

Azura

▶ **Detector UVD 2.1L**
User Manual

V6831



HPLC

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

Manuel en français: Si jamais vous préférez un manuel en français pour ce produit, veuillez vous contacter le support technique (Technical Support) par email ou par fax avec le no. de série. Merci beaucoup.

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For latest version of the manual, check our website:

<http://www.knauer.net/en/downloads.html>



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Product Information

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.

AZURA L features

This device is a member in the AZURA L product line and shares a number of common features:

- Removable front cover, for optional device and/or operator protection
- Instrument stability through a large base area and low center of gravity
- Intelligent leak management consisting of a leak sensor and safe leak handling
- LED device status indication
- Power connection and control connectors on rear of device

Identification

The device name can be found on the front panel, above the serial number. A silver sticker on the rear side displays the manufacturer name and address, the product number and power supply specifications.

Device Overview

Detector UVD 2.1L

The UV/VIS detector is a variable single wavelength detector, designed for measuring quickly and precisely in the ultraviolet and visual spectral range.

Legend

- ① Status LED
- ② Flow cell
- ③ Capillary guide

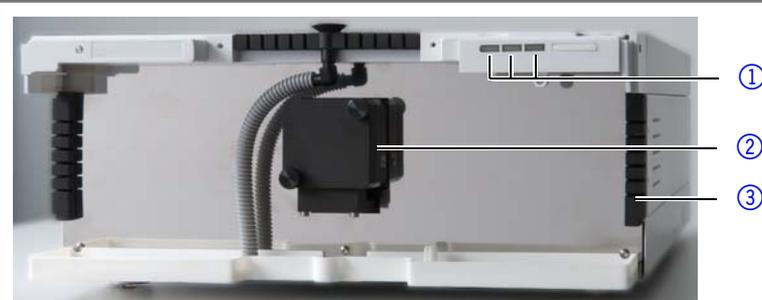


Fig. 1 Detector UVD 2.1L front view

Legend

- ① Serial number
- ② Integrator Output
- ③ LAN port
- ④ RS-232 port, only for servicing
- ⑤ Pin header
- ⑥ Fan
- ⑦ Connection and power switch

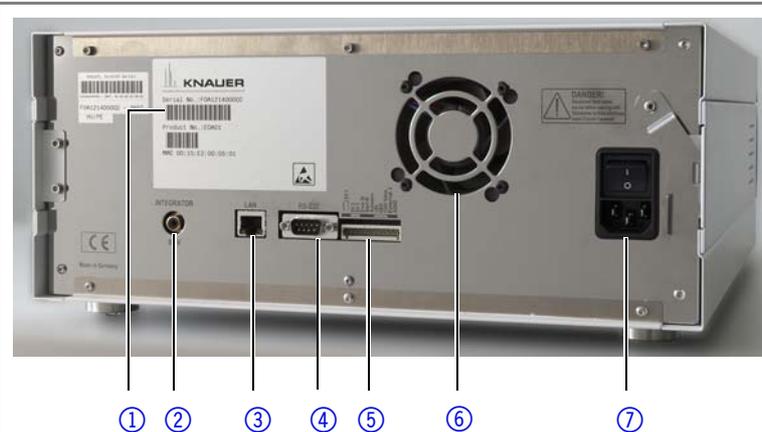


Fig. 2 Detector UVD 2.1L rear view

Operating Range

The detector can be used in analytical and preparative HPLC systems. It is used in laboratories to analyze substance mixtures. In an HPLC system, the detector serves to detect substances in liquids and show their concentration.

The device can be used in the following areas:

- Biochemistry analysis
- Chemical analysis
- Food analysis

- Pharmaceutical analysis
- Environmental analysis

The detector is, e. g., used at universities, research institutions and routine laboratories.

Features

- The deuterium lamp measures spectra from 190 nm to 750 nm
- Flexible use in the entire range of HPLC applications: Analytical flow cells with flow rates of $\approx 100 \mu\text{l}/\text{min}$ to preparative flow cells with 10 l/min
- Automatic recording and storage of the device-specific characteristics that are important for GLP (Good Laboratory Practice) the comprehensive function test (OQ: Operation Qualification) or for repairing the device
- Automatic and current diagnosis of the device
- Control with chromatography software or Mobile Control (optional)
- Easy integration of the detector into complex chromatography systems
- Integrated leak management drains liquids from leaks.

Options Various types of flow cells are available to the user. Pay attention to the compatibility of the flow cells.

Note: A test cell is preassembled to the detector. Before the detector can be used for measurements the test cell has to be replaced by a flow cell. The UVD 2.1L Fiber Optics Version is delivered without a test cell.

Meaning of the LEDs

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

Legend

- ① Left LED
- ② Center LED
- ③ Right LED
- ④ Standby key

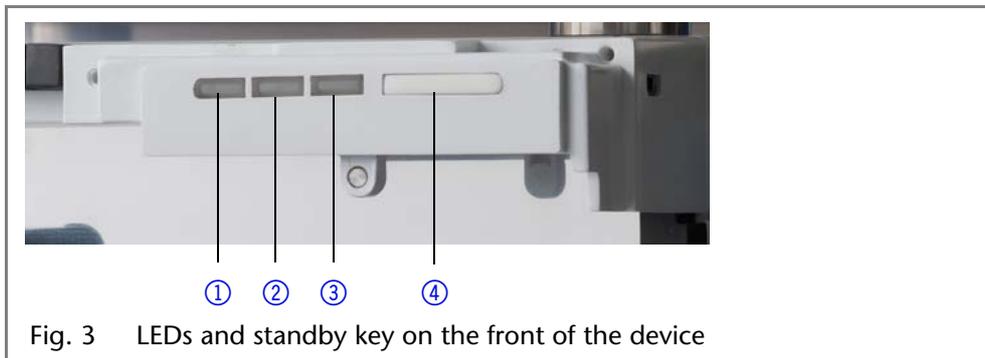


Fig. 3 LEDs and standby key on the front of the device

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

Standby To activate the standby, keep the standby key 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.

Legend

| | Color | Operating condition | Operation |
|-------------------|----------------|------------------------------------|---|
| <i>Left LED</i> | Red | Error message | <ul style="list-style-type: none"> ▪ Check the system ▪ Shortly press the standby key to deactivate the error message |
| <i>Center LED</i> | Does not light | Device is switched off | <ul style="list-style-type: none"> ▪ Switch on the device |
| | Flashes green | Device not yet ready for measuring | <ul style="list-style-type: none"> ▪ Wait until the device is ready |

Legend

Right LED

| Color | Operating condition | Operation |
|-------|--------------------------------------|--|
| Green | Device is switched on | |
| Green | Device active or ready for measuring | |
| Blue | Device in standby | <ul style="list-style-type: none"> ▪ Press the standby key to end the standby |

Eluents

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

If there is any doubt, contact the Technical Support of the manufacturer.

Suitable solvents

- Acetone at 4–25 °C (39.2–77.0 °F)¹
- Acetonitrile²
- Benzene
- Carbon dioxide (liquid 99.999 % CO₂)
- Chloroform
- Dilute acetic acid (e.g. 0.1–1 %) at 25 °C/77.0 °F
- Dilute ammonia solution
- Dilute sodium hydroxide (1 M)
- Ethyl acetate
- Ethanol
- Formiate buffer solution
- Hexane/heptane
- Isopropanol
- Methanol
- Phosphate buffer solutions (0.5 M)
- Toluol
- Water

Less suitable solvents

- Dilute phosphoric acid
- Dimethyl sulfoxide (DMSO)
- Methylene chloride³
- Slightly volatile solvents
- Tetrahydrofuran (THF)³

Not suitable solvents

- Concentrated mineral and organic acids
- Concentrated bases
- Halogenated hydrocarbons, e.g. Freon[®]
- Perfluorinated solvents, e.g. Fluorinert[®] FC-75, FC-40
- Perfluorinated polyether, e.g. Fomblin[®]
- Solvents containing particles

1. valid for the specified temperature range
2. not recommended in combination with PEEK small parts and PEEK capillary
3. not recommended in combination with PEEK small parts and PEEK capillaries

Scope of Delivery

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

- Power cable
- User manual (German/English)
- Installation Qualification document (German/English)
- Detector with test cell¹
- Accessory Kit AZURA
- Accessory Kit UVD 2.1L
- Transport protection

Safety

Professional Group

The user manual addresses persons who are qualified as chemical laboratory technicians or have completed 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
- Participation during an installation of a device or a training by the company KNAUER or an authorized company.

