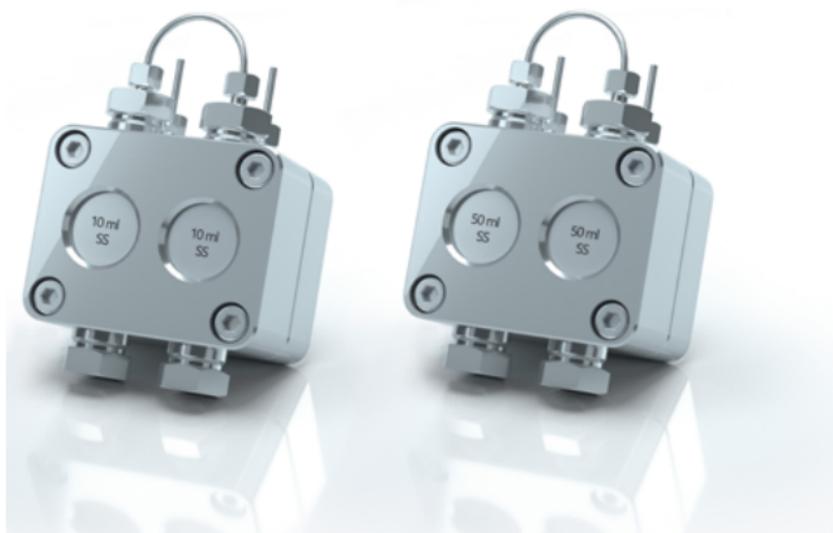


Azura

AZURA® Analytical pump heads Maintenance instructions





Note: Please read the corresponding technical documentation for handling and safety reasons.

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1. Pump head components

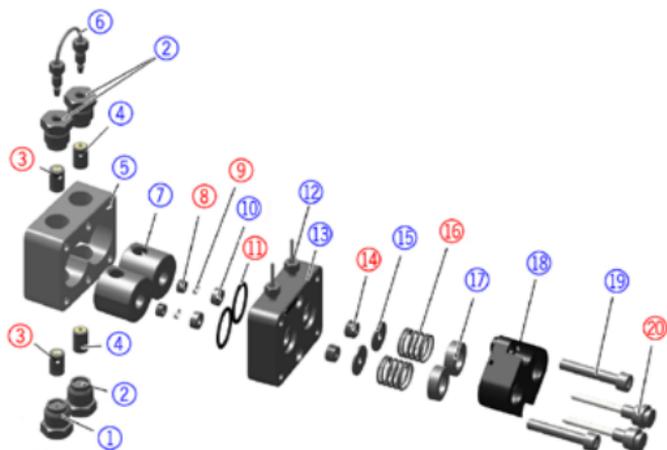


Fig. 1: Pump head components, shown on pump head EHB40

Legend

- | | |
|---|--|
| ■ Wear parts | ⑪ O-ring |
| ① Bushing, inlet side | ⑫ Screw fitting of piston backflushing |
| ② Bushing, outlet side | ⑬ Pressure plate (low-pressure side) |
| ③ Check valve unit | ⑭ Low-pressure seals |
| ④ Dummy check valve | ⑮ Washer disc |
| ⑤ Pressure plate (high-pressure side) | ⑯ Compression spring |
| ⑥ Capillary connection | ⑰ Pressure ring |
| ⑦ Inlay | ⑱ Piston guide |
| ⑧ High pressure seals | ⑲ Cylinder bolt M4 |
| ⑨ Backing ring | ⑳ Piston rod |
| ⑩ Adjusting ring | |

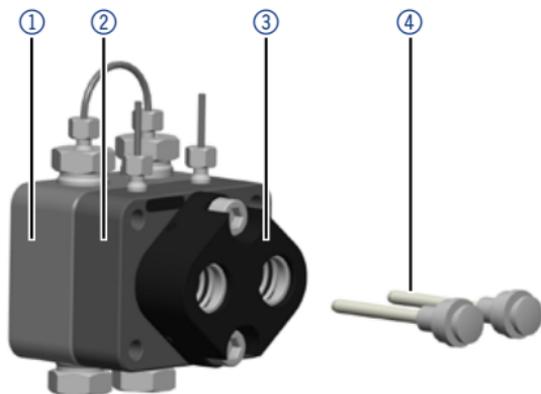
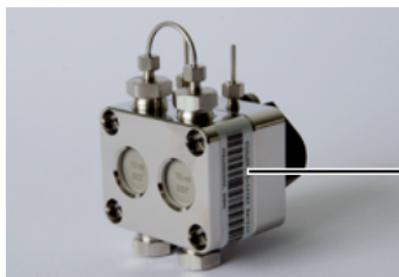


Fig. 2: Rear view of a 10 ml pump head

Legend

- ① Pressure plate with check valve (high-pressure side)
- ② Pressure plate with connectors for the piston backflushing (low-pressure side)
- ③ Piston guide
- ④ Piston rod



KNAUER, D-14163 Berlin
① ②
PFB143300002 EHB40

Fig. 3: Pump head with serial number ① and order number ②.

2. Required equipment and tools



Note: Newer pump heads may not yet be included in this document. Please contact KNAUER directly for corresponding maintenance kits.

2.1 Maintenance kits

Order the maintenance kit that matches the order number of your pump head. The maintenance kit includes all required wear parts. The [customer support](#) will help you to choose the correct kit.

