

Azura

Degasser DG 2.1S

Instructions



Document No. V6880

HPLC



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



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

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International Support:

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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 "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

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 "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 unauthorised 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 indoors for chromatographic applications.

2.1.2 Foreseeable misuse

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

- Medical purposes. The device is not approved as a medical product.
- Operating outdoors. Otherwise, the manufacturer does not guarantee the functionality and safety of the device.
- Operation in potentially explosive areas without special and additional explosion protection. Contact the KNAUER Customer Support for more information.

2.2 User qualification

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

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

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

2.3 Operator responsibility

The operator is any person who operates the device himself or leaves it to a third party for use 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
- Personalised protective safety equipment which is specified in the particular laboratory.

2.5 Safety features on the device

- Power switch: Devices of the AZURA® L series may be switched off using the power switch (toggle switch on the back side of housing) at any time, this causes no damage to the device. To switch off devices of the AZURA® S series, remove the plug from the power socket.
- 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 und 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 "10 Chemical compatibility of wetted materials", p. 19).
- 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 "8 Disposal", p. 18).

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 "7 Maintenance and care", p. 17).

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 "1.4.1 Liability limitation", p. 1).
- For more information visit the KNAUER website: www.knauer.net/hplc-troubleshooting

2.9 Service request form and decontamination report

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

3. Product information

3.1 Device overview

Description The degasser is a device for degassing eluents. On the front of the device, there are 2 analytical degasser chambers with inlet and outlet side, one bicolor LED and the exhaust port. Air and possibly solvent vapors will be pumped out through the exhaust port. If necessary, it can be combined with a fume hood or similar extraction devices. The ports for ground and mains connection are located on the rear side of the degasser.

Legend:

- ① Exhaust port
- ② LED
- ③ Outlets
- ④ Inlets



Fig. 1: Analytical 2-channel degasser front view

Legend:

- ① CE mark
- ② Serial number
- ③ Warning 1
- ④ Warning 2
- ⑤ Mains connection for power supply with power switch
- ⑥ Ground

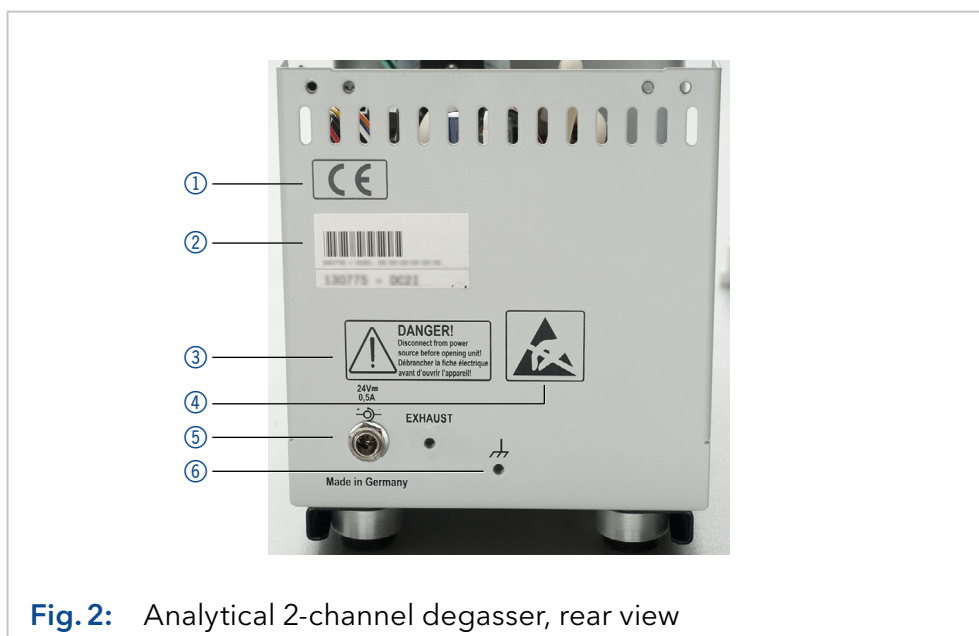


Fig. 2: Analytical 2-channel degasser, rear view

Operating range Gases that have dissolved into the solvent can cause bubbles in pumps and detectors. Good chromatographic separation therefore requires degassing the solvent. The analytical 2-channel degasser DG 2.1S is

equipped with two degassing chambers and can thus simultaneously degas two solvents.