If you do not belong to this or a comparable professional group, you may not perform the work described in this user manual under any circumstances. In this case, please contact your superior.

Safety Equipment

When working with the device, take measures according to lab regulations and wear protective clothing:

- Safety glasses with side protection
- Protective gloves
- Lab coat

What must be taken into account?

- All safety instructions in the user manual
- The environmental, installation, and connection specifications in the user manual
- National and international regulations pertaining to laboratory work
- Original spare parts, tools, and solvents made or recommended by KNAUER
- Good Laboratory Practice (GLP)
- Accident prevention regulations published by the accident insurance companies for laboratory work
- Filtration of substances under analysis
- Use of inline filters
- Once they have been used, never re-use capillaries in other areas of the HPLC system.
- Only use a given PEEK fitting for one specific port and never re-use it for other ports. Always install new PEEK fittings on each separate port.
- Follow KNAUER or manufacturer's instructions on caring for the columns

More safety-relevant information is listed below:

- flammability: Organic solvents are highly flammable. Since capillaries can detach from their screw fittings and allow solvent to escape, it is prohibited to have any open flames near the analytical system.

1. Test cell not supplied with Fiber Optics Version

- solvent tray: Risk of electrical shock or short circuit if liquids get into the device's interior. For this reason, place all bottles in a solvent tray.
- solvent lines: Install capillaries and tubing in such a way that liquids cannot get into the interior in case of a leak.
- leaks: Regularly check if any system components are leaking.
- power cable: Defective power cables are not to be used to connect the device and the power supply system.
- self-ignition point: Only use eluents that have a self-ignition point higher than 150 °C under normal ambient conditions.
- power strip: If several devices are connected to one power strip, always consider the maximum power consumption of each device.
- power supply: Only connect devices to voltage sources, whose voltage equals the device's voltage.
- toxicity: Organic eluents 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.

Secure decommissioning

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 be opened by the KNAUER Technical Support or any company authorized by KNAUER only.

Signal Words

Possible dangers related to the device are divided into personal and material damage in this user manual.



Lethal injuries will occur.

Serious or moderate injuries can occur.

Minor injuries can occur.

Device defects can occur.

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.



Life-threatening injuries

Health danger if getting in contact with toxic, infectious or radio-active substances.

→ Before disposing of the device or sending it away for repair, you are required to decontaminate the device in a technically correct manner.

All contaminated devices must be properly decontaminated by a specialist company or the operating company before they can be recommissioned, repaired, sold, or disposed of. All materials or fluids used for decontamination must be collected separately and disposed of properly.

Decontamination Report

Devices without a completed Decontamination Report will not be repaired. If you would like to return a device to KNAUER, make sure to enclose a completed **Decontamination Report** with the device: <http://www.knauer.net/en/downloads/service.html>

Symbols and Signs

The following symbols and signs can be found on the device, in the chromatography software or in the user manual:

| Symbol | Meaning |
|--|---|
|  | Electric shock hazard |
|  | Electrostatic discharge hazard, damages to system, device, or components can occur. |
|  | Obey maximum load for leak tray during transportation, installation and operation. |
|  | A device or system marked with CE fulfills the product specific requirements of European directives. This is confirmed in a Declaration of Conformity. |
|  | Testing seals in Canada and the USA at nationally recognized testing centers (NRTL). The certified device or system has successfully passed the quality and security tests. |

Unpacking and Setup

Contacting the Technical Support

You have various options to contact the Technical Support:

Phone +49 30 809727-111

Fax +49 30 8015010

E-mail support@knauer.net

You can make your requests in English and German.

Location Requirements

Only if the requirements for ambient conditions of the operating environment are met, can the intended use be ensured. Details on the operating conditions can be found in the Technical Data section.

NOTICE

Device defect

The device overheats at exposure to sunlight and insufficient air circulation. Device failures are very likely.

- Set up the device in such a way that it is protected against exposure to direct sunlight.
- Keep at least 15 cm clear at the rear and 5–10 cm at each side for air circulation.

Space Requirements

- At least 5 cm if another device is set up on one side
- At least 10 cm if further devices are set up on both sides
- At least 15 cm on the rear panel for the fan.

- General requirements*
- Leave the power plug on the rear of the device accessible to be able to disconnect the device from the mains.
 - Position the device on a level and even surface.
 - Protect the device against direct exposure to sunlight.
 - Set up the device at a location not exposed to air drafts (A/C systems).
 - Do not set up the device in the vicinity of other machines that cause floor vibrations.

Unpacking

Prerequisite Check packaging for damage caused during transportation. If necessary, put forward any claim for damages to the carrier.

Tools Utility knife



Bruising danger

Damage to the device by carrying or lifting it on protruding housing parts. The device may fall and thus cause injuries.

→ Lift the device on the side of the housing only.

- Process*
1. Set up the package in such a way that you can read the label. Using the utility knife, cut the adhesive tape and open the packaging.
 2. Remove the foam insert. Take out the accessory kit and the manual.
 3. Open the accessory kit and check the scope of delivery. In case any parts are missing, contact the Technical Support.
 4. Clasp the device from below, lift it out of the packaging and place it on its feet. Do not hold onto the front cover.
 5. Check the device for signs of damage that occurred during transport. In case you notice any damage, contact the Technical Support.
 6. Place the device in its site of operation and remove protective foil.

Next steps Store packaging and keep the included packing list for repeat orders.

Power Supply and Connection

Use only the enclosed power cable to connect the device to the mains to make sure that the specifications stated in Technical Data are met. But check beforehand to use power cables admitted for use in your country. Replace defective power cables only with accessories from KNAUER. Detachable power cables must not be replaced with different cable types.

The maximum power input is 100 watts.

NOTICE

Electronic defect

Electronic hazard when using an identically constructed power adapter from another manufacturer.

→ Contact the Technical Support of KNAUER.

→ Never connect the device to the power connection.

Note: The nominal capacity of the connected devices must be maximum 50 % of the power supply to account for larger inrush currents when switching on the modules.

- Prerequisites*
- The electrical power supply at the installation site must be connected directly to the nearest main power line.
 - The power must be free from ripple, residual current, voltage peaks and electromagnetic interference.
 - The connectors for the mains voltage are grounded accordingly.
 - The device receives sufficient power with reserve capacity.
- Power plug*
- The device is intended for use with AC power networks of 100–240 V.
 - Make sure that the power plug on the rear of the device is always accessible, so that the device can be disconnected from the power supply.

Connectors on the Rear Side

All connectors are on the rear side of the detector.

Legend

- ① Serial number
- ② Integrator Output
- ③ LAN port
- ④ RS-232 port (service only)
- ⑤ Pin header
- ⑥ Fan
- ⑦ Connection and power key



Fig. 4 Detector UVD 2.1L rear view

External devices like computers, fraction collectors, etc. can be connected in 2 different ways to the detector:

- Connected with the pin header
- Connected with LAN within a network

Controlling with the Pin Header

Electronic defect

Connecting cables to the multi-pin connector of a switched on device causes a short circuit.

