KNAUER

AZURA

Pump P 2.1L

User manual

V6840A

HPLC

Table of Contents

Note For your own safety, **read** the manual and **always** observe the warnings and safety information on the device and in the manual!

Intended Use

Note Only use the device for applications that fall within the range of the intended use. Otherwise, the protective and safety equipment of the device could fail.

Device Overview

P 2.1L is a self-priming pump with automatic piston backflushing that is used in preparative HPLC systems.

Legend

① Status LEDs

② Pump head

③ Pressure transducer

Fig. 1 Pump P 2.1L Front view

Operating range As part of a HPLC system, the pump takes part in separating substance mixtures and in filtering substances. It can alternatively be used as a single module. The pump transports the mobile phase within the chromatography system. For transportation there are two operating modes possible:

- Standard mode: Fluid transportation with a flow rate of up to 1000 ml/min
- Dosing mode Fluid transportation with a dose flow

Location In laboratories the device can be used in the following areas:

- Separation of chiral substances
- Purification of biomolecules
- Purification of fine chemicals
- Purification of active pharmaceutical ingredients (API)

Features

The pump transports the fluid. By choosing the pump head accordingly, it is possible to reach the following maximum values:

- Pressure up to 400 bar at a 100 ml/min flow rate
- Flow rate of 1000 ml/min at a 50 bar pressure

P 2.1L offers the following features:

- Self-priming pump
- Prolonged operating time because of the automatic piston backflushing

- Operating mode *Isobar*: The pump transports liquid at a constant pressure.
- Leak management

Options KNAUER offers the following accessories:

- Stainless-steel pump heads
- Titanium pump heads for biocompatible applications
- Display control
- Heating/cooling elements for the pump head
- Valve block for binary or ternary low pressure gradients

Pump Heads

The pump automatically recognizes the pump head by means of the RFID chips. The pump head is equipped with an RFID chip. It is used to monitor and save all important parameters and settings of the pump and pump head.

Pump head for use in preparative applications:

- Standard model, stainless steel
- Pump heads with titanium for biocompatible applications. 100 ml, 250 ml, 500 ml, 1000 ml

Eluents

Even small quantities of other substances, such as additives, modifiers, or salts can influence the durability of the materials.

Note The list of selected solvents was compiled based on research in the pertinent literature and is only a recommendation. If there is any doubt, contact the technical support of the manufacturer.

Suitable eluents	Less suitable eluents	Not suitable eluents
▪ Acetone ▪ Acetonitrile ▪ Benzene ▪ Chloroform ▪ Ethyl acetate ▪ Ethanol ▪ Hexane/heptane ▪ Isopropanol ▪ Carbon dioxide (liquid 99.999% CO_2) ▪ Methanol ▪ Phosphate buffer solutions (0.5 M) ▪ Toluol ▪ Dilute ammonia solution ▪ Dilute acetic acid (10-50%), at 25° C ▪ Dilute sodium hydroxide (1M) ▪ Water	▪ Dimethyl sulfoxide (DMSO) ▪ Slightly volatile eluents ▪ Methylene chloride ▪ Tetrahydrofuran (THF) ▪ Dilute phosphoric acid	▪ Halogenated hydrocarbons, e.g. Freon® ▪ Concentrated mineral and organic acids ▪ Concentrated bases ▪ Eluents containing particles ▪ Perfluorinated eluents, e.g. Fluorinert® FC-75, FC-40 ▪ Perfluorinated polyether, e.g. Fomblin®

Safety for Users

Professional group

The user manual is addressed to persons that have qualification as chemical-laboratory technician or comparable vocational training.

The following knowledge is required:

- Fundamental knowledge of liquid chromatography
- Knowledge regarding substances that are suitable only to a limited extent for use in liquid chromatography
- Knowledge regarding the health risks of chemicals

If you do not belong to this or a comparable professional group, under no circumstances may you perform the work described in this user manual.

What must be taken into account?

- All safety instructions in the user manual
- The environmental, installation and connection specifications in the user manual
- Observe national and international regulations pertaining to laboratory work
- Original spare parts, tools, and eluents made or recommended by KNAUER
- Good Laboratory Practice (GLP)
- For development of methods and validation of devices: Protocol for the Adoption of Analytical Methods in the Clinical Chemistry Laboratory, American Journal of Medical Technology, 44, 1, pages 30-37 (1978)
- Accident prevention regulations published by the accident insurance companies for laboratory work

More safety-relevant information is listed in alphabetical order in the following table:

Topic	Explanations
Decontamination	Contamination of devices with toxic, infectious or radioactive substances poses a hazard for all persons during operation, repair, sale, and disposal of a device. All contaminated devices must be properly decontaminated. All materials or fluids used for decontamination must be collected separately and disposed of properly.
Flammability	Organic eluents are highly flammable. Since capillaries can detach from their screw fittings and allow eluent to escape, it is prohibited to have any open flames near the analytical system.
Leaks	Regularly check if any system components are leaking.
Leak sensor	Observe display on the device, on the control unit, and in the chromatography software.

Topic	Explanations
Solvent tray	Risk of electrical shock or short circuit if liquids get into the device's interior. Place all bottles in a solvent tray.
Eluent lines	Install capillaries and hoses so as to liquids can not get into the interior in case of a leak.
Power strip	If several devices are connected to one power strip, always consider the maximum power consumption of each device.
Power cable	Defective power cables are not to be used to connect the device and the mains power.
Self-ignition point	Only use eluents that have a self-ignition point higher than 150 °C under normal ambient conditions.
Power supply	Only connect devices to voltage sources, whose voltage equals the device's voltage.
Toxicity	Organic solvents are toxic above a certain concentration. Ensure that work areas are always well-ventilated! Wear protective gloves and safety glasses when working on the device!

Where is use of the device prohibited? Never use the system in potentially explosive atmospheres without appropriate protective equipment. For further information, contact the Technical Support of KNAUER.

Take the device out of operation At any time, take the device completely out of operation by either switching off the power switch or by pulling the power plug.

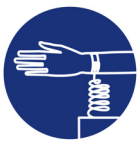
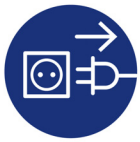
Opening the device The device may only be opened by the Technical Support of KNAUER.

Definition of Personal and Material Damages

Possible dangers related to the device are distinguished in personal and material damages in this user manual.

Type of damage	Category	Explanations
Personal damages and material damages	DANGER!	Lethal or very serious injuries can occur.
	WARNING!	Serious injuries can occur.
	CAUTION!	Moderate injuries can occur and device defect can occur.

Symbols and Signs

	Symbol	Meaning
Marks	CE	Device fulfills the requirements of the *Conformité Européenne*, which is confirmed by the Declaration of Conformity.
		Damage to the leak tray or front cover possible while carrying, setting up and installing a device. Grip the device at its sides near the middle when lifting or moving.
Warning signs		High-voltage hazard
		Electrostatic-discharge hazard
Mandatory signs		Wear protective bracelet against electrostatic discharge and ground.
		Pull the power plug.
		Observe torque of 5 Nm maximum.
		Wear protective gloves.

Scope of Delivery

Note Only use original parts and accessories made by the manufacturer or a company authorized by the manufacturer.

Delivery	Pump P 2.1L	☐
	Power Cable	☐
	User manual german and english	☐
	Installation Qualification Document	☐
Accessories kit	AZURA	☐
	Pump	☐

Unpacking and Setup

Contacting the Technical Support

You have various options to contact the technical support:

Phone +49 30 809727-0

Fax +49 30 8015010

E-mail support@knauer.net

You can make your requests in English and German.

Location Requirements

CAUTION! Defect of the device due to overheating!
Set up the device so that it is protected against exposure to direct sunlight.
Make sure the room is well-ventilated.
Allow 30-cm space at the rear of the device for air circulation.

Requirements The location for the device must meet the following requirements:

- Weight: 19 kg
- Dimensions (width x height x depth): 361 × 201 × 523 mm
- Power Supply: 100 – 240 V DC
- Air humidity: < 90 %, non-condensing
- Temperature: 10 – 40 °C
50 – 104 °F

Note The leak sensor may malfunction it the device is placed on an inclined surface. Use a level to check that the device is in an horizontal position.

Unpacking

CAUTION! Damages to the device caused by carrying it on protruding device parts!
Lift the device only at its side on the housing.

Store all packing materials. Included packing list should be kept for repeat orders.

Tools Utility knife

Procedure

1. Check for damages caused during transportation. In case you notice any damage, contact the technical support and the forwarder company.

