shank lubrication is necessary. Inadequate lubrication quickly causes serious damage to the rock drill. Inadequate lubrication causes the chuck and the shank to overheat, and this leads to rapid wear of these components. Overheating of the shank also causes shank breakage.

Adjusting the shank lubrication device

Monitor the dripping of oil from the drip pipe, and, if necessary, turn the mixture--adjusting screw. Adjust the drip rate to 30 to 50 drops/minute (50 -- 100 g/h). The lubrication is sufficient when the drill rod is oily for a length of 25 cm from the rock drill.

ID: 398 2 en 2010-03-17

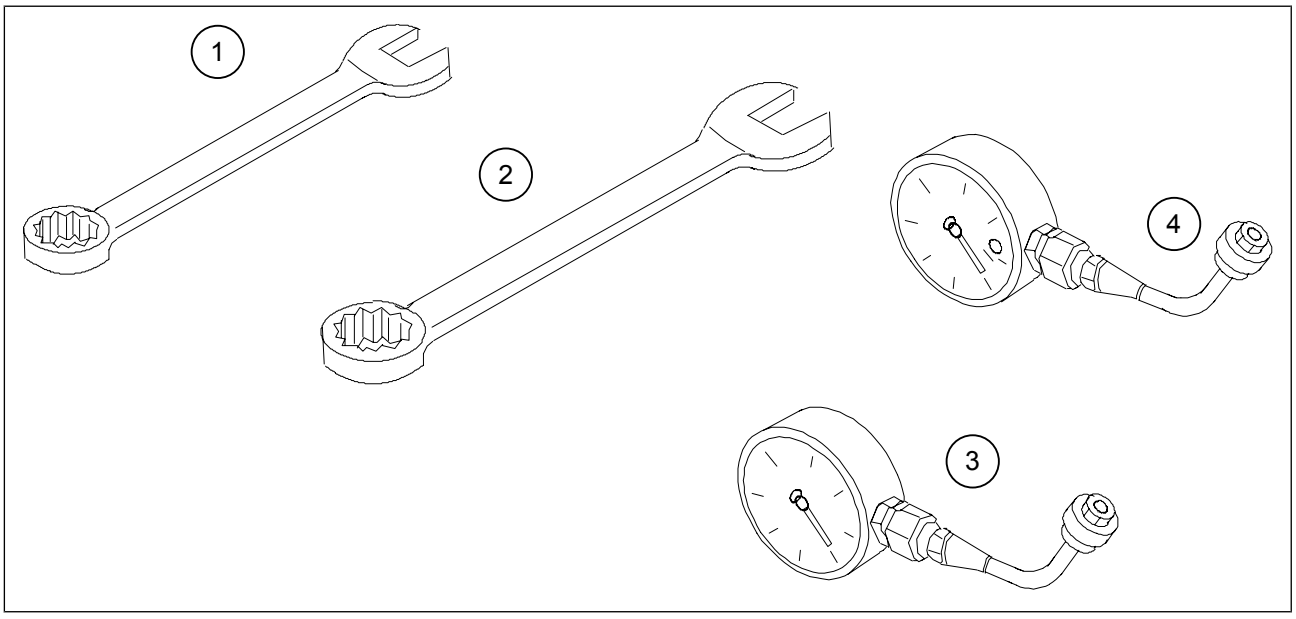
1.7. Periodic maintenance

1.7.1. General

The idea of regular preventive maintenance is to take the rock drill in for servicing before a failure stops it during operation. This will prevent expensive consequential failures and downtime that adversely affects production.
The maintenance interval varies according to local conditions and must therefore be determined on the basis of experience.
In defining the correct maintenance interval, the regular maintenance table should be consulted first and then the maintenance interval should be increased until a suitable maintenance interval for local conditions is determined.
In addition to this, the rock drill can undergo maintenance whenever the operator reports a malfunction that could lead to a failure or production downtime.

1.7.2. Tools needed for on-site maintenance

1. Spanner, 19 mm
2. Spanner, 24 mm
3. Check gauge for low--pressure accumulator
4. Check gauge for high--pressure accumulator



1.7.3. Daily

1. Check for possible oil leaks.
2. Check the hoses and hose connections.
3. Check that the end of the flushing pipe is intact.

1.7.4. Weekly

1. Check the hour--meter reading.
2. Check the accumulator filling valves and their cover plugs, and the tightness of the accumulator fastening bolts.
3. **Check accumulator pressures.**
   See instruction: “Pressure accumulator for hydraulic rock drill; Repair instructions“.
4. Check the condition of the chuck, rotation bushing, and rotation bushing bearing.
5. Check the tightness of the front and rear cover bolts.

1.7.5. Basic maintenance

The recommended maintenance interval for the rock drill is 500 percussion hours, but the interval varies according to local conditions and must therefore be determined on the basis of experience. It is better to perform preventive maintenance than repair the machine after the damage has already happened.
Write down the percussion hours and/or number of metres drilled per shift during each maintenance interval. Fill in the rock drill maintenance card.

1.7.6. After rock drill service

After the maintenance is complete, the reinstalled components, especially when surfaces are worn, settle into their proper places for a while, causing the side bolts and mounting bolts to loosen.
This is why the side bolts and mounting bolts must be re-tightened after drilling about 100–200 metres following maintenance.

1.7.7. Service card

The card is machine-specific. When a rock drill is brought in for maintenance, the previous maintenance cards must be available. The card is filled in with as much information about the maintenance as possible. When a rock drill enters use again after maintenance, the date for the next servicing is marked on the card.
The maintenance card reveals the replacement rate of parts in each rock drill, and the effect of different conditions and procedures can be seen by comparing the various cards.

- The card must be available for preventive maintenance.
- A properly completed card enables us to view the entire maintenance history of a rock drill.
- The card simplifies the decision to scrap an old machine.

1.7.8. Service follow-up

To monitor the maintenance of a rock drill, the attached type of maintenance card can be used.

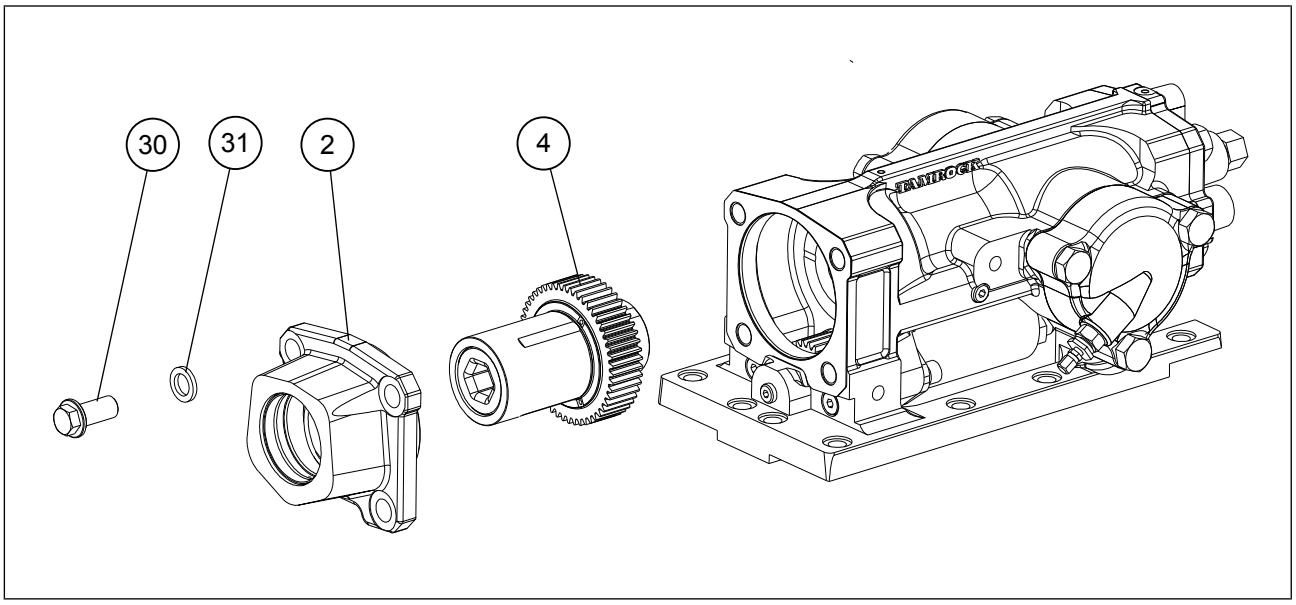
ID: 398 2 en 2010-03-17

2. REPAIR INSTRUCTIONS

2.1. DISASSEMBLY

2.1.1. Detaching the front cover

The front cover (2) is detached by opening the 4 bolts (30). Pull out the rotation bushing (4).

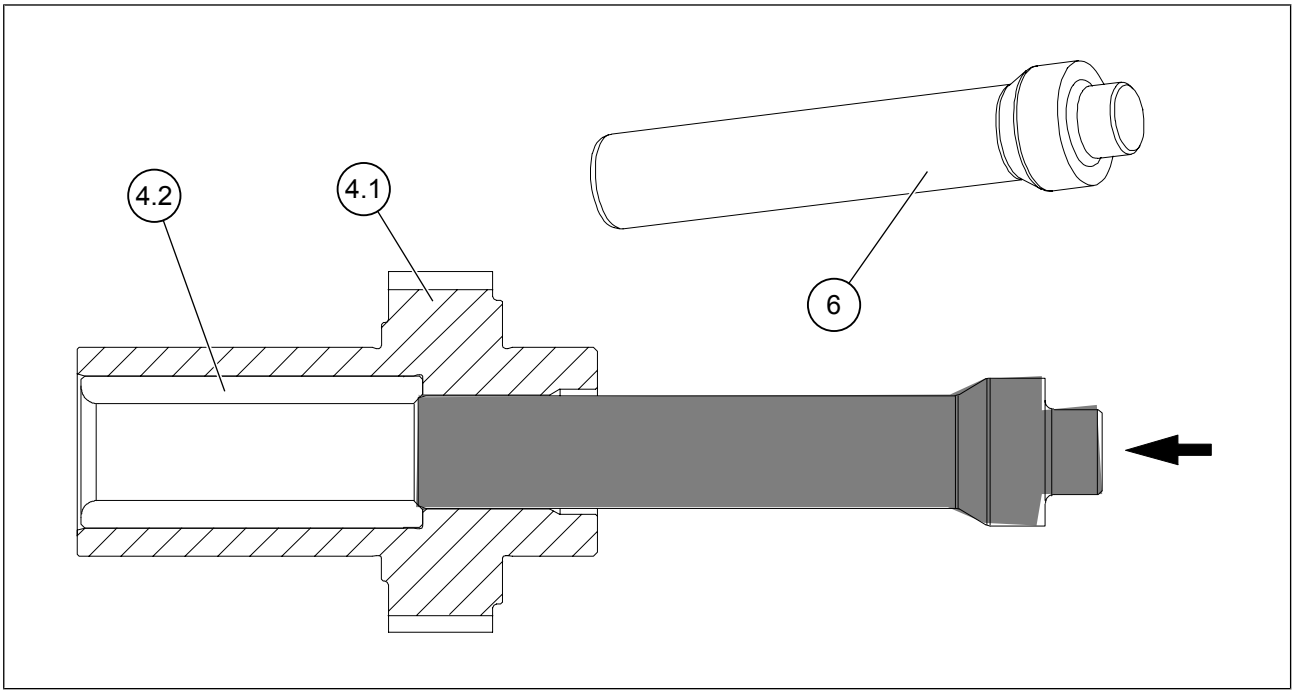


2.1.2. Replacing the chuck

Check the condition of the chuck

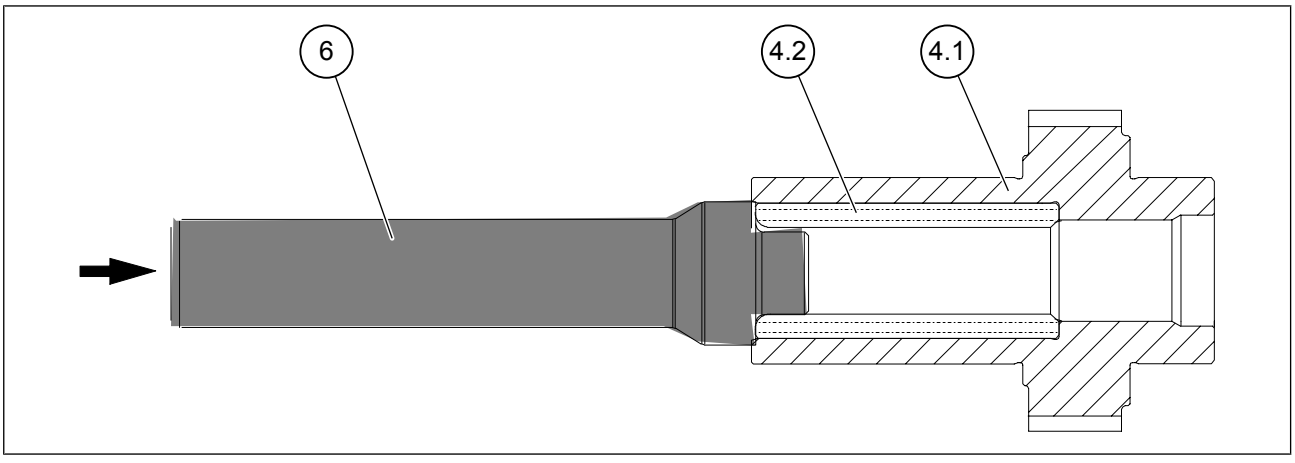
Detaching the chuck

1. Detach the chuck (4.2) by using a hydraulic press and a special tool (6).
   Do not detach the chuck by punching.
2. Punching the chuck out
   harm the rotation bushing (4.1) and decrease its service life.



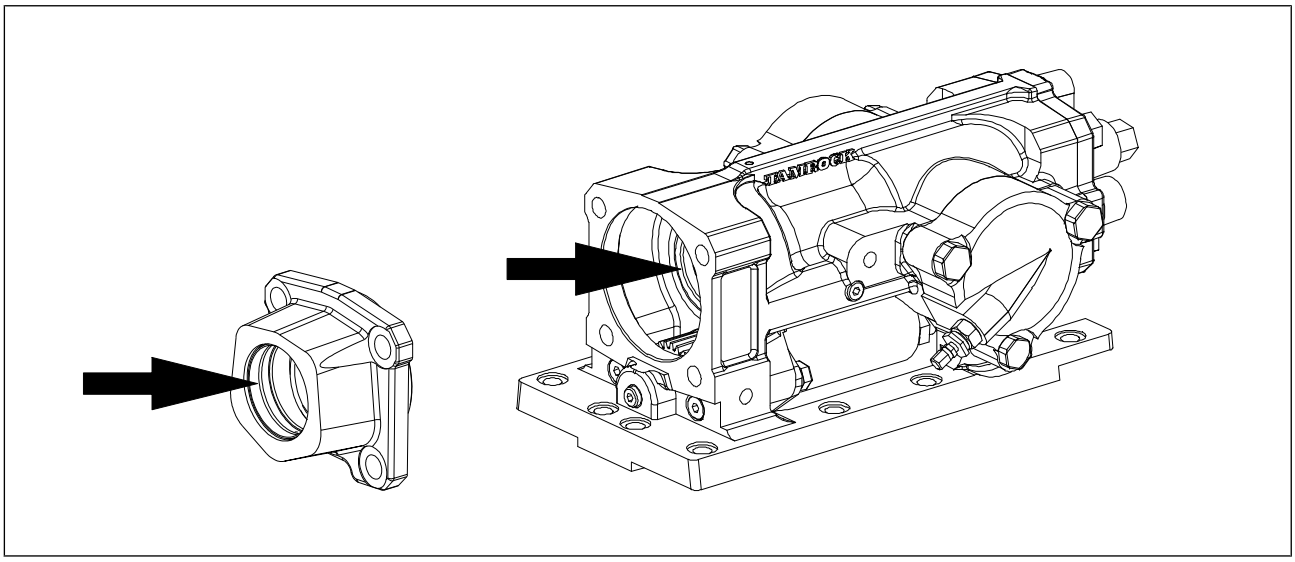
Installing the chuck

The best method to install the parts is to take advantage of temperature differences. The rotation bushing should be warm (e.g. room temperature or heated), and the chuck should be cold (cooled by, e.g., carbonic ice or liquid nitrogen). This will maintain the correct dimensions of the rotation bushing hole for a longer period of time and ensure that the force needed in installation is smaller.

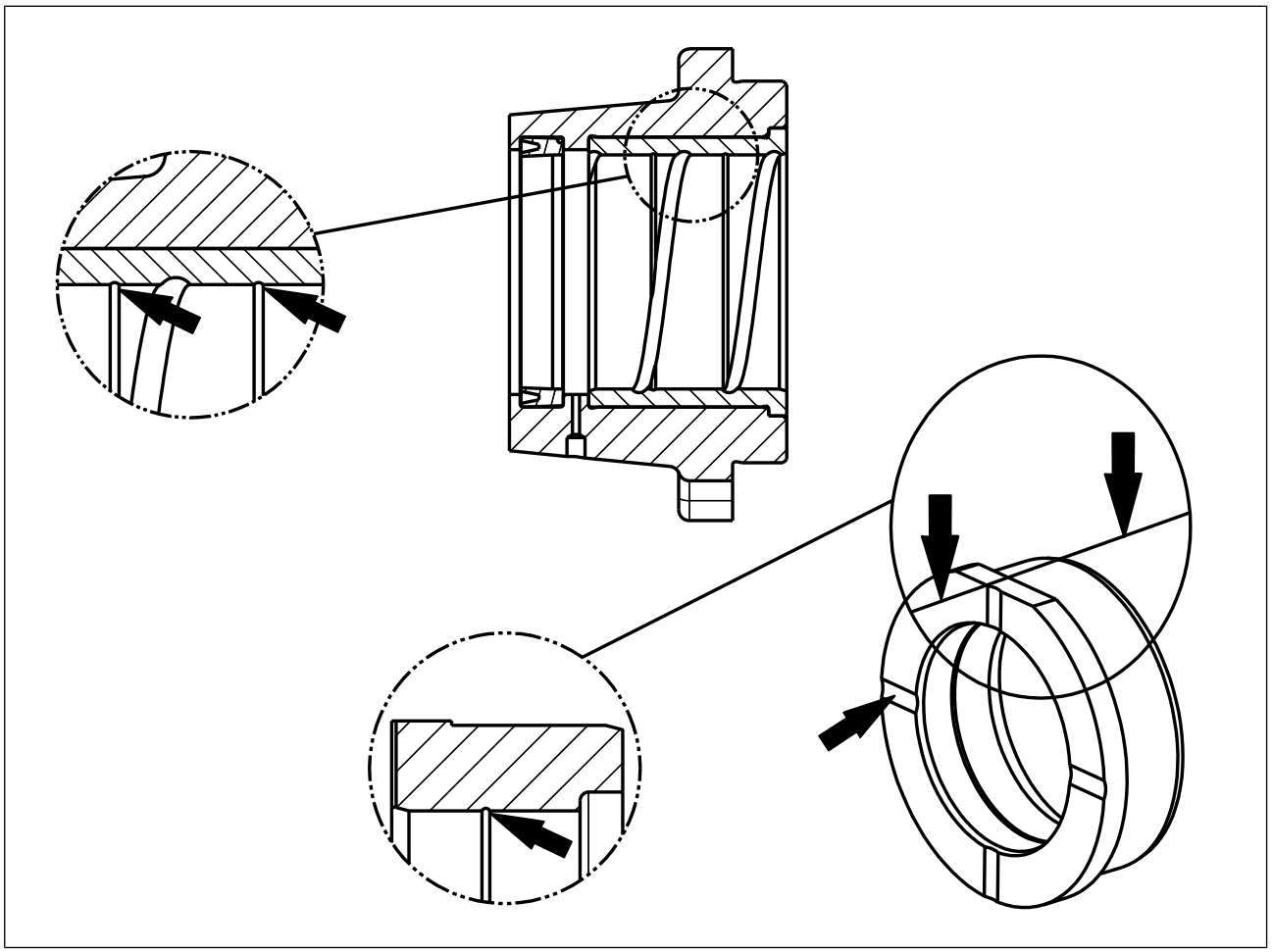


2.1.3. Replacing the front bearing of the rotation bushing

1. Check the condition of the front cover bearing and the rotation bushing rear bearing.

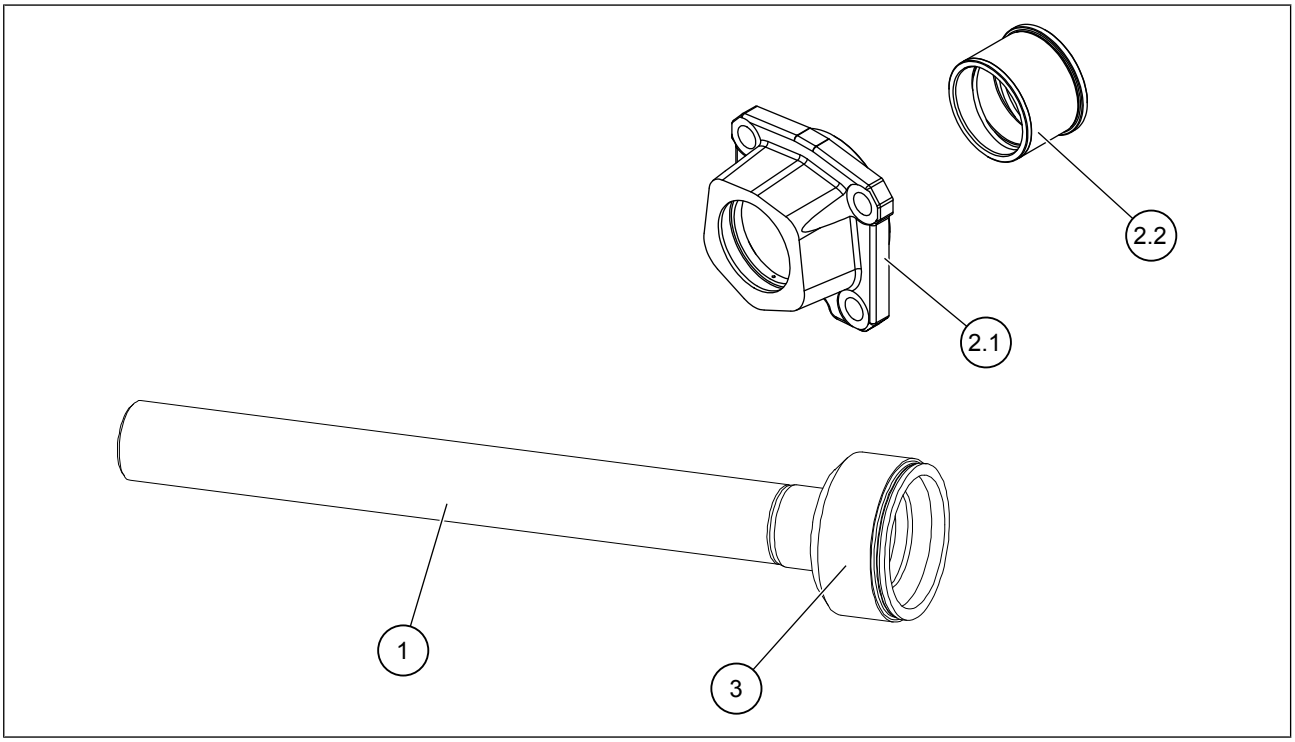


2. The bearings must be replaced when the bearing surface is worn down to the level of the wear indicator groove at any point. The indicator grooves are marked with arrows in the figure.