- Turn off the device before connecting cables.
- Pull the power plug.

NOTICE

Pin Header Assignments

| Connector | Function |
|---|--|
|  EV 1 (Event 1) | <p>Relay contact The contact is on a floating basis. Its setting depends on the settings in the Mobile Control or software. Steady-rate signal:</p> <ul style="list-style-type: none"> ▪ passive = open relay contact  ▪ active = closed relay contact  <p>Pulse:  ▪ Closed relay contact for at least 1000 ms Permissible load of the relay contact: 1 A/ 24 V DC</p> |
| EV 2 (Event 2) | <p>TTL compatible output Levels:</p> <ul style="list-style-type: none"> ▪ passive 5 V  ▪ active 0 V  <p>Pulse:  ▪ 0 V for at least 1000 ms</p> |

| Connector | Function |
|--------------------|---|
| EV 3 (Event 3) | <p>TTL compatible output</p> <p>Levels:</p> <ul style="list-style-type: none"> passive 5 V  active 0 V  <p>Pulse:</p> <ul style="list-style-type: none"> 0 V for at least 1000 ms  |
| Error IN | <p>TTL input</p> <ul style="list-style-type: none"> Low active <p>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.</p> |
| Start IN | <p>TTL input</p> <ul style="list-style-type: none"> Low active <p>Secure switching threshold at least 10 mA After receiving a signal (short circuit to ground) from an external device, the device starts. If controlled via software, an electronic trigger is sent via LAN.</p> |
| Autozero | <ul style="list-style-type: none"> Low active <p>Secure switching threshold at least 10 mA A signal (short circuit to ground) sets the measuring signal to zero.</p> |
| +5 V | Provides a voltage of 5 V with respect to GND. This makes it possible to supply an appliance that is switched by an EVENT. Max. current: 50 mA |
| GND | Reference point of the voltage at the signal inputs. |
| +24 V Valve | Event controlled switching of 24 V against GND Max. current: 200 mA |
| External λ | Allows external analog control of the detector when the option ANALOG has been selected in the SETUP menu. The control voltage must be applied against AGND. Voltage range: 0-10 V The scaling can be changed by the user. |
| AGND | Reference point of the voltage at the input external λ . |

Analog Control

Using the analog port, you can control the wavelength by changing the applied voltage. A Mobile Control is required in order to select the option ANALOG in the SETUP menu.

Example To use the analog port for controlling the detector, you have to set a zero point and enter a scaling value.

- Zero point at 0 V = 000 nm
- Scaling: 100 nm per Volt

If 5 V voltage is applied, the wavelength is 500 nm.

Integrator Connector

The integrator connector sends measuring signals from the detector.

- non-bipolar
- 1 channel
- 0 to 5 V
- DAC 20 bit
- scalable
- adjustable to offset

To control one device through another, you use the multi-pin connector. To use remote control, you have to connect cables to the terminal strip (both included with delivery). The single ports are used to exchange control signals.

Prerequisite

- The device has been turned off.
- The power plug has been pulled.

Tools

Depressor tool

NOTICE

Electronic defect

Connecting cables to the multi-pin connector of a switched on device causes a short circuit.

- Turn off the device before connecting cables.
- Pull the power plug.

NOTICE

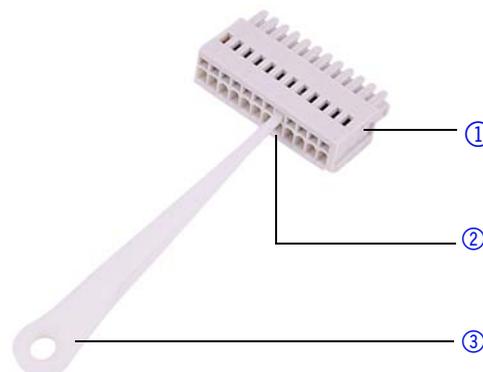
Electronic defect

Electrostatic discharge can destroy the electronics.

- Wear a protective bracelet against electrostatic discharge and ground.

Process

1. Push the depressor tool ① into an upper small opening on the front of the terminal strip ③.
2. Lead the cable into the opening ② below the inserted depressor tool.
3. Remove the depressor tool.



Next steps

Check if the cables are firmly attached. Push the terminal strip onto the multi-pin connector. Finish the installation. Then put the device into operation.

Initial Startup

Note: Before the detector is ready to use for measurements, a flow cell must be installed. You can change the optical path length of a preparative flow cell before assembling the flow cell. The optimal path length depends on type and quantity of the sample.

Checklist before Initial Operation

Use this checklist to determine whether the detector is ready for initial startup:

- Device is in the correct location.

Note: Observe the ambient conditions and space requirements!

- The power connection of the detector is plugged in.

If the detector is part of a HPLC system, the following must be observed:

- The network connection to the router is established
- The KNAUER chromatography software OpenLAB[®], ChromGate[®] or ClarityChrom[®] has been installed by KNAUER or a company authorized by KNAUER.
- Capillaries from the column to the UV detector and capillaries from the detector to the waste bottle are securely attached.

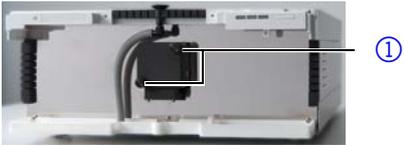
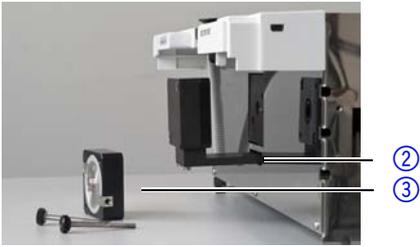
Inserting the Flow Cell

Note: The test cell is used during operation qualifications and must be stored.

Prerequisite

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

Procedure

| Process | Figure |
|--|---|
| <ol style="list-style-type: none"> 1. Unscrew the 2 knurled-head screws ① . 2. Pull out the slide ② as far as it needed to take out the test cell. 3. Remove the test cell. |  <p>Fig. 5 Removing the slide</p> |
| <ol style="list-style-type: none"> 4. Insert the flow cell ③ into the slide. 5. Push the slide ② into the detector. 6. Insert the knurled-head screws and screw tight. |  <p>Fig. 6 Assembling the flow cell</p> |

Result

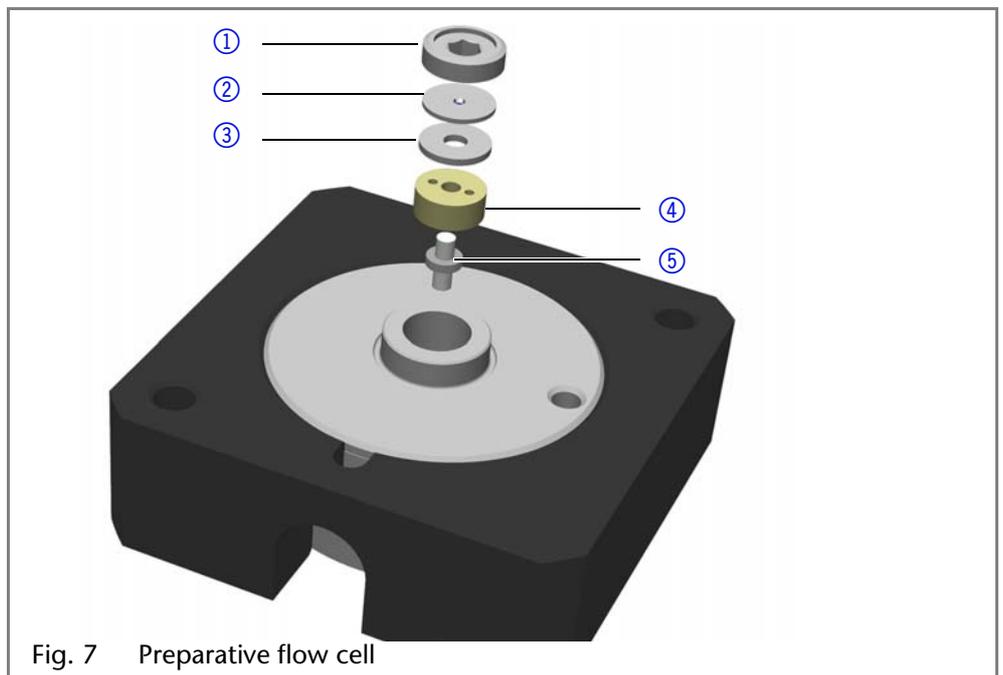
Flow cell is assembled. The next step is connecting the capillaries.

