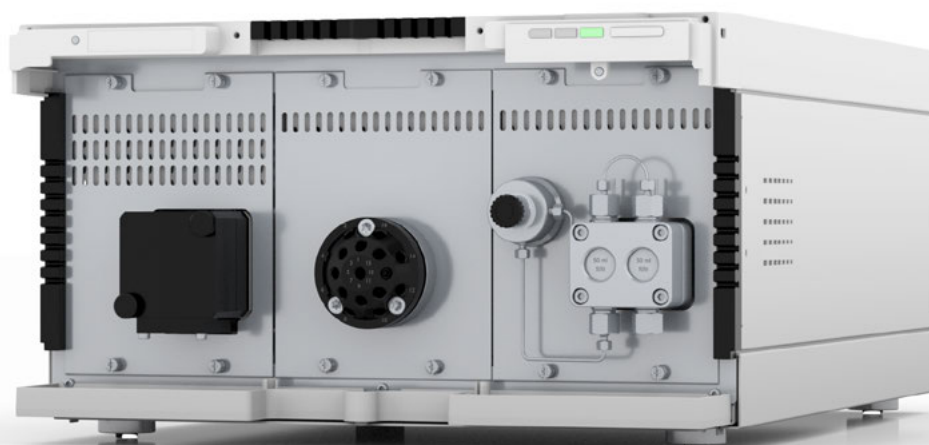


Azura

Assistant ASM 2.2L Instructions



Sample configuration of ASM 2.2L with valve



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

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For latest version of the instructions, check our website:

www.knauer.net/library.



Sustainability: The printed versions of our instructions are printed according to Blue Angel standards (www.blauer-engel.de/en/uz195).

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Table of contents

1. General	1
1.1 About these instructions	1
1.2 Signal words	1
1.3 Additional typographical conventions	1
1.4 Legal information	2
1.4.1 Liability limitation	2
1.4.2 Transport damage	2
1.4.3 Warranty conditions	2
1.4.4 Warranty seal	2
1.4.5 Declaration of conformity	2
2. Basic safety instructions	3
2.1 Intended use	3
2.1.1 Operating ranges	3
2.1.2 Foreseeable misuse	3
2.2 User qualification	3
2.3 Operator responsibility	3
2.4 Personal safety equipment	4
2.5 Safety features on the device	4
2.6 Working with solvents	5
2.6.1 General requirements	5
2.6.2 Contamination by health-threatening solvents	5
2.6.3 Avoiding leakage	5
2.7 Specific environments	6
2.7.1 Earthquake-endangered areas	6
2.7.2 Explosive environment	6
2.7.3 Cooling room	6
2.7.4 Wet room	6
2.8 Maintenance, care and repair	6
2.9 Service request form and decontamination report	6
3. Safe operation of the device modules	7
3.1 General	7
3.2 Detector and flow cells	8
3.3 Pump	9
3.4 Valve drive and valves	10
4. Symbols and signs	10

5. Product information	11
5.1 Intended use	11
5.2 Performance features	12
5.3 Views	12
5.3.1 Front view	12
5.3.2 Rear view	13
5.4 Device overview	13
5.5 Exceptions to the configuration	13
5.6 Overview of the device modules	14
5.6.1 Detector AZURA® UVD 2.1S	14
5.6.2 Pump AZURA® P 2.1S/P 4.1S	15
5.6.3 Valve drive AZURA® Valve unifier VU 4.1	16
5.7 Sample configuration	17
5.8 Exchange of the device modules	18
6. Scope of delivery	19
7. Unpacking and setup	20
7.1 Location requirements	20
7.2 Unpacking and setup	21
7.3 Power supply	21
8. Initial startup	22
8.1 Connecting the leak management	22
8.2 Connecting the device to a computer	23
8.2.1 Configuring the LAN settings	24
8.2.2 Connecting the cables	24
8.2.3 Configuring the router	25
8.2.4 Integrating the LAN into the company network	25
8.2.5 Controlling several systems separately in the LAN	25
8.2.6 Mobile Control: Setting a static IP address	26
8.2.7 Mobile Control Setting IP address to DHCP via device name	27
8.2.8 Mobile Control: Setting IP address to DHCP via device name	27
8.2.9 Firmware Wizard: Setting a static IP address	28
8.2.10 Firmware Wizard: Setting an IP address to DHCP	29
8.2.11 Setting a static IP address via APIPA	29
8.3 Remote control	30
8.3.1 Pin header connection	30
8.3.2 Pin header assignments	31
8.3.3 Integrator output	32
8.3.4 Analog port	32
9. Operation	33
9.1 Meaning of the LEDs	33
9.2 GLP-Data	34
9.3 Startup	35
9.4 Activate standby	36
9.5 Switching off assistant	36

10. Functionality tests	37
11. Troubleshooting	38
11.1 LAN	38
11.2 Possible problems and rectifications	39
11.3 System messages	40
12. Maintenance and care	42
12.1 Maintenance contract	42
12.2 System information	43
12.3 Cleaning and caring for the device 43	
12.4 Maintenance tasks for users	43
12.5 Preparing the assistant for storage or transportation	43
13. Transport and storage	44
13.1 Taking the device out of operation	44
13.2 Packing the device	44
13.3 Transporting the device	44
13.4 Storing the device	45
14. Disposal	45
14.1 AVV-Marking	45
14.2 WEEE registration number	45
14.3 Eluents and other operating materials	45
15. Technical data	46
15.1 Communication	46
15.2 General	46
16. Accessories and spare parts	47
17. Chemical compatibility of wetted materials	49
17.1 General	49
17.2 Plastics	49
17.3 Non-metals	51
17.4 Metals	52
Appendix: Installation Qualification (IQ)	53

1. General

1.1 About these instructions

These operating instructions enable the safe and efficient operation 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", p. 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.

These operating instructions are an integral part of the device. It must be kept in the immediate vicinity of the device and accessible to the user at all times.

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

1.2 Signal words

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

- General equal treatment: When persons are described, this document uses the male grammar form to keep the text easy to read. The form has a neutral sense and speaks to people of any gender in the same way.
- 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 Liability limitation

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", p. 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 please 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, service technicians attach an orange seal onto the identical position.

After repair, the service technician affixes an orange seal in the same place. 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/en/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 for chromatographic applications in the laboratory.

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 outside of a laboratory or measurement room. Otherwise, the manufacturer does not guarantee the functionality and safety of the device.
- Operation in potentially explosive areas without special and additional explosion protection. Contact the KNAUER Customer Support for more information.

2.2 User qualification

The user is qualified to handle the device if all of the following points apply:

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

If the user does not meet these qualifications, he must inform his supervisor.

2.3 Operator responsibility

The operator is any person who operates the device himself or leaves it to a third party for use and who 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 must 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.
- 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 "Chemical compatibility of wetted materials" on p. 49).
- 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 "Service request form and decontamination report" on p. 6).

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 off the system. Only take the device into operation if the cause of the leak has been resolved (see "Maintenance and care" on p. 42).

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 into operation, the device should stay switched on.
- Avoid temperature fluctuations.

2.7.4 Wet room

The device must not be operated 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 of KNAUER or any company authorized by KNAUER (see chapter "1.4.1 Liability limitation", p. 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. Safe operation of the device modules

Observe the following warnings when operating the individual device modules.

3.1 General

Unpacking and setup

⚠ 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.

NOTICE

Device defect

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

→ Set up the device in such a way that it is protected against exposure to direct sunlight.

→ Leave room for air circulation: See paragraph „space requirements“.

Startup of the device

NOTICE

Device defect

Changes of the environmental temperature cause condensation inside the device.

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

Pin-header connection

NOTICE

Electronic defect

Electrostatic discharge can destroy the electronics.

→ Wear a protective bracelet against electrostatic discharge and ground.

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.

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.
-

3.2 Detector and flow cells

Installing the detector

NOTICE

Component defect

Damage to the flow cell due to incorrect lifting possible.

- Lift the detector only on the side of the housing.
-

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.
-

Maintenance of the flow cells

⚠ WARNING

Eye injury

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

- Switch off the detector or the lamps.
-

Cleaning the flow cells

NOTICE

Performance reduction

Oil drops can contaminate the flow cell.

- Do not use compressed air for drying.
-

Connecting the capillaries

NOTICE

Component defect

Damage to the flow cell due to excessive tightening. Observe the torque of the screw connection.

- Use 5 Nm for stainless steel fittings
 - Use 0.5 Nm for PEEK fittings.
-

3.3 Pump

Start-up of the pump

NOTICE

Component defect

Damage to the pump head in case running-in procedure was not performed correctly.

- Set the correct backpressure and flowrate for the running-in procedure of the pump head. Specific running-in parameters and the general procedure can be found in the supplement „[Running-in procedure for pump heads \(V6894\)](#)“.

NOTICE

Component defect

Possible damage to the pump head due to dry running.

- Make sure that solvent flows through the pump head and piston backflushing.

Connecting the eluent line to the pump head

NOTICE

Device defect

Damage to pump head, device or system when inlet and outlet of the pump head are blocked.

- Remove the cap fittings from the inlet and outlet of the pump head prior to use.

Operating the pump

NOTICE

Device defect

If the pump is operated only with pure distilled water, significantly higher wear of the piston and the piston seals can be expected.

- If possible, only operate the pump with water together with the added additive or modifier.

Setting the flow rate

NOTICE

Device defect

Danger of strong overpressure: If the button is pressed for a longer time, the flow rate changes much faster.

- Control the keystroke.

Removing the pump head

⚠ WARNING

Chemical burns

Skin damage from aggressive or toxic eluents.

- Wear protective gloves.
- Flush the pump head before changing.

NOTICE**Component defect**

Possible damage to the pump piston by tilting the pump head.

- Tighten diagonally opposite fastening screws evenly one turn at a time.
- Also loosen the fastening screws evenly.

Installing the pump head**NOTICE****Component defect**

Possible damage to the pump head due to over-tightened capillary fitting.

- Note the torque of the screw connection.







3.4 Valve drive and valves


There are no special safety instructions for the valve drive.

Please observe the safety instructions for valves V 4.1:
www.knauer.net/v6864_en.

