

# Dynamic mixing chamber

## Instructions





**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](http://www.knauer.net/en/Support/Distributors-worldwide)

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**Version information:** Document number: V7119-1

Version number: 2.0

Release date: 2020/12/01

Translation of the original edition

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# 1. General

## 1.1 About this instruction

This operating instruction enables 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" on page 3). In addition to the safety and warning instructions in these operating instructions, the local accident prevention regulations and the national industrial safety regulations apply.

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](http://www.knauer.net/library)

## 1.2 Signal words

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

Symbol	Bedeutung
	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 SOPs in this manual



The Standard Operating Procedures (SOP) provided with this manual offer a convenient way of structuring complex tasks for operating the Dynamic Mixing Chamber. They include step-by-step instructions assisting the user through all routine tasks during operation. They can be used for documentation purposes: They can be copied, applied, signed, and filed to document the performance of the instrument.



**Note:** It is very important to follow all instructions and SOP's in this manual in order to operate the instrument and accessories. This ensures proper results and longevity of your equipment.

<b>SOP 1</b> Mounting the capillaries to the mixing chamber . . . . .	13
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## 1.4 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.

## 1.5 Legal information

### 1.5.1 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" on page 3)
- Use of non-approved spare parts
- Technical changes by the user such as opening the device and unauthorized modifications
- Violations of General Terms and Conditions (GTC)

### 1.5.2 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.

### 1.5.3 Warranty conditions

For information on warranty please refer to our general terms and conditions on the website: [www.knauer.net/terms](http://www.knauer.net/terms)

## 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](http://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
- Personalized protective safety equipment which is specified in the particular laboratory.

## 2.5 Safety features on the device

- Power switch: Devices of the AZURA® L series may be switched off using the power switch (toggle switch on the back side of housing) at any time, this causes no damage to the device. To switch off devices of the AZURA® S series, remove the plug from the power socket.
- 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.
- Note that organic solvents are toxic above a certain concentration. For handling hazardous solvents see the following section.
- Mobile phases and samples may contain volatile or combustible solvents. Avoid the accumulation of these substances. Ensure good ventilation of the installation site. Avoid open flames and sparks. Do not operate the instrument in the presence of flammable gases or vapors.
- Only use solvents which do not self-ignite under given conditions. This applies especially to the use of a thermostat where liquids could get onto hot surfaces in the interior.
- Degas solvents before use and observe their purity.

### 2.6.2 Contamination by health-threatening solvents

- Contamination with toxic, infectious or radioactive substances poses a hazard for all persons involved during operation, repair, sale, and disposal of a device.
- All contaminated devices must be properly decontaminated by a specialist company or the operating company before they can be recommissioned, repaired, sold, or disposed (see chapter "10. Disposal" on page 20).

### 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 chapter "8. Maintenance and care" on page 18).

## 2.7 Specific environments

### 2.7.1 Explosive environment

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

### 2.7.2 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.

### 2.7.3 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](http://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.
- For more information visit the KNAUER website:  
[www.knauer.net/hplc-troubleshooting](http://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](http://www.knauer.net/servicerequest)

## 3. Product information

### 3.1 General Description

The KNAUER Dynamic Mixing Chamber was developed in order to achieve the most homogeneous mixture of different solvents with the smallest possible volumes during gradient elution. It can be delivered in an analytical version, suitable for flow rates up to 10 ml / min and in preparative version for flow rates up to 100 ml / min. In the following the descriptions refer generally to the analytical version. Value deviations of the preparative one will be added in brackets.



**Note:** Usually the mixing chamber is made of stainless steel. For biocompatible work it also can be delivered with wetted parts made of titanium or peek.

