

Azura

Eluent heater ELH 2.1L Instructions



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.

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These operating instructions apply to products with product number A70060-1 (AZURA® ELH 2.1L single heating section device) and A70060-2 (AZURA® ELH 2.1L double heating section device).

The information in this document is subject to change without prior notice.

For latest version of the instructions, check our website:

www.knauer.net/bibliothek.



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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 chapter "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 (red) indicates a highly hazardous situation. If not avoided, it will result in death or serious injury. |
|  | WARNING (orange) indicates a hazardous situation. If not avoided, it could result in death or serious injury. |
|  | CAUTION (yellow) indicates a moderate hazardous situation. If not avoided, it could result in minor or moderate injury. |
|  | 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 User qualification" 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 Warranty seal

A blue or orange warranty seal is affixed to some devices.



- A blue seal is used by KNAUER's Manufacturing or Customer Support for devices to be sold.
- After repair, the KNAUER service technician attaches an orange seal onto the identical position.

If unauthorized persons tamper with the device or if the seal is damaged, the warranty will lapse.

1.4.5 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. To switch off devices of the AZURA® S series, remove the plug from the power socket or use the toggle switch of the power supply unit.
- Front cover: Devices of the AZURA® L series have a front cover as a splash protection for the user.
- Leak tray: Devices of the AZURA® L series have a leak tray on the front side. The leak tray collects leaking solvents and protects components from potential damage caused by discharging liquid.
- Lamp: For the detectors AZURA® DAD 2.1L, DAD 6.1L and MWD 2.1L, the lamp switches off automatically when the cover is opened.

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 chapter "13.2 Plastics" on page 34).

- Note that organic solvents are toxic above a certain concentration. For handling solvents dangerous to health see the following section (see chapter "2.6.2 Contamination by health-threatening solvents" on page 5).
- 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.

DANGER

Risk of burn

Solvents may be selfigniting on hot surfaces.

- Only use solvents that have an ignition temperature of more than 150 °C under normal conditions.

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 have to be properly decontaminated by a specialist company or the operating company before they can be recommissioned, repaired, sold, or disposed (see chapter "2.9 Service request form and decontamination report" 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: The use of a solvent tray prevents liquids get from the bottles into the inside of the device.
- 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.

- In case of leakage: Switch the system off. Only take the device into operation when the cause of the leak has been resolved (see chapter “4.7 Connecting the drainage system” on page 15).

NOTICE

Device defect

Device defects caused by intruding liquids are possible.

- ➔ Install capillaries in such a way that in the event of a leak, no liquid can penetrate into the devices underneath.
- ➔ Place solvent bottles next to the device or in a solvent tray.
- ➔ Regularly check the system for leaks.

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 Hazardous areas

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

2.7.3 Wet room

Do not use the device in wet rooms.

⚠ CAUTION

Device defect

Operating the device in wet rooms can lead to an electrical short circuit.

- ➔ Do not use the device in rooms with condensing air humidity.

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 Limitation of liability" on page 2).
- 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 AZURA® L characteristics

AZURA® L characteristics

The design of the device partly corresponds to that of the AZURA® L product line.

- The front cover serves as a protection for the eluent heater and its users, but may also be removed.
- The eluent heater is a sturdy device due to its large base and low center of gravity.
- The leakage tray on the front collects escaping liquids and protects the components from possible damage.
- On the rear side you will find the power supply connection and further connections to control the device.

Identification

The device name is above the serial number on the front. A silver-colored sticker on the back gives information about the manufacturer (name and address), the product number and the specifications of the supply connection.

3.2 Performance features

To ensure an uniform temperature for improved chromatographic separation and optimal encapsulation of individual components within an IJM Mixer, you may preheat solvents using the connections on the front of the device. You may also control column heating sleeves and connect external temperature sensors on the back of the device.

The ELH 2.1L has the following features:

- Display for stand-alone use and a quick overview of the device status
- Leak tray

3.3 Device variants

The variants of the ELH 2.1L differ in the number of available connections for solvents to be heated, column heating sleeves and the dead volume.