The device can be used in the following areas:

- Biochemistry analyses
- Chemical analyses
- Food analyses
- Pharmaceutical analyses
- Environmental analyses
- Chiral analyses

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

3.2 Symbols and signs

The following symbols are located on the device:

| Symbol | Explanation |
|---|--|
|  | Electrostatic-discharge hazard. |
|  | Danger due to electric shock. Failure to observe this warning may result in loss of life, serious injury, or damage to or destruction of the device. |
|  | 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. |

3.3 Scope of delivery



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

- Degasser DG 2.1S plus user manual
- Power unit, 24 V , 60 W
- Accessory kit AZURA small devices'
- Accessory kit DG 2.1S

3.4 Features

- Reliable and convenient degassing of up to two eluents at the same time.
- Teflon AF® allows high gas diffusion rates
- Constant performance vacuum pump for high baseline stability
- Chamber volumes lower than 0.5 ml, thus fast eluent changes are possible
- Very good physical and chemical stability

3.5 Degassing Principle

While the solvent flows through the short Teflon AF® tubes, the dissolved gases are removed from the solvent by means of a vacuum on the other side of the membrane.

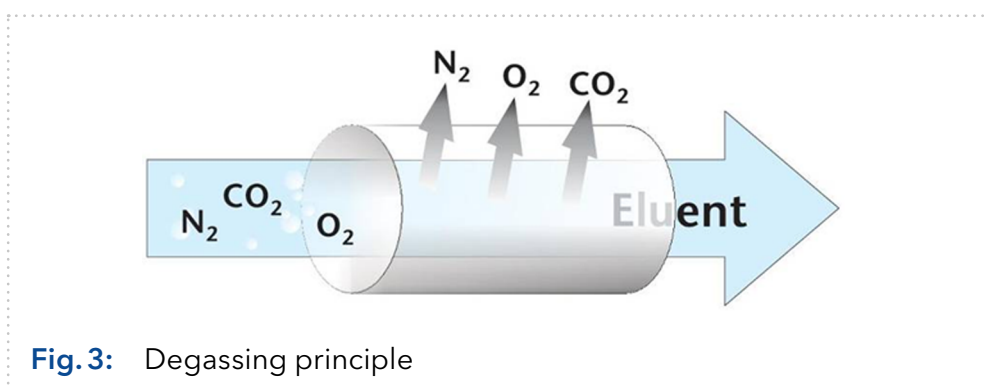


Fig. 3: Degassing principle

An integrated vacuum pump maintains a constant vacuum.

- Structural properties of the Teflon AF® membrane accelerate the degassing process.
- The solvophobic and hydrophobic properties of Teflon AF® reduces the risk of contamination when exchanging the solvent.
- Thanks to the molecular structure of the Teflon AF® membrane, only a very small surface is required for degassing the solvent. Thus the risk of carryover during a solvent change is reduced.

The special pump design makes it possible to flush the pump head with a small blast of air, to remove solvent fumes, which could escape from the vacuum chamber.

3.6 Eluents

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



Note: The list of selected solvents was compiled based on research in the pertinent literature and is only a recommendation by the manufacturer. If there is any doubt, contact the technical support of the manufacturer.

Suitable eluents

- | | |
|--|---|
| <ul style="list-style-type: none"> ■ Acetic acid, glacial ■ Acetone ■ Acetonitrile ■ Buffers ■ Chlorobenzene ■ Chloroform ■ Dimethyl sulfoxide (DMSO) ■ Ethanol ■ Ether ■ Ethyl acetate ■ Heptane ■ Hexane | <ul style="list-style-type: none"> ■ Isopropanol ■ Methanol, anhydrous ■ Methyl ethyl ketone ■ Methyl isobutyl ketone ■ Methyl tert-butyl ether ■ N,N-Dimethylacetamide ■ N,N-Dimethylformamide ■ n-Propyl alcohol ■ NMP (N-Methyl-2-pyrrolidinone) ■ Salt solutions (flush after use) ■ Tetrahydrofuran (THF) ■ Toluene ■ Water |
|--|---|

Less suitable eluents

- Methylene chloride
- Diluted acids and bases (flush after use)
- Slightly volatile eluents

Unsuitable eluents

- | | |
|---|---|
| <ul style="list-style-type: none"> ■ Concentrated acids (≥ 1 mol/l) ■ Concentrated bases (≥ 1 mol/l) ■ Eluents containing particles ■ Halogenated hydrocarbons, e.g. Freon® ■ Hexafluoroisopropanol ■ Hydrochloric acid | <ul style="list-style-type: none"> ■ Hydro fluoro solvents ■ Perfluorinated eluents, e.g. Fluorinert® FC-75, FC-40 ■ Perfluorinated polyether, e.g. Fomblin® ■ Sodium azide |
|---|---|

4. Unpacking and setup

Before you determine the operation site, read the chapter “Technical Data” (see chapter 9 on page 18). There you will find all device-specific information on power supply, ambient conditions and humidity.