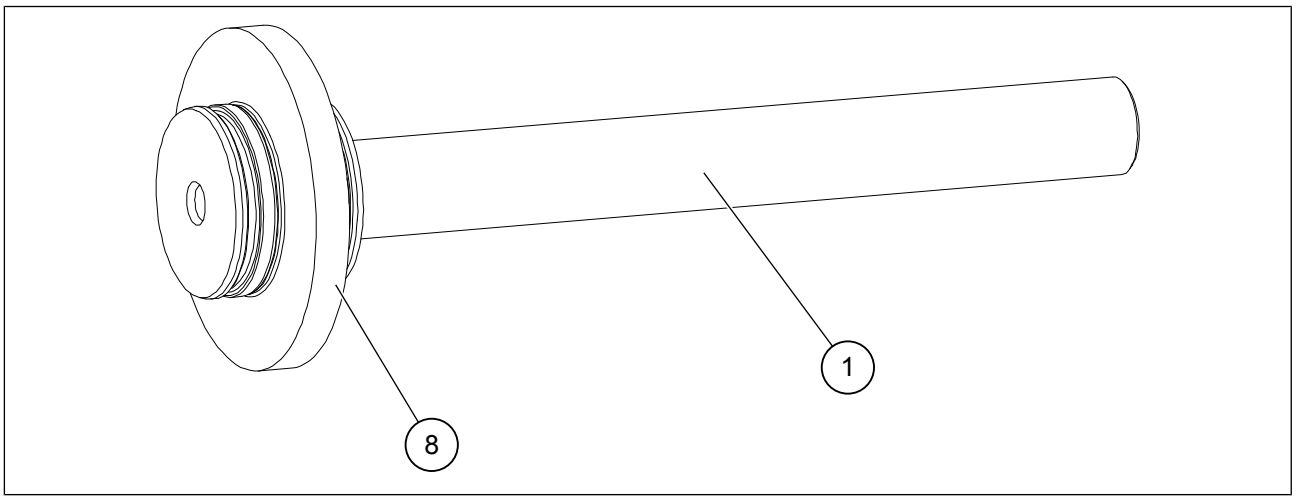
Detaching the bearing

Detach the bearing (2.2) by using a hydraulic press and special tools (1 and 3). Do not detach the bearing by punching it. Punching the chuck out will harmthe front cover (2.1) and decrease its service life.



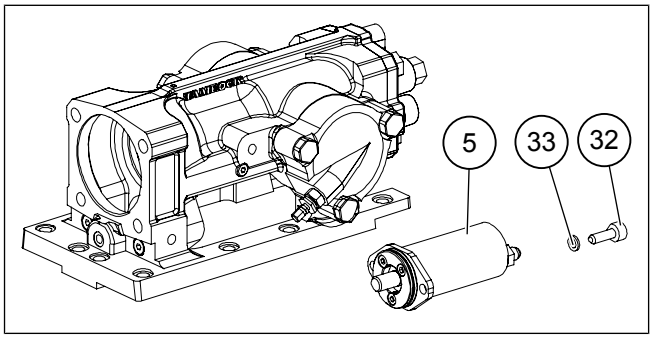
Installing the bearing

The best method for installing the parts is to take advantage of temperature differences. The front cover should be warm (e.g. room temperature or heated) and the bearing should be cold (cooled by, e.g., carbonic ice or liquid nitrogen). This will maintain the correct dimensions of the front cover hole for a longer period of time and ensure that the force needed in installation is smaller. Use special tools (1 and 8).

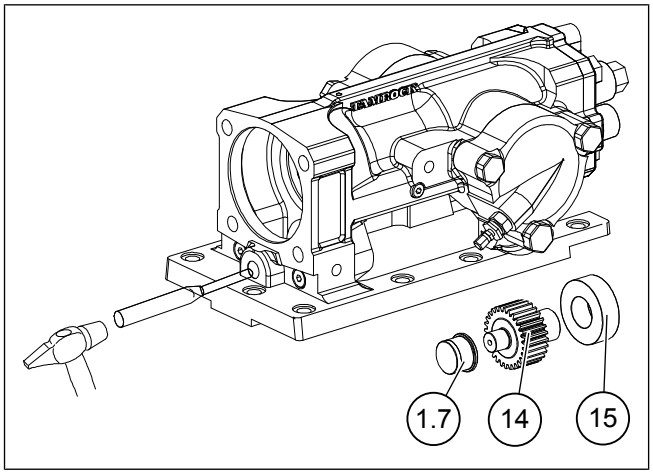


2.1.4. Detaching the rotation motor and primary gear bearings

1. Detach the rotation motor (5) by opening the screws (32).

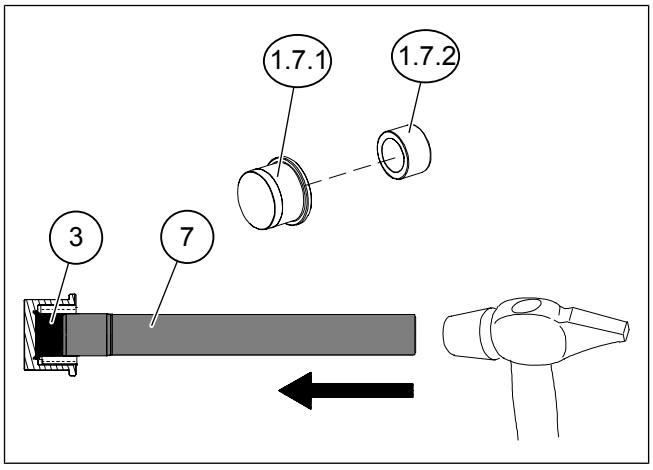


2. Detach the bearing housing shield plug. Using a suitable punch, remove the bearing housing (1.7), primary gear (14), and primary gear bearing (15).

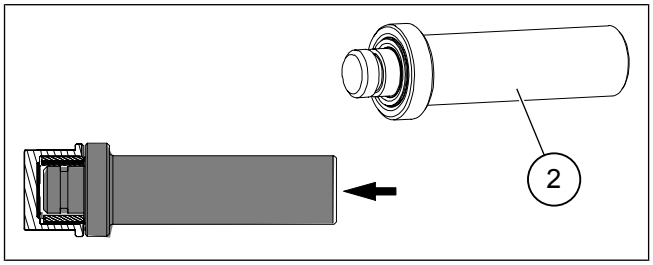


Replacing the bearing housing and needle bearing

1. Replace the bearing housing (1.7.1) and needle bearing (1.7.2) after every 500 operating hours.
   The needle bearing can be detached from the bearing housing. Use grease (3) and the special tool (7) as illustrated. Punch with a hammer so that the grease will loosen the bearing.

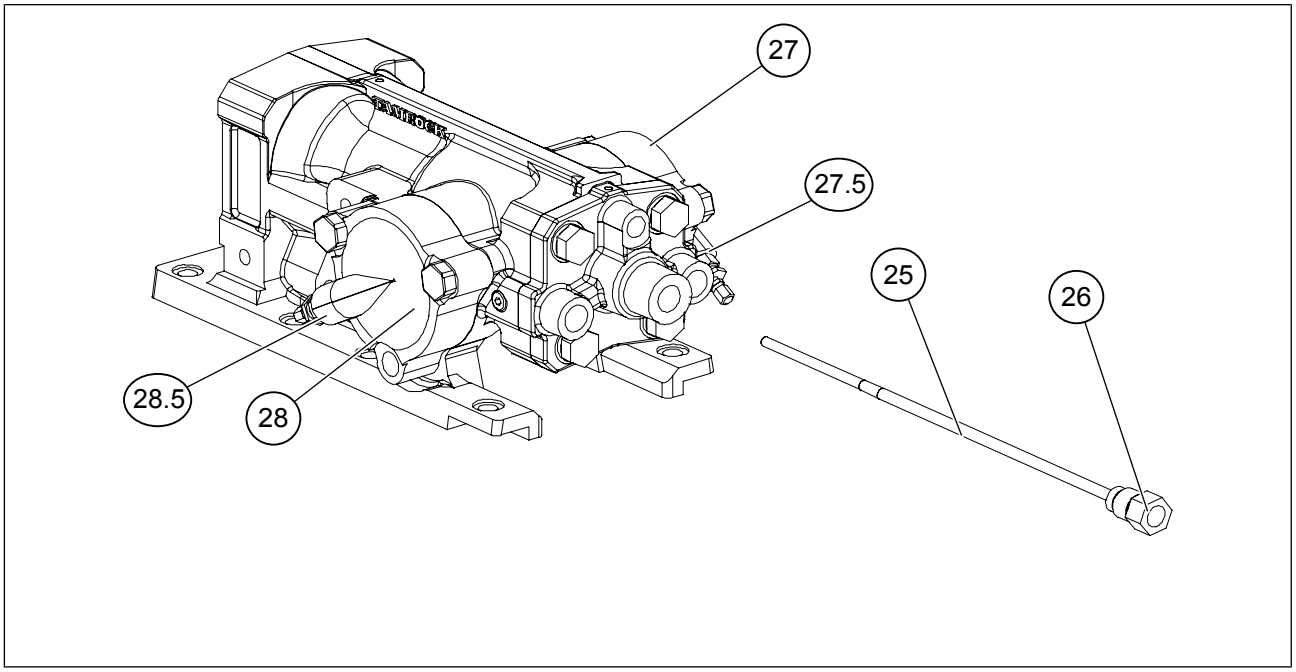


2. Press the bearing carefully into its place with the hydraulic press and the special tool (2).



2.1.5. Detaching the flushing pipe, pressure accumulators, and rear cover

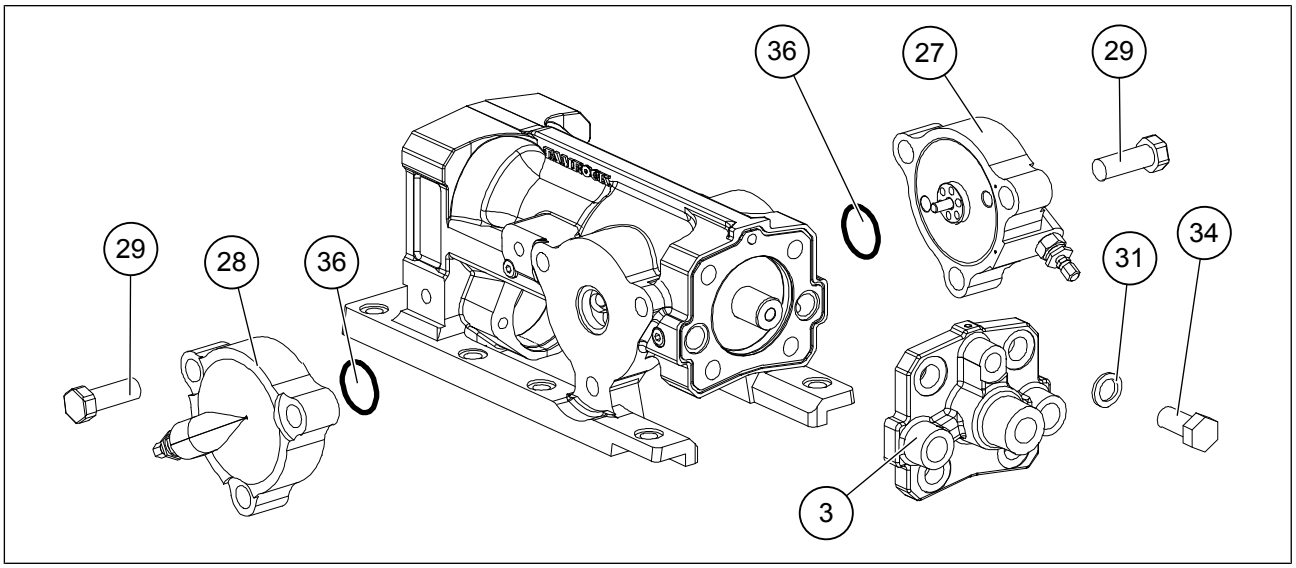
1. Open the nipple (26) and detach the flushing pipe (25) from the front end by pushing.



2. Release the accumulator pressure by opening the filling valves (27.5 and 28.5) before removing the pressure accumulators (27 and 28) from the rock drill.

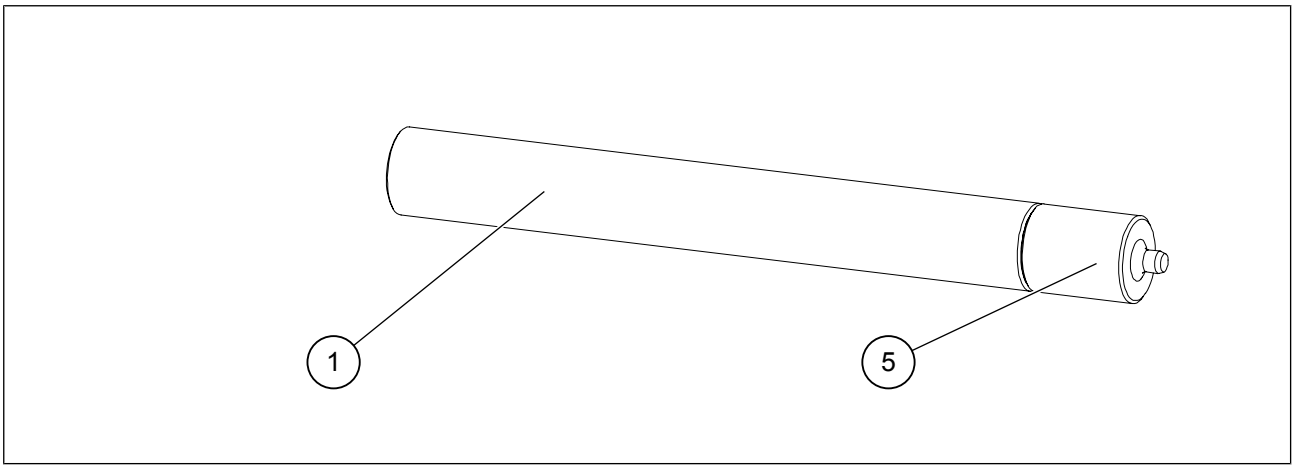
Never detach a pressure accumulator before verifying that the pressure has been released.

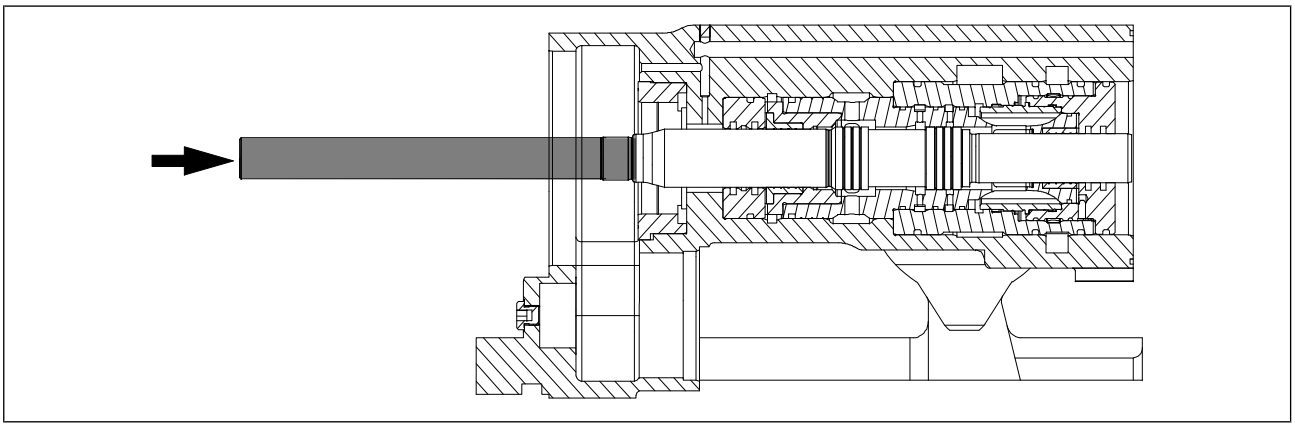
3. Open the pressure accumulator bolts (29).
4. Detach the pressure accumulators (27 and 28).
5. Remove the O-rings (36).
6. Put protective plugs into the openings on the rock drill body.
7. Open the rear cover fastening bolts (34).
8. Detach the rear cover (3) from the rock drill.
9. The disassembly, inspection, assembly, and pressurising of the pressure accumulators are discussed in: “Pressure accumulators for a hydraulic rock drill; Repair instructions“.