2. Setup the delivery so you are able to read the label. Using the utility knife, cut the adhesive tape. Open the delivery.
3. Remove the foam insert. Take out the accessories kit and the manual.
4. Open the accessories kit and take out all accessories. Check the scope of delivery. In case any parts are missing, contact the technical support.
5. Grip the device at its side panels and lift it out of the packaging. Do not hold onto front cover or leak tray.
6. Remove the foam inserts from the device.
7. Check for damages caused during transportation. In case you notice any damage, contact the technical support.
8. Set-up the device in its location.
9. Remove the protective foil.

Ports on the Rear Side

All connectors are located on the rear side of the detector.

Legend

① Serial number

② Pin header

③ LAN port

④ Interface for the Technical Support

⑤ Mains power connection and power switch

⑥ Connector Control Unit

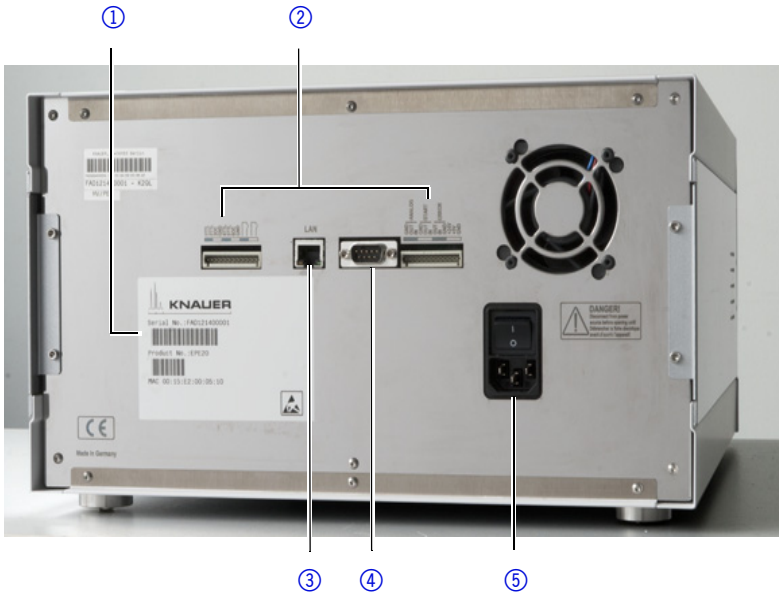


Fig. 2 P 2.1L rear view

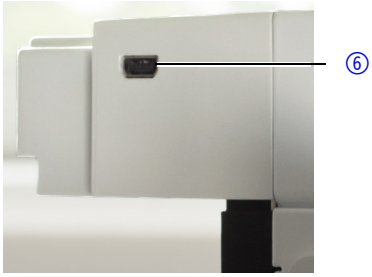


Fig. 3 Connector Control Unit

There are two ways to operate the pump:

- Control with pin header
- Control within a local network through a router

Controlling with the Pin Header

CAUTION! Short-circuit hazard.
Turn off the device before connecting it to the pin header.
Pull the power plug.

Plug Connector Assignments

Connection	Function
1TTL	TTL-compatible output Levels: ▪ passive 0 V ▪ active 5 V Pulse: ▪ 5 V for at least 1000 ms
2TTL	TTL-compatible output Levels: ▪ passive 0 V ▪ active 5 V Pulse: ▪ 5 V for at least 1000 ms
3OC	**TTL output** Levels: ▪ passive 0 V ▪ active 5 V Pulse: ▪ 5 V for at least 1000 ms
GND	Reference point of the voltage at the signal inputs.
4TTL	TTL-compatible output Levels: ▪ passive 0 V ▪ active 5 V Pulse: ▪ 5 V for at least 1000 ms

Connection	Function
5TTL	TTL-compatible output Levels: ▪ passive 0 V ▪ active 5 V Pulse: ▪ 5 V for at least 1000 ms
6OC	**TTL output** Levels: ▪ passive 0 V ▪ active 5 V Pulse: ▪ 5 V for at least 1000 ms
GND	Reference point of the voltage at the signal inputs.
	Relay contact The contact is on a floating basis. Its setting depends on the settings in the Control Unit or software. Steady-rate signal: ▪ passive = open relay contact ▪ active = closed relay contact Pulse: ▪ Closed relay contact for at least 1000 ms Permissible load of the relay contact: 1 A/ 24 V DC
	Relay contact The contact is on a floating basis. Its setting depends on the settings in the Control Unit or software. Steady-rate signal: ▪ passive = open relay contact ▪ active = closed relay contact Pulse: ▪ Closed relay contact for at least 1000 ms Permissible load of the relay contact: 1 A/ 24 V DC
Analog GND	Reference point of the voltage at the signal inputs.
Analog out	Voltage range 0 – 5 V, scalable
Analog in	Voltage range 0 – 10 V 10 V according to maximum flow rate

Connection	Function
Start GND	Reference point of the voltage at the signal inputs.
Start OUT	**TTL output** Levels: ▪ passive 5 V ▪ active 0 V
Start IN	**TTL input** ▪ Low active Secure switching threshold at least 10 mA After receiving a signal (short-circuit to ground) from an external device, the device starts. If controlled with software, an electronic trigger is send through the LAN.
Error OUT	**TTL output** Levels: ▪ passive 5 V ▪ active 0 V
Error IN	**TTL input** ▪ Low active Secure switching threshold at least 10 mA After receiving a signal (short-circuit to ground) from an external device, an error message appears and the device stops.
Error GND	Reference point of the voltage at the signal inputs.
+24V	Event-controlled switching of 24 V against GND Protection: 24 V – 200 mA
+5V	Provides a voltage of 5 V with respect to GND. This makes it possible to supply a consumer that is switched by an EVENT. Protection: 5 V – 50 mA
GND	Reference point of the voltage at the signal inputs.

Analog Control

Analog ports serve for exchanging analog control signals. Reference point for the signals is the connector GND.

OUT: Device sends signal.
IN: Device receives signal.

Initial Startup

Connecting the Piston Backflushing

The piston backflushing removes salts and other substances from the area behind the seals. To do this, connect a bottle with flushing solution to the flush pump and to the pump head. The connection between pump head and flush pump is preinstalled at the factory.

Functional principle

The piston backflushing function automatically flushes the rear piston area of the pump head upon switch-on and in continuous mode.

- Upon switch-on: The rear piston area of the pump head is automatically flushed for 30 seconds.
- In continuous mode: The rear piston area of the pump head is flushed automatically every 60 minutes, for 30 seconds.

Designation

Inlet and outlet of the flush pump are located on the front of the device.

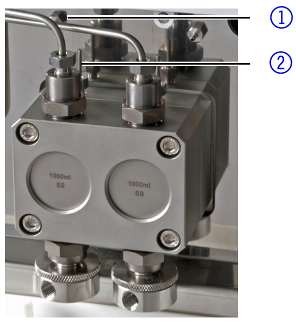
	
Fig. 4 Inlet symbol	**Fig. 5 Outlet symbol**

Flushing solution:

These are the recommended flushing solutions:

- Water
- Mixture of 80 % water and 20 % ethanol
- Isopropanol

Connecting the piston backflushing

Process	Figure
1. Use the first hose to connect the inlet ① of the flush pump to the bottle containing the flushing solution. 2. Use the second hose to connect the pump head ② to the bottle containing the flushing solution.	

Eluent Inlet

The eluent lines are connected by the eluent inlet to the pump head. Before the eluent lines are connected, the eluent inlet must be attached to the pump head.

Procedure

Fasten the eluent inlet to the two inlet screw fittings of the pump head.

Legend

① Knurled-head screw

② Eluent inlet

③ Olive-type tube fitting

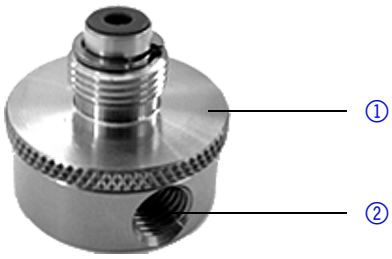


Fig. 6 Eluent inlet for pump heads from 100 – 500 ml

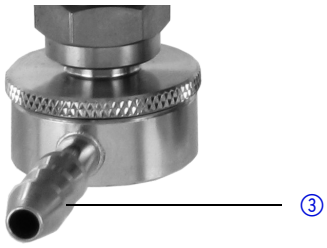
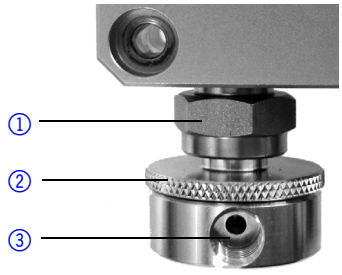


Fig. 7 Eluent for 1000 ml pump head

Connecting the Eluent Inlet to the Pump Head

Connecting the eluent inlet

Process	Figure
1. With the knurled-head screw ②, screw the eluent inlet into the inlet screw fitting ① of the pump head. 2. Turn the eluent inlet until the intake manifold input ③ points forward. 3. Tighten the knurled-head screw.	 **Fig. 8 Eluent inlet, variant 1**

Connection of the Eluent Line

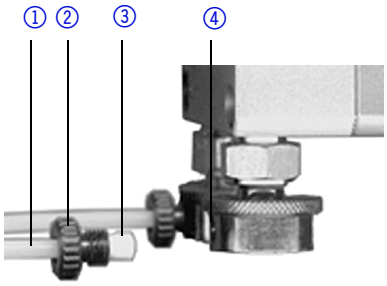
Prerequisite The eluent inlet is connected.