Pump head (order no.)	Maintenance kit (order no.)
AHA70	ARH20
AHA60	ARH30
AHB32	ARH30
AHB32DA	ARH30
AHB32FA	ARH33
AHB32GA	ARH33
AHB40	ARH30
AHB40BA	ARH31
AHB40CA	ARH30
AHB40CB	ARH30
AHB40FA	ARH33
AHB40XA	ARH30
AHB43	ARH32
AHC20	ARH34
AHC20BA	ARH37
AHC20CA	ARH34
AHC20CB	ARH34
AHC20FA	ARH36
AHC20FB	ARH39
AHC22	ARH34
AHC22FA	ARH38
AHC23	ARH35

2.2 Tools

Tools with KNAUER order number:

- Seal toolkit for 5 ml and 10 ml AZURA® pump heads (order no. W0238)
- Seal toolkit for 50 ml AZURA® pump heads (order no. W0106)
- Allen wrench, size 3 (order no. X0011)
- Allen wrench, size 4 (Best.-Nr. X0013)
- Open-end wrench, size 13 (order no. X0004)
- Torque wrench basic tool (order no. X0219)
- Torque wrench plug-in head adapter (order no. X0234)
- Torque wrench plug-in
 - Allen wrench, size 4 (order no. X0236)
 - Open-end wrench, size 13 (order no. X0222)
 - Open-end wrench, size 1/4" (order no. X0223)
- Flat pliers
- Tweezers

3. Maintenance of the pump head



Note: The adjustment/calibration of the flow rate after pump head maintenance can only be performed by the KNAUER company. If you perform the maintenance yourself, flow rate deviations > 2 % may subsequently occur.

The pump head can be disassembled into individual parts and cleaned. During this procedure all wear parts can be replaced.

3.1 General procedure

Process

1. Flush the pump head with a suitable flushing solution e.g. isopropanol.
 2. Switch off the pump.
 3. Remove the pump head from the pump (see chapter 3.2).
 4. Disassemble the pump head (see chapter 3.3).
 5. Clean metallic parts (see chapter 3.3.6).
 6. Exchange the wear parts (see chapter 3.4).
 7. Reassemble the pump head in the right order (see chapter 3.4).
 8. Reattach the pump head to the pump (see chapter 3.5).
 9. Perform a running-in procedure (see chapter 4).
-

3.2 Removing pump head from the pump

Prerequisites:

- The pump head has been flushed.
- The pump is switched off.

WARNING

Chemical burns

Skin damage from aggressive or toxic eluents.

- Wear protective gloves.
 - Flush the pump head before changing.
-

NOTICE

Component defect

Possible damage to the pump piston by tilting the pump head.

- Loosen diagonally opposite fastening screws evenly one turn at a time.
-

Process

1. Loosen the finger-tight fitting ① .
2. Remove the tubing ② .
3. Fixate the outlet bushing ④ with the open-end wrench (size 13).
4. Loosen the fitting ③ with the open-end wrench (size 1/4").
5. Remove the capillary ⑤ .

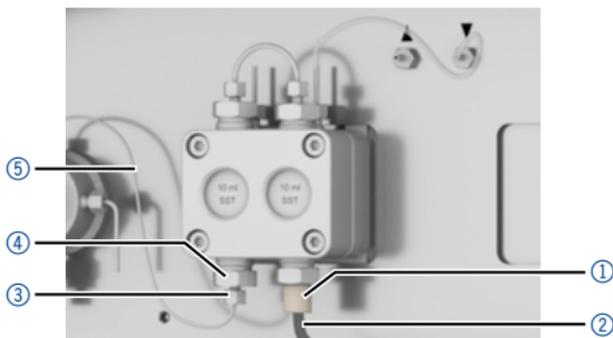


Fig.4: Removing fittings and tubings

6. Disconnect the tubing of the piston backflushing ⑥ from the pump head.

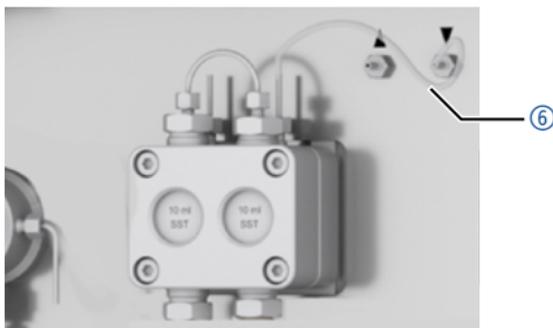


Fig.5: Removing tubing of piston backflushing

Process

7. Using the Allen wrench (size 3), unscrew the four screws ⑦ subsequently by one turn at a time.
8. Fixate the pump head with your hand and remove the screws.
9. Lift off the pump head from the pump.

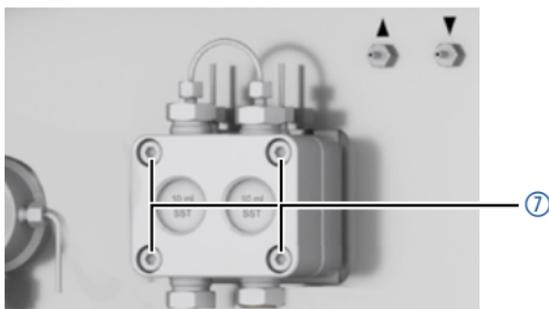


Fig. 6: Removing pump head screws

Result: The pump head has been removed from the pump.

