Science with Passion

KNAUER

AZURA

Fraction Collector FC 6.1

Instructions

Document no. V6777

HPLC

Note: For your own safety, read the instructions and follow the warnings and safety information on the device and in the instructions. Keep the instructions for future reference.

Note: In case you require this instruction in another language, please submit your request including the corresponding document number via e-mail or fax to KNAUER.

Support: Do you have questions about the installation or the operation of your instrument or software?

International Support:

Contact your local KNAUER partner for support:
www.knauer.net/en/Support/Distributors-worldwide

Support in Germany
(Austria & Switzerland on case-to-case basis):
Phone: +49 30 809727-111 (workdays 9-17h CET)
Fax: +49 30 8015010
E-mail: support@knauer.net

Publisher: KNAUER Wissenschaftliche Geräte GmbH
Hegauer Weg 38
14163 Berlin
Germany
Phone: +49 30 809727-0
Fax: +49 30 8015010
Internet: www.knauer.net
E-mail: info@knauer.net

Version information: Document number: V6777
Version number: 1.0
Release date: April 11, 2025

These instructions apply to products with the product number: AFA00, AFA01.

The information in this document is subject to change without prior notice. For the latest version of the instructions, visit our website: www.knauer.net/library.

Table of contents

1. General

1.1 About these instructions

These operating instructions enable the safe and efficient operation of the device. These operating instructions are an integral part of the device. The user must have carefully read and understood these operating instructions before starting any work.

The basic prerequisite for safe operation is compliance with all safety instructions (see "2. Basic safety instructions" on page 3). In addition to the safety and warning instructions in these operating instructions, the local accident prevention regulations and the national industrial safety regulations apply.

You can download these and other instructions from the KNAUER website: www.knauer.net/library.

1.2 Warnings

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

Symbol	Meaning
⚠ DANGER	DANGER (red) indicates a highly hazardous situation. If not avoided, it will result in death or serious injury.
⚠ WARNING	WARNING (orange) indicates a hazardous situation. If not avoided, it could result in death or serious injury.
⚠ CAUTION	CAUTION (yellow) indicates a moderate hazardous situation. If not avoided, it could result in minor or moderate injury.
NOTICE	NOTICE (blue) is used to address issues which are not related to physical injury.

1.3 Additional typographical conventions

Note: Specific information are prefixed with the word „Note" and an information icon.

Note: This is an example.

1.4 Legal information

1.4.1 Limitation of liability

The manufacturer is not liable for the following issues:

- Non-compliance of these instructions
- Non-observance of necessary safety precautions
- Improper use

- Operation of the device by unqualified personnel
  (see chapter 2.2 on page 3)
- Use of non-approved spare parts
- Technical changes by the user such as opening the device and unauthorized modifications
- Violations of General Terms and Conditions (GTC)

1.4.2 Transport damage

The packaging of our devices provides the best possible protection against transport damage. However, check the packaging for transport damage. In case you notice any damage, inform the Technical Support and the shipping company within three workdays.

1.4.3 Warranty conditions

For information on warranty refer to our general terms and conditions on the website: www.knauer.net/terms

1.4.4 Declaration of conformity

The declaration of conformity is enclosed as a separate document with the product and can be obtained online: www.knauer.net/de/Support/Declarations-of-conformity.

2. Basic safety instructions

The device has been developed and constructed in such a way that hazards arising from its intended use are largely excluded. Nevertheless, the following safety instructions must be observed in order to exclude residual hazards.

2.1 Intended use

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.

2.1.1 Operating ranges

The device is intended to be used indoors for chromatographic applications.

2.1.2 Foreseeable misuse

Refrain from the use of the device for the following purposes or conditions:

- Medical purposes. The device is not approved as a medical product.
- Operating outdoors. Otherwise, the manufacturer does not guarantee the functionality and safety of the device.

2.2 User qualification

The users are qualified to handle the device if all of the following points apply:

- They have at least a basic knowledge of liquid chromatography.
- They have knowledge about the properties of the used solvents and their health risks.
- They are trained for the special tasks and activities in the laboratory and know the relevant standards and regulations.
- Due to their technical training and experience, they can understand and carry out all the work described in the operating instructions on the instrument and recognize and avoid possible dangers independently.
- Their ability to react is not impaired by the consumption of drugs, alcohol or medication.
- They have participated in the installation of an instrument or training by KNAUER or an authorized company.

If users do not meet these qualifications, they have to inform their supervisors.

2.3 Operator responsibility

The operator is any person who operates the device himself or leaves it to a third party for use. It also bears the legal product responsibility for the protection of the user or third parties during operation.

The obligations of the operator are listed below:

- Know and follow the applicable work safety regulations.
- Identify hazards arising from the working conditions at the place of use in a risk assessment.
- Set up operating instructions for the operation of the device.
- Regularly check whether the operating instructions correspond to the current status of the regulations.
- Clearly regulate and specify responsibilities for installation, operation, troubleshooting, maintenance and cleaning and set clear rules.
- Ensure that all personnel who work with the device have read and understood these operating instructions.
- Train the personnel who work with the device at regular intervals and inform them about the dangers.
- Provide the necessary safety equipment to the employees working with the unit (see section below).

2.4 Personal safety equipment

The protective measures required in the laboratory have to be observed and the following protective clothing worn during all work on the device:

- Safety glasses with side protection
- Protective gloves in accordance with the prevailing ambient conditions and used solvents (e.g. heat, cold, protection against chemicals)
- Lab coat
- Personalized protective safety equipment which is specified in the particular laboratory.

2.5 Safety features on the device

- Power switch: Devices of the AZURA® L series may be switched off using the power switch (toggle switch on the back side of housing) at any time, this causes no damage to the device.
- Leak tray: The device has a leak tray on the underside. The leak tray collects leaking solvents and protects components from potential damage caused by discharging liquid. The leak tray has a drain at the bottom front, which the operator has to connect to an appropriate waste container via a waste tube.

2.6 Working with solvents

2.6.1 General requirements

- The user is trained for handling different solvents.
- Note recommended solvents and concentrations in these instructions in order to avoid personal injury or damage to the device. For example, certain chemicals may cause PEEK capillaries to swell or burst (see “13. Chemical compatibility of wetted materials“ on page 51).
- Note that organic solvents are toxic above a certain concentration. For handling hazardous solvents see the following section.

- Mobile phases and samples may contain volatile or combustible solvents. Avoid the accumulation of these substances. Ensure good ventilation of the installation site. Avoid open flames and sparks. Do not operate the instrument in the presence of flammable gases or vapors.
- Only use solvents which do not self-ignite under given conditions. This applies especially to the use of a thermostat where liquids could get onto hot surfaces in the interior.
- Degas solvents before use and observe their purity.

2.6.2 Contamination by health-threatening solvents

- Contamination with toxic, infectious or radioactive substances poses a hazard for all persons involved during operation, repair, sale, and disposal of a device.
- All contaminated devices must be properly decontaminated by a specialist company or the operating company before they can be recommissioned, repaired, sold, or disposed (see chapter 2.9 on page 7).

2.6.3 Avoiding leakage

Risk of electrical shock or short circuit if solvents or other liquids leak into the interior of the device. You can avoid a leakage through the following measures:

- Tightness: Visually check the device or system regularly for leaks.
- Solvent tray: A solvent tray prevents liquids getting from the bottles into the inside of the device.

NOTICE

Proper function of the valve

The swivel range of the swivel arm is not completely covered by the leakage tray.

➔ During installation, make sure that the valve functions properly and only switches to fractionation via rack positions.

The valve is set to Waste as the default setting.

- Eluent lines: Install capillaries and hoses in such a way that, in case of a leak, liquids cannot get into the interior of the devices underneath.

NOTICE

Laying the capillaries

Capillaries in the swivel area can be damaged if the swivel arm moves. This can lead to leaks.

➔ Lay the capillaries so that they are not in the area of the swivel arm.

- In case of leakage: Switch off the system. Only take the device into operation if the cause of the leak has resolved (see chapter 4.6 on page 20).

2.7 Specific environments

2.7.1 Earthquake-endangered areas

In earthquake-endangered areas, do not stack more than 3 devices on top of each other. Otherwise there is risk of injury due to falling devices or loose parts.

2.7.2 Explosive environment

Never use the system in potentially explosive atmospheres without appropriate protective equipment. For more information, contact the KNAUER Customer Support.

2.7.3 Cooling room

You may operate the device in a cooling room. To prevent condensation, note the following instructions:

- Allow the device to acclimatize for min. 3 hours before taking it into operation.
- After taking the device into operation, it should stay switched on.
- Avoid temperature fluctuations.

2.7.4 Wet room

Never use the device in wet rooms.

2.8 Maintenance, care and repair

- Avoiding electric shock: Before performing any maintenance and service work, disconnect the device from the power supply.
- Tools: Use only tools recommended or prescribed by the manufacturer.
- Spare parts and accessories: Only use original parts and accessories made by KNAUER or a company authorized by KNAUER.
- PEEK fittings: Use PEEK fittings only for a single port or brand-new PEEK fittings in order to avoid dead volume or not exactly fitting connections.
- Column care: Follow KNAUER or other manufacturer's instructions on caring for the columns (see www.knauer.net/columncare).
- Used capillaries: Do not use any used capillaries elsewhere in the system in order to avoid dead volumes, not exactly fitting connections and spreading contamination.
- Safety features: The device may only be opened by the KNAUER Customer Support or any company authorized by KNAUER (see chapter 1.4.1 on page 1).
- For more information visit the KNAUER website: www.knauer.net/hplc-troubleshooting

2.9 Service request form and decontamination report

Devices which are shipped without the completed document “Service request form and decontamination report” will not be repaired. If you would like to return a device to KNAUER, make sure to enclose the completed document: www.knauer.net/servicerequest.

3. Product information

3.1 Performance features

The fraction collector FC 6.1[1] is a compact fraction collector for use with low to medium flow rates. You can operate it with different racks (ranging from racks for vials to bottle racks). The fraction collector achieves optimum performance at a flow rate of between 1 – 50 ml/min. You can use it for flow rates in the range 0.1 - 100 ml/min. The back pressure at 100 ml/min is 0.4 bar.

Properties

- On/off switch in the top cover.
- Swivel arm which moves the magnetic valve with droplet former and sensor back and forth.
- Height-adjustable motor block, which is fixed to two sturdy support rods.
- LEDs in the on/off switch and on the drop former indicate the device status.
- Rod fixation with capillary guide.
- Leak tray with drain nozzle (collects escaping liquids and protects the components from possible damage).
- Drain hose directs leaked liquids to the waste container.
- Sturdy ground plate with device feet secure stability.
- Connection for the power supply.
- Connection strip for event control.
- Service interface
- Ports for the LAN connection.

The fraction collector is integrated into the KNAUER software environment and is supported by PurityChrom, ClarityChrom and MobileControl.

For efficient HPLC / UHPLC separations, observe the following instructions:

- Use highly purified, filtered solvents (gradient grade).
- Analyze purified substances.
- Use in-line filters.

[1] The fraction collector FC 6.1 is hereinafter referred to as the "fraction collector".

3.2 Device variants

The fraction collector is suitable for bio- and reversed-phase chromatography. Operation is possible for 1/16" and 1/8" via 1/4-28" UNF flat-bottom thread. However, the focus is on performance when using 1/16" capillaries and low flow (1-50 ml/min).