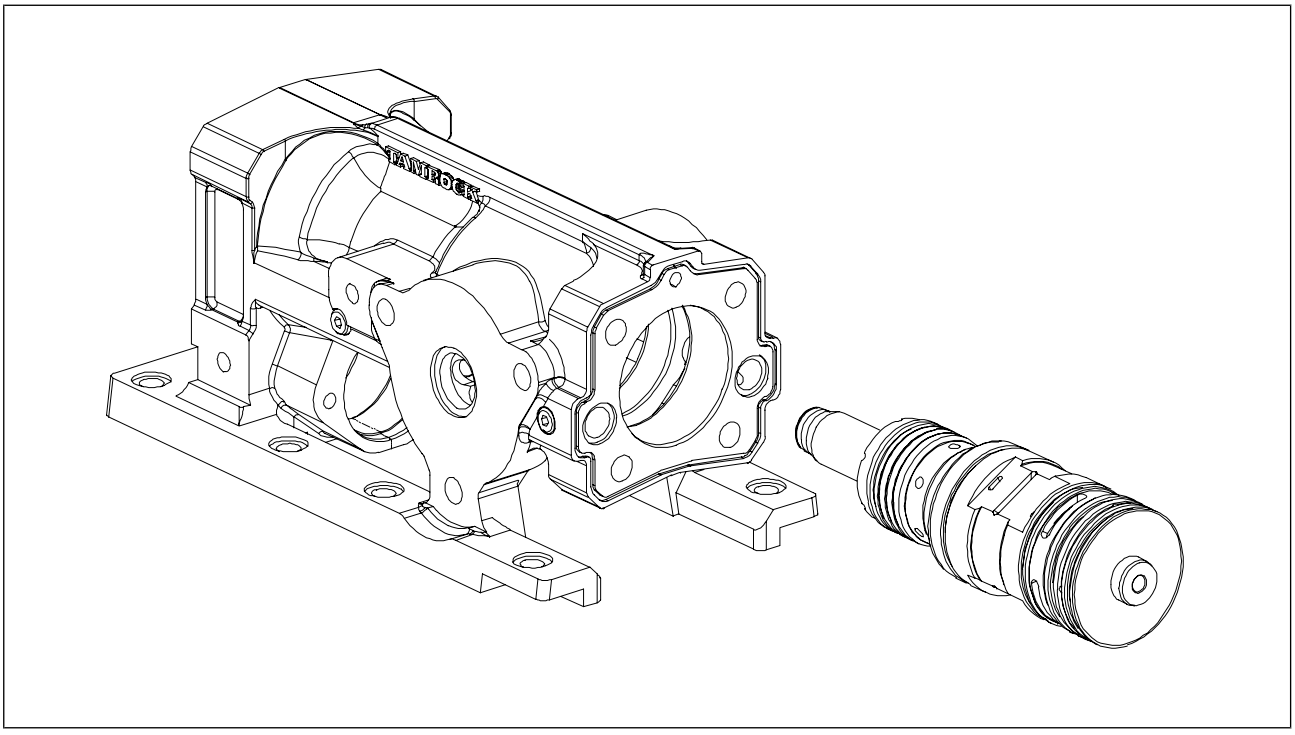


2.1.6. Detaching the percussion cartridge

1. Push the percussion cartridge out with special tools (1 and 5).

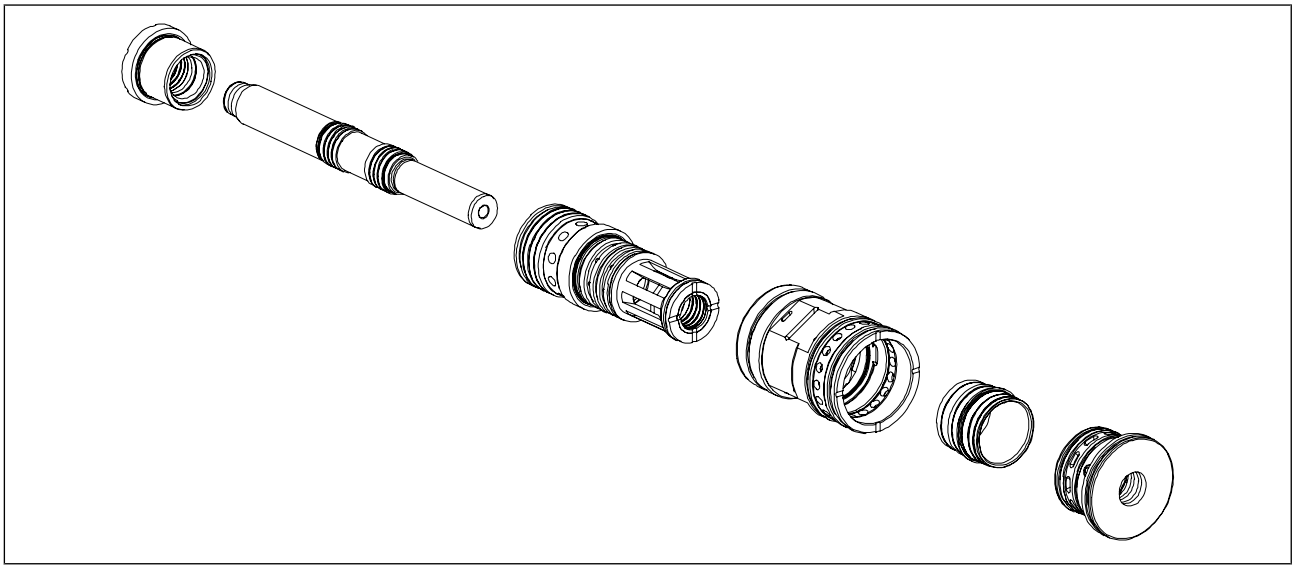




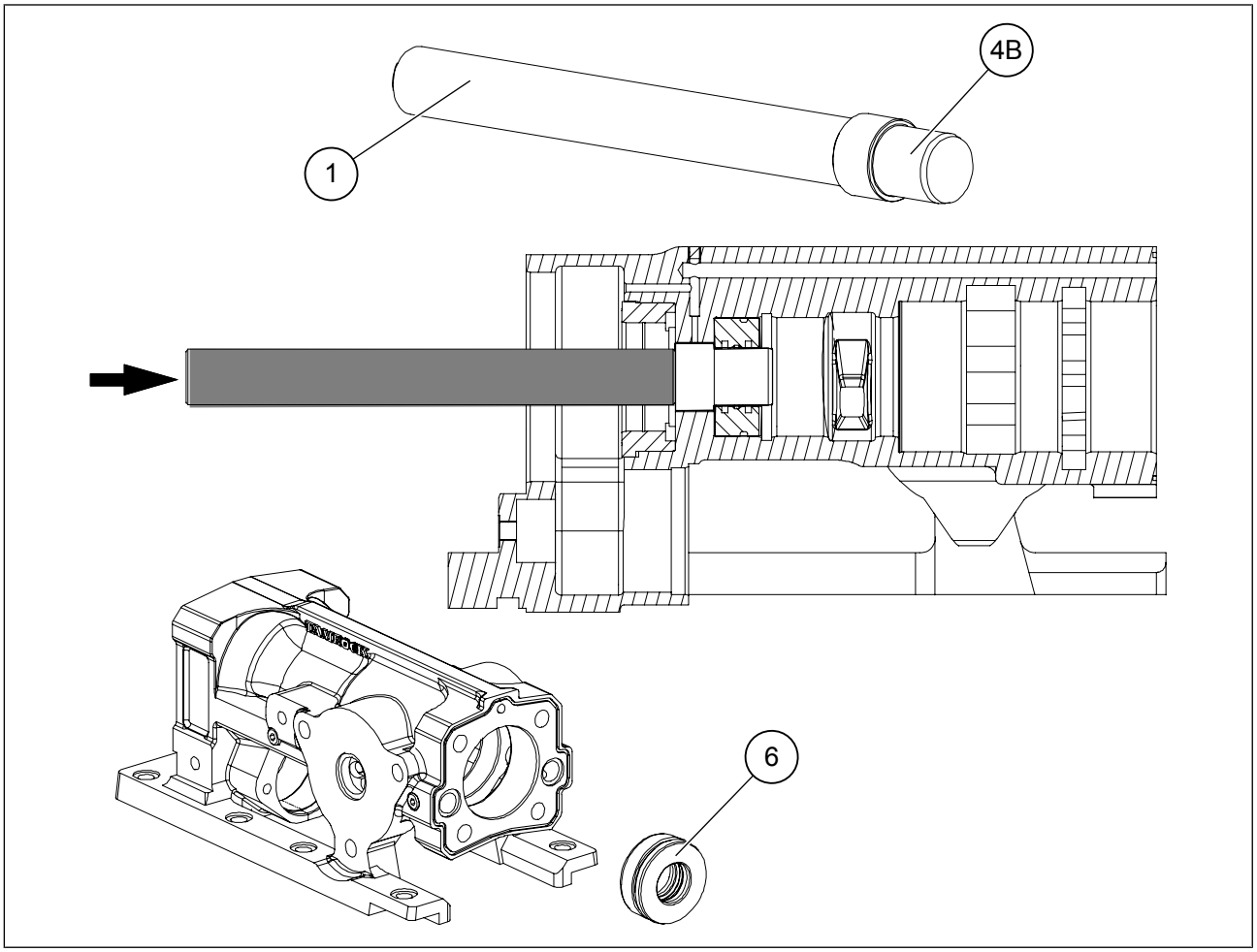


ID: 398 2 en 2010-03-17

2. Disassemble the percussion cartridge.

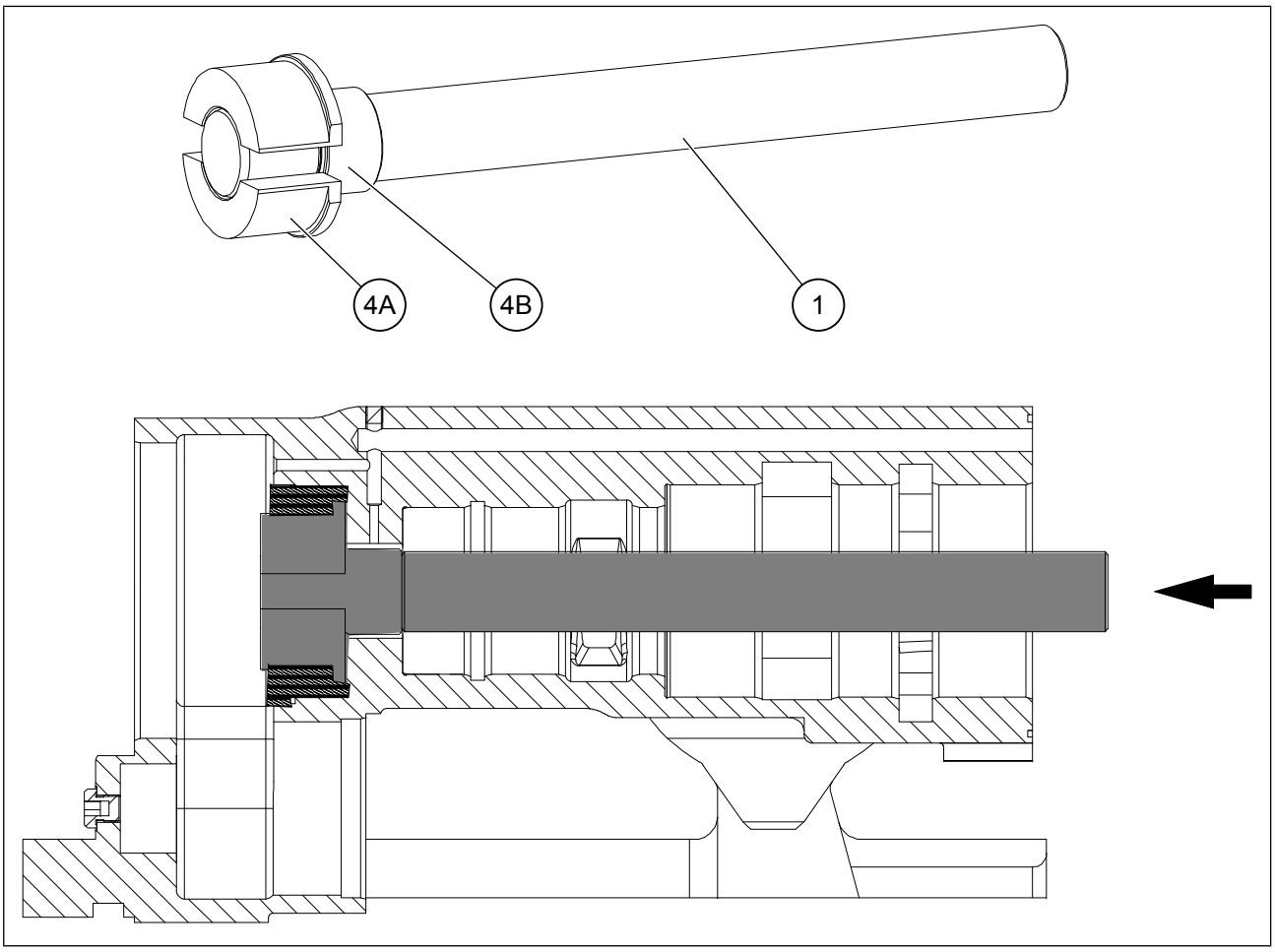


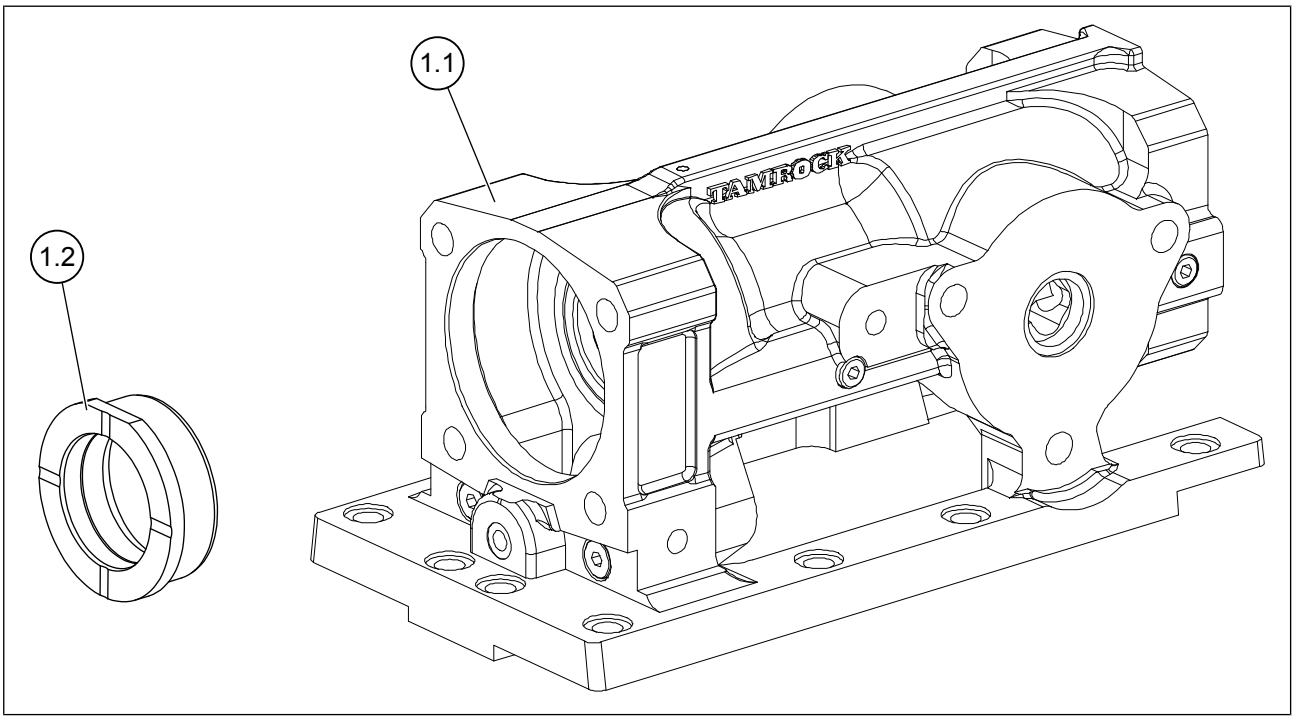
3. Push the seal bushing (6) out with special tools (1 and 4B).



2.1.7. Replacing the rotation bushing rear bearing

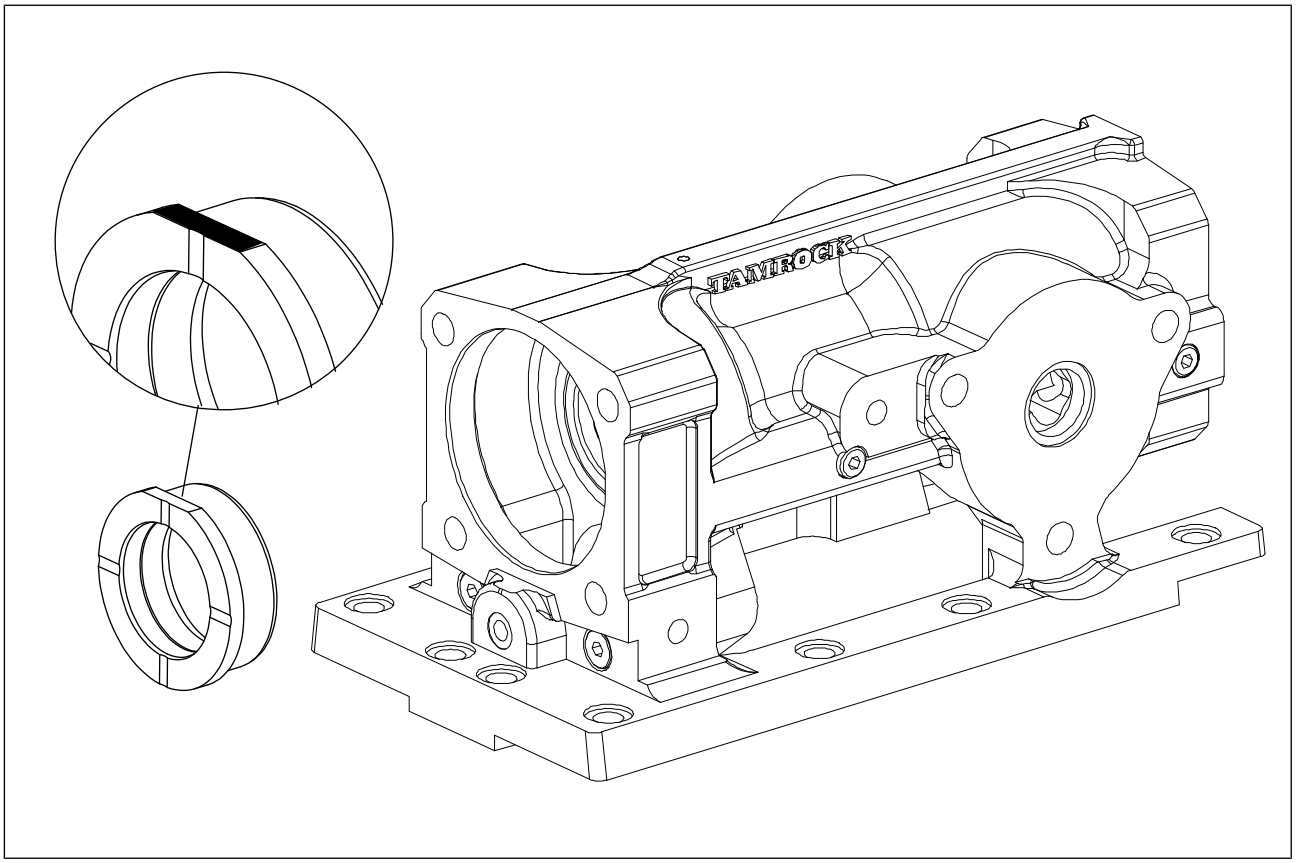
Detach the rear bearing (1.2) by using a hydraulic press and special tools (1, 4A and 4B).
Do not detach the bearing by punching. Punching the bearing out will harm the frame (1.1) and decrease its service life.

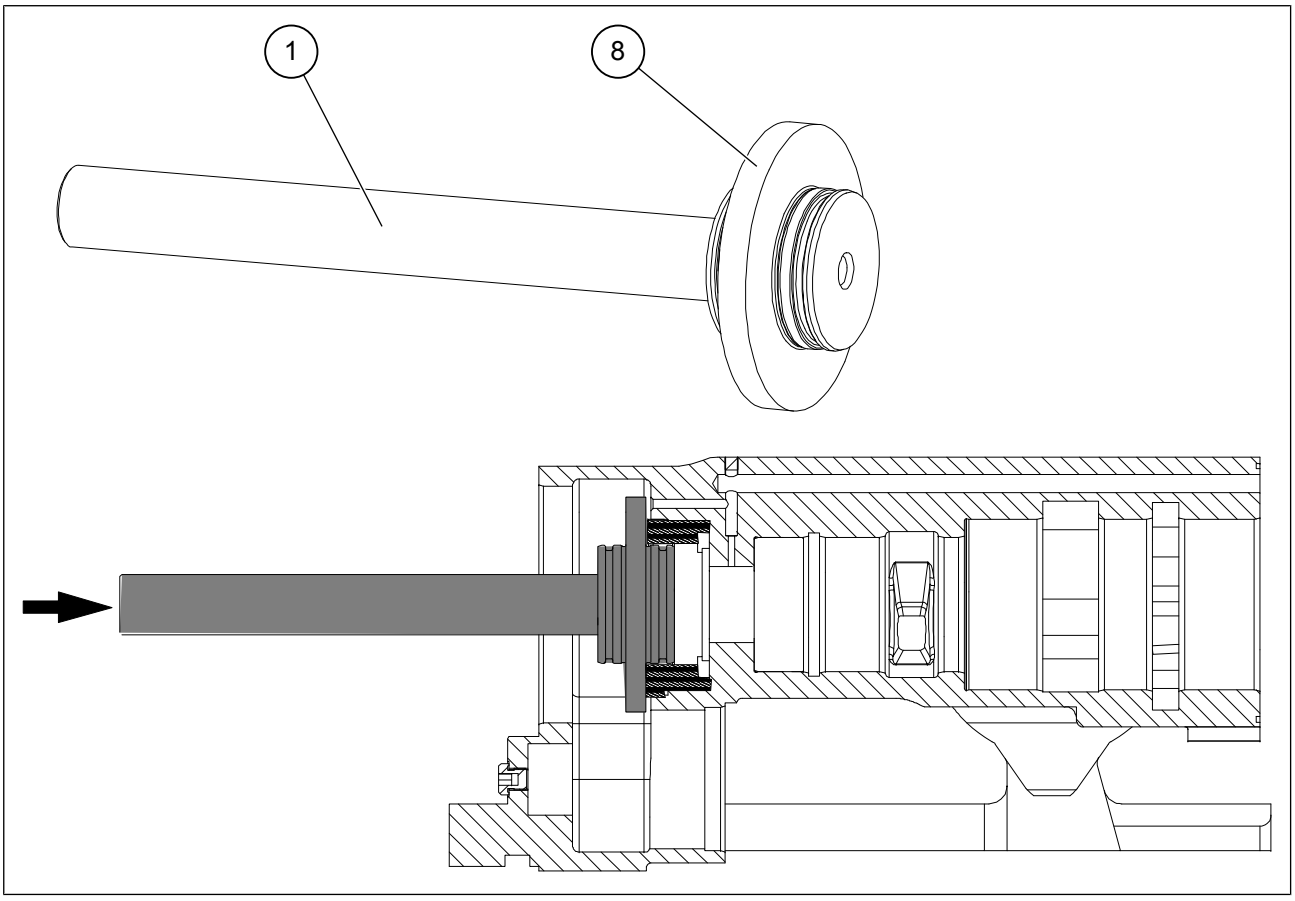




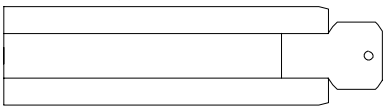
The best method for installing the bearing is to take advantage of temperature differences. The frame should be warm (e.g. room temperature or heated), and the bearing should be cold (cooled with, e.g., carbonic ice or liquid nitrogen). This will maintain the correct dimensions of the frame hole for a longer period of time and ensure that the force needed in installation is smaller. Use special tools (1 and 8).

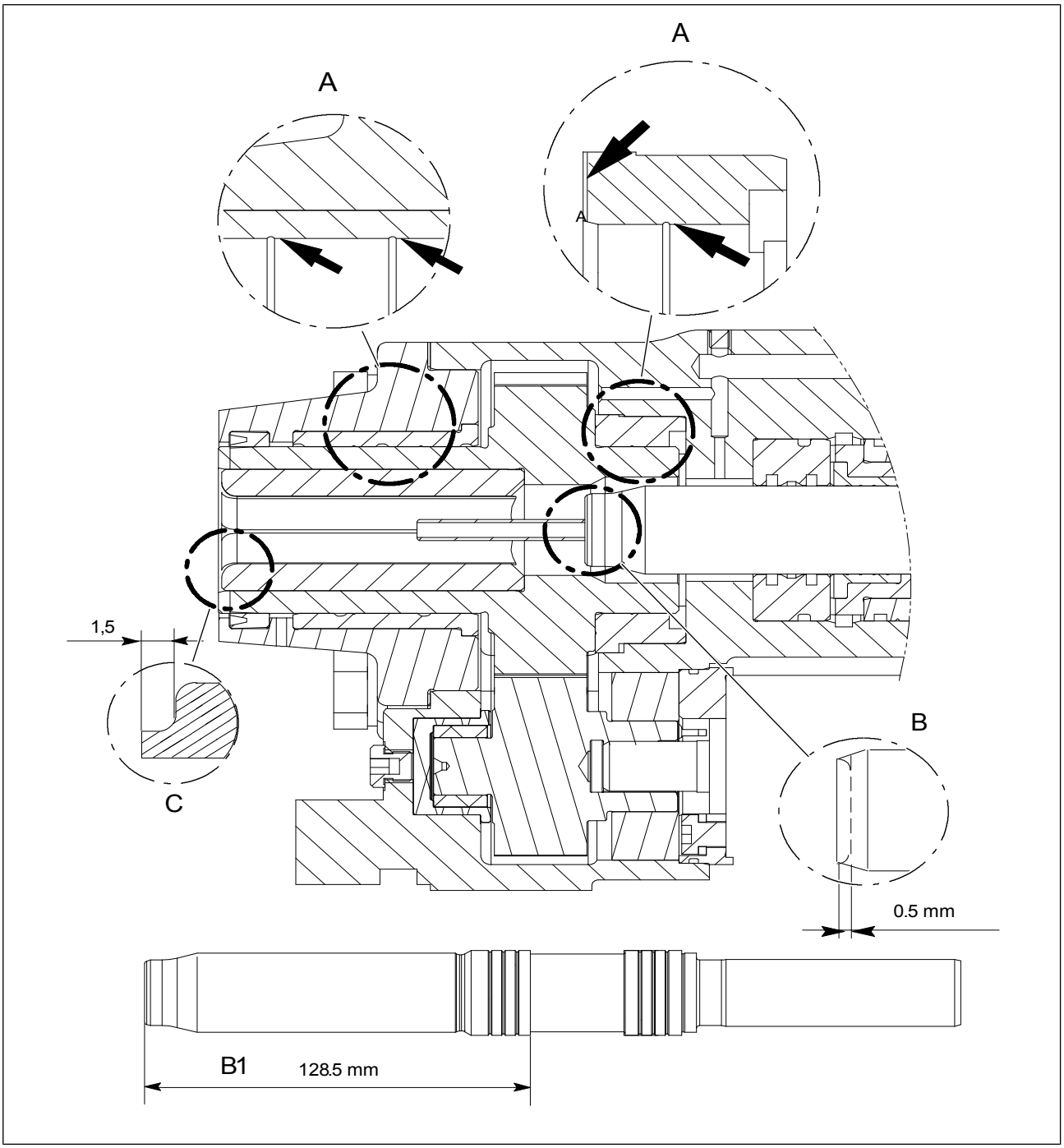
Push the rotation bushing rear bearing into its place so that **the locking surface** faces up.





2.2. Wearing limits

	Part	Wearing limits
A	Rotation bushing bearings	Replace the bearing if the bearing surface has worn off to the bottom level of the wear indicator groove at any point.
B	Piston	The piston end wears in use. The edge must be ground when the wear is 0.5 mm, at the latest; otherwise the piston end might break. The piston must be replaced when measurement B1 is 128.5 mm or less.
C	Chuck	The chuck inside the rotation bushing is checked using gauge 292 267 98. If the gauge fits inside the chuck as illustrated, the chuck must be replaced.  The chuck must be replaced if it has worn into a 1,5--mm groove, as illustrated.
D	Rotation bushing	The rotation bushing must be replaced when the hole diameter is 40.020 mm or more.



2.3. ASSEMBLY

Before assembly:

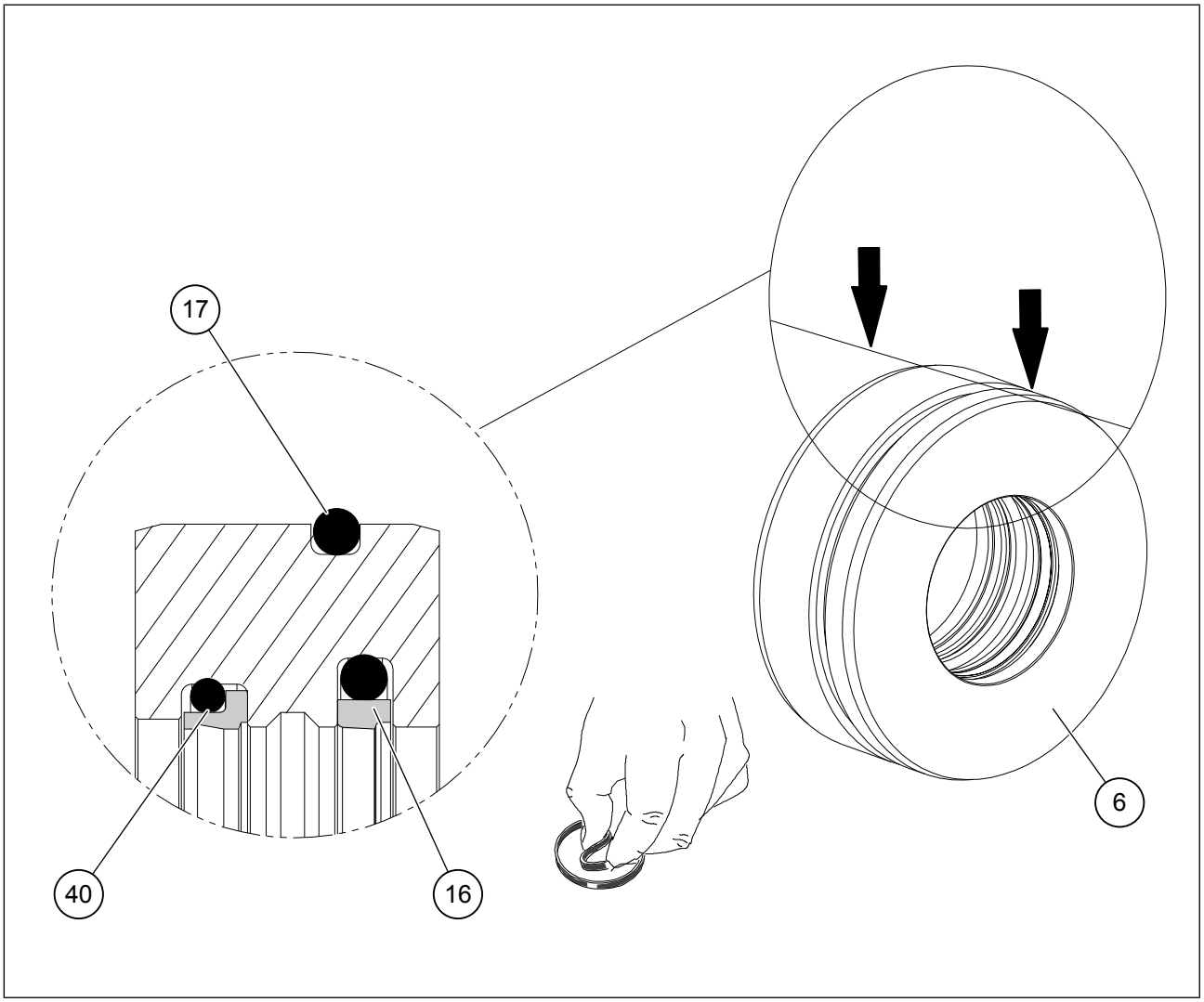
1. Remove all old O--rings and seals.
2. Clean all parts thoroughly.
3. Lubricate parts liberally!

2.3.1. Installing the percussion cartridge

Lubricate the seals thoroughly and soften them carefully with your fingers. An alternative is to soften the seals in warm oil or water (max. +50°C).

