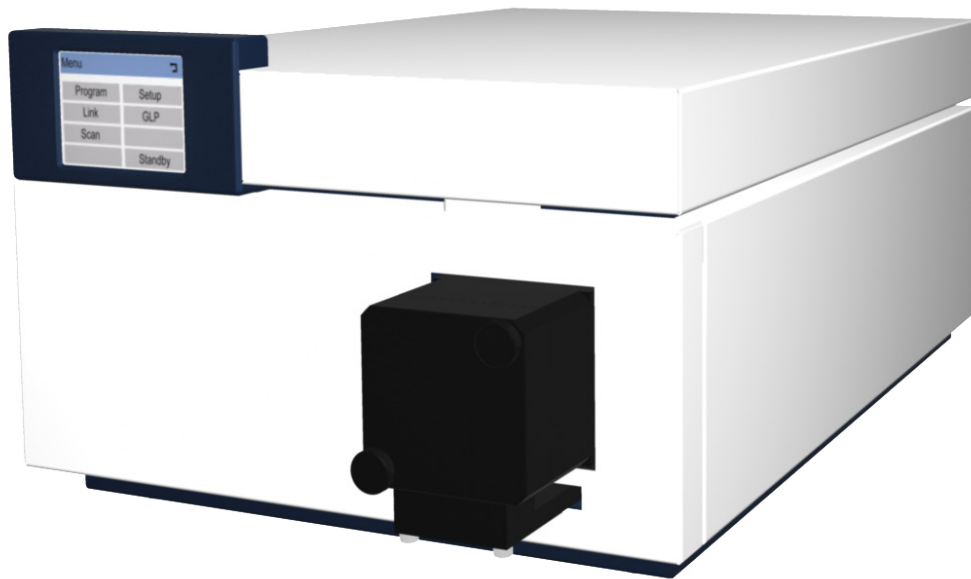


BlueShadow

► **Detector 40D**
User Manual

V7646



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	6
Device Overview	6
LAN and Automatic Configuration	6
Operating range	7
Features	7
Eluents	8
Scope of Delivery	8
Safety	8
Signal Words	10
Decontamination	10
Symbols and Signs	10
Unpacking and Setup	11
Contacting the Technical Support	11
Location Requirements	11
Power Supply and Connection	11
Unpacking	12
Connectors on the Rear Side	12
Control via Remote Connector	13
Analog Control	14
Integrator Port	15
Startup	15
Checklist before initial operation	15
Inserting the Flow Cell	15
Changing the Optical Path Length of the Preparative Flow Cell	16
Connecting the Capillaries	17
Configuring the LAN Settings	18
Connecting the Cables	18
Configuring the Router	19
Integrating the LAN into a Company Network	19
Controlling Several Systems Separately in a LAN	19
Switching the Detector On	20
Operation	20
Touchscreen	20
Handling	21
Overview of the Function Buttons	21
Graphical User Interface Structure	22

Status Display Settings	23
Main Menu	23
Program Menu	24
Creating a Program	24
Creating Program Lines	25
Deleting program lines	25
Running a Program	26
Changing a Program	26
Displaying the Program Lines	26
Deleting the Program	26
Creating a Program with a Starting Time	26
Link Menu	27
Creating a Link	27
Executing a Link	28
Deleting a Link	29
Setup Menu	29
Setup Menu Parameters	29
GLP Menu	32
Standby	33
Functionality Tests	33
Troubleshooting	33
Possible Problems and Rectifications	34
Possible LAN Connection Problems	34
System Messages	35
Maintenance and Care	37
Maintenance Contract	37
Cleaning and caring for the device	38
Cleaning the Flow Cell	38
Rinsing the Flow Cell	38
Cleaning the Lens of an Analytical Flow Cell	39
Cleaning the Light Guide of a Preparative Flow Cell	40
Replacing the Flow Cell	41
Replacing the Fiber Optics	41
Removing the Fiber Optics	42
Technical Data	42
Storage	43
Legal Information	43
Transport Damage	43
Warranty Conditions	44
Declaration of Conformity	44
Disposal	44
Abbreviations and Terminology	45
Index	46

- To whom it may concern** *In case you prefer a French language user manual for this product, submit your request including the corresponding serial number via email or fax to KNAUER:*
- *support@knauer.net*
 - *+49 30 8015010*
- Thank you.*
- A qui que ce soit** *Si jamais vous préférez un manuel en français pour ce produit contacter KNAUER par email ou par fax avec le no. de série:*
- *support@knauer.net*
 - *+49 30 8015010*
- Merci beaucoup.*

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

The touchscreen, the LED light for standby mode, and the flow cell can be found on the detector's front side. The device can be operated from either the chromatography software at the workstation, or the touchscreen.

Legend

- ① Touchscreen
- ② LED light for standby mode
- ③ Flow cell with holder

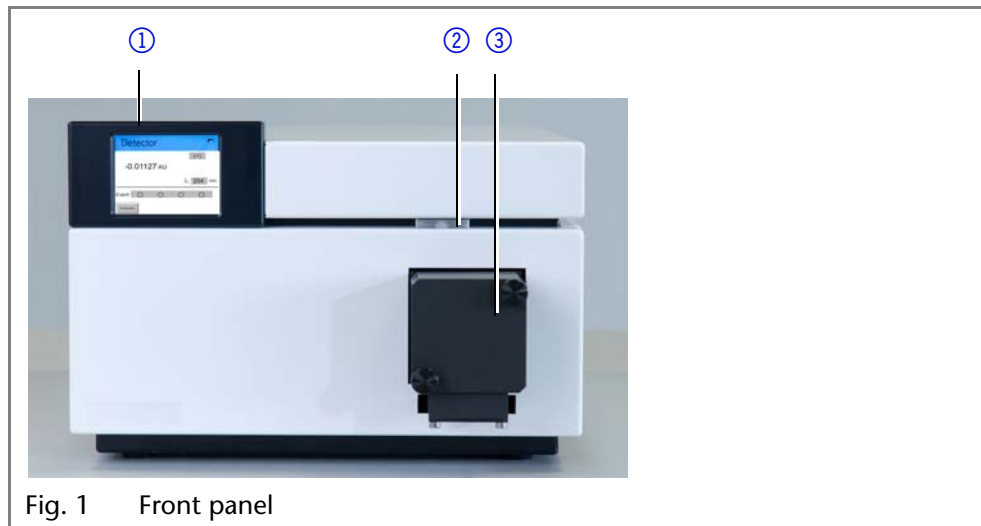


Fig. 1 Front panel

The rear of the device contains the mains power connection, power switch, connections for external devices, technical symbols and serial number, among other things.

Legend

- ① Serial number
- ② Integrator output
- ③ LAN port
- ④ RS-232 port
- ⑤ Fan opening
- ⑥ Remote connector
- ⑦ Power switch
- ⑧ Mains power connection

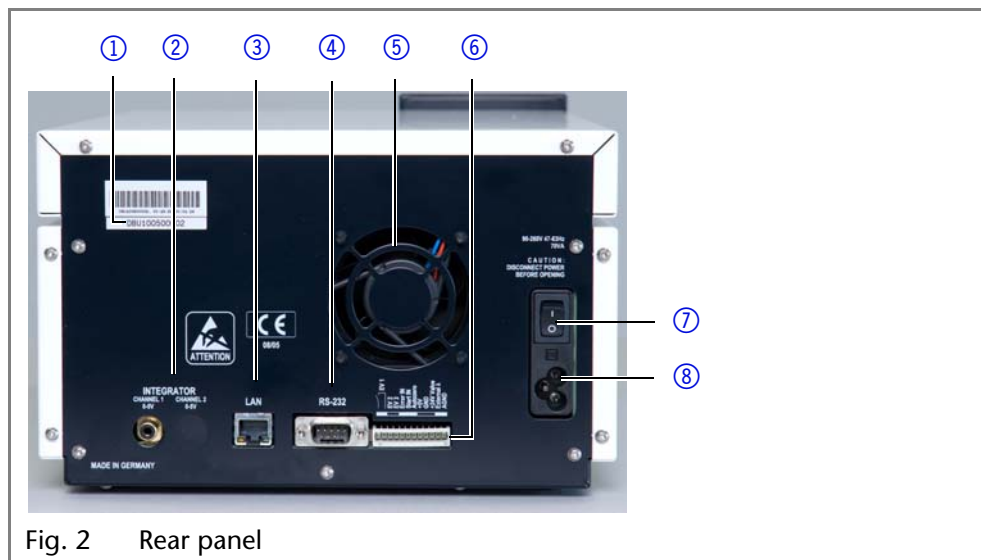


Fig. 2 Rear panel

LAN and Automatic Configuration

Remote Control Normally, the detector is controlled by the chromatography software through a local network (LAN).

Automatic configuration The detector connected to the local area network (LAN) is automatically detected by the chromatography software.

Device status When used in a local area network (LAN), the system status of the detector can be checked using the chromatography software.

LAN setting The detector is set to DHCP (Dynamic Host Configuration Protocol) at the factory. This means that the detector is automatically assigned an IP address within the local network. This setting can be changed manually in the *Setup* menu.

Operating range

The detector can be used in analytical and preparative HPLC system. It is used in laboratories to analyze substance mixtures. In a 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

Detectors play an important role, as they measure the analytical information of a chromatographic separation and make the results visible. They convert physical information into electric signals (analog signals).

Self-calibration The self-calibration of the detector guarantees operation without external settings. Type of the installed lamp as well as the transmission of the corresponding installed flow cell are analyzed and used for the automatic setting of the integration time, in order to achieve a high level of sensitivity.

- Features*
- Wavelength range 190-750 nm
 - The beam guidance is designed so that no chromatic aberration occurs and thus the best possible useful signal is available, independent of the selected wavelength.
 - Automatic recording and storage of the device-specific characteristics that are important for GLP (Good Laboratory Practice) and OQ (Operation Qualification) or for the device service and device history.
 - Self-running and up-to-date device status diagnostics.
 - Control with chromatography software is possible.
 - Easy integration of the detector into complex chromatography systems.
 - High data rates for fast chromatography.
 - Flexible options for use in the entire field of LC applications due to a comprehensive range of flow cells for the KNAUER detectors, from nano HPLC cells with flow rates ≈ 100 nl/min to preparative flow cells with 10 l/min.

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
<ul style="list-style-type: none"> ▪ Acetone at 4°-25° C (39.2°-77.0° F)¹ ▪ Acetonitrile ▪ Benzene ▪ Chloroform ▪ Ethyl acetate ▪ Ethanol ▪ Hexane/heptane at 4°-25° C (39.2°-77.0° F)¹ ▪ Isopropanol ▪ Carbon dioxide (liquid 99.999% CO₂) ▪ Methanol ▪ Phosphate buffer solutions (0.5 M) ▪ Toluol ▪ Dilute ammonia solution ▪ Dilute acetic acid (10-50%), at 25° C/77.0° F ▪ Dilute sodium hydroxide (1M) ▪ Water 	<ul style="list-style-type: none"> ▪ Dimethyl sulfoxide (DMSO) ▪ Slightly volatile eluents ▪ Methylene chloride ▪ Tetrahydrofuran (THF) ▪ Dilute phosphoric acid 	<ul style="list-style-type: none"> ▪ 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®

1.valid for the specified temperature range

Scope of Delivery

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

<i>Delivery</i>	Detector with test cell	<input type="checkbox"/>
	Accessories kit	<input type="checkbox"/>
	User manual (DE/EN)	<input type="checkbox"/>

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.
- 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.