4. Symbols and signs

The following table explains symbols and labels which are used on the device or the device modules, in the software or in the instructions:

Symbol	Meaning
	Device fulfills the requirements of the Conformité Européenne, which is confirmed by the Declaration of Conformity.
	The device complies with the product-specific requirements of the United Kingdom.
	High-voltage hazard (AZURA® Assistant ASM 2.2L)
	Danger of burns caused by hot deuterium or halogen lamps! Remove device module and allow the lamps to cool down for at least 15 minutes! (Device module AZURA® Detector UVD 2.1S)
 0.5 kg	Damage to the leak tray or front cover possible while carrying, setting up and installing a device. Grip the device at its sides near the middle when lifting or moving.
	Electrostatic-discharge hazard

Symbol	Meaning
	Testing seals in Canada and the USA at nationally recognized testing centers (NRTL). The certified device or system has successfully passed the quality and security tests.

5. Product information

AZURA® L-characteristics

The AZURA® Assistant ASM 2.2L¹ complies with the external structure of the devices of the AZURA® L product line.

- The front cover serves as a protection for the assistant and its users, but can also be removed.
- The Assistant is a sturdy device due to its large footprint and low center of gravity.
- The leak tray on the front collects leaking fluids and protects the components from possible damage.
- The LEDs indicate the device status. This tells the user whether the assistant is working properly or whether an error has occurred.
- On the rear side you will find the supply connection and further connections to control the device.

Identification

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

AZURA® Assistant ASM 2.2L

The assistant is a compact combination module used in analytical, preparative and continuous liquid chromatography. The concept of flexible combination of device modules combines highest functionality with minimal space requirements.

Equipped with up to three modules the assistant fulfills different tasks like sample and buffer selection, sample injection, column switching, fraction collection. These device types are available for selection: Valve drive, UV detector and pump. Depending on the selected modules the assistant is either a stand-alone compact system or a part of an advanced FPLC-, HPLC- or UHPLC-system.

5.1 Intended use



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

Operating Range

The device can be used in the following areas:

- Biochemical analysis
- FPLC/Biopurification
- Chemical analyses
- Food analyses
- Pharmaceutical analyses
- Environmental analyses

¹ Hereinafter referred to as "ASM 2.2L" or "Assistant"

Eluents Even small quantities of other substances, such as additives, modifiers, or salts can influence the durability of the materials. Detailed information on the chemical resistance can be found in the instructions of the device modules.

5.2 Performance features

Control The assistant can be controlled with a chromatography data system (Open-LAB®, ClarityChrom® and PurityChrom®) or with an optional touch display (Mobile Control). There are LAN and analogue interfaces available. Thus, the assistant can be integrated into almost any LC system.

GLP data The Mobile Control and supported software products (restricted in PurityChrom®) display or read GLP data, such as the operating hours of the device or light sources. For a detailed description of viewing or reading the GLP data, see the appropriate instructions for the software products (<https://www.knauer.net/en/Support/User-manuals/Software>).

Modular design The modular structure makes it possible to adapt the assistant to individual requirements. The plug-in modules can be easily released and replaced by other device modules (see chapter "5.8 Exchange of the device modules" on page 18).

AZURA® Neo The AZURA® Neo electronic platform features:

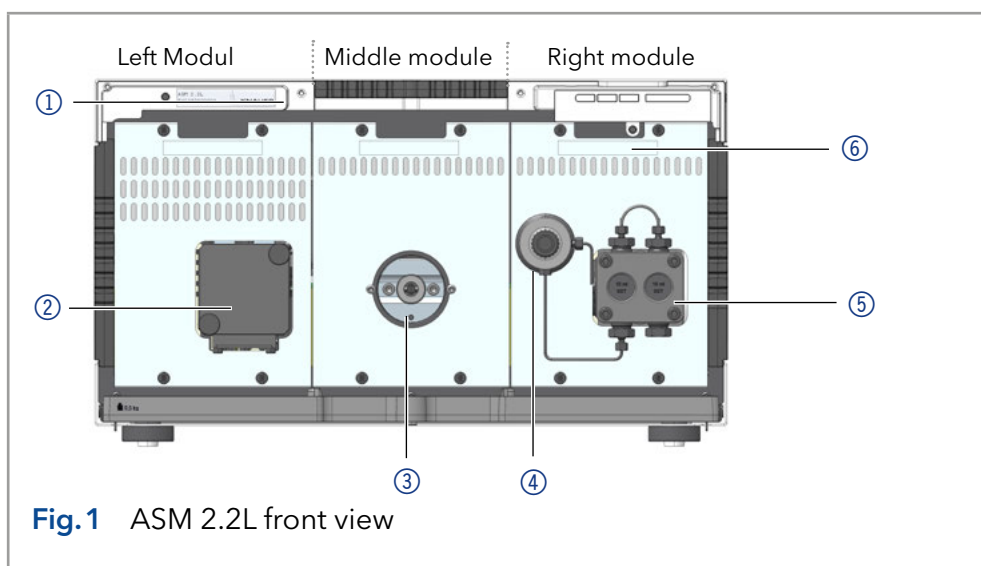
- New microprocessor for faster device performance
- Communication interfaces: IP dual stack with switch (for connecting AZURA® devices among each other) and LAN stack function plus USB service interface (internal USB to RS-232). Both LAN ports (1 and 2) can be used as interface or as switch.
- Industrial standard 4-20 mA analog input (replacing 0-10 V input on the previous electronic platform).
- No external display support.

5.3 Views

5.3.1 Front view

Legend

- ① Device name and serial numbers
- ② UV detector
- ③ Valve drive
- ④ Pressure sensor
- ⑤ Pump head
- ⑥ Module name and serial number



5.3.2 Rear view

Legend

- ① Label with serial numbers and article numbers
- ② CE-marking
- ③ UKCA-marking
- ④ Integrator output
- ⑤ Service interface
- ⑥ LAN-Connection 1
- ⑦ LAN-Connection 2
- ⑧ Pin header
- ⑨ Fan
- ⑩ Warning
- ⑪ Mains connection with mains switch
- ⑫ On/off switch
- ⑬ Warranty-Seal

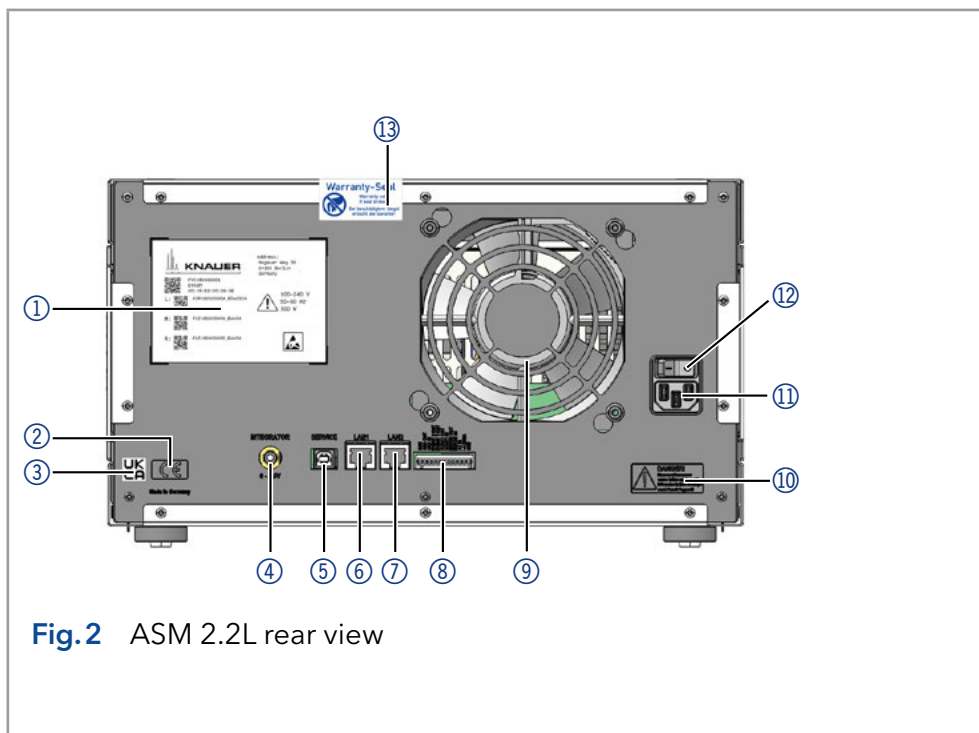


Fig.2 ASM 2.2L rear view

5.4 Device overview

The ASM 2.2L can be equipped with up to three modules. These device types are available for selection:

- Pump
- Valve Drive
- UV detector

In addition, the assistant can be operated with up to two empty modules.

5.5 Exceptions to the configuration

The following exceptions apply to the configuration of the assistant:

1. A maximum of one UV detector is allowed in an assistant.
2. A maximum of two pumps is allowed in an assistant. A high pressure gradient (HPG) is not supported.
3. An assistant with two pumps and a detector AZURA® UVD 2.1S is not supported because the power supply can be overloaded.
4. An assistant with three empty modules is not supported.

NOTICE

Device defect

The assistant must not be put into operation with missing modules. The ventilation system is thereby restricted.

- ➔ Operate the assistant only fully equipped with modules
- ➔ Insert empty modules if necessary.



Note: For printed manuals for the individual devices visit www.knauer.net or contact the technical customer support of KNAUER.

Further details about the assistant and the modules can be found at www.knauer.net/de/Systemloesungen/LC-Modul-Docking-Station.

5.6 Overview of the device modules

The ASM 2.2L can be equipped with the following device modules (plug-in modules):

5.6.1 Detector AZURA® UVD 2.1S

The ASM 2.2L can be equipped with one UV detector. The AZURA® UVD 2.1S detector is supplied with a test cell. For the use of the detector, a flow cell has to be installed.



Note: A maximum of one UV detector is allowed in an assistant.

5.6.1.1 Performance features:

- Single-channel detector with variable wavelength
- Wide range of flow cells for analytical and preparative applications with flow rates from 10 µl/min to 10 l/min.
- Automatic recognition and storing of device-specific information, which are important for Good Laboratory Practice, operation qualifications, or repairing the device.

Further information can be found in the AZURA® Detector UVD 2.1S instructions (document number V6820): www.knauer.net/uvd2.1s-manual.