### 3.2 Scope of delivery

The following items should be included in the scope of delivery:

- 1 dynamic mixing chamber (incl. power cable)
- 1 accessory kit for dynamic mixing chamber

### 3.3 Spare parts package for the mixing chamber

The package consists of:

- 4 sieves
- 6 gaskets

Valid documents:

- Instructions
- Declaration of conformity

## 3.4 View

### Front view

#### Legend:

- ① On/Off button

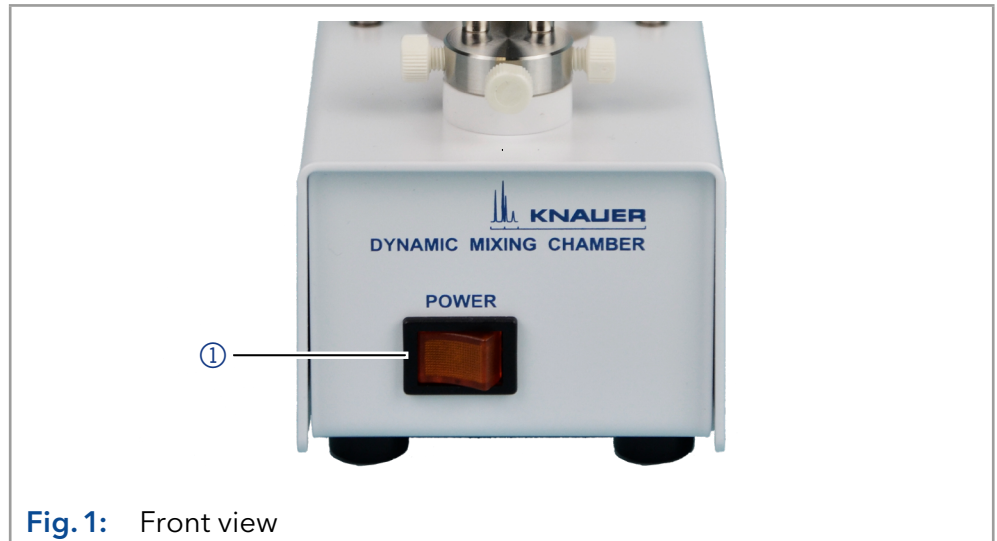


Fig. 1: Front view

### Rear view

#### Legend:

- ① CE mark
- ② Power cable

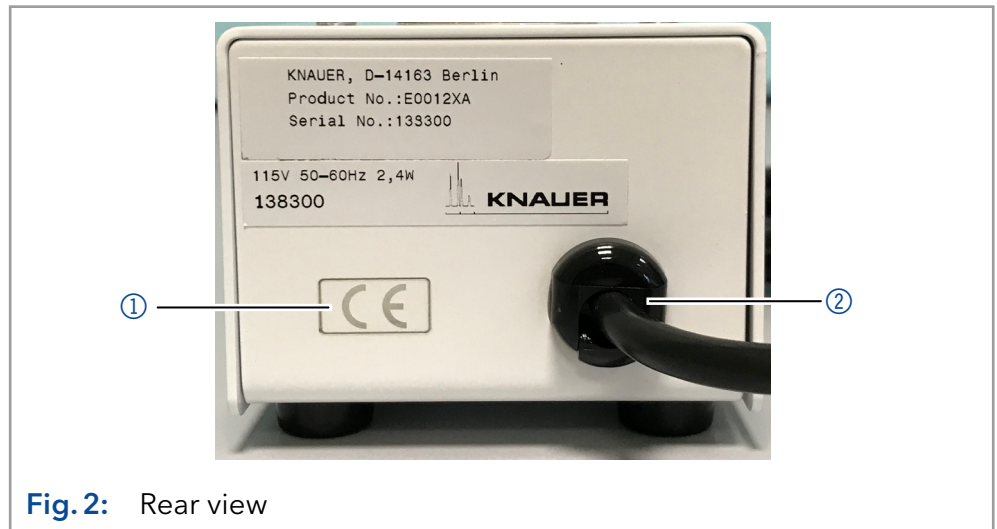



Fig. 2: Rear view

## 3.5 Symbols and signs

The following symbols and signs can be found on the device:

Symbole	Bedeutung
	A device marked with CE fulfills the product specific requirements of European directives. This is confirmed in a Declaration of Conformity.