Decommissioning the Device Securely Opening the Device

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

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.

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.
	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:

<i>Phone</i>	+49 30-809727-111
<i>Fax</i>	+49 30 8015010
<i>E-mail</i>	support@knauer.net (manufacturer)

Location Requirements

- Space Requirements*
- Side clearance to other devices:
 - At least 5 cm, if there is another device on one side.
 - At least 10 cm, if there are devices set up on both sides.
 - At least 15 cm on the rear panel for the fan.
- Requirements*
- The location for the device must meet the following requirements:
- level surface for device or system
 - Protect from heavy ventilation and sunlight
 - Weight 5.4 kg
 - Dimensions 242 x 169 x 399 mm
(width x height x depth)
 - Power supply 100 – 240 V
 - Air humidity below 90 %, non condensing
 - Temperature range 4 – 40 °C; 39.2 – 104 °F

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.

Power Supply and Connection

The device is intended for use with AC power networks of 100-240 V. The supplied power cable is to be used to connect the device to the mains supply.

- Power cable*
- Only the supplied power cable is to be used to connect the device to the mains supply. Replace defective power cables only with original accessories from KNAUER. Only use power cables with a permission for use from your country.

In case of queries contact the Technical Support.

- Power plug*
- 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.

NOTICE

Electronic defect

Damage to the electronics if the device is turned on while connecting or interrupting the power connection.

- Switch off the device beforehand.

Unpacking

At the factory, the device was carefully packed for safe transport. Carefully store all packaging material. Keep the included packing list for repeat orders.

Tool Utility knife

- Procedure*
1. Check for damage caused during transportation. In case you notice any damage, contact the technical support and the forwarder company.
 2. Setup the delivery in such a way that the label is in the correct position. Using the utility knife, cut the adhesive tape. Open the packaging.
 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. Clasp the device at its side panels and lift it out of the packaging.
 6. Remove the foam inserts from the device.
 7. Check the device for signs of damage that occurred during transport. In case you notice any damage, contact the technical support.
 8. Set-up the device in its location.
 9. Remove the protective foil

Connectors on the Rear Side

The rear of the device contains the mains power connection, power switch, connections for external devices, technical symbols and serial number, among other things.

Legend

- ① Serial number
- ② Integrator output
- ③ LAN port
- ④ RS-232 port
- ⑤ Fan opening
- ⑥ Remote connector
- ⑦ Power switch
- ⑧ Mains power connection

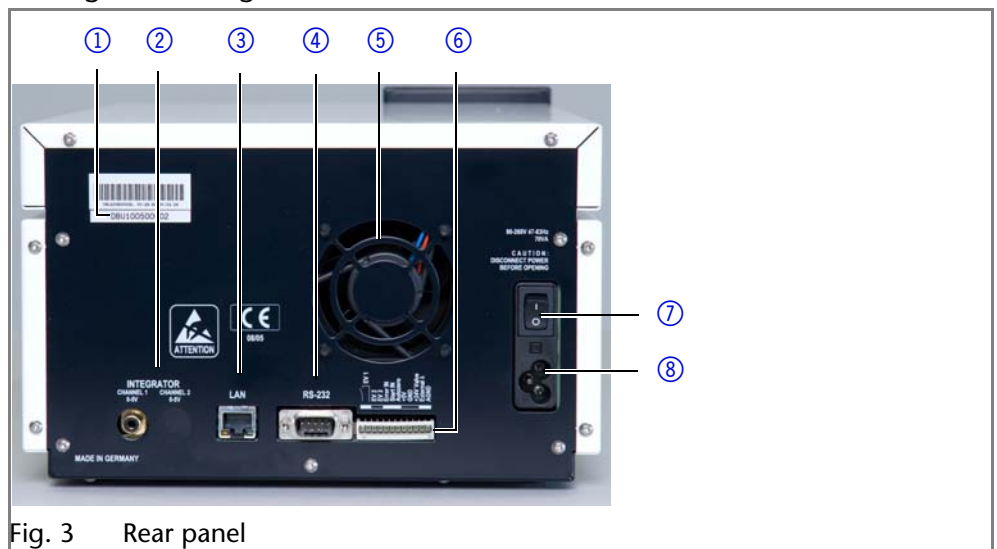












Fig. 3 Rear panel

External devices can be connected to the valve drive in different ways:

- Connect the detector to external devices using the remote connector.
- Use the LAN connection to connect the detector with external devices within a network.
- Alternatively, connect the detector to a computer by means of the RS-232 port.

Control via Remote Connector

Assignment

Connection	Function
 EV 1 (Event 1)	<p>Relay contact The contact is on a floating basis. Its setting depends on the settings in the Control Unit or software. Steady-rate signal:</p> <ul style="list-style-type: none"> passive = open relay contact  active = closed relay contact  <p>Pulse:</p> <ul style="list-style-type: none"> Closed relay contact for at least 1000 ms  <p>Permissible load of the relay contact: 1 A/ 24 V DC</p>
EV 2 (Event 2)	<p>TTL output 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 
EV 3 (Event 3)	<p>TTL output 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 with software, an electronic trigger is send through the 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	<p>Provides a voltage of 5 V with respect to GND. This makes it possible to supply a consumer that is switched by an EVENT. Max. current: 50 mA</p>
GND	<p>Reference point of the voltage at the signal inputs.</p>
+24 V Valve	<p>Event-controlled switching of 24 V against GND Max. current: 200 mA</p>

Assignment

Connection	Function
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 .

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 (everything comes 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.

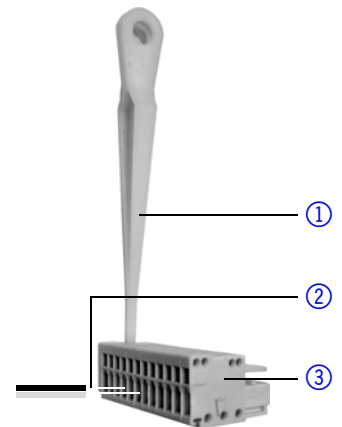
NOTICE**Electronic defect**

Electrostatic discharge can destroy the electronics.

- Wear a protective bracelet against electrostatic discharge and ground.

Process

1. Place the terminal strip ③ on a suitable surface.
2. Push the depressor tool ① into the opening on the upper side.
3. Continue pushing the depressor tool down and lead the cable ② into the front end of the terminal strip.
4. Remove the depressor tool.
5. Check whether the cables are tightly attached.
6. Plug the terminal strip onto the multi-pin connector.

*Next steps*

Finish the installation and perform the initial startup.

Analog Control

Using the analog port, you can control the wavelength by changing the applied voltage. You need a Control Unit to change to ANALOG setting 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 5V voltage is applied, the wavelength is 500 nm.

Startup

Integrator Port

The integrator connector sends measuring signals from the detector.

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

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:

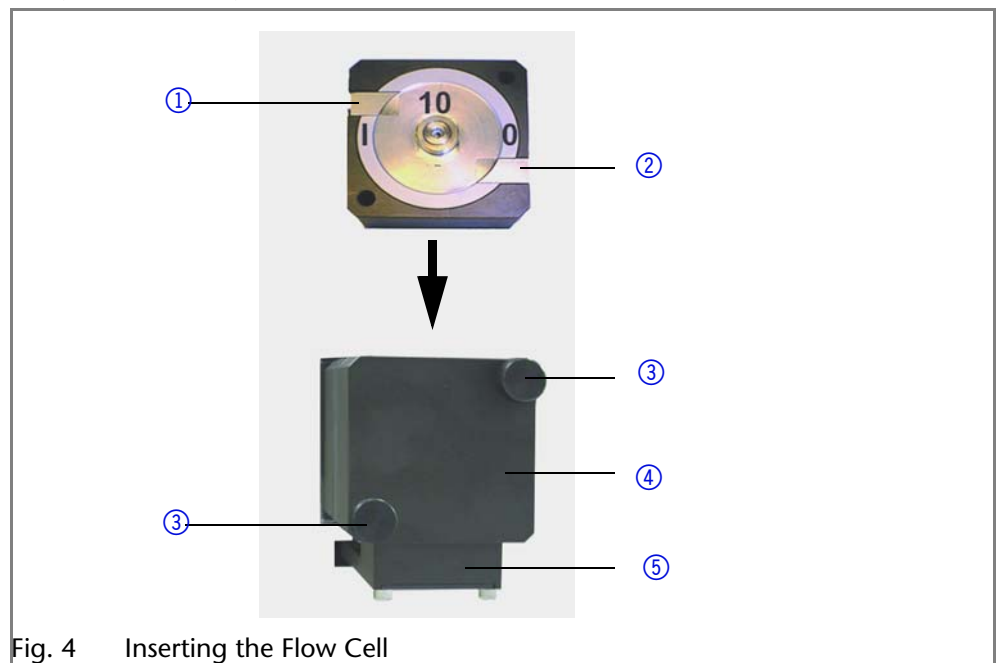
- The network connection to the router is established
- The KNAUER chromatography software OpenLAB[®], ChromGate[®] oder ClarityChrom[®] has been installed by KNAUER or a company authorized by KNAUER.
- Capillaries from the column to the UV detector and capillaries from the detector to the waste bottle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

Inserting the Flow Cell

The supply configuration of this detector only includes a test cell (dummy cell) from KNAUER, which does not have connections for solvent. It is used, for example, to check the lamp intensity, as a dirty flow cell could distort this value. Before using the device with solvents, the test cell must, therefore, be removed, and a flow cell must be installed.

Legend

- ① Inlet
- ② Outlet
- ③ Knurled-head screws
- ④ Cover plate
- ⑤ Slide



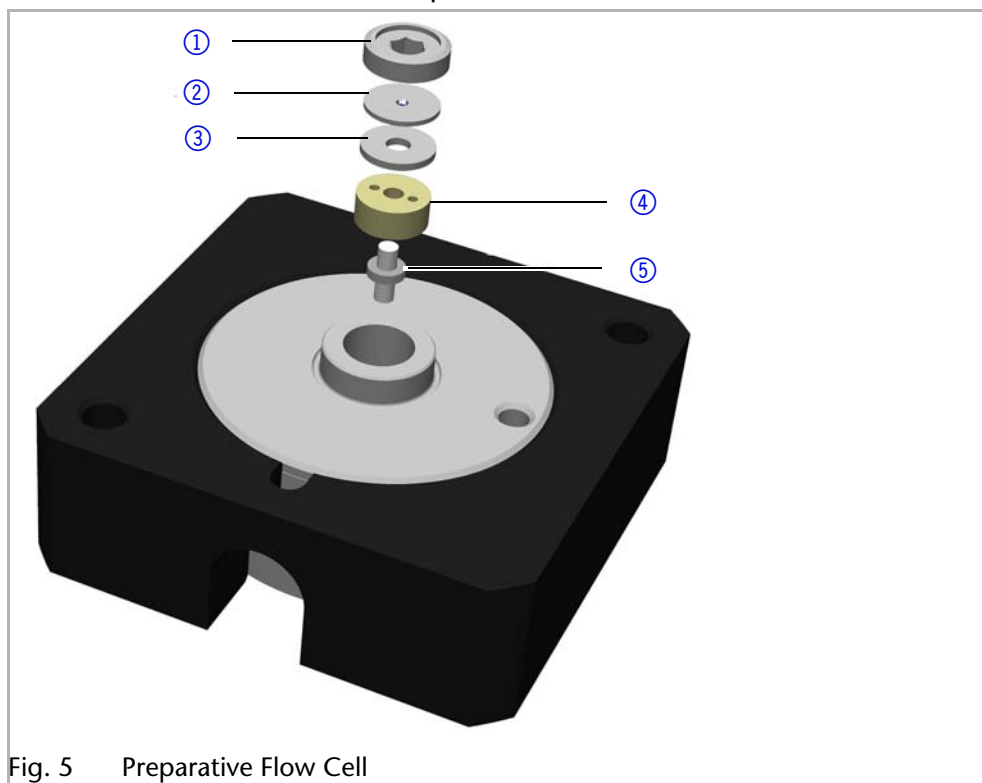
- Prerequisite**
- In case necessary, the optical wavelength has been set.
 - The device has been switched off.
 - The power plug has been pulled.
- Procedure**
1. Unscrew the knurled-head screws (③) of the cover plate (④). Hold the flow cell securely with your hand during this procedure.
 2. Pull out the slide with the flow cell (⑤) towards the front.
 3. Remove the flow cell upward.
 4. Position the new flow cell on top of the slide. Keep holding the flow cell.
 5. Push the slide back into the detector.
 6. Screw the knurled-head screws back into the cover plate (④) and tighten.
 7. Connect the incoming and outgoing capillaries at the inlet (①) and outlet (②) of the measuring cell.
- Next steps** Connect the capillaries.