3.3 Scope of delivery

The following items are included in the scope of delivery:

- Fraction collector FC 6.1
- Power adapter with power cable
- Fraction collector FC 6.1 accessories kit
- Installation accessory kit

Other applicable documents:

- Fraction collector FC 6.1 operating instructions (V6777)
- Supplement installation (V6778)
- IQ (as an appendix in the operating instructions)
- Declaration of conformity

3.4 Views

3.4.1 Front view

On the front of the device you find the leak tray with drain nozzle, the swivel arm with magnetic valve and drop former.

Legend

① Rod fixation with capillary guide
② Magnetic valve
③ Drop former
④ Swivel arm
⑤ Motor block
⑥ Ground plate with leak tray

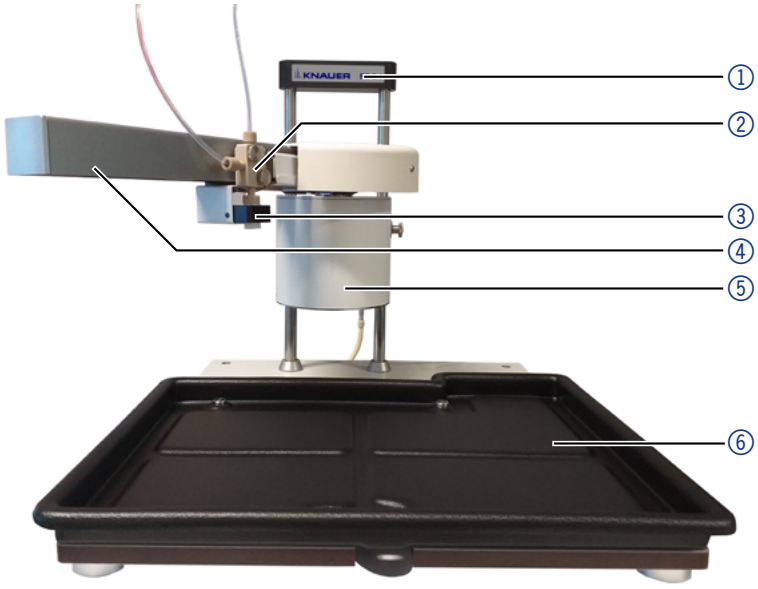


Fig. 1: Front view of the FC 6.1

Identification

A sticker on the rod fixation shows the manufacturer's logo and the device name.

3.4.2 Rear view

In addition to the serial number and symbols (see chapter 3.6 on page 12), you also find the LAN ports, the connection for the power supply, the service interface and event connection on the back of the device.

Note: The service interface is only used for maintenance and repair work by a service technician.

Legend

① Rod fixation with capillary guide
② On / Off switch
③ Top cover
④ CE mark, UKCA mark, warning label
⑤ Clamping block
⑥ CSA/UL label
⑦ Sticker with serial number etc.
⑧ Event connector
⑨ Power supply connector (24 V, 4-pole)
⑩ Service interface (USB-C)
⑪ LAN ports
⑫ Holding rods
⑬ Ground plate

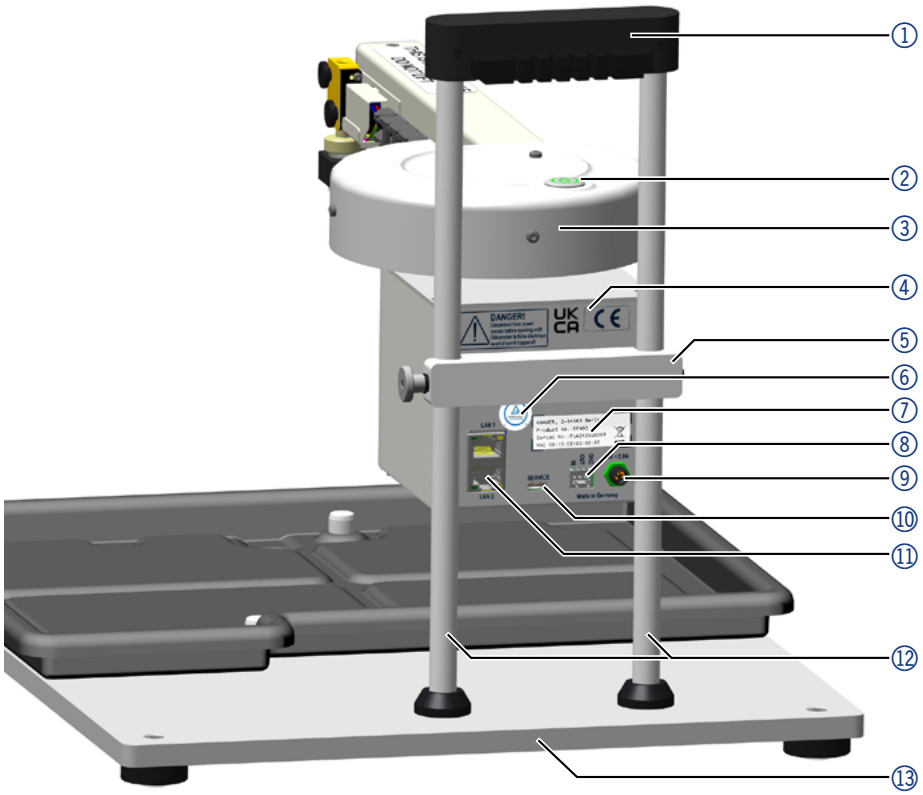


Fig. 2: Rear view of the FC 6.1

The sticker ⑦ on the back of the motor block shows the name and address of the manufacturer, the product number, the serial number, the MAC address of the device and the WEEE symbol.

Fig. 3: Sticker ⑦ on the back of the motor block

3.5 Meaning of the LEDs

There is an LED in the on/off switch on the top ① and an LED ② on the device's drop former. The illustration shows the LED display when the device is switched on.

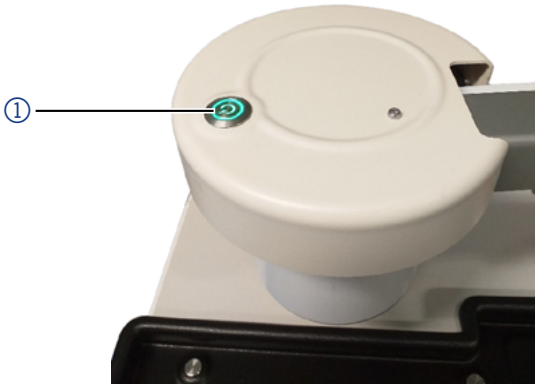


Fig. 4: LED on the top of the device

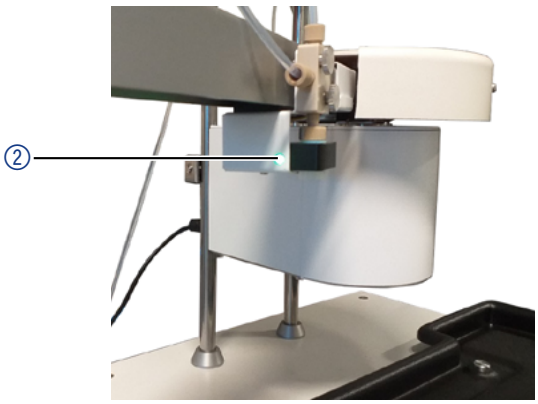


Fig. 5: LED on the drop former of the device

LED on the on/off switch and LED on the drop former

Both LEDs light up in different colors depending on the operating status. The colors have the following meaning:

Color	Operating status	What to do
Yellow	Initialization or re-home, firmware is being updated.	■ Wait until the device is ready.
Red	Serious error	■ Restart the device. ■ If the status of the device does not change, contact the Technical Support.
Flashes red	Error	■ Pay attention to the error message in the software. ■ Correct the error and restart the device.

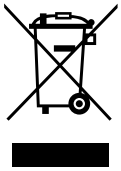
Only LED on the drop former

Color	Operating status	What to do
Flashes green	Initialization or re-home, firmware is being updated (device is not yet ready for use).	■ Wait until the device is ready.
Green (permanent)	The device is switched on. The device is ready for operation and does not fractionate.	-
White	The device is ready for operation and is currently fractionating.	-
Blue	Device is in standby mode.	■ Click on the "Power up" button in the software.

Standby To start standby mode, click on the "Standby" button in the software.

3.6 Symbols and signs

The following symbols and labels are located on the device:

Symbol	Meaning
	Electric shock hazard. Failure to observe this warning may result in loss of life, serious injury or damage or destruction of the device.
	Electrostatic discharge hazard. Damages to system, device, or sensitive electronic components can occur.
	The device is covered by the Waste Electrical and Electronic Equipment Directive (WEEE Directive). It may not be disposed of as unsorted municipal waste and must be collected separately. For more information (see chapter 10 on page 46).
	The device fulfills the product specific requirements of European directives. This is confirmed in a Declaration of Conformity.
	The device complies with the product-specific requirements of the United Kingdom.
	The device has successfully passed the TÜV tests for quality and safety. The TÜV Germany is a nationally recognized testing agency (NRTL) in Canada and the USA.

Symbol	Meaning
	The electromagnetic interference from the device is below the limits approved by the Federal Communications Commission (FCC).
	The device complies with the Australian EMV regulations.
CAN ICES-3 (B)	The device complies with Industry Canada license-exempt RSS standards.

4. Installation and initial startup

Before determining the operation site, read the chapter Technical data (see chapter 11 on page 47). There you find all device-specific information on the power supply and the permissible ambient conditions.

Note: The intended use be ensured only if the requirements for ambient conditions of the operating environment are met.

4.1 Ambient conditions

4.1.1 Operation site

Observe the following requirements for the operation site to ensure that the device functions properly:

- Place the device on a firm, level and straight surface.
- Protect the device against direct sunlight.
- Do not expose to air drafts such as air conditioning systems.
- Do not set up next to other machines that cause floor vibrations.
- Keep the device away from high-frequency sources. High frequencies can influence the measurement results.
- Make sure that the device is sufficiently ventilated (see chapter 4.1.3 on page 14).
- Avoid large temperature fluctuations (see chapter 4.1.2 on page 14).

4.1.2 Ambient temperature

If the ambient temperature of the device is changed abruptly (e.g. in a cold room), condensation will form in the device, which can lead to damage to the device. Allow device to acclimate for 3 h before connecting to power supply and taking into operation.

4.1.3 Space requirements

- Keep the supply plug on the power supply (wall socket or socket strip) freely accessible so that the device can be disconnected from the mains without any problems.
- Ensure adequate ventilation around the device, otherwise it may overheat and malfunction:
- The device swings out to the right and left. Therefore, leave at least 15 cm of space on both sides.
- Leave at least 10 cm space at the rear for the connection cables.

4.2 Power supply

Power supply requirements

- Fault-free power supply: For failure-free operation, the electrical voltage has to be free of fluctuations, residual currents, voltage peaks and electromagnetic interference. The device must receive sufficient voltage and reserve capacity.
- Check voltage: Devices may only be connected to a power supply whose voltage matches the permissible voltage of the device.
- Power consumption: The nominal power of the connected devices must not exceed 50 % of the highest connected power capacity, since higher currents can flow briefly when the device is switched on.
- Main connection: The electrical power supply at the place of use must be connected directly to the nearest main electrical connection.
- Grounding: The connectors for the voltage has to be grounded accordingly.

Power supply cables and plugs

- Original parts: Only use the power supply cables and plugs supplied for the connection to ensure that the specifications given in the technical data are met (see chapter 11 on page 47). Detachable power cable cables are not allowed to be replaced with other cable types.

