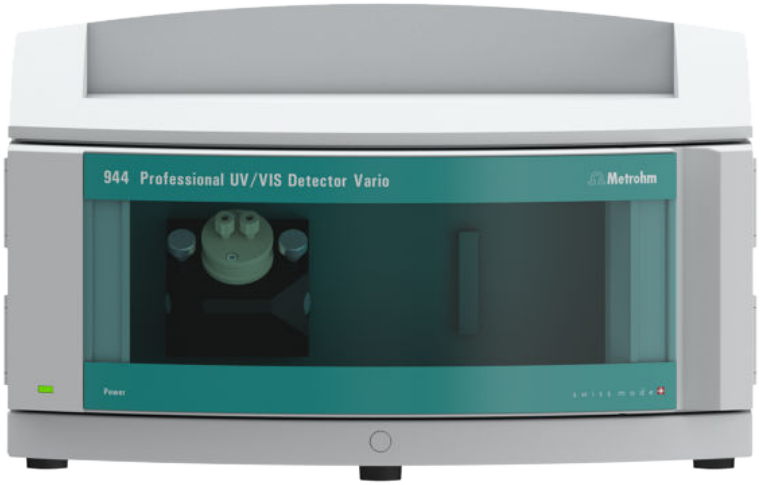
944 Professional UV/VIS Detector Vario



2.944.0010

Manual

8.944.8001EN / 2021-03-17

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This documentation has been prepared with great care. However, errors can never be entirely ruled out. Please send comments regarding possible errors to the address above.

Table of contents

Table of figures

1 Introduction

1.1 Instrument description

The **944 Professional UV/VIS Detector Vario** is an independent instrument for the photometric determination of light-absorbing substances in the UV/VIS range. It serves as UV/VIS detector within an ion chromatography system.

The 944 Professional UV/VIS Detector Vario is operated with the **MagIC Net** software. It is connected to a PC on which MagIC Net is installed with a USB cable. The software detects the instrument automatically and checks its functional readiness. MagIC Net controls and monitors the instrument, evaluates the measured data and manages it in a database.

Additional information on operating MagIC Net can be found in the document *"MagIC Net Tutorial"* or in the software's online help.

1.2 Intended use

The 944 Professional UV/VIS Detector Vario is used as an independent detector with various analysis instruments of the Metrohm line of instruments.

This instrument is suitable for processing chemicals and flammable samples. Therefore, the use of the 944 Professional UV/VIS Detector Vario requires the user to have basic knowledge and experience in handling toxic and caustic substances. Knowledge regarding the application of fire prevention measures prescribed for laboratories is also mandatory.

1.3 About the documentation

CAUTION

Read through this documentation carefully before putting the instrument into operation. The documentation contains information and warnings which the user must follow in order to ensure safe operation of the instrument.

1.3.1 Symbols and conventions

The following symbols and formatting may appear in this documentation:

*(5-**12**)*	**Cross-reference to figure legend** The first number refers to the figure number, the second to the instrument part in the figure.
1	**Instruction step** Carry out these steps in the sequence shown.
Method	**Dialog text**, **parameter** in the software
File ► New	Menu or menu item
[Next]	**Button** or **key**
	**WARNING** This symbol draws attention to a possible life-threatening hazard or risk of injury.
	**WARNING** This symbol draws attention to a possible hazard due to electrical current.
	**WARNING** This symbol draws attention to a possible hazard due to heat or hot instrument parts.
	**WARNING** This symbol draws attention to a possible biological hazard.
	**CAUTION** This symbol draws attention to possible damage to instruments or instrument parts.
	**NOTE** This symbol highlights additional information and tips.

1.4 Safety instructions

1.4.1 General notes on safety

WARNING

Operate this instrument only according to the information contained in this documentation.

This instrument left the factory in a flawless state in terms of technical safety. To maintain this state and ensure non-hazardous operation of the instrument, the following instructions must be observed carefully.

1.4.2 Electrical safety

The electrical safety when working with the instrument is ensured as part of the international standard IEC 61010.

WARNING

Only personnel qualified by Metrohm are authorized to carry out service work on electronic components.

WARNING

Never open the housing of the instrument. The instrument could be damaged by this. There is also a risk of serious injury if live components are touched.

There are no parts inside the housing which can be serviced or replaced by the user.

Supply voltage

WARNING

An incorrect supply voltage can damage the instrument.

Only operate this instrument with a supply voltage specified for it (see rear panel of the instrument).

Protection against electrostatic charges

WARNING

Electronic components are sensitive to electrostatic charges and can be destroyed by discharges.

Do not fail to pull the power cord out of the power socket before you set up or disconnect electrical plug connections at the rear of the instrument.

1.4.3 Tubing and capillary connections

CAUTION

Leaks in tubing and capillary connections are a safety risk. Tighten all connections well by hand. Avoid applying excessive force to tubing connections. Damaged tubing ends lead to leakage. Appropriate tools can be used to loosen connections.

Check the connections regularly for leakage. If the instrument is used mainly in unattended operation, then weekly inspections are mandatory.

1.4.4 Flammable solvents and chemicals

WARNING

All relevant safety measures are to be observed when working with flammable solvents and chemicals.

- Set up the instrument in a well-ventilated location (e.g. fume cupboard).
- Keep all sources of flame far from the workplace.
- Clean up spilled liquids and solids immediately.
- Follow the safety instructions of the chemical manufacturer.

1.4.5 Recycling and disposal

This product is covered by European Directive 2012/19/EU, WEEE – Waste Electrical and Electronic Equipment.

The correct disposal of your old instrument will help to prevent negative effects on the environment and public health.

More details about the disposal of your old instrument can be obtained from your local authorities, from waste disposal companies or from your local dealer.