3.4 Scope of delivery

The following items are included in the scope of delivery:

- Power adapter with mains cable
- LAN cable
- Device

Further applicable documents:

- Instructions Eluent heater ELH 2.1L (V6701)
- Declaration of Conformity

3.5 Views

3.5.1 Front view

Legend

- ① Display
- ② Output
- ③ Input

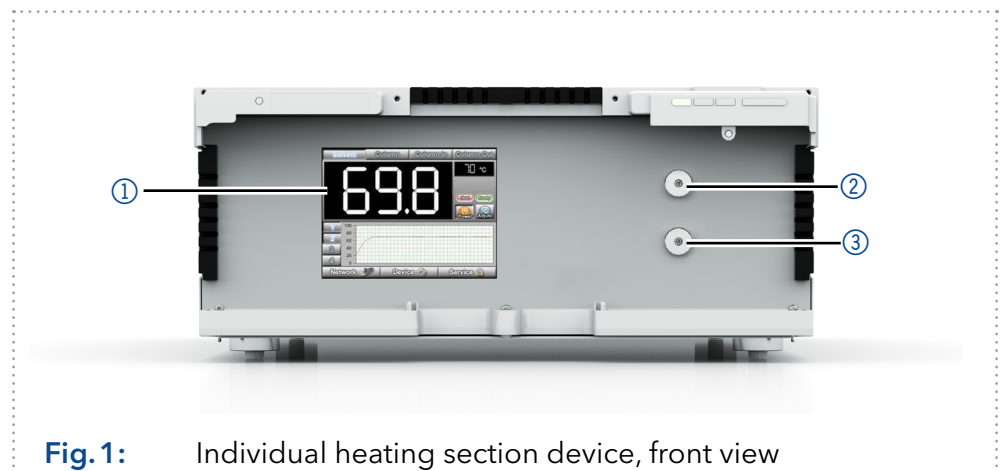


Fig. 1: Individual heating section device, front view

Legend

- ① Display
- ② Output 1
- ③ Output 2
- ④ Input 2
- ⑤ Input 1

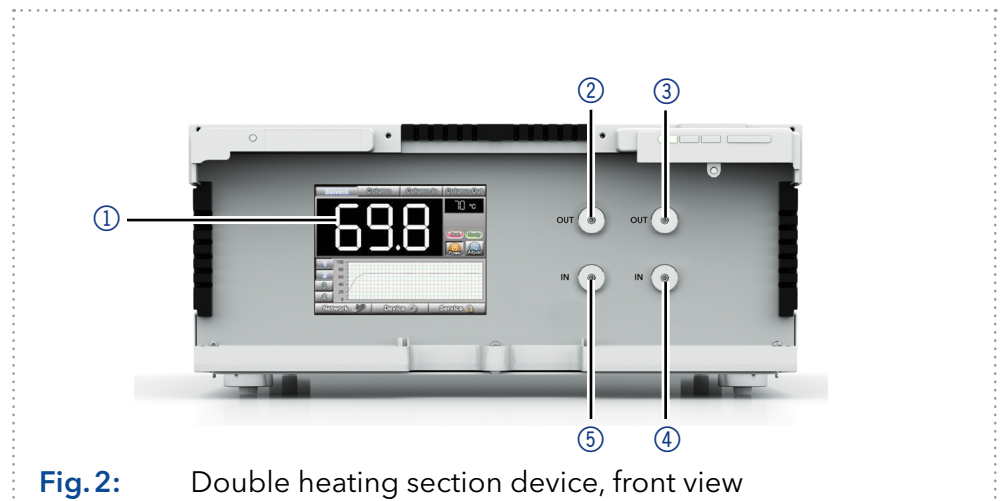


Fig. 2: Double heating section device, front view

3.5.2 Rear view

You will find the following connections on the back of the device:

Legend

- ① Column heating sleeve
- ② Connection for external temperature sensors
- ③ Power connection with mains switch
- ④ Fuse of the power supply
- ⑤ LAN connector