## 4. Installation and initial startup

Before you determine the operation site, read the chapter “Technical Data” (see chapter „1.1. Technical data“ on page 21). 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

	Process
<b>Procedure</b>	1. Place the packaging in such a way that the lettering on the label is in the correct position.
	2. Check the packaging, the device and the accessories for transport damage.
	3. Check the scope of delivery. In the event of incomplete delivery, contact Technical Support immediately.
	4. When lifting, carrying or moving the device, grab the unit only from below on the sides. Do not hold onto front cover or leak tray, as these parts are loosely attached to the device.
<b>Next steps</b>	<ul style="list-style-type: none"> <li>■ Keep the included packing list for repeat orders.</li> <li>■ Keep the original packaging for safe storage or transportation.</li> </ul>

### 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 Space requirements“ on page 11).
- Avoid temperature fluctuations (see chapter „4.2.2 Ambient temperature“ on page 10).

#### 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.

## 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

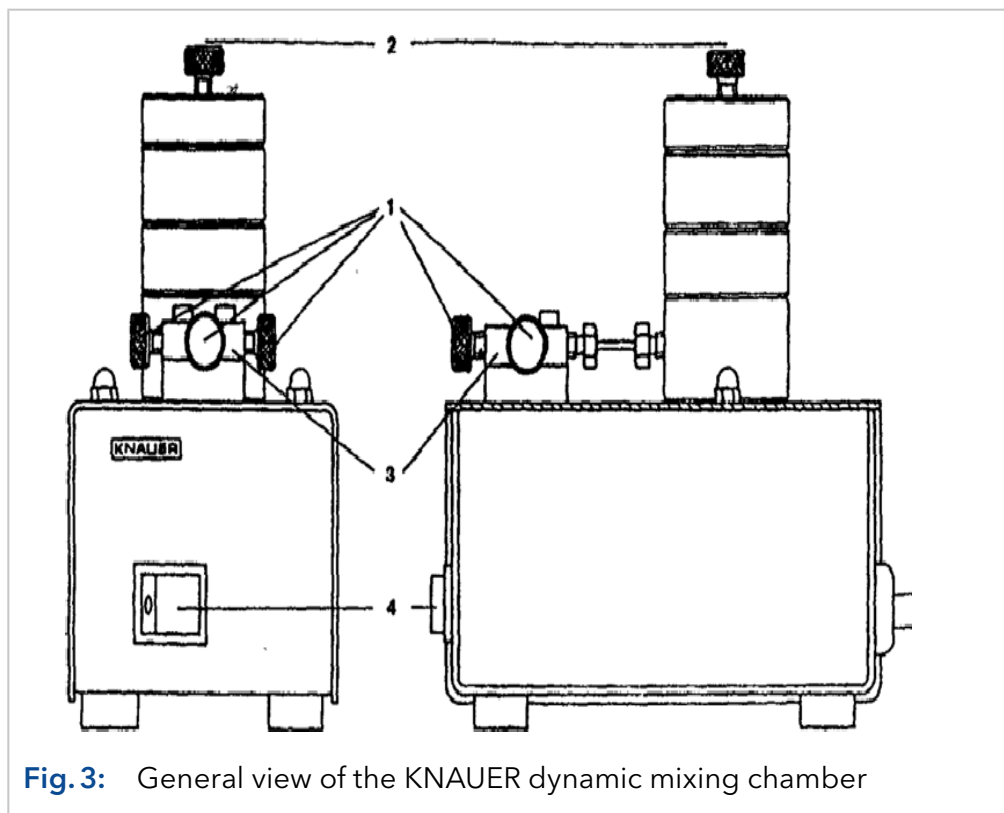
- Original parts: For power supply, use the supplied power cable and plug to meet the specifications which are described in the chapter "Technical Data" (see chapter „11. Technical data“ on page 21). Detachable power cable cables are not allowed to be replaced with other cable types.
- Power strips: 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. Operating the Dynamic Mixing Chamber

### 5.1 Description and Principle of Function

#### Legend:

- ① Inlets
- ② Outlet
- ③ 4-way capillary connector
- ④ Power switch



**Fig. 3:** General view of the KNAUER dynamic mixing chamber

The chamber of the instrument (**Fig. 3**) is composed of four (preparative version three) parts and is set on a housing together with a 4-way 1/16" (1/8") capillary connector, which is used as inlet connection.

The chamber and the connector are connected by a stainless steel capillary. The four-way capillary connector already functions as a premixer. The analytical and preparative versions look very similarly. They only differ in size and the number of possible intermediate parts, only one for the preparative version. The motor operates at a speed of 500 rpm which guarantees an intensive mix. Because of its overall technical concept, the mixing chamber is maintenance free.