2 Overview of the instrument

2.1 Front

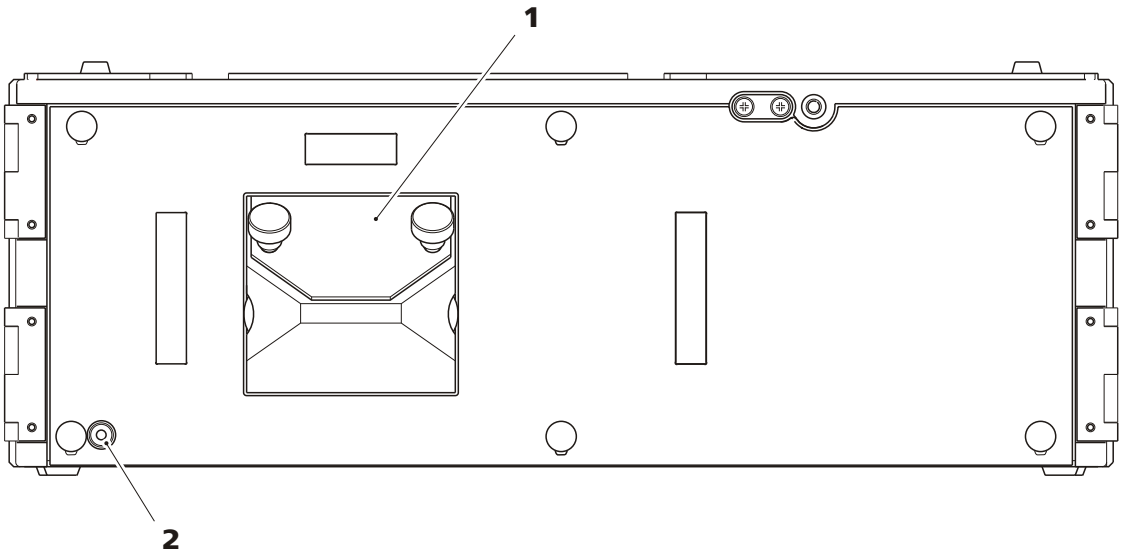


Figure 1 Front

1 Flow-through cell	**2 Standby indicator**

2.2 Rear

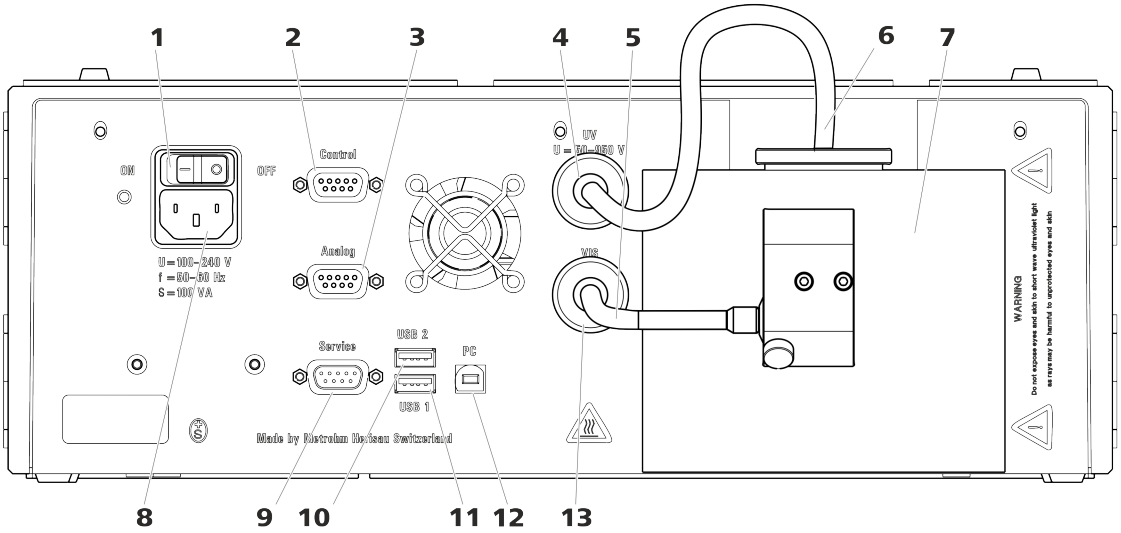


Figure 2 Rear

1 **Power switch** For switching the instrument on and off. I = On O = Off	**2** **Control connection socket** Not Used.
3 **Analog connection socket** Output for analog signals.	**4** **UV connection socket** For connecting the cable of the UV lamp.
5 **VIS lamp connection cable**	**6** **UV lamp connection cable**
7 **Lamp cooling element**	**8** **Power socket** For connecting the power cord.
9 **Service connection socket** Connector for service.	**10** **USB 2 connection socket** For connecting additional USB devices.
11 **USB 1 connection socket** For connecting additional USB devices.	**12** **PC connection socket** For connecting the USB cable to the PC.
13 **VIS connection socket** For connecting the cable of the VIS lamp.	

3 Installation

3.1 Setting up the instrument

3.1.1 Packaging

The instrument is supplied in protective packaging together with the separately packed accessories. Keep this packaging, as only this ensures safe transportation of the instrument.

3.1.2 Checks

Immediately after receipt, check whether the shipment has arrived complete and without damage by comparing it with the delivery note.

3.1.3 Location

The instrument has been developed for operation indoors and may not be used in explosive environments.

Place the instrument in a location of the laboratory which is suitable for operation and free of vibrations and which provides protection against corrosive atmosphere and contamination by chemicals.

The instrument should be protected against excessive temperature fluctuations and direct sunlight.

The distance between the rear of the instrument and the wall must be large enough to ensure air circulation on the cooling plate.

3.2 Setup configurations

The 944 Professional UV/VIS Detector Vario can be used as a detector with the instruments of the 940 Professional IC Vario and 930 Compact IC Flex family. For many applications with photometric detection, a post-column derivatization with the 943 Professional Thermostat / Reactor Vario (2.943.0110) is required. To build such a system, you will need a 944 Professional UV/VIS Detector Vario and the following instruments:

- any 940 Professional IC Vario, or
  any 930 Compact IC Flex
- a 943 Professional Thermostat / Reactor Vario
- optionally: a 942 Extension Module Vario for sample preparation
- optionally, if the reagent is pumped with a high-pressure pump: a Metrosep BP 1 Guard/2.0 backpressure column (6.1015.100)

An IC system with photometric detection and post-column derivatization can be set up in various configurations.