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

4.1 Unpacking

Store all packing materials. Packing list should be kept for repeat orders.



Note: Contact Technical Customer Support if you notice any defects in the delivery.

Tools Utility knife

- Procedure**
1. Check for damages caused during transportation. In case you notice any damage, contact the technical support and the forwarder company.
 2. Setup the delivery so the label is in the correct position. Using the utility knife, cut the adhesive tape. Open the delivery.
 3. Remove the foam insert. Take out the accessories kit and the manual.
 4. Open the accessories kit and take out all accessories. Check the scope of delivery. In case any parts are missing, contact the technical support.
 5. Grip the device at its side panels and lift it out of the packaging.
 6. Remove the foam inserts from the device.
 7. Check for damages caused during transportation. In case you notice any damage, contact the technical support.
 8. Set up the device in its location.

- Next steps**
- Keep the included packing list for repeat orders.
 - Keep the original packaging for safe storage or transportation.

4.2 Ambient conditions

4.2.1 Operation site

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

- Place on a firm, level and straight surface.
- Protect against direct sunlight.
- Do not expose to air drafts such as air conditioning systems.
- Do not set up next to other machines that cause floor vibrations.
- Keep from high frequency sources.
- Ensure adequate ventilation (see chapter 4.2.3 on page 12).
- Avoid temperature fluctuations (see chapter 4.2.2 on page 12).

4.2.2 Ambient temperature

If the ambient temperature of the device is abruptly changed (e.g. when it is installed in a cooling chamber), condensation will form inside the device and may cause damage to the device. Allow the device to acclimate for 3 h, before it is connected to the power supply and taken into operation.

4.2.3 Space requirements

- Make sure that the power plug on the power supply (wall socket or power strip) is always accessible, so that the device can be disconnected from the power supply.
- Ensure adequate ventilation around the device, otherwise it may overheat and malfunction:
 - Min. 5 cm distance if another device is set on one side.
 - Min. 10 cm distance if further devices are set on both sides.
 - At least 15 cm to the cooler fan on the rear.
- The mounting of a small device to an AZURA L device with a mounting bracket does not affect the performance of either device. The space requirements specified in both device instructions do not apply in this case.

4.3 Power supply

Power supply requirements

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

Power supply cables and plugs

- Original parts: For power supply, use the supplied power cable and plug to meet the specifications which are described in the chapter "Technical Data" (see chapter 9 on page 18). Detachable power cable cables are not allowed to be replaced with other cable types.
- Country-specific plugs: Before switching on the device, check whether the supplied plug is approved for your country. Overview of the device- and country-specific plug types from KNAUER: www.knauer.net/plugs
- Power strips: If several devices are connected to one power strip, always consider the maximum power consumption of each device.

- Access to power supply: Make sure that the power plug on the power supply (wall socket or power strip) is always accessible, so that the device can be disconnected easily from the power supply.
- Damaged power supply cables and plugs: For safety reasons, damaged or faulty cables and plugs must not be used to connect the device to the power supply. Replace defective cables and plugs only with KNAUER accessories.

5. Initial startup

5.1 Screw fitting of the solvent tube

Make sure that the tapered side of the seal ring ① faces the screw fitting ② of the solvent tube.

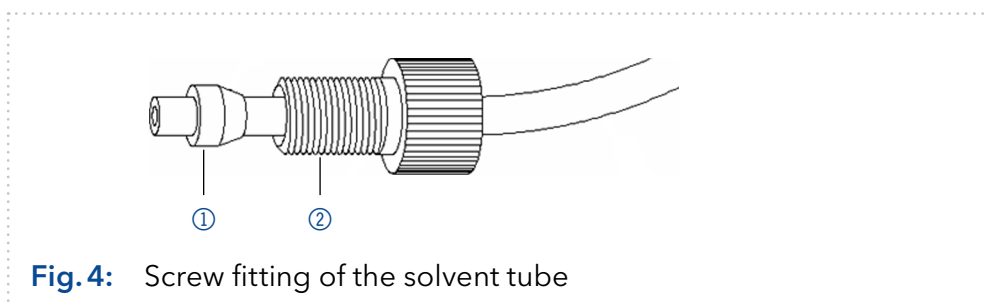


Fig. 4: Screw fitting of the solvent tube

5.2 Solvent tube connection

Appropriate solvent tubes are included in the device accessories.