Next step: Disassemble the pump head.

3.3 Disassembling the pump head

Prerequisites:

- The pump head is lying on a soft, clean work surface.
- Access to required tools.

3.3.1 Removing piston rods and piston guide

NOTICE

Component defect

Piston rods may break.

→ Before disassembling the pump head, remove the two piston rods.

Process

1. Using a suitable tool, e.g. flat pliers, remove the two piston rods ① from the piston guide ② while avoiding jamming.

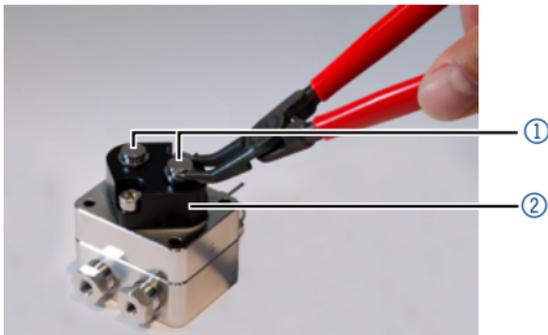


Fig. 7: Removing the piston rods from the piston guide

Process

- Using the Allen wrench (size 4), loosen both cylinder bolts ③ of the piston guide alternately and turn-by-turn. Press the piston guide down to prevent the compression springs from jumping out.

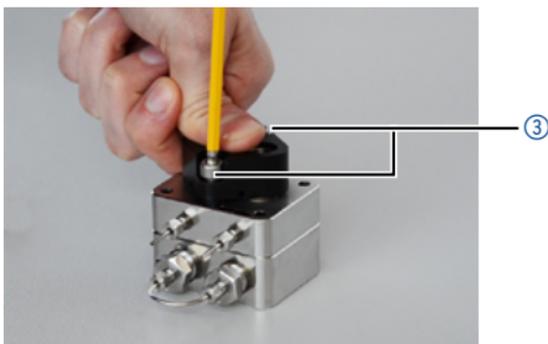


Fig.8: Removing cylinder bolts

- Take the piston guide off the pressure plate (low-pressure side) ④.

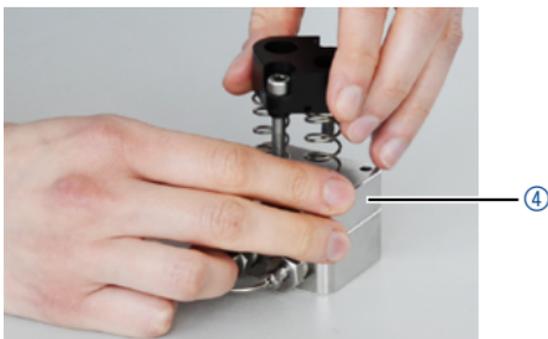


Fig.9: Removing piston guide

3.3.2 Disassembling piston guide components and pressure plates

Process

1. Remove the two pressure rings ①, the two compression springs ② and the two washers ③. Deposit them safely.

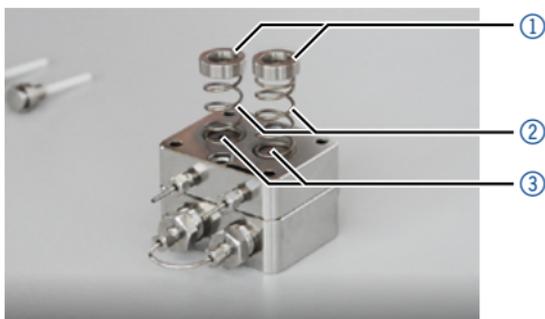


Fig. 10: Removing piston guide components

2. Remove the pressure plate (low-pressure side) ④ from the pressure plate (high-pressure side) ⑤.

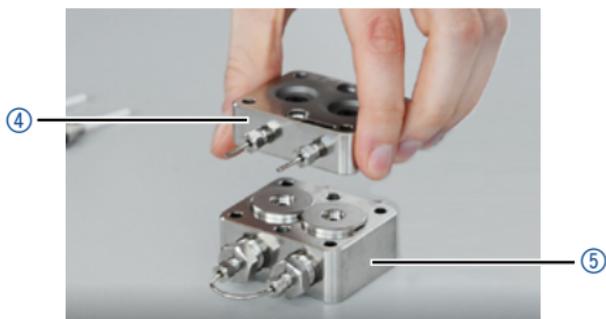


Fig. 11: Separating pressure plates

3.3.3 Removing backing ring and adjusting ring

Process

1. Remove the two adjusting rings from the pump head by turning the pressure plate (high-pressure side) ① downwards.

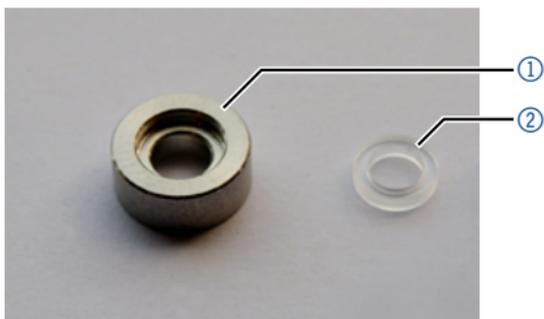


Fig. 12: Removing adjusting rings

2. Using tweezers or one of the piston rods, remove the backing rings from the adjusting rings carefully and deposit them.