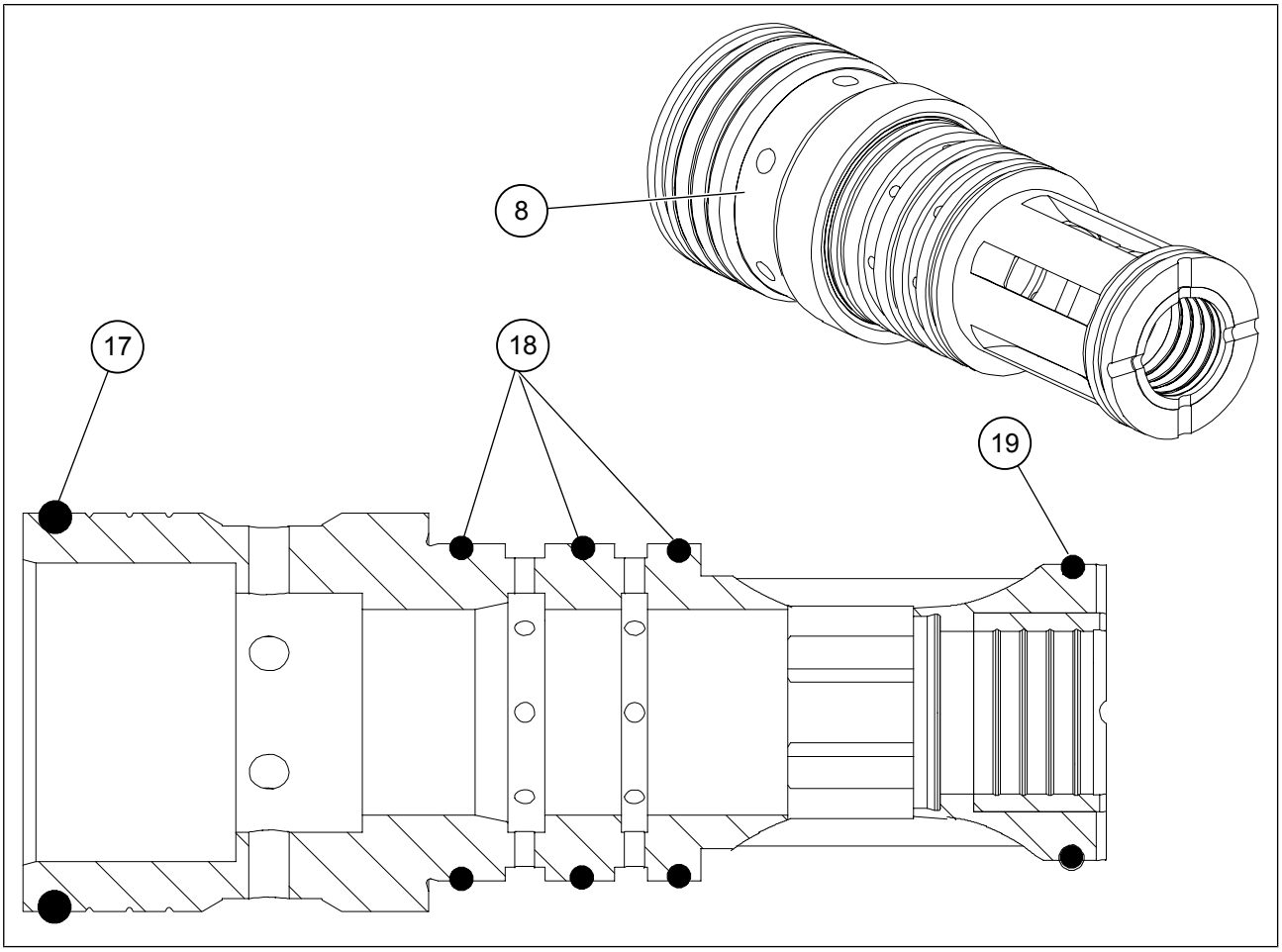
Seal housing

Install the piston seals (40) and (16) into their grooves in the seal housing (6).
Place the O--ring (17) in its groove in the front bearing



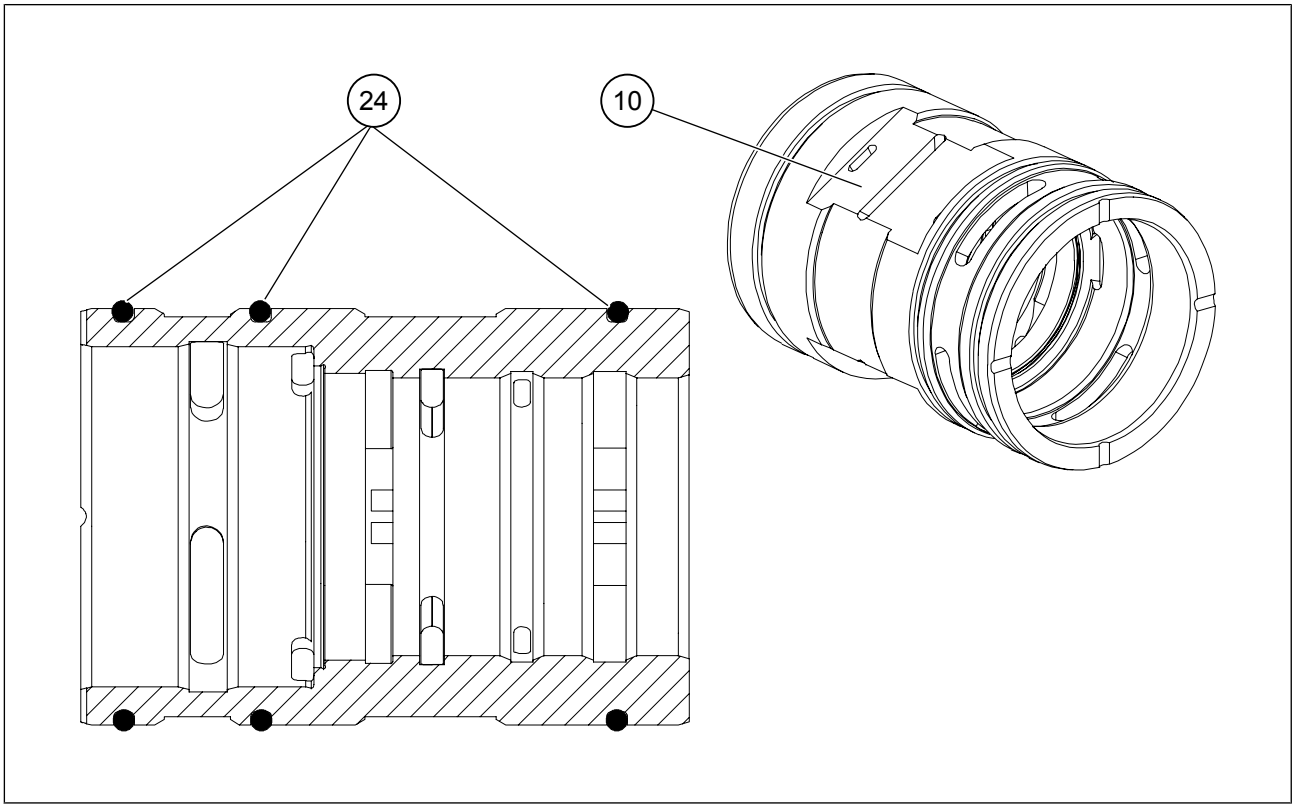
Pilot cylinder

Install the pilot cylinder (8) O--rings (17), (18) and (19).



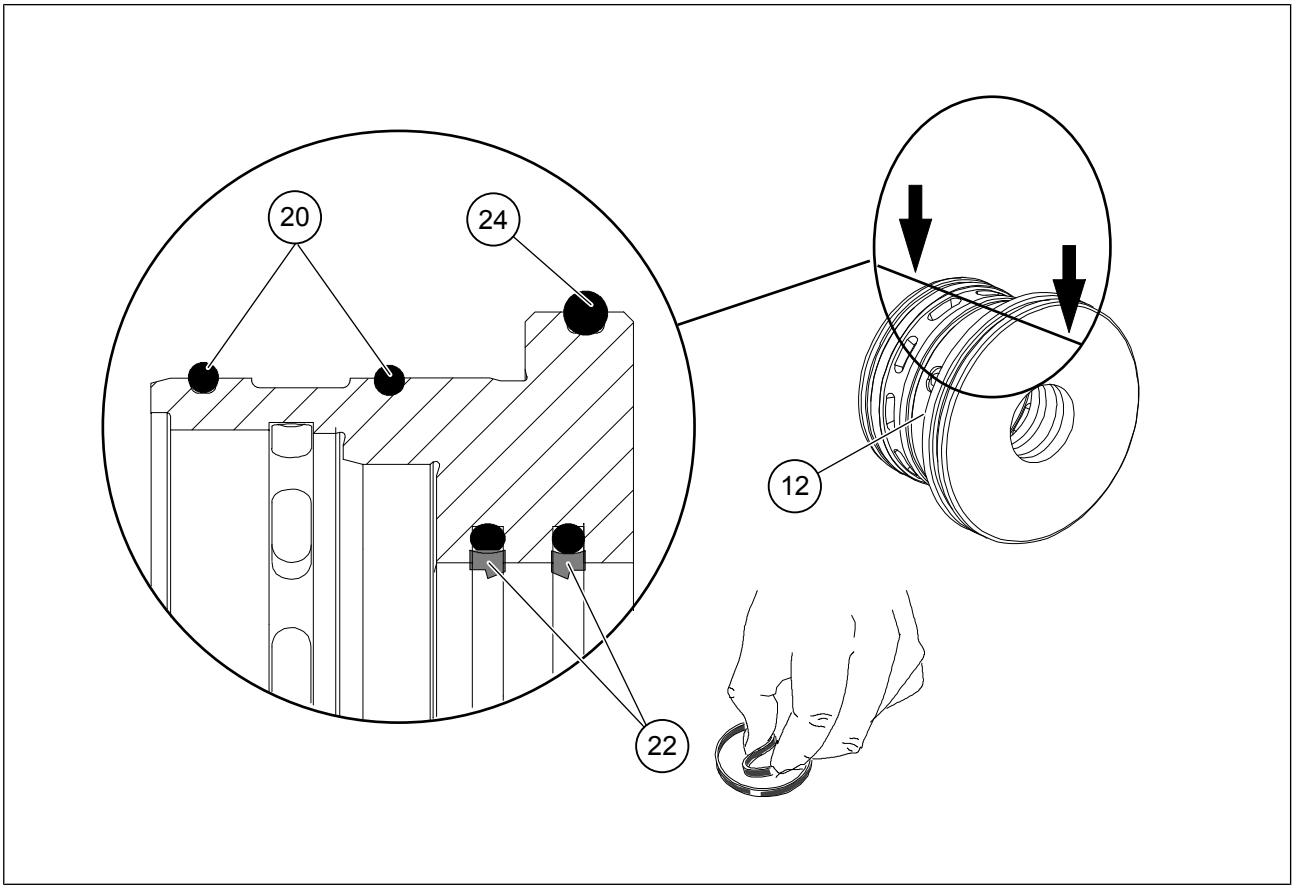
Front cylinder

Install the front cylinder (10) O--rings (24).

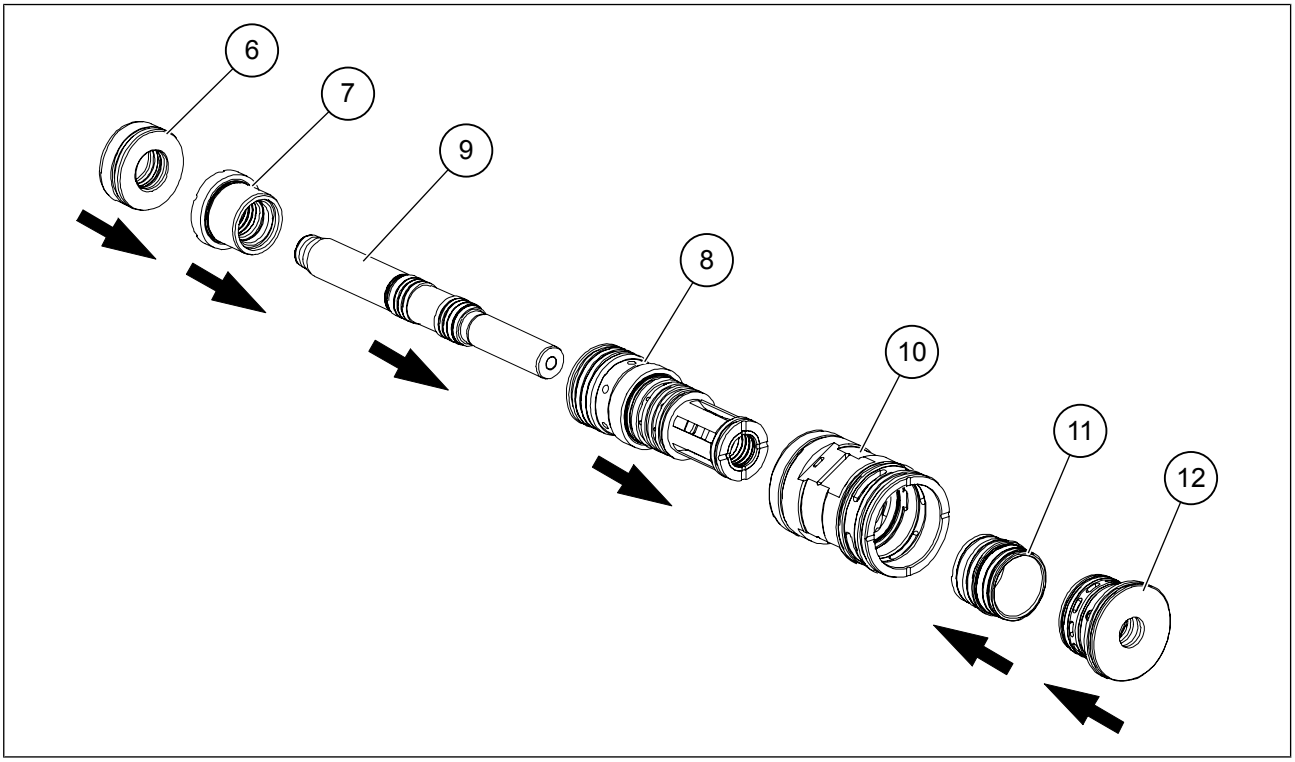


Rear cylinder

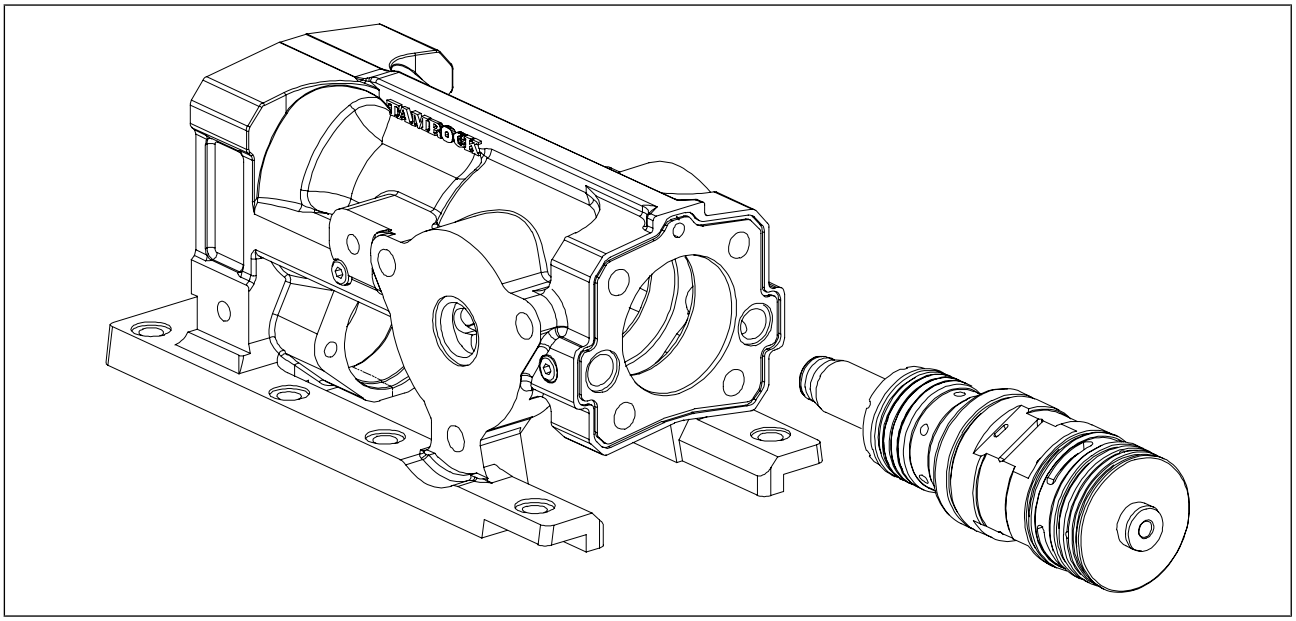
1. Install the rear cylinder (12) O--rings (20 and 24) and piston seals (22).



2. Assemble the percussion cartridge in the following order: 10, 11, 12, 8, 9, 7, 6.

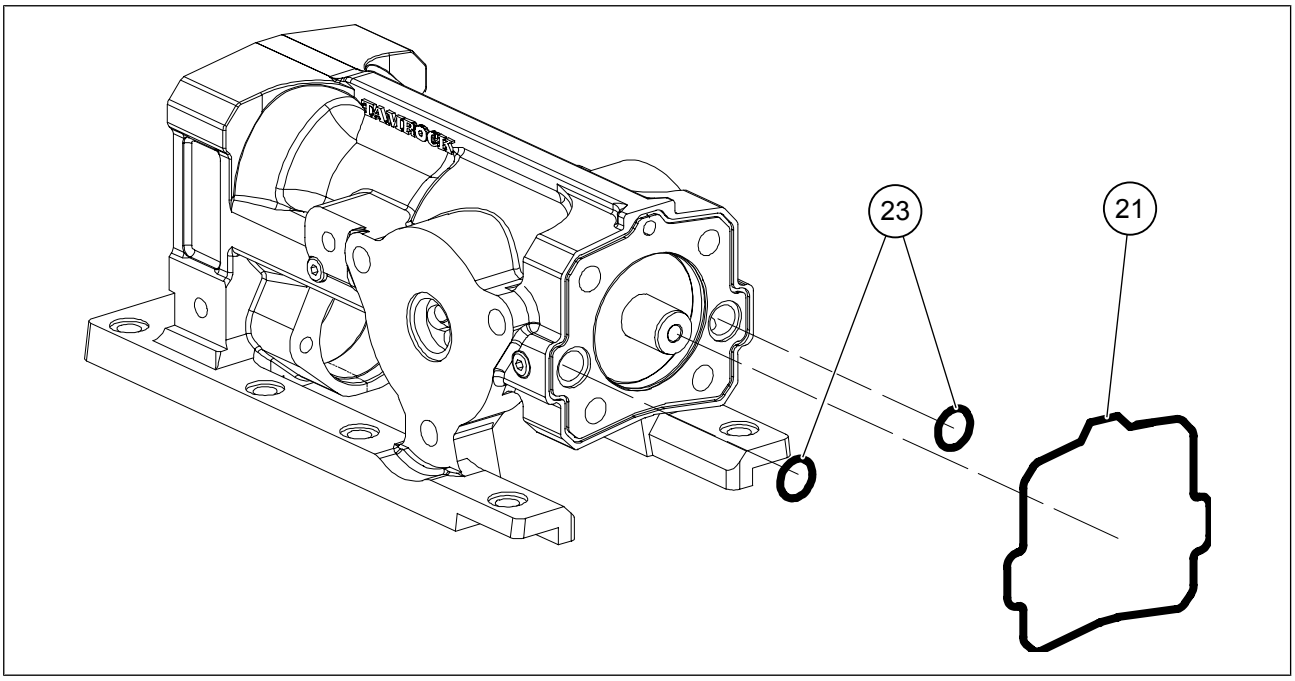


3. Push the percussion cartridge carefully into the body hole.

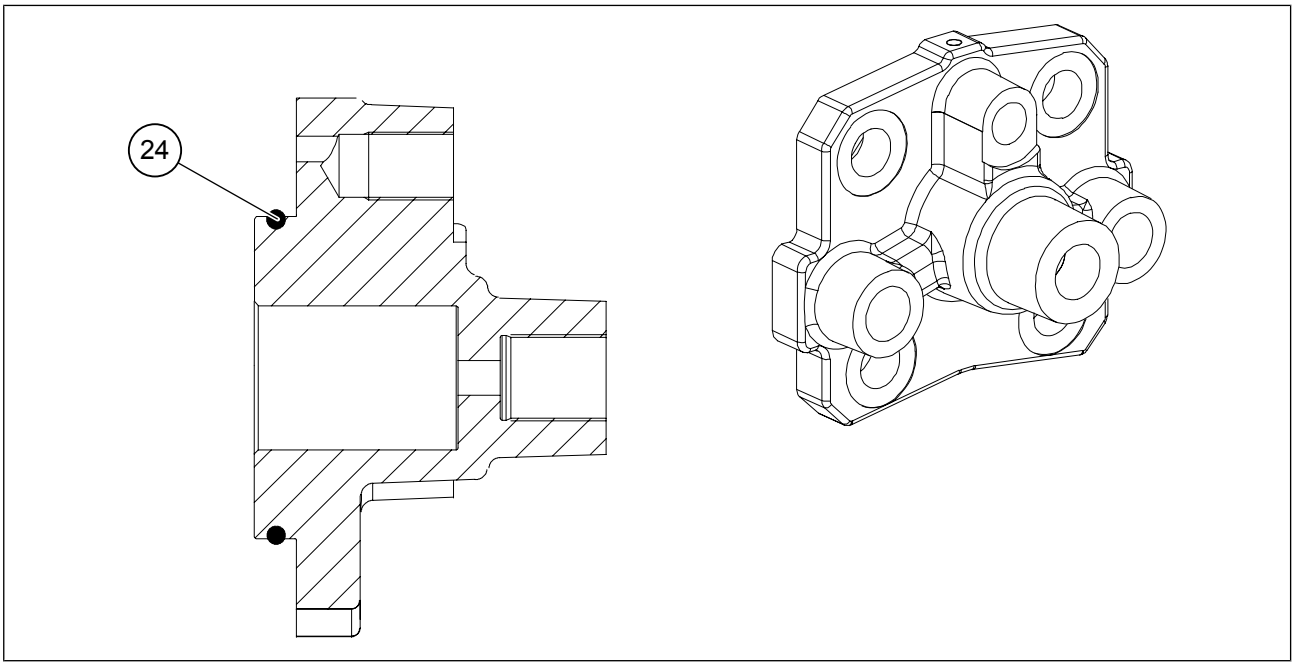


2.3.2. Installing the rear cover

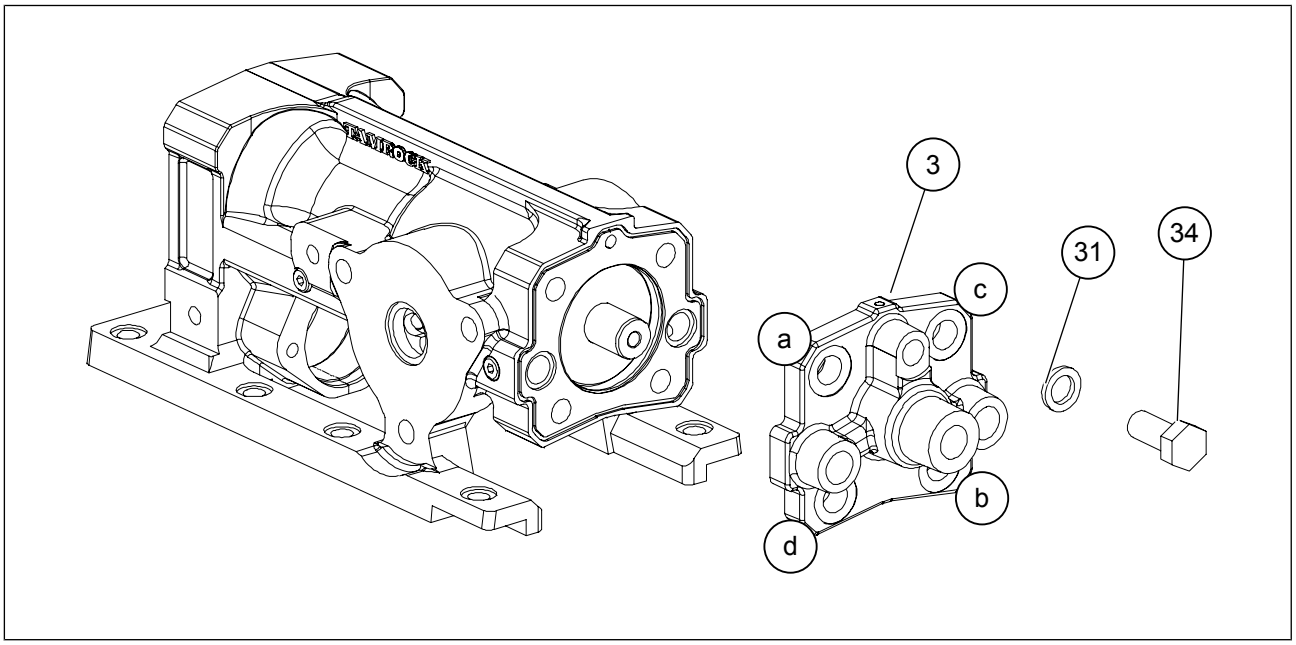
1. Set the seal (21) in place and glue it from its corners, and set the O–rings (23) in their place.