Legend

- ① UV-detector

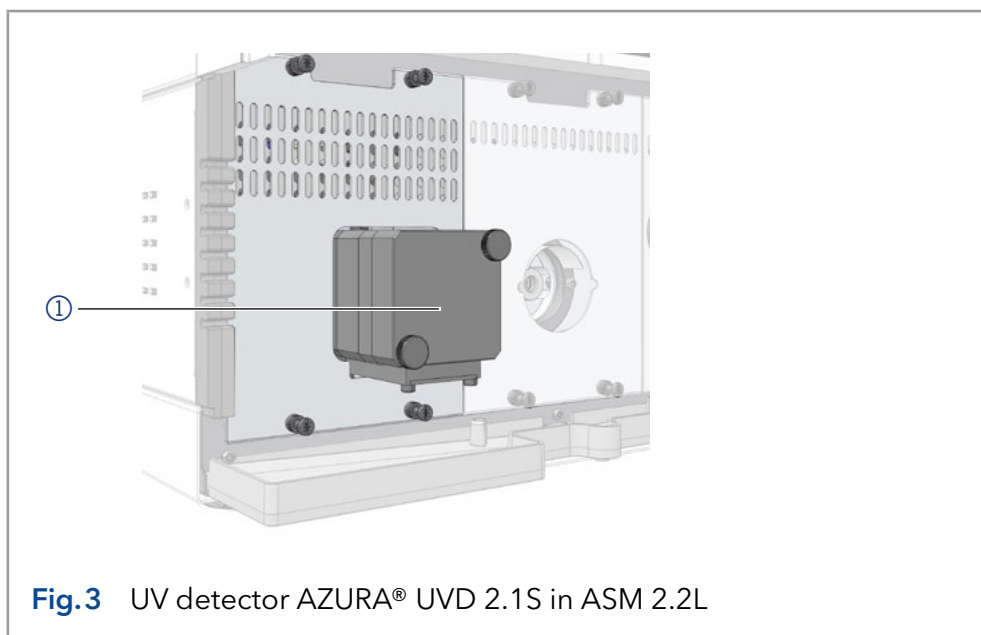


Fig.3 UV detector AZURA® UVD 2.1S in ASM 2.2L

5.6.2 Pump AZURA® P 2.1S/P 4.1S

The ASM 2.2L can be equipped with the AZURA® pumps P 2.1S and P 4.1S. Additionally the pump P 4.1S is equipped with a pressure sensor.



Note: A maximum of two pumps are allowed in one assistant. A high pressure gradient (HPG) is not supported.

5.6.2.1 Performance features:

- Dual-piston technology
- Liquid transport with stable flow rate and high flow accuracy
- Long service life
- 10 ml and 50 ml pump head selectable
- With or without pressure sensor for use with high pressure (HPLC) or low pressure (FPLC).
- The pump heads of the P 2.1S are made of either stainless steel, ceramic or Hastelloy C. The pump heads of the P 4.1S are available either in stainless steel or ceramic.

Legend

- ① Pressure sensor
- ② Pump head

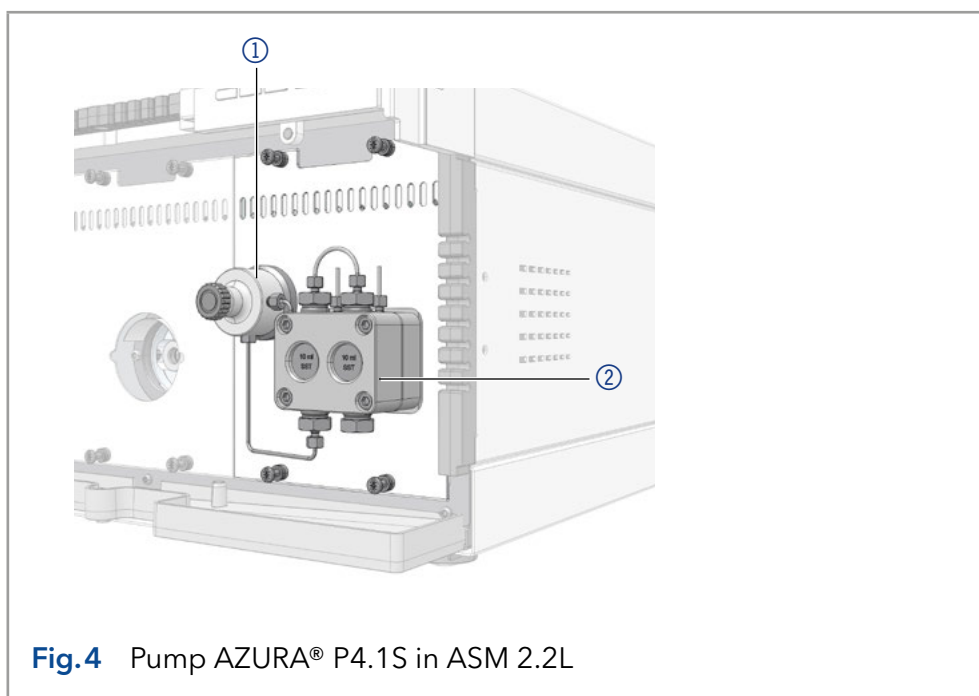


Fig.4 Pump AZURA® P4.1S in ASM 2.2L

Further information can be found in the AZURA® Pump P 2.1S/P 4.1S Instructions (document number V6870): www.knauer.net/P2.1-4.1-manual.

5.6.3 Valve drive AZURA® Valve unifier VU 4.1



Note: The ASM 2.2L can be equipped with a maximum of three VU 4.1 valve drives.

The valves V 4.1 are driven by the valve drive VU 4.1, but must be ordered separately. An overview of the valves supported can be found at: www.knauer.net/valves-assistant.

Legend

① Valve drive

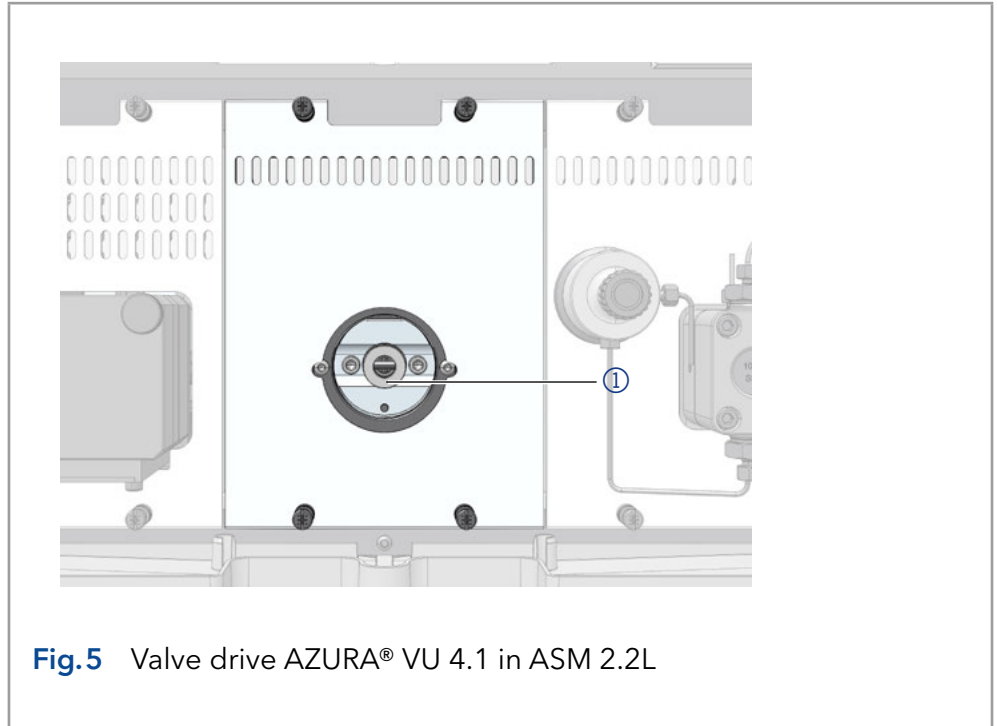


Fig.5 Valve drive AZURA® VU 4.1 in ASM 2.2L

Further information on the valve drive VU 4.1 can be found in the AZURA® Valve Unifier VU 4.1 Instructions (document number V6855): www.knauer.net/uvd2.1s-manual.

5.6.3.1 Mounting the valve onto the valve drive

Prerequisites

Before inserting the valve, check that the pin ① on the back of the valve is in a horizontal position (see Fig. 6). The notch ② is on the left, the RFID tag ③ points upwards.



Note: If the pin is in a different position, insert the valve into the drive coupling of the adapter and turn the valve until the pin snaps into the drive coupling.

Legend

① Pin

② Notch

③ RFID tag

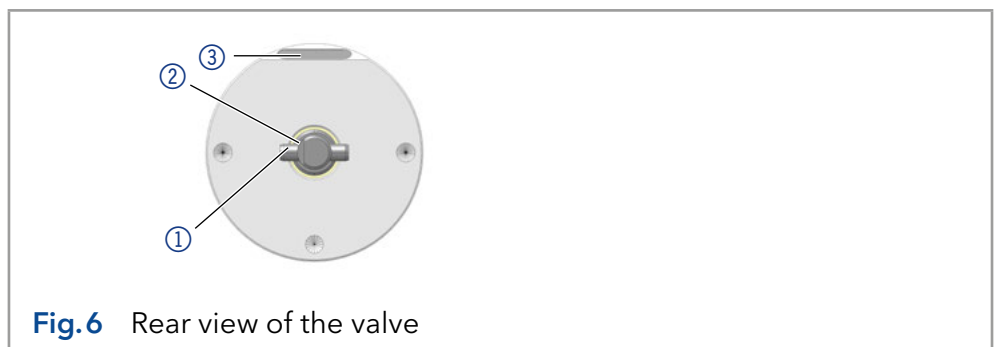


Fig.6 Rear view of the valve

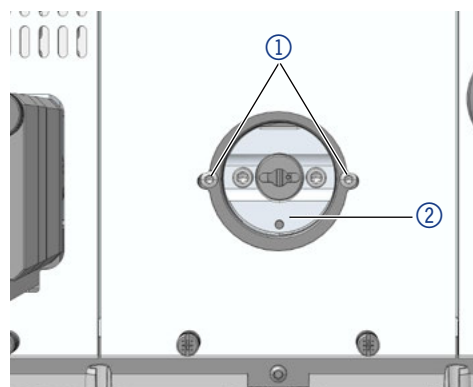
Tools Screwdriver, TX 10

Process

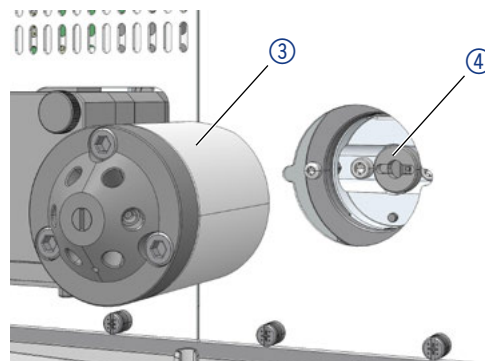
Process

Figure

1. Using the screwdriver, loosen the screws ① of the adapter ② until resistance.



2. Mount the valve ③ onto the drive coupling ④. The port 1 of the valve has to point up.
3. Using the screwdriver, tighten the screws ① of the adapter.