NOTICE

Electronic defect

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

➔ Only use spare parts and accessories from KNAUER or a company authorized by KNAUER.

- Country-specific plugs: Before switching on the device, check whether the supplied plug is approved for your country. An overview of the device and country-specific plug types from KNAUER can be found at: www.knauer.net/plugs
- Power strips: When connecting several devices to a single power strip, always observe the maximum permissible power consumption of the devices.
- Access to power supply: Make sure that the power plug on the power supply (wall socket or power strip) is always accessible, so that the device can be disconnected from the power supply.
- Defective power supply cables and plugs: For safety reasons, damaged or faulty cables and plugs must not be used to connect the device to the power supply. Replace defective cables and plugs only with KNAUER accessories.

4.3 Unpacking

Procedure

Process
1. Place the packaging in such a way that the lettering on the label is in the correct position.
2. Check the packaging, the device and the accessories for transport damage.
3. Check the scope of delivery. In the event of an incomplete delivery, contact Technical Customer Service immediately.
4. To carry or move the device, grasp the ground plate on both sides at half its length. Do not hold it by the leak tray, as this part is loosely attached to the device.

Next steps

- Keep the enclosed list with the scope of delivery for later reorders.
- Keep the original packaging for safe storage or transportation of the device.

The fraction collector consists of three main components:

- Motor block with swivel arm
- Ground plate with leak tray
- Holding rods

Legend

① Swivel arm
② Motor block
③ Clamping block

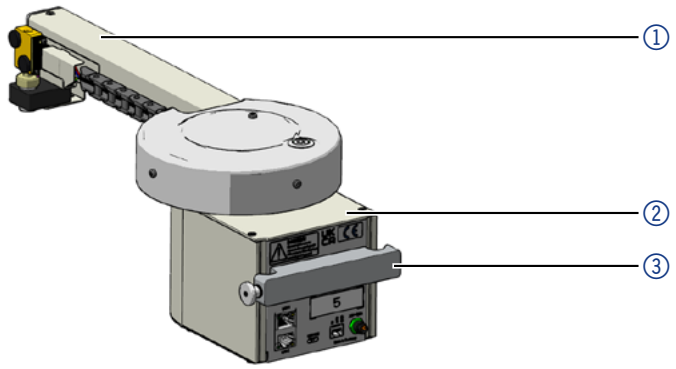


Fig. 6: Motor block with swivel arm

Legend

④ Leak tray:
⑤ Ground plate
⑥ Holes for the holding rods

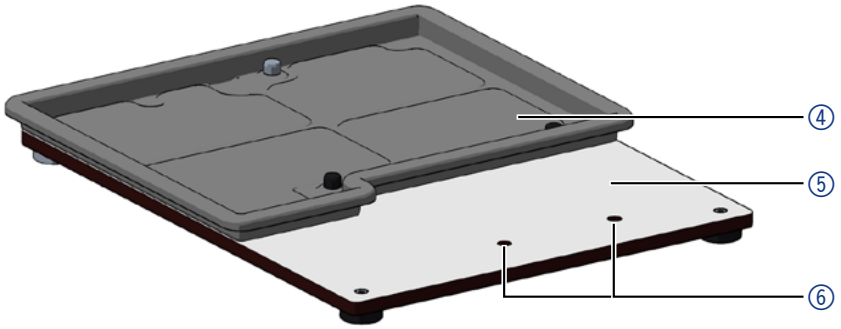


Fig. 7: Ground plate with leak tray

Legend

⑦ Holding rods
⑧ Holding nuts
⑨ Washers
⑩ Screws

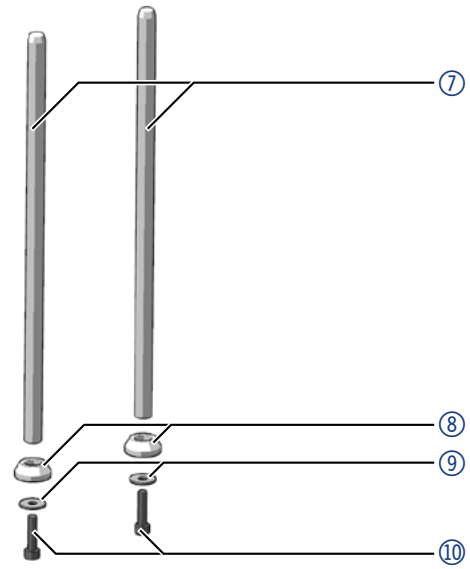


Fig. 8: Holding rods

4.4 Installing

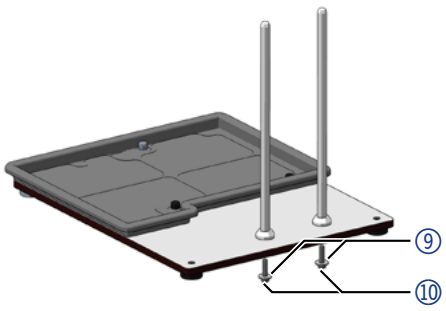
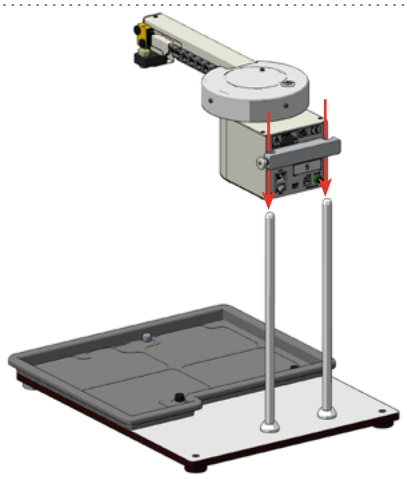
Prerequisite

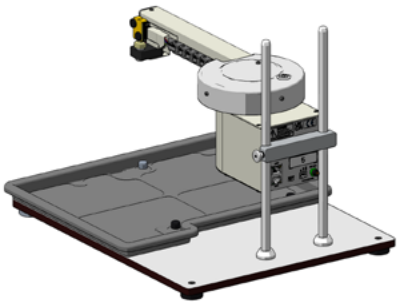
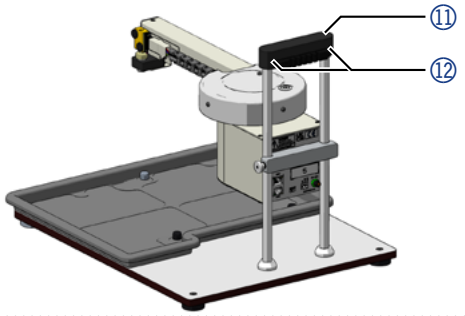
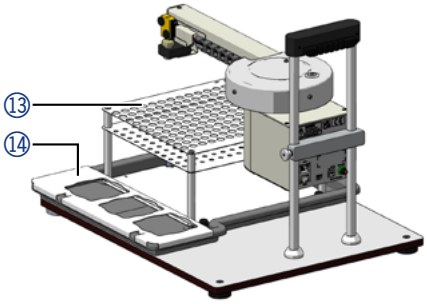
- The individual components of the device were unpacked.

Tools

- Allen wrench Torx 30
- Allen wrench 1.5 mm

Procedure

Process	Figures
1. Place the holding rods ⑦ in the holding nuts ⑧ and insert them together in the holes ⑥ in the rear area of the ground plate. **2.** Place the washers ⑨ on the Torx 30 screws ⑩ and screw them into the holding rods from the underside. **3.** Tighten the screws with the Allen wrench Torx 30.	
4. Carefully place the motor block ② on the holding rods from above so that the holding rods can be inserted into the trapezoidal recesses on the left and right side of the clamping block (at the rear of the motor block). As soon as the holding rods are inserted into the recesses in the clamping block, the motor block can be moved up and down as required.	

Process	Figures
5. Set the desired height and fix the motor block to the holding rods by tightening the knurled nut on the right-hand side of the clamping block.	
Note: Adjust the height of the fraction collector so that the swivel arm does not touch the vessels inserted in the rack and the liquid does not splash when arriving in the vessel.	
6. Place the rod fixation ⑪ on the holding rods from above so that the capillary guide points to the rear (away from the motor block). **7.** Fasten the rod fixation by tightening the grub screws ⑫ with the Allen wrench 1.5 mm.	
8. Place the rack ⑬ and the bottle holder ⑭ in the leak tray.	
Note: The rack is not recognized automatically. Select the correct rack type in the software.	

Result You have assembled the main components.

Next steps Place the device on or next to your HPLC system and connect the capillaries.

4.5 Integrating the device into an HPLC system

Position Set up the device to the side of an HPLC system or place it on the top of the housing of an AZURA-L device. The device's feet fit into the recesses on the top of the housing.

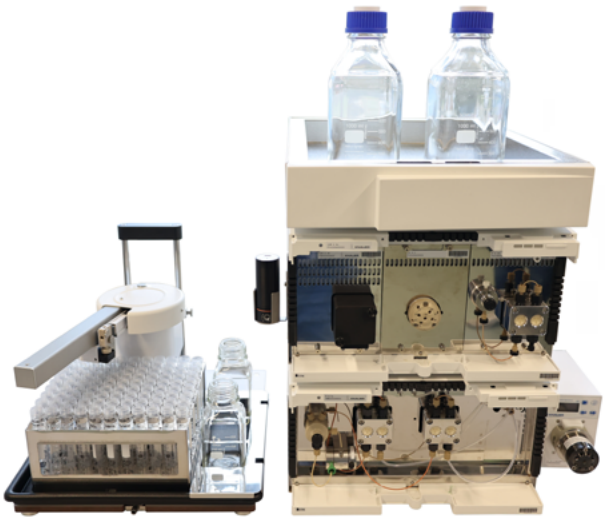


Fig. 9: FC 6.1 to the side of an HPLC system

Fig. 10: FC 6.1 on top of an HPLC system

4.6 Connecting capillaries to magnetic valve

The magnetic valve ③ on the swivel arm of the fraction collector has three connectors for liquids. The inlet of the magnetic valve is the horizontal connection ④ (running parallel to the swivel arm). It is used to connect the capillary that comes from the LC system and conveys the liquid. The fractions are collected in the containers of the rack via the drop former, which is screwed into the downward-facing connection ⑤ . The waste hose is connected to the upward-facing connector ② , where the liquid is discharged if no fractions are collected. This connection in the magnetic valve (input to waste) is in place after switching on the device (normally open).