- Make sure that the tube has a straight ending.
- Only tighten screw fittings by hand.
- Use the supplied blind fittings to seal off all unused inlets and outlets.

5.3 Connecting degasser and pump

Each degassing chamber features an inlet and an outlet.

NOTICE

Device defect

Very high pressures can damage the degasser membrane. The membrane can withstand a maximum pressure of 4 bar.

→ Never connect the degasser to the pump outlet.

- Procedure**
1. Connection of the chambers in the direction of the arrow.
 2. Remove the blind fittings from the degassing chamber inlets and outlets that are to be used. Keep the filler caps.
 3. Unused in and outlets have to be closed with blind fittings to prevent contamination of the disconnected chambers.

4. The inlets of the degasser chambers are connected to the solvent containers by means of Teflon tubes.
5. Teflon tubes are also connected to the outlets of the degassing chambers, with screw fittings and seal rings. These tubes are then connected to the respective pump.

5.4 Switching on the degasser

- Requirements**
- All lines have been connected correctly.
 - Unused degasser chambers have been sealed off with blind fittings.

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.



Note: Purge the degasser when changing solvents.



Note: Regularly check the capillaries for leaks.

- Procedure**
1. Switch off the power supply.
 2. Connect device with power supply.
 3. Connect the power supply of the device to the mains.
 4. Switch on the power supply. During the start procedure, the LED flashes yellow for approx. 30 seconds. After the specified vacuum value has been reached, the LED lights up green permanently. The device is now ready for operation.
 5. Switch on the HPLC pump.

When you switch off the HPLC pump, also switch off the degasser.

5.5 Purging

Flush the degasser and the connecting tubes with the appropriate solvent prior to use. Thanks to the low chamber volume, only small amounts of the solvents are needed for flushing.

Prerequisite The degasser is connected to the pump.



Note: Prior to a solvent change in the degasser, purge with a liquid in which both solvents are soluble.

- Procedure**
1. Configure the pump: Flow rate 2 ml/min.
 2. Start the pump and flush for 1 to 2 minutes.

5.6 Leak test

The vacuum is continuously checked by means of a built-in microprocessor and the pump output adjusted. Thus it is possible to detect leaks.

Procedure in the event of a detected leak

- If a leak is detected, the microprocessor of the degasser automatically increases the pump speed to maintain the vacuum. If the vacuum still falls below the target value, the yellow LED flashes.
- If it is not possible to achieve the required vacuum within 30 minutes by means of the increased pump output, the LED lights up yellow at the degasser to indicate that there is possibly a leak in the system.
- The degasser will be switched off automatically.

5.7 Switching off the degasser

Here a differentiation is made between short-term and long-term switch-off.



Note: To separate the degasser from the mains, remove the switched-mode power supply from the rear of the device.

5.7.1 Short-term switch-off



Note: Damage to the degasser that results from using buffer-containing solvents are not covered by the warranty.

Procedure

1. Remove critical solvent from the degassing chambers and other system components by purging with for example isopropanol (2-propanol).
2. Subsequently purge with water.
3. If the degasser is switched off for several days (e.g. over the weekend), purge the device with isopropanol prior to ending operation.
4. Switch off the degasser at the power supply.

5.7.2 Long-term switch-off

Procedure

1. Remove critical solvent from the degassing chambers and other system components by purging with a suitable solvent.
2. First purge the degasser with water and subsequently with isopropanol.
3. Switch off the degasser and remove the connection tubes to the degasser.
4. The degasser chambers can be dried by means of laboratory gas.
5. Seal all inlets and outlets of the degasser with blind fittings and subsequently store the device at a safe and dry location.
6. Prior to the reuse of the degasser, purge the device briefly with the solvent which will be used afterwards.

6. 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.