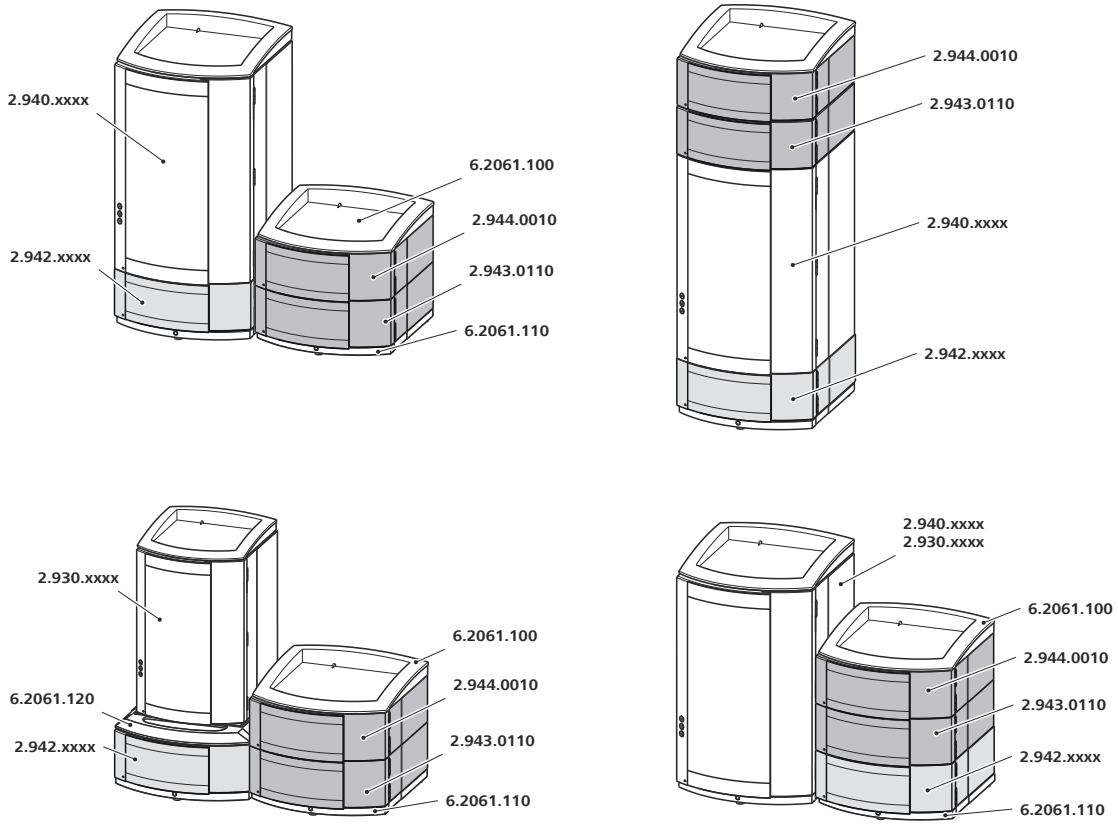


Figure 3 Setup configurations

Notes on the setup configurations

If you want to set up the instruments in two stacks, we recommend you order the following accessories to protect the instruments of the second stack:

- Bottle holder (ProfIC) (6.2061.100)
- Base tray with sensor for Professional IC instruments (6.2061.110)

If you would like to stack a 930 Compact IC Flex on a 944 Professional UV/VIS Detector Vario, a 943 Professional Thermostat / Reactor Vario and/or a 942 Extension Module Vario, then you will need the System Connector (6.2061.120) to accommodate the different base sizes.

3.3 Base tray and bottle holder

3.3.1 Basic information on base tray and bottle holder

The base tray (6.2061.110) and bottle holder (6.2061.100) protect IC instruments from dust, dirt and leaking fluids. The supply bottles for eluent and auxiliary solutions can be positioned neatly on the bottle holder.

In a complex IC system, several different instruments may be used, such as an analyzer, an extension module and a detector. These instruments can be set up in one or more stacks. We recommend that a base tray and bottle holder be mounted for each stack of IC instruments.

The bottle holder and base tray must be removed or set up if one of the following instruments is to be mounted on or under a 940 Professional IC Vario:

- One or more 942 Extension Module Vario
- Or another instrument with the same-sized footprint

3.3.2 Mounting base tray and bottle holder (optional)

The base tray and bottle holder come fully assembled on a new ion chromatograph. To install an Extension Module on the ion chromatograph, remove the bottle holder and put it back on top of the topmost instrument. To install an Extension Module under the ion chromatograph, remove the base tray and set it under the lowest instrument.

3.3.2.1 Removing/mounting the base tray

Remove the base tray to install another instrument under the IC instrument.

CAUTION

Do not pinch capillaries or leak sensor cables

Capillaries are fed through the guide ducts between the base tray and the instrument. Pinches in the leak sensor cable or the capillaries may lead to malfunctions.

- Unplug the leak sensor cable before you remove the base tray.
- Remove all the capillaries from the capillary ducts before you remove the base tray.

Removing the base tray

Prerequisites

- The instrument is switched off.

- The bottle holder is cleared.
- All of the cable connections on the rear have been disconnected.
- The capillaries are removed from the guide ducts between the instrument and the base tray.
- There are no loose parts in the instrument.

Accessories

- 3 mm hex key (6.2621.100)

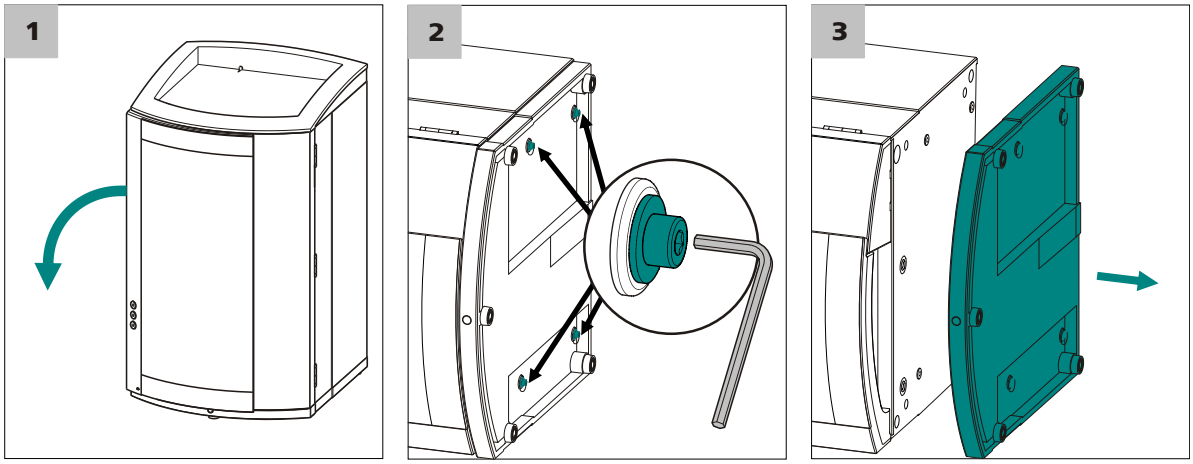


Figure 4 Removing the base tray

1 Tilt the instrument sideways and lay it down flat.

2 Loosen the 4 cylinder screws with the 3 mm hex key. Remove the cylinder screws and their washers.

3 Remove the base tray.

Always mount the base tray under the lowermost instrument of the stack.

Mounting the base tray

Prerequisites

- The instrument is switched off.
- The bottle holder is cleared.
- All of the cable connections on the rear have been disconnected.
- There are no loose parts in the instrument.
- The instrument is lying on its side, and the bottom surface is visible.

