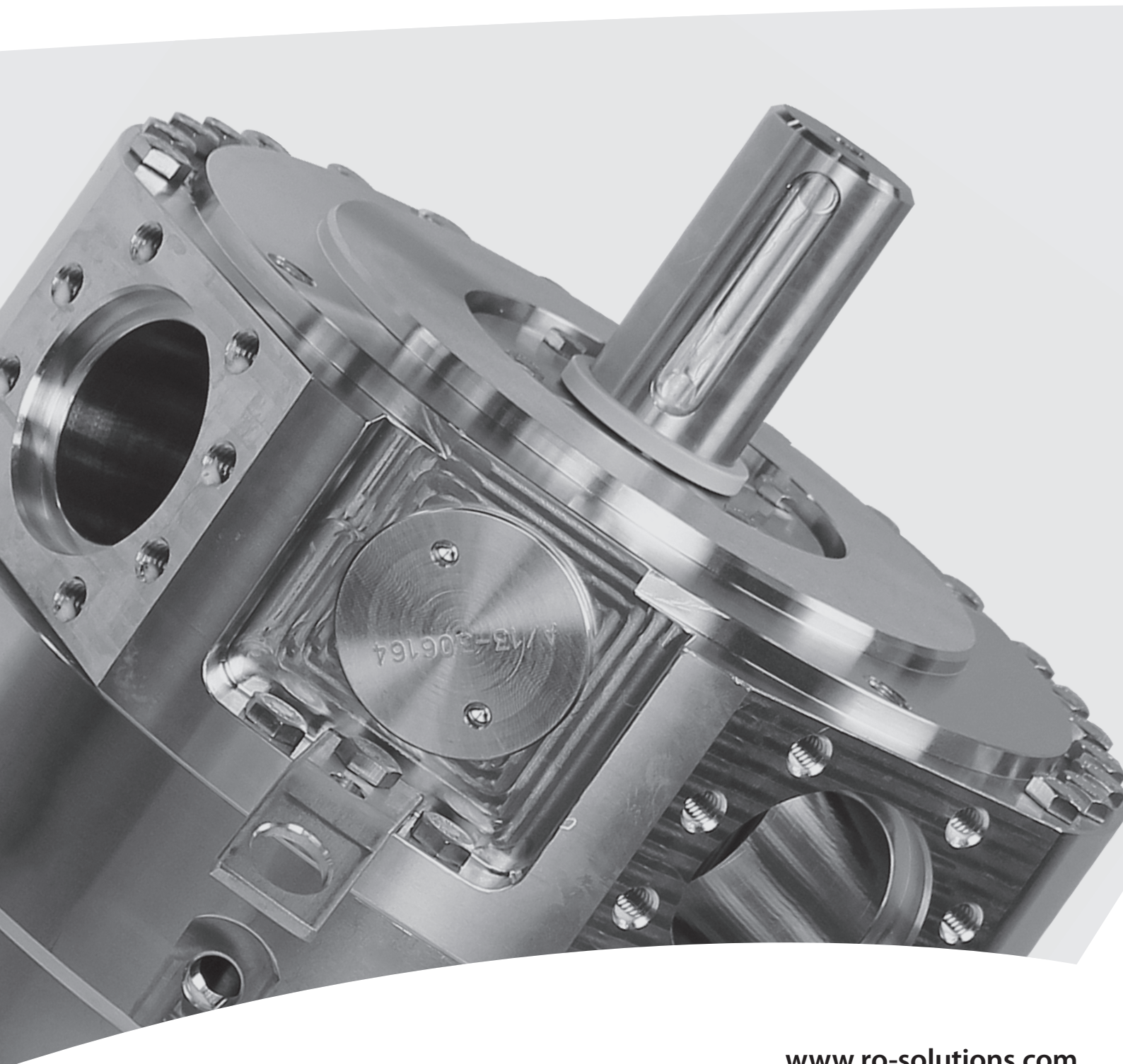


Instruction

Disassembling and assembling APP S 674 21-38



Instruction **Disassembling and assembling APP S 674 21-38**

Table of Contents	1.	Disassembling	2
	2.	Disassembling the pump.....	3
	3.	Assembling the pump.....	8
	4.	Disassembling and assembling of the swash plate	14
	5.	Disassembling and assembling of cylinder barrel-/ valve plate	15
	6.	Disassembling and assembling of the flush valve	16
	7.	Changing pistons	17
	7.1.	Disassembling	17
	7.2.	Assembling	20
	8.	Exploded view APP S 674 21-38.....	22
	9.	When should the pistons be replaced.....	23

This document covers the instructions for disassembling and assembling the axial piston pumps APP S 674 21-38.

Tools provided with toolset 180B4347:

- Adjustable pin wrench
- Stop for retainer plate
- Press bush for valve plate
- M8 allen screw (20 mm and 140 mm)
- Press bush ø 45 (Plastic)
- M8 mm eye bolt
- M8 mm nut
- M8 x 70 mm screw

1. Disassembling

Important: It is essential that the pump is serviced in conditions of absolute cleanliness.

For a better understanding of the pump, please see the exploded view in item 8.

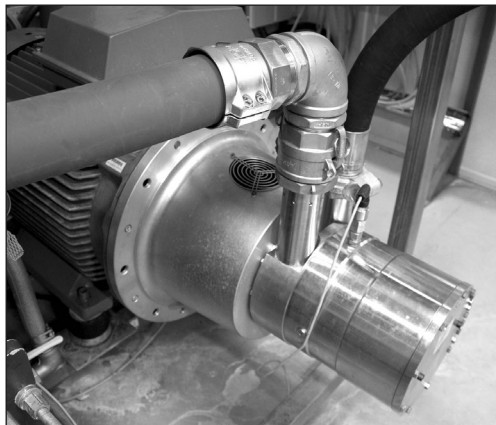
Place the pump on a pallet or other stable surface above the ground. Ensure that the pump cannot roll. It must be possible to place the pump vertically with the shaft pointing downwards. This can be done between two pallets or between two boards on a pallet provided that the distance is minimum 50 mm.

WARNING:
Do not reuse disassembled O-rings or shaft seal as they might be damaged. Always use new O-rings.

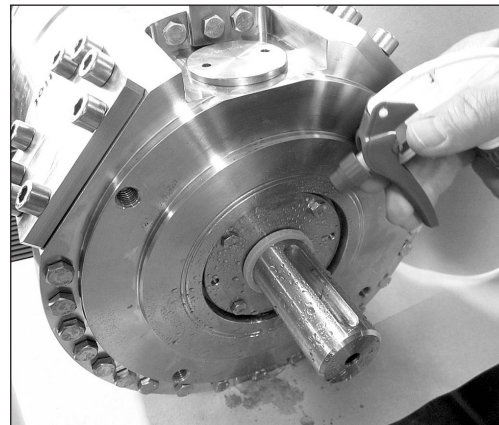


2. Disassembling the pump

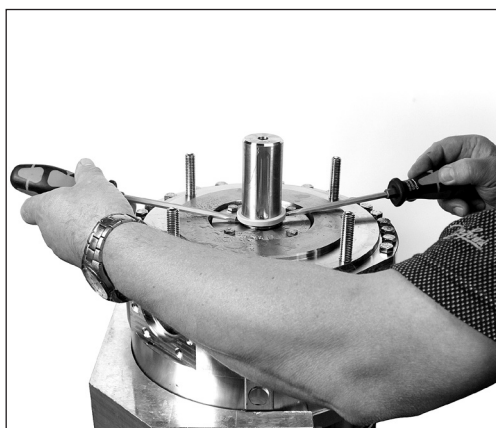
1. Disconnect the pump from the rest of the system.