- Further measures:**
- Check errors against error list
 - Contact the technical support hotline of the manufacturer

6.1 Possible problems and rectifications

| Problem | Cause | Solution |
|---|--|--|
| The device is on, but the LED is not light and the device is not energized. | <ul style="list-style-type: none"> ■ Power supply or plug is not plugged ■ Fuse blown ■ Power supply is defective | Contact the service department. |
| The device is running but you can not/hardly hear the pump. | At low rotational speeds, the pump can hardly be heard, although the vacuum is good and the degassing process is taking place. | Compare the baseline of non-degassed ethanol at 251 nm with the baseline of degassed ethanol. If the degasser is working properly, the noise of the baseline of the non-degassed ethanol should be significantly higher. |
| Air bubbles occur in the solvent tubes of the degasser outlet. | Loose or damaged screw fittings | Check the inlet and outlet fittings. Replace old fittings, if necessary. |
| No solvent flow | Air in the degasser chambers | Purge degasser chambers |
| | If a buffer solution is left in the degasser for an extended period of time, it can cause clogging in the degasser. | Use another degasser chamber. Carefully let water flow into the clogged degasser chamber to dissolve the buffer. If this does not help, contact the service department. |

- Further measures** Inform the Technical Support of the manufacturer.

7. Maintenance and care

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

7.1 Maintenance contract

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

- Opening the device
- Removing the hood or the side panels

7.2 Cleaning and caring for the device

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

NOTICE

Device defect

Intruding liquids can cause damage to the device.

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

7.3 What to do if the degasser is leaking?

If the degasser leaks, solvent can reach the motor and from there reach the degasser exhaust and flow out. In this case, the automatic pump control will switch the device off.

- Inform the Technical Support of KNAUER.

7.4 Tightening screw fittings

1. If the screw fitting of the solvent tube is untight, carefully tighten the screw fitting.
2. If it still leaks, loosen and check the screw fitting.
3. If no damage or deformation is visible at the seal ring and at the screw fitting, repeat step 1.
4. If it still leaks, replace the screw fitting and seal ring.

7.5 Preventative measures

To ensure that the degasser can constantly run at maximum capacity, pay attention to the following:

- Only use ultrapure solvent as mobile phase. If water is used as solvent, it also has to fulfill this standard or be filtered and deionized.
- Filter all solvents to prevent clogging.
- To dry the degasser, only use ultrapure gas.
- Observe the information on switching off the degasser.

8. Disposal

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

AVV Marking in Germany

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

WEEE-Registration

KNAUER is registered by the WEEE number DE 34642789 in the German „Elektroaltgeräteregister“ (EAR). The number belongs to category 8 and 9, which, among others, comprise laboratory equipment.

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

Solvents and Other Operating Materials

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

All wetted components of a device have to be flushed first with isopropanol and then with water before being maintained or disposed.

9. Technical data

| | | |
|------------------------------|-------------------------|---|
| | Channels | 2 |
| | Maximum flow rate | 10 ml/min |
| | Degassing method | gas permeation through a fluoropolymer membrane |
| | Dead volume | approx. 285 µl per channel |
| | Pressure decline | 1.37 mm (Hg/ml/min) |
| | Max. pressure stability | 4 bar |
| | Wetted materials | PEEK, glass-filled PTFE, Teflon AF® |
| | Display | 1 LED |
| | Dimensions | 121 x 138 x 190 mm (W x H x D) |
| | Weight | 2.3 kg |
| | Power supply | 85-265 V, 50-60 Hz, 20 W |
| Permitted ambient conditions | Temperature range | 4-40°C; 39.2-104 F |
| | Air humidity | below 90 %, non-condensing |
| | Operating height | max. 2000 Meters above sea level |
| | Area of use | for indoor use only |
| | Overtoltage category | II |

| | |
|---------------------------------------|---------|
| Permitted pollution degree | II |
| Admissible mains voltage fluctuations | +/- 10% |

10. 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.

10.1 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.

10.2 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 (VespeI®)

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.

Polychlorotrifluoroethylene (PCTFE, Kel-F®)

The semi-crystalline thermoplastic material is plasticizer-free and dimensionally stable, even in a wide temperature range (–240 °C to +205 °C). It is moderately resistant against ether, halogenated solvents and toluene. 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.

10.3 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.

10.4 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 sensitive, 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 chlor, 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.

11. Accessories and spare parts



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

11.1 Device and accessories

| Name | Order numbers |
|-----------------------------------|---------------|
| Degasser DG 2.1S | AZE02 |
| Accessory kit AZURA small devices | FZA01 |
| Accessory kit DG 2.1S | FZE02 |
| User manual | V6880 |

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