The mixing chamber consists of a lower and upper part as well as of two (one) intermediate pieces (see **Fig. 4**) and is composed of two sections. The lower half effects a fast and intensive mixing by means of the Teflon-coated stirrer. The upper half is tightly packed with glass wool and serves for additional mixing of the solvent. Without this static mixer, a fluctuating solvent composition can result from relatively strong pulsation or an uneven transport by the pumps, especially in a low flow rate range. This can cause a noisy baseline during the course of a gradient elution. The sieves in the intermediate pieces protect the HPLC columns against solvent particles and dust from the pumps.



## 6. Installation

### WARNING

#### Device defect

- ➔ Connect the instrument to the power supply only after installation has been completed.
- ➔ Always disconnect the power supply before opening the instrument or the housing.

## 6.1 Connections

### SOP 1 Mounting the capillaries to the mixing chamber

1. Connect the pump(s) to the inlets of the 4-way connector with capillaries using bushings and ferrules. First, tighten the bushings with which the pump(s) are connected to the 4-way connector by hand, then 1/2 - 3/4 of a turn with a wrench.



**Note:** For high pressure gradients, up to three pumps can be directly connected to the 4-way connector on the mixing chamber. To do this, the three ports on the connector equipped with blind fittings are to be used. For low pressure gradients where only one pump is required, any one of the three inlets can be used. The remaining two inlets must be closed with blind fittings.

2. Connect the outlet of the mixing chamber (2, [Fig. 3](#)) to the injection valve, then proceed as above.
3. Now connect the instrument to a grounded power supply outlet.
4. Führen Sie die SOP 2 Drucktest der Mischkammer mit Sichtkontrolle durch.
5. Before using the mixing chamber for analyses, rinse it with approx. 100 ml methanol or i-propanol. Check the chemical compatibility of the eluents to be used with the materials in the dynamic mixing chamber.

### SOP 2 Pressure check of the mixing chamber

1. Set the following parameters at your pump:

Flow rate:	50 µl/min
Maximum pressure:	250 bar with 10 ml-pump head
	50 bar with 50 ml-pump head
2. Connect the pump head outlet to one of the mixing chamber inlets. Blind the other inlet and the outlet of the mixing chamber.
3. Start the eluent delivery and wait for the pressure stop of the pump. The displayed pressure shall not drop more than 5 % within three minutes.
4. Inspect during this time all connections for possible leakages.

**⚠ WARNING**

- Even the smallest leakage makes a correction necessary.
  - Repeat the pressure check.
- 