Procedure Connect the eluent line to the pump head.

Note If connecting a pump head from 100 – 500 ml, make sure that the tapered side of the cutting ring is pointed towards the fastening screw of the Teflon tube.

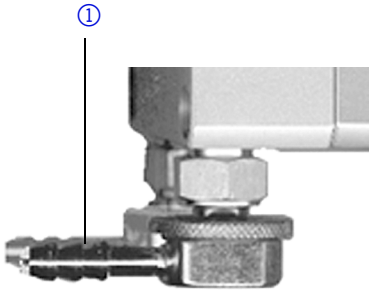
Connecting the eluent line

Pump head:
- 100 ml
- 250 ml
- 500 ml

Process	Figure
1. Push the Teflon hose ① through the fastening screw ② and the cutting ring ③. 2. Insert the hose end as far as possible into the eluent inlet fitting ④ of the pump head. 3. Tighten the fastening screw by hand.	 **Fig. 9 Connecting the eluent line to the pump head**

Connecting the eluent line

Pump head:
1000 ml

Process	Figure
1. Push the Teflon hose directly on the olive-type tube fitting ①. 2. Fasten the Teflon hose with hose clamp.	 **Fig. 10 Eluent line and 1000 ml pump head**

Result The eluent line is connected.

Next steps Check the seal and lines of the connections.

Changing the Setup to LPG

By assembling a valve block, the setup of the system is changed to low pressure gradient (LPG). The valve block is mounted to the front of the pump. There are 2 types of valve blocks:

Types

- Ternary valve block for flow rates from 10 – 250 ml
- Binary valve block for flow rates from 10 – 800 ml/min

Note The manufacturer recommends to employ the binary LPG valve block for flow rates in the range of 100 – 800 ml/min.

Legend

① Valve block

② Screw with seal ring

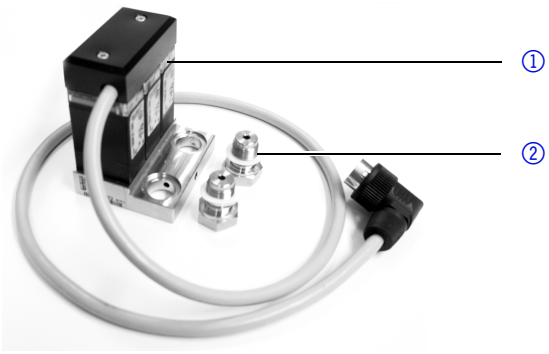


Fig. 11 Ternary valve block

You can not use the front cover after having mounted the valve block.

Mounting the Valve Block

Note Always place seals in pairs on both fastening screws.

Prerequisite

- Pump has been switched off.
- Power plug has been pulled.

Tools Open-end wrench, size 17

Torque wrench

Mounting the valve block

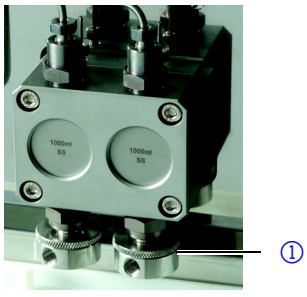
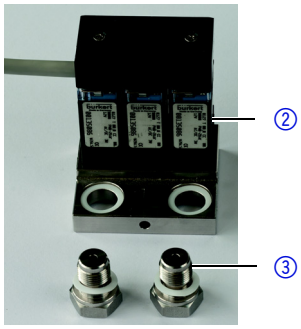
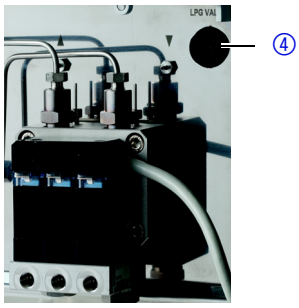
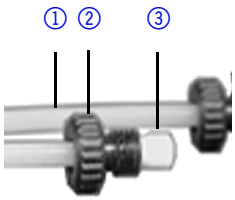
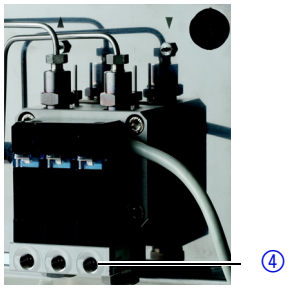
Process	Figure
1. Unscrew the inlet ① from the pump head.	

Fig. 12 Inlet on the pump head

2. Place the seal rings ③ on the screws and valve block. 3. Using the torque wrench, tighten the screws of the valve block ② with a 7.5 Nm torque.	 **Fig. 13 Valve block**
4. Insert the plug into the female connector ④ .	 **Fig. 14 Socket for the LPG valve block**

Connecting the Eluent Line to the Pump Head

Connecting the valve block

Process	Figure
1. Push the Teflon hose ① through the fastening screw ② and the cutting ring ③ . 2. Insert the hose end as far as possible into the eluent inlet fitting ④ of the pump head.	 **Fig. 15 Cutting ring with Teflon hose**
3. Tighten the fastening screw by hand. 4. Plug a blind fitting into the unused inlet.	 **Fig. 16 Inlets of the valve block**

Intermediate result Valve block is mounted to the pump head.

Next steps Connect the plug of the valve block.

Venting the Pump

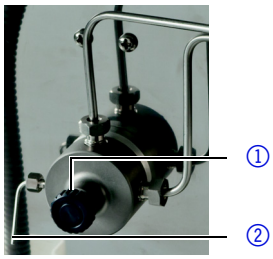
Prerequisite Capillary connections are connected.

Before the pump can be used, it must be vVentented.

Tools Syringe

CAUTION! Damage to the columnn due to venting!
Open the venting screw or remove column!

Venting the pump

Process	Figure
1. Open the venting screw ① of the pressure transducer. 2. With the syringe, extract fluid through the venting port ② . 3. If the fluid flows continuously, stop suction and close the venting screw.	 **Fig. 17 Venting screw of the pressure transducer**

Result No air bubbles in the pump head and in the capillaries.

Using PEEK Fittings

PEEK fittings can withstand pressures up to 400 bar for 1/16" and 200 bar for 1/8".

CAUTION! Damage to the pump head caused by strongly tightened capillary fittings!
Check the torque of screw fittings:
- 5 Nm for stainless steel fittings
- 0,5 Nm for PEEK fittings

Leak Management

The leak management consists of the leak sensor and the drainage system. The drainage system ensures that escaping liquids flow into a waste bottle. If there is to much liquid, the red LED starts flashing. Both device and data acquisition from the chromatography software are stopped.

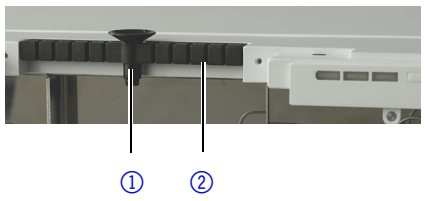
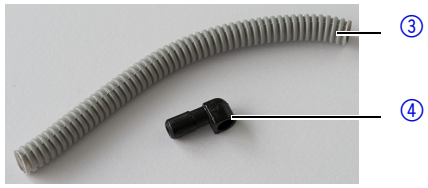
① Funnel
② Capillary guide
③ Nozzle
④ Nozzle
⑤ Collection point with leak sensor
⑥ Leak tray

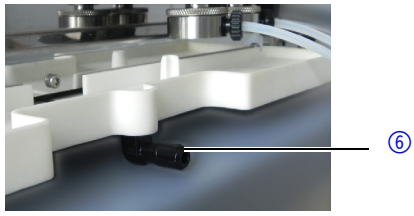
Fig. 18 View of the drainage system

Connecting the Leak Management

Prerequisite Front panel has been removed.