Changing the Optical Path Length of the Preparative Flow Cell

At delivery, the optical path length of a preparative flow cell is set to 2 mm at the factory. This path length can, however, be set to 2, 1.25 or 0.5 mm. To reduce it to 1.25 or 0.5 mm, proceed as follows

Legend

- ① Threaded ring
- ② Stainless steel cover
- ③ PEEK spacer
- ④ Seal holder (compression bushing)
- ⑤ Light guide with PTFE seal



Shortening the optical path length

1. Remove the threaded ring ① using a hexagonal spanner.
2. Remove stainless steel cover ② and the PEEK spacer ③.
3. Insert the stainless steel cover again and carefully tighten the threaded ring again.

The missing spacer causes the light guide ④ to be pushed deeper into the flow cell (0.75 mm), resulting in a shortened optical path length of 1.25 mm. To further shorten down to 0.5 mm, the PEEK spacer on the other cell side must also be removed.

Extending the Optical Path Length

To extend the optical path length in steps of 0.75 mm, put the spacers back in.

1. Loosen the threaded ring.

2. Remove the stainless steel cover and light guide, together with the seal ring, with tweezers.
3. To extend the path length, push the light guide out about 1 mm. Please use a clean cloth and avoid touching the light guide with your fingers.
4. Push the light guide together with the seal holder back into the cell.
5. Insert the PEEK spacer followed by the stainless steel cover.
6. Carefully tighten the threaded ring again.

When tightening the threaded ring, the rod-shaped light guide is pushed into the correct position in the cell. Inserting a spacer extends the optical path length by 0.75 mm. The PTFE seal does not need to be replaced when the path length is changed.

Next steps Insert the flow cell into the detector.

Connecting the Capillaries

Capillaries connect the detector to other devices and lead liquids.

Prerequisite The flow cell has been inserted.

Tool Torque wrench

NOTICE

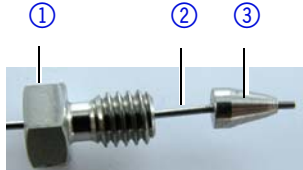
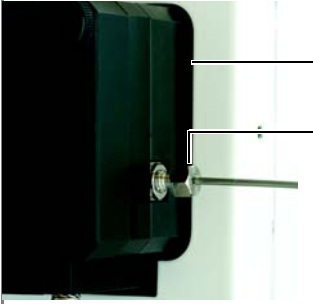
Component defect

Damage to the (flow cell) connectors 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 pressures up to 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. 6 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 by using the open-end wrench. 	 <p>Fig. 7 Capillary and flow cell</p>

Next steps Connect the power plug to mains power.

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

This chapter describes how to set up a local area network (LAN) and how a network administrator can integrate this LAN into a 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. Connect 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.

Note: The port is set to 10001 at the factory. The IP port numbers in the device configuration of the chromatography software must be identical to those in the device, otherwise the connection fails.

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, automatic Windows update and screen saver must be deactivated.
 - In case you use a USB-to-COM box, the option "Allow the computer to turn off this 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 this device to save power" in the *Device Manager* must be deactivated.

- Procedure*
1. In Windows 7 click on *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

To avoid interference, we recommend to operate the HPLC system separate from the company network. This is why we recommend using a router.

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.

Note: A patch cable is included in the accessories kit. A router is not included in the scope of delivery. To connect the router to a WAN, an addi-

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

Legend

- ① Modules
- ② Router
- ③ LAN port
- ④ WAN port
- ⑤ Workstation

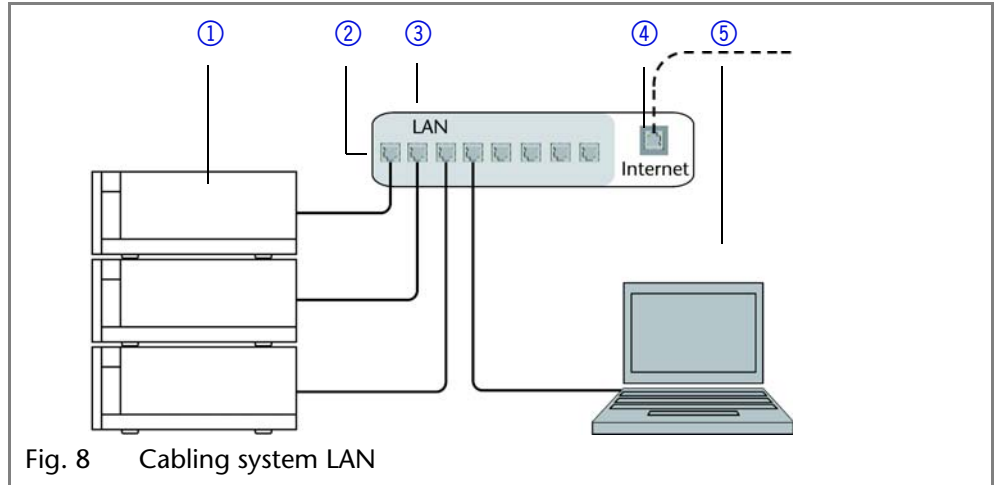


Fig. 8 Cabling system LAN

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 password 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 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 a company network. In this case the WAN port of the router is used.

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. The IP port numbers in the device configuration of the chromatography software must be identical to those 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.

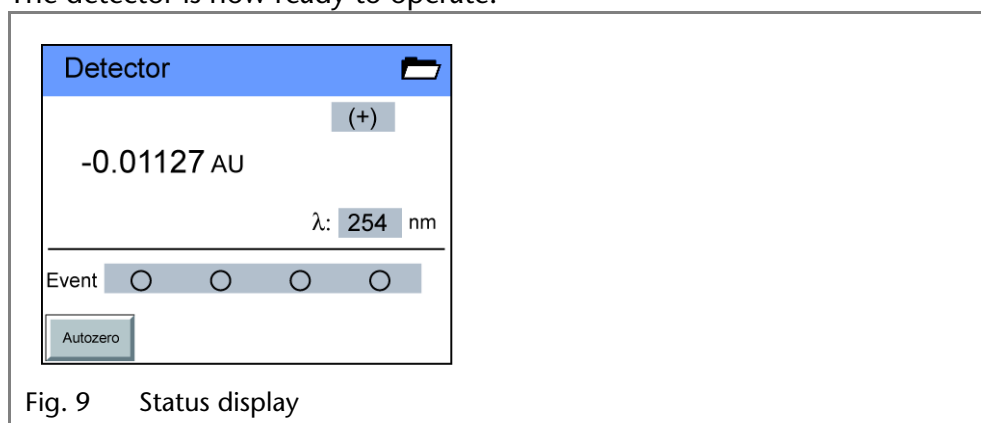
Result The connection is established.

Note: Refer to the troubleshooting chapter, if you experience connection problems.

Switching the Detector On

The device is switched on by the power switch on the back of the device. It begins by initializing the lamps (initializing lamps), then proceeds through a self-test and calibration cycle (calibration is running), and finally registers itself as ready to operate with the *status display*.

The detector is now ready to operate.



Operation

The detector is operated either by touchscreen or the chromatography software. Software control is done for the detector only or for the detectors as part of an isocratic, high pressure or low pressure gradient system.

Remote control Normally, the detector is controlled by the chromatography software through a local network (LAN).

Automatic configuration The detector connected to the local area network (LAN) is automatically detected by the chromatography software.

Device status When used in a local area network (LAN), the system status of the detector can be checked using the chromatography software.

LAN setting The detector is set to DHCP (Dynamic Host Configuration Protocol). This means that the detector is automatically assigned an IP address within the local network. This setting can be changed manually in the *Setup* menu.

Touchscreen

Working without chromatography software The touchscreen is suitable for the following procedures without chromatography software:

- Monitoring the module functions
- Standby and wake-up programs (Wake Up)
- Programs for configuring the modules (*Setup* menu)
- Checking the system conditions as part of quality assurance measures in accordance with good laboratory practices (in the *GLP* menu) including LAN configuration.

Handling





With the *touchscreen* it is possible to input data and commands by tapping certain areas on the screen with a finger or with a blunted object. These areas are highlighted in gray.

Tapping such buttons often calls up a menu with further, self explanatory buttons.

Overview of the Function Buttons




Navigation

In order to navigate the display has buttons with the following meanings:

Button	Function	Explanation
	Scroll	Through all functions Scroll
	One level higher up	Tap briefly to move up one level up
	Go to device status display	Press and hold for 2 seconds
	To Main menu	Tap to go to the Main menu
	Saves the entry	-

Controlling the program

Further buttons help control the program:

Button	Function	Explanation
	Running a program	Starts previously configured program in <i>Program</i> menu
	Pause program	-
	Stop program	-

Other buttons have their functions displayed in plaintext:

Button	Function	Explanation
Restart	Repeat the program	-
Finish	Exit loaded program	-
Day	Confirm the day	-

Button	Function	Explanation
Month	Confirm month	-
Year	Confirm the year	-
Autozero	Carry out zero balance	
Disable	Deactivate, skip	
New	Create a new program line with time indicator	-
Load	Load program	-
Edit	Edit the program	-
Del/Delete	Deleting the program	-
Tab	Table	Program line display

Graphical User Interface Structure

The user interface is divided into various areas.