Accessories

- 3 mm hex key (6.2621.100)

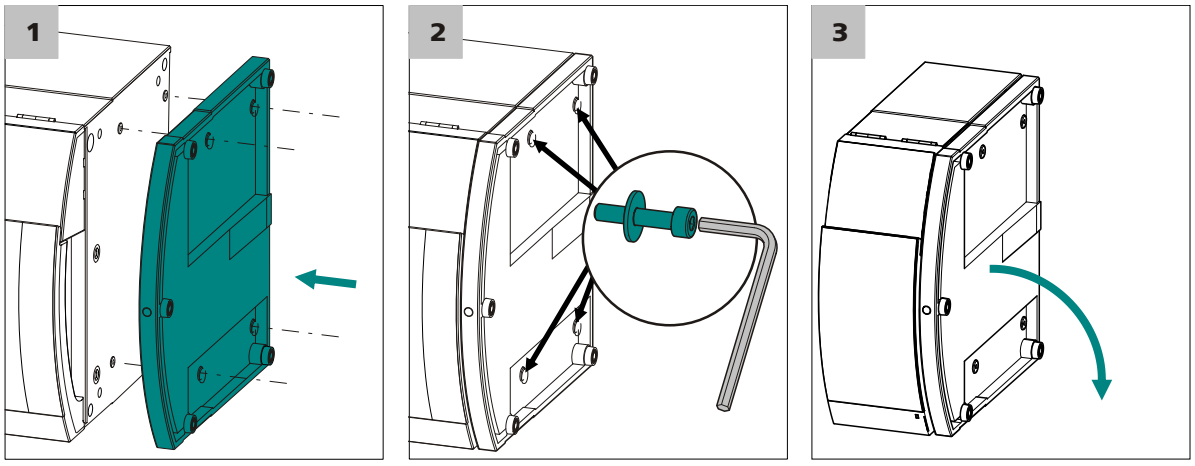


Figure 5 Mounting the base tray

1 Mount the base tray in such a way that the openings in the base tray match exactly the screw threads in the bottom of the instrument.

2 Slide the washers onto the cylinder screws. Insert the cylinder screws with the washers and tighten them with the 3 mm hex key.

3 Set the instrument back up on the base tray.

Stack other instruments in the required order. Mount the bottle holder (6.2061.100) onto the topmost instrument on the stack *(see "Mounting the bottle holder", page 13)*.

3.3.2.2 Removing/mounting the bottle holder

Remove the bottle holder if you want to install another instrument onto the IC instrument.

Removing the bottle holder

Prerequisites

- The instrument is switched off.
- The bottle holder is cleared.
- Drainage tubing is disconnected from the drainage tubing connection of the bottle holder.
- The capillaries are removed from the guide ducts between the instrument and the bottle holder.

Accessories

- 3 mm hex key (6.2621.100)

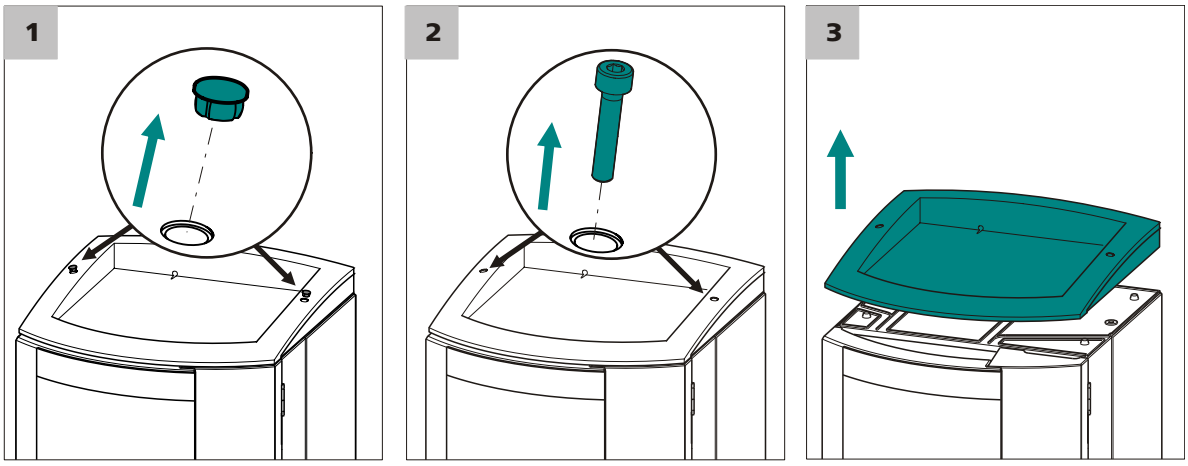


Figure 6 Removing the bottle holder

1 Remove the 2 covering stoppers.

2 Loosen the 2 cylinder screws with the 3 mm hex key and remove them.

3 Remove the bottle holder.

Stack other instruments in the required order. Mount the bottle holder (6.2061.100) onto the topmost instrument on the stack.

Mounting the bottle holder

Prerequisite

- The instrument is switched off.

Accessories

- 3 mm hex key (6.2621.100)

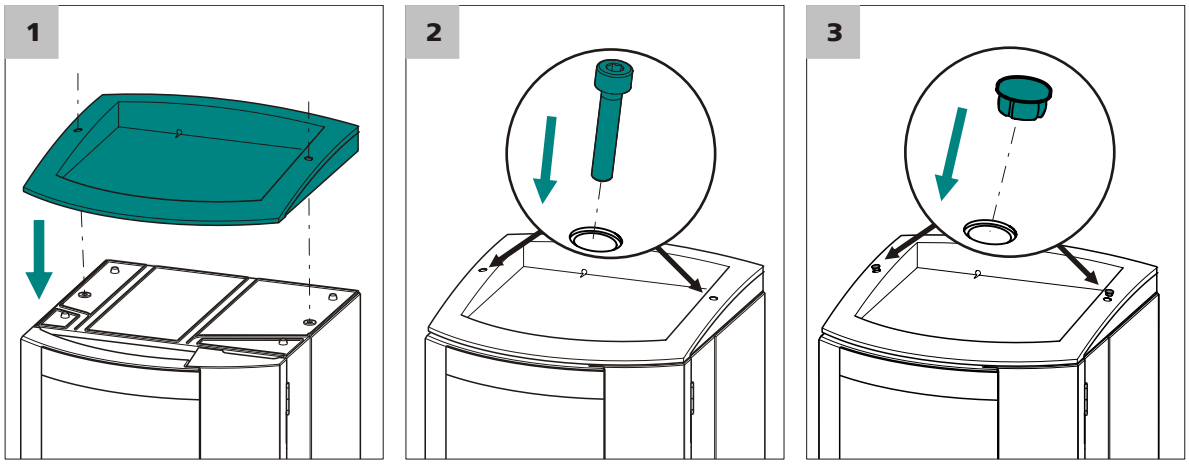


Figure 7 Mounting the bottle holder

1 Mount the bottle holder onto the topmost instrument in such a way that the openings in the bottle holder exactly match the screw threads on the top surface of the instrument.