2. Lubricate shaft with clean filtered water.

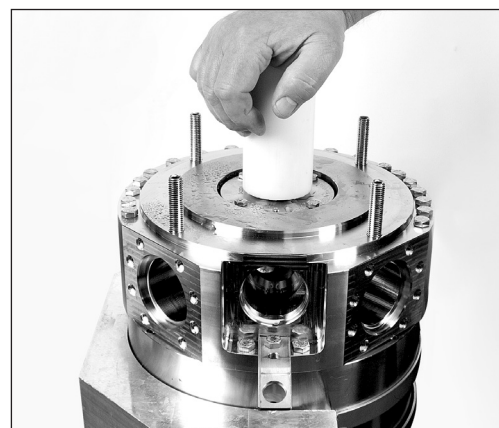


3. Carefully remove the stop bush ring and the O-ring with a screw driver.



4. Using a 10 mm combination wrench, unscrew the four bolts from shaft seal flange.

WARNING!
Place the shaft seal press bush tool to ensure the flange does not pop out and damage the ceramic ring.



5. Place two bolts in screw holes in the flange.



6. Remove flange slowly.

WARNING!
Be careful, the shaft has sharp edges.



7. Remove O-ring. Remove ceramic ring from flange by carefully pushing it from the back of the sealing ring.

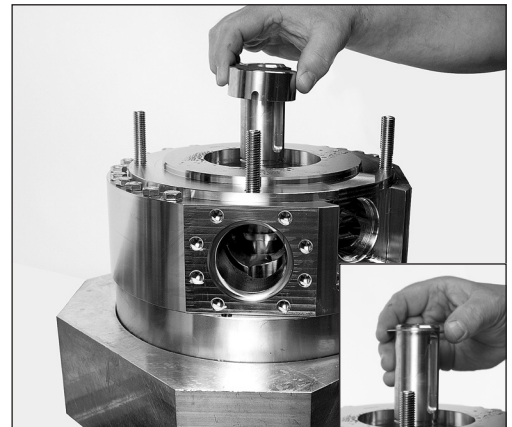
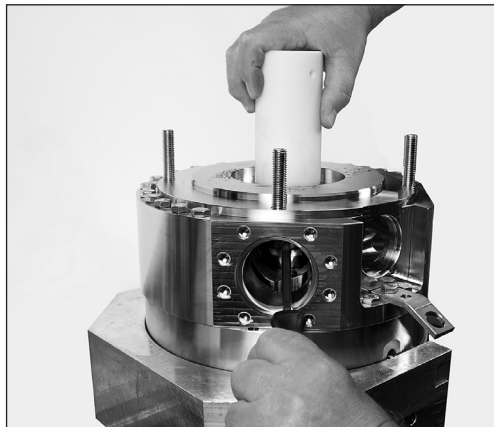
8. Wet the shaft and shaft seal with clean filtered water.



9. Place the press bush tool over the shaft seal again. Through the inlet port lift the shaft seal with a screwdriver between shaft seal and spring.

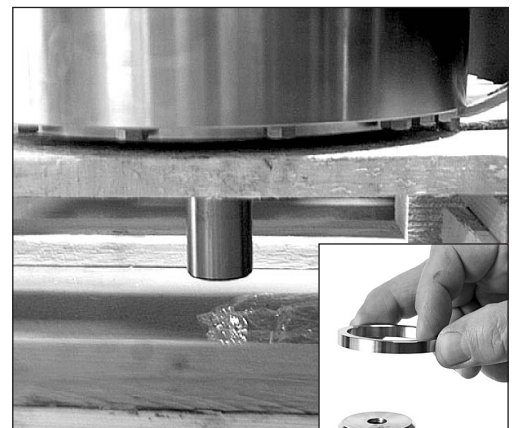
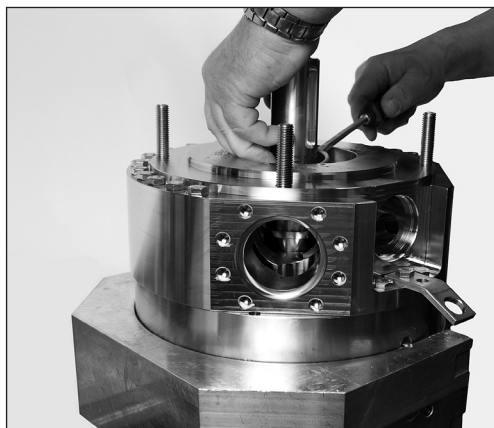
10. Carefully remove the shaft seal and ring.

WARNING!
Be careful not to scratch the shaft.



11. Carefully remove the spring by lifting it with a screwdriver.

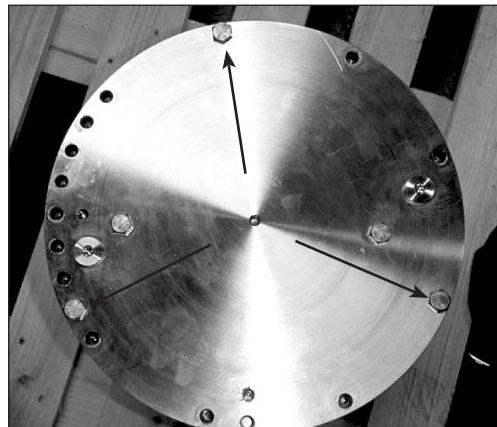
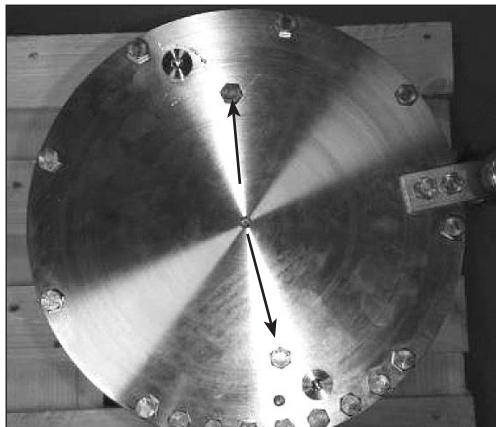
12. Turn pump into vertical position with shaft pointing downwards and remove the shaft seal distance ring.



13. Using the 13 mm combination wrench, remove all the bolts on the mounting flange except the three shown in the picture under item 14.

WARNING:
Do not loosen the two screws keeping swash plate in place.

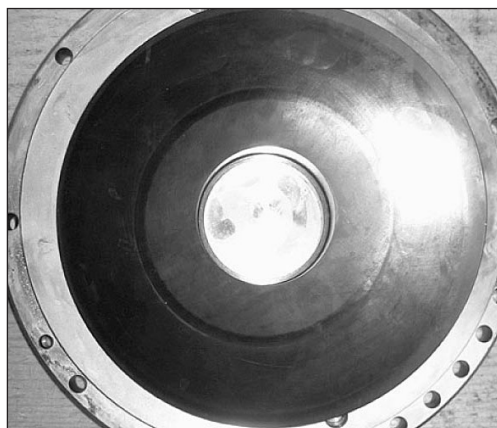
14. Unscrew the remaining three bolts. Turn each bolt one round at the time to make sure that the flange is removed as straight forward as possible.