Setting the Optical Path Length of a Preparative Flow Cell

Depending on type, the path length is factory set to 2 mm, 3 mm, or 10 mm. You can remove the spacers on one or both sides and hence change the path length to 1.25 mm or 0.5 mm.

Legend

- ① Threaded ring
- ② Cover
- ③ Spacer
- ④ Seal holder (compression bushing)
- ⑤ Light guide with PTFE seal



Prerequisite Flow cell has been disassembled.

Tools Allen screwdriver, size 3

WARNING

Eye injury

Irritation of retina through UV light. Concentrated UV light can leak out from the flow cell or the fiber optic connectors.

→ Switch off the device and pull the power plug.

- Procedure*
1. Using the allen screwdriver, unscrew and remove the threaded ring ① .
 2. Remove the cover ② and spacer ③ . Put the spacer aside.
 3. Insert the cover.
 4. Using the allen screwdriver, tighten the threaded ring.

Enlarging To enlarge the optical path length, put in one or both spacers.

Connecting the Capillaries

Capillaries connect the detector to other devices and lead liquids.

Prerequisite Flow cell has been assembled.

Tools Torque wrench

NOTICE

Component defect

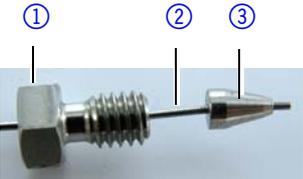
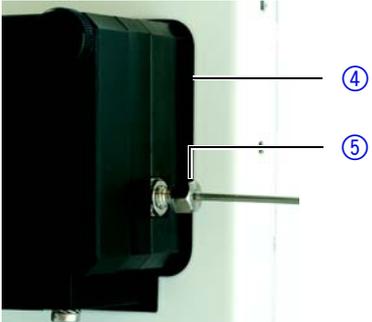
Damage to the ports caused by strongly tightened fittings.

→ Use 5 Nm torque for stainless steel fittings.

→ Use 0.5 Nm torque for PEEK fittings.

Note: PEEK fittings withstand a maximum pressure of 400 bar.

Procedure

| Steps | Figure |
|--|---|
| <ol style="list-style-type: none"> 1. Push the capillary ② through the fitting ① . 2. Push the clamping ring ③ onto capillary. |  <p>Fig. 8 Capillary fitting</p> |
| <ol style="list-style-type: none"> 3. Manually, screw together the capillary and the flow cell ④ . To avoid leaks, tighten the fitting ⑤ with a maximum torque of 5 Nm for stainless steel fittings or 0.5 Nm for PEEK fittings by using the open-end wrench. |  <p>Fig. 9 Capillary and flow cell</p> |

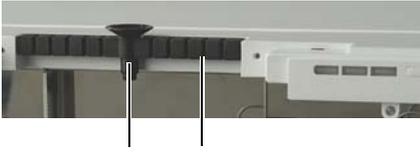
Result Capillaries have been connected and the detector is ready for operation.

Connecting the Leak Management

The leak management consists of the leak sensor and the drainage system (funnels, hoses, nozzles). The drainage system ensures that escaping liquids flow into a waste bottle. When leaks are registered by the leak sensor, the LED flashes red. Both the device and the data acquisition via chromatography software are stopped.

Prerequisite The front cover has been removed.

Process

| Process | Figure |
|--|--|
| 1. Carefully push the funnel ① into the center opening of the capillary guide ② . |  <p>Fig. 10 Funnel and capillary guide</p> |
| 2. Push the long ending of the first nozzle ④ into the hose ③ . |  <p>Fig. 11 Hose and nozzle</p> |
| 3. Connect the nozzle and the funnel. 4. Push the other end of the hose onto the nozzle ⑤ of the leak tray. |  <p>Fig. 12 Hose connected to device</p> |
| 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. |  <p>Fig. 13 Leak tray with nozzle</p> |

Next steps Attach the front cover.

Connecting a Device in a Local Area Network (LAN) to a Computer

This section describes how to set up an HPLC system in 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. That means the following steps are required:

- 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

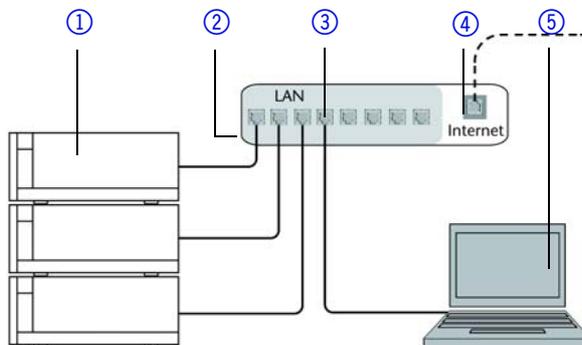
The LAN uses only one server (which is normally the router) from that the devices automatically receive their IP address.

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

- Process*
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 IP address automatically*
 - b) *Obtain DNS server address automatically*
 7. Click on the button *OK*.

Connecting the Cables

A router ③ has several LAN ports ② and one WAN port ④ that can be used to integrate the LAN into a wide area network (WAN), e.g. a company network or the Internet. In contrast, the LAN ports serve to set up a network from devices ① and a computer ⑤. To avoid interference, we recommend operating the HPLC system separately from the company network.



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.

- Prerequisite*
- The computer has been switched off.
 - There is a patch cable for each device and the computer.

- Process*
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 will find a label at the bottom side of the router, on which IP address, user name, and password are printed. These information help to open the router configuration.

- Process*
1. To open the router configuration, start your Internet browser and enter the IP address (not for all routers).
 2. Enter user name and password.
 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.

- Process*
1. Check that the IP address range of the router and of the company network do not overlap.
 2. In case of an overlap, 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 devices, 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.

- Process*
1. Find out port number and change it on the device.
 2. Enter the port number in the chromatography software.

Result The connection is established.

Setting a Static IP Address

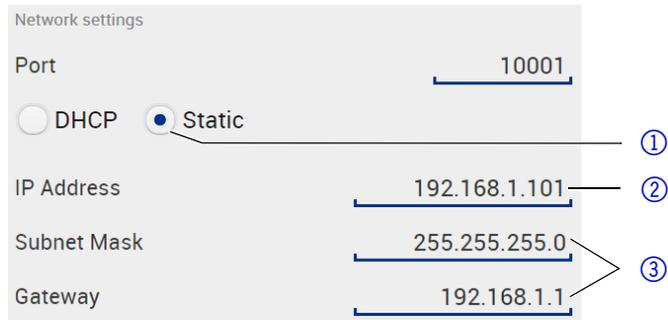
Note: Please inform yourself about the IT safety standards valid for your laboratory, before changing the LAN settings.

The device is factory set to a dynamic IP address (DHCP). To ensure a permanent LAN connection between the chromatography software and the device, we recommend to set a static IP address for certain applications.

- Prerequisites*
- The device has been switched on.
 - Mobile Control has been installed and started.
 - The connection between the Mobile Control and the device has been established.