Procedure

Process	Figure
1. Carefully push the funnel ① into the center opening of the capillary guide ② .	 **Fig. 19 Funnel and capillary guide**
2. Push the long ending of the first nozzle ④ into the hose ③ .	 **Fig. 20 Hose and nozzle**

Process	Figure
3. Connect the nozzle and the funnel. 4. Push the other end of the hose onto the nozzle ⑤ of the leak tray. 5. For the bottom device, push the short end of the nozzle ⑥ into the opening in the collection point of the leak tray. 6. Connect the hose to the nozzle and lead the second ending to the waste bottle. 7. Place the waste bottle below the bottom device.	 **Fig. 21 Hose connected to device**  **Fig. 22 Leak tray with nozzle**

Next steps Place front on the device.

Setting the Leak Sensor

The leak sensor is preset to medium. The sensitivity can be adjusted in 3 steps: low, medium, high.

Prerequisite Device is controlled with Control Unit or chromatography software.

Note With decreasing polarity of the eluent, the sensitivity of the leak sensor must increase.

Non-polar eluents: Setting high for e. g. hexane, heptane

Polar eluents: Setting low for e. g. water

Deactivating the Leak Sensor

When should you deactivate the leak sensor?

- In case the leak sensor detects leaks without reason and constantly sends error messages, which make working or repairing the device impossible.
- In case you want to continue working even though leaks were detected.

Prerequisite Device is controlled with Control Unit or chromatography software.

Eliminating the Leak

Procedure

1. Eliminate the leak.
2. Dry the surface of the collection point.

3. Confirm the error message.

Result The device is ready for operation.

Holding Bracket

You can mount a holding bracket onto the side panel and attach valves, columns, or flow cells to it.

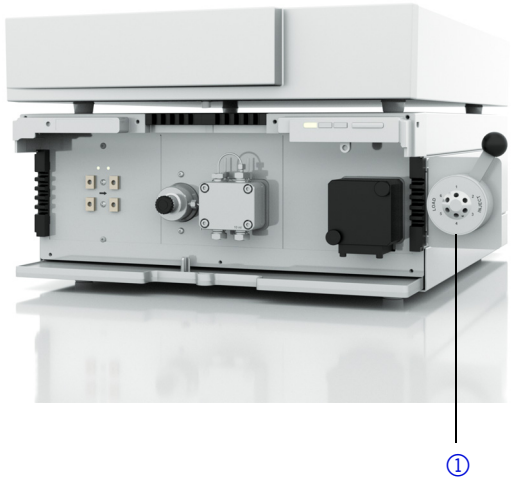


Abb. 23 Holding bracket with valve

Following accessories can be mounted onto the side panel:

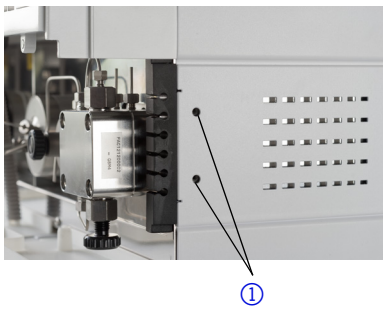
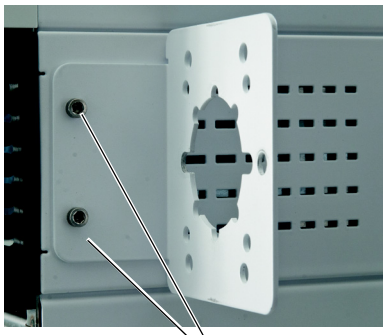
	Accessories	Comment
Valves	KNAUER valve	Mounting directly at the holding bracket
	VICI Valco valve	Mounting directly at the holding bracket
	VICI Valco valve drive	Mounting at the holding bracket by using the adapter plate
Flow cells	KNAUER flow cells	Mounting at the holding bracket by using the adapter plate
Columns	Axially compressible column Vertex Plus AX 20 mm and 30 mm	Mounting at the holding bracket by using the adapter
Sample loops	Preparative sample loops 11 ml and 40 ml	Mounting at the holding bracket by using the adapter

Attaching a Holding Bracket to the Side Panel

Before accessories can be mounted, the holding bracket has to be attached to the side panel.

Tools Allen screwdriver, size 2.5

Procedure

Process	Figure
1. Position the holding bracket onto the bore holes ① in the side panel. 2. Using the wrench, fasten the screws ② .	 ① **Abb. 24 Holes**  ② **Abb. 25 Screws holding bracket**

Result Holding bracket is attached.

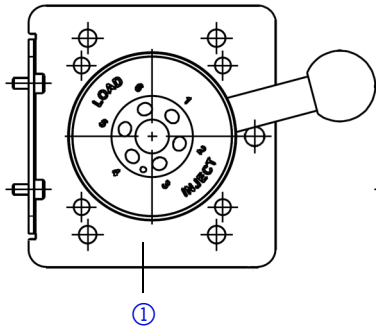
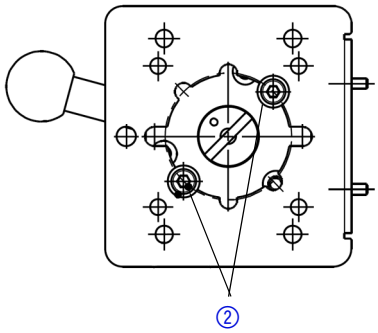
Next steps Mount accessories like valves, flow cells or columns to the holding bracket.

Mounting a KNAUER Valve

Prerequisite Holding bracket is attached to the side panel.

Tools Allen screwdriver, size 3

Procedure

Process	Figure
1. Position the valve on the front side of the holding bracket ①.	
2. Fasten the valve with two screws and two washers ② from the back side.	**Abb. 26 Front view** 
	Abb. 27 Rear view

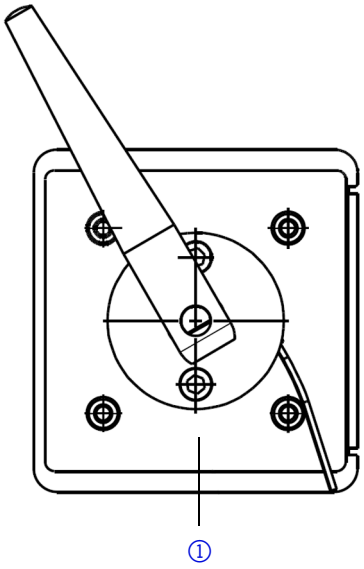
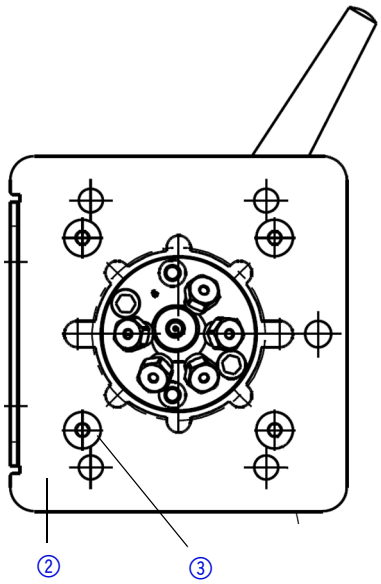
Result KNAUER valve is mounted.

Mounting a VICI Valco Valve

Prerequisite Holding bracket is attached to the side panel.

Tools Allen screwdriver, size 2.5

Procedure

Process	Figure
1. Position the adapter plate ① on the rear side of the holding bracket. 2. Slide the valve and the adapter plate through the hole of the holding bracket ② . 3. Fasten the valve with four screws ③ to the front side.	 **Abb. 28 Rear view**  **Abb. 29 Front view**

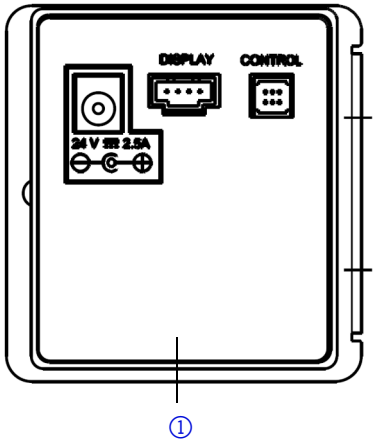
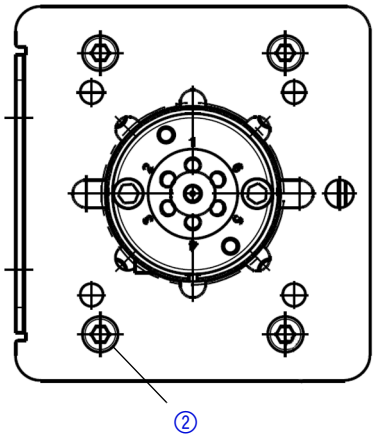
Result KNAUER valve is mounted.

Mounting a VICI Valco valve drive

Prerequisite Holding bracket is attached to the side panel.