## 6.2 Size of the mixing chamber

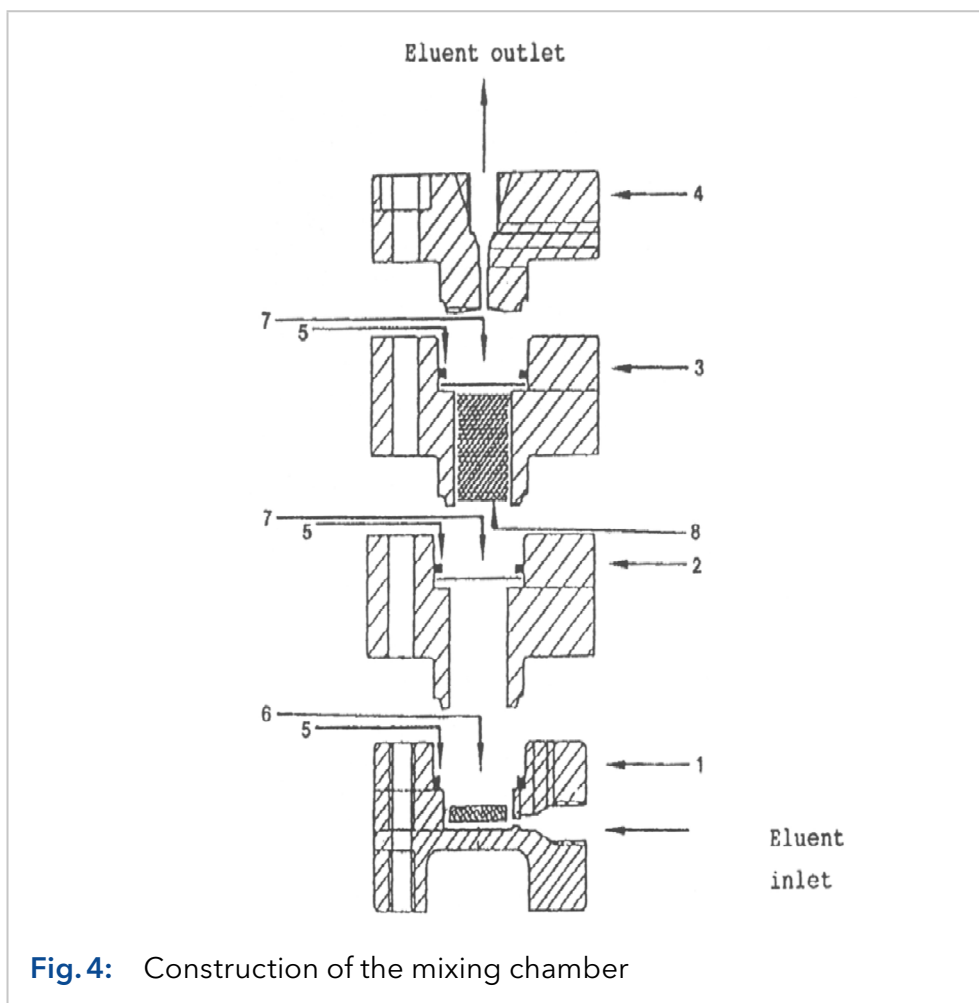
The mixing chamber is assembled as a complete unit for delivery so that it has the largest possible volume. It is therefore suitable for use in the semipreparative range. Should very short response times be required, remove one or both of the intermediate pieces according to the following SOP 3. Removal of the static mixing section (upper intermediate piece filled with glass wool) should scarcely be necessary since, although this would further shorten the response time, it does not affect the mixing speed (see Configuration Examples of the Dynamic Mixing Chamber).

### SOP 3 Changing the mixing chamber volume

1. Disconnect the power supply of your mixing chamber.
2. Disconnect the capillary of the chamber outlet.
3. Loosen and remove the three mounting screws.
4. Remove the chamber upper piece.
5. According to your requirements remove or set in the chamber intermediate piece(s).
6. If all intermediate pieces are removed place a sieve (7) directly on the lower part.
7. Set in the chamber upper piece and fix it with the three mounting screws.  
If the intermediate piece is removed, the three shorter screws out of the accessory kit must be used.
8. Connect the outlet capillary to the chamber outlet.
9. Perform the SOP 2 to ensure the mounting without any leakage.

**Legend:**

- ① Lower part
- ② Intermediate part (dynamic section)
- ③ Intermediate part (static section)
- ④ Upper part
- ⑤ Teflon seal
- ⑥ Stirrer (magnetic core)
- ⑦ Sieve
- ⑧ Glass wool filling



**Fig.4:** Construction of the mixing chamber

## 7. Configuration examples of the dynamic mixing chamber

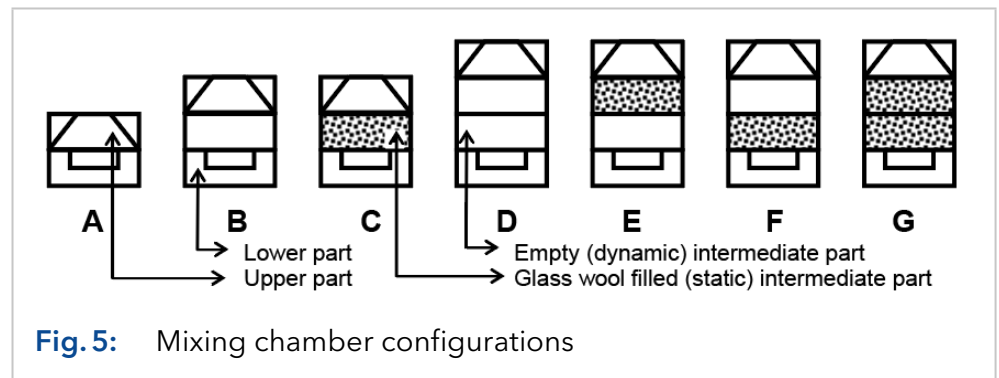
The role of the chamber is as follows:

- The lower chamber range effects rapid, dynamic mixing by means of a Teflon coated stirring magnet.
- The upper chamber provides additional static mixing of the solvent. This static mixer helps to minimize the pulsation and/or uneven delivery of solvent from the pumps, which can occur at lower flow rates and lead to noisy baselines, especially when a gradient is employed.