- Program: Device programming
- Link: Creating combination programs
- Setup: Device presets
- GLP: Device status displayed according to good laboratory practice (GLP)
- Standby mode

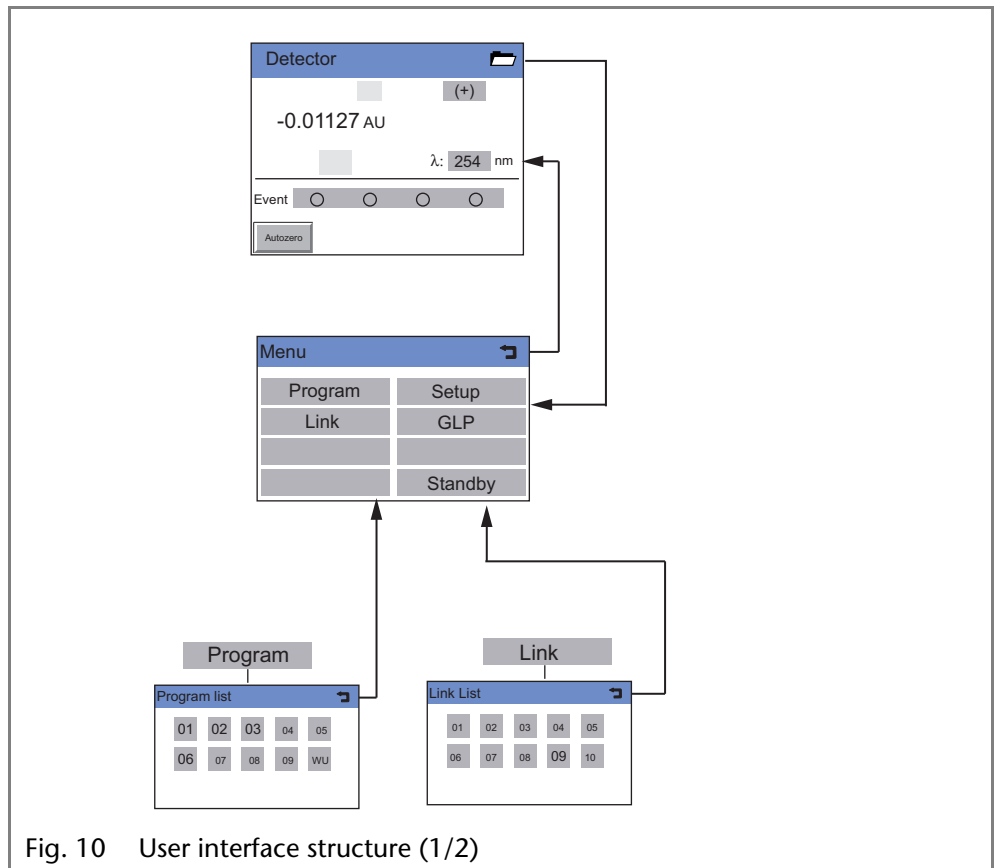


Fig. 10 User interface structure (1/2)

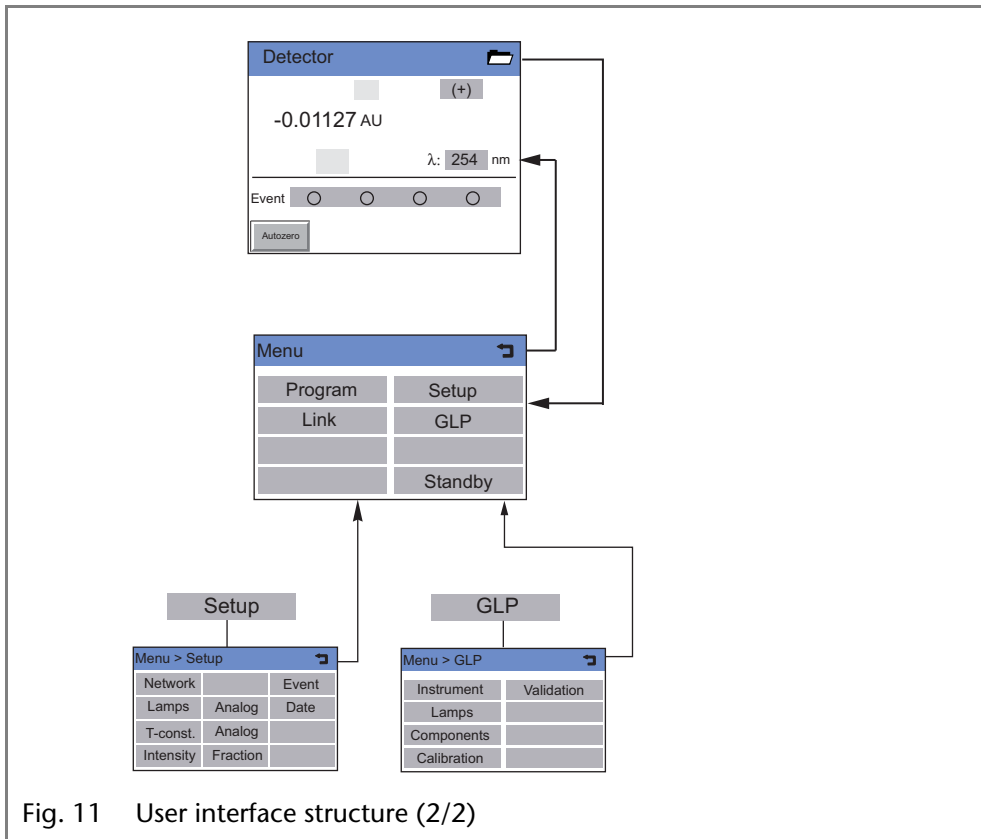


Fig. 11 User interface structure (2/2)

Status Display Settings

The following settings can be made in the status display:

Signal options There are two options for signal output. You can choose either by selecting the top gray field on the status display.

Option	Explanation
(-)	Signal is inverted
(+)	Signal remains unchanged

Wavelength Tapping the gray fields next to λ opens a virtual number pad in which the wavelength measures can be specified. The entry is confirmed with the return key. The entry is deactivated with the *disable* key.

Events Events are electric signals that are effective on the terminal strip events and remote control and are used to control the detector and other devices. Up to four events can be activated by tapping the gray *Event* button.

Autozero An autozero scan is performed when this button is tapped.

Main Menu

Navigating the Main menu Tapping the  button in the *status display* calls up the Main menu:

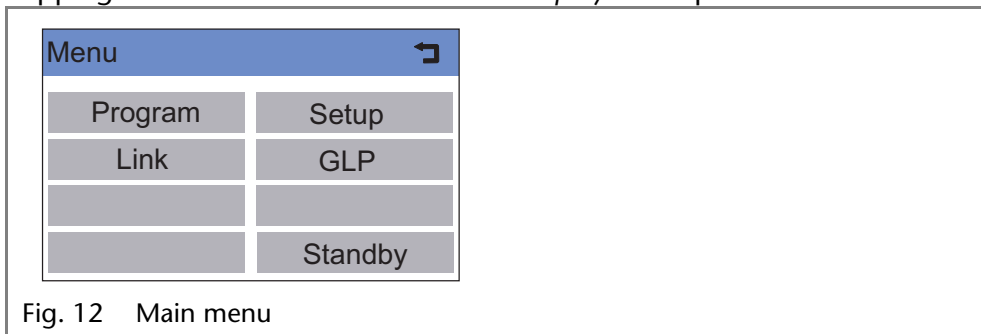


Fig. 12 Main menu


The individual menus are opened by tapping the correspondingly labeled buttons.

Program Menu

The detector can store ten programs with 99 program lines each. Program 10 (WU) is reserved for a *wake-up* program for a time-delayed execution of the links or programs.

The individual programs are labeled with numbers.

Program menu navigation

1. Tap the *Program* menu in order to display the program list.
2. Tap the desired program number to edit, open or delete the program.
3. Tap *Load* to run a program.
4. Tap *Edit* to enter the edit mode.
5. Tap *Delete* to delete a program.
6. Tap *Tab* to display a program line in a table.
7.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

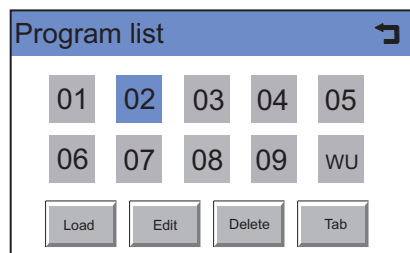





Fig. 13 Program menu

Creating a Program

Note: Occupied programs are represented by large displayed numbers, and free programs are represented by small displayed numbers.



Fig. 14 Program list

- Procedure*
1. Tap the *Program* menu in order to display the program list.
 2. Tap the desired program number and *Edit* to edit the program. (Diagram A)
 3. Enter the desired signal options.
 4. Enter the desired wavelengths and save them with .
 5. Enter the event settings.
 6. Tap *New* to specify the time. (Diagram B).
 7. Enter the value and time and tap  to save the settings. (C)
 8.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

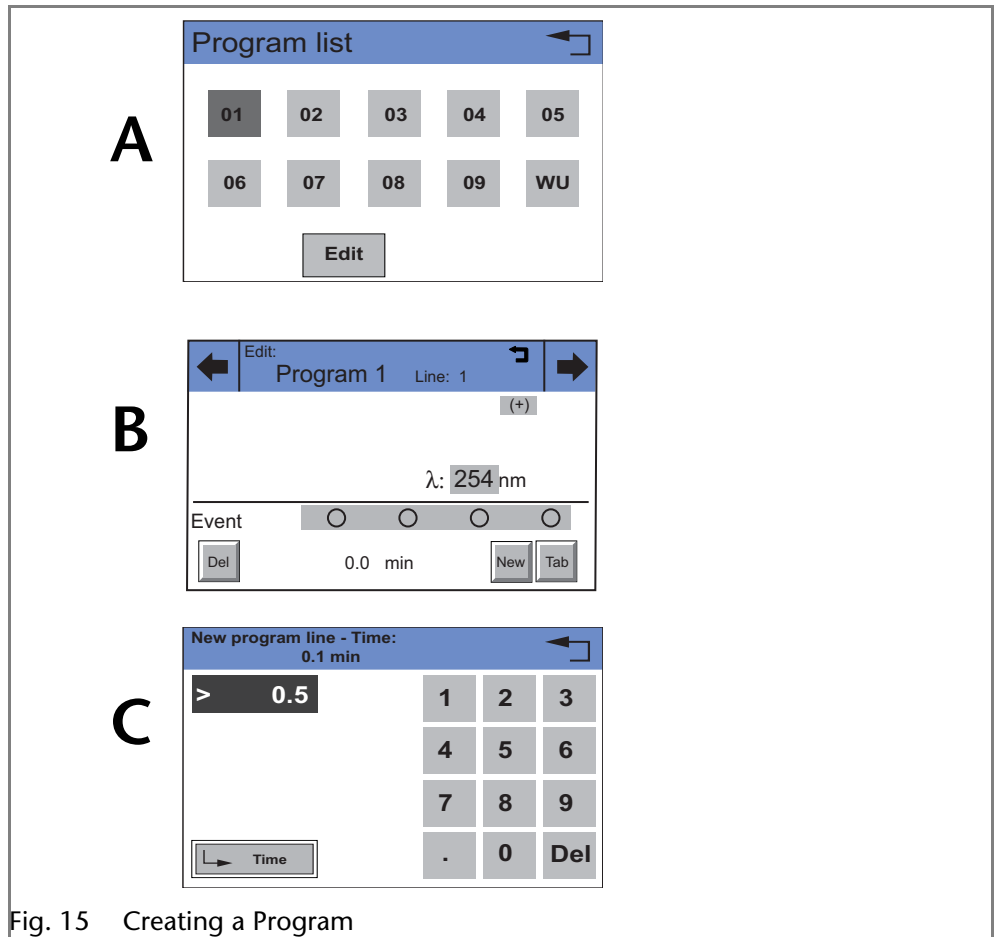


Fig. 15 Creating a Program

Creating Program Lines

New program lines can be created while creating a program.

Tap *Tab* in the program's editing window to display the program lines.

1. Tap *New* to create a new program line.
2. Enter the time value.
3. Save setting.
4. Enter value of desired channel.
5. Save setting.