2. Place the O–ring (24) in the rear cover.

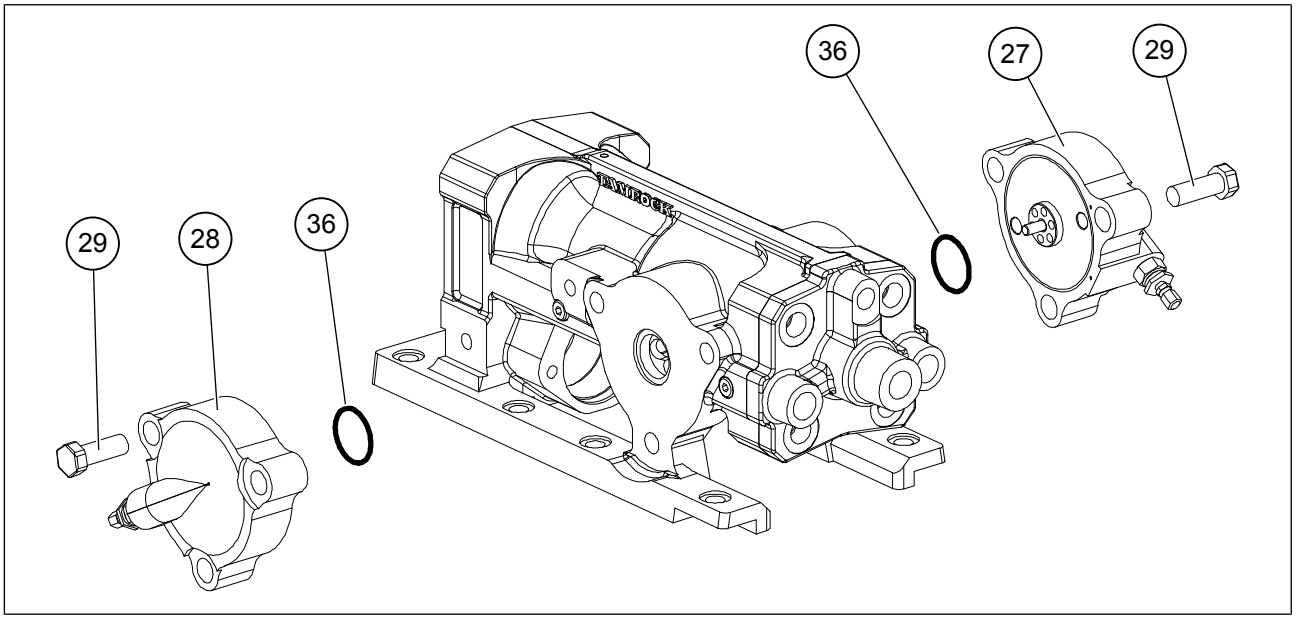


3. Attach the rear cover (3). Install the locking washer pairs (31) and lubricate the bolt thread switch grease. Cross tighten the bolts (34) in two stages: first to**100 Nm**, then a final tightening to **200 Nm**. The tightening order is **(a, b, c, d)**.



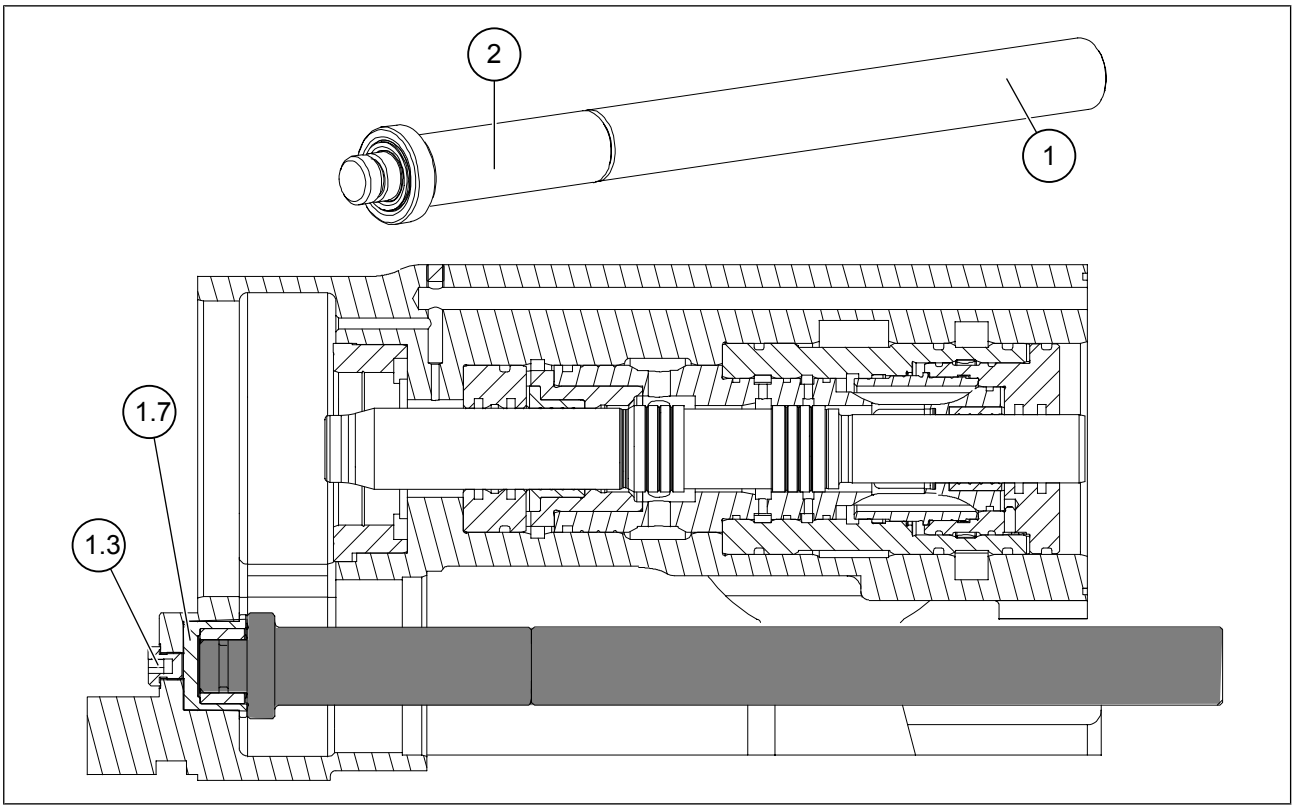
2.3.3. Attaching the pressure accumulators

Attach the pressure accumulators (27 and 28). Set the O–rings (36) in place in the body. Lubricate the threads of the bolts (29) with grease. Cross tighten the bolts in two stages: first to **100 Nm**, then a final tightening to **200 Nm**.



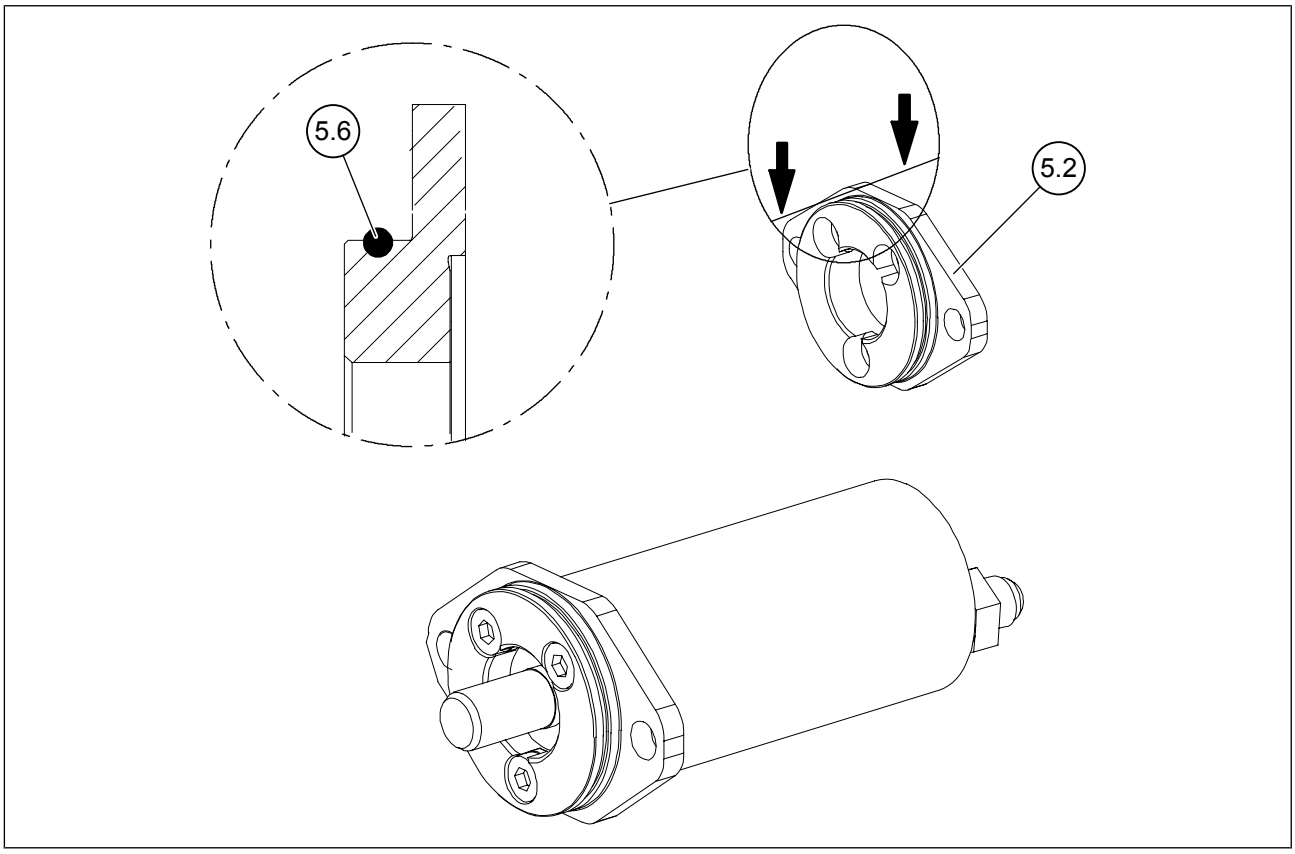
2.3.4. Installing the bearing housing

1. Insert the bearing housing (1.7) in place with special tools provided (1 and 2) and attach the shield plug (1.3).

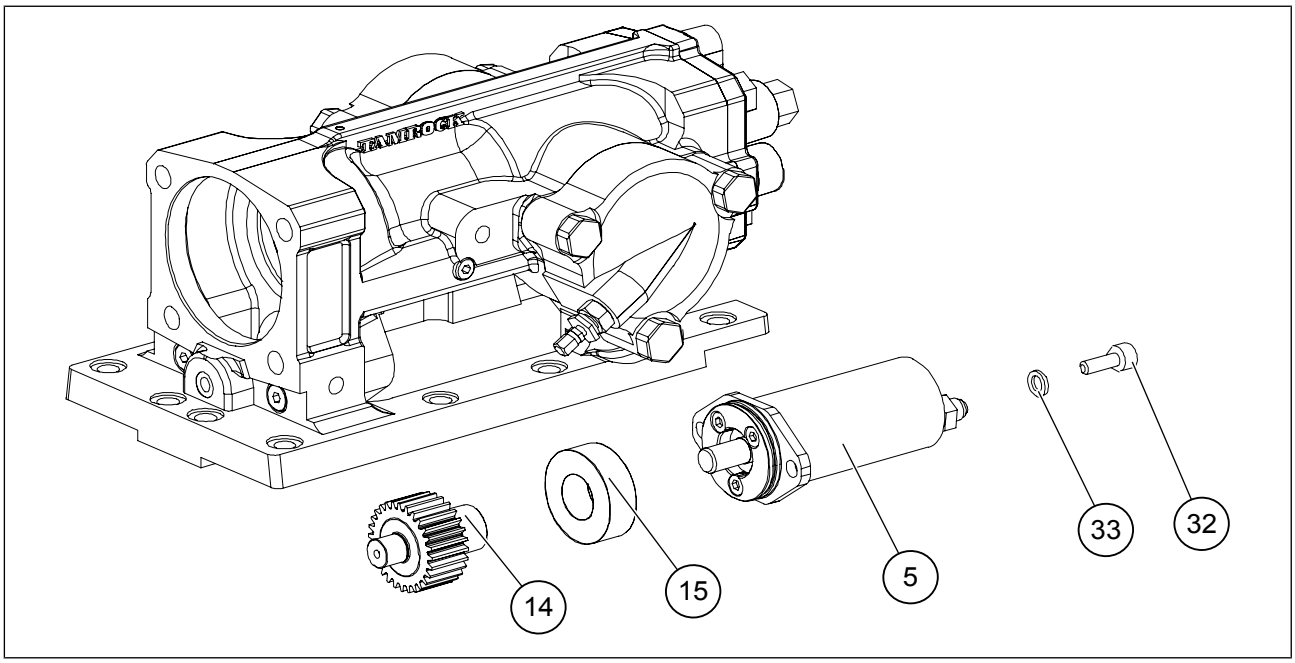


2.3.5. Installing the primary gear, bearing, and rotation motor

1. Place the O--ring (5.6) on the rotation motor flange (5.2).

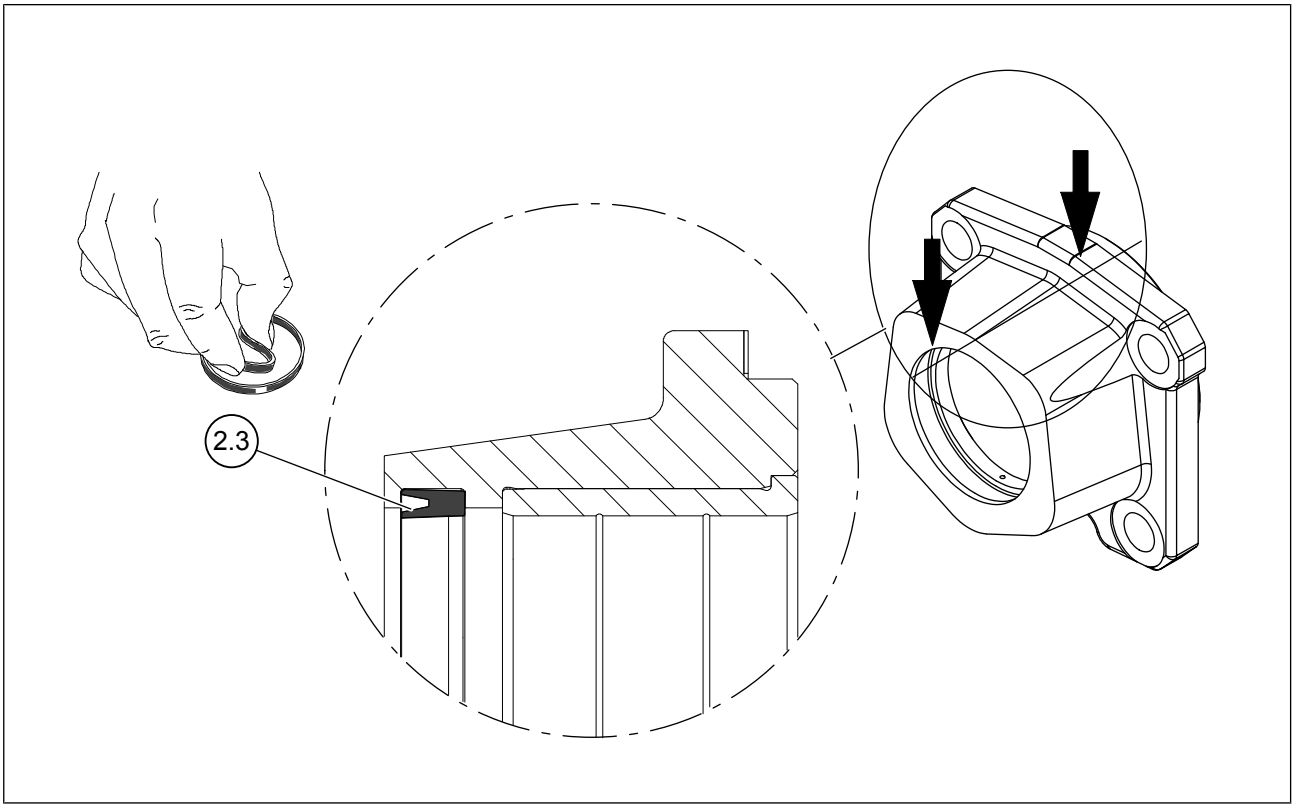


2. Push the primary gear (14) and the bearing (15) into place. Fasten the rotation motor (5) in place with screws (32).



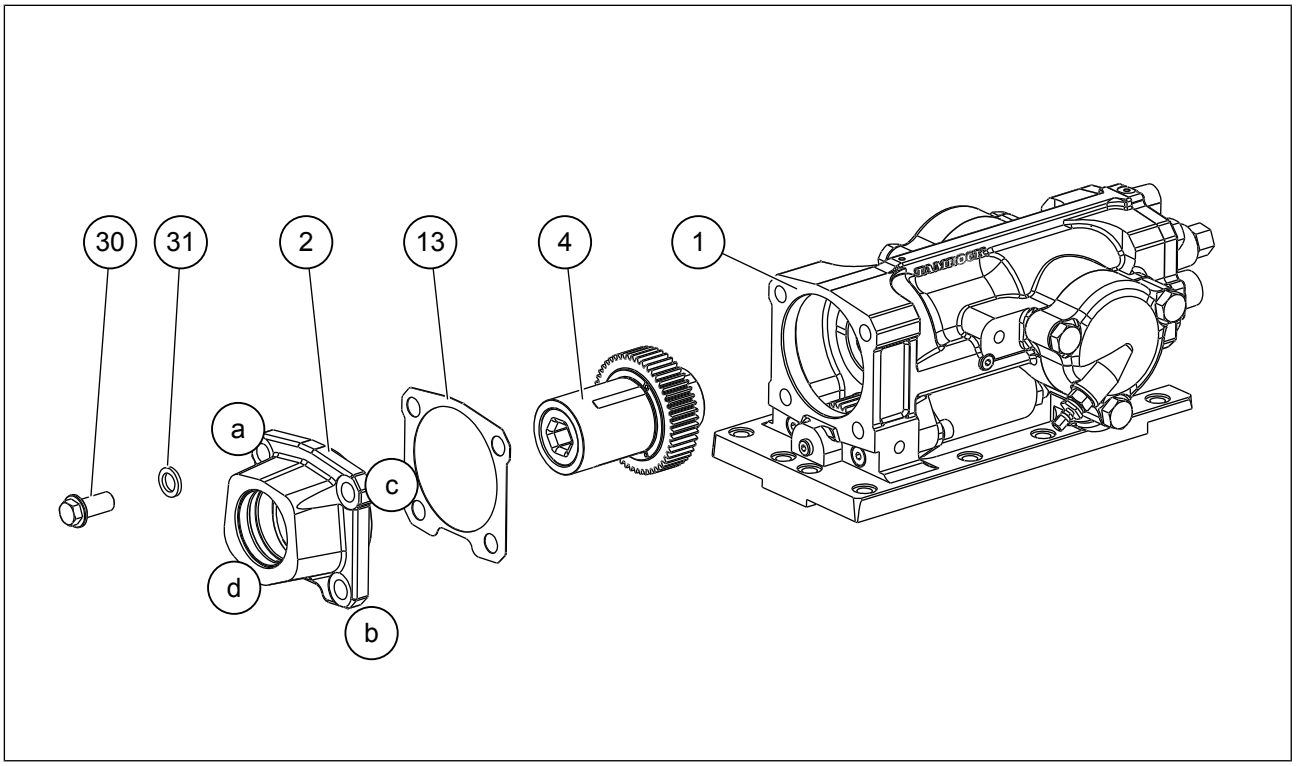
2.3.6. Installing the front cover's rotation bushing seal

Install the seal (2.3) on the front cover.



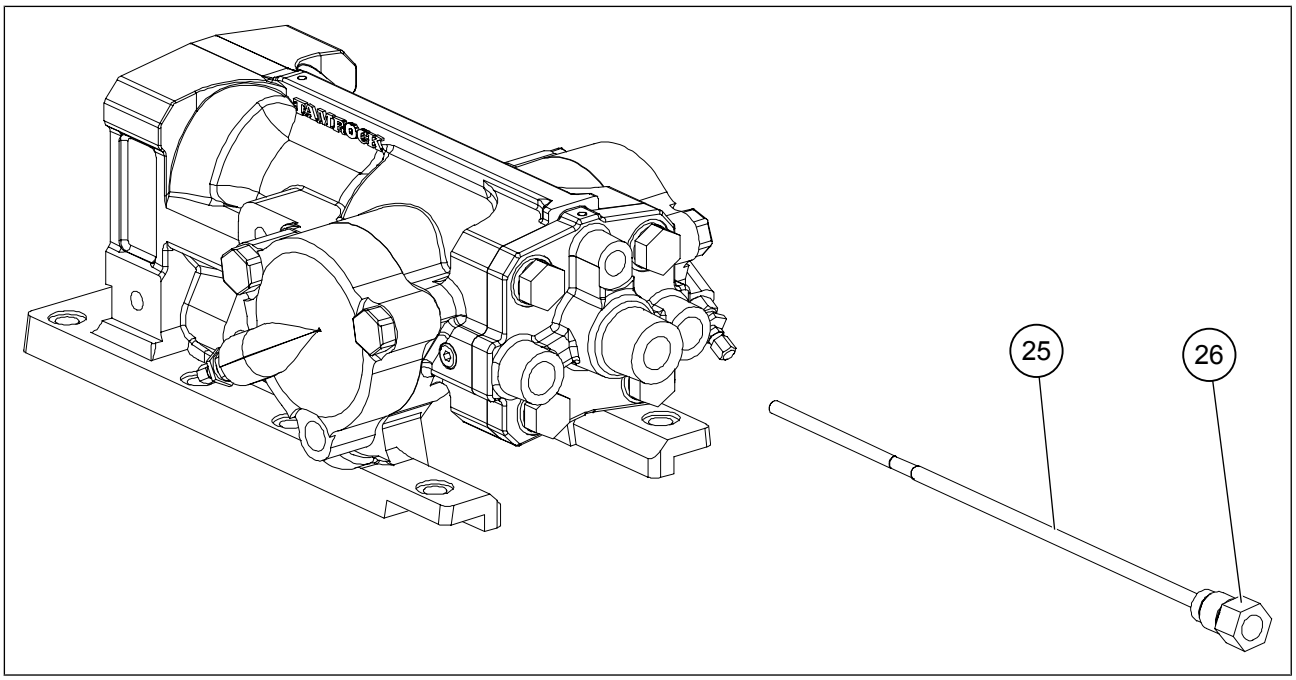
2.3.7. Installing the rotation bushing and front cover

1. Push the rotation bushing (4) into place, then place the seal (13) on the hub of the front cover (2).
2. Fasten the front cover (2) in place.
3. Install the locking washer pairs (31) and lubricate the bolt threads with grease.
4. Cross tighten the bolts (30) in two stages: first to **100 Nm** and then a final tightening to **200 Nm**. The tightening order is **(a, b, c, d)**.