15. Screw the eye bolt in the M8 hole in the middle of the flange. Pull it straight upwards.



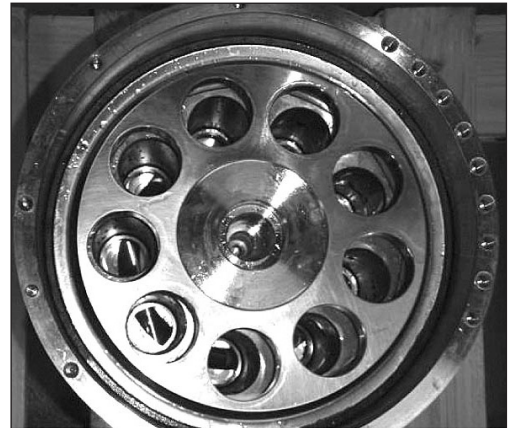
16. Swash plate must be placed so that its surface is not scratched. For further disassembling of swash plate, see page 14.



17. Remove by hand the pistons one by one. Be careful not to scratch the pistons. If required, tilt the retainer plate to horizontal position for easy removal of pistons.

WARNING:
Do not use any tools.

18. Remove the retaining plate and the retaining ball.
Note: As the retaining ball is not attached to the retaining plate, it might fall out.



19. Remove the retaining guide, the 4 springs and the spring guide.

20. Mount the 8 mm eye bolt in the cylinder barrel. Pull straight upwards. A continuous lift will elevate the cylinder barrel out of housing. This can only be done if shaft seal is removed.

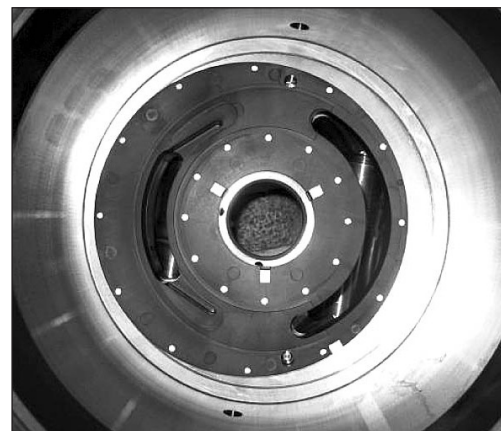
WARNING:
If the cylinder barrel is dropped or lowered too fast into housing, the main bearing/ shaft bearing might be damaged.



21. Place cylinder barrel upside down. For further disassembling of cylinder barrel and valve plate see page 15.



22. Remove the port plate by hand.

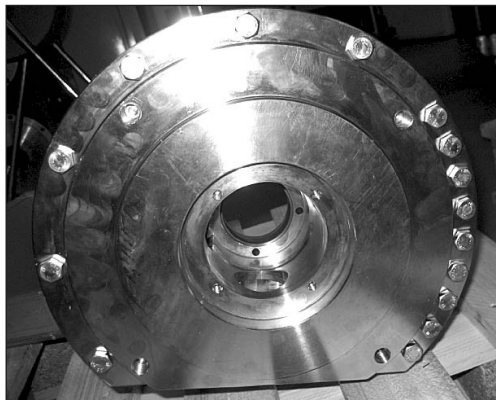


23. Remove, by hand, the two guide pins.
Note: The following operation is only necessary if O-ring on port flange is to be changed.



24. Place the pump horizontally.

25. Remove the remaining screws in port flange by using a 13 mm combination wrench.



26. Carefully separate house and port flange. Ensure that guide pin for the positioning house is not lost. For further disassembling of flush valve, see page 16.

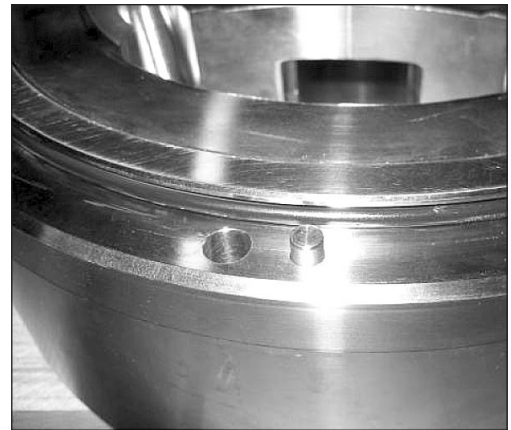
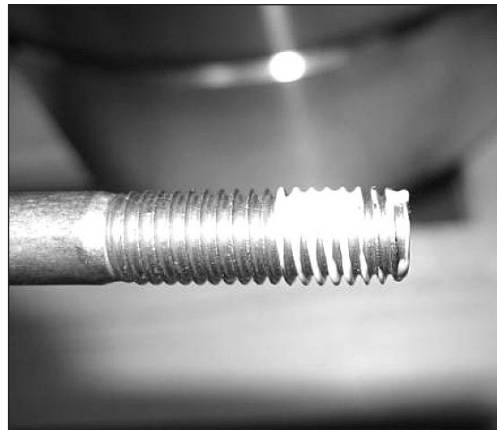
3. Assembling the pump

WARNING:
Do not use silicone when assembling the pump. Do not reuse disassembled O-rings; they might be damaged. Always use new O-rings.

Important:
It is essential that the pump is serviced in conditions of absolute cleanliness. All parts must be absolute clean before mounting.

1. Lubrication:
 - To prevent seizing-up, lubricate all threads with PTFE lubrication type.
 - O-rings inside pump must be lubricated only with clean filtered water.
 - O-rings for port flange, mounting flange and flushing valve must be lubricated.
 - It is important to lubricate ALL parts to be assembled with clean filtered water (Especially all PEEK parts).

2. Place port flange with O-ring pointing upwards.



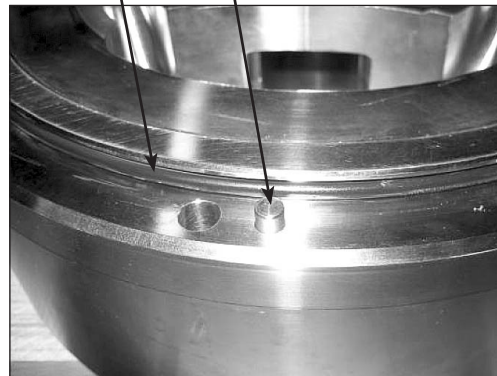
3. Insert guide pin for positioning housing on port flange. Ensure that two screw holes can be reached from below.

5. Position housing aligning pin hole over guide pin.

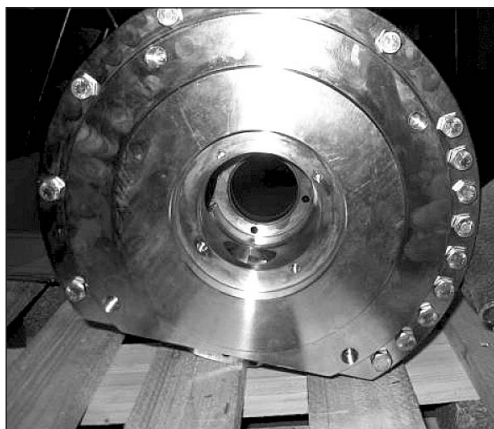
4. Mount O-ring.

6. Carefully press downwards. Be careful not to squeeze O-ring. If O-ring is damaged, the pump will leak.

7. Screw in at least two screws.



8. Place housing horizontally. Screw in the rest of the screws on port flange. Tighten screws to a torque of 30 ± 2 Nm.



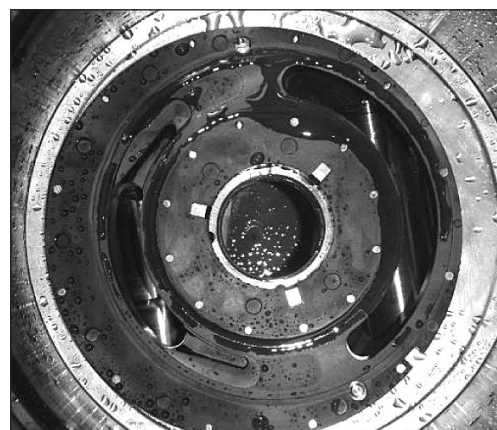
9. Place pump vertically. Place 10.5 mm guide pins in port flange.