5.7 Sample configuration:

ASM 2.2L as AZURA® educational system (article no. A46002)

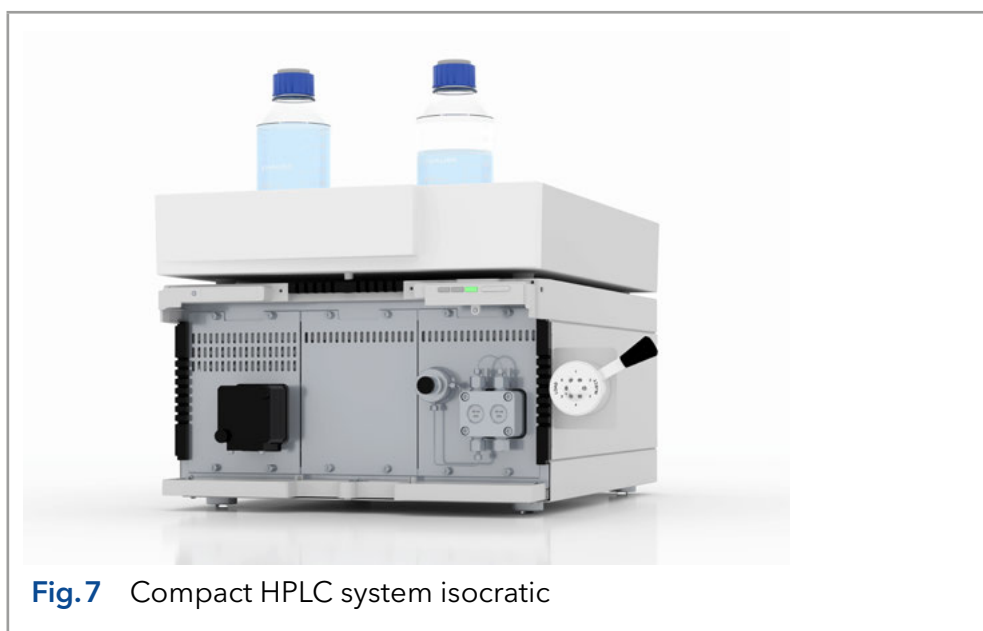


Fig. 7 Compact HPLC system isocratic

The AZURA® Compact HPLC isocratic educational system is a small complete analytical isocratic HPLC system. Due to its compact dimensions, the system fits onto every laboratory bench.

The AZURA® Compact HPLC is based on the multi-functional AZURA® Assistant ASM 2.2L. The assistant includes a UV / VIS detector with a variable wavelength and a compact pump with pressure sensor. The manual injection valve is attached to the side of the system.

5.8 Exchange of the device modules

⚠ CAUTION

Hot surface

The detector module can become warm during operation.

- ➔ Allow the detector module to cool for 20 minutes before removing it from the assistant.

NOTICE

Component defect

When changing the device modules if the assistant is switched-on, damage to the board is possible.

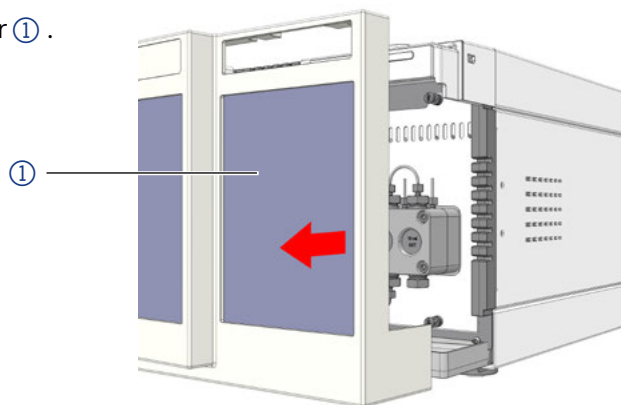
- ➔ Switch off the assistant before changing device modules.

Process

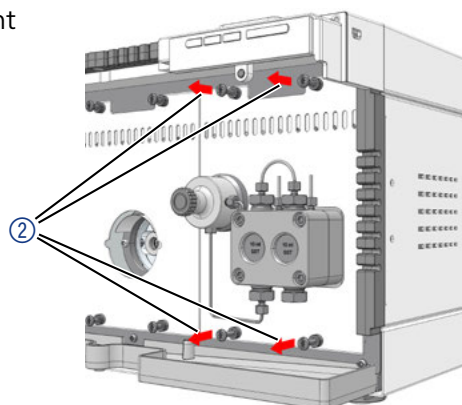
Figure

Remove module

1. Remove the front cover ①.

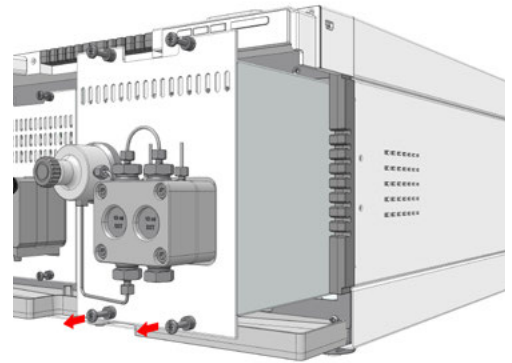


2. Loosen the four loss-resistant screws ② crosswise using a Phillips screwdriver (size 1).

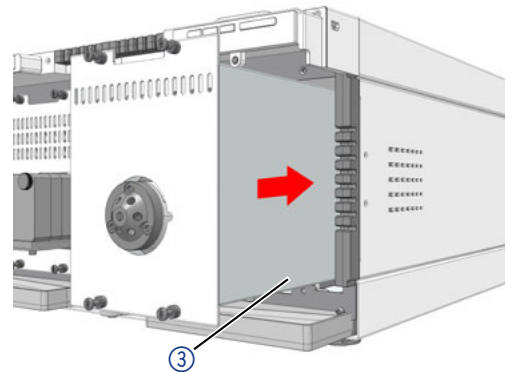


Process**Figure**

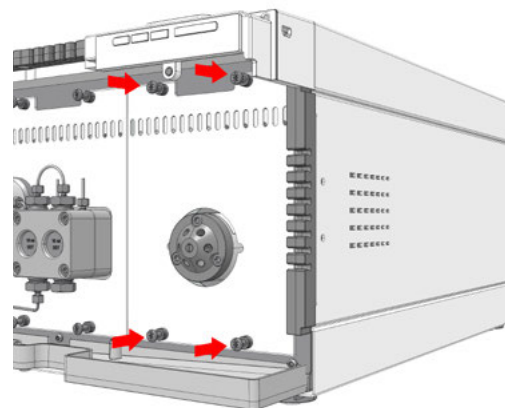
- Carefully drag the module out of the guide rails by pulling on the screw heads.

**Insert module**

- Place the module in the guide rail ③.
- Slide the module into the assistant.



- Tighten the four loss-resistant screws crosswise.
- The assistant automatically detects the device modules and checks the configuration according to the chapter "5.4 Device overview" on page 13.



6. Scope of delivery



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

- AZURA® Assistant ASM 2.2L
- Device modules
- Power cable with kettle plug
- AZURA® accessories kit
- Accessories kits of the built-in device modules

Applicable Documents:

- Instructions (German/English)
- Declaration of conformity

7. Unpacking and setup

7.1 Location requirements



Note: Proper operation is only guaranteed if you adhere to the specifications for the ambient conditions and the place of use.

Before you specify the location, read the technical data (see p. 46). There you will find all the important information about power connection, ambient conditions and humidity.

NOTICE

Device defect

The center of gravity of the assistant is located at the front of the device.

The device could fall down and be damaged.

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

NOTICE

Device defect

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

→ Set up the device in such a way that it is protected against exposure to direct sunlight.

→ Leave room for air circulation: See paragraph „space requirements“.

- General requirements**
- Set up the assistant on an even surface.
 - Protect the assistant from direct sunlight.
 - Set up the assistant in a place protected from draft (air conditioning).
 - Protect the assistant from strong draft.
 - Avoid placing the assistant next to machines that cause ground vibration.
 - Avoid vibration.
 - Keep the assistant away from high frequency sources. High-frequency sources may compromise measuring values.
 - If you are located in an earthquake area, use the bore holes. The bore holes are located on both right and left side panels.
- Space requirements**
- Minimum distance of 5 cm with a device on one side.
 - Minimum distance of 10 cm with devices on both sides.
 - Minimum distance of 15 cm at the back for the fan.

7.2 Unpacking and setup



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

Store all packing material. Retain included packing list carefully for repeat orders.

Prerequisites ■ You have checked the carton for shipping damage.

Tools ■ Utility knife

⚠ 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.

Procedure

Procedure

1. Set-up the package in such a way that you can read the label.
2. Cut the tape with a utility knife and open the package.
3. Lift off the foam pad. Remove the accessories and the instructions.
4. Take the accessories out of the bag and check the delivery. In case of incomplete delivery, please contact the technical support.
5. Hold the device from below, lift it out of the packaging and place it on its feet. Do not hold onto the front cover.
6. Check the device for transport damage. In case of damage, please contact the technical support.
7. Set up the device at the operation site.

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

7.3 Power supply

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.

- The assistant is intended for use with AC power networks of 100-240 V.
- Only the supplied power cable is to be used to connect the device to the mains supply.
- Make sure that the power plug on rear of the device is always accessible, so that the device can be disconnected from the power supply.



Note: Make sure that the power adapter and power cables meet the technical requirements (see 'Technical Data' on p. 46). Removable power cables must not be replaced by other types of cables.