Legend

① Rod fixation with capillary guide
② Waste connector of the magnetic valve
③ Magnetic valve
④ Inlet of the magnetic valve
⑤ Drop former

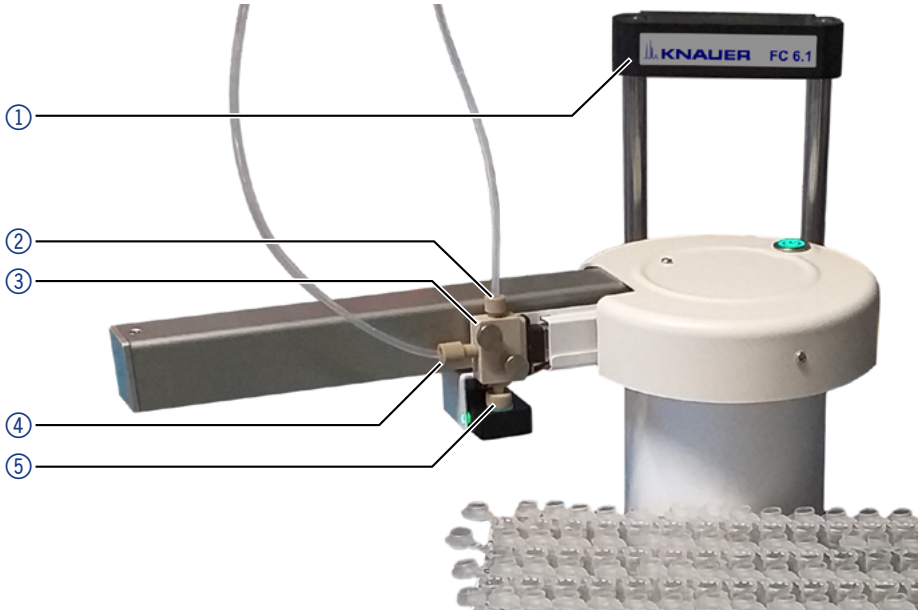


Fig. 11: Connectors of the magnetic valve

Procedure

Process
1. Connect the waste hose to the upward-facing connector ② of the magnetic valve ③ .
2. Connect the capillary from the LC system to the horizontal connector ④ of the magnetic valve ③ .
3. Press the capillaries in the capillary guide on the back of the rod fixation ① .

Result You have connected the capillaries.

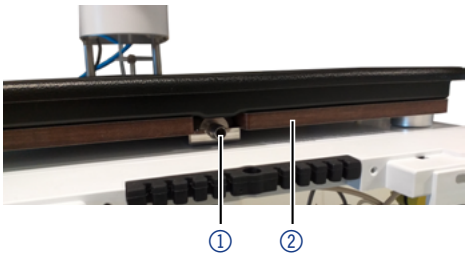
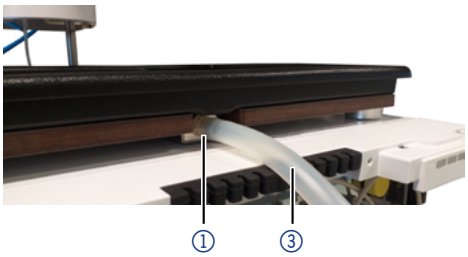
Next step Connect the leakage management system.

4.7 Connecting the leakage management system

The leakage management system consists of a drain with a drain nozzle on the underside of the ground plate and a silicone hose (OD 12 mm). The drainage system ensures that leaked liquids automatically flow into a waste bottle.

Note: To ensure that leaked liquids can drain away unhindered, guide the silicone hose to the waste bottle at a steady gradient without kinking or looping the hose.

Procedure

Process	Figures
1. Connect the silicone hose to the drain nozzle ① on the underside of the ground plate ② .	 **Fig. 12:** Drain nozzle
2. Connect the silicone hose ③ to the waste bottle. **3.** Place the waste bottle underneath the devices.	 **Fig. 13:** Silicone hose and drain nozzle

Result You have installed the drainage system.

4.8 Computer control

Note: HPLC devices from KNAUER only work with IP addresses, which have been assigned by IPv4. IPv6 is not supported.

This chapter describes how to set up a chromatography 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: When using PurityChrom®, static IP addresses are needed (see chapter 4.9 on page 25).

You can control the fraction collector externally in two ways:

- In a local network via the LAN connection ① to the router
- Via the events connector ③ (pin header).

All connectors for external control are located on the rear side of the fraction collector.

Legend

① LAN/Ethernet connectors
② Service interface
③ Events connector
④ Power connection

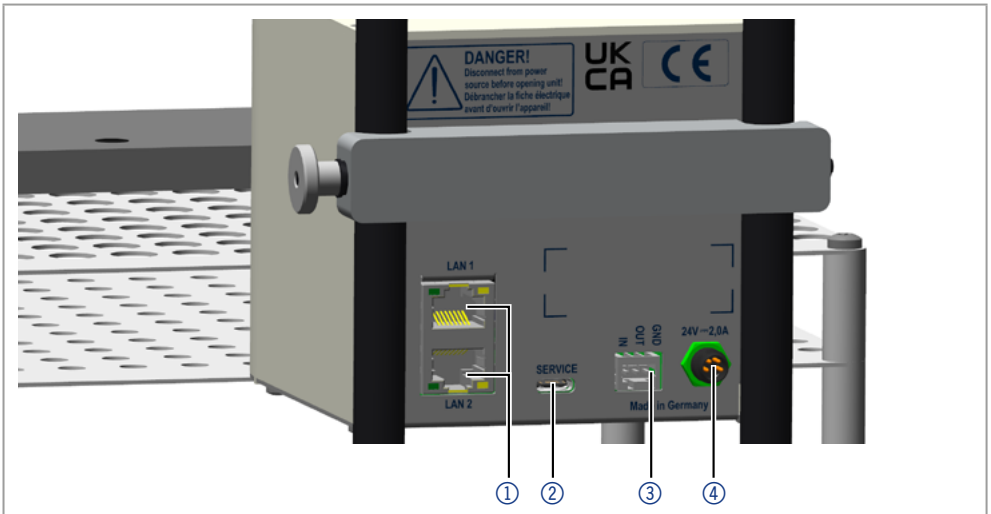


Fig. 14: Connectors on the rear side of the

4.8.1 Setting up LAN

To set up a LAN, we recommend to use a router. That means the following steps are required:

Procedure

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. Set up the router for the network on the computer.
4. Install the chromatography software.
5. Switch on the device and run the chromatography software.

Next steps Set the LAN properties (see section 4.8.2).

4.8.2 Configuring LAN settings

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

Prerequisites

- In Windows, power saving, hibernation, standby, and screen saver has to be deactivated.
- In case you use an “USB-to-COM” box, the option "Allow the computer to turn off this device to save power" in the device manager has to be deactivated for all USB hosts.
- Applies to all LAN devices: Disable the setting for the network adapter in Device Manager "Allow the computer to turn off this device to save power”.

Procedure

Process
1. In Windows, open <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>.

Next steps Connect devices (see section 4.8.3).

4.8.3 Connecting the devices to the LAN

A router ② has several LAN ports ③ and one WAN-/internet 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 chromatography system separately from the company network.

Legend

① Devices
② Router
③ LAN ports
④ WAN/internet connection
⑤ Computer

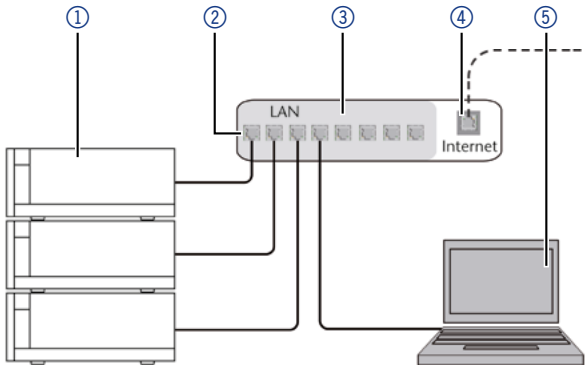


Fig. 15: Connect devices to LAN

Note: You will find patch cables for each device and the router in the accessories kit. To connect the router to a LAN, an additional patch cable is required, which is not supplied within the scope of delivery.

Prerequisites

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

Procedure

Process
1. Use the patch cable to connect the router and the computer.
2. With additional patch cables, connect all devices individually with the router.
3. Use the power supply to connect the router to the mains power system.

Next steps Set the router properties (see section 4.8.4).

4.8.4 Configuring the router

The router is preset at the factory. Information about address, user name and password is noted in the router manual: www.knauer.net/en/Support/Library/PC-hardware.

Procedure

Process
1. To open the router configuration, start your Internet browser and enter the IP address (does not apply 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.

Note: If the IP address range has been changed, it is essential to note this information on the router.

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

4.8.5 Integrating LAN into the company network

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

Prerequisite

- There is a patch cable for the connection.

Procedure

Process
1. Make sure that there is no overlap between the IP addresses of the router and the corporate network.
2. In the event of an overlap in the router configuration, change the IP address range.
3. Use the patch cable to connect the router WAN port to the company network.
4. Restart all devices, including the computer.

Result The LAN is now integrated into the company network.

4.8.6 Controlling several systems separately in LAN

Devices connected to a LAN communicate through ports, which are part of the IP address. If more than one chromatography 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 have to be entered into the device configuration of the chromatography software. Recommendation: Use the same port number for all devices.

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

Process

Procedure

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.

4.9 Setting IP addresses via software

Note: Check the IT security standards for your lab before intervening in the LAN settings.

PurityChrom® Static IP addresses are required to run certain chromatography software, e.g. Purity Chrom®. For a comprehensive overview on how to set static IP addresses for PurityChrom®, refer to the document "PurityChrom® Installation Guide" on the PurityChrom® installation CD.

For Mobile Control and Firmware Wizard, it is possible to set a fixed (static) or dynamic (DHCP) IP address via software.

4.9.1 Mobile Control: Setting a static IP address

Note: The device is preset to a dynamic address (DHCP). To ensure a constant LAN connection between the chromatography software and the instrument, we recommend switching the instrument to a static IP address for certain applications. More information about LAN settings can be found in the Mobile Control Software Instructions (document no. V6851-4).

Prerequisite

- The device is switched on.
- Mobile Control is installed and running.
- The connection between Mobile Control and the device has been established.

Process

Procedure

1. In Mobile Control, click <Settings> ⚙.
2. On the <General> tab, choose the device.
3. In <Network Settings>, choose the setting <Static> ①.
4. Enter the IP address into the text field <IP address> ②.

Process
5. If necessary, change the subnet mask and the gateway ③ .
6. Click Apply in the top right corner.
7. Restart the device (recommended).

Legend

① IP address mode

② Text box for IP address

③ Text field for subnet mask/gateway

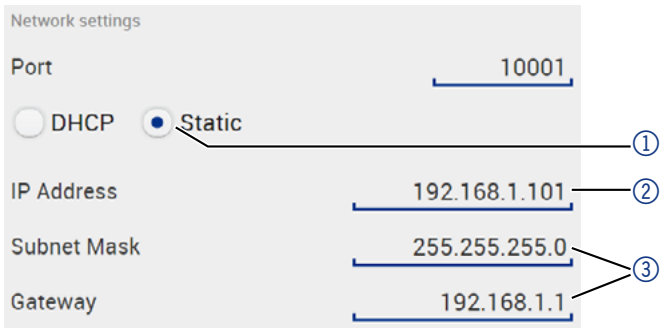


Fig. 16: Network settings for static IP address

Result The device is now accessible via the static IP address.

4.9.2 Mobile Control: Setting a dynamic IP address via device name

Prerequisites

- The device is switched on.
- Mobile Control is installed and running.
- The connection between Mobile Control and the device has been established.

Procedure

Process
1. In Mobile Control, click <Settings> ⚙.
2. On the <General> tab, choose the device.
3. In <Network Settings>, choose the setting <DHCP> ① .
4. Click Apply in the top right corner.
5. Restart the device (recommended).