10. Position port plate by using the two guide pins. Do not use force for this operation.

11. Ensure port plate is fitted tightly against the bottom.

Important: Lubricate port plate with clean filtered fresh water. If valve plate is disassembled from cylinder barrel please see section 5 before continuing.



12. Screw eye bolt in cylinder barrel.

13. Make sure there is enough free space for the shaft beneath housing. Carefully lower cylinder barrel into housing.

WARNING:

If cylinder barrel is dropped or lowered too fast into housing, main bearing and shaft bearing might be damaged. Replacement can only be done at Danfoss, Nordborg.



14. Unscrew M5 eye bolt.

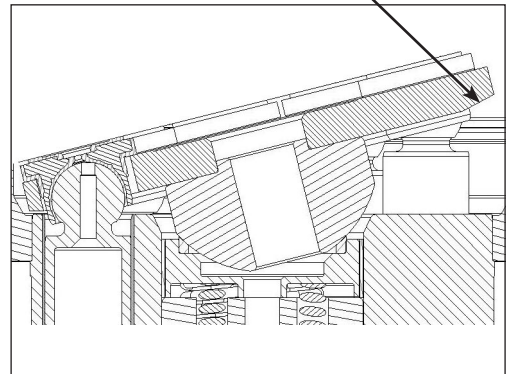
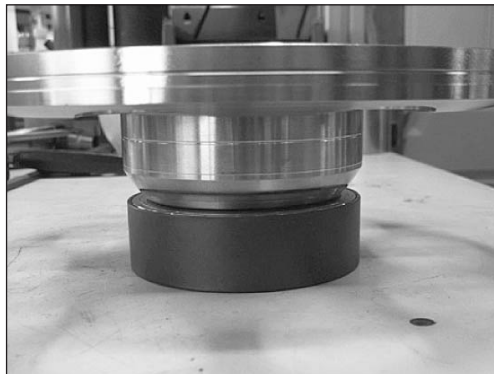
15. Place the four springs and spring guide in cylinder barrel. Springs must be positioned in the holes.

Note: For an APP S 674 33 and 38 a distance ring must be placed underneath each spring.



16. Retaining guide, retaining ball and retaining plate must be mounted as indicated in below picture.

17. Ensure that retaining plate is oriented correctly, i.e. with its slant surfaces pointing downwards.



18. Place retaining guide, retaining ball and retaining plate in cylinder barrel.

19. Place pistons in retaining plate and cylinder barrel.

Note: If pistons are replaced, place new pistons in clean filtered water for a couple of minutes. Exercise piston shoes to make them "run" smoother.

When pistons are placed, tilt retaining plate for easier placement of swash plate. If swash plate has been disassembled from mounting flange, see page 14 for assembly of swash plate.



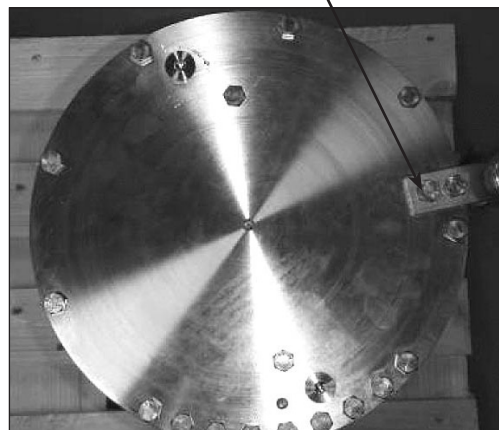
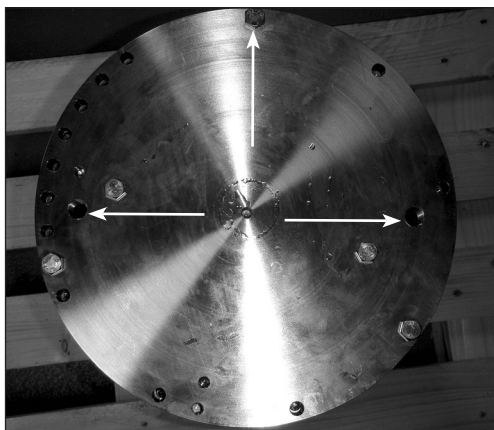
20. Lubricate piston shoes and swash plate with clean filtered water.

21. Remember to place the guide pin in the housing.

22. Place three bolts in mounting flange. Turn each bolt one round at a time to ensure mounting flange is mounted as straight downwards as possible. Be careful not to squeeze O-ring.

23. Screw in the rest of the bolts and tighten all screws to a torque of 30 +/- 2 Nm.

Note: Screws for lifting eye are shorter than the rest.



24. Lubricate and press new ceramic ring into the shaft seal cover by using the press bush tool.

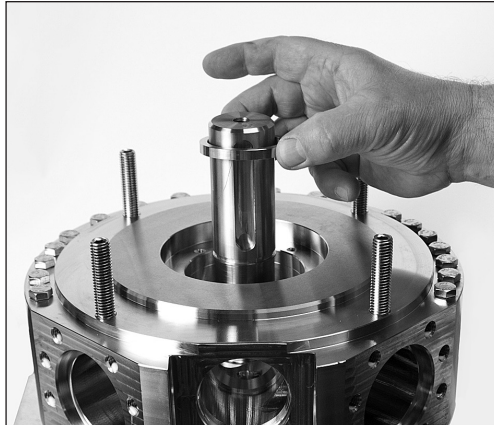
25. Place the new O-ring on shaft seal cover.

WARNING:

Ensure that the face with rubber seal is positioned against shoulder in shaft seal flange.



26. Place pump upside down to get access to shaft. Position the distance ring.



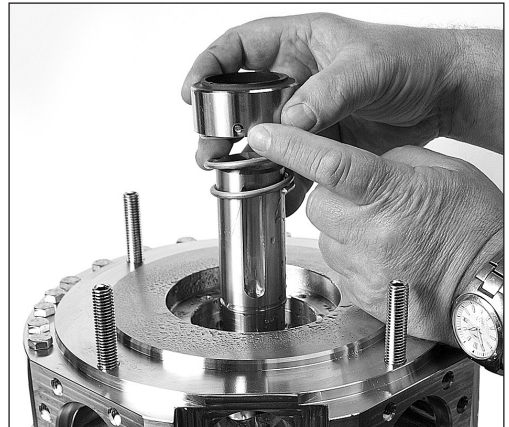
27. Lubricate shaft and shaft seal with clean filtered water.



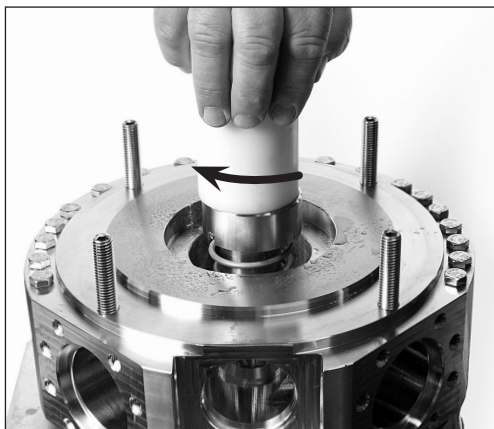
28. The shaft seal consists of 3 parts.