Tools Allen screwdriver for 9/64"

Procedure

Process	Figure
1. Screw the adapter plate on the rear side of the holding bracket. 2. Slide the valve drive ① and the adapter plate from the rear to the front through the hole of the holding bracket as far as possible. 3. Fasten the valve with four screws ② to the front side.	 **Abb. 30 Back side of valve at the holding bracket**  **Abb. 31 Front side of valve at the holding bracket**

Result Valve drive is mounted.

Mounting a Flow Cell

Prerequisite Holding bracket is attached to the side panel.

Procedure

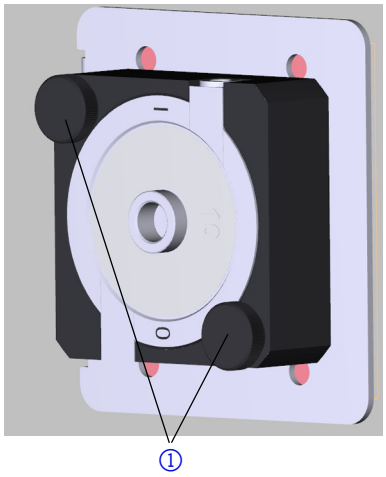
Process	Figure
1. Position the adapter plate on the rear side of the holding bracket. 2. Position the flow cell to the front of the holding bracket. 3. Fasten the flow cell with both knurled-head screws ① in position.	

Abb. 32 Flow cell with adapter plate at the holding bracket

Result Flow cell is mounted.

Mounting the Axially Compressible Column Vertex Plus AX (20 mm/30 mm)

Prerequisite Holding bracket is attached to the side panel.

Tools Allen screwdriver, size 4

Procedure

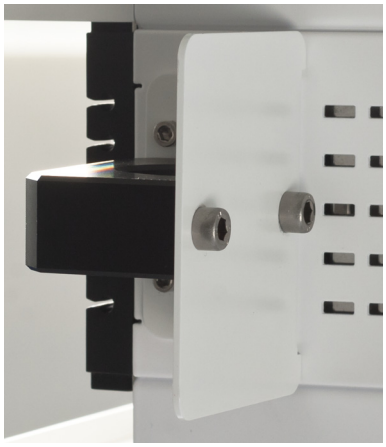
Process	Figure
1. Place the column inside the holder. 2. Position the holder onto the bore holes of the holding bracket. 3. Tighten the screws and washers.	

Abb. 33 Column holder with holding bracket

Result Axially compressible column is mounted.

Control the Devices with a Computer in a Local Area Network (LAN)

This chapter describes how to set up a local area network (LAN) and how a network administrator can integrate this LAN into your company network. The description applies to the operating system Windows® and all conventional routers.

Note To set up a LAN, we recommend to use a router. The following steps are necessary:

Process
1. On the computer, go to the control panel and check the LAN properties.
2. Hook up the router to the devices and the computer.
3. On the computer, configure the router to set up the network.
4. Install the chromatography software from the data storage device.
5. Switch on the device and run the chromatography software.

Configuring the LAN Settings

The LAN uses only one server (which is normally the router) from that the devices automatically receive their IP address.

Prerequisite
- In Windows®, power saving, hibernation, standby, and screen saver must be deactived.
- In case you use an USB-to-COM box, the option "Allow the computer to turn off ths device to save power" in the device-manager must be deactivated for all USB hosts.
- Only for Windows 7: For the network adapter, the option "Allow the computer to turn off ths device to save power" in the devicemanager must be deactivated.

Procedure
1. In Windows 7 choose *Start* ⇒ *Control Panel* ⇒ *Network and Sharing Center*.
2. Double-click on *LAN Connection*.
3. Click on the button *Properties*.
4. Select *Internet Protocol version 4 (TCP/IPv4)*.
5. Click on the button *Properties*.
6. Check the settings in the tab *General*. The correct settings for the DHCP client are:
   a) *Obtain an IP address automatically*
   b) *Obtain DNS server address automatically*
7. Click on the button *OK*.

Connecting the Cables

A router has several LAN ports and one WAN port that can be used to integrate the LAN into a wide area network (WAN), e. g. a company network or the Internet. On the other hand, the LAN ports serve to set up a network from devices and a computer. To avoid interference, we recommend to operate the HPLC system separate from the company network.

Note You will find patch cables for each device and the router in the accessories kit. To connect the router to a WAN, an additional

patch cable is required, which is not supplied within the scope of delivery.

Legend

① Modules

② Router

③ LAN port

④ WAN port

⑤ Workstation

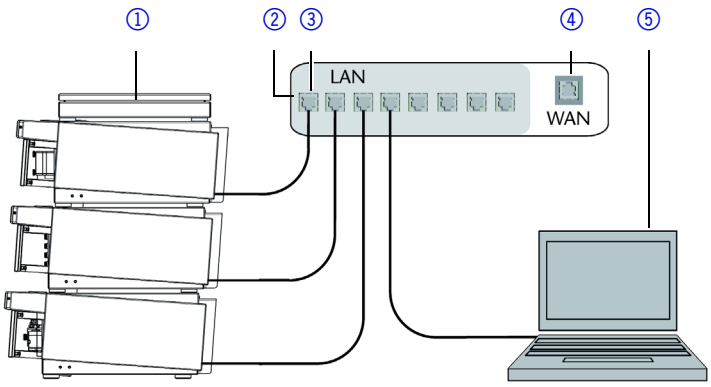


Fig. 34 Cabling system LAN

Prerequisite

- Computer is on.
- There is a patch cable for each device and the computer.

Procedure

1. Use the patch cable to connect the router and the computer. Repeat this step to connect all devices.
2. Use the power supply to connect the router to the mains power system.

Configuring the Router

The router is preset at the factory. You can find a label at the bottom side of the router, on which IP address, user name, and passwort are printed. These information help to open the router configuration.

Procedure

1. To open the router configuration, start your Internet browser and enter the IP address (not for all routers).
2. Enter user name and passwort.
3. Configure the router as DHCP server.
4. In the router configuration, check the IP-address range and make changes if necessary.

Result

Once the router has assigned IP addresses to all devices, the chromatography software can be used to remotely control the system.

Integrating the LAN into a Company Network

A network administrator can integrate the LAN into your company network. In this case you use the WAN port of the router.

Prerequisite

There is a patch cable for the connection.

Procedure

1. Check that the IP-address range of the router and of the company network do not overlap.
2. In case of an overlapping, change the IP-address range of the router.
3. Use the patch cable to connect the router WAN port to the company network.
4. Restart all device, including the computer.

Controlling Several Systems Separately in a LAN

Devices connected to a LAN communicate through ports, which are part of the IP address. If more than one HPLC system is connected to the same LAN and you plan on controlling them separately, you can use different ports to avoid interference. Therefore, the port number for each device must be changed and this same number must be entered into the device configuration of the chromatography software. We recommend to use the same port number for all devices in the same system.

Note The port is set to 10001 at the factory. You must use the same numbers in the device configuration of the chromatography software as in the device, otherwise the connection fails.

Procedure

1. Change the port number of the device.
2. Enter the port number in the chromatography software.

Result The connection is established.

Troubleshooting for Connection Problems

In case no connection between the computer and the devices can be established, go through the following points. Check after each point, if the problem is solved. If you did not manage to locate the problem, call the Technical Support.

1. Check the status of the LAN connection in the Windows taskbar: -  Connected -  Connection not established If no connection was established, test the following: ▪ Is the router on? ▪ Is the patch cable connected correctly to the router and the computer?	☐
2. Check the router settings: ▪ Is the router set to DCHP server? ▪ Is the IP-address range sufficient for all the connected devices?	☐
3. Check all connections. ▪ Are the patch cable connected to the LAN ports and not the WAN port? ▪ Are all cable connections between devices and router correct? ▪ Are the cables plugged in tightly?	☐
4. If the router is integrated into a company network, pull out the patch cable from the WAN port. ▪ Can the devices communicate with the computer, even though the router is disconnected from the company network?	☐

5. In case you own a Control Unit, check the settings in the menu *Setup* > *Network*. ▪ Is *LAN-DHCP* set for controlling? ▪ Did the device receive an IP address?	☐
6. Turn off all devices, router, and computer. Firstly turn on the router, secondly the devices and the computer. ▪ Has this been successful?	☐
7. Replace the patch cable to the device with that no connection could be established. ▪ Has this been successful?	☐

The pump stops automatically when the communication between pump and software is interrupted for longer than 10 s.