Legend

① IP address mode

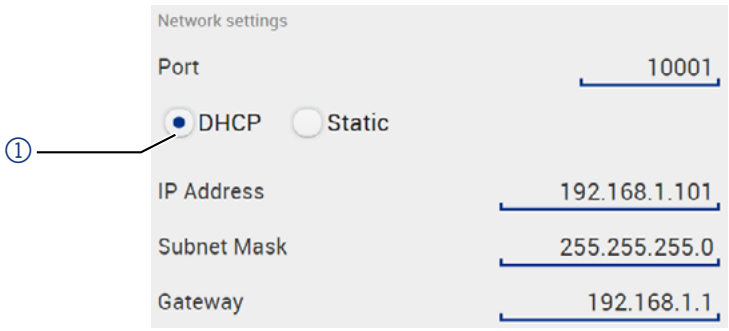


Fig. 17: Network settings for dynamic IP address

Result The device is now accessible via a dynamic IP address.

4.9.3 Mobile Control: Setting a dynamic IP address via device serial number

Prerequisites

- The device is switched on.
- Mobile Control is installed and running.
- The connection between Mobile Control and the device has been established.

Procedure

Process
1. In Mobile Control, click <Settings> ⚙.
2. In <Network Settings>, click <Reset>. The window <Reset communication settings> opens.
3. Enter the serial number of the device into the text field.
4. Click <OK>. The device is now reset to the factory settings.
5. Restart the device (recommended).

Result The device is now accessible via a dynamic IP address.

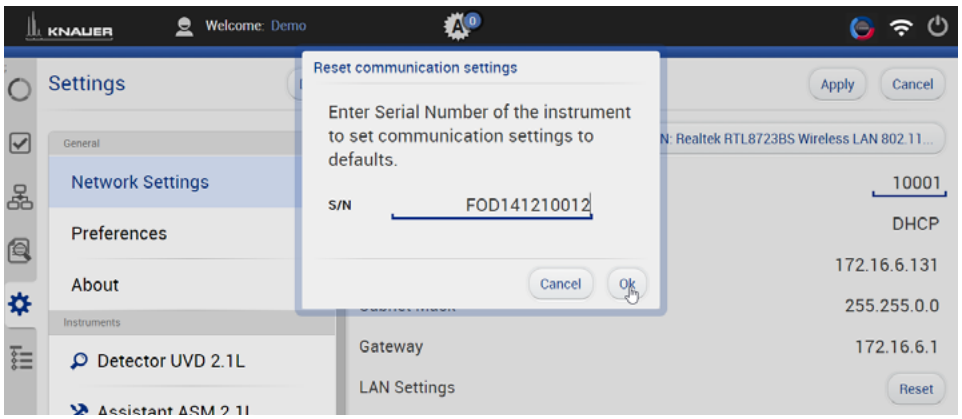


Fig. 18: Reset device to factory settings

4.9.4 Firmware Wizard: Setting a static IP address

Note: More information about LAN settings can be found in the Mobile Control Software Instructions in the chapter "Firmware Wizard" (document no. V6851-4).

Legend

① Text box for the device's serial number
② Setting IP address manually
③ Text box for IP address
④ Text box for subnet mask & gateway
⑤ Confirm changes

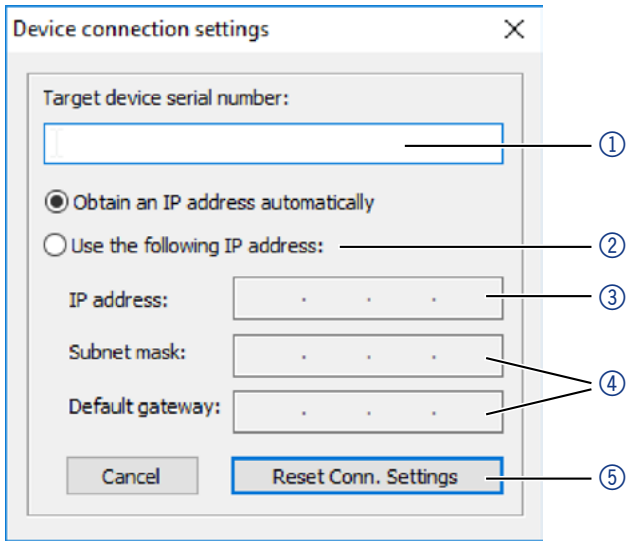


Fig. 19: Network settings in Firmware Wizard:

Prerequisites

- The device is switched on.
- Firmware Wizard is installed and running.
- The connection between Firmware Wizard and the device has been established.

Procedure

Process

1. In Firmware Wizard, click <Reset LAN Settings...>.
   The window <Device connection settings> opens.
2. Enter serial number of the device into the text field <Target device serial number> ① .
3. Select option <Use the following IP address> ② .
4. Enter the IP address into the text field <IP address> ③ .
5. If necessary, change the subnet mask and the gateway ④ .
6. Click <Reset Conn. Settings> ⑤ to accept changes.
7. Restart the device (recommended).

Result The device is now accessible via the static IP address.

4.9.5 Firmware Wizard: Setting a dynamic IP address

Prerequisites

- The device is switched on.
- Firmware Wizard is installed and running.

Procedure

Process
1. In Firmware Wizard, click <Reset LAN Settings...>. The window <Device connection settings> opens.
2. Enter serial number of the device into the text field <Target device serial number> ① .
3. Select option <Obtain an IP address automatically> ② .
4. Click <Reset Conn. Settings> ⑤ to accept changes.
5. Restart the device (recommended).

Result The device is now accessible via a dynamic IP address.

4.10 Remote control

4.10.1 Connector assignment

All connectors for event control are located on the rear side of the fraction collector. Analog control signals are exchanged via the analog ports. The connector GND is the reference point for the signals.

- IN: For receiving start, control, and error signals from external devices
- OUT: For sending start, control and error signals to external devices

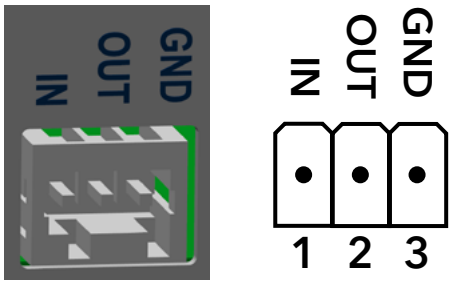


Fig. 20: Connector assignment for event control

Signal	Explanation
Analog IN	Is the default setting in error input mode. The input is used to signal the system error status. TTL, 0 or 5 V
Analog OUT	Is the default setting in error output mode. TTL, 0 or 5 V
Analog GND	Reference point of the voltage at the signal inputs.

4.10.2 Connecting the pin header

To control one device through another, you use the pin header. To use remote control, you have to connect cables to the pin header. The single ports are used to exchange control signals.

Prerequisites

- The device is switched off.
- The power plug is disconnected from the device.

Tool 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.

Legend

① Pin header
② Lower opening
③ Depressor tool

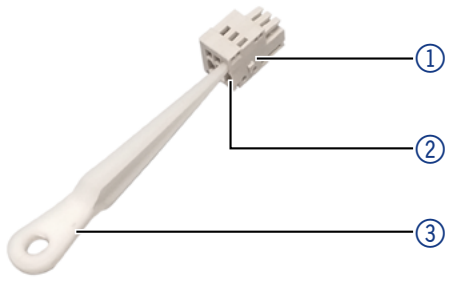


Fig. 21: Depressor tool and pin header

Process

Procedure

1. Insert the depressor tool ③ in an upper small opening at the front of the pin header ① .
2. Insert the cable into the opening ② underneath the inserted depressor tool.
3. Pull out the depressor tool.

Next steps Check whether the cables are tightly attached. Press the pin header onto the connector. Finish the installation. Put the device into operation.

5. Operation

5.1 Initial operation

Use this checklist to check if the pump is ready for initial operation:

- Device is positioned in the correct location.
- The power plug has been connected.

If the device is part of an HPLC system, note the following:

- The network connection to the router is established.
- The chromatography software has been installed by KNAUER or a company authorized by KNAUER.

5.2 Switching on

After switching on the fraction collector it moves once through all angular positions. The swivel arm moves once to the rightmost position and back to the far left. After this self-test, the fraction collector moves to the HOME position.

Prerequisites

- The installation has been completed.

Procedure

Process
1. Connect the power cable of the device to the power supply.
2. Switch on the power switch.
3. Wait until the fraction collector has completed the self-test.
4. The device is ready for operation.

Next step

- Control the device during operation.

5.3 Software control

There are several options for controlling the device:

- using chromatography software
- using Mobile Control software

5.3.1 Chromatography software

To operate the device with software, you have to establish a connection between the LAN port and a computer. You find a detailed description on chromatography software in the corresponding operating instructions.

5.3.2 Mobile Control

You can install the Mobile Control software on your computer or tablet. To control the fraction collector using Mobile Control, connect the computer or tablet with Windows 10 operating system or higher to a WLAN router. The firmware version of the fraction collector must be V01.02 or higher. You find a detailed description in the Mobile Control Instructions (V6851-4).

6. Functionality tests

Note: Standard processes regarding IQ and OQ in single devices may be handled differently in individual cases.

6.1 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 a provider authorized by KNAUER performs this functionality test during the installation.

The Installation Qualification is a standardized document that includes the following:

- Confirmation of flawless condition at delivery
- Check if the delivery is complete
- Certification on the functionality of the device

You can either use the IQ document attached to this instruction manual or download a digital version from our website:

6.2 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. 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 depend on the usage of the device.

Execution The test can be carried out either by the technical support of KNAUER or by a provider authorized by KNAUER (for a fee). For further information visit our website:

7. Troubleshooting

First measures for troubleshooting:

- Check all cables and fittings.
- Check if air has got into the supply lines.
- Check the device for leakages.

Further measures:

- Compare occurring errors with the list of possible errors (see below).
- Contact the Technical Support.

7.1 LAN

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, contact the Technical Support.

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

 Connected	 Not connected

If no connection was established, test the following:

- Is the router switched on?
- Is the patch cable correctly connected 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 cables 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. First, switch on the router and wait until it has successfully completed its self-test. Turn on the devices and then the computer.
   - Has this been successful?
6. Replace the patch cable with the device to which a connection could not be established.
   - Has this been successful?
7. Make sure that the IP port of the device matches the port in the chromatography software.

7.2 Possible problems and solutions

Problem	Solution
Device cannot be switched on.	Check the power cable to ensure that it is connected to the mains.
System breakdown	Switch off the device to reset the memory in the device, then switch it on again.
Device shows error during initialization.	Switch the device off and on.
Swivel arm hits an obstacle and device shows error.	Remove all obstacles in the area of the swivel arm and restart the device.
Valve does not move far enough forward on the swivel arm.	Switch off the device. Check the tubings on the valve. Make sure that the tubing is long enough so that the valve can be moved along the entire swivel arm. If necessary, replace the tubing with a longer one and install it between capillary guide and valve with sufficient play.
Valve hits the motor cover during initialization and does not retract properly.	Switch the device off. Manually move the valve on the arm forwards. Check the screws. Make sure the two screws of the valve block are screwed in correctly and far enough.
Rack is not level or slanted in the leak tray.	Check the position of the rack. The rack is fixed in the leak tray using the metal pins. The front pin in the center fits into the front recess on the underside of the rack.
The fraction collector does not hit the fractionation vessels. The liquid coming from the drop former does not hit the vessel in the inserted rack.	Automatic rack detection is not supported. If a different rack is used, the correct rack type must be selected in the software.
The drop counter does not detect any drops.	Check the protective tube of the drop counter, which is located at the outlet/drop former, and clean it if necessary. Rinse the fraction collector after each use to prevent deposits and crystal formation on the drop former.
No drops are formed or the liquid splashes out of the drop former.	The accessory pack contains drop formers with different internal diameters. Select a suitable drop former for the set flow rate.