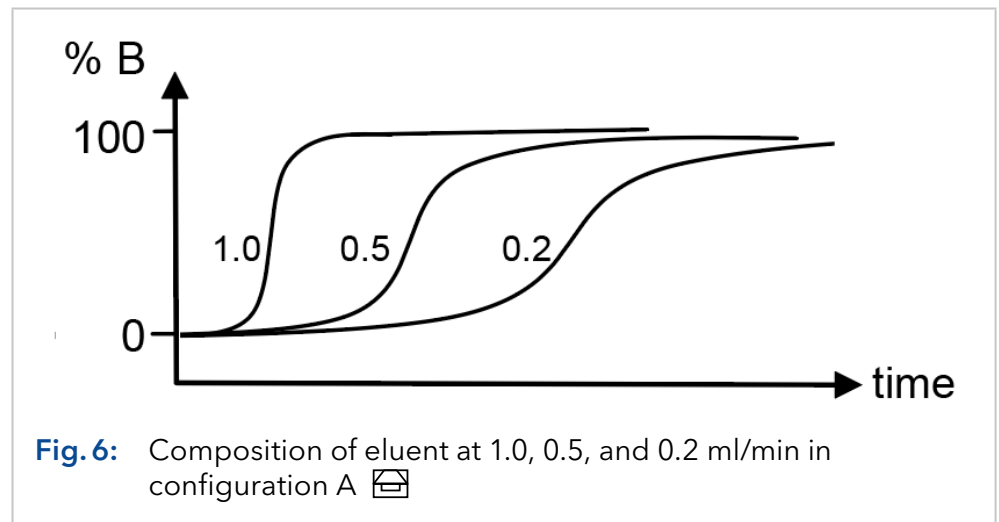
Some examples shall illustrate the possibilities for use of the dynamic mixing chamber in various configurations. They demonstrate how the actual composition of the eluent at the column inlet depends on the total mixing area volume before the column, as well as on the dead volume of the static (with glass wool) or dynamic (without glass wool) mixing chamber.

The examples are based on a system of eluent A = pure water and eluent B = methanol/water 80/20 v/v. At time zero always a switch from 100 % A to 100 % B is performed. The detector was directly connected to the dynamic mixing chamber. Thus, the illustrations represent the composition of the eluent at the column head.

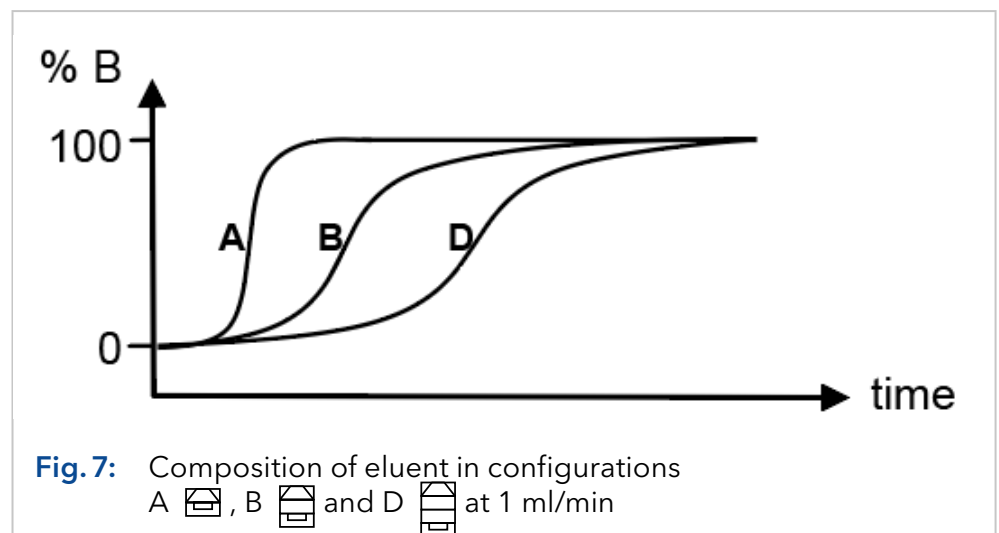
**Fig. 6** symbolizes all possible configurations of the mixing chamber. The preparative version can only be configured in the variants A, B, and C.