Possible reasons for interrupted communication:

- Software or operating-system crash
- Network problems

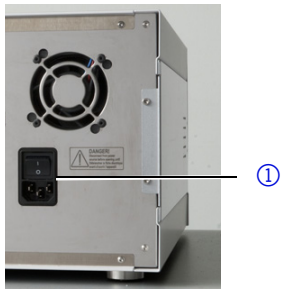
Switching On the Pump

CAUTION! Damage to the pump head in case it runs dry. Ensure that liquids runs through pump head and piston backflushing.

Prerequisite

- Liquid container is sufficiently filled.
- Piston backflushing is connected.
- Washing container is sufficiently filled.

Switching on the pump

Process	Figure
1. Switch on the pump at the power switch ① on the rear side. 2. Wait until the pump has completed the self-test. 3. If the self-test has been successfully completed, the LED on the right lights up green.	 **Fig. 35 Power switch**

Result

The pump is now ready for operation. If the test fails an error message will be displayed. Contact the Technical support of the manufacturer if the error occurs several times.

Flushing the Pump

To flush the pump, insert the inlet hoses into the storage containers and start the pump with an intermediate flow rate. As the pump is self-priming, the venting screw can be open.

CAUTION! Damage to the columnn due to venting! Open the venting screw or remove column!

When is flushing required?

Flush the pump in the following cases:

- At initial startup to eliminate air bubbles in hoses and capillaries.
- When changing solvents.
- After using buffer solutions to eliminate salt residues.

Use the solvent for flushing that is to be used in the subsequent application.

Note

If you used a buffer solution, pay attention to choosing a solvent for flushing in which the buffer solution is soluble.

The purging process of the pump is limited to a maximum pressure of 5 MPa. If this value is exceeded during the purging process, the pump switches off automatically. If you are using very small hoses and capillaries, the pressure can be too high.

How long does flushing take?

If there are air bubbles in the capillaries, the flow pulsates. As soon as the flow is constant, the pump is vented and flushing can be stopped. The duration for flushing depends on capillary and hose length as well as the flow rate.

Operation

A device can be operated in two ways:

- Control with chromatography software
- Control with Control Unit

Control with Chromatography Software

To control the device with chromatography software, it must be connected to the computer through the LAN interface.

AZURA Devices can be controlled with e. g. ChromGate version 3.3.2 or higher and ClarityChrom version 3.0.7 or higher.

You find a detailed description on the chromatography software in the software manual.

Control with Control Unit

You can control the device using the touchscreen on the mobile Control Unit. The Control Unit is an optional accessory. You find a detailed description on the Control Unit in its accompanying user manual.

Meaning of the LEDs

There are three LEDs and a switch on the front of the device.

Legend

① Left LED

② Center LED

③ Right LED

④ Switch

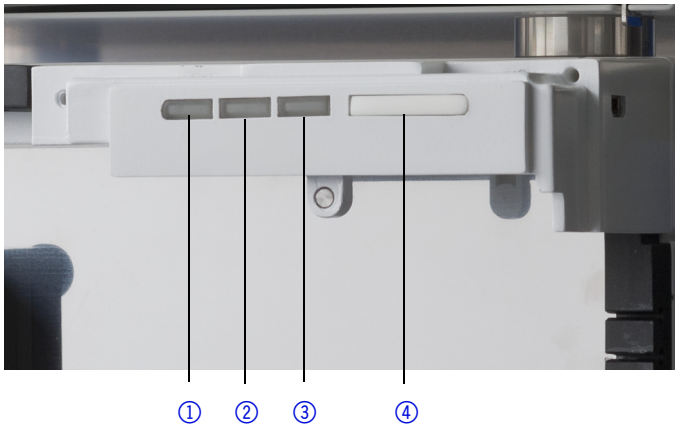


Fig. 36 LEDs and switch on the front of the device

The LEDs can have different colors depending on the operating conditions.

Standby To activate the standby, keep the switch pressed for 5 seconds.

Note Malfunctioning system after repeated standby possible. After repeatedly using the standby, switch off the power switch and back on again, to reset the data storage.

	Color	Operating condition	Operation
Left LED	red	Error message	▪ Check the system. ▪ Shortly press the switch to deactivate the error message.
Center LED	does not light	Device is switched off.	▪ Switch on the device.
	flashes green	Device not ready for measuring.	▪ Wait until the device is ready.
	green	Device is switched on.	
Right LED	green	Device active or ready for measuring.	
	blue	Device in standby	▪ Press the switch to end the standby.

Installation Qualification (IQ)

Installation report Certification on the functionality of the device. During installation of the device, an installation report (IQ document) is created upon request in coordination with the technical support of the manufacturer.
This installation report needs to be completed in full and signed by both parties. It serves as proof of the properly executed installation and the functionality of the device.

Operation Qualification (OQ)

Extensive functionality test Extensive test of the detector's functionality. A successfully executed *OQ* ensures that the detector functions properly.

Test Intervals

Run the device test at the following time intervals:

Average useful life	Device test
1 to 5 days/week:	Every 6 months
More than 5 days/week or 24 hours/day:	Every 3 months
Operation with buffer solutions or other salt solutions:	Every 3 months

Execution

The execution is done either by the manufacturer's technical service or by a technical service authorized by the manufacturer.

Note The *OQ* documentation required for executing the *OQ* is with costs (once) and can be ordered separately from the manufacturer.

Maintenance and Care

Proper maintenance of the HPLC device will ensure successful analyses and reproducible results.

Switching Off the Pump

If you want to switch off the pump for a longer term, flush the pump head with isopropanol.

Contact with the Technical Support

Contact data Technical Support

If you have any technical questions regarding the hardware or software of the manufacturer, please use one of the contact options below:

Technical Support Hotline:

European hotline

Languages: German and English
Available by telephone: 8 am to 5 pm (CET)
Phone: +49-(0)30-809727-111
Fax: +49-(0)30-8015010

E-mail contact: support@knauer.net (manufacturer)

Maintenance Contract

The following maintenance work on the device may only be performed by the manufacturer or a company authorized by the manufacturer and is covered by a separate maintenance contract:

- Opening the device or removing housing parts

What maintenance tasks can users perform on the device?

CAUTION! Maintenance tasks on a switched on device can cause damage to the device.
Switch off the power switch and pull the power plug.

Users may perform the following maintenance tasks themselves:

- Replacing the pump head
- Replacing the check valves of the pumps

Screw Fittings on the Pump Head

Legend

① Capillary screw fitting
② Allen screws
③ Outlet fittings
④ Inlet fittings
⑤ Eluent inlet

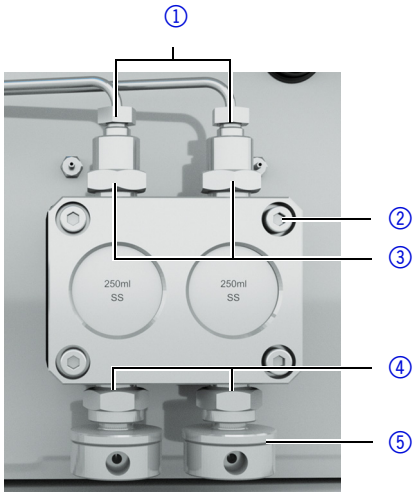


Fig. 37 Screw fittings on the pump head

Leaks in the Capillary Screw Fittings

CAUTION! Damage to the device possible! If leaks occur after maintenance and assembly, replace the capillary connections with new ones!

Replacing the Pump Head

Depending on the requirements of the user, different pump heads are used. The chapter accessories and spare parts contains a pump head overview.

Prerequisite
- The pump head has been purged.
- Hoses are disconnected.

Procedure
- Loosen the capillary fittings.
- Loosen the Allen screws on the pump head.
- Remove the pump head.

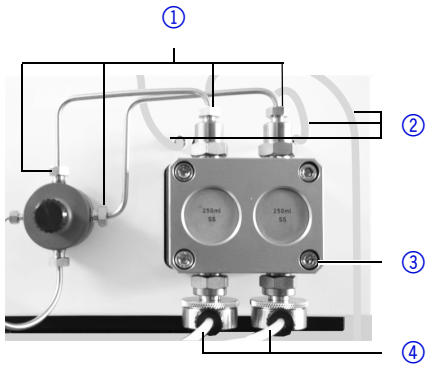
Tools
- Allen wrench size 3
- Open-end wrench, sizes 10, 17

Dismounting the Pump Head

WARNING! Aggressive or toxic solvent residue can irritate the skin!
Wear protective gloves.
Flush the pump head before exchanging it.

CAUTION! Damage to the pump pistons due to jamming of the pump head.
Loosen diagonally opposite fastening screws evenly by one turn.