Note: You find further information on LAN settings in the chapter Device Settings of the Mobile Control User Manual.

- Procedure*
1. In the Mobile Control, choose *Settings* .
 2. On the *General* tab, choose the device name.
 3. Under *Network Settings*, choose the setting *Static* .



4. Enter the IP address into the text box *IP Address* ② .
5. If necessary, change the subnet mask and the gateway ③ .
6. Click **Apply** in the top right corner.
7. Restart the device.

Next steps

In case necessary, go back to the original setting with the [Reset] button that can be found under *Settings > General > Network Settings > LAN Settings*.

Switching the Detector On

Prerequisite

The device is switched on by the power key on the back of the device.

- Installation has been completed.
- Flow cell has been assembled.

NOTICE

Device defect

Changes of the environmental temperature cause condensation inside the device.

→ Allow device to acclimate for 3 h, before connecting to power supply and taking into operation.

Procedure

| Process | Figure |
|---|--|
| <ol style="list-style-type: none"> 1. Insert the plug into the female connector ② at the rear panel. 2. Plug the other end into an electric socket. 3. Switch on the device at the power key ① . | <p>Fig. 14 Power key with female connector at the rear panel</p> |

Result

The detector starts its self calibration. The display shows the progress that has been made. When the self calibration has finished, the status display appears. If the self calibration fails, switch the detector off and back on again.

Practical Tip: Regularly check the capillaries for leaks.

Operation

A device can be operated in several ways:

- with chromatography software
- with Mobile Control

Note: It is not possible to use two operating methods simultaneously. If the device is connected to the software, it cannot be controlled via Mobile Control. The device status can however be monitored.

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. OpenLAB EZChrom edition version A.04.05 or higher, ChromGate version 3.3.2 or higher and ClarityChrom version 3.0.7 or higher and PurityChrom version 5.07.039 or higher. You will find a detailed description on the chromatography software in the software manual.

Control with Mobile Control

The Mobile Control is a device control software which can be installed on your computer or tablet. To control the device using the Mobile Control, connect the computer or tablet to a wireless LAN router. Data transfer between device and Mobile Control is actualized through wireless LAN. You find a detailed description on the Mobile Control in its accompanying user manual.

Setting the Wavelength

You can set a wavelength between 190–750 nm.

Resetting the Device

Using the Mobile Control, you can re-set the detector to its default settings.

| Parameter | Setting |
|--------------------|------------------------------------|
| Network | LAN DHCP, port 10001 |
| Lamps | D2 ON |
| Time constant | 2 s |
| Channels | Channel 1: WL = 254 nm |
| Analog out | Offset 1 = 10 mV, Scale 1 = 1 AU/V |
| Event check | All events deactivated (o) |
| Date/Time | Current date/time |
| Fraction collector | OFF |
| Leak sensor | ON, Sensitivity = low |

Functionality Tests

Installation Qualification (IQ)

The customer may request the Installation Qualification, which is free of charge. In case of a request, the Technical Support of KNAUER or from a provider authorized by KNAUER performs this functionality test during the installation.

The Installation Qualification is a standardized document that comes as part of the delivery and includes the following:

- confirmation of flawless condition at delivery
- check if the delivery is complete
- certification on the functionality of the device

Operation Qualification (OQ)

The Operation Qualification includes an extensive functionality test according to KNAUER standard OQ documents. The Operation Qualification is a standardized document and free of charge. It is not part of the delivery, please contact the Technical Support in case of a request.

The Operation Qualification includes the following:

- definition of customer requirements and acceptance terms
- documentation on device specifications
- device functionality check at installation site

Test Intervals To make sure that the device operates within the specified range, you should test the device regularly. The test intervals are dependent on the usage of the device.

Execution The test can be carried out either by the Technical Support of KNAUER or from a provider authorized by KNAUER.

Troubleshooting

- First measures*
1. Check all cabling.
 2. Check all screw fittings.
 3. Check whether air has entered into the supply lines.
 4. Check device for leaks.
 5. Check system messages in the Mobile Control or software.

Possible Problems and Rectifications

| Problem | Solution |
|--|---|
| Baseline drift | Maintain constant temperature conditions during the measurement. |
| Device will not turn on | Inspect the power cable to ensure that it is plugged into the power supply. |
| Device cannot be calibrated | <ol style="list-style-type: none"> 1. Fasten the knurled-head screws on the slide to prevent incursion from interfering light or an electronics error. 2. Insert the test cell. 3. Inspect the calibration with a weak absorbing eluent. |
| Baseline noise | <ol style="list-style-type: none"> 1. Inspect the flow cell assembly. 2. Fasten the knurled-head screws on the slide to prevent incursion from interfering light or an electronics error. 3. Exchange the defective flow cell. 4. Inspect the service life of the lamp on the display. 5. Reduce the air in the flow cell with a degasser. |
| The relationship of the signal to the light path reference is very low | <ol style="list-style-type: none"> 1. Flush the flow cell. 2. Clean the flow cell window. 3. Replace the lamps |

- Further measures*
1. Install the maintenance software (service tool).
 2. Save device information and send to manufacturer.
 3. Inform the Technical Support of the manufacturer.

Possible LAN Connection Problems

Go through the following steps, in case no connection between the computer and the devices can be established. Check after each step if the problem is solved. If the problem cannot be located, call the Technical Support.

1. Check the status of the LAN connection in the Windows task bar:

-  Connected
-  Connection not established

If no connection was established, test the following:

- Is the router switched on?
 - Is the patch cable connected correctly to the router and the computer?
2. Check the router settings:
 - Is the router set to DHCP 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. Turn off all devices, router, and computer. Firstly, turn on the router and secondly turn on the devices and the computer.
 - Has this been successful?
 6. Replace the patch cable to the device with that no connection could be established.
 - Has this been successful?
 7. Make sure that the IP port of the device matches the port in the chromatography software.

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 |
|--|---|
| Calibration failed | Restart the device. Check whether lamps, motor and filter are functioning correctly. Inform the Technical Support of the manufacturer in case the system message repeats itself. Restart calibration on the device or in the chromatography software. |
| Calibration failed - Filter position error | The filter wheel moves incorrectly. Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| Calibration failed - Low light | Both reference channel and signal channel do not have enough light for the calibration due to, for instance, a defective lamp. Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| Calibration failed: Signal path open | Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |

| | System message | Solution |
|----------|---|---|
| | Calibration failed: Too much light | Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| | 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 an uncalibrated instrument | Restart the device. Wait until calibration is completed. |
| | Cannot operate with an empty link | Create a link. |
| | Cannot proceed: D2 lamp heating | Restart the device. If the error occurs again, replace the lamp. |
| | Cannot proceed: D2 lamp is OFF! | Switch the lamp on. If the error occurs again, restart the device. If the lamp is off after restarting, replace the lamp. |
| | Cannot proceed: lamps are off. | Switch the lamp on. If the error occurs again, restart the device. If the lamp is off after restarting, replace the lamp. |
| | Cannot read data from FRAM | Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| | Cannot read RTC | Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| | Cannot write data on FRAM | Delete the programs. |
| <i>D</i> | D2 lamp operation failed | Restart the device. If the error occurs again, replace the lamp. |
| | D2 lamp does not start | Restart the lamp. Inform the Technical Support of the manufacturer in case the system message repeats itself. The lamp unit has to be replaced. |
| | Data acquisition active | No entries are possible. First stop acquiring measurement data, afterwards you can make a new entry. |
| <i>F</i> | Filter move error | Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| <i>G</i> | GUI communication failed | Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |

| | System message | Solution |
|----------|--|---|
| <i>I</i> | Instrument remote controlled | This entry is not executable. Close and exit the software. |
| | Invalid command | Check the cable connections. Change the entry. |
| | Invalid line number | Change the entry in the program line. |
| | Invalid link | Reconfigure the link. |
| | Invalid parameter(s) | Check the validity of the parameters. |
| | Invalid time in time table | Correct the time entry. |
| | Invalid index in time table | Change the entry in the program line. |
| <i>L</i> | 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. |
| | Link does not exist | Create a link. |
| | Link is running | Wait until the link has been completed, then change the link or delete it. |
| <i>M</i> | Motor end position reached Instrument will be recalibrated | The motor that controls the wavelength reached its end position and stopped. Recalibrate the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| | Motor failure | Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| <i>N</i> | No link available | Create a link. |
| | Not enough space to store link | Check the number of link lines. A maximum of 50 link lines are possible. |
| | Not enough space to store program | Check the number of program lines. A maximum of 50 program lines are possible. |
| <i>O</i> | Operation time out | Restart the device. Inform the Technical Support of the manufacturer in case the system message repeats itself. |
| <i>P</i> | Program does not exist | Create a program. |
| | Program is running | Quit program or wait until program has been completed. |
| <i>T</i> | 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. |

| System message | Solution |
|--------------------------------|---|
| 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. |
| Too many lines in program | Check the number of program lines. A maximum of 50 program lines are possible. |
| W Wake up time already passed! | Specify new time. |

Maintenance and Care

Organic solvents are toxic above a certain concentration. Ensure that work areas are always well-ventilated! When performing maintenance tasks on the device, always wear safety glasses with side protection, protective gloves, and an overall.

All wetter components of a device, e. g. flow cells of detectors or pump heads and pressure sensors for pumps, have to be flushed with isopropanol first and water afterwards before being maintained, disassembled or disposed.

Users may perform the following maintenance tasks themselves:

- Regularly check the light intensity of the D₂ lamp (best before 2000 operating hours).
- Inspect the flow-cell assembly
- Clean the flow cell.
- Replace the flow cell.

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



Electric shock

High voltages in the lamp area inside the housing pose a risk for lamp replacement.

- Only authorized service technicians are allowed to remove the housing and to replace the lamp.



Eye injury

Irritation of retina through UV light. Concentrated UV light can leak out from the flow cell or the fiber optic connectors.

- Switch off the device and pull the power plug.



Electronic defect

Performing maintenance tasks on a switched on device can cause damage to the device.

- Switch off the device
- Pull the power plug.

Contacting the Technical Support

You have various options to contact the Technical Support:

Phone +49 30 809727-111

Fax +49 30 8015010

E-mail support@knauer.net

You can make your requests in English and German.

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
- Removing the hood or the side panels.

Cleaning and Caring for the Device

NOTICE

Device defect

Intruding liquids can cause damage to the device.

- Place solvent bottles next to the device or in 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.

Cleaning the Flow Cell

Increased baseline noise and reduced sensitivity can be a result of a dirty flow cell. Often it is sufficient to rinse the flow cell to restore optimal sensitivity.

Note: Dirty lenses or fiber optic connectors could falsify the measurement. Do not touch the lens or the fiber optic connector lenses with bare hands. Wear gloves.

Rinsing the Flow Cell

The following solvents are recommended for rinsing:

- diluted HCl (1 mol/L)
- 1 ml/L NaOH aq.
- Ethanol
- Acetone

Tools Syringe

NOTICE

Performance decrease

Oil drops can contaminate the flow cell.

- Do not use compressed air for drying.

- Procedure*
1. Fill the syringe with eluent.
 2. Inject it into the inlet of the flow cell and allow it to act for 5 minutes.
 3. Fill the syringe with water and inject again.
 4. Remove the flow cell from the detector and use a nitrogen stream to dry it.

Result Flow cell is clean.

Next steps Check if the baseline noise has improved.

If the rinsing does not have the desired effect, all flow cells can be disassembled to clean the lens.

Cleaning the Lens of an Analytical Flow Cell

Legend

- ① Seal ring
- ② Lens
- ③ Compression part
- ④ Threaded ring

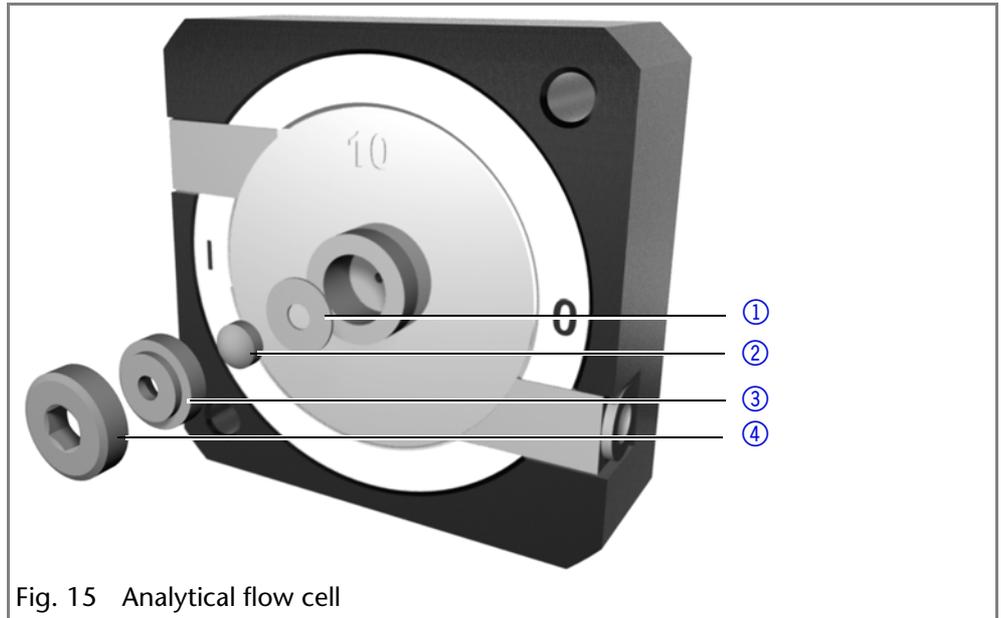


Fig. 15 Analytical flow cell

Prerequisite

- Device has been switched off.
- Power plug has been pulled.
- Flow cell has been removed.

Tools

- Tweezers
- Allen screwdriver, size 3

Procedure

1. Using the allen screwdriver, loosen the threaded ring ④.
2. Using tweezers or by gently tapping on a clean surface, remove the compression part ③.
3. The lens ② is protected by a seal ring ①. This must be renewed every time the lens is disassembled.
4. Remove the lens and clean with a clean, soft cloth or with water in an ultrasonic bath.
5. Afterwards, assemble the flow cell and make sure that the new seal ring does not interrupt the light path.
6. Using the allen screwdriver, tighten the threaded ring.

Result

Flow cell can be assembled.

What to do when...

If the cleaning of the lens does not have the desired effect, the lens has to be replaced.

Cleaning the Light Guide of a Preparative Flow Cell

The preparative flow cells have a rod shaped light guide instead of the concave lens of the analytical cells.