7.3 Error messages

If other error messages are displayed besides those listed below, restart the device. Inform the Technical Support of the manufacturer in case the error message displays repeatedly.

The system messages are sorted by error code:

Error code	Error name	System message	Correcting the error
298	Invalid Command Name	Wrong command sent to device. Check the list of available device commands and correct the name.	Check the list of available device commands and correct the name.
299	Invalid command syntax	The command name is correct, but the list of parameters is incomplete. Check the list of the command's required parameters and provide the correct one.	Check the list of the command's required parameters and provide the correct one.
300	Invalid parameter(s)	The command's list of parameters is looking complete but some of them are out of allowed limits. Check them and correct invalid one.	Check the list of parameters for the command and correct any invalid parameters.
401	Access level insufficient	A command, requiring service mode access level, was send to device without switching the device to service mode. Switch device to service mode. Returned on attempt to execute some UDP requests, providing wrong system id. Check the system id provided with UDP request	Inform the Technical Support of the manufacturer.
402	Instrument in standalone mode	The command can be executed only for devices in remote modus. Please switch the remote modus on.	Switch on the remote mode.
403	Instrument in standby mode	The command cannot be executed for devices in stand-by modus. Please wake up your device.	Exit standby mode and wake up your device.
405	Error programming device's flash memory	Update of device firmware has failed due internal issues. Please restart service application and try again.	Restart the service application and try to update the firmware again.
406	Cannot initialize RTC	Problem configuring Real Time Clock hardware.	Restart the device. If the error occurs again, inform the Technical Support of the manufacturer.
407	Device is busy.	Device is busy changing position. Please wait until the end of moving and try again. In case device is in stall state - restart it or call the service.	Wait until the device has executed the current command.

Error code	Error name	System message	Correcting the error
408	No space left to store position	Programming custom rack exhausts available device memory. No more entries can be added. Simplify your custom rack layout.	The available device memory is exhausted. Simplify your rack definition.
411	Wake up time already passed	An attempt to set a wakeup time in the Past has occurred. It is a response to SHUTDOWN command with wake-up parameter. Check your wake-up data and current RTC settings in device.	Choose a point in time in the future.
412	Operation not supported	Generic error code returned in case requesting feature or parameter, that is not currently supported by firmware. Check your request and parameters.	Check the commands and parameters entered.
413	Drops program is empty	Drops program is not set. Please use DROP_TSET to fill the program or define it using DROP_START parameters.	Use DROP_TSET to fill the program or define it using DROP_START parameters.
417	Not enough dynamic memory	Internal device memory resources are exhausted. Please restart the device.	Restart the device. If the error occurs again, replace the mainboard.
418	FRAM memory exhausted	Nonvolatile device memory exhausted. It is critical problem. Please call the service.	Restart the device. If the error occurs again, replace the mainboard.
419	Error programming/erasing E2 Data Flash	Error programming, erasing or using E2 Data Flash memory. Please restart the device and try again.	Restart the device. If the error occurs again, replace the mainboard.
421	Cannot initialize RTC	Problem configuring Real Time Clock hardware. Please restart device or call the service.	Restart the device. If the error occurs again, replace the battery on the mainboard.
422	Operation timeout	Generic error code signaling about stall state of some device hardware module(s). Please restart the device or call the service.	Restart the device. If the error occurs again, inform the Technical Support of the manufacturer.
424	Error input activated	Input pin, that was configured as an Error input, is activated by external signal. The source of problem is outside of device – just clean the error state.	Check the system or connected devices at the error input for sources of error.

Error code	Error name	System message	Correcting the error
425	Not allowed on this interface	The command cannot be executed on this communication interface. Looks like device already has remote mode activated on another interface. Only restricted set of basic information can be requested on the secondary interface otherwise the primary one must be closed for full support. So opening RS-232/USB communication will set LAN interface to restricted mode and vice versa.	The software does not have write access to the device. Currently only possible as a display. Check other software that is accessing the device and close it if necessary.
481	No more slots for async. events	Non-critical error working with device asynchronous (NOTIFY) events. Restart the device.	Restart the device.
20005	Device is not ready.	Device is in not ready state. Please rehome the device to continue.	Carry out a new rehome.
30002	A drive failure. Over-temperature limit reached.	A drive hardware failure. Over-temperature limit reached - drive stopped. Please restart device or call the service.	Restart the device. If the error occurs again, inform the Technical Support of the manufacturer.
30003	A drive failure. Stopped due overheating.	A drive hardware failure. Drive was stopped due overheating. Please restart device or call the service.	Restart the device. If the error occurs again, replace the mainboard.
30004	A drive failure. Phase short to ground condition detected.	A drive hardware failure. Phase short to ground condition was detected. Please restart device or call the service.	Restart the device. If the error occurs again, replace the mainboard.
30007	A drive failure. Driver was reset. Rehoming needed.	A drive hardware controller was reset by some reasons. Please restart device or call the service.	Restart the device. If the error occurs again, replace the mainboard.
30008	A drive failure. Undervoltage condition detected.	A drive hardware module undervoltage was detected. Please restart device or call the service.	Restart the device. If the error occurs again, replace the mainboard.
30011	A drive failure. Phase short to supply condition detected.	A drive hardware failure. Phase short to supply condition detected. Please restart device or call the service.	Restart the device. If the error occurs again, replace the mainboard.
30015	A drive hardware communication failure.	Drives hardware communication failure. Please restart device or call the service.	Restart the device. If the error occurs again, replace the mainboard.
100000	Rack id X is not valid.	Rack id provided with a command is not valid. Check the command parameter(s).	Check the list of available racks and correct the selection.

Error code	Error name	System message	Correcting the error
100001	Rack Position X is not valid	Rack position provided with a command is not valid. Check the command parameter(s).	Requested position does not exist. Check the position.
100002	Rack id X is not in the device configuration.	No rack with this id is found in the configuration. Check the command parameter(s) or change the device racks configuration.	Check the list of configured racks and correct the configuration.
100003	Polar encoder communication failure.	An error communication with polar drive encoder occurred. Restart device or call the service.	Restart the device. If the error occurs again, check the encoder cable/replace the encoder board/ replace the mainboard.
100004	No rack is defined for id X.	Rack with provided id is not configured in device nonvolatile memory. Check you command parameters.	Check the list of available racks and correct the selection.
100005	Rack position $s does not exist.	Requested rack position does not exist on the current rack's configuration. Check your command parameters.	The rack position does not exist, correct your entry.
100006	Rack ids X and Y not allowed in the same configuration.	Racks with these Ids are not allowed for the same configuration. Usually, due occupation of the same place on device table. Check your command parameters.	The selected racks cannot be used together in the same configuration. Correct your entry.
100007	Cannot modify the rack type (id X) using this command.	Cannot edit a rack type using the command. For example, to change a normal orthogonal rack RACKINFO command should be used. And POSINFO command is only applicable for irregular and dynamic racks. Use corresponding command to define your rack.	To change a normal, orthogonal rack, use the RACKINFO command. The POSINFO command can only be used for irregular and dynamic racks.
100008	No racks found in the configuration.	No racks were configured in the device, or all racks are excluded from the "move next vial" enumeration. Check the racks configuration.	Check the configured racks. Add a rack to the configuration.
100009	Current pos. 'B' is not equal to requested 'A' one.	A reached position is not equal to the requested one. This error code is thrown after the reposition is finished in case final position is not the same as requested one. Check the collector access area for obstacles, restart device or call the service.	Check the fraction collector for mechanical obstructions. Carry out a new rehome. If the error occurs again, inform the Technical Support of the manufacturer.

Error code	Error name	System message	Correcting the error
100010	Actual span X.X° is too narrow. Please remove obstacles.	Actual span of polar reposition is found too narrow during rehoming. Some obstacles may reduce the access area of the collector. Remove the obstacles and rehome device.	Check the fraction collector for mechanical obstructions. Carry out a new rehome. If the error occurs again, inform the Technical Support of the manufacturer.
100011	Encoder run-out X µsteps is out of limit Y µsteps.	Polar Encoder deviation is out of allowed limits during startup rehoming. Restart the device and call the Service if the problem persists.	Restart the device. If the error occurs again, replace the encoder board.
100012	Instrument in drop counting mode.	Instrument is in drop counting mode. Any reposition by external command is prohibited. Wait until drop count program will be finished.	Check the flow rate and whether it is possible to count the drops. Exit the current method or sequence to end the drop counting mode. Restart the device if necessary.
100013	Drops program line N does not exist.	Index of a line in the drops program is not valid. Check the command parameters.	Check the input for the method or sequence.
100014	(Left, right) adjustment (points, stop) not found.	Left or right adjustment points or sensor stop were not found. Auto adjustment operation not succeeded. Check correctness of adjustment tool setup and try again.	Check if the adjustment tool is correctly positioned and set up. Minimize the distance between the distance sensor and the adjustment tool. This should be approx. 5 mm.
100015	Proximity sensor communication failed.	Communication with proximity sensor hardware has been failed. Restart device or call the service.	Restart the device. If the error occurs again, inform the Technical Support of the manufacturer.
100016	(Left, Right) adjustment point scan failed.	Scanning of requested adjustment point has failed. An operation not succeeded. Check persistence of adjustment point in requested place and try again.	Check if the adjustment tool is correctly positioned and set up. Minimize the distance between the distance sensor and the adjustment tool. This should be approx. 5 mm.
100019	Adjust failed. Pole radius 220.0 mm too far from 222.3 mm.	Calculated value of the Pole is outside of mechanical security limits and cannot be applied to the device. Auto adjustment operation not succeeded. Call the service.	Check if the adjustment tool is correctly positioned and set up. Minimize the distance between the distance sensor and the adjustment tool. This should be approx. 5 mm. Restart the device. If the error occurs again, inform the Technical Support of the manufacturer.
100020	(Left, Right) stop is not found. Rehoming failed.	A left or right stop were not found during rehoming. Check rotation range for obstacles and restart rehoming.	Check the fraction collector for mechanical obstructions. Carry out a new rehome. If the error occurs again, inform the Technical Support of the manufacturer.

Error code	Error name	System message	Correcting the error
100022	Position is out of drive control by X°(Y µstep).	The device rotating position was changed manually by the user. Polar encoder synchronization was lost. Device rehoming is needed.	Restart the device. If the error occurs again, inform the Technical Support of the manufacturer.
100023	Radial home error X.X mm. Please check for obstacles.	The radial home position check deviation is too high. Some obstacles may reduce the access area of the collector. Remove the obstacles and rehome device.	Check whether the energy chain links block during the automatic extension movement of the swivel arm.

8. Maintenance and care

Maintenance of a HPLC instrument is critical to the success of analyses and the reproducibility of results. If you require a maintenance task which is not described here, contact your dealer or the Customer Support.

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.

8.1 Maintenance contract

The device may only be opened by the Technical Service of KNAUER or any company authorized by KNAUER. These maintenance tasks are part of a separate maintenance contract.

8.2 What maintenance work may users perform?

Users can carry out the following maintenance work:

- Replacing the drop forming capillary
- Replacing and connecting hoses

8.3 Maintenance intervals

With the help of Mobile Control and various software packages (e.g. ClarityChrom® or OpenLAB®), it is possible to display or read the operating hours of the fraction collector. You find a detailed description on how to display or read out GLP data in the respective user manuals. It is recommended to clean the drop former regularly and to carry out an OQ at least once a year.