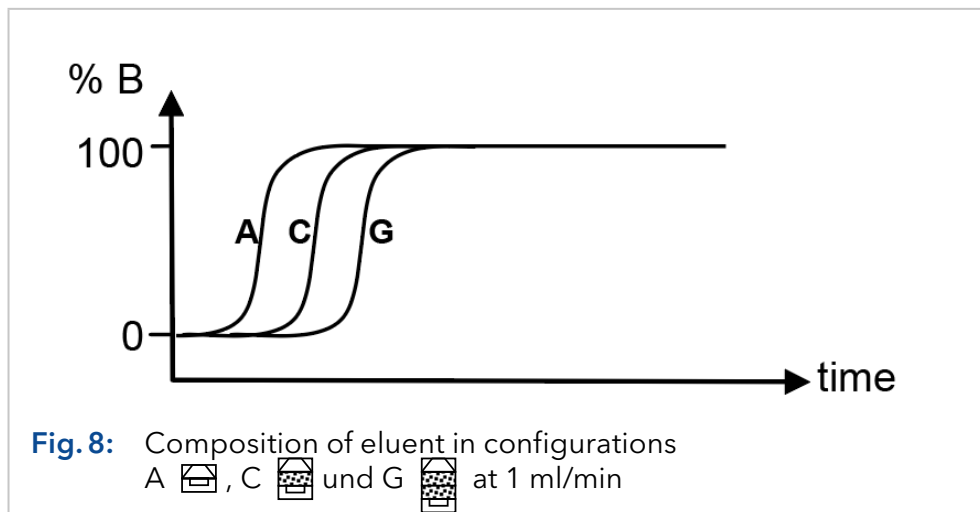
Firstly, the influence of the flow rate at a given mixing chamber volume shall be shown (**Fig. 6**). The higher the flow rate the steeper is the slope of the eluent gradient, limited of course by the capacity (volume) of the mixing chamber.



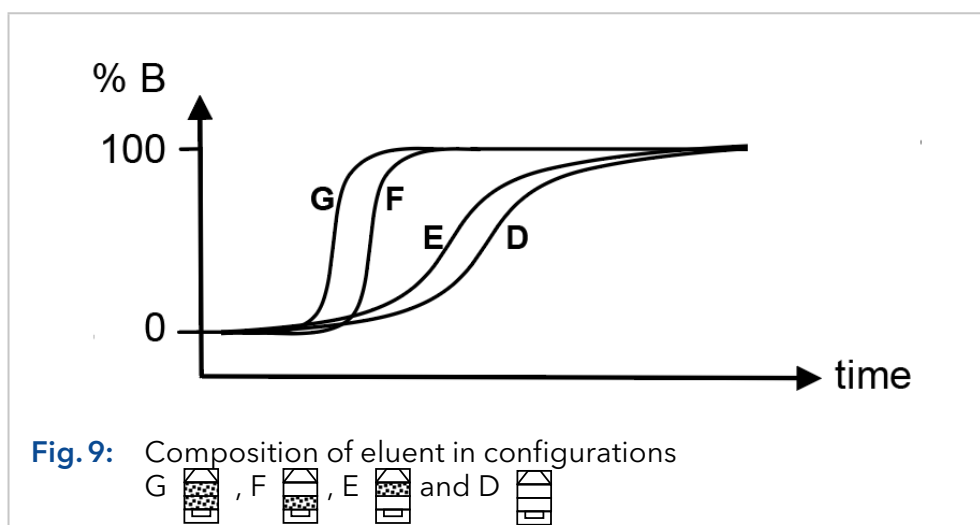
Very similar is the influence of the mixing chamber volume at a given flow rate. The smaller the mixing chamber volume the steeper is the slope of the eluent gradient.