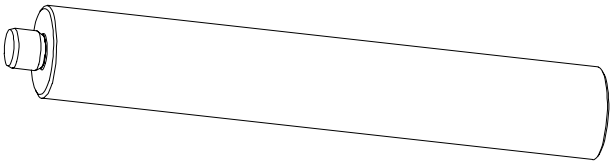
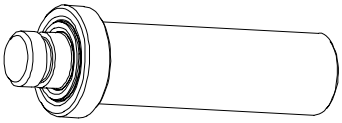
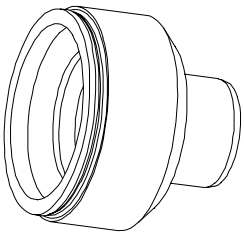
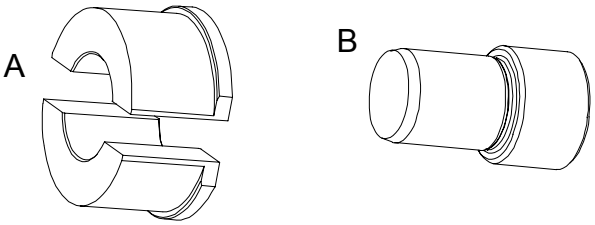
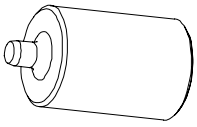
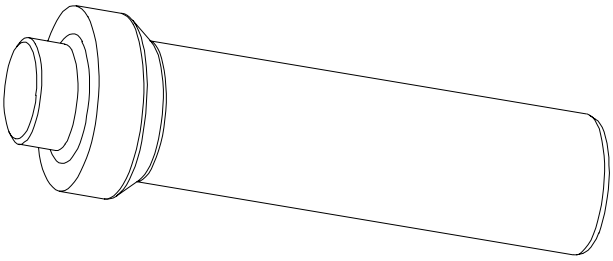
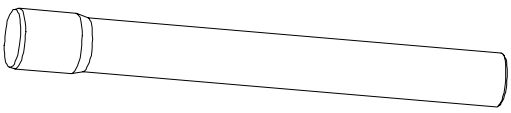
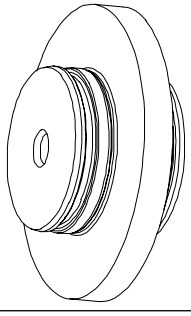


2.3.8. Installing the flushing pipe

Push the flushing pipe (25) into place and rotate the nipple (26) into position.



2.4. SPECIAL TOOLS

1.		**550 229 13**
2.		**550 229 14**
3.		**550 229 15** **551 816 53**
4.		**A 550 462 16** **B 550 228 99**
5.		**550 229 07**
6.		**092 294 18**
7.		**150 551 68**
8.		**550 229 16**

The table shows some of the special tools in tool kit 550 259 07. A complete listing of the contents of the tool kit is provided in the spare part manual.

ID: 398 2 en 2010-03-17

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Original instructions

BG00264521 en-US C.001.1 2015-06-08

Pressure accumulator for hydraulic rock drill, maintenance instructions

SANDVIK

Pressure accumulator for hydraulic rock drill, maintenance instructions

⚠ WARNING	
	**IGNORING INSTRUCTIONS HAZARD!** **To avoid death or injury you MUST read, understand and follow operator's and maintenance manuals before installing, inspecting, operating, servicing, testing, cleaning, transporting, storing, dismantling or disposing of the product or a part or accessory of the product. Keep this publication for future reference.**

ID: BG00264521 en-US C.001.1 2015-06-08

Pressure accumulator for hydraulic rock drill, maintenance instructions

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ID: BG00264521 en-US C.001.1 2015-06-08

Table of Contents

ID: BG00264521 en-US C.001.1 2015-06-08

Pressure accumulator for hydraulic rock drill, maintenance instructions

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ID: BG00264521 en-US C.001.1 2015-06-08

1 INTRODUCTION

1.1 The Purpose of these instructions

This manual contains supplementary information for operation, maintenance and repair of a component.

Before operating, or performing maintenance or repair procedures for the component or system described in this manual, read and understand the information in operator´s and maintenance manuals supplied with the machine. Pay special attention to the safety information in chapter "2 Safety and environmental instructions" of those manuals.

1.1.1 Validity of the manuals

This manual, and especially the safety information, is valid only if no unauthorized changes to the product are made.

Continuing improvement and advancement of product design might have caused changes to your product which are not included in this publication. Note also that if a third party has made changes to the product after delivery from the manufacturer, this publication does not include information on these changes or their influences on the product.

Whenever a question arises regarding your product, or this manual, please consult your local Sandvik representative for the latest available information.

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ID: BG00264521 en-US C.001.1 2015-06-08

2 SAFETY AND ENVIRONMENTAL INSTRUCTIONS

2.1 Safety precautions

Operating, service and adjustment procedures must be carried out only by personnel with specialized operation and service training. Read and ensure that you understand the operating, maintenance, and safety instructions before using or servicing the component.

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ID: BG00264521 en-US C.001.1 2015-06-08

3 ACCUMULATOR MAINTENANCE AND REPAIR

3.1 Pressure accumulators

⚠ WARNING	
	**RISK OF EXPLOSION!** **A pressure accumulator repaired in a faulty manner can explode and could cause death or severe injury.** **Repairing a pressure accumulator by welding or in any other faulty manner is strictly prohibited. Replace a faulty pressure accumulator with a new one.**

⚠ WARNING	
	**HIGH PRESSURE HAZARD!** **A high pressure gas discharge could cause death or severe injury.** **Before removing the pressure accumulator from the rock drill, release the pressure by opening the filling valve.** **Before pressurizing the pressure accumulator, install it to the rock drill. Do not pressurize a pressure accumulator if it is not installed to a rock drill.** **When a pressure gauge is used, the discharge opening must be directed to an unrestricted space to prevent a risk to those in the immediate vicinity as a result of the pressure discharge.**

In all hydraulic systems, cleanliness is the single most important factor in ensuring trouble-free operation. For this reason, the pressure accumulators must be filled and serviced in a clean and dust-free environment.

The condition of a pressure accumulator must be checked whenever the accumulator is being disassembled and the rock drill is being serviced. The rock drill's special toolkit contains all the tools required for servicing and checking the pressure accumulators.

Experience has shown that the first (originally fitted) pressure accumulator diaphragm will not achieve the normal service life, especially if the time between pressurization and commissioning is long. This is why the pressure accumulators supplied as spare parts are unpressurized and this is also indicated on the accumulator.

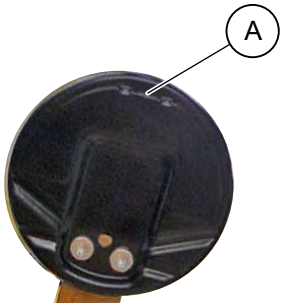
Tho bottom and cover of a pressure accumulator must remain as a pair. All accumulator covers and bottoms supplied by Sandvik are paired. Other parts, such as diaphragms and filling valves, are supplied separately.

ID: BG00264521 en-US C.001.1 2015-06-08

3.2 Pressure gauges

⚠ WARNING	
	**HIGH PRESSURE HAZARD!** **Flying shrapnels could cause severe injury.** **Use only gauges meant for gas pressure measurement when checking or pressurizing accumulators. The glass of a liquid damped gauge may break under pressure and fly off at high speed.**

A gauge meant for gas pressure measurement



An over-pressure breaking point of a gas pressure gauge

If the pressure inside the gas pressure gauge rises too high (for the result of a broken tube inside the gauge), the gauge's back side (A) breaks open and relieves the pressure.

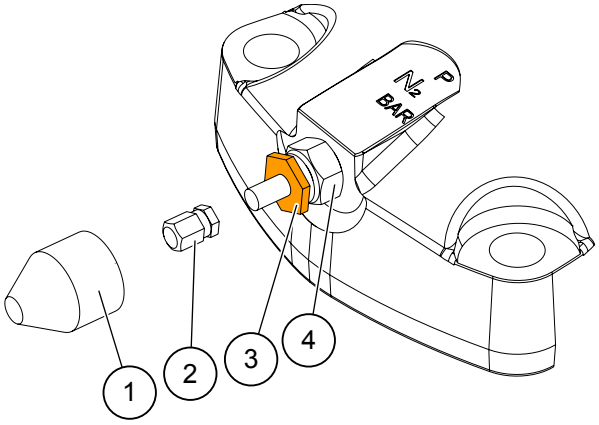
The gauge must be replaced if the gauge's back side is broken.

3.3 Checking the charge gas pressure of a pressure accumulator

The charge gas pressure of a pressure accumulator must be checked every 50 hours or earlier if necessary.

The check is performed by using a pressure gauge included in the rock drill's special toolkit. The pressure gauge's range is from 0 to 100 bar for the high-pressure accumulators, and from 0 to 10 bar for the low-pressure accumulators.

ID: BG00264521 en-US C.001.1 2015-06-08

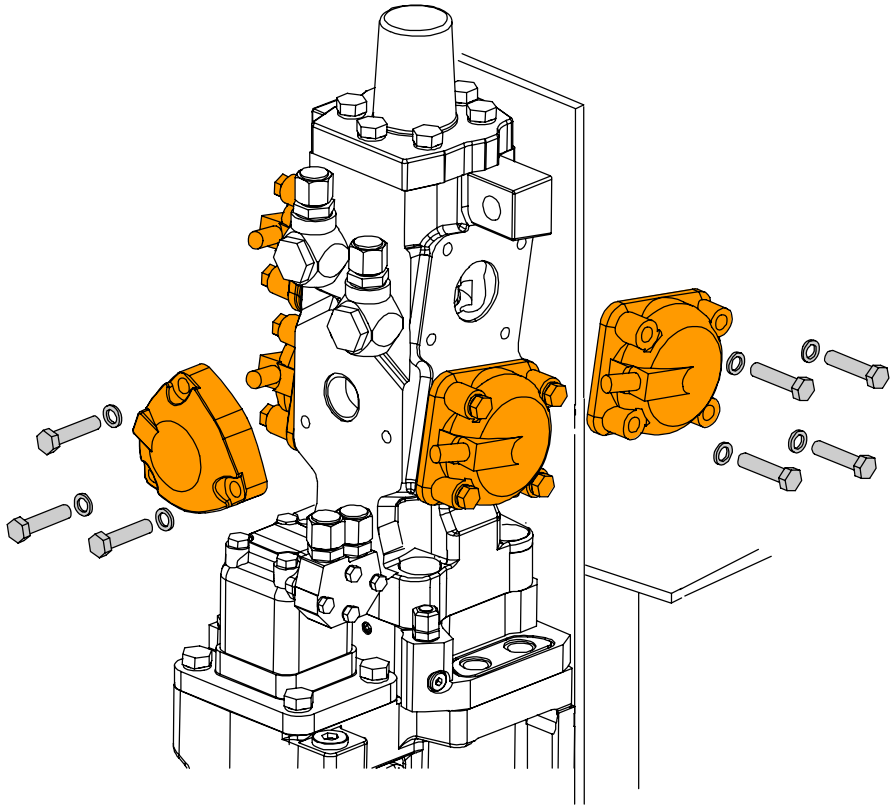


1. Remove the rubber protection cap (1) or the metal cap (2).
2. Screw the pressure gauge to the filling valve (4).
3. Open the locking nut (3).
4. Wait until the gauge pointer stops moving and then check the reading.
   If the reading is low, refer to *3.8.1 Filling instruction (Page 21)* on how refill the accumulator.
5. Close the locking nut (3).
   By using a torque wrench, tighten the locking nut to 20 Nm (2 kpm).
6. Disconnect the gauge from the filling valve (4).
7. Install the rubber protection cap (1) or the metal cap (2) back to its place.

3.4 Removing the pressure accumulators

⚠ WARNING	
	**HIGH PRESSURE HAZARD!** **High pressure gas discharge could cause death or severe injury.** **Make sure that the accumulator pressure has been released before removing the accumulator from the rock drill.**

Before removing the pressure accumulators from the rock drill, release the accumulators' pressure by opening the filling valves. No one is allowed in front of the valve when it is being opened.



1. Open the filling valves.
2. Remove the accumulator mounting bolts.
3. Detach the accumulators.
4. Remove the O-rings.
5. Remove the gasket plates.
6. Insert protective plugs into the rock drill openings.

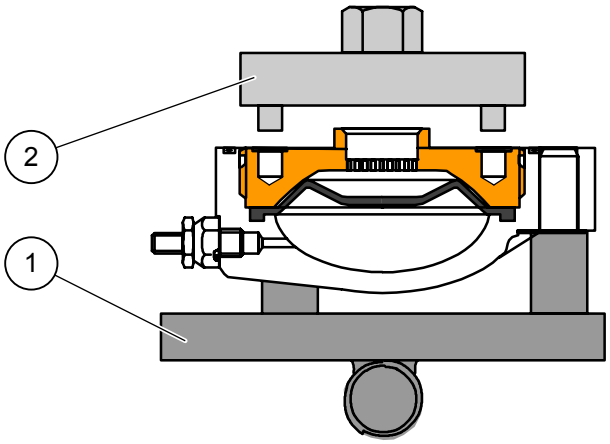
3.5 Disassembling the pressure accumulator

⚠ DANGER	
	**RISK OF EXPLOSION!** **An exploding pressure accumulator will cause death or severe injury.** **Never heat an accumulator to temperatures over 100°C.**

ID: BG00264521 en-US C.001.1 2015-06-08

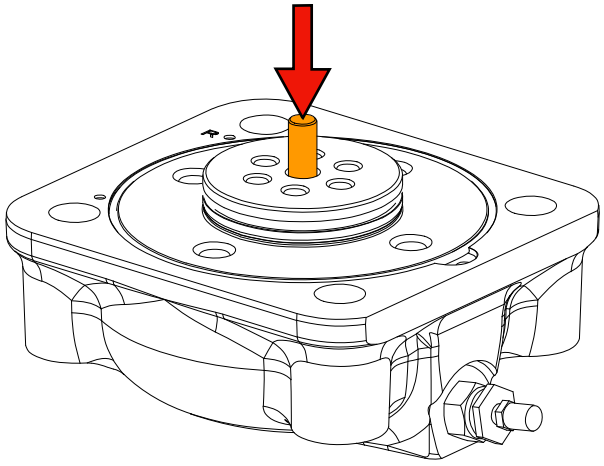
⚠ WARNING	
 	**HIGH PRESSURE AND FLYING MATERIAL HAZARD!** **Disassembling a pressurized accumulator will cause high pressure gas discharge and flying material, which could cause death or severe injury.** **Do not disassemble a pressurized accumulator.** **If an accumulator can not be depressurized, it must be disposed of properly.** **Do not try to depressurize an accumulator using false methods, e.g. drilling a hole through the diaphragm.**

⚠ WARNING	
 	**HIGH PRESSURE AND FLYING MATERIAL HAZARD!** **Using false working methods may cause high pressure gas discharge and flying material, which could cause death or severe injury.** **Do not use any other methods, than described in this manual, to depressurize or disassemble an accumulator.** **Do not drill a hole through the diaphragm or any other part of an accumulator.**



1. Fasten the bracket (1) to a vice.
2. Place the accumulator on the bracket, with the bottom pointing upward.
3. **Ensure that the filling valve is open!**

4. When disassembling a stem-type accumulator, ensure that there is no pressure inside of the accumulator by pressing the stem. The stem should move inward freely.



If the stem does not move, do not open the accumulator.

5. Open the accumulator bottom with the special tool (2).

   The cover and bottom of a pressure accumulator are marked with the same number, and they must be retained as a pair.

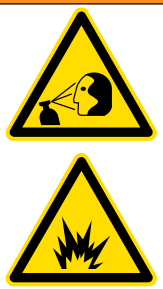
3.6 Checking the pressure accumulator

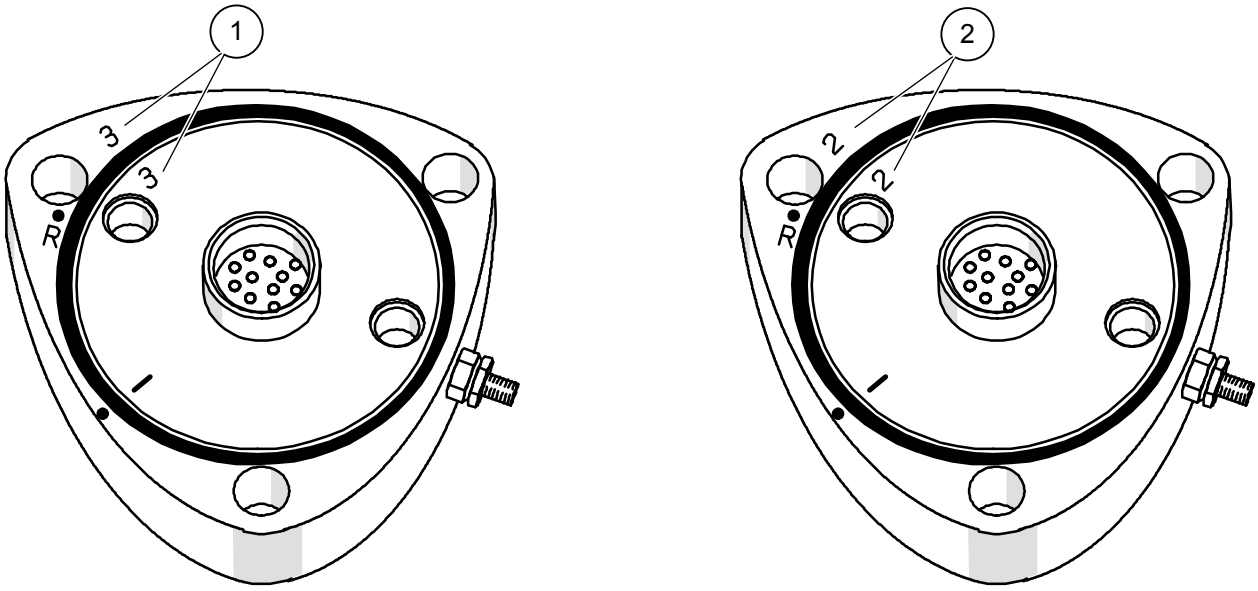
⚠ WARNING	
 	**HIGH PRESSURE AND EXPLOSION HAZARD!** **The breakage of a worn-out or damaged pressure accumulator could cause death or severe injury.** **Damaged pressure accumulators must be scrapped.** **If the threads of the pressure accumulator are corroded, it must be scrapped.**

1. Carefully clean and check the threading.
2. Visually check the inside and outside of the accumulator for wear, damage, and corrosion.
3. If necessary, use fluid penetrant testing to check the accumulator for damage.

ID: BG00264521 en-US C.001.1 2015-06-08

3.7 Assembling the accumulator

⚠ WARNING	
	**HIGH PRESSURE AND EXPLOSION HAZARD!** **A breakage of a worn-out or damaged pressure accumulator could cause death or severe injury.** **A worn-out or damaged pressure accumulator must be discarded immediately.**



1. Check the number on the cover and the bottom.

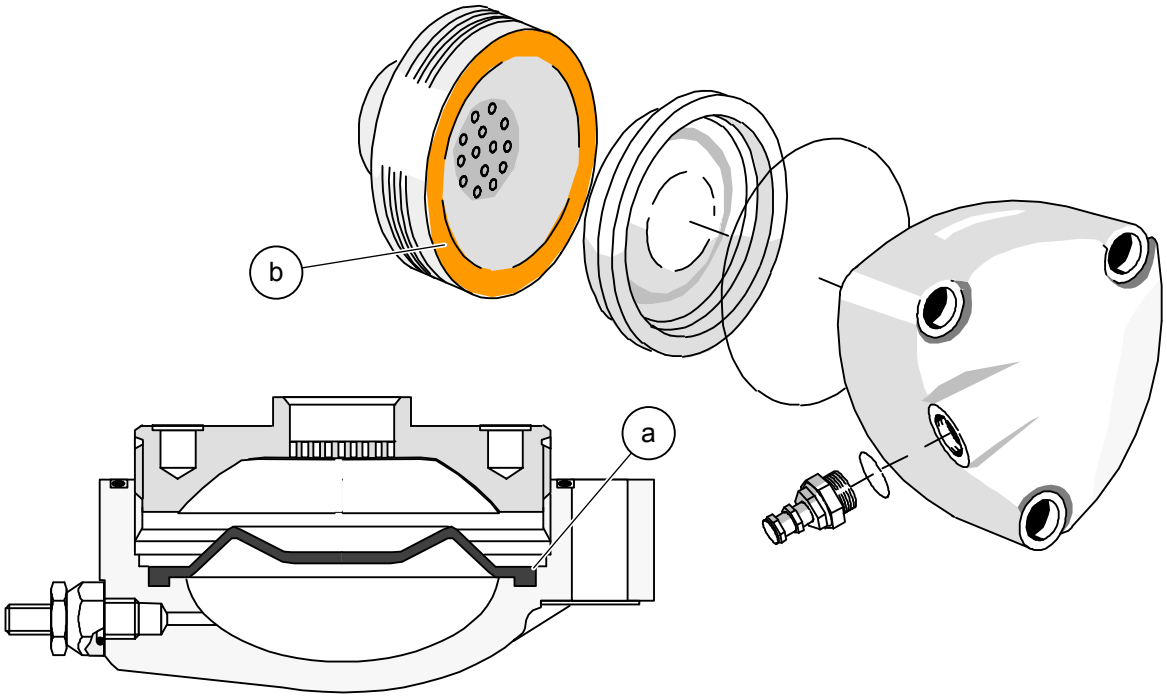
Note! ***The number on the cover and the bottom must be same.***

The high pressure accumulators are marked with uneven numbers and the low pressure accumulators with even numbers.

ID: BG00264521 en-US C.001.1 2015-06-08

2. Fit a new or inspected diaphragm to the cover.

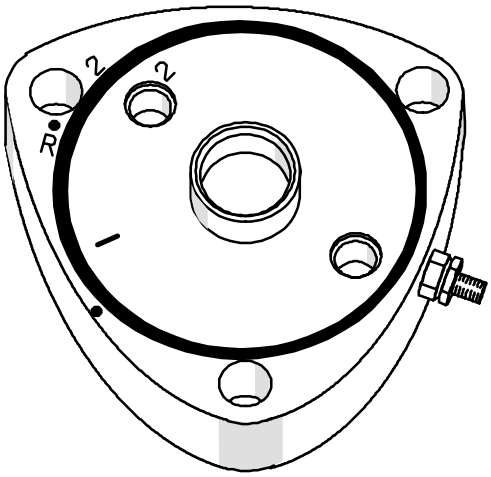
   Make sure that the diaphragm is in the groove and fitted so that the correct side is downwards.
   When the pressure accumulator diaphragm is changed, the O-rings should also be changed.

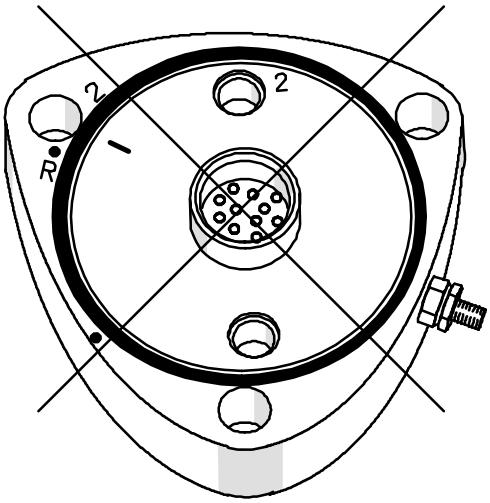


3. Lubricate the surface of the diaphragm (a) and the bottom surface of the accumulator (b) with vaseline or lanolin.
4. Lubricate the thread of the bottom with vaseline or lanolin.
5. By using a torque wrench and the special tool, tighten the bottom to 150 Nm (15 kpm).
6. Replace the filling valve.

   Use a thread locking compound.

ID: BG00264521 en-US C.001.1 2015-06-08





Always check the wear limit marks of the thread after tightening the bottom. if the mark**(I)** on the bottom remains between the dot **(•)** and the mark **(R)** on the cover, the thread is in order.

If the mark **(I)** on the bottom goes beyond the mark **(R)**, the threads of the accumulator cover and bottom are too worn. Replace the accumulator and discard the old one.

If the accumulator can not hold the charge gas after changing the diaphragm and filling valve, check the threading, bottom, and body of the accumulator carefully with, for example, a fluid penetrant test.