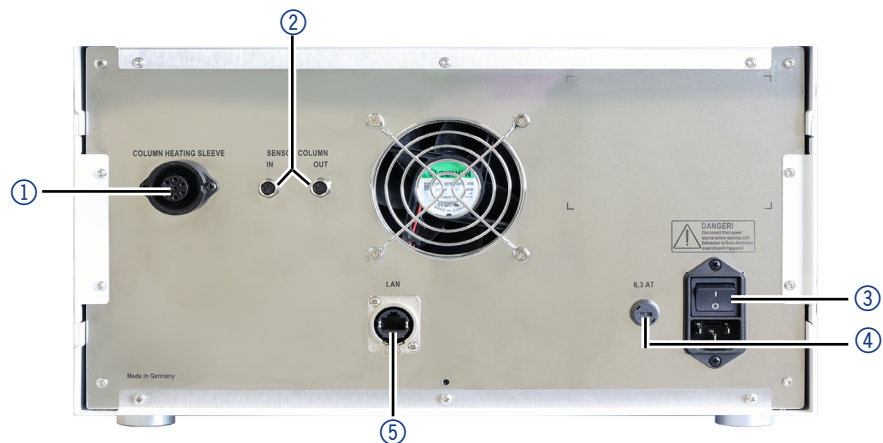


Fig. 3: Individual heating section device, rear view

Legend

- ① Column heating sleeve
- ② Connection for external temperature sensors
- ③ Power connection with mains switch
- ④ Fuse of the power supply
- ⑤ LAN connector

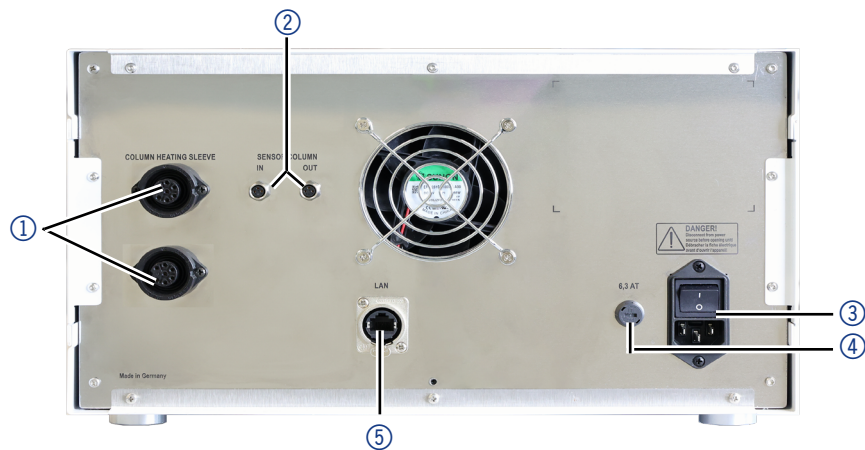









Fig. 4: Double heating section device, rear view

3.6 Symbols and signs

The following symbols and labels are located on the device:

| Symbols | Meaning |
|--|---|
|  | Electric shock hazard. Failure to observe this warning may result in loss of life, serious injury or damage or destruction of the device. |
|  | Risk of electrostatic discharge, damage to the system, the device or certain components possible. |
|  0.5 kg | Observe the maximum weight load of the leakage tray during transportation, installation and operation. |
|  | 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. |
|  | A warranty seal is attached on some devices. For more information, see section (see chapter "1.4.4 Warranty seal" on page 2). |
|  | 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 "10.2 WEEE registration number" on page 29). |

4. Installation and initial startup

Before determining the installation location, read the chapter “Technical data” on page 30. There you will find all device-specific information on the power supply, the permissible ambient conditions, and air humidity.



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

4.1 Unpacking and set up

| | Process |
|-------------------|--|
| Procedure | 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, only hold it by the middle of the side. Do not hold onto the front cover or the leak tray, as these parts are loosely attached to the device. When lifting the device, ensure that the center of gravity is more in the front third. |
| Next steps | <ul style="list-style-type: none"> ■ Keep the enclosed list with the scope of delivery for later reorders. ■ Keep the original packaging for safe storage or transportation of the device. |

4.2 Ambient conditions

4.2.1 Installation location

Observe the following requirements for the operation site so that the measurement results are not influenced:

- The device is placed on a firm, level and even surface.
- The device is protected from direct sunlight.
- The device is not located in a draft (e.g. due to air conditioning).
- The device is not placed next to machines that cause floor vibrations.
- Keep from high-frequency sources.
- Ensure sufficient ventilation (see chapter “4.2.3 Space requirements” on page 13).
- Avoid temperature fluctuations (see chapter “4.2.2 Ambient temperature” on page 12).

4.2.2 Ambient temperature

If you change the ambient temperature of the device 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.