8. Initial startup

Optional accessories such as mounting brackets, a tablet holder for th Mobile Control or AZURA® Click can be mounted during commissioning (see chapter "16 Accessories and spare parts", p. 47). The instructions of the device modules contain all the information required for commissioning (see 'Device overview' on p. 13).

NOTICE

Device defect

Changes of the environmental temperature cause condensation inside the device.

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

8.1 Connecting the leak management

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

Prerequisites ■ Remove the front cover.

Procedure

Process

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

Figure

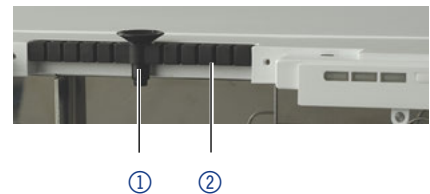


Fig.8 Funnel and capillary guide

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



Fig.9 Hose and nozzle

Procedure**Process****Figure**

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



Fig. 10 Connect the hose to the device

5. Attach the waste nozzle ⑥ to the bottom unit
6. Attach the waste-hose to the waste nozzle and connect it to the waste container.
7. Place the waste container below the devices.

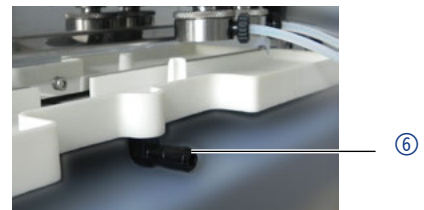


Fig. 11 Leak tray with waste nozzle

Next steps Attach the front cover.

8.2 Connecting the device to a computer



Note: HPLC devices made by KNAUER work only with IP addresses which are assigned via IPv4. IPv6 is not supported.

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

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

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

8.2.1 Configuring the LAN settings

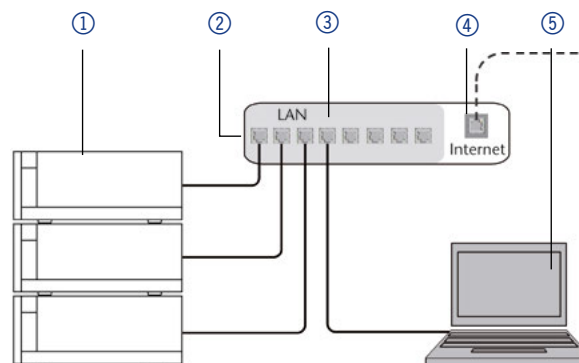
The LAN uses only one server (which is normally the router) from that the devices automatically receive their IP address.

- Prerequisites**
- In Windows, power saving, hibernation, standby, and screen saver must be deactivated.
 - In case you use an USB-to-COM box, the option "Allow the computer to turn off the device to save power" in the device manager must be deactivated for all USB hosts.
 - For all LAN devices: For the network adapter, the following option in the device manager must be deactivated: "Allow the computer to turn off this device to save power".

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

8.2.2 Connecting the cables

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



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

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

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

8.2.3 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/User-manuals/PC-hardware.

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



Note: If the IP address range has been changed, it is necessary to note it down.

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

8.2.4 Integrating the 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.

- Prerequisites**
- There is a patch cable for the connection.

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

To assign an IP address to the device, it must be connected to a LAN network. The two LAN ports of the device can be connected to the PC and/or to another device as desired. Note that the other device can in turn be connected to a third device, and so on, so that you can connect several devices in succession (cascade). Never connect both ports to the same PC/device or close a ring. At the end of the chain, you can also connect a device with only one LAN port.

All devices connected in this way can be controlled individually via the PC if they have an IP address from the same network range as the PC. However, none of the devices in this chain may be switched off, otherwise communication will be interrupted.

Via Mobile Control you can either assign the IP address manually or set the device to DHCP (obtain dynamic IP address). Furthermore, all devices with AZURA Neo can obtain an IP address via the "routerless" APIPA service.

8.2.5 Controlling several systems separately in the LAN

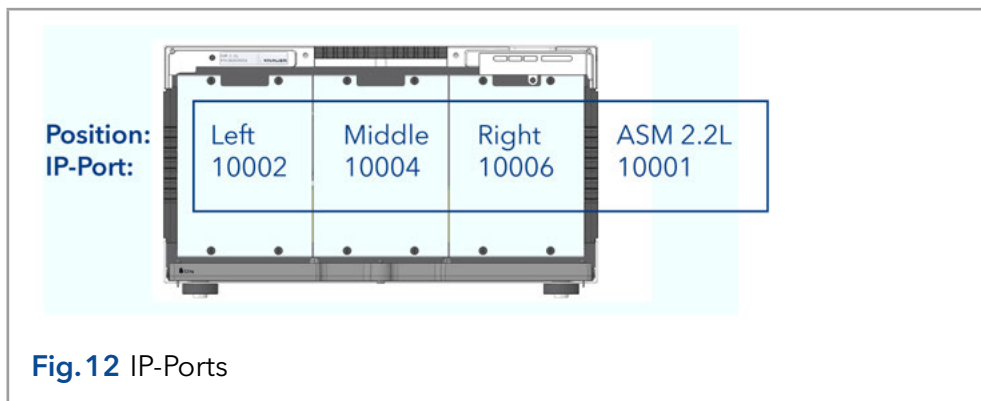
Devices connected to a LAN communicate through ports, which are part of the IP address. If more than one chromatography systems are connected to the same LAN and you plan on controlling them separately, you can use different ports to avoid interference. Therefore, the port number for each device must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



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



Note: The basic module of the assistant and the modules have the same IP address. The differentiation of the individual devices takes place via the IP ports. The basic module is the IP port 10001, the left module 10002, the middle module 10004 and the right module 10006.



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.



Note: Set a fixed IP address.



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

Two options are given to set the device IP address to fixed (static) or dynamic (DHCP) via software: Mobile Control or Firmware Wizard.

8.2.6 Mobile Control: Setting a static IP address




Note: The device is factory set to a dynamic IP address (DHCP). To ensure a permanent LAN connection between the chromatography software and the device, we recommend to set a static IP address for certain applications. You find further information on LAN settings in the chapter "Device Settings" of the Mobile Control Software Instructions

Prerequisites

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

Procedure

1. In Mobile Control choose <Settings> .
2. On the <General> tab, choose the device name.
3. Under <Network Settings> choose the setting <Static> ①.
4. Enter the IP address into the text box <IP Address> ②.
5. If necessary, change the subnet mask and the gateway ③.
6. Click in the top right corner.
7. Restart the device.

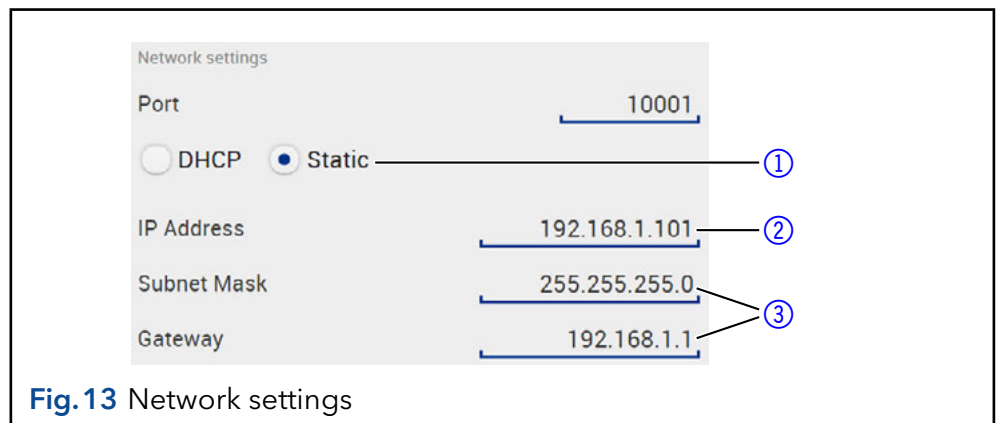

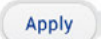


Fig. 13 Network settings

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

8.2.7 Mobile Control Setting IP address to DHCP via device name


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

- Procedure**
1. In Mobile Control choose <Settings> .
 2. On the <General> tab choose the device name.
 3. Under <Network Settings> choose <DHCP> ①.
 4. Click  in the top right corner.
 5. Restart the device.

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

8.2.8 Mobile Control: Setting IP address to DHCP via device name

- Prerequisites**
- The device has been switched on.
 - Mobile Control has been installed and started.

- Procedure**
1. In Mobile Control choose <Settings> .
 2. Under <Network Settings> click on <Reset>. The window <Reset communication settings> opens.
 3. Enter the serial number of the device in the text box.
 4. Click <OK>. The device is now reset to factory settings.
 5. Restart the device.

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

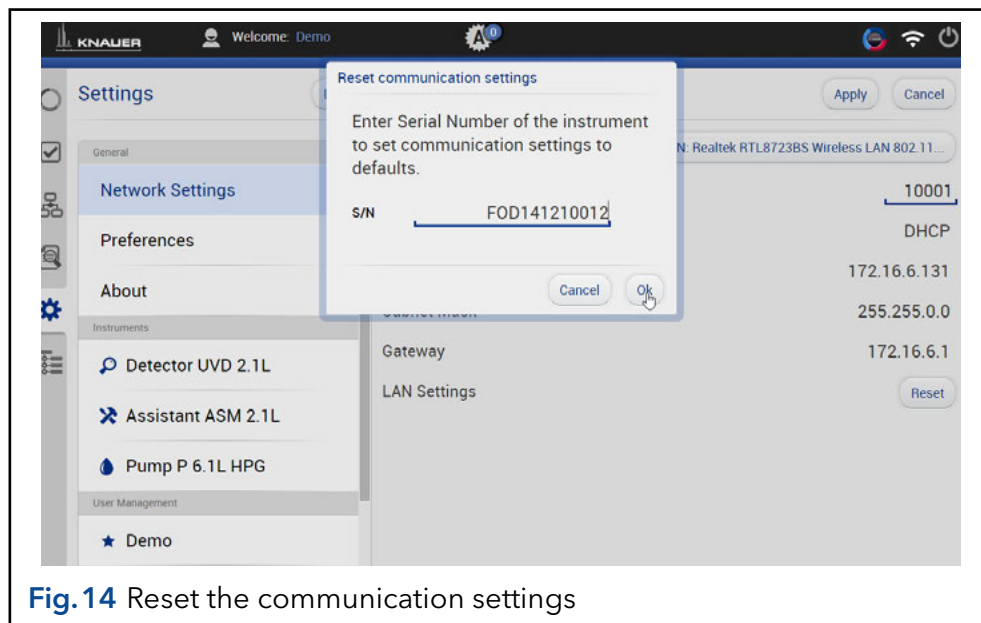


Fig. 14 Reset the communication settings

8.2.9 Firmware Wizard: Setting a static IP address



Note: You find further information on LAN settings in the chapter “Firmware Wizard” of the Mobile Control instructions.