2 Insert the 2 cylinder screws and tighten them with the 3 mm hex key.

3 Insert both covering stoppers.

After attaching the bottle holder, restore all connections that were loosened at the beginning of the process.

Restoring the loosened connections

1 Plug in all necessary USB cables.

2 Plug in all necessary MSB cables.

3 Plug in the power cord.

4 Mount the drainage tubing again *(see manual of the IC instrument)*.

A longer section of silicone tubing (6.1816.020) may have to be cut to size and mounted *(see also the manual for the IC instrument)*.

5 If one of the instruments in the stack is equipped with a leak sensor connection socket, connect the leak sensor *(see manual of the IC instrument)*.

6 Restore any capillary connections that may have been removed.

3.4 Installing the flow-through cell

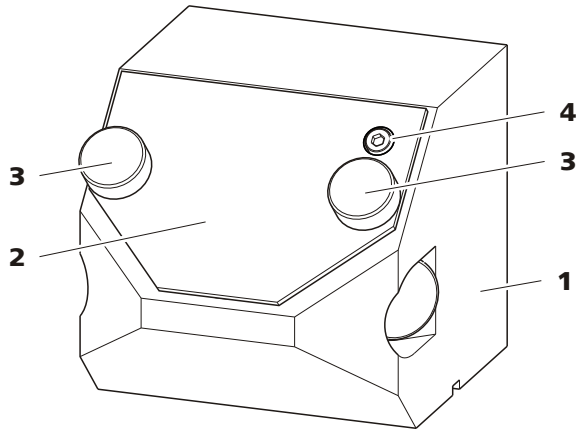
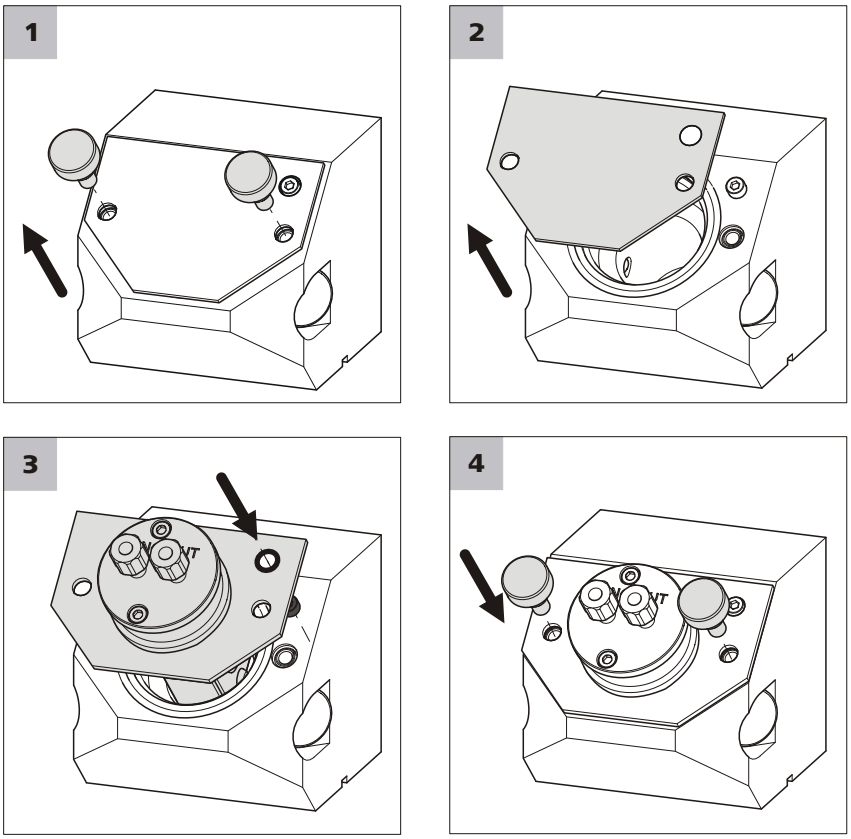


Figure 8 Cell block

1 **Cell holder** Holder for the flow-through cell.	**2** **Cover plate** Protects the cell holder form contamination if no cell is installed.
3 **Knurled screws**	**4** **Cylinder screw** For the correct alignment of the flow-through cell.

Installing the flow-through cell



1 Loosen and remove the knurled screws *(8-**3**)*.

2 Remove the cover plate *(8-**2**)*.

3 Insert the flow-through cell (6.2839.130) such that the opening in top right corner is aligned with the cylinder screw *(8-**4**)* on the cell block.

4 Screw in the knurled screws again.

NOTICE

In order to fix the flow-through cell in the correct position, the two knurled screws must be tightened symmetrically and with constant force.

Any tilting, twisting or canting of the flow-through cell influences the light incidence and thus the measuring results.

3.5 Connecting the flow-through cell

To connect the capillaries to the flow-through cell, proceed as follows:

Connecting the capillaries

1 Connecting the detector input

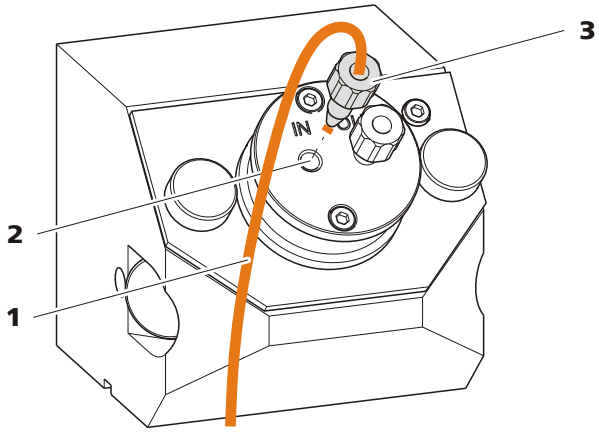


Figure 9 Connecting the detector input

1 Detector input capillary PEEK capillary (6.1831.100).	**2 Detector inlet** Labeled *IN*.
3 Pressure screw	

- Unscrew the pressure screw from the *IN* detector inlet.
- Slide the presssure screw over the detector input capillary such that a small part of the capillary is visible at the top.
- Tighten the detector input capillary in the detector inlet using the pressure screw.