4.2.3 Space requirements

- 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.
- Ensure adequate ventilation around the device, otherwise it may overheat and malfunction:
 - Minimum distance of 5 cm if another device is set on one side.
 - Minimum distance of 10 cm if further devices are set on both sides.
 - At least 15 cm distance to the fan on the rear.
- Mounting a small device on an AZURA L device with a mounting bracket does not affect the performance of either device. The space requirements specified in both operating instructions do not apply in this case.

4.3 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 power adapter supplied to ensure that the specifications given in the technical data are met (see chapter "1.3 General" on page 31). Detachable power cables are not allowed to be replaced with other cable types.
- 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. The ELH 2.1L has a high power consumption of up to 3000 W.
- 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.

4.4 Integration of the device into an HPLC system

The ELH 2.1L is integrated into the flow path of the HPLC system, usually between the pump and the column. The device has two capillary connections with UNF 10-32 internal thread for the usual HPLC connections for 1/16" external thread capillaries. The connections for the capillaries are labeled "IN" and "OUT" accordingly.

4.5 Integration of the column heating sleeve

The ELH 2.1L has an additional connection for up to two column heating sleeves. You can heat one column per heating sleeve. For heating, you also need external heating sleeves with integrated temperature sensors.



Note: While you are initializing the ELH 2.1L, check whether the temperature sensors of the heating sleeve can be found, especially if you are using a third-party product. If this is not the case, additionally attach external temperature sensors to the heating sleeve (see chapter "4.6 Integration of external temperature sensors" on page 14).

DANGER

Risk of burns

Depending on the temperature setting, there is a risk of burns when working with the column heating sleeve.

→ Wear protective gloves during your work.



Note: Always use the column sleeve with a temperature sensor.

4.6 Integration of external temperature sensors

You have the option of connecting up to 2 external temperature sensors to the rear of the ELH 2.1L. You can use the temperature sensors to regulate the temperature of an additional heating sleeve. Place one temperature sensor close the inlet (device connection: SENSOR COLUMN IN) and one to the outlet (device connection: SENSOR COLUMN OUT) of the column between the surface of the heating sleeve and the column.

4.7 Connecting the drainage system

The drainage system ensures that leaked liquids automatically flow into a waste bottle.

Prerequisite ■ Remove the front cover.

Procedure

Process

Figure

- Carefully push the funnel ① into the center opening of the capillary guide ②.

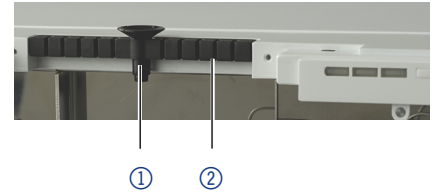


Fig. 5: Funnel and capillary guide

- Push the long ending of the first nozzle ④ into the hose ③.

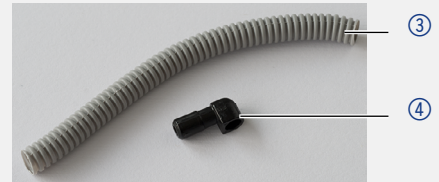


Fig. 6: Silicone hose and drain nozzle

- Afterwards, push the nozzle onto the funnel.
- Push the other end of the hose onto the nozzle ⑤ of the leak tray.



Fig. 7: Connect the hose to the device

- Attach the waste nozzle ⑥ to the bottom unit
- Attach the waste hose to the waste nozzle and connect it to the waste container.
- Place the waste bottle underneath the devices.

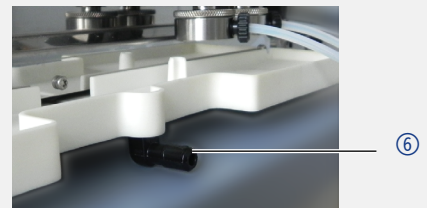


Fig. 8: Leakage tray with waste nozzle

Next step ■ Attach the front cover.

4.8 Computer control

You can control the eluent heater externally in two ways:

- Via the touch display on the front of the device
- As part of a LAN, via the LAN connector of the router.

All electronic connections are located on the rear of the eluent heater (see chapter 3.5.2 Rear view on page 10).



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.

4.8.1 Configuring LAN settings

The connection properties of the eluent heater are configured via the touch display.

Prerequisites

- The device is switched on

Procedure

Process

1. Open the "Network" menu item on the touch display.
2. Deactivate DHCP.
3. Set the device to a fixed IP address by specifying "IP Address" and "Subnet Mask".
4. Close the menu item using the "Save & Reboot" button.