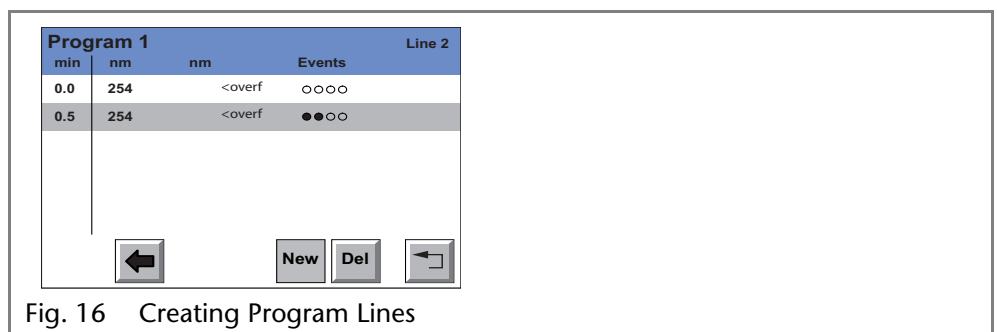







Fig. 16 Creating Program Lines

Deleting program lines


Program lines can be deleted while creating a program.

1. Tap *Tab* in the program's editing window to display the program lines.
2. **← →** should be tapped to mark the desired program line.
3. Tap *Del* to delete the desired program line.
4. Confirm the query.
5. **←** should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

Running a Program

1. Tap the *Program* menu in order to display the program list.
2. Tap the desired program number and *Load* to load the program.
3.  should be tapped to stop the program.
4.  should be tapped to interrupt the program.
5.  should be tapped to stop the program.
6.  should be tapped to repeat the program.
7.  should be tapped to exit the loaded program.

Changing a Program

1. Tap the *Program* menu in order to display the program list.
2. Tap the desired program number and *Edit* to edit the program.
3. Change the desired value.
4. Save setting.
5.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

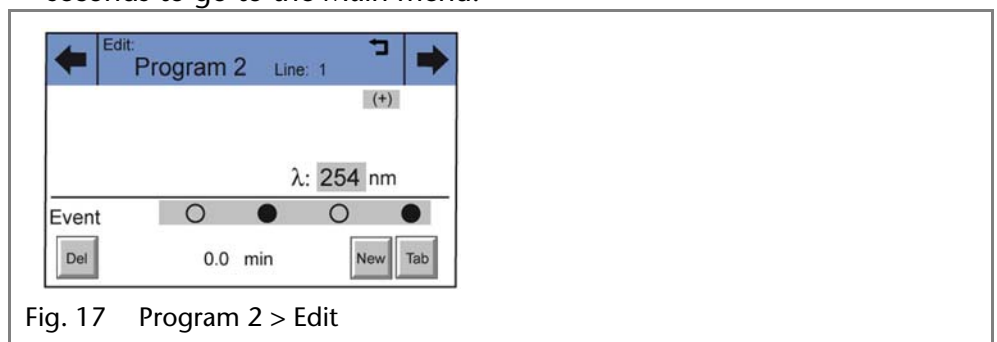




Fig. 17 Program 2 > Edit

Displaying the Program Lines

1. Tap the *Program* menu in order to display the program list.
2. Tap the desired program number and *Tab* to reach the program line display.
3.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

Deleting the Program




1. Tap the *Program* menu in order to display the program list.
2. Tap the desired program number and *Delete* to delete the program.
3. Confirm the query.
4.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.


Creating a Program with a Starting Time

Program WU The program labeled WU serves as a *wake-up* program . It can be used to load a program or link and can be started at a predetermined time.

Note:

Note: Make sure that the date and time configured in the *Setup* menu are correct.

- Procedure*
1. Tap the *Program* menu in order to display the program list.
 2. Tap *WU* and *Edit* to edit the program.
 3. Chose the program or link to be run at the wake-up time in the *wake-up* line and confirm it with .
 4. Enter the program start-date and confirm it with .
 5. Enter the program start-time and confirm it with .

6.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

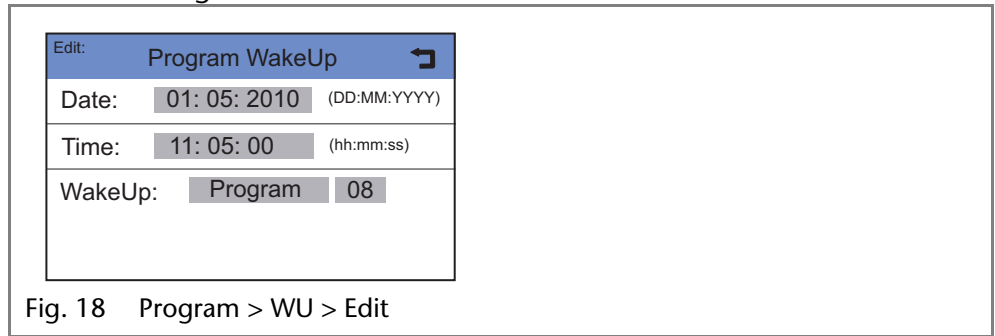


Fig. 18 Program > WU > Edit

WU > Load


The *WakeUp* control mode can be started with *WU > load* after answering the security query *load wakeup program?* The screen will display the characters *WAKEUP*, as well as the detector's wake-up time and the current time. The screen turns on the power saving mode.

Link Menu

Links contain connections between existing programs, which can be defined and edited, like the programs themselves.

A maximum of 10 links between defined programs can be created and saved.

Navigating through the Link menu

1. Tap the *Link* menu to display the Link list.
2. Tap the desired link number to edit, open or delete the link.
3. Tap *Load* to run a link.
4. Tap *Edit* to enter the edit mode.
5. Tap *Delete* to delete a link.
6. Tap *Tab* to display the program line.
7.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

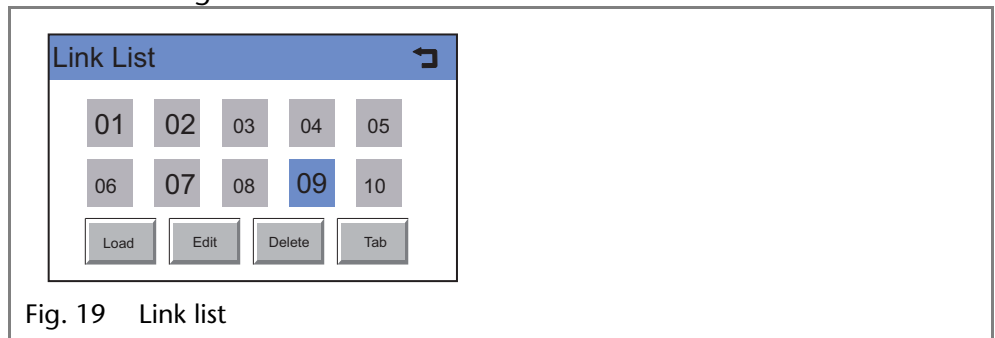


Fig. 19 Link list


Creating a Link



A link can contain up to 50 lines (*line*).

Each link contains

- the number of a to be connected program (*line program*, 1 through 9),
- the number of repetitions (*line repeat*, 1 through 99)
- the *wait status* i.e. waiting for an external signal (*for external signal*) or continue without interruption (*no wait*).

Procedure

1. Tap the *Link* menu to display the Link list (diagram A).
2. Tap the desired link number to edit the link.
3. Enter program number (diagram B).
4.  should be tapped to save the settings.
5. Enter the number of repetitions (*Repeat*) for the previously specified program.

6.  should be tapped to save the settings.
7. Select the desired option for *wait* (diagram C).
8.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

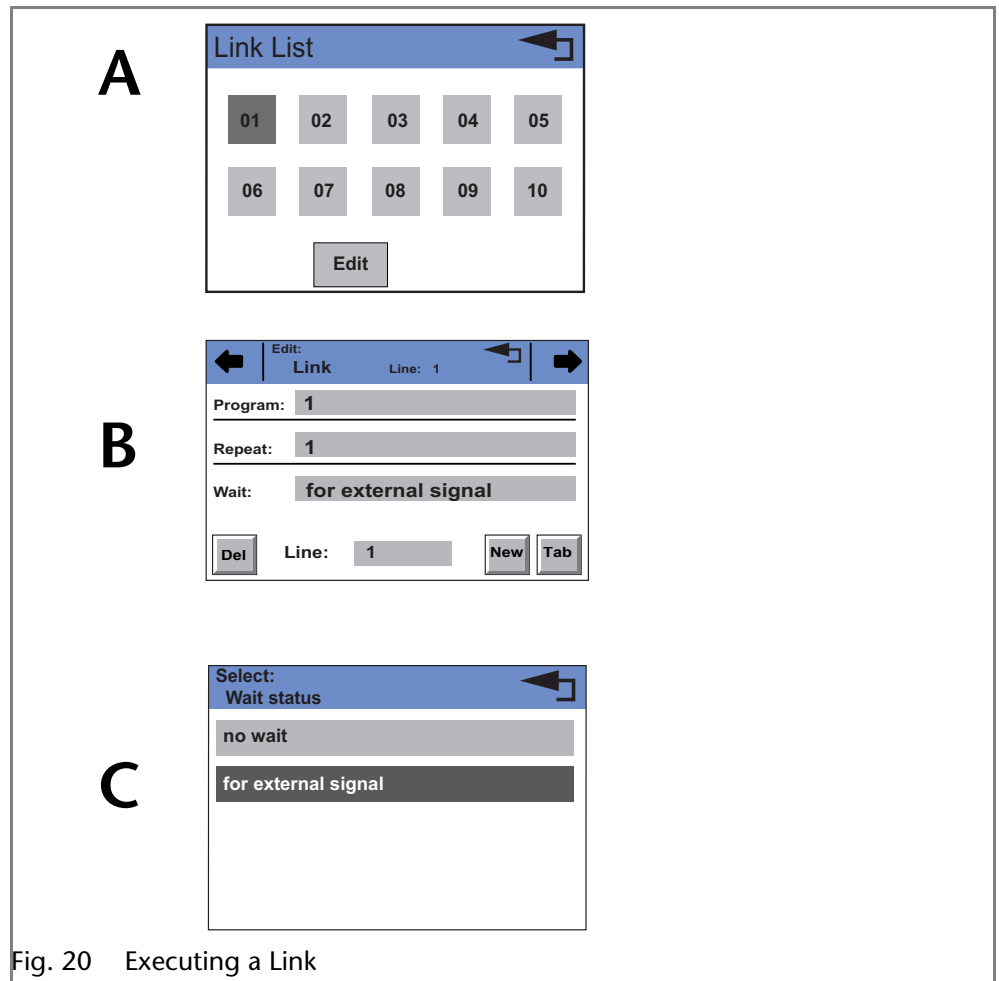








Fig. 20 Executing a Link

Executing a Link

1. Tap the *Link* menu to display the Link list.
2. Tap the desired link number and *Load* to load the link.
3.  should be tapped to start the link.
4.  should be tapped to interrupt the link.
5.  should be tapped to stop the link.
6.  should be tapped to be able to repeat the link.
7.  should be tapped to exit the loaded link.