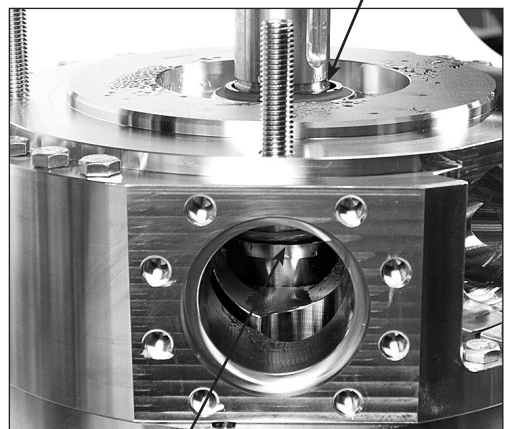
29. Mount new shaft seal with the carbon seal face pointing upwards and ensure, the spring tap is placed in the hole.



30. Use the press bush tool to press the seal down and at the same time turn the seal clockwise until spring stops at distance ring.



31. Right position of the spring can be inspected through inlet hole. The groove on shaft shall also be above shaft seal.



Spring against distance ring

33. Position the shaft seal cover on shaft. Be careful not to damage the ceramic ring.

WARNING!
Be careful, the shaft has sharp edges.

34. Hold the cover down with one hand and tighten the bolts with a torque of 10 Nm \pm 2 Nm.

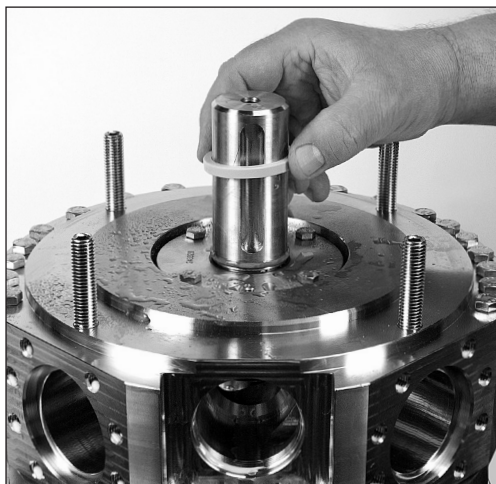


35. Lubricate the shaft with water before mounting the stop bush.

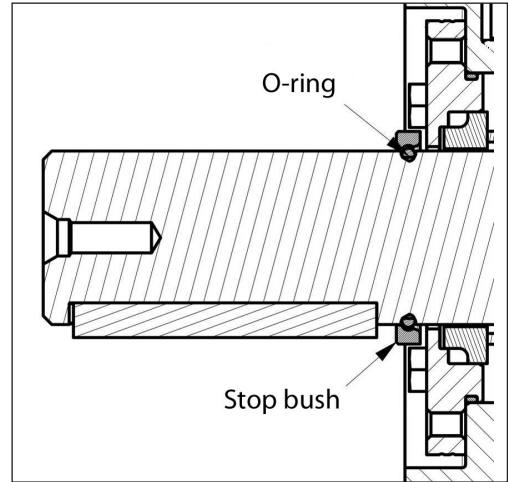
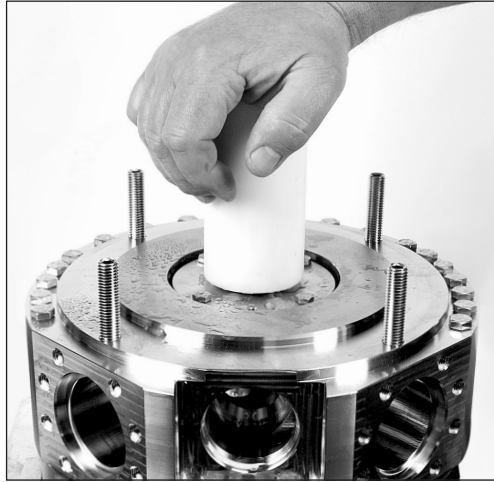
36. Mount O-ring in the shaft groove.



37. Mount stop bush. Ensure the gap with O-ring groove is pointing in correct direction (towards pump).



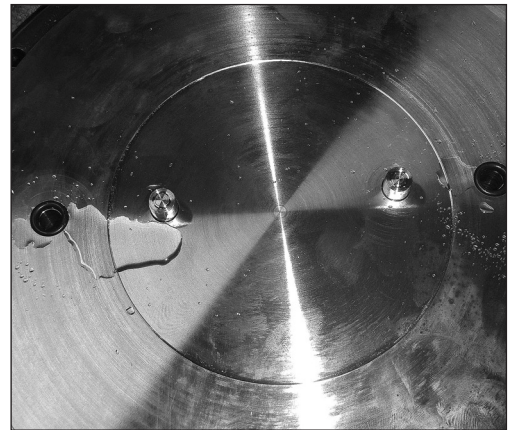
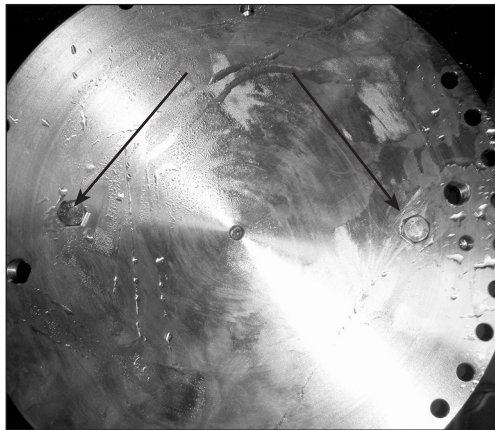
38. Press stop bush in place by using the press bush tool.



4. Disassembling and assembling of the swash plate

WARNING:
Make sure that the surface on the swash plate does not get any marks.

1. Place the swash plate upside down. Remove the 2 bolts holding the swash plate. Remove the mounting flange from the swash plate.
2. Check that the O-ring and pin are in good condition (Provided with sealing set).



3. Change the O-ring on the mounting flange.
4. Mount the swash plate on the 2 guide pins. Carefully by hand tilt the unit to horizontal position and mount the 2 bolts which hold the swash plate. Tighten the bolts with a torque of 30 Nm +/- 2 Nm. Finally check the surface on the swash plate for any marks or foreign particles.

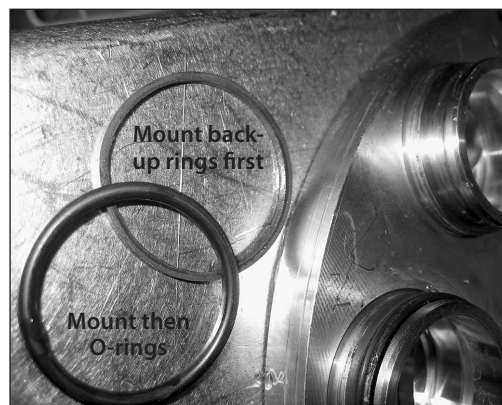


5. Mount the assembled part on the pump.

5. Disassembling and assembling of cylinder barrel- / valve plate

1. Push a screwdriver into the hole between cylinder barrel and valve plate. Carefully push downward the screwdriver so that it makes a gap between cylinder barrel and valve plate. Use this gap to put in another screwdriver and loosen the valve plate from the cylinder barrel.
2. Remove the O-rings and backup rings. If they have been removed they can not be reused.

Mount the new back-up rings on the valve plate first and then mount the O-rings.