The use of filled intermediate pieces enlarges the static mixing area in addition to the dynamic mixing volume of the lower part. The influence on the response time is obviously whereas on the curve form it is much lower.



**Fig. 9** illustrates that for all possible combinations with two intermediate pieces the curve shape is mainly dependent on the lower one if it is filled or not.



**Note:** Flow rate and volume of the mixing chamber affect the form of the gradient. Mixing chambers from different manufacturers can therefore produce different gradients at the start of the column. The usual details given in the literature for the gradient curve of the controlling instruments are generally not sufficient for reproduction of the same results with other mixing chambers.

## 8. Maintenance and care

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

### NOTICE

#### **Electronic defect**

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

- Switch off the device
  - Pull the power plug.
- 

### 8.1 Maintenance contract

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

### 8.2 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.

## 9. Transport and storage

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

### 9.1 Taking the device out of operation

**Prerequisites** The device is switched off.

**Procedure**

**Process**

1. Pull the power plug out of the socket.
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.

### 9.2 Packing the device

- Original packaging: Ideally you should use the original transport packaging.

### 9.3 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 „11. Technical data“ on page 21).

### 9.4 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 (see chapter „11. Technical data“ on page 21).

# 10. Disposal

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

## 10.1 AVV-Marking Germany

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

## 10.2 WEEE registration number

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.

## 10.3 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.



# 11. Technical data

## 11.1 Specifications of the Mixing Chamber

	Analytical	Preparative
<b>Chamber Volume</b>		
Total	1740 µl	5,9 ml
Lower part	260 µl	1,1 ml
Dynamic intermediate	880 µl	4,8 ml
Static intermediate	500 µl	-
<b>Maximum pressure</b>		
	420 bar	250 bar
<b>Power supply</b>		
	110-220 V AC	110-220 V AC
<b>Dimensions (WxHxD)</b>		
	80 x 100 x 120 mm	80 x 130 x 125 mm
<b>Weight</b>		
	1,2 kg	1,6 kg

## 11.2 General

### 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
Overvoltage category	II
Permitted pollution degree	II
Admissible mains voltage fluctuations	+/- 10 %

## 12. Reorders

The list of repeat orders is current at the time of publication. Deviations at a later time are possible. Use the enclosed packing list for reordering spare parts. If you have any questions regarding spare parts or accessories, please contact our Customer Support.

**Further Information** Current information on spare parts and accessories can be found on the Internet at [www.knauer.net](http://www.knauer.net).

### 12.1 Device

Name	Order no.
Dynamic mixing chamber (250 V), stainless steel, analytical, 1/16", up to 420 bar, 1740 µl mixing volume	A0285
Dynamic mixing chamber (115 V), stainless steel, analytical, 1/16", up to 420 bar, 1740 µl mixing volume	A02851
Dynamic mixing chamber (250 V), titanium, analytical, 1/16", up to 420 bar, 1740 µl mixing volume	A0275
Dynamic mixing chamber (115 V), titanium, analytical, 1/16", up to 420 bar, 1740 µl mixing volume	A02751
Dynamic mixing chamber (250 V), stainless steel, preparative, 1/8", up to 250 bar, 5.9 ml mixing volume	A0581
Dynamic mixing chamber (115 V), stainless steel, preparative, 1/8", up to 250 bar, 5.9 ml mixing volume	A05811
Dynamic mixing chamber (250 V), titanium, preparative, 1/8", up to 250 bar, 5.9 ml mixing volume	A70581
Dynamic mixing chamber (115 V), titanium, preparative, 1/8", up to 250 bar, 5.9 ml mixing volume	A705811

### 12.2 Accessories and spare parts

Name	Oder no.
Mixing chamber extension unit for A70581/A705811, 1 intermediate section, titanium, 4.8 ml, 3 screws 6 x 60 mm	A2515
Accessories for preparative dynamic mixer	F0020
Accessories for analytical dynamic mixer, stainless steel (A0285, A02851)	F0026
Accessories for analytical dynamic mixer, titanium (A0275, A02751)	F0029

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