Legend

- ① Threaded ring
- ② Cover
- ③ Spacer
- ④ Compression bushing
- ⑤ Light guide with seal ring
- Seal

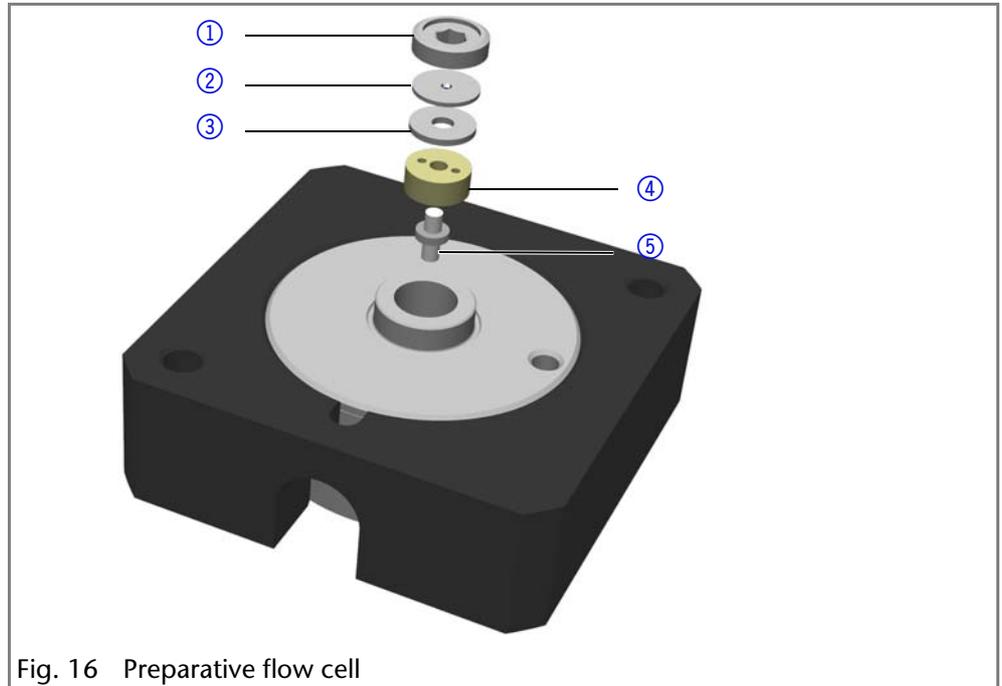


Fig. 16 Preparative flow cell

Prerequisite

- Device has been switched off.
- Power plug has been pulled.
- Flow cell has been removed.

Tools

- Tweezers
- Allen screwdriver, size 3

Procedure

1. Using the screwdriver, loosen the threaded ring ① .
2. Remove the cover ② and the spacer ③ (not part of all flow cells).
3. Using the tweezers, pull out the compression bushing ④ and the light guide ⑤ .
4. Carefully push the light guide out of the holder and strip off the seal. The seal ring needs to be renewed during every cleaning of the fiber optics.
5. Clean the light guide with a clean, soft cloth or with an appropriate solvent in an ultrasonic bath. Make sure that the clean light guide is not touched by fingers.
6. Afterwards, assemble the flow cell and make sure that the new seal ring does not interrupt the light path.
7. Using the screwdriver, tighten the threaded ring ① .

Result

Flow cell can be assembled.

What to do when...

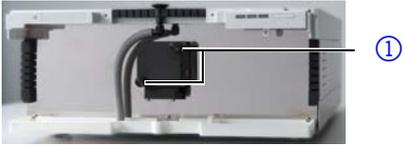
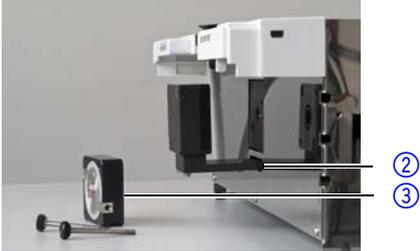
If the cleaning does not have the desired effect, the light guide has to be replaced.

Replacing the Flow Cell

UV light will cause the flow cells to become blind with time (solarization), making them no longer suitable for use.

Prerequisite

- Detector has been switched off.
- Power plug has been pulled.
- Capillaries are disconnected.

| <i>Procedure</i> | Steps | Figure |
|------------------|---|---|
| | <ol style="list-style-type: none"> 1. Unscrew the knurled-head screws ① . 2. Pull out the slide ② . 3. Remove the flow cell. 4. Insert the flow cell ③ into the slide. 5. Push the slide into the detector ② . 6. Insert the knurled-head screws and screw tight. |  <p>Fig. 17 Removing the slide</p>  <p>Fig. 18 Assembling the flow cell</p> |

Result Flow cell is assembled. The next step is to connect the capillaries.

Replacing the Fiber Optics

UV light will cause the fiber optics to become blind with time (solarization), making them no longer suitable for use.

Observe the following regarding the use of fiber optics:

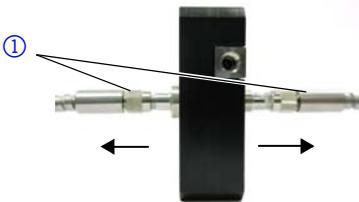
- Do not touch the ends of the fiber optics with your fingers, as this could falsify the measurement.
- Handle the fiber optics with care, avoid impacts or hard actions.
- Move the fiber optics carefully without using pressure or bending it.

Removing the Fiber Optics

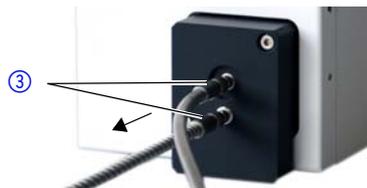
Prerequisites The device has been switched off.

Tools Cap fittings for the fiber optics

Note: Do not touch the ends of the fiber optics with your fingers, as this could falsify the measurement.

| <i>Procedure</i> | Process | Figure |
|------------------|---|---|
| | <ol style="list-style-type: none"> 1. Manually, unscrew the fittings ① of the fiber optics from the flow cell. |  <p>Fig. 19 Fiber optics fittings on the flow cell</p> |
| | <ol style="list-style-type: none"> 2. Seal the fiber optic connectors with caps ② . |  <p>Fig. 20 Cap fittings on the fiber optics</p> |

Procedure

| Process | Figure |
|--|---|
| 3. Manually, unscrew the fiber optics ③ from the detector. |  <p>Fig. 21 Fiber optic connectors on the detector</p> |

Technical Data

| Detection | |
|----------------------|--|
| detector type | Variable single wavelength UV/VIS detector Variable single wavelength UV/VIS detector with fiber optic connectors |
| detection channels | 1 |
| light source | Deuterium (D ₂) lamp with integrated GLP chip |
| wavelength range | 190–750 nm |
| spectral bandwidth | 11 nm at H α line (FWHM) |
| wavelength accuracy | ± 2.5 nm |
| wavelength precision | 0.3 nm (ASTM E275-93) |
| noise | $\pm 1.5 \times 10^{-5}$ AU at 254 nm $\pm 2.0 \times 10^{-5}$ AU at 254 nm (fiber optics version) (ASTM E1657-98) |
| drift | 3.0×10^{-4} AU/h at 254 nm 4.0×10^{-4} AU/h at 254 nm (fiber optics version) (ASTM E1657-98) |
| linearity | > 2.0 AU at 270 nm (ASTM E1657-98) |
| time constants | 0.0/0.1/0.2/0.5/1.0/2.0/5.0/10.0 s |
| integration time | Automatic |

| Communication | |
|-------------------|--|
| maximum data rate | 50 Hz (LAN), 20 Hz (analog) |
| interfaces | LAN (RJ-45), RS-232 (SUB-D 9, service only), multi-pin connector, Analog (RCA cinch connector) |
| control | Mobile Control, software, event control, Analog, terminal protocol |
| inputs | Error (IN), Start (IN), Autozero, 0–10 V Analog IN |

| | |
|---------------|---|
| outputs | Event 1–3, +5 V, +24 V Valve |
| analog input | wavelength 0–10 V |
| analog output | 1 x 0–5 V scalable, 20 bit, offset adjustable |

Technical Parameters

| | |
|--------------------|---|
| GLP | Detailed report including lamp recognition, operating hours, lamp operating hours, number of lamp ignitions |
| display | Mobile Control (optional) |
| ambient conditions | temperature range 4–40 °C, 39.2–104 °F air humidity below 90 %, non-condensing |

General

| | |
|--------------|--|
| power supply | 100–240 V, 50–60 Hz, 65 W |
| dimensions | 361 × 158 × 523 mm (W × H × D) |
| weight | 5.9 kg, 6.0 kg (fiber optics version) |
| leak sensor | Yes |

Accessories and Spare Parts

This list for repeat orders is valid for the time the document has been published. Deviations afterwards are possible.