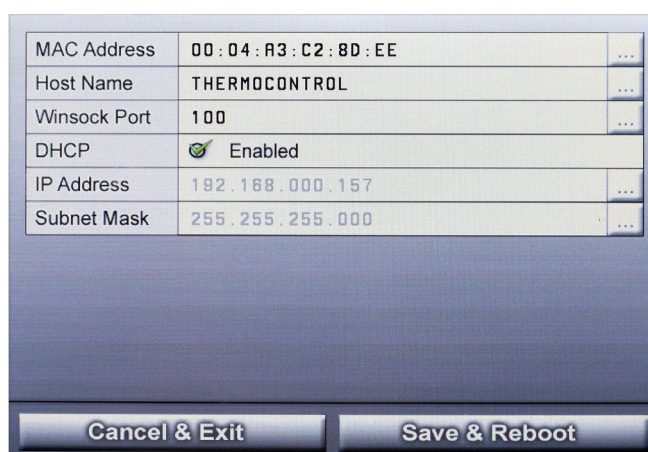


Fig. 9: Menu - Point Network

4.8.2 Connecting devices to LAN

The switch has several LAN connections. The LAN ports serve to set up a network from devices and a computer. To avoid interference, we recommend operating the chromatography system separately from the company network.



Note: You will find patch cables for each device and the router in the accessories kit.

Prerequisites

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

Process

Procedure

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 LAN properties Computer(see chapter 4.8.1 Configuring LAN settings on page 16).

4.8.3 Controlling several systems separately in LAN

Devices connected to a LAN communicate through ports, which are part of the network IP address. If more than one chromatography systems are 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 has to be changed and this same number has to be entered into the device configuration of the chromatography software.



Note: We recommend you to use the same port number for all devices.



Note: The port is set to 100 at the factory for ELH 2.1L. You have to use the same numbers in the device configuration of the chromatography software as well as in the device, otherwise the connection fails.

Process

Procedure

1. Determine the port number and change it on the device if necessary via the "Network" menu item on the touch display (see chapter 4.8.1 Configuring LAN settings on page 16).
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. (PurityChrom®).

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.

5. Operation

5.1 Initial operation

Check whether the device is ready for commissioning:

- Prerequisites**
- 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 has been established.
- The chromatography software has been installed by KNAUER or a company authorized by KNAUER.

5.2 Switching on

After switching on, the ELH 2.1L carries out a self-test. During this time, the touch display remains black, the individual test steps appear in white and the test result is also indicated by an acoustic signal.

- Prerequisite**
- The installation has been completed.

Process

Procedure

1. Connect the power cable of the device to the power supply.
2. Switch on the power switch.
3. Wait until the eluent heater has completed the self-test.
4. Start the connected pump and deliver eluent at a moderate temperature through the eluent heater. Control the device via the touch display or software.

5.3 Control via touch display

In the display and control panels for the heating zones, use three buttons to open the "Network", "Device" and "Service" submenus. Use the channels shown in the display and control fields as temperature controllers or as temperature display channels. In the second case, the "Power" and "Adjust" buttons are deactivated. The buttons at the top of the screen show the names of the individual heating zones. Use these buttons to enlarge the presentation of the relevant heating or display zone so that it can be read from a greater distance.

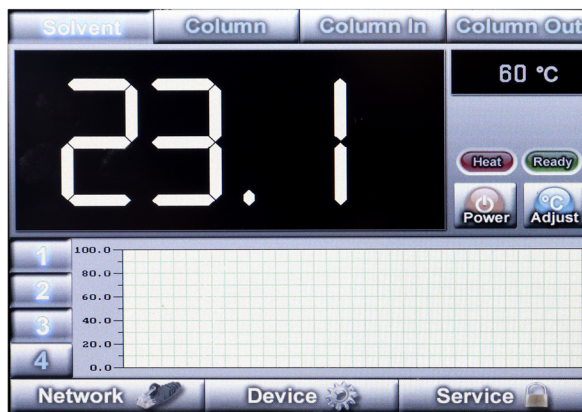


Fig. 10: Touch display, main menu

Each heating zone has its own control panel with a presentation for the set temperature (gray) and the actual temperature (white) and two buttons for switching the heating circuit on and off ("Power") and for setting the set temperature ("Adjust"). The red "Heat" control panel shows the current heat output. As soon as the set temperature is reached within the set tolerance (± 1 °C by default), the green "Ready" field lights up.