Operating hours	Measures
1 000	■ Check the torque of the screw fittings. ■ Clean the drop former of the fraction collector.

8.4 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.

Clean all smooth surfaces of the device using a mild, commercially available cleaning solution, or with isopropanol.

8.5 Check screw fittings

Make sure that all screw fittings are tight. If screw fittings are leaking, tighten them. Note the respective torque for screw fittings so as not to damage any components.

Capillary fittings	Torque
PEEK fittings	1 Nm

Next steps Put the device back into operation.

9. Transport and storage

⚠ CAUTION

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 only centrally on the side of the housing.

Carefully prepare the device for transport or storage taking into account the following information.

9.1 Taking the device out of operation

Prerequisites The device is switched off.

Procedure

Process
1. Disconnect the mains plug from the socket and then remove the power supply cable from the device.
2. Pack the power supply cable together with the device.

Next steps Disconnect all electrical connections. Remove the accessories and pack the device for transport or storage.

9.2 Packing the device

- Original packaging: Ideally use the original transport packaging.
- Disassemble the fraction collector into the three main components:
  - Motor block with swivel arm
  - Holding rods
  - Ground plate
- To do this, remove the motor block from the holding rods.
- Unscrew the holding rods from the ground plate.
- Lifting: Hold the device by the sides at the ground plate and the leak tray and lift the device into the packaging. Do not hold the device by the swivel arm, the rod fixation or the leak tray, as these parts cannot support the weight of the device.

9.3 Transporting the device

- Documents: If you wish to return your device to KNAUER for repairs, enclose the document "Service request form and decontamination report" which can be downloaded from the KNAUER website.
- Device data: For a secure transport, note the weight and dimensions of the device (see chapter 11 on page 47).

9.4 Storing the device

NOTICE

Solvent residues

Solvent residues can damage the fraction collector. The resulting deposits can block the flow when using the device again.

➔ Flush the fraction collector before storage.
➔ Flush the valve with isopropanol.
➔ Close the openings with cap fittings.

If the fraction collector is not used for several weeks, solvent residues can cause damage.

- Flushing solution: Pay attention that all hoses and capillaries have been emptied or filled with flushing solution (e. g. isopropanol) before storage. To prevent algae formation, do not use pure water.
- Seals: Close all inputs and outputs with cap fittings.
- Ambient conditions: The device can be stored under ambient conditions which are listed in the chapter Technical Data (see chapter 11 on page 47).

Prerequisites

- The fraction collector head has been purged.
- The fraction collector was switched off and disconnected from the power supply.

Procedure

Process
1. Unscrew the supply line and the drain line of the eluents from the valve.
2. Disconnect the fraction collector from the HPLC system.

Result

The device has been prepared for storage and can be stored under the ambient conditions specified in the Technical Data (see chapter 11.3 on page 48).

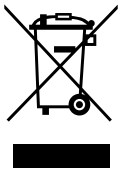
10. Disposal

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

10.1 AVV-Marking Germany

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

10.2 WEEE registration number



All WEEE registrations of KNAUER and the corresponding categories can be viewed on our website: www.knauer.net/imprint

All dealers and importers of KNAUER devices are responsible for the disposal of old devices in accordance with the WEEE Directive. KNAUER devices may not be disposed of with household waste.

For devices purchased directly from KNAUER, KNAUER will bear the costs of disposal. In all other cases, the respective dealer is obliged to bear the disposal costs. Get in touch with your contact person for further information on disposal.

If it is necessary to ship the old device, you will bear the shipping costs.

10.3 Eluents and other operating materials

All eluents 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 with isopropanol first and water afterwards before being maintained, disassembled or disposed of.

During the flushing process of the fraction collector, switch the magnetic valve (fraction/waste valve) several times between the two positions in order to flush both channels.

11. Technical data

11.1 Main features

Faction modes	■ Drop counting ■ Time intervals ■ Volume intervals ■ Filling level
Maximum flow rates	Best working up to 100 ml/min; maximum 250 ml/min
Fraction capacity	Refer to the list of racks in the "Accessories and spare parts" table
Dead volume	Valve: 50 µl, Drop former (inner diameter 0.75 mm, length 22 mm): 10 µl
Wetted materials	■ Valve: - AFA00: PPS, EPDM - AFA01: PEEK, FFKM ■ Ferules supplied: ETFE ■ Valve and drain hoses supplied: ETFE or FEP
Number of racks	1 main rack (1 side rack for 250 ml bottles possible)
Capillary connections	■ 1/16“: 50 ml/min ■ 1/8“: 250 ml/min
Dimensions	■ Ground plate approx. 36 x 43 cm ■ Device height without tubing: 35 cm ■ Device height with tubing: approx. 45 cm ■ Weight: 5.06 kg
Swivel range	42 cm of the ground plate + 15 cm on both sides
Power connection	100 – 240 V AC, 50 – 60 Hz, max. 1.5 A
Connectivity	via LAN
Status display	via LED on the top and front
Biocompatible option	possible with PEEK fittings and PEEK drop formers
Conformity	CE, CSA

11.2 Communication

Interfaces	■ LAN ■ 3-way pin header plug (Analog IN, OUT, GROUND)
Control	■ LAN ■ Analog and event control ■ Software
Analog input	TTL (0 or 5 V)
Analog control input	Change to the next position
GLP	Injector valve cycles, radial drive revolutions, polar drive revolutions
Display	2 LEDs
Leak sensor	No
Protection type	IP20

11.3 General

Power Supply	Power input	■ 100 – 240 V AC, 50 – 60 Hz ■ Maximum power consumption: 100 Watts
Permitted operating environment	Area of use	For indoor use only
	Ambient temperature	4 – 40 °C (39.2 – 104 °F)
	Air humidity	Below 90 %, non-condensing
	Operating altitude	Max. 2 000 meters above sea level
	Permitted pollution degree	2
	Overvoltage category	II (Energy consumers are supplied by a fixed device.)
	Permissible mains voltage fluctuations	±10 % of normal voltage

12. Repeat orders

The list of repeat orders is up-to-date at the time of publication. Deviations afterwards are possible.

Use the enclosed packing list for reordering spare parts. If you have any questions regarding spare parts or accessories, contact our Customer Support.

More information

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

12.1 Device

Name	Order no.
AZURA® FC 6.1 BIO Fraction collector	AFA00
AZURA® FC 6.1 Fraction collector	AFA01
Accessory kit for AZURA® FC 6.1 1/16" and 1/8" fittings and tubing, drop former, tools, power supply, bottle holder, manual	FCB61
Accessory kit: drop former capillary for AZURA® FC 6.1 in PEEK and SST for OD 1/16", Super flangeless ferrule PEEK and SST Ring for OD 1/16" for UNF 1/4-28 flat-bottom	FCB61AA (included in FCB61)
Accessory kit: fittings (PEEK) for UNF 1/4-28 flat-bottom for 1/16" and 1/8" OD tubing	FZG11 (included in FCB61)

12.2 Accessories

Racks

Name	Order no.
Rack for 165 tubes 1/1.5/2 ml each (11 mm)*	AFR01
Rack for 99 tubes 15 ml each (17 mm)	AFR02
Rack for 30 tubes 50 ml each (31 mm)	AFR03
Rack for 15 round bottles (56 mm) 100 ml each	AFR04
Rack for 8 round (72 mm) or square (65 mm) bottles 250 ml each	AFR05

* Note: For vessels with lids, only every second row can be used.

12.3 Spare parts

	Name	Order no.
Device feet	Spare part kit device feet, self-adhesive, for L devices	A8880028
Mainboard	Spare part kit mainboard, complete (including mainboard and two spacers)	A8880103
	CR2032 Lithium battery 3V / 225 mAh, 3 pcs.	A80171
	Light barrier circuit board	A80427
	Encoder board	A80428
Drop counter	Spare part kit drop counter with protective foil (including drop counter board, drop counter housing, light guide and connector cover)	A8880104
Ferrule	Super flangeless ferrule (10 ferrules for 1/16", PEEK, 1/4-28 Flat-Bottom, with lock ring SST, max. 172 bar)	A58292
Cables	Cable of the drop counter and the magnetic valve	A80429
	Cable of the light barrier	A80430
	On/off switch with cable	A80431
Motor	Motor with cable (spindle drive)	A80432
	Spindle nut	A80433
Valve	Valve (EPDM membrane) for AFA00	A80434
	Valve (FFKM membrane) for AFA01	A80001
	Glider	A80435
	Magnetic valve cover	A80436
	Leak tray	A80437
	Cover, complete (cover incl. on/off switch with cable)	A80438
	Capillary guide	A80292

12.4 Wear parts

	Name	Order no.
Maintenance kit	Maintenance kit (for magnetic valve block) including magnetic valve block, super flangeless ferrule, drop former capillary, fitting and protective tube	ARF01
Valve block	Magnetic valve block	A80439
Ferrule	Super flangeless ferrule (10 ferrules for 1/16", PEEK, 1/4-28 Flat-Bottom, with lock ring SST, max. 172 bar)	A58292
Capillaries	Drop former capillary (P5345)	A80443
	Drop former capillary (P5345A)	A80444
	Drop former capillary (P5345B)	A80445
	Drop former capillary (P5345C)	A80446
	Drop former capillary (P5345D)	A80455
	Fitting drop former fingertight 1/16", 1/4-28	A80440
	Protective tube drop former	A80441
	Snap-in fastener, self-adhesive, 2 pcs.	A80442
Timing belt	Timing belt	A80426
	Thermal gap filler pad, 15 mm × 42 mm × 4 mm	A80457

13. Chemical compatibility of wetted materials

Note: The user takes the responsibility for using the fluids and chemicals in an appropriate and safe way. If there is any doubt, contact the Technical Support of the manufacturer.

13.1 General

The device is very resistant against a variety of commonly used eluents. However, make sure that no eluents or water come in contact with the device or enter into the device. Some organic solvents (such as chlorinated hydrocarbons, ether) may cause coating damage or loosen glued components by improper handling. Even small quantities of other substances, such as additives, modifiers, or salts can influence the durability of the materials. Exposure time and concentration have a high impact on the resistance.

The following list contains information about the chemical compatibility of all wetted materials which are used in devices made by KNAUER. The data bases on a literature research on the manufacturer specifications of the materials. The wetted materials of this device are listed in the chapter “Technical data”.

All resistances mentioned here are for use at temperatures up to 40 °C, unless stated otherwise. Note that higher temperatures can significantly affect the stability of different materials.

13.2 Plastics

Polyetheretherketone (PEEK)

PEEK is a durable and resistant plastic and, next to stainless steel, the standard material in HPLC. It can be used at temperatures up to 100 °C and is highly chemical resistant against almost all commonly used solvents in a pH range of 1-12.5. PEEK is potentially moderate resistant against oxidizing and reducing solvents.

Therefore, following solvents should not be used: Concentrated and oxidizing acids (such as nitric acid solution, sulfuric acid), halogenated acids (such as hydrofluoric acid, hydrobromic acid) and gaseous halogens. Hydrochloric acid is approved for most applications.

In addition, following solvents can have a swelling effect and may have an impact on the functionality of the built-in components: Methylene chloride, THF and DMSO in any concentration such as acetonitrile in higher concentrations.

Polyethylene terephthalate (PET, outdated PETP)

PET is a thermoplastic and semi-crystalline material with high wear resistance. It is resistant against diluted acids, aliphatic and aromatic hydrocarbons, oils, fats and alcohols, but not against halogenated hydrocarbons and ketones.