Dismounting the pump head

Process	Figure
1. To remove the capillary, loosen the capillary screw fittings ① at the pump head outlet and pressure transducer inlet. 2. Disconnect the hoses of the piston backflushing ② from the flush pump and the pump head. 3. Remove the eluent lines ④ from the eluent inlets. 4. Unscrew the Allen screws ③ . 5. Hold the pump head by hand, and consecutively pull out all Allen screws. 6. Remove the pump head.	 **Fig. 38 Removing the pump head**

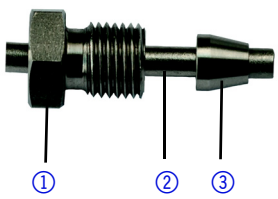
Intermediate result The pump head is dismounted. To mount the pump head, proceed the steps in reverse order.

Next steps Mounting a pump head.

Attaching Capillaries to the Pump Head

Tools Open-end wrench, sizes 10, 17

Attaching capillaries

Process	Figure
1. Slide the fitting ① onto the capillary ② . 2. Slide the clamping ring ③ onto the capillary, so the capillary comes out.	 **Fig. 39 Screw fitting**

Attaching capillaries

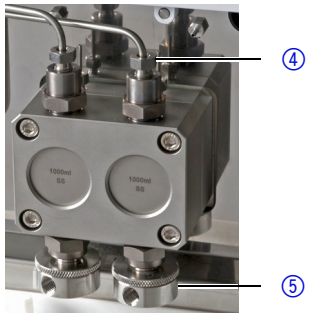
Process	Figure
3. Using an open-end wrench, hold the inlet fitting ⑤ in place. 4. Tighten the fitting ④ at the pump head. 5. If the capillary cannot be screwed tight, then use a new clamping ring!	

Fig. 40 Pump head

Maintaining the Check Valves

Dirty check valves do not properly open and close. They cause pressure fluctuations and irregular flow. If it is impossible to clean the check valves, replace the whole unit.

Prerequisite

- Pump head has been flushed.
- Capillaries are disconnected.
- Pump head has been dismounted.

Procedure

- Unscrew the outlet and inlet fittings.
- Remove the check valve.
- Insert the check valve.
- Screw in the outlet and inlet fittings.

Tools

- Open-end wrench, sizes 10, 17

Removing the Check Valves

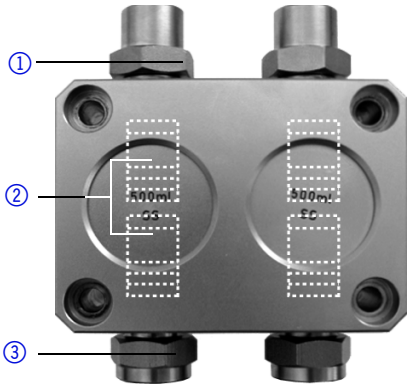
Process	Figure
6. Unscrew the outlet fitting ① . 7. Remove the check valve ② . 8. Unscrew the inlet fitting ③ . 9. Remove the check valve.	

Fig. 41 Removing the check valve

Intermediate result

Check valves are removed.

Next steps

Replace or clean the check valves.

Cleaning the Check Valve

The check valves are not disassembled for cleaning but they are cleaned as a unit.

1. Put the valve in a beaker with solvent e. g. isopropanol.
2. Put the beaker in an ultrasonic bath for at least 10 minutes.

Installing the Check Valve

Note The ball and position of the valves have been harmonized to each other. Insert the valves in the direction of flow!

Installing the check valve

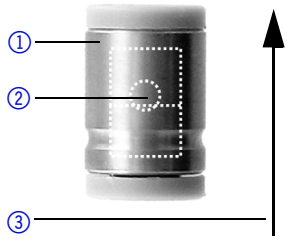
Process	Figure
1. Insert the check valves ①. 2. Manually screw in inlet and outlet fittings and tighten them with a torque wrench and the respective torque.	

Fig. 42 BCheck valveall valve

Legend

① Check valve

② Ball (dotted line)

③ Flow direction (arrow)

Torques for Inlet and Outlet Fittings

Pay attention to the torques when tightening inlet and outlet fittings.

Pump head, stainless steel	Torque
100 ml	19 Nm
250 ml	15 Nm
500 ml, 1000 ml	12 Nm

Cleaning and Caring for the Device

CAUTION! Intruding liquids can cause damage to the device!
Place solvent bottles next to the device or on a solvent tray.
Moisten the cleaning cloth only slightly.

All smooth surfaces of the device can be cleaned with a mild, commercially available cleaning solution, or with isopropanol.

Technical Data

Conveying system	Dual-piston pump
Flow rate range	▪ 100 ml pump head: 0.1 - 100 ml/min ▪ 250 ml pump head: 0.1 - 250 ml/min ▪ 500 ml pump head: 0.1 - 500 ml/min ▪ 1000 ml pump head: 0.1 - 1000 ml/min
Maximum pressure	▪ 100 ml pump head: - 400 bar to 100 ml/min ▪ 250 ml pump head: - 225 bar to 100 ml/min - Linear reduction: 225-200 bar of 100-150 ml/min - 200 bar of 150-250 ml/min ▪ 500 ml pump head: - 100 bar to 500 ml/min ▪ 1000 ml pump head: - 75 bar to 350 ml/min - Linear reduction: 75-50 bar of 350-600 ml/min - 50 bar of 600-1000 ml/min
Flow rate accuracy	±2 % at 2 – 50 % of the flow range with methanol-water mixture (10/90, v/v)
Flow rate precision	RSD (Relative Standard Deviation) < 0.1 %
Gradients	▪ Isocratic HPLC pump ▪ Pump with binary or ternary LPG valve block (low pressure gradient system, LPG) ▪ Up to 4 pumps combined (high-pressure gradient system, HPG)
System protection	P_{min} and P_{max} adjustable
Operation	▪ LAN ▪ Pin header connectors (Analog IN, Start IN, Error IN) ▪ Control Unit

Programming	19 programs, 9 program links (*Links*), *WAKE UP* program
Supply voltage range	▪ Pump: 100-240 V ▪ Binary LPG valve block: 24 V ▪ Ternary LPG valve block: 12 V
Supply frequency	47-63 Hz
Power consumption	▪ Pump: maximum 320 W ▪ Binary or ternary LPG valve block: 5 W
IP protection class	IP-20
Weight	19 kg
Dimensions with pump head (length x width x height)	397 × 242 × 201 mm

Accessories and Spare Parts

For repeat orders of spare parts use the enclosed packing list. Contact the Technical Support in case there are any questions on spare parts or accessories.

Accessories

Name	Order number
Control Unit	AZD00
User manual german	V6840
User manual english	V6840A
Accessories kit	FPE
AZURA accessories kit	FZA02

Device Variations

Name	Order number
Pump P 2.1L without pump head	APE20
Pump P 2.1L with 100 ml stainless-steel pump head	APE20KA
Pump P 2.1L with 100 ml titanium pump head	APE20KB
Pump P 2.1L with 250 ml stainless-steel pump head	APE20LA
Pump P 2.1L with 250 ml titanium pump head	APE20LC
Pump P 2.1L with 500 ml stainless-steel pump head	APE20MA
Pump P 2.1L with 500 ml titanium pump head	APE20MC
Pump P 2.1L with 1000 ml stainless-steel pump head	APE20NA
Pump P 2.1L with 1000 ml titanium pump head	APE20NB

Available Pump Heads

Name	Order number
Pump head, 100 ml, stainless steel	A4029-1
Pump head, 100 ml, titanium	A4029V2
Pump head, 250 ml, stainless steel	A4021-1
Pump head, 250 ml, titanium	A4021V2
Pump head, 500 ml, stainless steel	A4038-1
Pump head, 500 ml, titanium	A4038V2
Pump head, 1000 ml, stainless steel	A4022-1
Pump head, 1000 ml, titanium	A4022V2

Troubleshooting

First measures

1. Check all cabling.
2. Check all screw fittings.
3. Check whether air has gotten into the supply lines.
4. Check device for leaks.
5. Pay attention to system messages.

Further measures

1. Install the maintenance software (service tool).
2. Save device information and send to manufacturer.

- Inform the Technical Support of the manufacturer.

Possible Problems and Rectifications

Error	Solution
Device will not turn on	Inspect the power cable to ensure that it is plugged into the power supply.
When purging, the pump switches off.	Check if the ventingion screw on the pressure transducer is turned up.
Pump does not transport solvent	▪ Purge the pump head to remove the air bubbles. ▪ Clean the check valves. ▪ Exchange the check valves. ▪ If the pump head seals are defective, solvent enters the piston backflushing; inform the technical support of the manufacturer. ▪ Exchange the pump head
Pressure and flow rate variations	▪ Purge the pump head to remove the air bubbles. ▪ Always tighten the inlet screw 1 and outlet screw 1 on the pump head with a torque wrench and 15 Nm. ▪ Clean the check valves. ▪ Exchange the check valves. ▪ Exchange the pump head. ▪ Inform the Technical Support of the manufacturer.