Tapping the "Adjust" button opens a numeric keypad for entering the set point temperature. Tap E to accept the value of the temperature input.

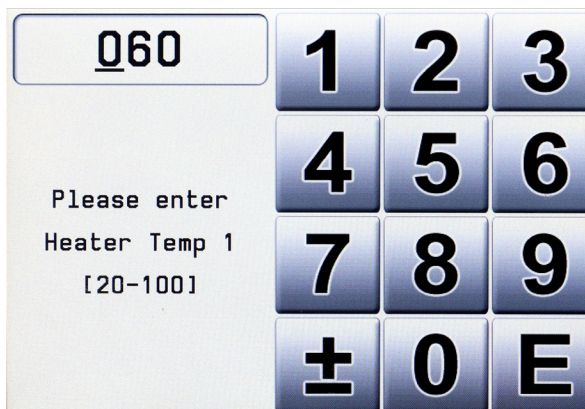


Fig. 11: Temperature input field

The temperature sequences are displayed graphically in the field below the presentation of the 4 heating zones. Use buttons 1, 2, 3 and 4 to show and hide the respective channels in the display. The temperature range and the time resolution can be configured via the "Device" keypad.

The communication parameters can be set in the "Network" menu to enable control via software (see chapter 4.8.3 Controlling several systems separately in LAN on page 17).

Under the "Service" menu, you can set the control parameters of the heating zones, you can activate and deactivate the heating zones, and you can adjust the maximum temperatures.



Note: The parameters may only be changed by trained personnel. The "Service" area is therefore password-protected.

5.4 Controlling with chromatography - software

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

The AZURA® ELH 2.1L eluent heater can be controlled via PurityChrom®.

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
- Definition of customer requirements and acceptance terms

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 whether air has gotten 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 customer 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:



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 all connections:
 - Are all cable connections between devices and switch correct?
 - Are the cables plugged in tightly?
 3. Switch off all devices, the switch and the computer. First switch on the switch and then the devices and the computer.
 - Has this been successful?
 4. Replace the patch cable to the device with that no connection could be established.
 5. Make sure that the IP port of the device matches the port in the chromatography software.

7.2 Possible problems and rectifications

| Problem | Solution |
|---|---|
| Device cannot be switched on. | Check the mains cable to ensure that it is connected to the mains. |
| System breakdown | Switch the device off to reset the memory in the device, then switch the device on again. |
| Error tone during self-test | <p>Checked heating zone was not detected. Check whether the respective heating zone (2: column heating sleeve; 3, 4: external temperature sensors) has been connected correctly.</p> <p>If you only use heating zone 1 (eluent heating), you can ignore the error tone.</p> |
| Display message during the self-test: "Calibration Heater ... failed" | <p>Checked heating zone was not detected. Check whether the respective heating zone (2: column heating sleeve; 3, 4: external temperature sensors) has been connected correctly.</p> <p>If you only use heating zone 1 (eluent heating), you can ignore the error tone.</p> |
| Temperature display "Column" does not show any temperature. | Check that the column heating sleeve has been connected correctly. |
| Temperature display "Column IN" does not show any temperature. | Check that the external temperature sensor has been connected correctly. |
| Temperature display "Column OUT" does not show any temperature. | Check that the second external temperature sensor has been connected correctly. |
| Connection to the software cannot be established. | <p>Compare the IP address setting and port number on the device display with the information in the chromatography software.</p> <p>Check the connection (patch cable) between the computer and the switch and the connection of the eluent heater to the switch.</p> |

8. Maintenance and care

Proper maintenance of your HPLC device will ensure successful analyses and reproducible results. If maintenance work is required for which you cannot find a description here, please contact your dealer or Technical Customer Support.

However, the eluent heater ELH 2.1L is largely maintenance-free when used as intended.

8.1 Maintenance contract

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

- Opening the device or removing housing parts

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.

The following maintenance work may be carried out by the user:

- Replacement of the inlet and outlet fittings for connection to the fluidic system.

8.2 Maintenance and care

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

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.

8.3 Check screw fittings

 **DANGER**

Risk of burns

Depending on the temperature setting, there is a risk of burns when working on the outlet.