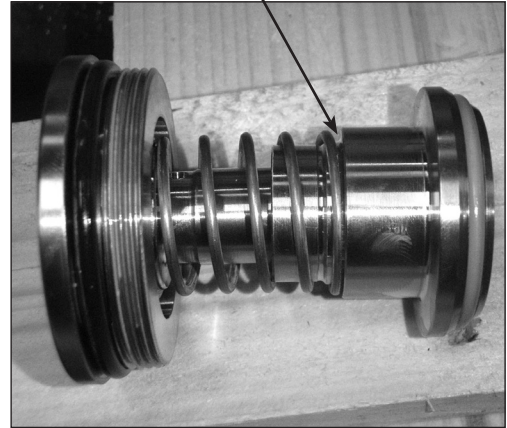
3. Lubricate the new O-rings/back-up rings and the liners in the cylinder barrel with clean filtered water. Lower the valve plate upside down on the cylinder barrel. Place the press bush for valve plate (provided in tool set) like on the picture. Screw the bolt into the shaft of the cylinder barrel. Turn the nut slowly clockwise. The valve plate must slide carefully into the cylinder barrel. Stop when the gap between cylinder barrel and valve plate is 1-2 mm.
4. Remove the press bush again by screwing the nut counter-clockwise.



6. Disassembling and assembling of the flush valve

1. Unscrew the flush valve counter-clockwise by using the pin wrench.

2. Remove the O-rings (green and black). If necessary, change the valve cone, spring and plug. It is important that if the spring is changed it is located like on the picture. The end of the spring must be against the shoulder of the valve cone.



3. Place a bit of grease on the thread on the plug. Screw it into the port flange. Tighten with a torque of 30 Nm +/- 3 Nm.

7. Changing pistons

Note : It is essential that the pump is serviced in conditions of absolute cleanliness.

Tools needed:

- 13 mm combination wrench
- 6 mm allen key
- Tool set 180B4347



7.1. Disassembling

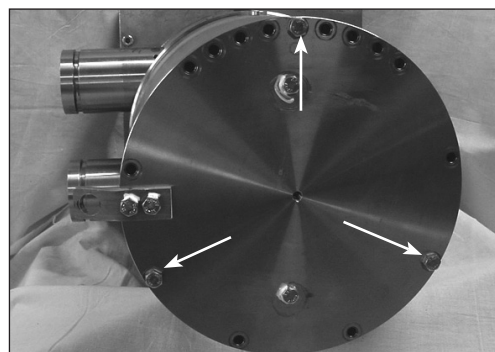
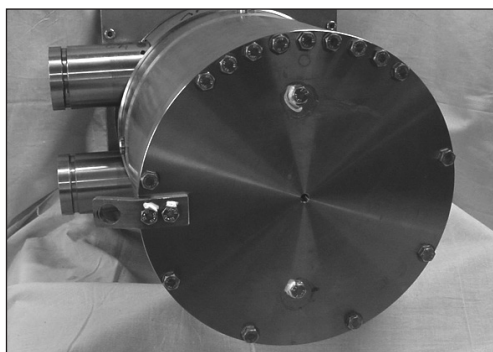
To understand the pump design better, please also see the exploded view in item 8.

1. Disconnect the pump from the rest of the system.

2. Loosen all screws on the pump except the three screws as shown in the picture below.

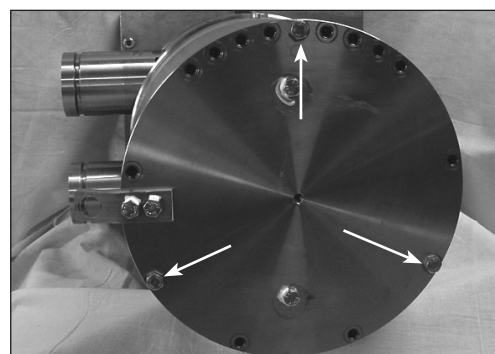
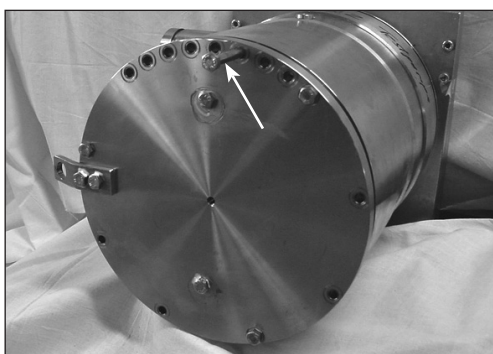
WARNING:
Never unscrew the 4 screws marked with coloured sealer.

Note: There is still water inside the pump.

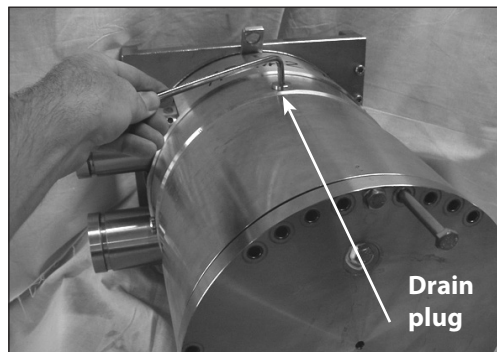


3. Mount the guide bolt in the top hole.

4. Unscrew the remaining three screws by using a combination wrench to turn each screw a couple of rounds at a time so the flange is removed as straight forward as possible.



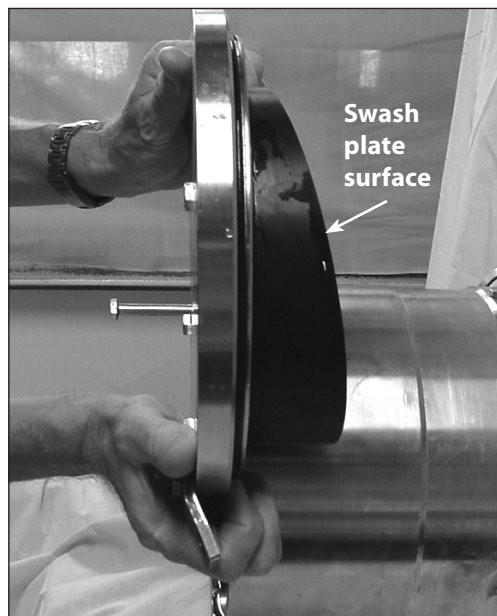
5. If the flange does not move forward - loosen the drain plug to empty the pump from water by releasing vacuum.



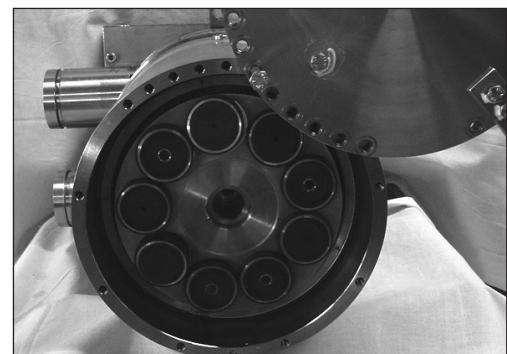
6. Remove the flange when the remaining three screws have been loosened. The guide bolt must remain mounted.