2 Connecting the detector outlet

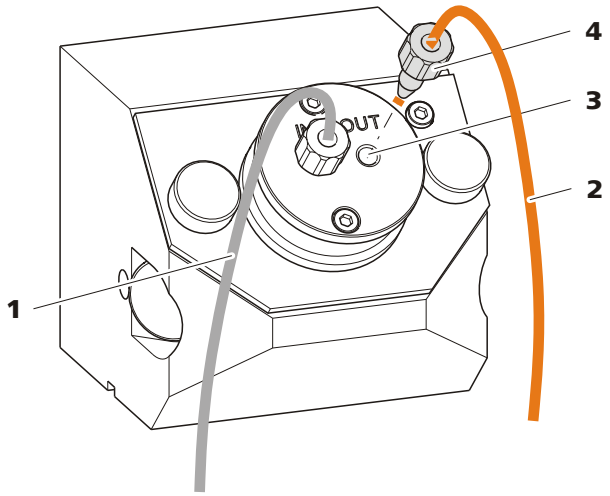


Figure 10 Connecting the detector outlet

1 Detector input capillary	**2 Detector output capillary** PEEK capillary (6.1831.100).
3 Detector outlet Labeled *OUT*.	**4 Pressure screw**

- Unscrew the pressure screw form the *OUT* detector outlet.
- Slide the presssure screw over the detector output capillary such that a small part of the capillary is visible at the top.
- Screw the detector output capillary to the detector outlet with the pressure screw.

NOTICE

The detector output capillary (6.1831.100) is 1 m long and may not be shortened.

3.6 Connecting the instrument

3.6.1 Connecting the instrument to a computer

NOTICE

The instrument must be switched off when being connected to a computer.

Accessories

For this step, you need the following accessories:

- USB connecting cable (6.2151.020)

1 Insert the USB cable into the connection socket on the rear of the instrument labeled *PC*.

2 Insert the other end into a USB port on the computer.

3.6.2 Connecting the instrument to the power grid

WARNING

Electric shock from electrical potential

Risk of injury by touching live components or through moisture on live parts.

- Never open the housing of the instrument while the power cord is still connected.
- Protect live parts (e.g. power supply unit, power cord, connection sockets) against moisture.
- Unplug the power plug immediately if you suspect that moisture has gotten inside the instrument.
- Only personnel who have been issued Metrohm qualifications may perform service and repair work on electrical and electronic parts.

Connecting the power cord

Accessories

Power cord with the following specifications:

- Length: max. 2 m
- Number of cores: 3, with protective conductor
- Instrument plug: IEC 60320 type C13
- Conductor cross-section 3x min. 0.75 mm^2 / 18 AWG

- Power plug:
  - according to customer requirement (6.2122.XX0)
  - min. 10 A

NOTICE

Do not use a not permitted power cord!

1 Plugging in the power cord

- Plug the power cord into the instrument's power socket.
- Connect the power cord to the power grid.

4 Start-up

The 944 Professional UV/VIS Detector Vario is put into operation together with the IC instrument.

The following preconditions must be met before initial start-up:

- The 944 Professional UV/VIS Detector Vario is installed as outlined in this manual and connected to the ion chromatograph.

You can find additional information on carrying out initial start-up in the *Start-up* chapter in the manual for the IC instrument and the MagIC Net online help.

We recommend checking the intensity spectrum of the lamps in addition to performing the initial start-up with the IC system.

Checking the intensity spectrum

Before you can check the intensity of the lamps, the following preconditions must be met:

- The lenses and the flow path of the flow-through cell must be clean.

1 Rinsing the flow-through cell with ultrapure water

Rinse the flow-through cell with ultrapure water at a flow rate of 0.5 mL/min.

Ensure that no air bubbles remain in the flow-through cell.

2 Checking the intensity of the lamps

In MagIC Net, adjust the following settings:

- Go to the **Manual** program part.
- Click on the icon for the **944 UV/VIS Detector**.
- On the **UV lamp** tab, switch on the UV Lamp.
- On the **VIS lamp** tab, switch on the VIS lamp.
- On the **Detector** tab, select the **Intensity spectrum**.
  First click on **[Reset baseline]** and then click on **[View]**.

The lamp's intensity range is monitored and the spectrum is recorded.

If the intensity spectrum looks similar to the spectrum in *Figure 11*, then the lamp is correctly adjusted.

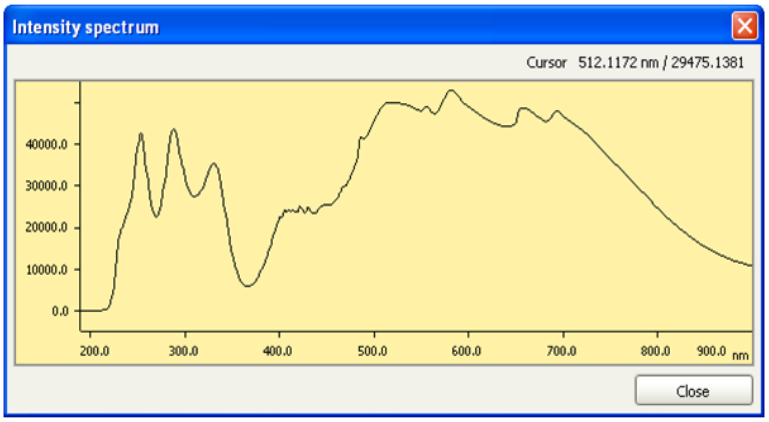


Figure 11 Intensity spectrum OK

If the intensity spectrum is cut off like the one in *Figure 12*, then the lamp settings must be adjusted *(see chapter 6.6, page 28)*.

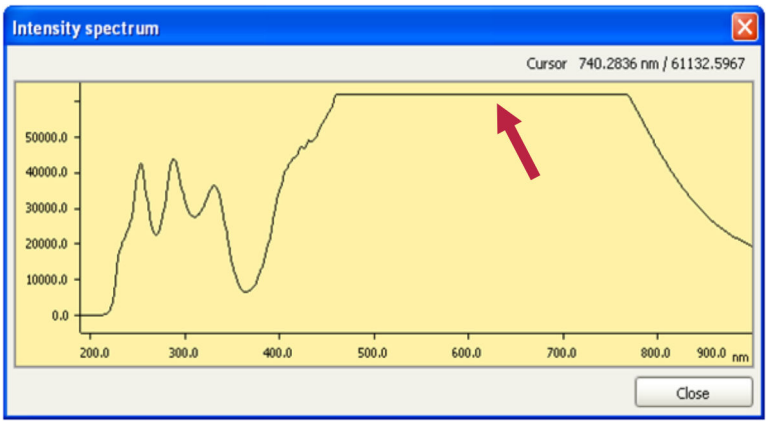


Figure 12 Lamp intensity too high

5 Operation

The instrument is operated via MagIC Net software only. Additional information on operating MagIC Net can be found in the document *"MagIC Net Tutorial"* or in the software's online help.