→ Wear protective gloves during your work.



Note: Make sure that all screw fittings are tight. If screw fittings are leaking, tighten them.

9. Transport and storage

Regarding the following information, carefully prepare the device for transport or storage.

9.1 Taking the device out of operation

| Prerequisites | The heating section is rinsed with isopropanol and the eluent heater is separated from the HPLC system. The open connections for the inlet and outlet have been sealed with dummy plugs. The device has been switched off. | | | |
|--|---|---------|--|--|
| Procedure | <table border="1"> <thead> <tr> <th>Process</th> </tr> </thead> <tbody> <tr> <td>1. Pull the power plug out of the socket and then out of the device.</td> </tr> <tr> <td>2. Pack the power supply cable together with the device.</td> </tr> </tbody> </table> | Process | 1. Pull the power plug out of the socket and then out of the device. | 2. Pack the power supply cable together with the device. |
| Process | | | | |
| 1. Pull the power plug out of the socket and then out of the device. | | | | |
| 2. Pack the power supply cable together with the device. | | | | |
| Next steps | Disconnect the remaining 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.
- Lifting: Grab the device around the center of both sides and lift it into the packaging. Do not hold onto front cover or leak tray, as these parts are loosely attached to the device. When lifting the device, ensure that the center of gravity is more in the front third.

9.3 Transporting the device

Carefully prepare the device for transport or storage. If you wish to return your device to KNAUER for repair, please enclose the service request form, which you can download from our website.

| | |
|--------------------|---|
| Device data | For a secure transport, note the weight and dimensions of the device (see chapter "9. Transport and storage" on page 27). |
|--------------------|---|

CAUTION

Bruising danger

The device may fall during setting up, installing or carrying. If it falls, it may cause injury.

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

Lifting Grab the device around the center of both sides and lift it into the packaging. Do not hold the device by the front cover or the leakage tray. When lifting the device, ensure that the center of gravity is more in the front third.

9.4 Storage

9.4.1 Storing the device



Note: If the eluent heater is inactive for a longer period of time, solvent residues can cause damage. Therefore, make sure that the heating section has been emptied or filled with rinsing solution (e.g. isopropanol) before storage.



Note: To prevent algae formation, do not use pure water. Close all inputs and outputs with cap fittings.

Prerequisites

- The eluent heater has been purged.
- The eluent heater has been switched off and disconnected from the power supply.

Tool

- Open-end wrench if necessary

Process

Procedure

1. Disconnect the eluent supply line and then seal the exposed connections with dummy plugs.
2. Disconnect the eluent heater from the pump of the HPLC system and then close the open outlet on the pressure sensor (for binary and quaternary versions) with a dummy plug.

Storage conditions The device can be stored under the specified ambient conditions (see chapter "11.3 General" on page 31).

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 in 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

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 have to be collected separately and disposed of properly.

Flush all wetted components of a device, e. g. flow cells of detectors or pump heads and pressure sensors for pumps, with isopropanol first and water afterwards before being maintained, disassembled or disposed.

11. Technical data

11.1 Main features

| | |
|--------------------------------|---|
| Alternative | I: Individual heating sections Eluent heater II: Double heating sections Eluent heater |
| Weight | I: 16 kg II: 24 kg |
| Max. flow rate* | 300 ml/min |
| Wetted materials | Stainless steel |
| dead volume | I: 5.5 ml II: 0.59 ml |
| Max. controllable temperature* | 100 °C |
| Protection type | IP-20 |
| Temperature accuracy | ± 2 °C |

11.2 Communication

| | |
|-------------|---------------|
| Interfaces | LAN |
| Control | LAN |
| Display | Touch display |
| Leak sensor | No |

* The maximum flow rate depends on the solvents used, the pump configuration or the local conditions of the power supply. An overview of the maximum possible parameters can be found in chapter "11.4 Maximum temperature control parameters" on page 31. We recommend a temperature of up to 60 °C.