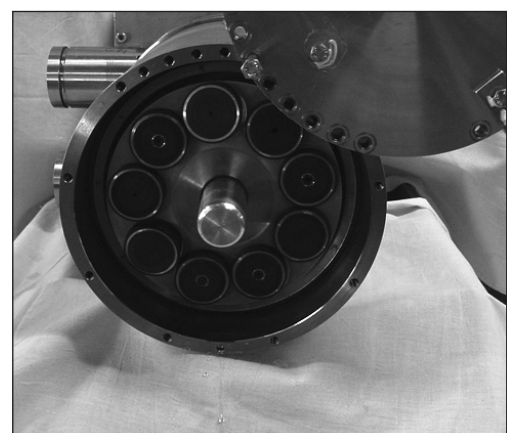
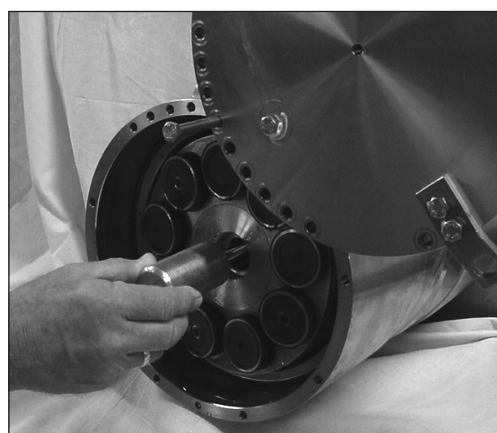
7. Carefully turn the flange and push it backwards to make it rest on the housing surface. Ensure not to scratch the swash plate surface.



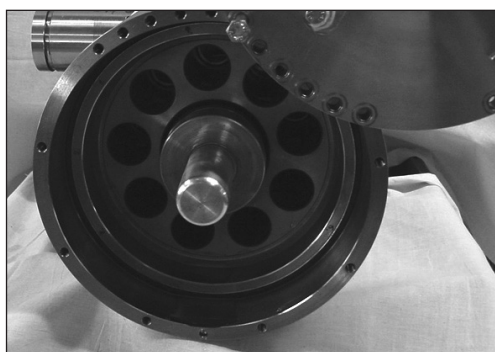
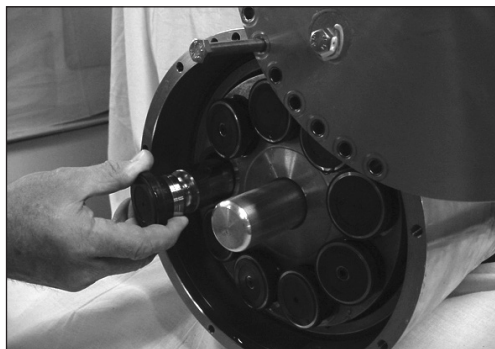
8. Adjust the retaining plate to be parallel to the end flange.



9. Screw the stop for the retaining ring into the centre to keep the retaining ball in place.



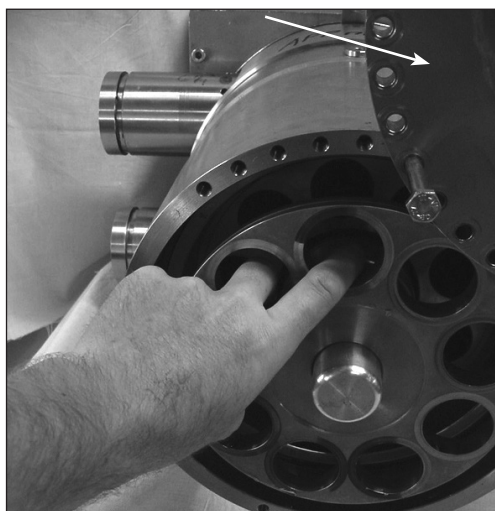
10. Carefully remove the pistons one by one.



11. **WARNING:** Ensure that the piston shoes and the piston surfaces are not damaged during removal. It is recommended to place the pistons upside down on an even and clean base/surface.



12. Remove the retaining ring by sliding it across the stop for the retaining ball. If necessary, tilt the flange.



13. Inspect the piston liners.



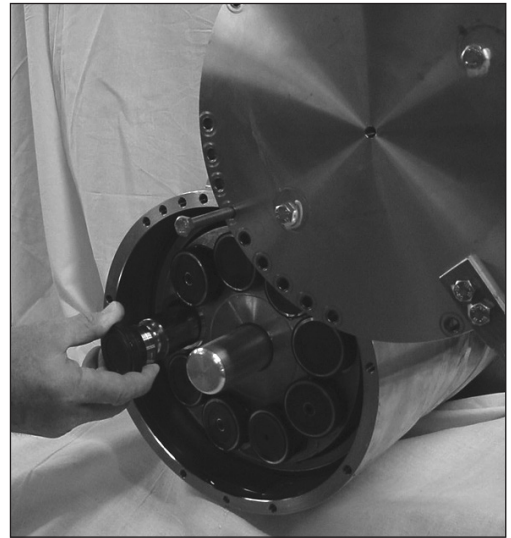
14. Replace any worn parts.

7.2. Assembling

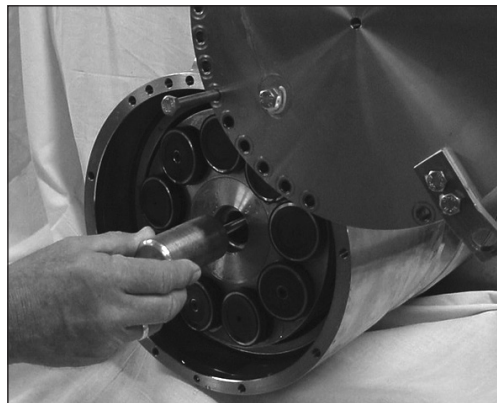
1. Carefully push the retaining ring in place.



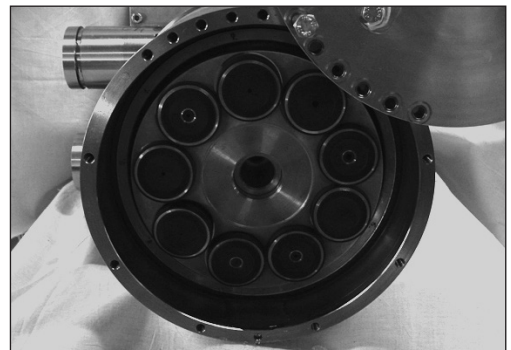
2. Insert the pistons randomly.



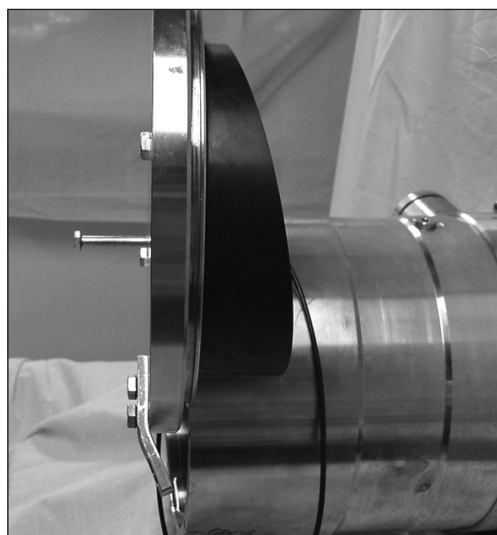
3. Remove the stop for retaining ball.