6 Operation and maintenance

6.1 Care

The instrument requires appropriate care. Excess contamination of the instrument may result in malfunctions and a reduction in the service life of the sturdy mechanical and electronic components.

The instrument must be cleaned immediately if chemicals or solvents are spilled on it. In particular, the plug connections (particularly the power plug) must be protected against contamination.

CAUTION

The instrument has been designed so that liquid is largely prevented from being able to get inside the instrument. However, unplug the power plug immediately if you suspect that corrosive media have gotten inside the instrument. This is the only way to prevent extreme damage to the instrument electronics. Notify Metrohm Service.

WARNING

Untrained personnel may not open the instrument's housing.

6.2 Maintenance by Metrohm Service

Maintenance of the instrument is best carried out as part of annual service, which is performed by specialist personnel from Metrohm. A shorter maintenance interval is recommended if you frequently work with caustic and corrosive chemicals. Metrohm Service offers every form of technical advice for maintenance and service of all Metrohm instruments.

6.3 Door

CAUTION

The door is made of PMMA (poly(methyl methacrylate)). It must never be cleaned with abrasive media or solvents.

CAUTION

Never hold the instrument by the door when lifting or moving it.

6.4 Replacing the UV lamp

After a prolonged burning time, the radiation of the UV lamp starts to decrease, which can be noticed by an increased noise on the baseline. Check the effective burning time on the operating hours counter fixed to the cable of the lamp. This counter measures the effective hours of operation and displays them on a scale.

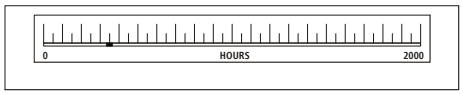


Figure 13 Operating hours counter

The UV lamp must be replaced if the noise on the baseline becomes too strong or when the lamp does not ignite.

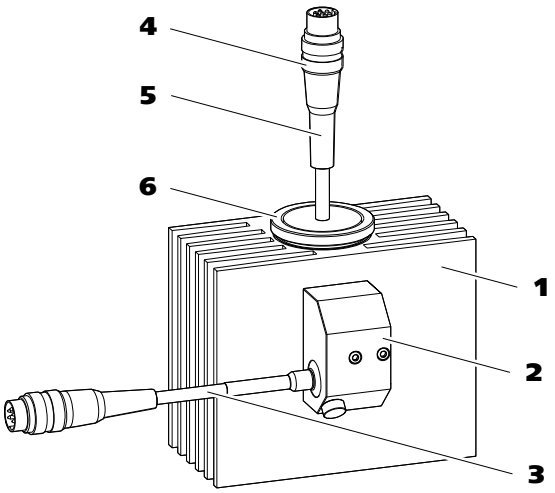


Figure 14 Lamp module

1 Lamp cooling element	**2 VIS lamp holder**

3 **VIS lamp** Halogen lamp (6.2804.100).	**4** **Retaining ring plug deuterium lamp**
5 **UV lamp** Deuterium lamp (6.2804.060) with operating hours counter.	**6** **Fastening ring** For UV lamp.

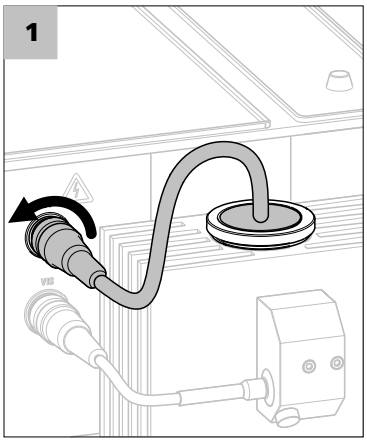
Removing the old UV lamp

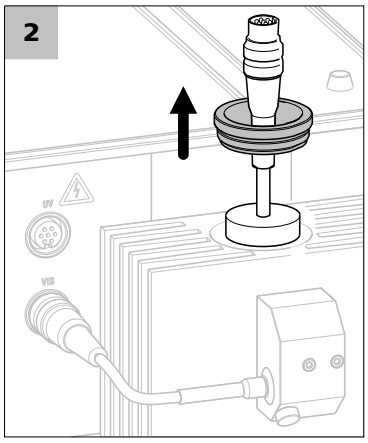
WARNING

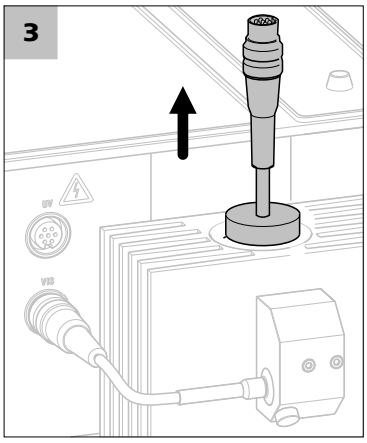
After longer operation, the UV lamp becomes hot!

Risk of burns!

Switch off the instrument and allow the lamp to cool before you start working.







1 **Disconnecting the UV lamp**

Loosen the retaining ring of the UV lamp plug and pull the plug out of the *UV* connection socket.

2 **Loosening the fastening ring**

Loosen and remove the fastening ring of the UV lamp.

3 **Removing the UV lamp**

Carefully remove the old UV lamp from the housing.

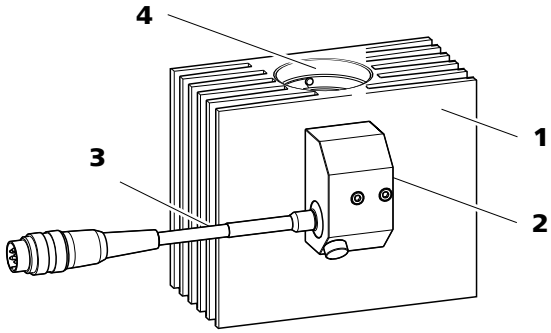


Figure 15 Lamp module – without UV lamp

1	**Lamp cooling element**	**2**	**VIS lamp holder**
3	**VIS lamp**	**4**	**Opening** For UV lamp.