Fig. 13: Separating backing ring and adjusting ring

Process**Legend**

- ① Adjusting ring
 - ② Backing ring
-

3.3.4 Removing seals and o-rings

Tools:

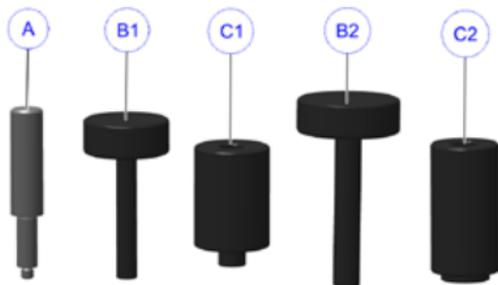


Fig. 14: Seal toolkit W0238
(for 5 ml and 10 ml AZURA® pump heads)

Legend

- A** Extraction tool
- B1** Sealing tool for pressure plate (high-pressure side)
- C1** Adapter for pressure plate (high-pressure side)
- B2** Sealing tool for pressure plate (low-pressure side)
- C2** Adapter for pressure plate (low-pressure side)

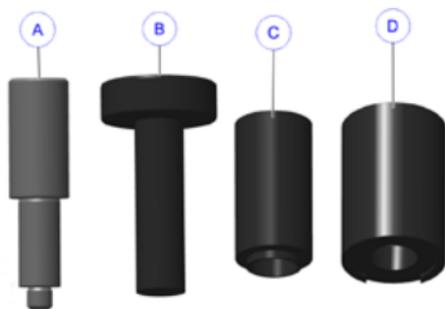


Fig. 15: Seal toolkit W0106 (for 50 ml AZURA® pump heads)

Legend

- A Extraction tool
- B Sealing tool
- C Adapter for pressure plate (high pressure side)
- D Adapter for pressure plate (low pressure side)

NOTICE

Component defect

Seals could be damaged causing the pump head to become unusable.

- Use the steel made extraction tool to pull out old seals.
- Use the black plastic made sealing tool in combination with the appropriate adapter to prevent damage to the new seal during insertion.
- Only use original seals.
- Do not reuse old seals.

Process

1. Remove the two seals from the pressure plate (high-pressure side) ① by turning the extraction tool **A** into the old seals and pulling them out. The seals are now destroyed and have to be disposed of.



Fig. 16: Removing seals (high-pressure side)

2. Turn the pressure plate (low-pressure side) ② around and remove the two seals in the same way.



Fig. 17: Removing seals (low-pressure side)

Process

3. Remove the two o-rings ③ from the pressure plate (low-pressure side) using the tweezers.



Fig. 18: Removing o-rings

3.3.5 Removing capillary connection and check valves

Process

1. Loosen the two screw fittings ② of the capillary connection ① on the pressure plate (high-pressure side) using the open-end wrench (1/4") and remove the capillary connection.