Prerequisites

- The device has been switched on.
- Firmware Wizard has been installed and started.

Procedure

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

Result

The device is now accessible via the static IP address.

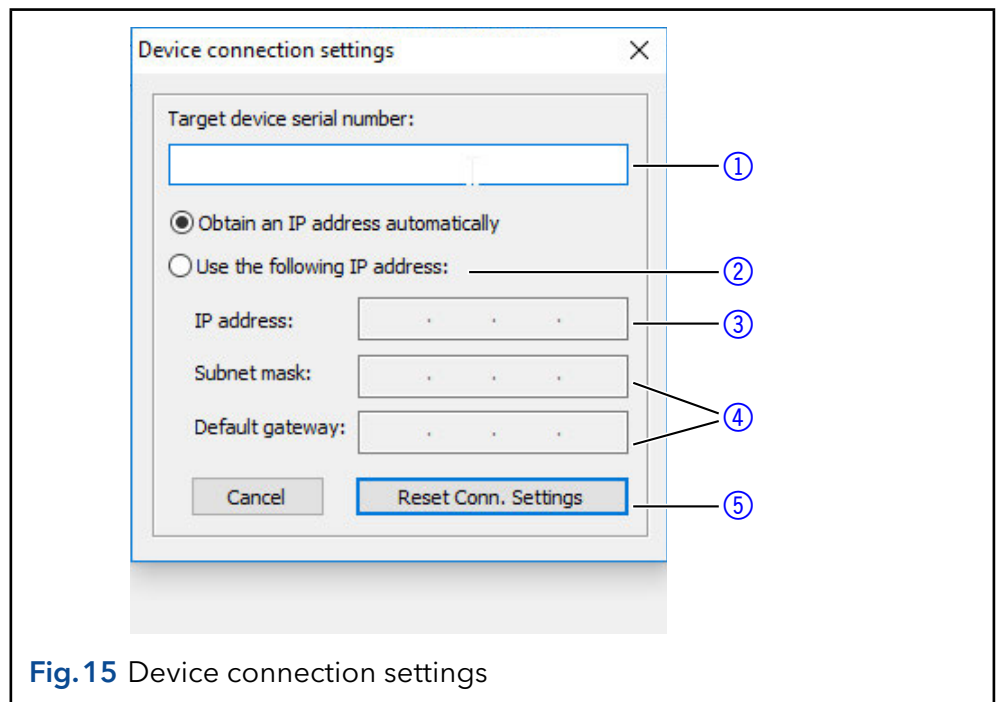


Fig. 15 Device connection settings

8.2.10 Firmware Wizard: Setting an IP address to DHCP

Prerequisites

- The device has been switched on.
- Firmware Wizard has been installed and started.

1. In Firmware Wizard, click <Reset LAN Settings...>.
2. The window <Device connection settings> opens. 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.

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

8.2.11 Setting a static IP address via APIPA

APIPA is a service that allows devices to obtain a dynamic IP address even without a DHCP server in the network. The AZURA Neo platform from KNAUER supports APIPA. The device must be set to DHCP for this. If no DHCP server responds, the APIPA implementation ensures that the device gives itself a random IP address from the IP address range reserved for APIPA (169.254.x.x). This ensures that 2 devices do not use the same IP address. This process can take several minutes. At each reboot the device will use a different APIPA IP address.

Since Windows also supports APIPA, if the setting for the IP address (IPv4) is set to "Obtain automatically", a connection to the device can be established via this even without a router or fixed IP addresses. It is not recommended to use APIPA in general to establish a connection for device control by chromatography software.

8.3 Remote control

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

- Connected to terminal strip
- Connected to LAN within a network

The single ports exchange start, control and error signals with other devices. The events can only be controlled via software.

8.3.1 Pin header connection

To control one device through another, you use the pin header. To use remote control, you have to connect cables to the pin header. connect.

Prerequisites

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

Tools

- Depressor tool

NOTICE

Electronic defect

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

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

NOTICE

Electronic defect

Electrostatic discharge can destroy the electronics.

- ➔ Wear a protective bracelet against electrostatic discharge and ground.

Procedure

Process

1. Insert the operating tool ③ into an upper small opening on the front of the terminal strip ①.
2. Lead the cable into the opening ② below the inserted operating tool.
3. Pull out the depressor tool.

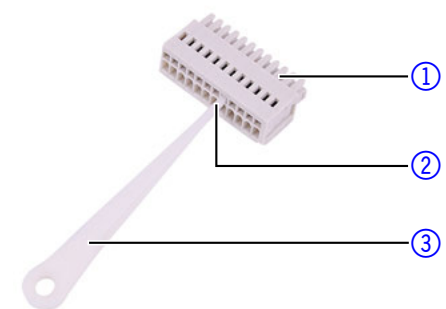


Fig. 16 Pin header

Next steps

- Check if the cables are firmly attached.
- Press the pin header onto the connector.
- Finish the installation.
- Bring the device into operation.

8.3.2 Pin header assignments

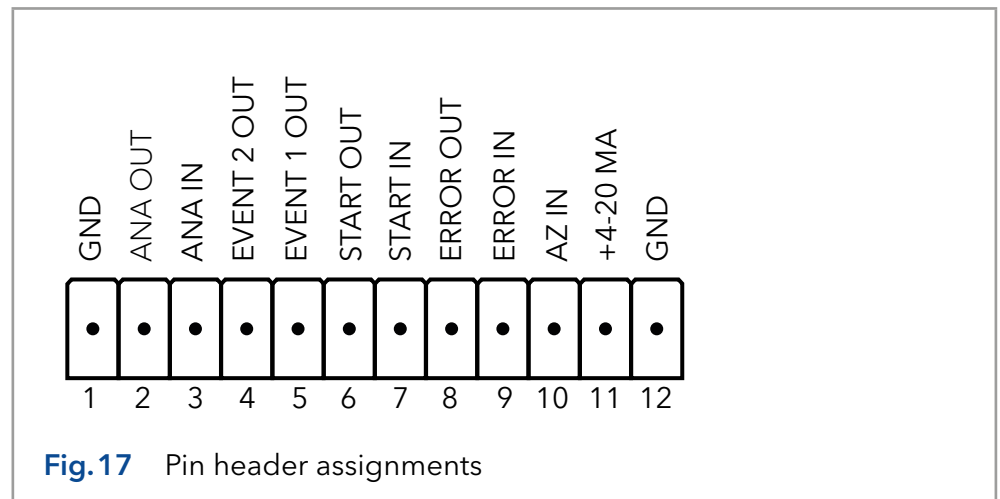
















Fig.17 Pin header assignments

Connection	Function
GND	Reference point of the voltage at the signal inputs.
ANA OUT	Voltage range 0 V - 10 V Depending on the module in the ASM 2.2L, the pump pressure or the detector signal can be output.
ANA IN	Voltage range 0 V - 10 V Depending on the module in the ASM 2.2L, the flow rate or the wavelength can be set.
EVENT 2 OUT	<p>OC: TTL-compatible output </p> <ul style="list-style-type: none"> passive 5V (default setting with external pull-up to 24 V / 25 mA)  active 0 V <p>TTL output </p> <ul style="list-style-type: none"> passive 0 V  active 5 V 
EVENT 1 OUT	<p>OC: TTL-compatible output </p> <ul style="list-style-type: none"> passive 5V (default setting with external pull-up to 24 V / 25 mA)  active 0 V <p>TTL output </p> <ul style="list-style-type: none"> passive 0 V  active 5 V 
START OUT	<p>TTL-output (default setting)/ OC with external pull-up to 24 V (25 mA)</p> <p>Levels:</p> <ul style="list-style-type: none"> passive 5 V  active 0 V  <p>The output can be used to start an external device.</p>

Connection	Function
START IN	<p>TTL-compatible input</p> <ul style="list-style-type: none"> Low-active <p>Secure switching threshold at least 10 mA</p> <p>The start of a hold method which is stored in the ASM 2.2L device can be triggered by a signal (short circuit to GND) from an external device.</p> <p>Starting single modules with START IN is not supported.</p>
ERROR OUT	<p>TTL-output (default setting) / OC with external pull-up to 24 V (25 mA)</p> <p>Levels:</p> <ul style="list-style-type: none"> passive 5 V  active 0 V  <p>Output remains active until the cause of the error has been eliminated.</p>
ERROR IN	<p>TTL-compatible input</p> <ul style="list-style-type: none"> Low-active <p>Secure switching threshold at least 10 mA</p> <p>For a signal (short circuit to GND) from an external device an error message appears and the device stops.</p>
AZ IN	<p>TTL-compatible input</p> <ul style="list-style-type: none"> Low-active <p>Secure switching threshold at least 10 mA</p> <p>For a signal (short circuit to GND) from an external device, an autozero is performed by the detector.</p>
+4-20 Ma	<p>Passive Optocoupler-input 4 - 20 mA for active sensors.</p> <p>Reference point is GND, depending on the module in the ASM 2.2L, the flow rate or the wavelength can be set.</p>



Note: The signals of the two analogue (integrator and pin header) and the digital output can be different for the same measured values.

8.3.3 Integrator output

The integrator output sends signals of the detector or the pressure sensor.

- non-bipolar
- 1 channel
- 0 - 2.5 V
- DAC 20 bit
- Scalable
- Adjustable to offset

8.3.4 Analog port

You can find information about the analogue connection in the operating instructions of the respective device module.



Note: The AZURA® valve drive VU 4.1 is not supported as source for the analog output signal.

9. Operation

There are several options for controlling the device:

- with chromatography software
- with Mobile Control

Chromatography software

To operate the device with software, you have to establish a connection between the LAN port and a computer. A list of supported devices is available in the public area of the website at www.knauer.net/softwarecontrol.

You find a detailed description on chromatography software in a corresponding instruction.