11.3 General

| | | |
|--|--------------------------------------|---|
| Permitted operating environment | Power supply | <ul style="list-style-type: none"> ■ Power input: 100-230 VAC ■ Maximum power consumption: I: 1500 W II:3000 W ■ Fuse: I: 6.3 AT 10 AT |
| | Dimensions (W × H × D) | 361 mm x 208.2 mm x 523 mm |
| | Leak sensor | No |
| | Area of use | Indoors only |
| | Air humidity | Below 90 %, non-condensing |
| | Operating altitude | Max. 2000 meters above sea level |
| | Permitted contamination level | 2 |
| | Temperature range | 4-40 °C (39.2-104 °F) |
| | Overvoltage category | II |
| | Permitted mains voltage fluctuations | ± 10% |

11.4 Maximum temperature control parameters

| Solvent | Max. voltage** | Max. Flow** | Max. temperature at a specified flow** | Pressure loss at specified flow |
|---------|----------------|-------------|--|---------------------------------|
| Ethanol | 230V | 300 ml/min | 60 °C | approx. 35 - 40 bar |
| | 100 - 120V | 100 ml/min | 60 °C | approx. 5 - 10 bar |
| Water | 230V | 260 ml/min | 60 °C | approx. 25 - 35 bar |
| | 230V | 200 ml/min | 90 °C | - |
| | 100 - 120V | 100 ml/min | 60 °C | approx. 5 - 15 bar |

** The maximum performance parameters may vary depending on the local power grid (e.g. EU: 230 V, USA: 110/120 V, Japan: 100 V).

12. Repeat orders

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

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

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

12.1 Devices

| Description | Order no. |
|--|-----------|
| Individual heating sections Eluent heater ELH 2.1L | A70060-1 |
| Double heating sections Eluent heater ELH 2.1L | A70060-2 |

12.2 Accessories and spare parts

| Description | Order no. |
|--|-----------|
| Heating sleeve for HPLC column 250 x 21.2 mm, max. 100 °C | A57021 |
| Heating sleeve for HPLC column 250 x 4.6 mm, max. 100 °C | A57022 |
| Heating sleeve for HPLC column 250 x 10 mm, max. 100 °C | A57023 |
| Heating sleeve for HPLC column 79x 54 mm, max. 100 °C | A57025 |
| Heating sleeve for HPLC column 150 x 20 mm, max. 100 °C | A57026 |
| Heating sleeve for HPLC column 250 x 20 mm, max. 100 °C | A57027 |
| Heating sleeve for HPLC column 150 x 30 mm, max. 100 °C | A57028 |
| Heating sleeve for HPLC column 250 x 30 mm, max. 100 °C | A57029 |
| Heating sleeve for HPLC column 150 x 50 mm, max. 100 °C | A57030 |
| Heating sleeve for HPLC column 250 x 50 mm, max. 100 °C | A57031 |
| Heating sleeve for custom-made HPLC products up to 350 x 50 mm, max. 100 °C | A57032 |
| Heating sleeve for HPLC column 350 x 50 mm, max. 100 °C, moisture-resistant / suitable for clean rooms | A57034 |

| Description | Order no. |
|--|-----------|
| Temperature sensor Pt100 for customized heating sleeves | A57038 |
| Heating sleeve for a pipe or a custom-made pipe section, self-limiting heating tape HBRC 85 °C | A57042 |

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 may 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. Operating Temperature: up to 120 °C.

Polyimide (Vespel®)

This material is wear-resistant and permanent resilient thermally (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-HTF is a combination of PTFE fibers 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. 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 maybe 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. 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.

System 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.

Polychlorotrifluoroethylene (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. Do not use halogenated solvents over +60 °C and chlorine gas.

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 may be employed at higher temperatures (up to 275 °C). It is not compatible with Pyrrole.

13.3 Metals

Stainless steel

Stainless steel is, next to 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 has to 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 (TiA16V4)

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 (Al₂O₃)

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.

Zirconia (ZrO₂)

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 fibers and isolates in high oxidizing conditions and at high temperatures. Mineral wool is valid as commonly inert against organic solvents and acids.

Glass, glass fiber, 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 |  |  |  <small>Kathryn Monks (Paul, 2023 15:21 GMT+1)</small> |

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 |
|------|----------|---------------------|------|-----------|
| | | | | |
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| | | | | |

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 |
|---------|----------|--------------------|------------------------------|-------------|---------------------|----------|----------------|
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*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 |
|--------------|-----------------------|------------------------|----------------|
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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 |
|------|----------|------|-----------|
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10.2 KNAUER agent approval

| Name | Function | Date | Signature |
|------|----------|------|-----------|
| | | | |

11. Comments / recommendations

Science with Passion



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

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