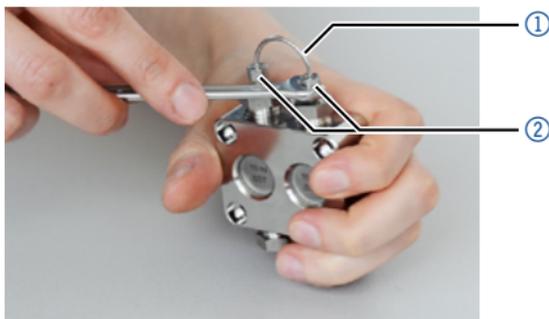


Fig. 19: Removing capillary connection

Process

2. Loosen the two upper bushings ③ using the open-end wrench (size 13) and remove them.

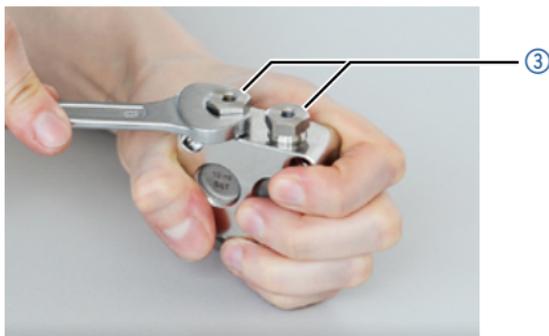


Fig.20: Removing upper bushings

3. Turn the pressure plate upside down to remove the check valve ④ and the dummy check valve ⑤.

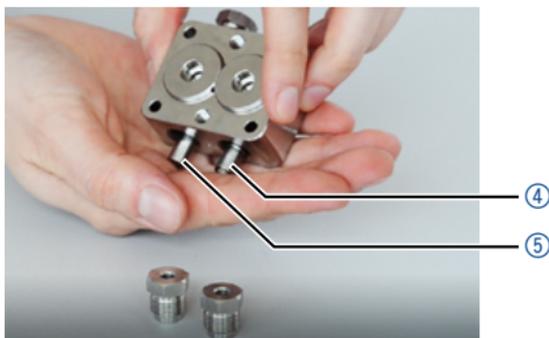


Fig.21: Removing check valves

Process

4. Loosen the two lower bushings ⑥ using the open-end wrench (size 13) and remove them.



Fig.22: Removing lower bushings

5. Turn the pressure plate upside down to remove the check valve ⑦ and the dummy check valve ⑧.

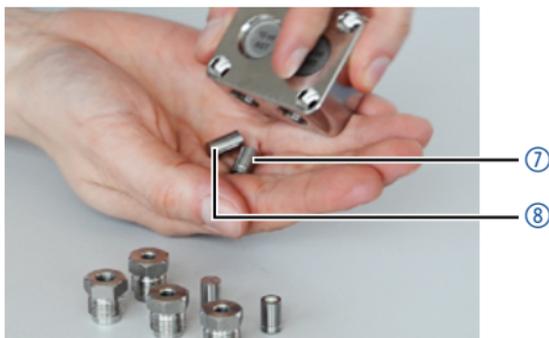


Fig.23: Removing check valves

Process

6. Remove the two inlays ⑨.

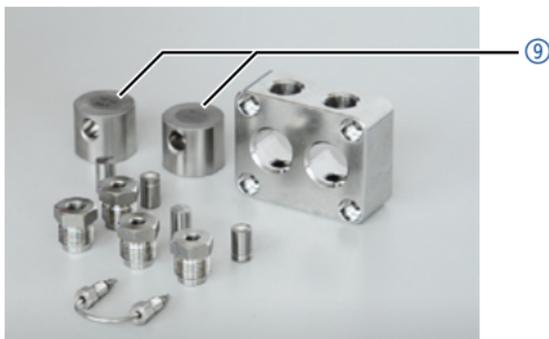


Fig.24: Removing inlays

Result: The pump head is disassembled.

Next step: Clean metallic parts in the ultrasonic bath (optional).

3.3.6 Cleaning metallic parts

Clean all metallic parts **except the pressure plate (low-pressure side)** in the ultrasonic bath. Allow the parts to dry thoroughly afterwards.

NOTICE

Component defect

The pressure plate (low-pressure side) contains a sensitive RFID chip.

- Do not clean the pressure plate (low-pressure side) in the ultrasonic bath.

Alternatively, the parts can also be cleaned with a cotton swab soaked in ethanol.

Next step: Replace the wear parts and reassemble the pump head.

3.4 Replacing the wear parts and reassembling the pump head

Prerequisites:

- The pump head is disassembled.
- The parts of the pump head are lying on a soft, clean work surface.
- Access to wear parts.
- Access to required tools.

3.4.1 Replacing check valves and assembling the capillary connection

Process

1. Push the two inlays ① into the openings of the pressure plate (high-pressure side) without tilting.



Note: Pay attention to the correct orientation of the writing on the inlets. The lettering must be visible on the front of the pump head.

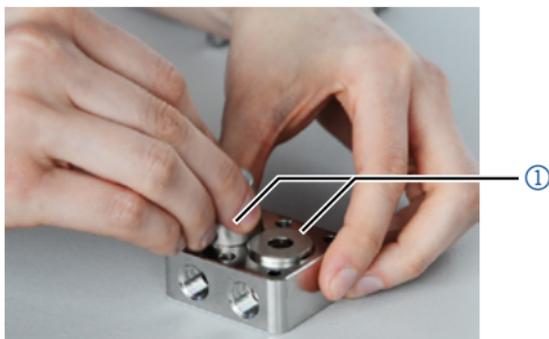


Fig.25: Reinserting inlays

Process

2. Insert the two new check valves and the two dummy valves into the inlays according to Fig.26.



Note: Ensure that the alignment is correct. The notch **D** on the check valve must point downwards, otherwise the eluent flow will be blocked. No alignment is required for the dummy check valves.

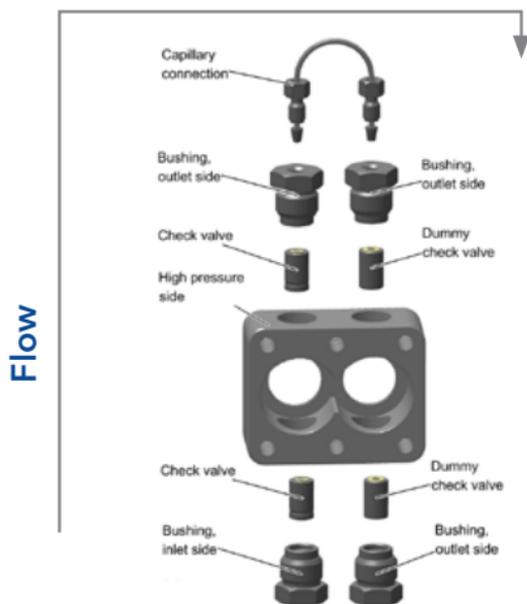
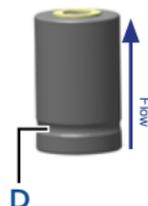


Fig. 26: Check valves and bushings of analytical pump head



Note: The view shows the pressure plate (high-pressure side) from behind.

Process

3. Manually screw in the inlet and outlet bushings.



Fig.27: Inserting bushings

4. Tighten the bushings ② with the open-end wrench (size 13). Note the correct torque value (see table "Torque values" on page 25).