Mobile Control

Mobile Control is an app which can be installed on your computer or tablet. To control the device using the Mobile Control, connect the computer or tablet to a wireless LAN router. Detailed information can be found in the Mobile Control Software Instruction (Document number V6851-2): www.knauer.net/mobile-control-5.5-instructions.

9.1 Meaning of the LEDs

There are three LEDs ① and a standby switch ② on the front of the device

Legend

- ① LEDs
- ② Standby Switch

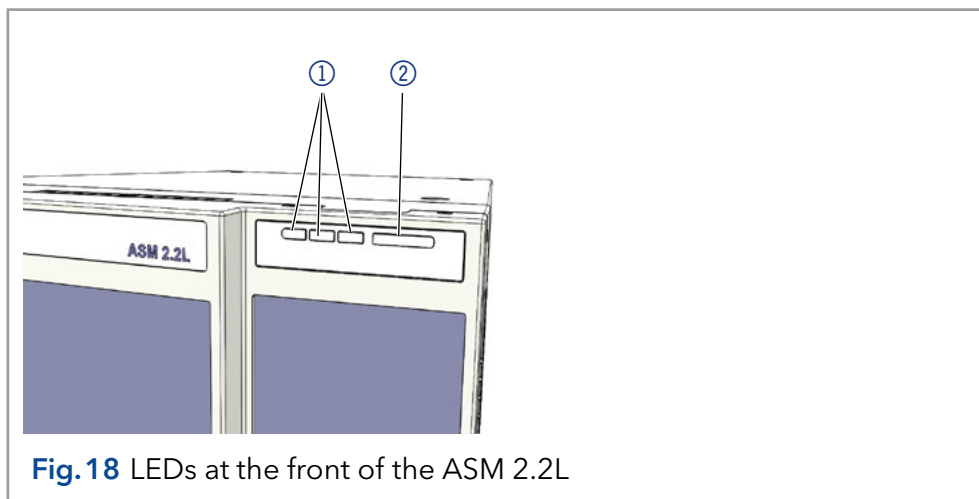


Fig. 18 LEDs at the front of the ASM 2.2L

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

	Color	Operating condition	Operation
Left LED	flashes red	Error message	Check the system. Shortly press the switch to deactivate the error message.
	red	Serious error	Restart the device. If the operating condition does not change, call the technical support.
	green	Program or sequence is running / has been loaded.	
Center LED	does not light	Not ready for operation	Switch on the device.

	Color	Operating condition	Operation
Right LED (Operational status)	flashes green	Detector is initializing/ calibrating	Wait until the device is ready.
	green	Ready for operation	
	green	Switched on	
	blue	standby	Exit with the standby switch.

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



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

9.2 GLP-Data

The following GLP data of the assistant can be found in the software.

	GLP data	Explanation
Device information	Serial number	FYCYYWWXXXXX
	Firmware version	Current firmware version of the device
	Operating time	Operating hours after production
	Date of installation	Date of manufacture
Leak sensor	Last maintenance	Date of last maintenance
	Serial number	Serial number leak sensor
	Firmware version	Current firmware version of the leak sensor



Note: The GLP data of the installed device modules are read by the ASM 2.2L. You can read the individual GLP data in the instructions of the respective device module: www.knauer.net/en/Support/User-manuals.

9.3 Startup

Checklist prior to switch-on

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

- The modules are at the desired location.
- The power plugs of the modules are plugged in.
- The LAN connections between the modules and router are connected.
- The LAN cable is connected to the workstation and router.
- The chromatography software has been installed by KNAUER or a company authorized by KNAUER.
- The capillaries in the solvent bottles have a filter insert.
- All capillaries are tightly connected.

Prerequisites

- Capillaries, tubings and cables are connected.
- In case of the detector the flow cell is installed.
- Liquid container is sufficiently filled.
- Washing container is sufficiently filled.

Process

Figure

Procedure

1. Switch on the device at the power switch ① on the rear side.
2. Wait until the device has completed the self-test.
3. If the self-test has been successfully completed, the LED ② on the right lights up green.

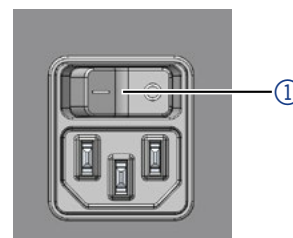


Fig.19 Power switch on the rear side of the device

Result

The firmware is successfully initialized if shortly after switching on the device all three LEDs light up red, green and blue for approx. 1 second. If the test fails an error message will be displayed. If the error occurs several times in succession, contact KNAUER technical support.

9.4 Activate standby

Prerequisites The flow has been switched off.

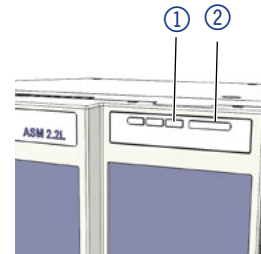


Note: Malfunctioning system after repeated standby possible. After repeatedly using the standby, switch off the power switch and back on again, to reset the data storage.

Procedure

1. Press the standby switch ② for 5 seconds.
2. Wait if the LED ① shows a blue light.

Figure



Result If you were successful, the right LED lights up blue.

Next steps To end standby, press the switch again.

9.5 Switching off assistant

The assistant is designed for the use of different solvents. In case the assistant has not been used for several weeks, solvent residues may cause damage. If you plan to take the assistant out of operation for a long period of time, fill the capillary with alcohol (eg. isopropanol) before switching it off.

- Prerequisites**
- The back must be accessible.
 - The assistant is switched on.
 - The capillaries have been flushed.

Procedure

1. Turn the power switch ① to OFF.

Figure

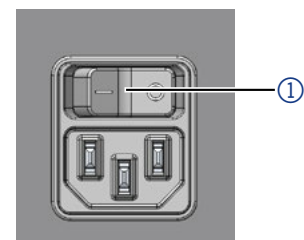


Fig.20 Power switch

Next steps Either restart the assistant in a timely manner or you prepare it for storage (see p. 43).

10. Functionality tests



Note: In case of the ASM 2.1L the Operation Qualification will be executed for every single device module.



Note: Standard processes in single devices may be handled differently in individual cases.

Installation Qualification (IQ)

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

The Operation Qualification is a standardized KNAUER document and includes the following:

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

Operation Qualification (OQ)

The Operation Qualification includes an extensive functionality test according to KNAUER standard OQ documents. The Operation Qualification is a standardized document and free of charge. It is not part of the delivery, please contact the technical support in case of 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 using the Operation Qualification at following intervals: The test intervals are dependent on the usage of the device.

Execution

The test can be carried out either by the technical support of KNAUER or from a provider authorized by KNAUER (for a fee).



Note: Flush the system (with the purge valve open) with water for 60 minutes before starting the device test.

11. Troubleshooting



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

Further measures Inform the technical support of KNAUER.

11.1 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, call the technical support.

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

-  Connected
-  Connection not established

If no connection was established, test the following:

- Is the router switched on?
- Is the patch cable connected correctly to the router and the computer?
2. Check the router settings:
 - Is the router set to DHCP server?
 - Is the IP address range sufficient for all the connected devices?
3. Check all connections:
 - Are the patch cable connected to the LAN ports and not the WAN port?
 - Are all cable connections between devices and router correct?
 - Are the cables plugged in tightly?
4. If the router is integrated into a company network, pull out the patch cable from the WAN port.
 - Can the devices communicate with the computer, even though the router is disconnected from the company network?
5. Turn off all devices, router, and computer. First switch on the router and wait until it has successfully completed its self-test. Firstly, turn on the router and secondly turn on the devices and the computer.
 - Has this been successful?
6. Replace the patch cable to the device with that no connection could be established.
 - Has this been successful?
7. Make sure that the IP port of the device matches the port in the chromatography software.

11.2 Possible problems and rectifications

	Problem	Solution
Assistant	Device will not turn on.	Inspect the power cable to ensure that it is plugged into the power supply.
Detector	Baseline drift	<ul style="list-style-type: none"> ■ Maintain constant temperature conditions during the measurement. ■ Avoid air draft. ■ Avoid vibrations.
	Device cannot be calibrated.	<ol style="list-style-type: none"> 1. Fasten the knurled-head screws on the flow cell to prevent incursion from interfering light or an electronics error. 2. Insert the test cell. 3. Inspect the calibration with a weak absorbing eluent.
	Baseline noise	<ol style="list-style-type: none"> 1. Inspect the flow-cell assembly. 2. Fasten the knurled-head screws on the flow cell to prevent incursion from interfering light or an electronics error. 3. Exchange the defective flow cell. 4. Inspect the service life of the lamp.
	The relationship of the signal to the light path reference is very low.	<ol style="list-style-type: none"> 1. Flush the flow cell. 2. Clean the flow-cell window. 3. Replace the lamps
Pump	When purging, the pump switches off	Check if the venting screw on the pressure sensor is turned open.
	Pump does not transport solvent	<ul style="list-style-type: none"> ■ Purge the pump head to remove the air bubbles. ■ Inspect the eluent filter of the HPLC column and change when blocked ■ Clean ball valves. ■ Exchange the ball valves. ■ When the pump head seals are defective, solvent enters the piston back-flushing. Inform the technical support of KNAUER. ■ Exchange the pump head.

	Problem	Solution
	Pressure and flow rate variations	<ul style="list-style-type: none"> ■ Pump without pressure sensor: Pay attention to the influence of the pressure on the flow rate (will not be compensate). ■ Purge the pump head to remove the air bubbles. ■ Always tighten the inlet screw fittings and outlet screw fittings on the pump head with a torque wrench and 7.5 Nm. ■ Clean the ball valves. ■ Exchange the ball valves. ■ Exchange the pump head ■ Inform the technical support of KNAUER.
	Pump head leaks	<ul style="list-style-type: none"> ■ Inspect the inlet and outlet screw fittings of the pump head. ■ When the pump head seals are defective, solvent enters the piston back-flushing. Inform the technical support of KNAUER. ■ Exchange the pump head.
Valves	Valve leaks	Tighten the connections.
	Pressure variations caused by leaking valve head	Exchange the rotor seals.

Further measures Inform the technical support of KNAUER.

11.3 System messages

If other system messages are displayed besides those listed below, please turn the device off and then on. In case the system message repeats itself, inform the technical support of KNAUER .

The system messages are sorted alphabetically.