Deleting a Link

1. Tap the *Link* menu to display the Link list.
2. Tap the desired link number and *Delete* to delete the link.
3. Confirm the query.
4.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

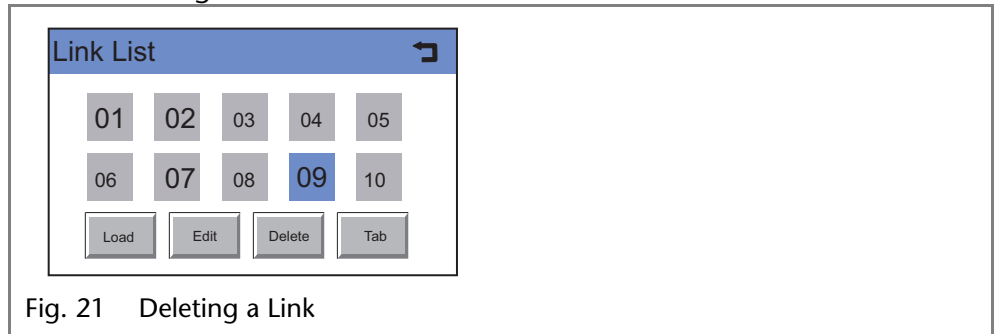





Fig. 21 Deleting a Link

Setup Menu

In the Setup menu, fundamental parameters for controlling the detector are specified.

Navigating the Setup Menu

1. Tap the *Setup* menu to display options.
2. Tap this option to see current parameters selected. The option *Scan* is only for multiple wavelength detectors available.
3. Tap the gray highlighted values to display all available parameters.
4. Tap the desired parameters.
5.   should be tapped to scroll through the other options in the setup menu.
6.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

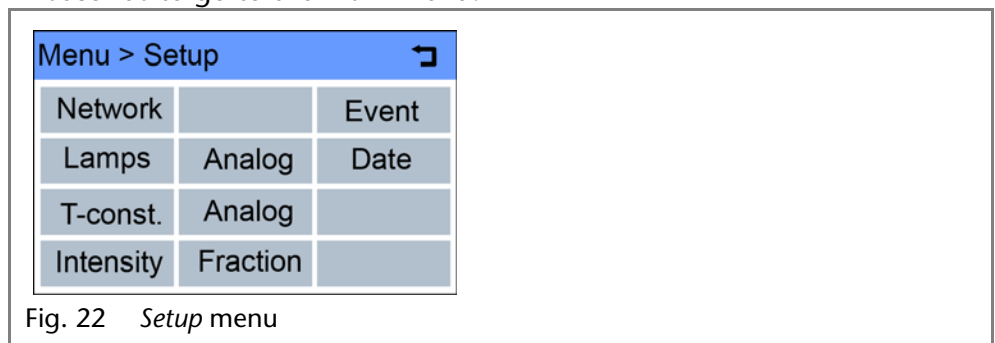


Fig. 22 Setup menu

Setup Menu Parameters

Network

The network configuration is displayed:

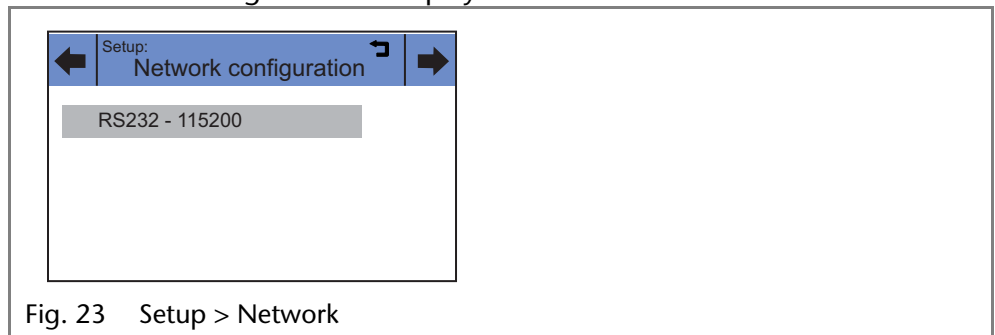


Fig. 23 Setup > Network

Tapping the gray areas opens a list of further configuration options.

Lamps The deuterium lamp can be switched and calibrated.

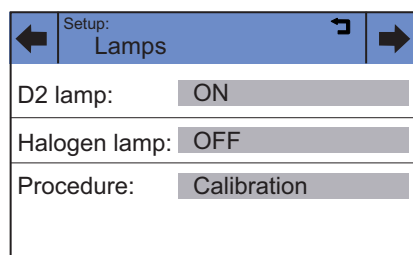


Fig. 24 Setup > Lamps

T-const. Here a time constant can be selected from prescribed values from 0.1 s to 10.0 s, to smooth the analog output signal. Smaller time constants can only be set using LAN control with the chromatography software.

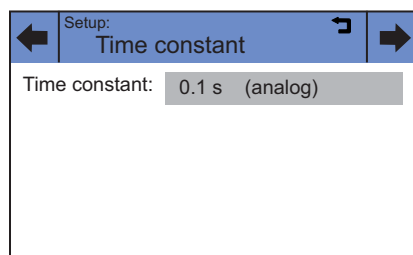


Fig. 25 Setup > T-const.

Intensity The intensities in channel C1 are displayed. *Monitor source* can be selected (absorption, signal channel, reference channel).

Setup: intensities - channel 1	
I-sig: 0.0562	I-sig: 511 nW
I-ref: 0.0275	I-ref: 220 nW
756 nm	Integr.: ms
Monitor source: absorption	

Fig. 26 Setup > Intensity

For check the functionality of the lamp, the two light intensity values **I-sig** and **I-ref** provide useful information. The right column notes the absolute light intensity that the signal and reference channels in the UV-maximum measure after a calibration. The values are independent from the integration time default setting and can, therefore, be used as a spectra sources quality gauge. The value **I-sig** allows you to draw conclusions about the measurement situation (installed flow cell type, solvent used, bubble free, etc.).

Analog out Here the offset (moving the baseline) and scaling (in AU/V) of the integrator output can be set.

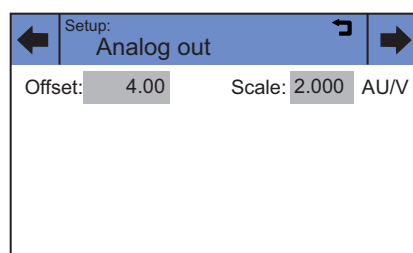


Fig. 27 Setup > Analog out

Analog in The external λ input on the back of the device enables external control of the detector through a positive analog voltage that is applied against AGND.

By selecting *Set to zero* a voltage can be defined as the spectral zero point for the wavelength 000 nm. Typically, a voltage of 0 is used in this case.

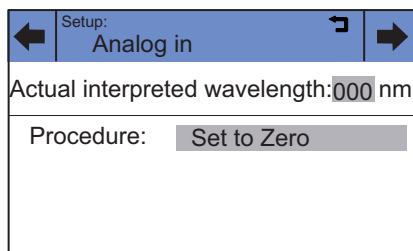


Fig. 28 Setup > Analog in

If the control voltage is raised, then the *actual interpreted wavelength* field shows the corresponding wavelength with a scaling of 100 nm/V. The scaling can be changed with the number keys that appear after tapping the field.

Note: For optimal linearity a scaling of 100 nm/V is recommended. The greatest wavelength (750 nm) is then reached with a control voltage of 7.5 V.

Fraction A fraction collector can be controlled through the terminal strip on the back of the detector.

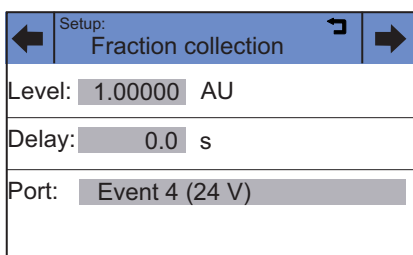


Fig. 29 Setup > Fraction

Setup>Fraction> Level The *Level* line is used to specify the signal height that needs to be exceeded to switch on the fraction collector.

Setup>Fraction> Delay With the value in the *Delay* line, the propagation delay due to the dead volume of the capillaries between detector and fraction collector is taken into account.

Setup>Fraction> Port When the set threshold in the *Level* is exceeded, the event output selected in the *Port* line is switched and remains active until the signal drops below the threshold value. The threshold always relates to the signal on the measurement channel.

The following event outputs can be selected in the *Port* line:

- Event 1 (relay contact EV 1)
- Event 2, Event 3 (TTL outputs EV 2, EV 3)
- Event 4 (switch voltage +24V valve)

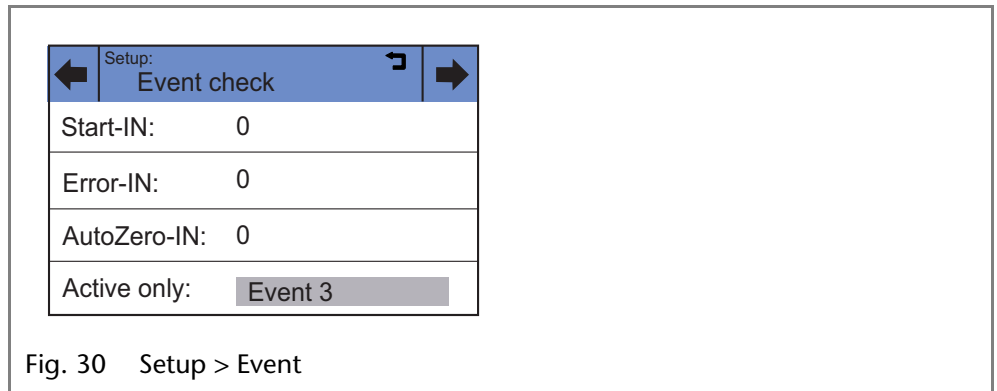


Fig. 30 Setup > Event

By tapping the gray field in the *active only* line, the condition of the event connections can be checked.

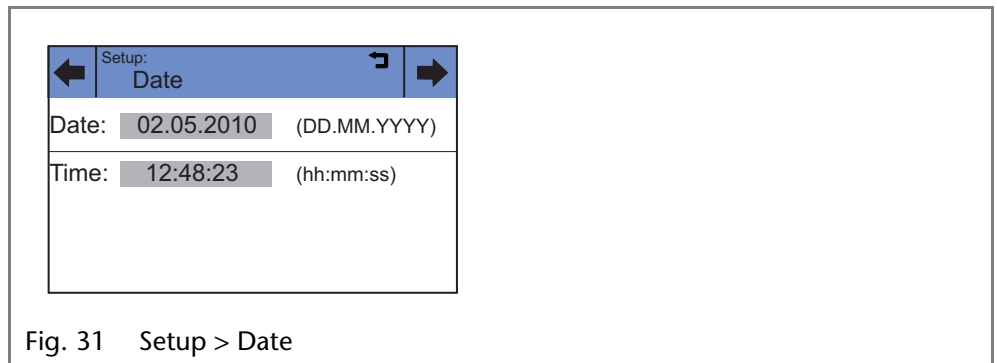




Fig. 31 Setup > Date

Here the date and time for the detector can be entered, after tapping the gray buttons next to *Date* and *Time*.

GLP Menu

The GLP menu is for information purposes only. The submenus provide information about the use of the detector, deliver an overview of the configuration and inform as to the condition of the device. The data can be viewed by tapping the corresponding buttons.

Navigating through the GLP menu

1. Tap the *GLP* menu to display operating parameters.
2. Tap the gray highlighted values to display all available options.
3.  should be tapped to scroll through the other options in the *GLP* menu.
4.  should be tapped to go to the superordinate level, or hold for two seconds to go to the Main menu.