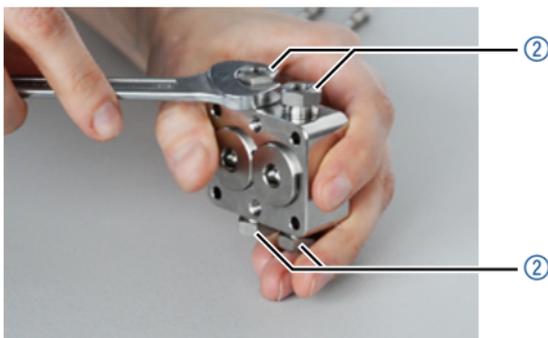


Fig.28: Tighten bushings

Process

5. Reinsert the capillary connection ③.
6. Tighten the screw fittings ④ of the capillary connection using the open-end wrench (size 1/4"). Note the correct torque value (see table "Torque values" on page 25).

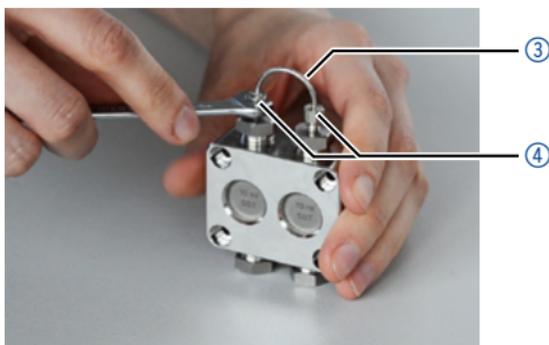


Fig.29: Tighten screw fittings of capillary connection

Torque values:

Use the following torque values to tighten the bushings and screw fittings of the capillary connection of the pump head.

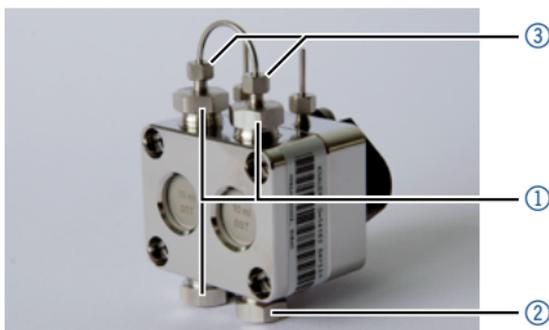


Fig.30: Bushings of analytical pump head

Legend

- ① Bushing, outlet side
- ② Bushing, inlet side
- ③ Screw fittings of the capillary connection

Pump head order no.	Variant	Bushings outlet/inlet side	Screw fittings capillary connection
AHA70	5 ml sst	7.5 Nm	5.0 Nm
AHA60	5 ml sst	7.5 Nm	5.0 Nm
AHB32	10 ml ce	3.5 Nm	1.0 Nm (finger-tight)
AHB32DA	10 ml sst	5 Nm	5.0 Nm
AHB32GA	10 ml ce	5 Nm	5.0 Nm
AHB40	10 ml sst	7.5 Nm	5.0 Nm
AHB40BA	10 ml sst	7.5 Nm	5.0 Nm
AHB40CA	10 ml sst	7.5 Nm	5.0 Nm
AHB40CB	10 ml sst	7.5 Nm	1.0 Nm (finger-tight)
AHB40FA	10 ml sst	7.5 Nm	5.0 Nm
AHB40XA	10 ml sst	7.5 Nm	5.0 Nm
AHB43	10 ml HC	7.5 Nm	5.0 Nm
AHC20	50 ml	7.5 Nm	5.0 Nm
AHC20BA	50 ml	7.5 Nm	5.0 Nm
AHC20CA	50 ml sst	7.5 Nm	5.0 Nm
AHC20FA	50 ml	7.5 Nm	5.0 Nm
AHC22	50 ml ce	3.5 Nm	1.0 Nm (finger-tight)
AHC22FA	50 ml ce	3.5 Nm	1.0 Nm (finger-tight)
AHC23	50 ml HC	7.5 Nm	5 Nm

* sst = stainless steel, ce = ceramic, HC = Hastelloy C®

3.4.2 Replacing the seals

An exemplary 10 ml pump head is used to describe how to insert the seals. The low pressure seals are inserted in the same way as the high pressure seals.

Practical tip: Place the seals in ethanol or isopropanol for approx. 5 minutes before installation.

Process

1. Insert the new seal ① into the adapter C1. Pay attention to the correct direction of the seal. The spring must point downward.

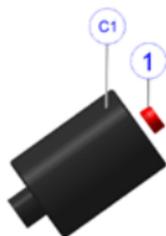


Fig.31: Positioning seal in adapter

2. Position C1 with the seal ① in the intended opening of the pressure plate (high pressure side).
3. Press the sealing tool with B1 with a slight rotation into the opening until the seal is seated properly.

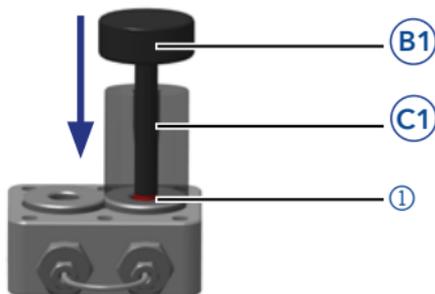


Fig.32: Inserting high-pressure seal

Process

4. Insert the low-pressure seals in the same way the seals of the high pressure side get exchanged.

The only difference is to use the sealing tool **B2** and adapter **C2** and for the pressure plate (low-pressure side). This is necessary for the correct positioning of the seal.