3.8 Filling the accumulators

⚠ WARNING	
	**HIGH PRESSURE HAZARD!** **A high pressure gas discharge could cause death or severe injury.** **Before pressurizing the pressure accumulator, install it to the rock drill. Do not pressurize a pressure accumulator if it is not installed to a rock drill.**

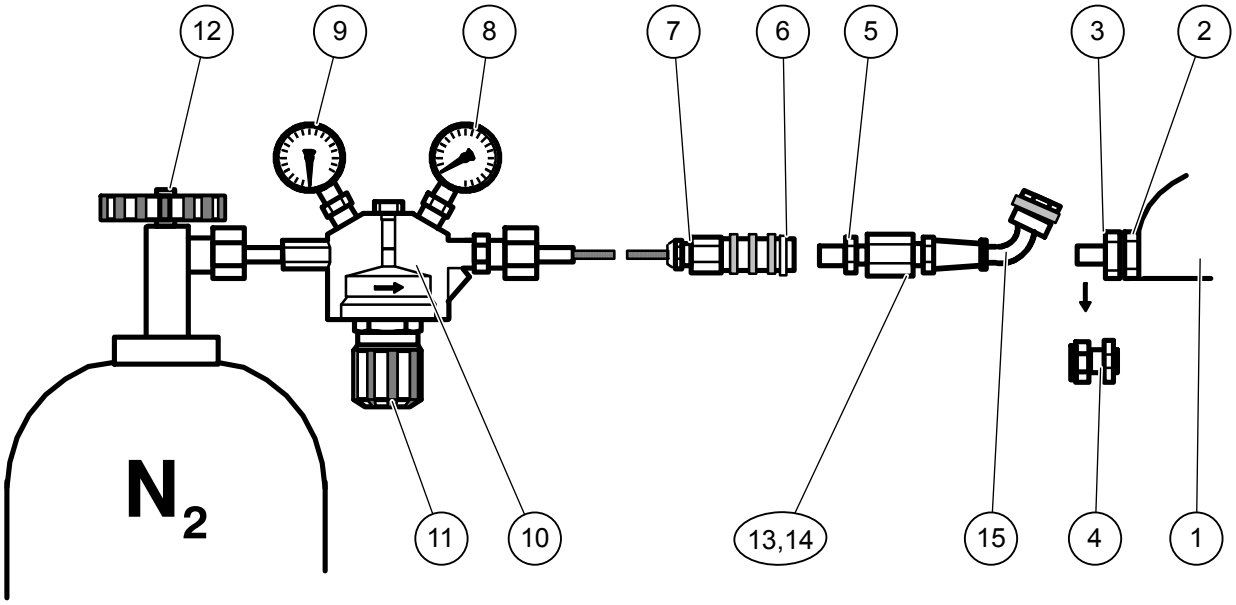
⚠ WARNING	
	**HIGH PRESSURE HAZARD!** **Breakage of the accumulator when filling a damaged or worn accumulator could cause death or severe injury.** **Do not fill an unchecked or too worn accumulator.**

ID: BG00264521 en-US C.001.1 2015-06-08

⚠ WARNING	
	**EXPLOSION HAZARD!** **An accumulator filled with wrong type of gas could explode and cause death or severe injury.** **Use only nitrogen (N2) to fill a pressure accumulator.**

ID: BG00264521 en-US C.001.1 2015-06-08

3.8.1 Filling instruction



1	*Accumulator body*	*2*	*Filling valve*
3	*Locking nut*	*4*	*Cap*
5	*Quick coupling stem*	*6*	*Quick coupling sleeve*
7	*Hose*	*8*	*Accumulator pressure gauge*
9	*Gas bottle pressure gauge*	*10*	*Pressure reducing valve*
11	*Pressure regulating valve*	*12*	*Shut-off valve*
13	*Adapter*	*14*	*Seal*
15	*Elbow adapter*		

1. Remove the cap (4).
2. Screw the elbow adapter (15) to the filling valve (2).
3. Push the quick coupling sleeve (6) onto the stem (5).
4. Undo the locking nut (3).
5. Turn the pressure regulating valve (11) open.
6. Open the nitrogen bottle valve (12).

   The gauge (9) indicates the pressure in the bottle.
7. Adjust the pressure in the low pressure accumulator to 5 - 10 bar by turning the regulating valve (11).

   Gauge (8) indicates the pressure in the accumulator. Adjust the pressure according to step 15.
8. Adjust the pressure in the H.P. accumulator with the pressure control valve (11), according to the instructions.

   Gauge (8) indicates the pressure in the accumulator. Max. pressure is marked on the accumulator.
9. Adjust the pressure of the stabilizer accumulator with the pressure control valve, according to the instructions.

   Gauge (8) indicates the pressure in the accumulator.
10. Close the filling valve (2) by turning the locking nut (3).

11. Close the nitrogen bottle valve (12).
12. Turn the pressure regulating valve (11) open.
13. Disconnect the quick couplings (5) and (6).
14. Release the elbow adapter (15) from the filling valve (2).
15. Mount the checking gauge (0-10 bar) in to the low pressure accumulator filling valve (2) and by opening the locking nut (3) let the pressure flow out until the gauge shows **3 - 5 bar**.
16. Tighten the locking nut (3) to 15 Nm (1,5 kpm).
17. Refit the cap (4).

3.8.2 Filling pressures of accumulators

Low pressure accumulator (LP)

A low pressure accumulator damps the hydraulic vibrations in the return line. It also prevents cavitation in the return lines and channels.

To get the optimum performance from a low pressure accumulator, the gas pressure of the accumulator should be half of the return line pressure. Normally a low pressure accumulator is pressurized to 3 - 5 bars.

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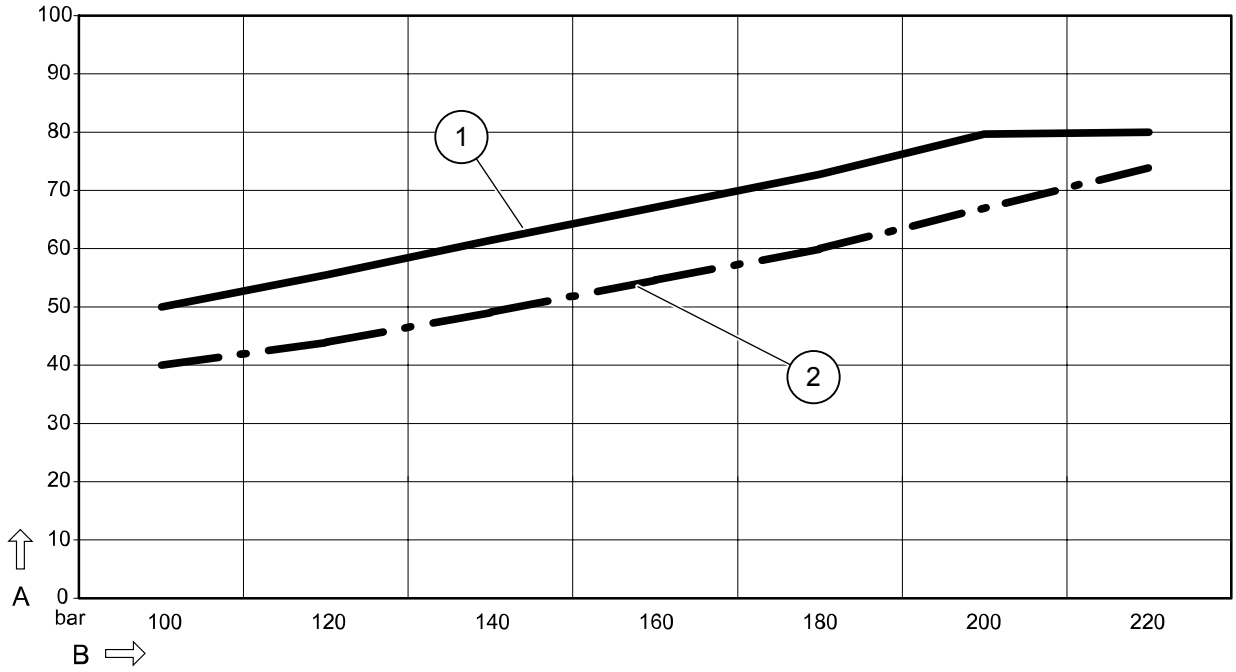
High pressure accumulator (HP)

The main function of high pressure accumulator is to store pressurized oil during the return stroke of the piston. This stored pressure can be utilized during the next piston stroke.

Another vital function is to dampen vibrations.

HP-accumulator's gas pressure must be relative to the set maximum percussion pressure according to the following graph.



Stem-type diaphragm

1 Upper limit
2 Lower limit
A Filling pressure
B Percussion pressure

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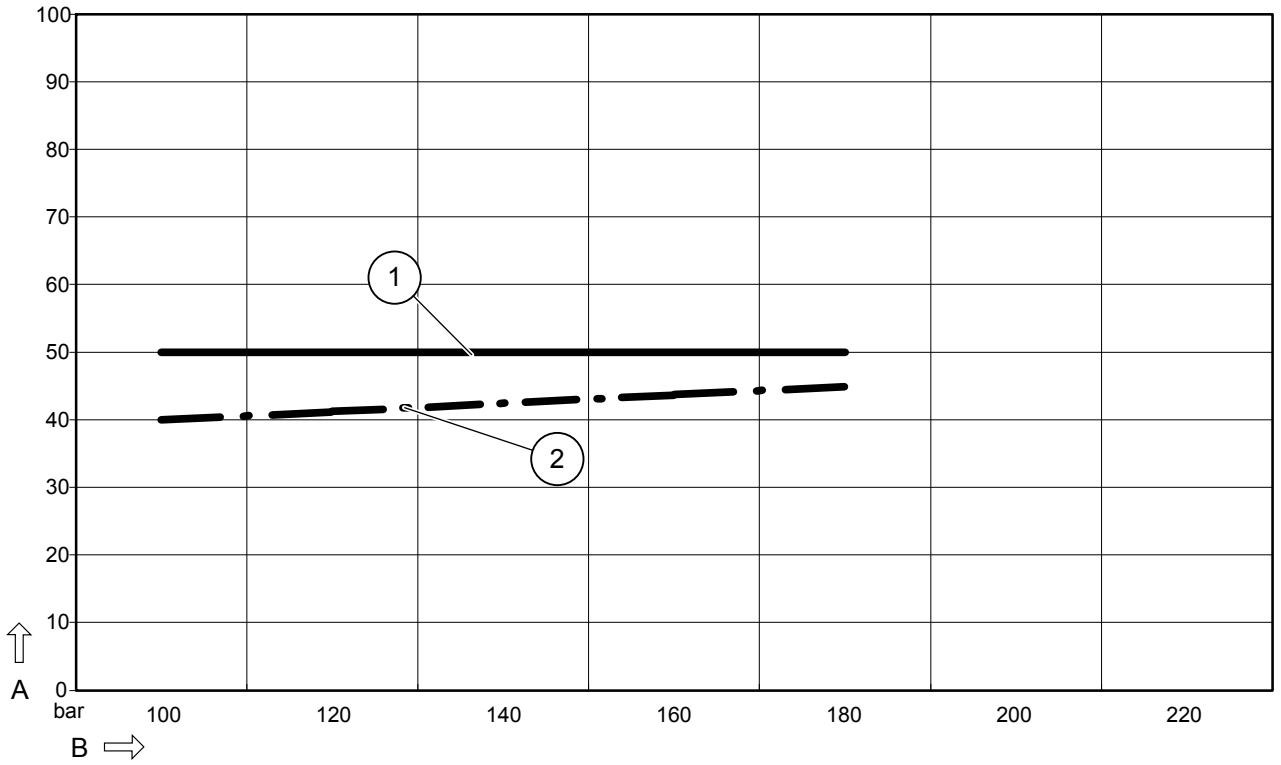


Normal (stemless) diaphragm

1	*Upper limit*	*A*	*Filling pressure*
2	*Lower limit*	*B*	*Percussion pressure*

Pressure of stabilizer accumulator

RD414	30 bar
HLX5 T	8 bar
HFX5 T	8 bar
RD520 series	30 bar
HL810 series	30 bar
HL820T / HF820T	30 bar
HL1060	40 bar
HL1500	50 bar
HL1560T / HF1560T / HL1560ST	40 bar
RD1635C	40 bar

3.9 Mounting the pressure accumulator on the rock drill

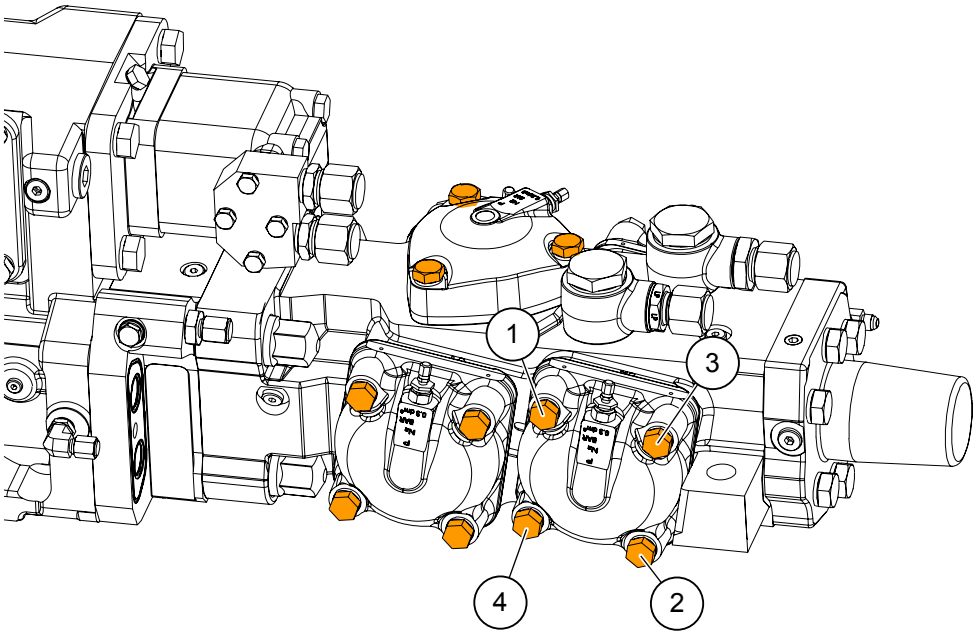
Note! ***The positions of the HP and LP accumulators, related to the rock drill body, might change between different rock drill models. Check the correct positions from the service manual of the rock drill in question.***

1. Remove the cover plugs from the accumulator connection port

ID: BG00264521 en-US C.001.1 2015-06-08

2. Clean the joint surfaces both in the accumulator and in the rock drill.
3. Check that the bolts move easily in their threads in the drill body.
4. Lubricate the threads of the bolts with grease.
5. Fit the O-ring and the gasket.
6. By using a torque wrench, pre-tighten the accumulator bolts to 100 Nm (10 kpm).

   The four-bolt accumulator must be tightened using a cross-tightening method 1-2-3-4.



7. By using a torque wrench, tighten the bolts to 200 Nm (20 kpm).

   The four-bolt accumulator must be tightened using a cross-tightening method 1-2-3-4.

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ID: BG00264521 en-US C.001.1 2015-06-08

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Original instructions

BG00309898 en-US B.001.1 2015-04-21

Hydraulic motors OMSU, OMT and MTA Repair instructions

SANDVIK

⚠ WARNING	
	**IGNORING INSTRUCTIONS HAZARD!** **To avoid death or injury you MUST read, understand and follow operator's and maintenance manuals before installing, inspecting, operating, servicing, testing, cleaning, transporting, storing, dismantling or disposing of the product or a part or accessory of the product. Keep this publication for future reference.**

ID: BG00309898 en-US B.001.1 2015-04-21

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ID: BG00309898 en-US B.001.1 2015-04-21

Table of Contents

ID: BG00309898 en-US B.001.1 2015-04-21

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ID: BG00309898 en-US B.001.1 2015-04-21

1 INTRODUCTION

1.1 The Purpose of these instructions

This manual contains supplementary information for operation, maintenance and repair of a component.

Before operating, or performing maintenance or repair procedures for the component or system described in this manual, read and understand the information in operator´s and maintenance manuals supplied with the machine. Pay special attention to the safety information in chapter "2 Safety and environmental instructions" of those manuals.

1.1.1 Validity of the manuals

This manual, and especially the safety information, is valid only if no unauthorized changes to the product are made.

Continuing improvement and advancement of product design might have caused changes to your product which are not included in this publication. Note also that if a third party has made changes to the product after delivery from the manufacturer, this publication does not include information on these changes or their influences on the product.

Whenever a question arises regarding your product, or this manual, please consult your local Sandvik representative for the latest available information.

ID: BG00309898 en-US B.001.1 2015-04-21

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ID: BG00309898 en-US B.001.1 2015-04-21

2 SAFETY AND ENVIRONMENTAL INSTRUCTIONS

2.1 Safety precautions

⚠ WARNING	
	**SPECIAL SKILLS REQUIRED!** **Incorrect maintenance procedures could cause severe injuries.** **Do not do any maintenance tasks without proper training. Always follow the instructions. Use appropriate personal protective equipment, depending on the task.**

ID: BG00309898 en-US B.001.1 2015-04-21

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ID: BG00309898 en-US B.001.1 2015-04-21

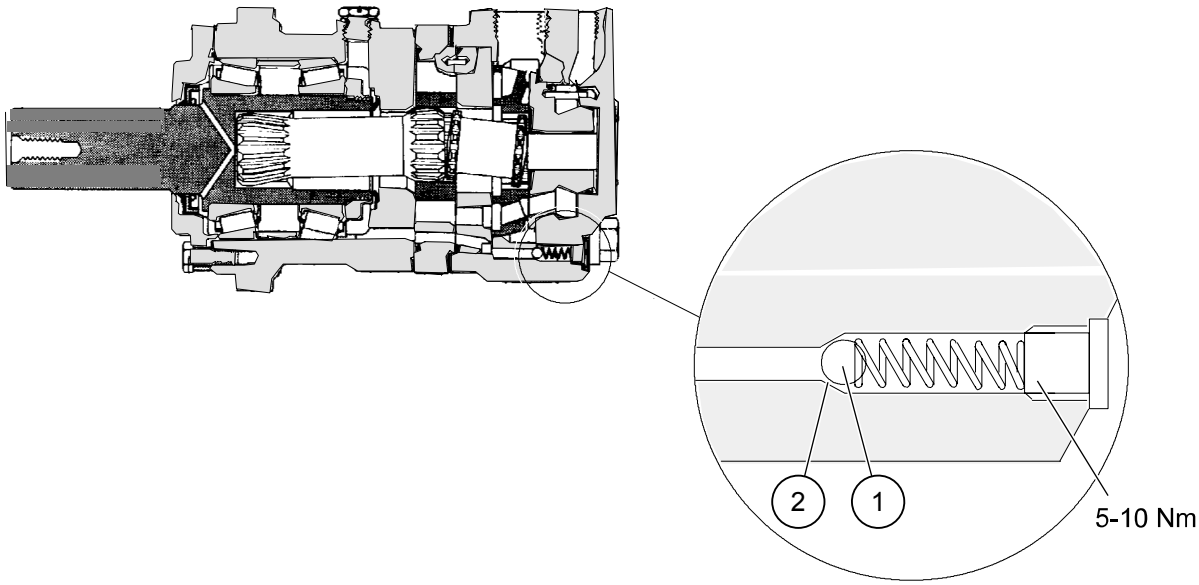
3 REPAIR INSTRUCTIONS

3.1 Repair

In order to ensure uninterrupted use, cleanliness must be considered in all maintenance and repair procedures related to hydraulic equipment. We recommend that all maintenance and repair procedures for hydraulic motors be performed in a clean and dust-free room.

When disassembling a hydraulic motor, always replace all seals and O-rings.

3.2 Checking the motor



Non-return valve

Check the condition of the ball (1) and the valve surfaces (2). If they are damaged, the valve will leak and the motor must be replaced.

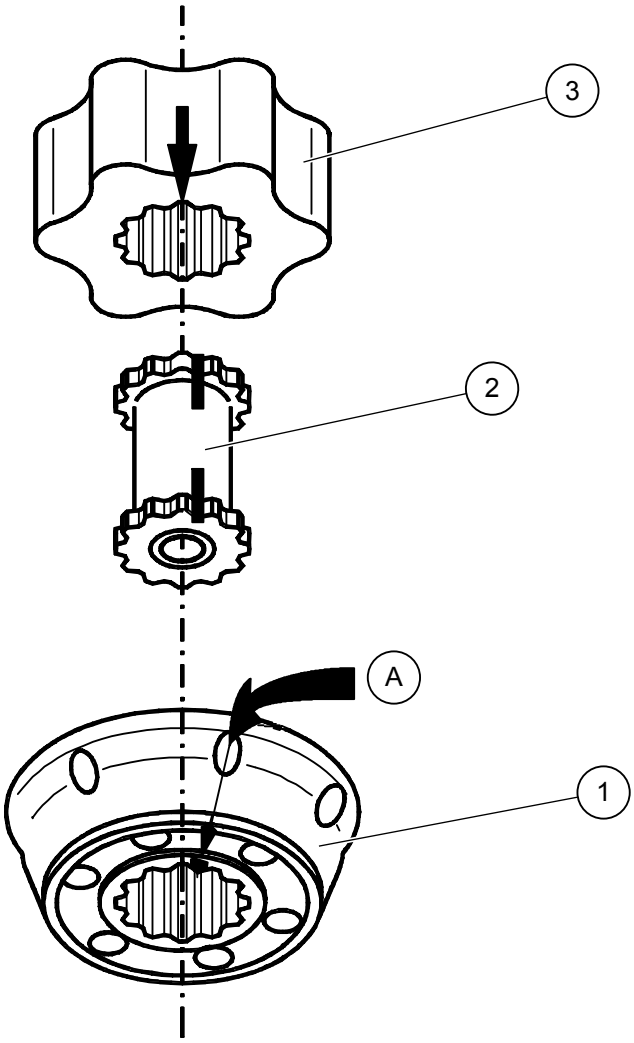
Gear wheel set

If the parts have cracks or indications of motor jamming, or if the gear wheel set is worn out, the motor should be replaced. Retain and install the outer and inner ring of the same gear wheel set as a pair.

3.3 Timing the motor

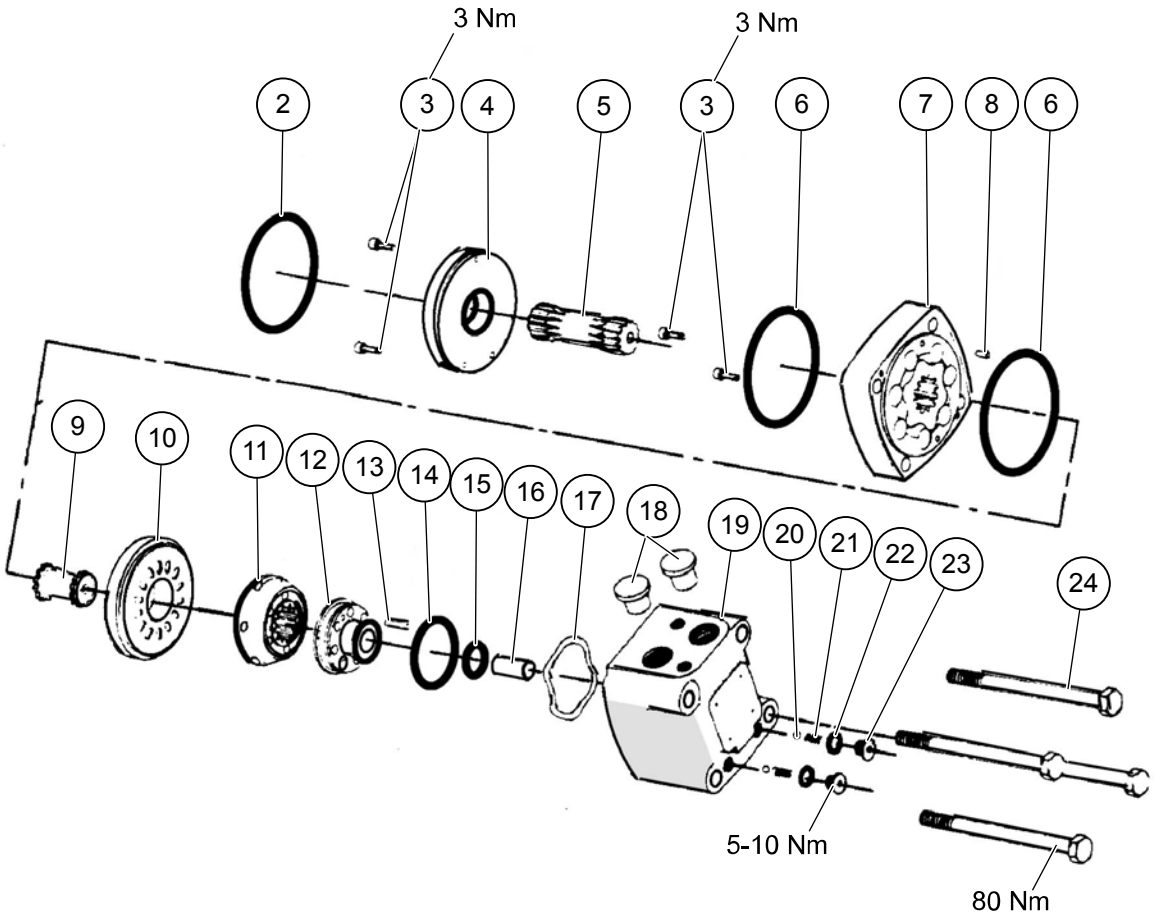
- Place the valve plate (1) on top of the balance plate, and mark (with chalk or ink) the drive spline, which lines up with the hole (A) on the outer rim of the valve.
- Mark the bottom of the valve drive shaft spline. Place the valve drive shaft such that the marked spline bottom is aligned with the marked spline on the valve and the end with the widest splines (5 mm) is mounted in the valve. Push the channel plate into place.