Note: 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.

Further Information Further information on spare parts and accessories can be found online: www.knauer.net

Devices and Accessories

| Name | Order no. |
|---|-----------|
| AZURA UV/VIS Detector UVD 2.1L without flow cell | ADA01XA |
| AZURA UV/VIS Detector UVD 2.1L Fiber Optics Version without flow cell | ADA04XA |
| Mobile Control license with 10" touchscreen | A9607 |
| Mobile Control Chrom license with 10" touchscreen | A9608 |
| Mobile Control license | A9610 |
| Mobile Control Chrom license | A9612 |
| Tool kit AZURA | A1033 |
| Deuterium lamp | A5193 |
| Accessories kit | FDA |
| AZURA accessories kit | FZA02 |

| Name | Order no. |
|----------------------------|-----------|
| User manual German/English | V6831 |

Fiber Optic Connectors

| Name | Order no. |
|---|-----------|
| 2 × fiber optic connector 750 mm | A0740 |
| 2 × fiber optic connector 750 mm, high temperature up to 85°C | A0740HT |
| 2 × fiber optic connector, custom made size | A0743 |

Available Flow Cells

Most flow cells are also available equipped with fiber optic connectors for the use with the fiber optics version of the detector.

Analytical Flow Cells

| Technical data | | Order no. |
|--|--|---|
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 10 mm 1/16" 1.1 mm 10 µl Stainless steel with heat exchanger 20 ml/min 300 bar | A4061XB |
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 10 mm 1/16" 1.1 mm 10 µl Stainless steel with heat exchanger 20 ml/min 300 bar | A4061 A4074 (fiber optics version) |
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure Max. temperature | 3 mm 1/16" 1.0 mm 2 µl Stainless steel 50 ml/min 300 bar 85°C | A4042 A4044 (fiber optics version) A4044HT (high temperature version) |
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 3 mm 1/16" 1.0 mm 2 µl PEEK 50 ml/min 30 bar | A4045 A4047 (fiber optics version) |

Preparative Flow Cells

| Technical data | | Order no. |
|---|---|---------------------------------------|
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 0.5 / 1.25 / 2 mm 1/8" 2.3 mm 1.7 / 4.3 / 6.8 µl Stainless steel 1000 ml/min 200 bar | A4066 A4078 (fiber optics version) |
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 0.5 / 1.25 / 2 mm 1/8" 2.3 mm 1.7 / 4.3 / 6.8 µl PEEK 1000 ml/min 100 bar | A4067 A4079 (fiber optics version) |
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 0.5 / 1.25 / 2 mm 1/4" 4.0 mm 1.7 / 4.3 / 6.8 µl Stainless steel 10000 ml/min 200 bar | A4068 A4081 (fiber optics version) |
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 0.5 / 1.25 / 2 mm 1/4" 4.0 mm 1.7/4.3/6.8 µl Stainless steel 10000 ml/min 200 bar | A4068-2 |
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 0.5 mm 1/16" 0.8 mm 3 µl Stainless steel 250 ml/min 200 bar | A4069 A4089 (fiber optics version) |
| Path length Connection Inner diameter Volume Material Max. flow rate Max. pressure | 0.5 mm 1/16" 0.8 mm 3 µl PEEK 250 ml/min 100 bar | A4095 A4096 (fiber optics version) |

Fiber Optics Preparative Flow Cells

| Technical data | | Order no. |
|--|---|-----------|
| Path length Capillary connection Material Max. pressure | 10 mm 1/2" with TRI-Clamp PEEK and fused silica 10 bar | A4154-1 |

| Technical data | | Order no. |
|--|--|-----------|
| Path length Capillary connection Material Max. pressure | 7 mm 3/8" with TRI-Clamp PEEK and fused silica 10 bar | A4152-1 |
| Path length Capillary connection Material Max. pressure | 0.5/1.25/2 mm 1/2" with TRI-Clamp Stainless steel and fused silica 80 bar | A4154 |
| Path length Capillary connection Material Max. pressure | 0.5/1.25/2 mm 3/4" with TRI-Clamp Stainless steel and fused silica 80 bar | A4155 |
| Path length Capillary connection Material Max. pressure | 0.5/1.25/2 mm 3/8" with TRI-Clamp Stainless steel and fused silica 80 bar | A4152 |
| Path length Capillary connection Material Max. pressure | 0.5/1.25/2 mm 1/4" with TRI-Clamp Stainless steel and fused silica 80 bar | A4153 |

Test Cells

| Technical data | | Order no. |
|----------------|----------------------|---------------------------------------|
| Test cell | normal | A4123 A4125(fiber optics version) |
| Test cell | holmium oxide filter | A4126 A4128 (fiber optics version) |
| Test cell | filter stray light | A4146 A4148 (fiber optics version) |

Legal Information

Transport Damage

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

Warranty Conditions

The factory warranty for the device is stipulated by contract. During the warranty period, any components with material or design-related defects will be replaced or repaired by the manufacturer free of charge. Please connect to our website for further information on terms and conditions.

All warranty claims shall expire in the event that any unauthorized changes are made to the device. This warranty also excludes the following:

- accidental or willful damage
- damage or errors caused by third parties that are not contractually related to the manufacturer at the time the damage occurs
- wear parts, fuses, glass parts, columns, light sources, cuvettes and other optical components
- damage caused by negligence or improper operation of the device and damage caused by clogged capillary
- packaging and transport damage

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

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Declaration of Conformity

The Declaration of Conformity is part of the delivery and accompanies the product as a separate document.

Warranty Seals

The warranty seal is color-coded. A blue seal is used by the assembly or technical support of KNAUER for devices to be sold. After repair, service technicians affix an orange seal in identical position. If unauthorized persons interfere with the device or the seal is damaged, the warranty claim will forfeit.



Disposal

Hand in old devices or disassembled old components at a certified waste facility, where they will be disposed of properly.

AVV Marking in Germany

According to the German "Abfallverzeichnisverordnung" (AVV) (January, 2001), old devices manufactured 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). The number belongs to category 8 and 9, which, among others, comprise laboratory equipment.

All distributors and importers are responsible for the disposal of old devices, as defined by the WEEE directive. End-users can send their old devices manufactured by KNAUER back to the distributor, the importer, or the company free of charge, but would be charged for the disposal.

Solvents and Other Operating Materials

All solvents and other operating materials must be collected separately and disposed of properly.

All wetted components of a device, e. g. flow cells of detectors or pump heads and pressure sensors for pumps, have to be flushed first with isopropanol and then with water before being maintained, disassembled or disposed.

HPLC Glossary

Here you can find information on the abbreviations and terminology used in this device manual for the detector.

| Term | Meaning |
|------------------|--|
| Degasser | Degasser module for fluids |
| GLP | Good Laboratory Practice – quality assurance for laboratories |
| Gradient | Time-dependent composition of solvent (mobile phase) on low-pressure or high-pressure side of system |
| HPLC | High pressure liquid chromatography |
| Integration time | The integration time determines how fast the detector reacts to changes in absorbance. |
| IP address | Unique address of transmitter or receiver in local networks or Internet (Internet protocol) |
| Solvent | Mobile phase (eluent) or carrier for liquid chromatography |
| Remote control | The detector is completely controlled by the chromatography software. |
| Dead volume | Volume of capillaries and system components between mixing chamber, injector and column as well as between column and detector. The dead volume should be kept as small as possible. |

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▶ See up-to-date manuals online:
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HPLC · SMB · Osmometry

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