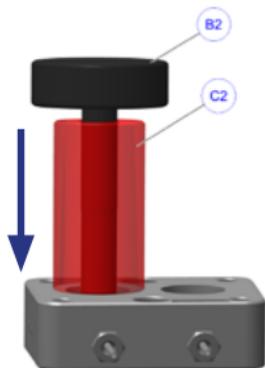


Fig.33: Inserting low-pressure seal



Note: For a 50 ml pump head: Perform steps 1-3 on both pressure plates (high-pressure side, low-pressure side). The seals of the 50 ml pump head are identical. Only the adapters (C, D) differ depending on which plate the seals have been replaced on.

3.4.3 Inserting backing ring and adjusting ring

Process

1. Place the new backing ring ① and the adjusting ring ② on the piston rod ③. In this step, the piston rod serves only as a tool for better positioning of the rings.
2. Push the backing ring ① manually into the adjusting ring ②.

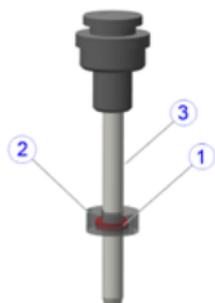


Fig.34: Placing rings on piston rod

3. Place the piston rod ③ into the intended opening on the pressure plate (high pressure-side) and press the rings ① and ② into the opening so that they are located above the seal.

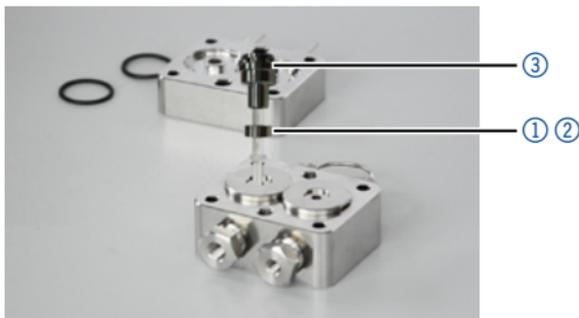


Fig.35: Inserting backing ring and adjusting ring

Process

4. Remove the piston rod.
 5. Insert the second backing ring and adjusting ring in the same way in the second opening.
-

3.4.4 Inserting the o-rings

Practical tip: Moistening the o-rings with isopropanol supports adhesion.

Process

1. Manually insert the new o-rings ① into the intended openings of the pressure plate (low-pressure side).

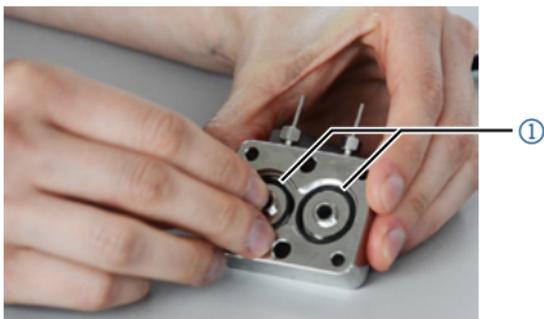


Fig.36: Inserting o-rings

3.4.5 Reassembling pressure plates and piston guide

Practical tip: Place the pressure plate (high-pressure side) on the table and place the pressure plate (low-pressure side) on top of it from above. If necessary, press the o-rings into the openings with a finger so that they do not fall out.

Process

1. Place the pressure plate (low-pressure side) ① on the pressure plate (high-pressure side) ② while ensuring that the capillary connection and bushings for the piston back flushing point into the same direction and the o-rings do not fall out.



Fig.37: Assembling pressure plates

2. Insert the washers ③, pressure springs ④ and pressure rings ⑤.

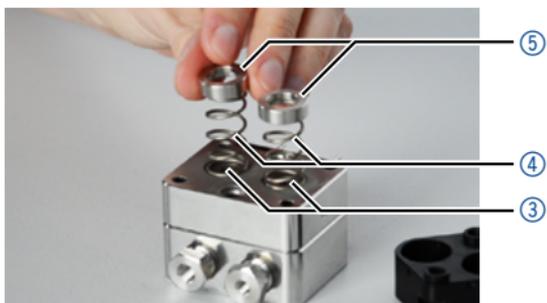


Fig.38: Assembling piston guide components

Process

3. Press the piston guide ⑥ against the pressure rings and compression springs.

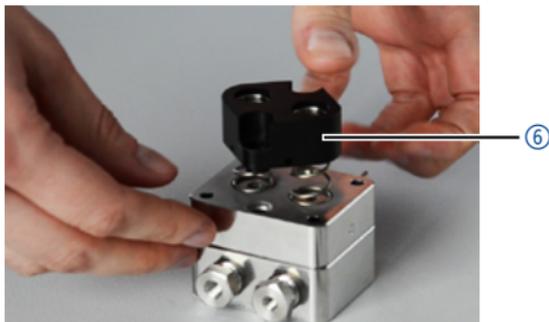


Fig.39: Positioning piston guide

4. Screw in the cylinder bolts ⑦ with the Allen wrench and avoid jamming. Tighten both bolts with a torque of 3 Nm.

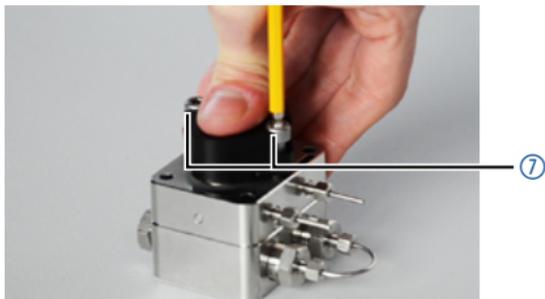


Fig.40: Screw-on piston guide

3.4.6 Inserting piston rods

Practical tip: Moistening the piston rods with isopropanol supports adhesion.