	System message	Solution
A	At least one wavelength must be valid.	Check whether a channel is on. Check whether the wavelengths are within permissible range (190 - -500 nm).
C	Calibration failed	Switch the device off and on. Check whether lamps, motor and filter are functioning correctly. In case the system message repeats itself, inform the technical support of KNAUER . Restart calibration on the device or in the chromatography software.
	Cannot initialize	Check cables and connections in local area network.

	System message	Solution
	Cannot proceed: D2 lamp heating	Wait for the ignition of the D2 lamp.
	Cannot proceed: D2 lamp is OFF!	Switch D2 lamp on before "RUN".
	Cannot proceed: Lamps are off	Switch the lamps on the device to "ON".
	Cannot read RTC	Switch the device off and on. In case the system message repeats itself, inform the technical support of KNAUER .
D	Detector: calibration failed	<ul style="list-style-type: none"> ■ Check lamp. ■ Check piezomotor with filter wheel.
	Detector: D2 lamp failed	Exchanging the D2 lamp
	Detector: D2 lamp not detected	Installing the D2 lamp
	Detector: external error detected	Error IN is connected to another device, which is defective.
	Detector: grating drive failed	<ul style="list-style-type: none"> ■ Replace step motor of the grating drive ■ Replace the mainboard.
	Detector: low light	<ul style="list-style-type: none"> ■ Check lamp ■ Clean flow cell
	Detector: not calibrated	Activate calibration
	Detector: validation failed	Install test cell and activate calibration
E	Error input activated	Device error. Change the device settings.
G	GUI communication failed	Replace the display.
L	Leak sensor not present	Switch the device off and then on. If the leak sensor is still not present, contact the technical support of the manufacturer.
	Leak was detected	Switch off the device. Remove the leak and start the device afterwards.
M	Maximum pressure! System stopped	<ul style="list-style-type: none"> ■ Reduce the pressure or adjust the upper pressure limit. ■ Restart the system.
	Minimum pressure! System stopped	<ul style="list-style-type: none"> ■ Increase the pressure or adjust the lower pressure limit. ■ Restart the system.

	System message	Solution
P	Pump: external error detected	<ul style="list-style-type: none"> ▪ Localize external error and remove it ▪ Replace the motor. ▪ Replace the mainboard.
	Pump: max. current detected	<ul style="list-style-type: none"> ▪ Replace the motor. ▪ Replace the mainboard.
	Pump: max. pressure detected	<ul style="list-style-type: none"> ▪ System pressure is too high. ▪ Remove the blockage ▪ Check the contacts at the motor ▪ Replace the motor.
	Pump: min. motor current detected	<ul style="list-style-type: none"> ▪ Replace the motor. ▪ Check the motor contacts.
	Pump: min. pressure detected	Localize leakage in the system and remove it
V	Valves have different types in 'column switch' mode	Correct the settings. Both valves have to be of the same type

12. Maintenance and care

Proper maintenance of your HPLC device will ensure successful analyses and reproducible results. In this chapter, you find the information relevant for maintenance, care and storage. Additionally, you find instructions for maintenance tasks that may be performed by the customer. In case there are any maintenance tasks on that you do not find instructions here, contact your supplier or the technical support.

Further information can be found in the operating instructions of the individual device modules (see 'Device overview' on p. 13).



Note: All wetted components of a device, e. g. flow cells of detectors, have to be flushed with isopropanol first and water second before being maintained, disassembled or disposed.

12.1 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.
- Removing the hood or the side panels.

12.2 System information

Operating hours Using the Mobile Control or the software you can read out the operating hours of the assistant.

12.3 Cleaning and caring for the device

NOTICE

Device defect

Intruding liquids can cause damage to the device.

- Place solvent bottles next to the device or in a solvent tray.
- Moisten the cleaning cloth only slightly.

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

12.4 Maintenance tasks for users

For maintenance, care and the recommended intervals, please refer to the operating instructions of the respective device modules.

12.5 Preparing the assistant for storage or transportation

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.

We recommend the same ambient conditions (temperature range and humidity) for storage as during operation (see 'Technical data' on p. 46).

Prerequisites Flow cell has been filled with isopropanol.
The assistant is switched off.

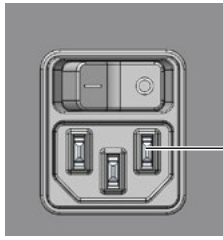
Tools Open-end wrench

DANGER

Life-threatening injuries

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

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

	Procedure	Figure
Process	<ol style="list-style-type: none"> Using the open-end wrench, disconnect the first capillary and close the opening with a hole plug. Using the open-end wrench, disconnect the first capillary and close the opening with a hole plug. Disconnect the power cable from the connector ① on the rear side. 	

Next steps If you want to ship the device, reuse the packaging materials that you received with the delivery.

13. Transport and storage

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

13.1 Taking the device out of operation

Prerequisites The device is switched off.

Procedure	Process
	1. Pull the power plug out of the socket and then out of the device.
	2. Pack the power cable together with the device.

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

13.2 Packing the device

- **Original packaging:** Ideally you should 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.

13.3 Transporting the device

- **Documents:** If you want to return your device to KNAUER for repairs, enclose the „[Service request form and decontamination report](#)“ which can be downloaded from our website.
- **Device data:** For a secure transport, note the weight and dimensions of the device (see chapter “15 Technical data”, p. 46).

13.4 Storing the device

- 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 Technical Data section (chapter 15 on page 46).

14. Disposal

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

14.1 AVV-Marking

According to the German "Abfallverzeichnis-Verordnung" (AVV) (January, 2001), old devices manufactured by KNAUER are marked as waste electrical and electronic equipment: 160214.

14.2 WEEE registration number

KNAUER as a company is registered by the WEEE number DE 34642789 in the German "Elektroaltgeräteregister" (EAR). The number classifies to category 8 and 9, which, among others, comprises laboratory equipment.

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

14.3 Eluents and other operating materials

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

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

15. Technical data



Note: Please also note the technical data of the integrated device modules in the corresponding instructions.

15.1 Communication

Port	LAN
Control	<ul style="list-style-type: none"> ■ Mobile Control ■ Software
Inputs	Error (IN), Start (IN), Autozero, 0-10 V Analog IN
Outputs	Event 1-2, Error (OUT) (OC), + 5 V, + 24 V
Analog outputs	Integrator output (detector signal, pump pressure)

15.2 General

Power supply	100 - 240 V; 50 - 60 Hz; maximum 130 W
Dimensions	361 mm x 208 mm x 523 mm (width x height x depth)
Weight of the individual device modules	<ul style="list-style-type: none"> ■ AZURA® Assistant ASM 2.2L basic module 10 kg ■ Pump AZURA® P 2.1S/P 4.1S 2,5 kg ■ Detector AZURA® UVD 2.1S 2,5 kg ■ Valve drive AZURA® VU 4.1 2 kg
Maximum weight	Approx. 17 kg (depending on configuration)
Leak sensor	Yes
Ambient conditions	<ul style="list-style-type: none"> ■ Temperature range: 4-40 °C; 39.2-104 °F ■ Air humidity: 10-90 %, not condensing ■ Operating altitude: max. 2000 meters above sea level
Use	Indoor use only
Permitted contamination level	II
Overvoltage category	II
Permitted mains voltage fluctuations	±10 %

16. Accessories and spare parts



Note: If a compact HPLC was ordered, tools and capillaries are within the scope of delivery. The torque wrench for pumps is not within the scope of delivery.

	Name	Order number
	ASM 2.2L with devices	depending on equipment
Device modules¹	Empty module	AG2022
	Valve drive AZURA® Valve Unifier VU 4.1	AWA04
	UV Detector AZURA® UVD 2.1S	ADA03XA
	UV Detector AZURA UVD 2.1S fibre optics	ADA07XA
Compact pump without pressure sensor:	P 2.1S, 10 ml, stainless steel	APG92EA
	P 2.1S, 10 ml, Hastelloy C	APG92EC
	P 2.1S, 10 ml, ceramic	APG92EB
	P 2.1S, 50 ml, stainless steel	APG92FA
	P 2.1S, 50 ml, Hastelloy C	APG92FC
	P 2.1S, 50 ml, ceramic	AGP92FB
Compact pump with pressure sensor:	P 4.1S, 10 ml, stainless steel	APG22EA
	P 4.1S, 10 ml, stainless, normal	APG22ED
	P 4.1S, 10 ml, ceramic	APG22EB
	P 4.1S, 50 ml, stainless steel	APG22FA
	P 4.1S, 50 ml, stainless, normal	APG22FD
	P 4.1S, 50 ml, ceramic	APG22FB
	P 4.1S, 50 bar, 10 ml, stainless steel	APG12EA
	P 4.1S, 50 bar, 10 ml, ceramic	APG12EB
	P 4.1S, 50 bar, 50 ml, stainless steel	APG12FA
	P 4.1S, 50 bar, 50 ml, ceramic	APG12FB
Mobile Control	Mobile Control license with 10 " touchscreen	A9607
	Mobile Control license with 10 " touchscreen	A9608
	Mobile Control licence	A9610
	Mobile Control Chrom licence	A9612
	Tablet holder	A9617
Accessories	Column holder for ASM 2.2L	AG2022B
	Magnetic clip for column 8 mm	A9847

¹ The modules of the ASM 2.2L can be changed independently by the user. The article numbers stand for the individual modules and are delivered without the assistant basic module.

	Name	Order number
	AZURA® Click for attaching IFU 2.1, air sensor, pressure control	A70089
Accessory kits	AZURA® accessories kit	FZA02
	Accessory kit AZURA® P 2.1S and P 4.1S	FPGA
	Accessory kit AZURA® UVD 2.1S and UVD 2.1L	FDA
	Accessory Kit AZURA® VU 4.1	FWA04

17. 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.

17.1 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. Please note that higher temperatures can significantly affect the stability of different materials.

17.2 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 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 is 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-HTF)

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 is 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: 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.

Polychlorotrifluorethylene (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.

17.3 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.

Zirconium oxide (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 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.

17.4 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 (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.

Appendix: Installation Qualification (IQ)

Installation Qualification (IQ) for a Device

0. Customer pre-approval

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

Company name:

Name	Function	Reviewed & approved	Date	Signature

Installation Qualification (IQ) for a Device

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

Installation Qualification (IQ) for a Device

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.				

Installation Qualification (IQ) for a Device

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

Installation Qualification (IQ) for a Device

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

Science with Passion



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www.knauer.net/library

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