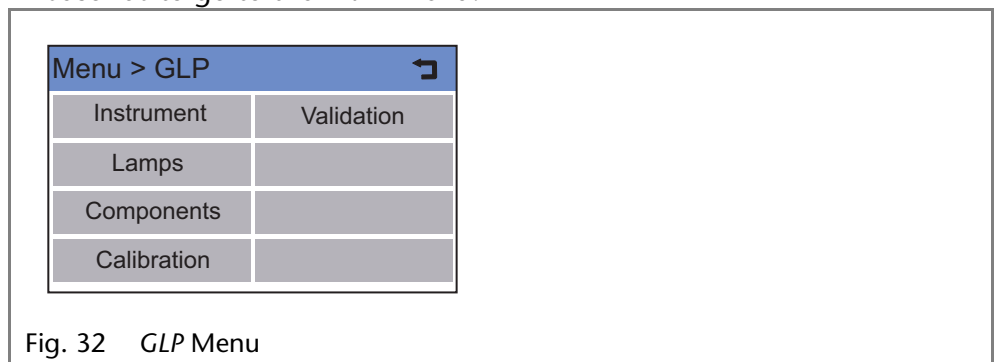


Fig. 32 GLP Menu

The supplied service tool additionally records all device data and is used for remote service diagnostics.

Standby

By tapping the *Standby* button, the detector goes into the energy saving standby mode. The word STANDBY is displayed on the touchscreen and the standby lamp goes on. The event inputs and communication interfaces remain active.

The return from standby mode is made by tapping the touchscreen. The standby lamp goes out, and the device behaves as it would if turned on with the power switch. No calibration takes place, as the set wavelength has been fixed.

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 and must be purchased from the manufacturer. Contact the KNAUER Sales Department to request an offer. The Operation Qualification is a standardized KNAUER document and 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 using the Operation Qualification at following intervals:

- Every 3 months: average useful life of more than 5 days/week or 24 hours/day; when operating with buffer solutions or other salt solutions:
- Every 6 months: average useful life of 1 to 5 days/week

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 gotten into the supply lines.
 4. Check device for leaks.
 5. Observe system messages on the display.

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 be sure 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 flow cell 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 flow cell to prevent incursion from interfering light or an electronics error. 3. Replace the defective flow cell. 4. Inspect the service life of the display lamp 5. Reduce the air in the flow cell by using a degasser.
The relationship of the signal to the light path reference is very low	<ol style="list-style-type: none"> 1. Rinsing the Flow Cell 2. Clean the flow cell window. 3. Exchange lamp (spectrum source)

Further Measures

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

Possible LAN 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.

<ol style="list-style-type: none"> 1. Check the status of the LAN connection in the Windows taskbar: <ul style="list-style-type: none"> -  Connected -  Connection not established If no connection was established, test the following: <ul style="list-style-type: none"> ▪ Is the router on? ▪ Is the patch cable connected correctly to the router and the computer? 	<input type="checkbox"/>
<ol style="list-style-type: none"> 2. Check the router settings: <ul style="list-style-type: none"> ▪ Is the router set to DHCP server? ▪ Is the IP-address range sufficient for all the connected devices? 	<input type="checkbox"/>
<ol style="list-style-type: none"> 3. Check all connections. <ul style="list-style-type: none"> ▪ 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? 	<input type="checkbox"/>

<p>4. If the router is integrated into a company network, pull out the patch cable from the WAN port.</p> <ul style="list-style-type: none"> ▪ Can the devices communicate with the computer, even though the router is disconnected from the company network? 	<input type="checkbox"/>
<p>5. In case you own a Control Unit, check the settings in the menu <i>Setup > Network</i>.</p> <ul style="list-style-type: none"> ▪ Is <i>LAN-DHCP</i> set for controlling? ▪ Did the device receive an IP address? 	<input type="checkbox"/>
<p>6. Turn off all devices, router, and computer. Firstly turn on the router, secondly the devices and the computer.</p> <ul style="list-style-type: none"> ▪ Has this been successful? 	<input type="checkbox"/>
<p>7. Replace the patch cable to the device with that no connection could be established.</p> <ul style="list-style-type: none"> ▪ Has this been successful? 	<input type="checkbox"/>
<p>8. Check that the IP port in the device/s and chromatography software are identical.</p>	<input type="checkbox"/>

System Messages

If other system notifications 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
At least one wavelength must be valid.	Check whether a channel is on. Check whether the wavelengths are within permissible range (190 to 750 nm).
Calibration failed	Switch the device off and on. Check whether lamps, motor and filter are functioning correctly. If the system message appears again, notify the manufacturer for technical support. Restart calibration on the device or in 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 an uncalibrated instrument	Switch the device off and on. Wait until calibration is completed.
Cannot operate with an empty link	Create a link.
D2-Lamp does not start!	Switch off lamp on touchscreen and turn it on again. If the system message appears again, notify the manufacturer for technical support. The lamp unit has to be replaced.

System message	Solution
Data acquisition active	No entries are possible. First stop acquiring measurement data, afterwards you can make a new entry.
Filter move error	Switch the device off and on. If the system message appears again, notify the manufacturer for technical support.
Instrument remote controlled	This entry is not executable. Quit software.
Invalid command	Check the cable connections. Change the entry.
Invalid parameter(s)	Check the validity of the parameters.
Invalid time in time table	Correct the time entry.
Invalid time table index	Change the entry in 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.
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.
Not enough space to store link	Check the detector. Check the number of program lines. A maximum of 100 program lines are possible.
Not enough space to store program	Check the detector. Check the number of program lines. A maximum of 100 program lines are possible.
Program does not exist	Create a program.
Program is running	Quit program or wait until program has been completed.
This link is used in Wake up	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 Wake up	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
Time table is not active	The device is in <i>Standalone mode</i> , no program is running. If you try to quit a non-existent program sequence, this message appears.
Time table is not loaded	First load the program, then start the program.
Time table line is empty	Edit the program line.
Too many lines in program	Check the number of program lines. A maximum of 100 program lines are possible.
Wrong Line number	Change the entry in the program line.

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.

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.

NOTICE

Electronic defect

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

→ Switch off the device

→ Pull the power plug.

Users may perform the following maintenance tasks themselves:

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

Maintenance Contract

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

The following maintenance work on the device may only be performed by KNAUER or a company authorized by KNAUER 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.

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

Touchscreen The touchscreen of the devices can be cleaned with isopropanol and wiped dry with a soft, lint-free cloth.

Cleaning the Flow Cell

Increased noise of the baseline 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.

Rinsing the Flow Cell

The following solvents are recommended for rinsing:

- | | |
|---------------------------|---|
| <i>Auxiliary material</i> | <ul style="list-style-type: none"> ▪ HCl ▪ NaOH ▪ Ethanol ▪ Acetone |
| <i>Tools</i> | <ul style="list-style-type: none"> ▪ Syringe |

NOTICE

Performance decrease

Oil drops can contaminate the flow cell.

- Do not use compressed air for drying.

- Procedure*
1. Fill one of the recommended solvents into a syringe.
 2. Inject it into the inlet of the flow cell and allow it to act for 5 minutes.
 3. Flush with plenty of water
 4. The cell is then dried in a nitrogen stream.

What to do when... 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 PTFE seal
- ② Lens
- ③ Compression part
- ④ Threaded ring

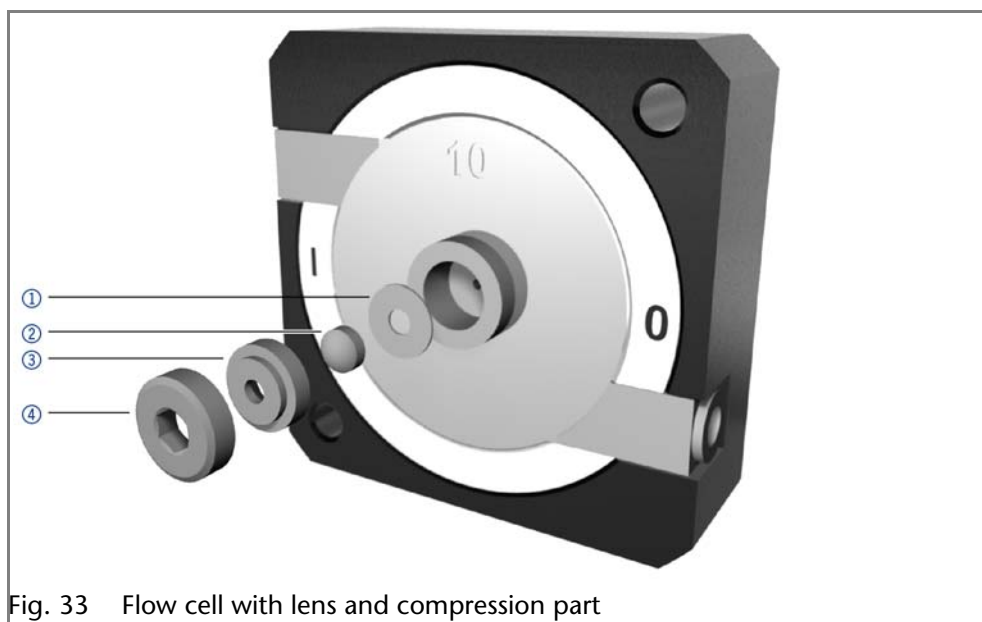


Fig. 33 Flow cell with lens and compression part

Prerequisite

- The device has been switched off.
- The flow cell has been removed.

Auxiliary material

- Tweezers
- Allen wrench, size 3

Procedure

1. Loosen the threaded ring ④ with the 3 mm hexagonal spanner included with the measuring cell.
2. Using tweezers or by gently tapping on a clean surface, remove the compression part ③ .
3. The lens ② is protected by a PTFE seal ① . This must be renewed every time the lens is disassembled.
4. Remove the lens and clean with a clean, soft cloth or with an appropriate solvent in an ultrasonic bath. Make sure that the clean lens is not touched by fingers.
5. Afterwards, assemble the flow cell and make sure that the new PTFE seal does not interrupt the light path.
6. Next, tighten the threaded ring with the hexagonal spanner to avoid damage to the lens.

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 analytic cells.

Legend

- ① Threaded ring
- ② Stainless steel cover
- ③ PEEK spacer
- ④ Seal holder (compression bushing)
- ⑤ Light guide with PTFE seal ring

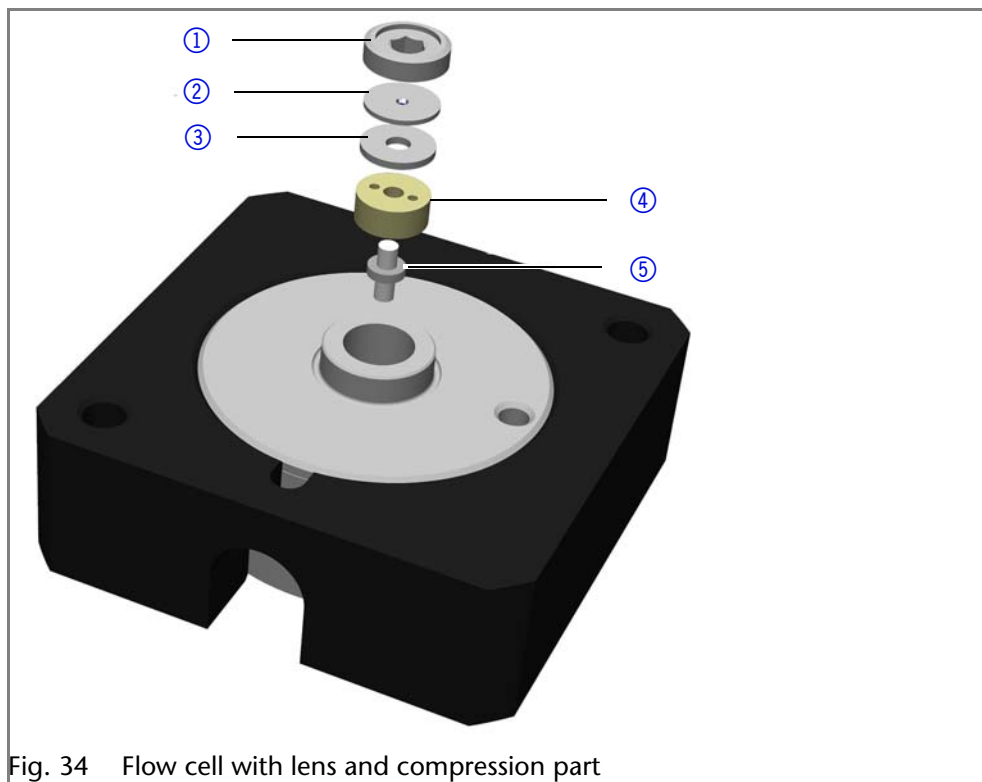


Fig. 34 Flow cell with lens and compression part

Prerequisite

- The device has been switched off.
- The flow cell has been removed.