Process

1. Carefully insert the piston rods ① one after another in the correct orientation. Make sure that the piston rods do not tilt.

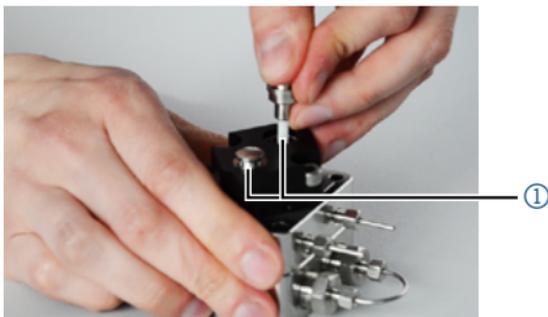


Fig.41: Inserting piston rods

Result: The wear parts have been replaced and the pump head has been reassembled.

Next step: Mount the pump head to the pump.

3.5 Mounting the pump head to the pump

Process

1. Using the Allen wrench (size 3), screw the four screws ① subsequently by one turn.

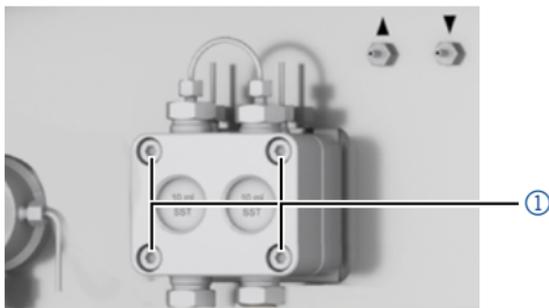


Fig.4.2: Attaching pump head

2. Connect the tubing ② to the piston backflushing.



Fig.4.3: Connecting tubing of piston backflushing

Process

3. Connect the tubing ④ with the finger-tight fitting ③ .
4. Tighten the fitting ⑤ with an open-end wrench (size 1/4") to attach the capillary. Note the correct torque (see table "Torque values" on page 25).

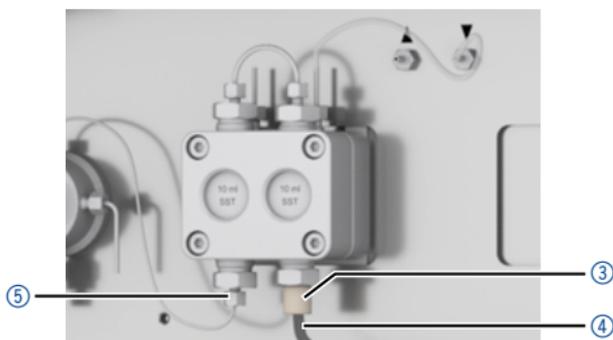


Fig.44: Attach fittings and tubings

Result: The pump head is mounted to the pump.

Next step: Perform a running-in procedure.

4. Running-in procedure

It is mandatory to perform a running-in procedure after a pump head maintenance. For an optimal running-in of the pump head, the pump needs a specific back pressure. This pressure will be produced by a restriction capillary connected after the pressure sensor. Depending on the dimensions of this capillary, different values of the back pressure can be generated.

Refer to the table below for correct running-in parameters. If you have questions contact the KNAUER technical support.

Prerequisites

- The pump head was installed on the pump.

Process

1. Choose suitable restriction capillaries and install them on the device.
 2. Connect the pump inlet to the solvent.
 3. Switch on the pump.
 4. Flush the pump.
 5. Start the pump and let it run with the correct running-in parameters (see chapter 4.1).
 6. After the running-in procedure is completed, the desired solvent can be used.
-

4.1 Running-in parameters



Note: Using a degasser or a degassed solvent is recommended.

Pump head	5 ml	5 ml	10 ml	10 ml	50 ml	50 ml
Article no.	AHA70	AHA60	AHB40 AHB40BA AHB40CA AHB40CB AHB40FA AHB40XA	AHB32 AHB32DA AHB32GA AHB43	AHC20 AHC20BA AHC20CA AHC20CB AHC20FA AHC22FA	AHC22 AHC23
Material*	sst	sst	sst/Ti	Ce/HC	sst	Ce/HC
Pmax [bar]	1200	1000	700	400	300/350	200
Backpressure	$\frac{2}{3} - \frac{3}{4}$ of Pmax					
Flowrate [% of max. flow]	20 - 50 %	20 - 50 %	15 - 40 %	15 - 40 %	10 - 25 %	10 - 25 %
Running-in time [min]	15	15	15	15	60	60
Solvent	EtOH	EtOH	EtOH	EtOH	EtOH	EtOH

* sst = stainless steel, Ce = ceramic, Ti = titanium, HC = Hastelloy C®

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