Since PET belongs chemically to esters, it is not compatible with inorganic acids, hot water and alkalis. Maximum operating Temperature: up to 120 °C.

Polyimide (Vespel®)

This material is wear-resistant and permanent resilient thermically (up to 200 °C) as well as mechanically. It is chemically broadly inert (pH range 1-10) and is especially resistant against acidic to neutral and organic solvents, but vulnerable to pH strong chemical or oxidizing environments: It is incompatible with concentrated mineral acids (such as sulfuric acid), glacial acetic acid, DMSO and THF. In addition, it will be disintegrated by nucleophilic substances like ammonia (such as ammonium salts under alkaline conditions) or acetate.

Ethylene-tetrafluorethylene copolymer (ETFC, Tefzel®)

This fluorinated polymer is highly resistant against neutral and alkaline solvents. Some chlorinated chemicals in connection with this material should be handled with care. Maximum operating Temperature: up to 80 °C.

Perfluorethylenpropylen-Copolymer (FEP), Perfluoralkoxy-Polymer (PFA)

These fluorinated polymers hold similar features as PTFE, but with a lower operation temperature (up to 205 °C). PFA is suitable for ultrapure applications, FEP can be used universally. They are resistant against almost all organic and inorganic chemicals, except elemental fluorine under pressure or at high temperatures and fluorine-halogen compounds.

Polyoxymethylene (POM, POM-H-TF)

POM is a semi-crystalline, high-molecular thermoplastic material which stands out due to its high stiffness, low friction value and thermic stability. It can even substitute metal in many cases. POM-H-TF is a combination of PTFE fibres and acetal resin and is softer and has better slip properties as POM. The material is resistant against diluted acids (pH > 4) as well as diluted lyes, aliphatic, aromatic and halogenated hydrocarbons, oils and alcohols. It is not compatible with concentrated acids, hydrofluoric acid and oxidizing agent. Maximum operating temperature: up to 100 °C.

Polyphenylene sulfide (PPS)

PPS is a soft polymer which is known for its high break resistance and very high chemical compatibility. It can be used with most organic, pH neutral to pH high, and aqueous solvents at room temperature without concerns. However, it is not recommended for using with chlorinated, oxidizing and reducing solvents, inorganic acids or at higher temperatures. Maximum operating temperature: up to 50 °C.

Polytetrafluorethylene (PTFE, Teflon®)

PTFE is very soft and anti-adhesive. This material is resistant against almost all acids, lyes and solvents, except against fluid sodium and fluoride compounds. In addition, it is temperature-resistant from –200 °C to +260 °C.

Systec AF™

This amorphous perfluorinated copolymer is inert against all commonly used solvents. However, it is soluble in perfluorinated solvents like Fluorinert® FC-75 and FC-40, and Fomblin perfluor-polyether solvents from Ausimont. In addition, it is affected by Freon® solvents.

Polychlortrifluorethylene (PCTFE, Kel-F®)

The semi-crystalline thermoplastic material is plasticizer-free and dimensionally stable, even in a wide temperature range (–240 °C to+205 °C). It is moderately resistant against ether, halogenated solvents and toluene. Halogenated solvents over +60 °C and chlorine gas should not be used.

Fluorinated rubber (FKM)

The elastomer consisting of fluorinated hydrocarbon stands out due to a high resistance against mineral oils, synthetic hydraulic fluids, fuels, aromatics, and many organic solvents and chemicals. However, it is not compatible with strong alkaline solvents (pH value > 13) like ammonia, and acidic solvents (pH value < 1), Pyrrole and THF. Operating temperature: Between –40 °C and +200 °C.

Perfluorinated rubber (FFKM)

This perfluoro elastomer has a higher fluorine content as fluorinated rubber and is therefore chemically more resistant. It can be employed at higher temperatures (up to 275 °C). It is not compatible with Pyrrole.

13.3 Metals

Stainless steel

Stainless steel is, apart from PEEK, the standard material in HPLC. Steels with WNr. 1.4404 (316L) are used, or with a mixture of higher compatibility.

They are inert against almost all solvents. Exceptions are biological applications which are metal ion sensible, and applications with extreme corrosive conditions. These steels, in comparison to commonly used steels, are increasingly resistant against hydrochloric acid, cyanides and other halogen acids, chlorides and chlorinated solvents.

The use in ion chromatography is not recommended. In case of electrochemical applications, a passivation must be executed first.

Hastelloy®-C

This nickel-chrome-molybdenum alloy is extremely resistant to corrosion, especially against oxidizing, reducing and mixed solvents, even at high temperatures. This alloy may be used in combination with chlorine, formic acid, acetic acid and saline solutions.

Titanium, titanium alloy (TiAl6V4)

Titanium has a low weight and a high hardness and stability. It stands out due to its very high chemical compatibility and biocompatibility. Titan is applied when neither stainless steel nor PEEK are usable.

13.4 Non-metals

Diamond-like carbon (DLC)

This material is characterized by a high hardness, a low coefficient of friction and thus low wear. In addition, it is highly biocompatible. DLC is inert against all acids, alkalis and solvents commonly used in HPLC.

Ceramic

Ceramic is resistant against corrosion and wear and is fully biocompatible. An incompatibility against acids, alkalis and solvents commonly used in HPLC is not known.

Alumina (Al_2O_3)

Due to their high resistance to wear and corrosion, alumina ceramic is used as a coating for mechanically stressed surfaces. It is a biocompatible material with low thermal conductivity and low thermal expansion.

Zirconium oxide (ZrO_2)

Zirconia ceramics are characterized by their high mechanical resistance, which makes them particularly resistant to wear and corrosion. It is also biocompatible, has low thermal conductivity and is resistant to high pressures.

Sapphire

Synthetic sapphire is virtually pure monocrystalline alumina. It is biocompatible and very resistant to corrosion and wear. The material is characterized by a high hardness and a high thermal conductivity.

Ruby

Synthetic ruby is monocrystalline alumina and gets its red color by the addition of some chromium oxide. It is biocompatible and very resistant to corrosion and wear. The material is characterized by a high hardness and a high thermal conductivity.

Mineral wool

This insulating material consists of glass or stone wool fibres and isolates in high oxidizing conditions and at high temperatures. Mineral wool is valid as commonly inert against organic solvents and acids.

Glass, glass fibre, quartz, quartz glass

These mineral materials are resistant against corrosion and wear and are mostly chemical inert. They are compatible with oils, fats and solvents and show a high resistance against acids and lyes up to pH values of 3-9. Concentrated acids (especially hydrofluoric acid) may embrittle and corrode the minerals. Lyes may ablate the surfaces slowly.

	Created	Reviewed	Approved
Function	Technical Editor	Engineering	Head of Quality
Name	Anna Erben	Paul Pietsch	Kate Monk
Date	23/02/2023	23/02/2023	23/02/2023
Signature			

0. Customer approval

Prior to installation at the customer site, the customer has reviewed the OQ document and agrees with the design and scope.

Company name:

Name	Function	Reviewed & approved	Date	Signature
		☐		
		☐		
		☐		
		☐		
		☐		
		☐		
		☐		
		☐		

1. Definition of the Installation Qualification

The qualification document „Installation Qualification (IQ)" is part of the quality management system at the company KNAUER Wissenschaftliche Geräte GmbH.

2. Scope

The customer can request the Installation Qualification. In case of a request, the technical support of KNAUER or a provider authorized by KNAUER performs this functionality test during the installation. The IQ is a standardized document and includes the following:

- Confirmation of flawless condition at delivery
- Check if the delivery is complete
- Certification on the functionality of the device

3. Instructions

All deviations from the specifications that occurred during installation have to be recorded in this document.

In addition, all measures taken to eliminate the deviations have to be noted down as comments in the list of rectifications (LOR) on page 4.

If certain items in the report are not applicable, this has to be indicated in the table as „N/A" (not applicable). Major sections that are not used have to be crossed out (diagonal line), marked „N/A", dated and signed.

All required documents have to be completed by the end of the installation. The document has to be reviewed and approved by an authorized person. The review and approval have to be documented with signature and date (DD/MM/YYYY).

The tests have to be carried out in a suitable environment, as described in the user instruction of the device.

4. About this document

The information in this document is subject to change without prior notice. This document may not be used, reproduced or translated without written consent of KNAUER Wissenschaftliche Geräte GmbH. Depending on the customer's quality assurance system, the signed document either has to be filed in the device folder or scanned and stored in an electronic archive.

5. Device data

Device name		Product number	
Serial number		Order number	
Firmware version			
Installation location			

6. Customer and manufacturer data

	Customer	**Manufacturer**
Company		KNAUER Wissenschaftliche Geräte GmbH
Customer number		-
Contact person/agent		
Address		Hegauer Weg 38
Postal Code/City		14163 Berlin
Phone		+49 30 80 97 27 111
E-Mail		support@knauer.net

7. Installation Qualification Tests

Test	Description	Specification	Passed	Failed	N/A	Comment/LOR No.
1	Identify the device.	The name on the device matches the name on the delivery order.	☐	☐	☐	
2	Check the device for transport damage.	No transport damage is observed.	☐	☐	☐	
3	Check the scope of delivery.	The scope of delivery matches the packing list and /or the delivery order.	☐	☐	☐	
4	Check that the technical documentation provided is correct and complete (material documentation of wetted parts, calibration certificates etc.)	The documentation is correct and complete.	☐	☐	☐	
5	Check that all equipment is properly and correctly labeled according to the delivery order and/or the labeling specifications document, if applicable.	The equipment is labeled correctly.	☐	☐	☐	
6	Connect all loose parts (e.g. capillaries, tubings, measuring head) according to the user instructions.	The device is fully assembled and ready to use.	☐	☐	☐	
7	Ensure that the installation site is suitable according to the user instructions.	The installation site matches the specifications in the user instructions.	☐	☐	☐	
8	Connect the device to the power supply and switch it on.	The device starts (operating noise). The power LED or the display lights up.	☐	☐	☐	

8. List of rectifications (LOR)

LOR No.	Test No.	Type of deviation*	Description of the deviation	Action plan	Persons responsible	Due date	Date/signature

* Type of deviation:

A = acceptable (e.g. not a GMP-critical deviation)

N = not acceptable
Continuation of qualification activities into the next qualification phase is only possible when deviation is rectified.

T = temporarily acceptable
a) Release and use of the system is possible, even when the deviation is not rectified.
b) A continuation of qualification activities into the next qualification phase is possible, even when the deviation is not rectified

9. List of changes to the document

Revision no.	Description of change	Additional information	Date/signature

Installation Qualification (IQ) for a Device

10. Certificate and approval

A KNAUER employee or an employee authorized by KNAUER has checked the device and performed all tests described in the IQ.

The IQ form has to be signed by an authorized person. The scope of the IQ meets the customer's requirements.

The results of the IQ, any changes made as well as the IQ process have been documented in this form in writing. The users listed below were instructed and are familiar with how to operate the device. Both parties confirm that the IQ has been performed to the customer's satisfaction by signing it.

10.1 Customer approval

Name	Function	Date	Signature

10.2 KNAUER agent approval

Name	Function	Date	Signature

11. Comments / recommendations

Appendix: List of supporting documents

No.	Test no.	Description

Science with Passion

Latest KNAUER instructions online:
www.knauer.net/library

KNAUER
Wissenschaftliche Geräte GmbH
Hegauer Weg 37-38
14163 Berlin

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