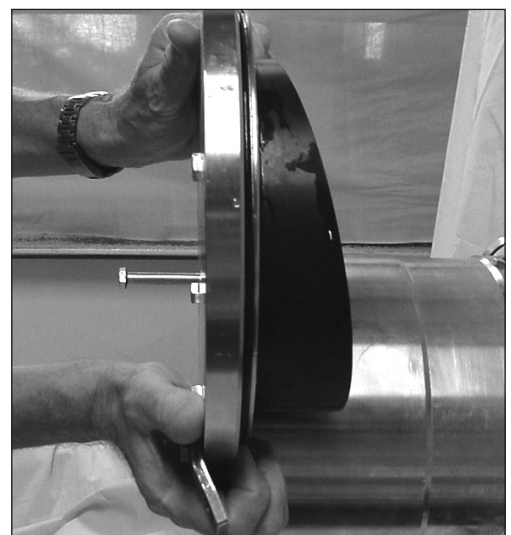
4. Place the retaining ring in an odd angle corresponding to the orientation of the swash plate.



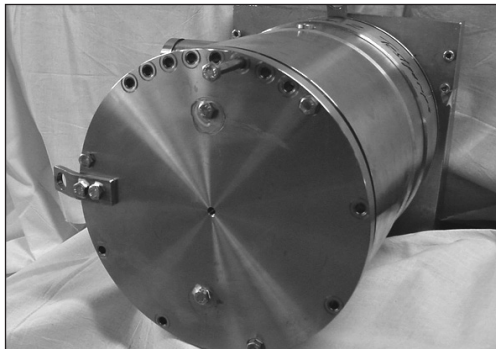
5. Tilt the flange and replace the flange O-ring.



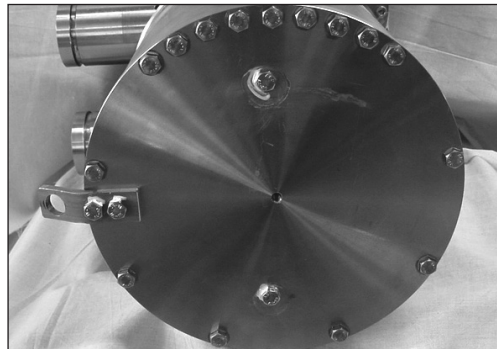
6. Turn the flange and gently push it into the housing.



7. Mount the three screws as shown below.
Tighten them to a torque of $30 \text{ Nm} \pm 3 \text{ Nm}$.



8. Remove the guide bolt.



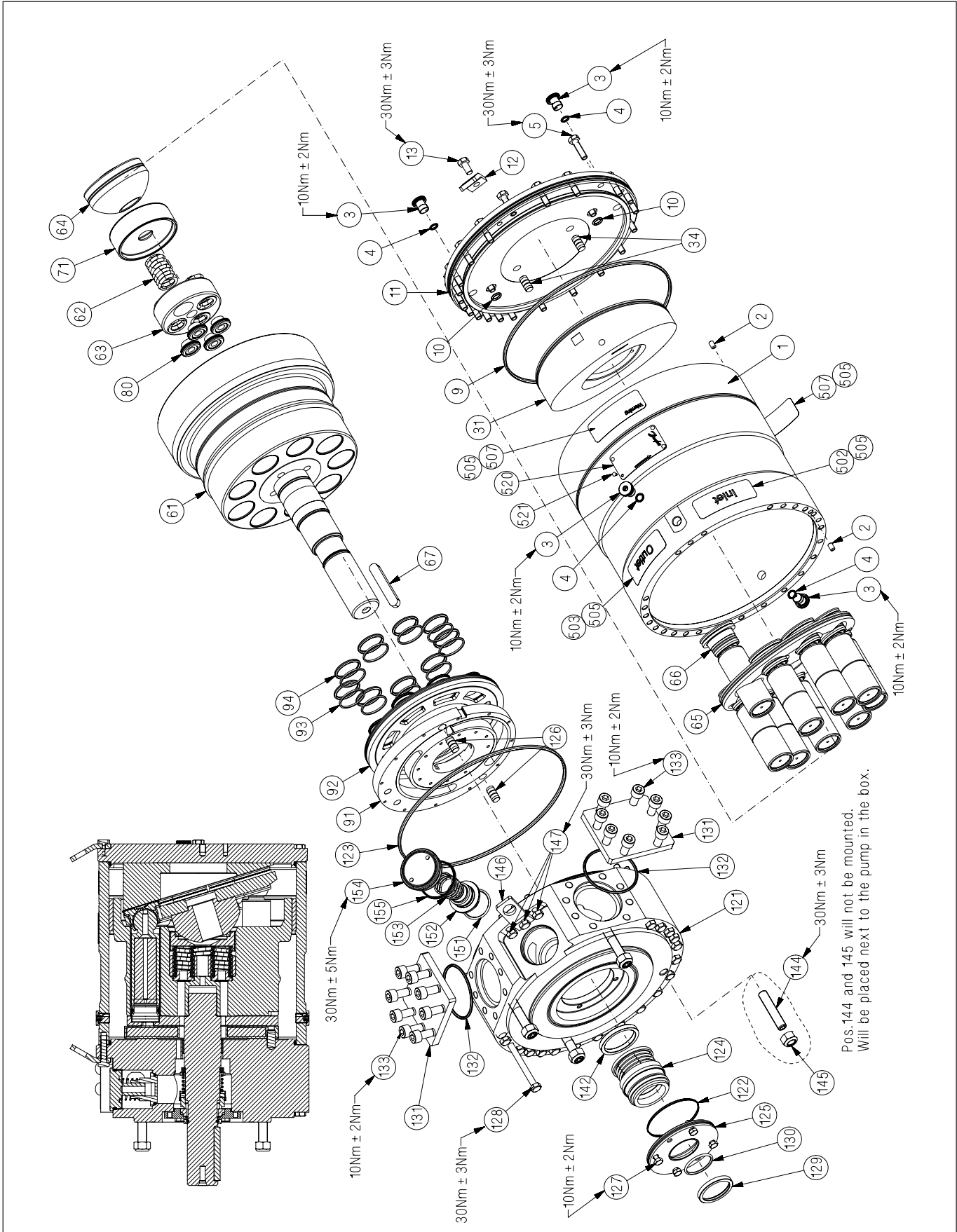
9. Mount the remaining screws and cross
tighten them to a torque of $30 \text{ Nm} \pm 3 \text{ Nm}$.

10. Connect the pump to the rest of the system.

11. Bleed the pump.



8. Exploded view
APP S 674 21-38



9. When should the pistons be replaced

This section provides guidance on, how to determine whether the parts of the pump are worn and should be replaced. In case of doubt - the pistons must be replaced. The pictures below are meant as a guideline for evaluating the wear of the sliding surface.

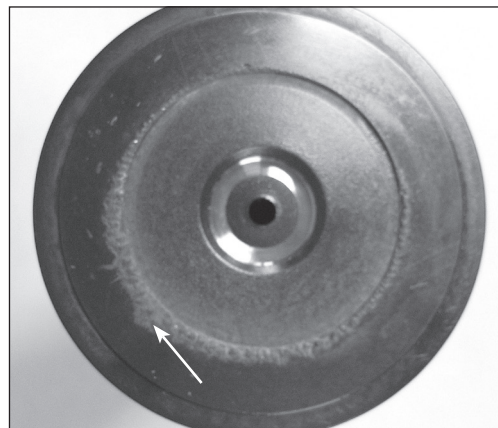
Note: If the pistons break down, the pump will suffer a disastrous breakdown.

Picture 1:

No wear or cavitation of the piston shoe.
New inspection is required in 4,000 hours.

**Picture 2:**

Cavitation of the piston shoes.
New inspection is required in 2,000 hours.

**Picture 3:**

Cavitation of the piston shoes.
All pistons must be replaced within the next 1,000 hours.



Danfoss A/S
High Pressure Pumps
DK-6430 Nordborg
Denmark

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.