Auxiliary material

- Tweezers
- Allen wrench, size 3

Procedure

1. Loosen the threaded ring ① with the 3 mm hexagonal spanner included with the measuring cell.
2. Remove stainless steel cover ② and the PEEK spacer ③ (not part of all flow cells).
3. Using tweezers, pull out the seal ring with the light guide ⑤.
4. Carefully push the light guide out of the holder and strip off the PTFE seal. The PTFE seal needs to be renewed during every cleaning.
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 PTFE seal does not interrupt the light path.
7. Next, tighten the threaded ring ① with the hexagonal spanner to avoid damage to the light guide.

What to do when...

If cleaning does not lead to success, you have to replace the light guide.

Replacing the Flow Cell

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

Legend

- ① Inlet
- ② Outlet
- ③ Knurled-head screws
- ④ Cover plate
- ⑤ Slide

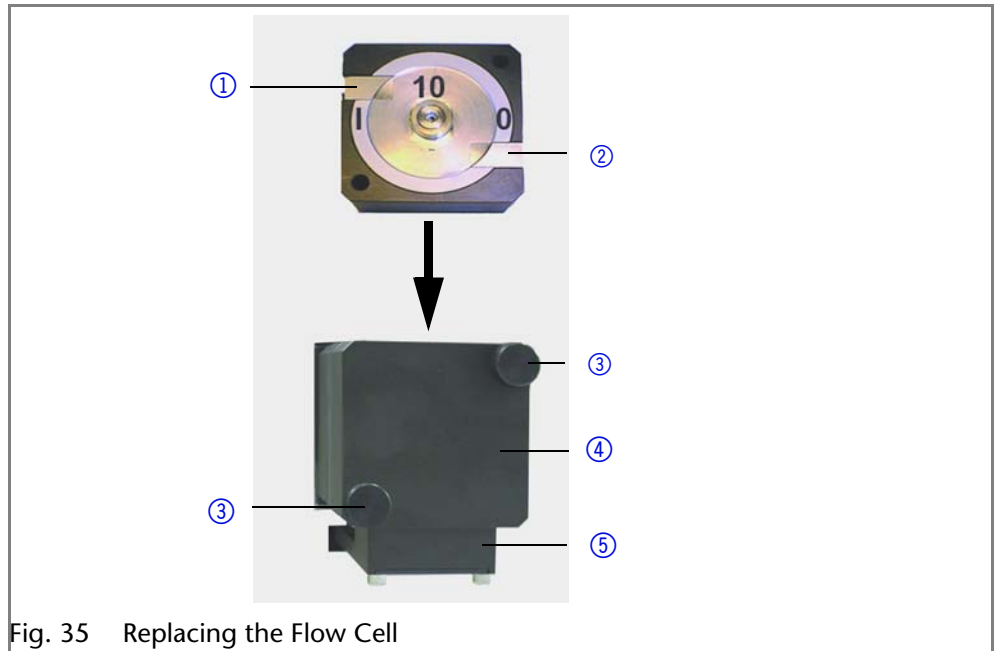


Fig. 35 Replacing the Flow Cell

Prerequisites

- The device has been switched off.
- The power plug has been pulled.
- The capillaries have been removed.

Procedure

1. Remove capillaries at the inlet ① and outlet ② of the flow cell.
2. Unscrew the knurled-head screws ③ of the cover plate ④. Hold the flow cell securely with your hand during this procedure.
3. Pull out the slide with the flow cell ⑤ towards the front.
4. Remove the flow cell upward.
5. Insert new flow cell from above into the flow cell holder. Keep holding the flow cell.
6. Push the flow cell holder against the detector again.
7. Screw the knurled-head screws back into the cover plate ④ and tighten.

Replacing the Fiber Optics

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

Observe the following regarding the use of UV 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

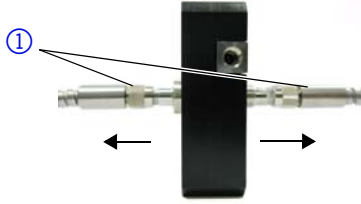


Prerequisites
Auxiliary material

The device has been switched off.

Blind fittings for the flow cell

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

Procedure

Process	Figure
1. Manually, unscrew the fittings ① of the fiber optics from the flow cell.	 <p>Fig. 36 Fitting of the fiber optics on the flow cell</p>
2. Seal the fiber optics endings with caps ②.	 <p>Fig. 37 Cap fitting on the fiber optics</p>
3. Manually unscrew the fiber optics ③ from the detector.	 <p>Fig. 38 Fitting of the fiber optics 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
Optical bandwidth	11 nm at H _α line (FWHM)
Wavelength accuracy	± 2.5 nm
Wavelength precision	0.3 nm (ASTM E1657-98)
Noise	± 1.5 × 10 ⁻⁵ AU at 254 nm ± 2.0 × 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	0.1/ 0.2/ 0.5/0.1/ 1.0/ 2.0/5.0/ 10.0 s
	Integration time	Automatic
<i>Communication</i>	Maximum data rate	50 Hz (LAN), 20 Hz (Analog), 10 Hz (RS-232)
	Inputs	Error (IN), Start (IN), Autozero, 0–10 V Analog IN
	Outputs	Events 1–3, +5 V, 24 V Valve
	Analog outputs	1 × 0–5 V scalable, 20 bit, offset adjustable
	Control	Digital: RS-232, LAN-DHCP, remote connector Analog: wavelength control Manual: Touchscreen
	Programming	Time-controlled: wavelength, events, fraction valve, links, wake-up (program, link), 9 programs, 50 program lines
<i>Technical parameters</i>	GLP function	Detailed report including lamp recognition, operating hours, lamp operating hours, number of lamp ignitions
	Display	TFT 2.4" monitor
<i>Ambient conditions</i>	Temperature range	4–40 °C/39.2–104 °F
	Air humidity	below 90 %, non condensing
<i>General</i>	Power supply	100–240 V, 50–60 Hz, 75 W
	Dimensions	242 mm x 169 mm x 399 mm (W × H × D)
	Weight	5.3 kg/5.4 kg (fiber optics version)
	Protection type	IP 20
	Height above sea level	maximum 2000 meters

Storage

The device can be stored within the following ambient conditions:

- Temperature range: 4–40 °C/39.2–104 °F
- Air humidity: below 90 %, non condensing

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 any damage, 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.

KNAUER Wissenschaftliche Geräte GmbH

Hegauer Weg 38

14163 Berlin, Germany

Phone: +49 30 809727-111

Telefax: +49 30 8015010

e-mail: info@knauer.net

Internet: www.knauer.net

Declaration of Conformity

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

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.

Abbreviations and Terminology

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

Terminology	Meaning
Degasser	Degasser module for fluids, e.g., in a high-pressure pump.
GLP	Good Laboratory Practice – quality assurance for laboratories.

Terminology	Meaning
Gradient	Time-dependent composition of solvent (mobile phase) on low-pressure or high-pressure side of system.
HPLC	High pressure liquid chromatography (HPLC).
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 network or Internet (Internet protocol).
Solvent	Mobile phase (eluent) or carrier for liquid chromatography.
Remote	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.
UHPLC	Liquid chromatography in the ultra-high pressure or ultra-high performance range.

Index

A

Abbreviations 45
 Additives 8
 Ambient conditions 43
 Analog in 31
 Analog out 30
 Analog port 14
 Example 14
 AVV marking 44

B

Buttons 21

C

Capillaries 17
 Capillary
 Clamping ring 17
 Fitting 17
 Torque 17
 Care 37
 changing the optical path length 16
 Cleaning 37
 Cleaning and Caring for the Device 38
 Cleaning the flow cell 38
 Cleaning the lens 39
 Cleaning the light guide 40
 Configuration 20
 Conformity 45
 Connection Problems (LAN) 34
 Connectors 12
 Contact data 11
 Control menu 23

D

Date 32
 decontamination 10
 Device Overview 6

E

Eluents 8
 Event 32
 Events 23

F

Features 7
 Flow cell, installation 15
 Flow cells 41
 Fraction 31
 Functionality tests 33

G

GLP menu 20, 32
 Graphical user interface structure 22
 GROUND, see spring strip 13

H

Hotline
 Europe 11

I

Initial Startup 15
 Installation 11
 Integrator, see analog port 15
 Intended Use 6
 Intensity 30
 IP port 20
 IQ 33

K

Keys
 Touchscreen 21
 Keys, see buttons 21

L

Lamps 30
 LAN
 Connection Problems 34
 Router 19
 Settings 18
 Setup 18
 Troubleshooting 34
 leak 9
 Link menu 27
 Location 11

M

Maintenance 37
 Maintenance Contract 37
 Markings 10
 Modifiers 8

O

OQ 33

P

Pin header
 Autozero 13
 Start-IN port 13
 Port, see IP port 20
 power
 strip 9
 supply 9
 Power connection 11
 Power Supply 11
 power supply
 cable 9
 professional group 8
 Program menu 24

R

Replacement **41**
Replacing the flow cell **20, 41**

S

Safety **8**
safety equipment **9**
Salts **8**
Scan menu **29, 33**
Scope of Delivery **8**
Setup menu **29**
Simulation cell **15**
solvent
 flammability **9**
 line **9**
 self-ignition point **9**
 tray **9**
Solvents **8**
Spring strip **13**
Standby **33**
Start IN, see pin header **13**
Status display **23**
Storage **43**

Switching the detector on **20**
Symbols **10**
System Messages **35**

T

T-const. **30**
Technical Data **42**
Technical Support **11**
Terminology **45**
test
 Installation Qualification **33**
 Operation Qualification **33**
Touchscreen **20**
 Keys **21**
transport damage **43**
Troubleshooting **33**
 LAN **34**

U

Unpacking **12**

W

Wakeup Program **26**
warranty **44**

© KNAUER Wissenschaftliche Geräte GmbH
All rights reserved.
Technical data are subject to change without notice. Please check our website for latest updates and changes.
Translation of the original German edition of this manual, version 2.0
Last manual update: 2016-04-20
Printed in Germany on environmentally friendly paper from sustainable forests.

® BlueShadow are registered trademarks of:
KNAUER Wissenschaftliche Geräte GmbH

www.knauer.net

HPLC · SMB · Osmometry

KNAUER
Wissenschaftliche Geräte GmbH
Hegauer Weg 38
D-14163 Berlin, Germany

Phone: +49 30 809727-0
Telefax: +49 30 8015010
E-Mail: info@knauer.net
Internet: www.knauer.net



© KNAUER 2016 V7646/0.05/10.13/Mimeo