Pump head leaks	▪ Inspect the inlet and outlet screw fittings of the pump head. ▪ If the seals are defective, eluent enters the piston backflushing; inform the Technical support of the manufacturer. ▪ Exchange the pump head.
Flow rate is not correct	Check the following options: ▪ Check the data for the solvent compressibility ▪ Clean the check valves ▪ Exchange the check valves

System Messages

If other system messages are displayed besides those listed below, please turn the device off and then on. Inform the Technical Support of the manufacturer in case the system message repeats itself.

The system messages are in alphabetical order:

System message	Solution
A	
Auto pump head type: head data uninitialized!	▪ Switch the device off and on ▪ Check whether a pump head with RFID recognition has been installed ▪ Repeat the automatic configuration step in the chromatography software ▪ Remove pump head, clean it and install it again
Auto pump head type: no valid head detected!	▪ Switch the device off and on ▪ Check whether a pump head with RFID recognition has been installed ▪ Repeat the automatic configuration step in the chromatography software ▪ Remove pump head, clean it and install it again
Auto pump head type: RFID hardware not present or failed!	Pump head without RFID detection: If necessary, replace pump head.

	System message	Solution
	Auto pump head type: read failed!	▪ Switch the device off and on ▪ Repeat the automatic configuration step in the chromatography software ▪ Remove pump head, clean it and install it again ▪ Inform the Technical Support of the manufacturer in case the system message repeats itself.
	Auto pump head type: write failed!	▪ Switch the device off and on ▪ Repeat the automatic configuration step in the chromatography software ▪ Remove pump head, clean it and install it again ▪ Inform the Technical Support of the manufacturer in case the system message repeats itself.
C	Cannot edit program from the running link	First stop the *link* and then edit the data on the device display or with the chromatography software.
	Cannot delete active program/link	First pause link, then delete program.
	Cannot edit program from the running link	First pause link, then edit data using chromatography software.
	Cannot initialize LAN	Check cables and connections in local area network.
	Cannot operate with an empty link	Create a link.
	Cannot purge during the run!	End method and start purging.
	Cannot read data from FRAM	Switch the device off and on. Inform the technical support of the manufacturer in case the system message repeats itself.
	Cannot read RTC	Switch the device off and on. Inform the technical support of the manufacturer in case the system message repeats itself.
	Cannot start time table	Edit the data on the device display or in the chromatography software.

	System message	Solution
	Cannot use non-existing component!	Change the *setup* settings or change the gradient in the program or in *setup*.
	Cannot write data on FRAM	Switch the device off and on. Inform the technical support of the manufacturer in case the system message repeats itself.
	Component settings not compatible with gradient setup!	Change the *setup* settings or change the gradient in the program or in *setup*.
E	Error input activated	Device error, change device settings.
G	GUI communication failed	Switch the device off and on. Inform the technical support of the manufacturer in case the system message repeats itself.
I	Instrument in stand-alone mode	▪ Change the entry in the Setup menu. ▪ Change the entry in the chromatography software.
	Instrument remote controlled	This entry is not executable. Quit software.
	Invalid index in time table	Change the entry in the program line.
	Invalid line number	Change the entry in the program line.
	Invalid time in time table	Correct the time entry.
L	Leak sensor not present	Switch the device off and then on. If the leak sensor is still not present, contact the Technical Support of the manufacturer.
	Leak was detected	Switch off the device. Remove the leak and start the device afterwards.
	Line in time table is empty	Edit the program line.
	Link is loaded	First unload the link then change the link or delete it.
	Link is running	Wait until the link has been completed, then change the link or delete it.
M	Max. flow limit reached	Confirm, pump continues running

	System message	Solution
	Maximum pressure! System stopped	▪ Reduce the pressure or adjust the upper pressure limit. ▪ Restart the system
	Minimum pressure! System stopped	▪ Increase the pressure or adjust the lower pressure limit. ▪ Restart the system
	Motor failure: max current	Switch the device off and on. Inform the technical support of the manufacturer in case the system message repeats itself.
N	No gradient is available in isocratic mode	Change the *setup* settings or change the gradient in the program or in *setup*.
	No link available	Create a link and edit it.
	No link available. Pls edit link first	Create a link and edit it.
	No time table to start	Edit the data by means of the chromatography software.
	Non-existing component is set to non-0 value	Switch on the channel or edit the data using the chromatography software.
P	Program does not exist	Create a program.
	Program is running	Quit program or wait until program has been completed.
	Program not compatible with pump head	Modify the program or replace the pump head.
S	Sum of components is not 100	Change the entry.
T	This link is used in WAKEUP	First quit or delete wakeup program (wu = Wake Up), then edit or delete link.
	This program is used in a link	First pause or delete the link, then edit or delete data by means of the chromatography software.
	This program is used in WAKEUP	First quit or delete wakeup program (wu = Wake Up), then edit or delete data by means of the chromatography software.
	Time already exists	Correct the time entry.

	System message	Solution
	Too many lines in program	Check the number of program lines. A maximum of 100 program lines are possible.
U	Unable to attain min. flow set point	Confirm, pump continues running
	Unknown pump head type!	▪ Check the pump head. ▪ Check whether a pump head with RFID recognition has been installed
W	Wake up time already passed	Correct the entry for date or otherwise time.

Legal Information

Warranty Conditions

The factory warranty for the device is valid for 12 months after the date of dispatch. All warranty claims shall expire in the event that any unauthorized changes are made to the device.

During the warranty period, any components with material or design-related defects will be replaced or repaired by the manufacturer free of charge.

This warranty excludes the following:

1. Accidental or willful damage
2. Damage or errors caused by third parties that are not contractually related to the manufacturer at the time the damage occurs
3. Wear parts, fuses, glass parts, columns, light sources, cuvettes and other optical components
4. Damage caused by negligence or improper operation of the device and damage caused by clogged capillaries
5. Packaging and transport damage

In the event of device malfunctions, directly contact the manufacturer.

Manufacturer

Wissenschaftliche Gerätebau
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Hegauer Weg 38
14163 Berlin, Germany
Phone: +49 30 809727-0
Fax: +49 30 8015010
E-Mail: info@knauer.net
Internet: www.knauer.net

Transportation Damages

The packaging of our devices provides the best possible protection against transport damage. Check the devices for signs of transportation damages. In case you notice any damage, contact the technical support and the forwarder company within three workdays.

Environmental Protection

Disposal

Drop-off old devices at the certified waste facilities, where they will be disposed of properly.

AVV marking

According to the German "Abfallverzeichnisverordnung" (AVV) (January, 2001), old devices manufactred by KNAUER are marked as waste electrical and electronic equipment: 160214

WEEE registration

KNAUER as a company is registered by the WEEE number DE 34642789 in the German "ElektroAltgeräteRegister" (EAR). It belongs to category 8, under which fall all medical devices and laboratory equipment.

Within the meaning of the WEEE directive, all distributors and importers are responsible for the disposal of old devices. End-users can send their old devices, which must have been manufactured by KNAUER, back to the distributor, the importer, or the company free of charge, but would be charged for their disposal.

Declaration of Conformity

Manufacturer name and address

Wissenschaftliche Gerätebau
Dr. Ing. Herbert KNAUER GmbH
Hegauer Weg 38
14163 Berlin, Germany

Pump P 2.1L

Product number: EPE20

The device complies with the following requirements and product specifications:

- DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)
- IEC 60799 (1998) Electrical accessories – Cord sets and interconnection cords
- IEC 61010-1 (2010 + Corrigendum: 2011) Safety requirements for electrical equipment for measurement, control and laboratory use
  - Low voltage directive (2006/95/EC)
- EN 61000-3-2 (2005 + A1:2008 + A2:2009) Electromagnetic compatibility (EMC) Part 3-2
  - EMC standard (2004/108/EC)
- IEC 61326-1 (2006) Electrical equipment for measurement, control and laboratory use – EMC requirements
  - EN 61326-1 Corrigendum 2 (2011)
- Directives for an environmentally sound use of electrical and electronic equipment
  - RoHS directives 2002/95/EC (2003) and 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment
  - WEEE directive 2002/96/EC (2003) on waste electrical and electronic equipmenta

The product was tested with a typical configuration.

Berlin, 10/31/2012

Dr. Alexander Bünz (Managing Director)

The mark of conformity has been applied to the rear panel of the device.

CE

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