- Mark the inner rotor with the spline bottom that acts against the bottom of the outer splines. Mount the gear wheel set, and align the rotor (3) such that the mark is aligned with the bottom of the marked spline of the valve drive shaft. Turn the rotor anticlockwise until the splines engage with the splines on the drive shaft splines.



ID: BG00309898 en-US B.001.1 2015-04-21

3.4 OMSU hydraulic motors

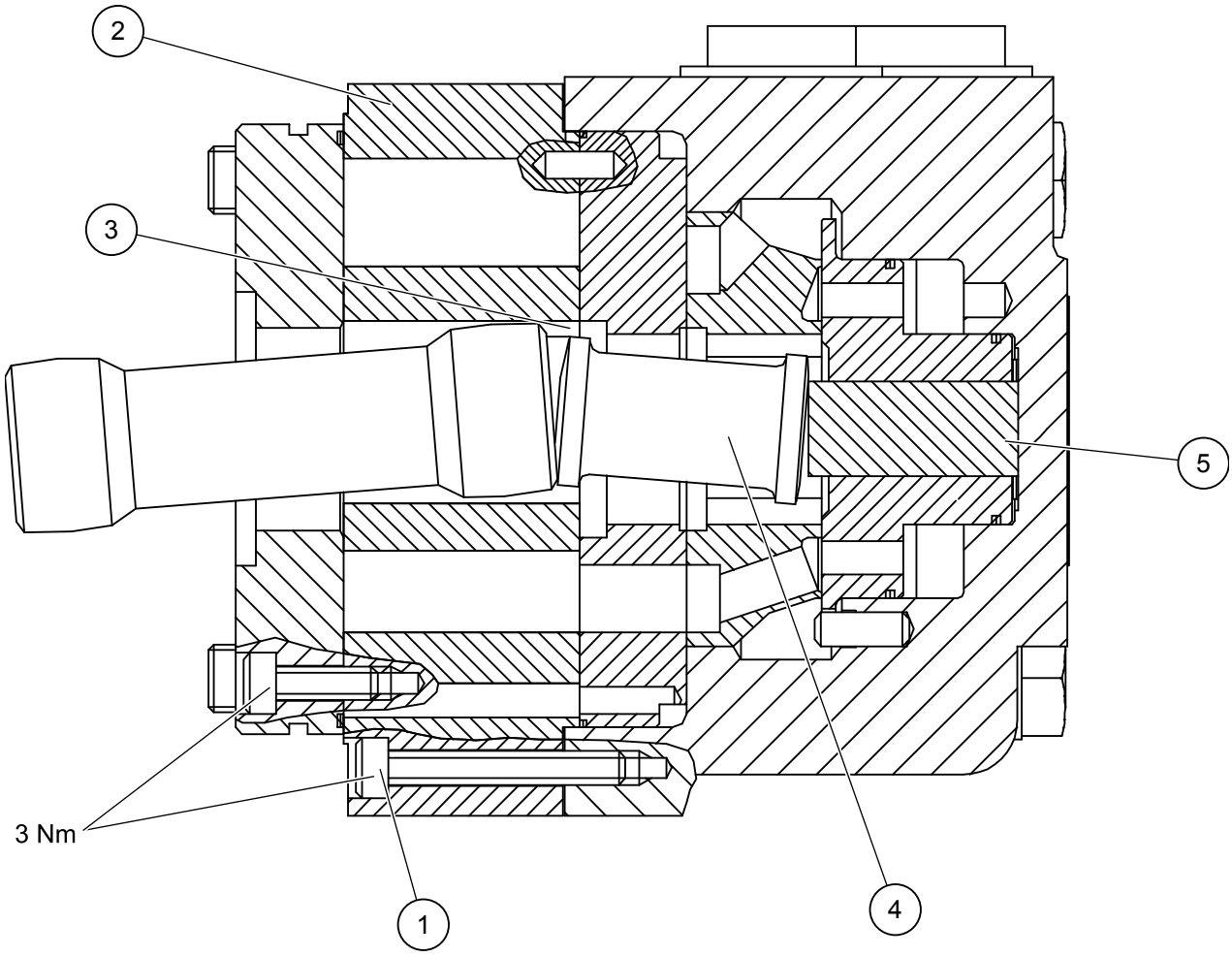


The motor seal set includes parts 2, 6, 14, and 15. Refer to the spare parts manual.

NOTICE

RISK OF DAMAGING THE HYDRAULIC MOTOR!
Never rotate the motor without a shaft, as this could damage the plate.

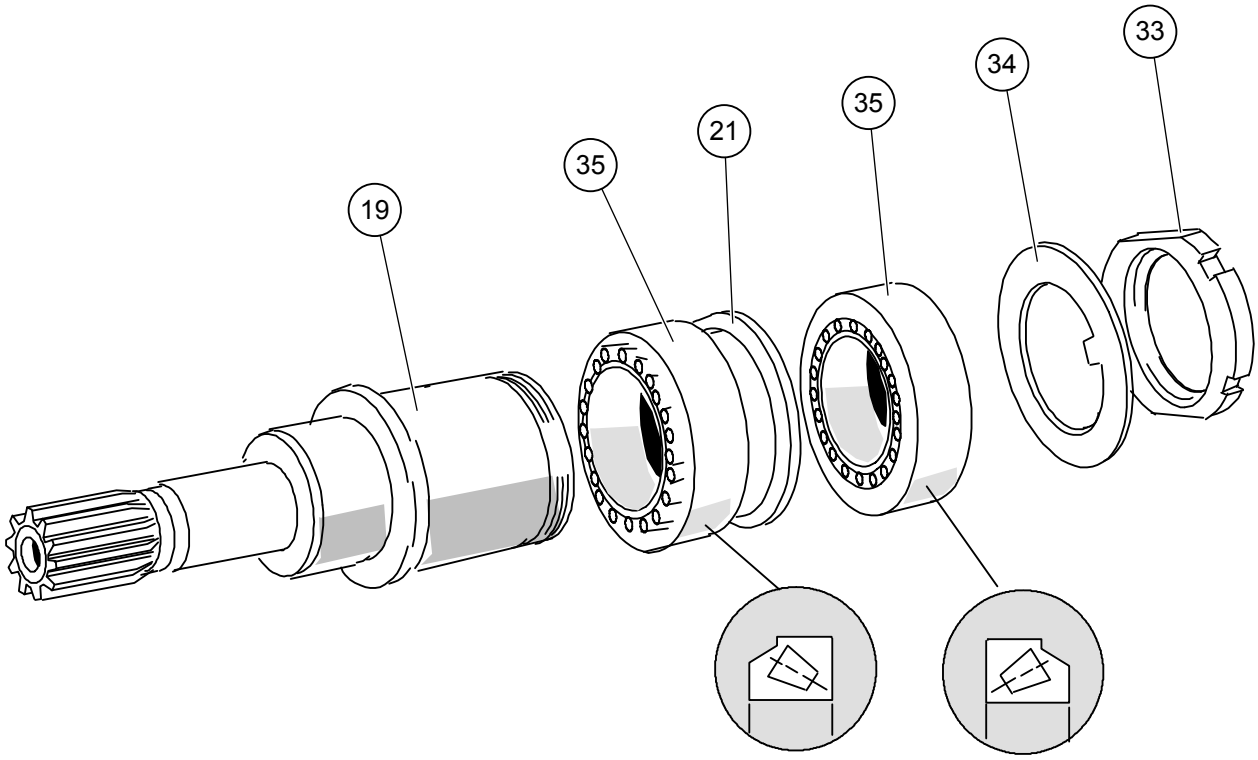
3.4.1 Assembling the motor



Note! ***Carefully press the cover (2) into place. Make sure that the clearance between the cover and the frame is equal on all sides before you tighten the bolts (1). Otherwise the shaft (4) can be behind the corner (3) and the bearing (5) will break the rear cover when the bolts are tightened.***

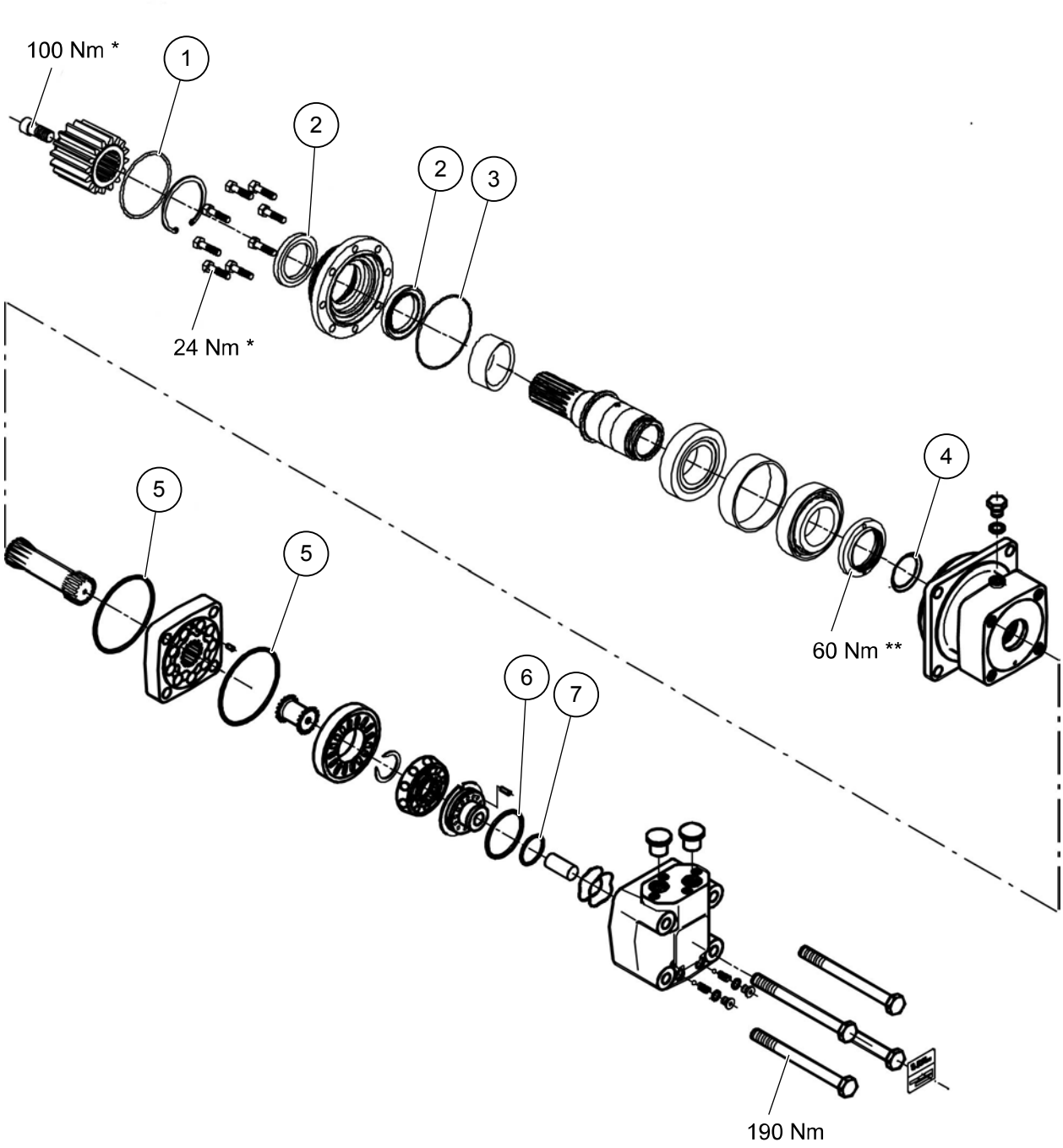
ID: BG00309898 en-US B.001.1 2015-04-21

3.4.2 Installing the bearings



- Install the bearings (35) and the bushing (21) on the shaft (19) as shown in the figure.
- Tighten the nut (33) with a special tool (tightening torque: 25 Nm), and bend the edges of the locking plate (34) on top of the nut (33).

3.5 OMT hydraulic motors



* Secure with glue

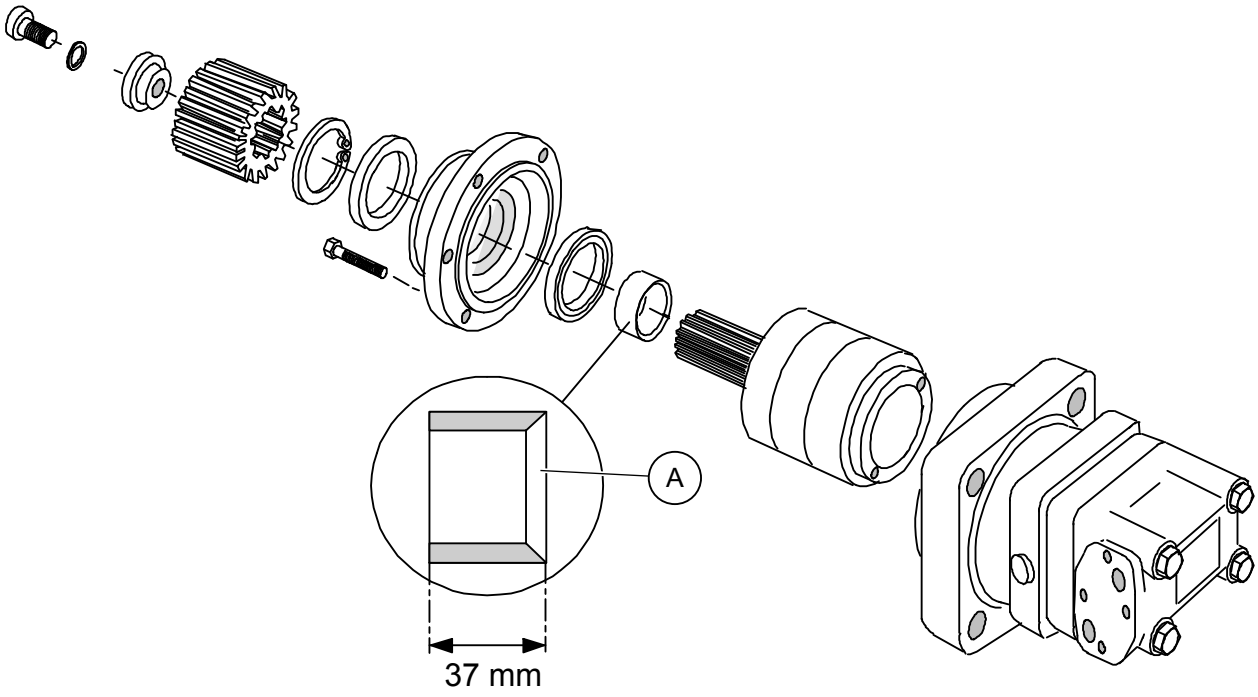
** Secure with glue and point pin

The motor seal set includes parts 1 through 7. Refer to the spare parts manual.

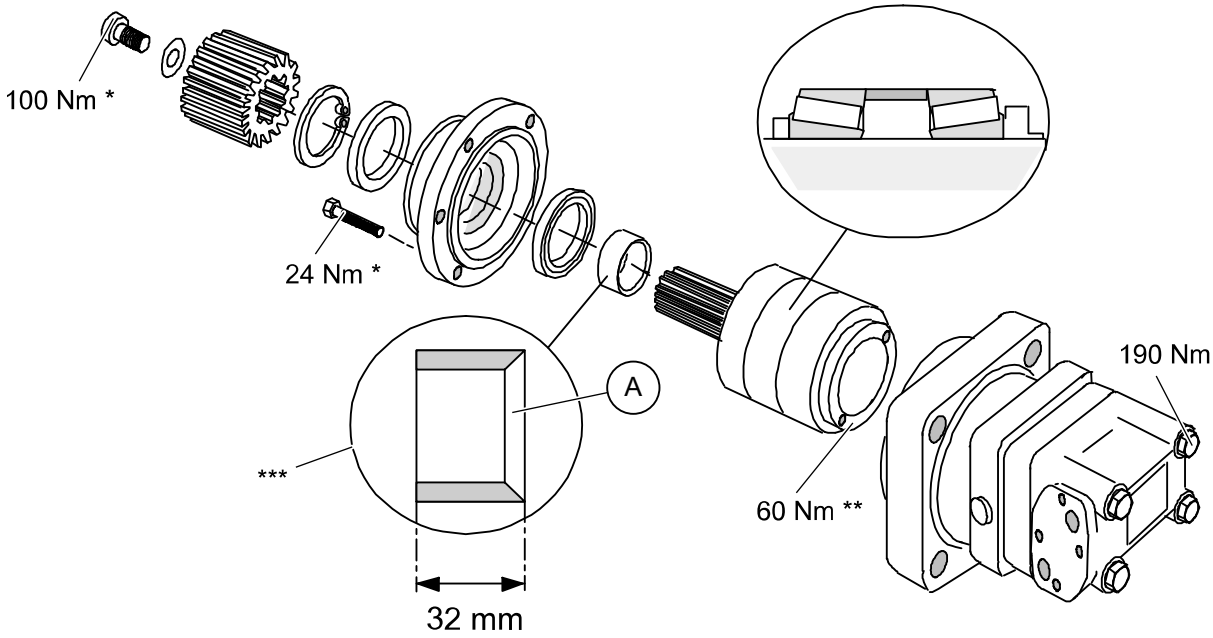
ID: BG00309898 en-US B.001.1 2015-04-21

3.5.1 Fastening the gear wheel

Two different gear wheels are used on the OMT hydraulic motors. Depending on the gear wheel type, you must use sealing bushings (A) of different length (37 mm or 32 mm).



Old gear wheel



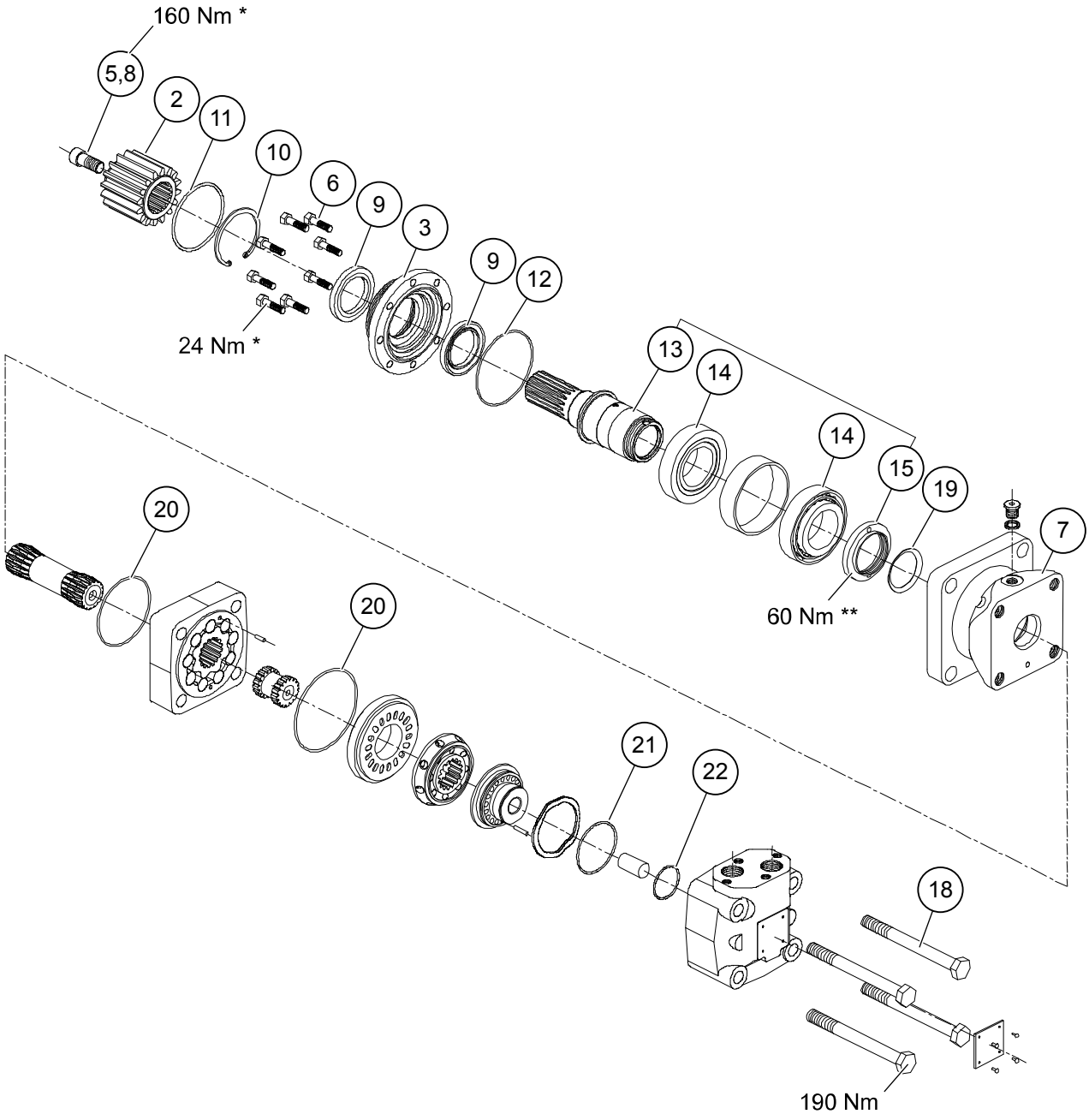
New gear wheel

* Secure with glue (Loctite 270)

** Secure with glue and point pin

*** Pressed-on fit preheat max.: 150 °C. Seal with glue (Loctite 250)

3.6 MTA hydraulic motors



* Secure with glue

** Secure with glue and point pin

The motor seal set includes parts 9, 11, 12, and 19 through 22. Refer to the spare parts manual.

ID: BG00309898 en-US B.001.1 2015-04-21

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ROCK DRILL SERVICE CARD N:o _____

Equipment _____ S/n _____

Rock drill _____ S/n _____

Percussion hours since last service _____

drill. shifts/rounds _____

drilled meters _____

SERVICE INFORMATION

Purpose of the service			Service man		
Arrival date	Previous service	Edell. iskutunnit	Work. hours	Dism.	Insp.
Departure date	Previous service card n:r		Rep.	Ass.	Total

REPLACED PARTS / PART INSPECTION						
Qty	Part no.	Description	Repaired	Replaced	OK	Remarks
		Piston	☐	☐	☐	
		Front cylinder	☐	☐	☐	
		Front bearing	☐	☐	☐	
		Rear cylinder	☐	☐	☐	
		Rear bearing	☐	☐	☐	
		Distributor	☐	☐	☐	
		LP. accumulator	☐	☐	☐	
		HP. accumulator	☐	☐	☐	
		Spacer	☐	☐	☐	
		Gear housing	☐	☐	☐	
		Rotation bushing	☐	☐	☐	
		Rot. bush. bearing	☐	☐	☐	
		Chuck	☐	☐	☐	
		Connecting piece	☐	☐	☐	
		Rotation motor	☐	☐	☐	
		Rotation shaft	☐	☐	☐	
		Rot. shaft bearings	☐	☐	☐	
		Front cover / body	☐	☐	☐	
		Flushing seal housing	☐	☐	☐	
		Shank bearings	☐	☐	☐	
			☐	☐	☐	
			☐	☐	☐	
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			☐	☐	☐	

Remarks

Perc.mechanism tested ☐ Rot.mechanism tested ☐

Cont. ☐