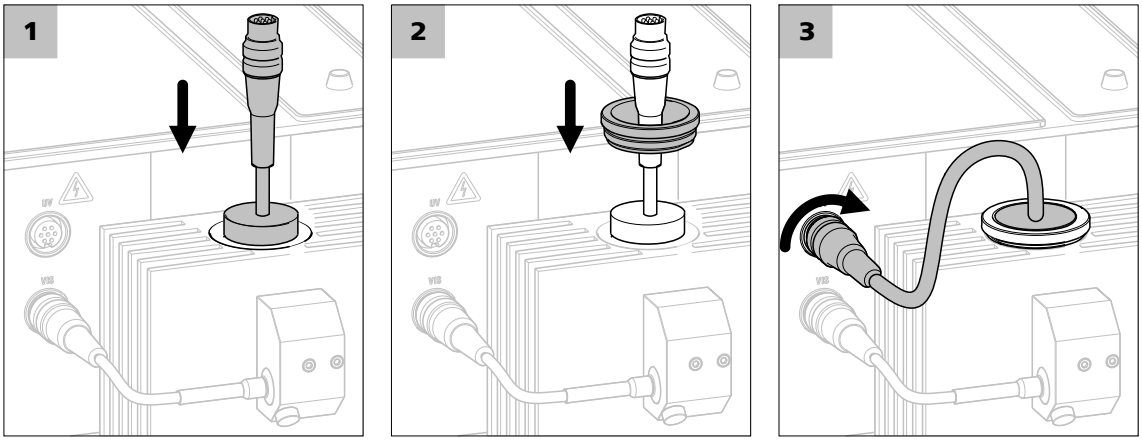
Inserting the new UV lamp

CAUTION

Do not touch the glass of the UV lamp!

Residues on the glass diminish light transmission. In addition, they can burn into the glass and permanently damage the lamp.

If the glass is dirty, clean it with alcohol before inserting the lamp again.



1 Inserting the UV lamp

Insert the new UV lamp (6.2804.060) into the opening for the UV lamp on the lamp cooling element.

When doing so, make sure that the groove on the lamp socket and the screw in the lamp cooling element are aligned with each other.

2 Fastening the UV lamp

Slide the fastening ring over the cable of the UV lamp and screw it to the lamp cooling element.

3 Connecting the UV lamp

Plug the plug of the UV lamp into the connection socket *UV* of the instrument and secure it with the fastening ring.

6.5 Replacing the VIS lamp

NOTICE

A description on how to replace the VIS lamp (6.2804.100) is described in the leaflet supplied with the VIS lamp.

6.6 Adjusting the lamp settings

The lamp settings are set correctly at delivery.

CAUTION

The lamp settings may be adjusted **only in the following cases**:

- After initial start-up, if the the check of the intensity spectrum shows a cut-off *(see figure 12, page 22)*.
- After having replaced the UV lamp *(see chapter 6.4, page 25)* or the VIS lamp *(see chapter 6.5, page 28)*, if the check of the intensity spectrum shows a cut-off *(see figure 12, page 22)*.

Before each adjustment of the lamp values, it is **mandatory** to check the intensity spectrum. The lamp settings may only be adjusted if the intensity spectrum is cut off at the top.

Adjusting the lamp settings

Before you can adjust the lamp settings, **all** the following preconditions must be unconditionally met:

- The UV lamp has been burning for at least 30 minutes.
- The flow-through cell is clean.
- The flow-through cell is rinsed with ultrapure water.
- The flow-through cell is free of air bubbles.

- The intensity spectrum has been checked and shows a cut-off *(see figure 12, page 22)*.

1 Starting the automatic lamp setting

- In MagIC Net, select the **944 UV/VIS Detector** from the device table in the **Configuration** program part.
- Click on **Edit ► Properties...** to open the properties window.
- On the **Detector** tab, click on **[Properties...]** to open the detector settings.
- In the detector settings, click on **[Adjust automatically]** to start the automatic lamp adjustment.

The lamp settings are made based on a built-in algorithm. This algorithm calculates and sets the optimized values for **Integration duration** and **VIS intensity level**. After the automatic adjustment, a new intensity spectrum is displayed.

2 Saving the lamp settings

- Check the new intensity spectrum that is displayed and click on **[OK]** to complete the lamp optimization.

The adjusted lamp values are transferred to the instrument. The dialog window is closed.

6.7 Cleaning the flow-through cell

Depending on the application, hardly visible deposits may form on the lenses, which leads to higher absorption and thus increasing noise on the baseline.

If the baseline is very noisy and the problem is not caused by other parts of the system, the flow-through cell must be cleaned.

For the cleaning of the flow-through cell, we recommend a three-step process:

1. Rinse the flow-through cell with methanol.
2. Rinse the flow-through cell with a different solvent.
3. Dismantle the flow-through cell and clean it manually.

Always start the cleaning process with step 1. If this does not solve the problem, perform step 2. Perform step 3 only if the deposits are persistent.

Rinsing the flow-through cell with methanol

1 Disconnect the input capillary from the IC system.

2 Connect the input capillary to a high-pressure pump or a peristaltic pump and rinse the flow-through cell as described below; make sure that the permissible maximum pressure of 5 MPa is not exceeded:

- first rinse with ultrapure water to avoid precipitates,
- then rinse several minutes with methanol, to dissolve the deposits, and
- finally, rinse with ultrapure water for at least another 15 minutes to wash away the dissolved deposits.

3 Observe the baseline during the last rinsing with ultrapure water.

If the baseline is only slightly noisy, then the flow-through cell is clean.

If the noise on the baseline persists, rinse the flow-through cell once again with another solvent *(see "Rinsing the flow-through cell with another solvent", page 30)*.

Rinsing the flow-through cell with another solvent

A solvent made up of a 1:2 mixture of acetic acid and isopropanol has shown good results. Depending on the application, other solvents may also prove efficient.

Prerequisites:

- Rinsing with methanol was ineffective.
- The input capillary is connected to a high-pressure pump or a peristaltic pump.

1 Rinse the flow-through cell as described below; make sure that the maximum permissible pressure of 5 MPa is not exceeded:

- first rinse with ultrapure water to avoid precipitates,
- then rinse several minutes with the selected solvent to dissolve the deposits, and
- finally, rinse with ultrapure water for at least another 15 minutes to wash away the dissolved deposits.

2 Observe the baseline during the last rinsing.

If the baseline is only slightly noisy, then the flow-through cell is clean.

If the noise on the baseline persists, the flow-through cell must be dismantled and cleaned manually *(see "Dismantling and cleaning the flow-through cell", page 31)*.

Dismantling and cleaning the flow-through cell

NOTICE

Ex works, the retaining screws are tightened with a torque wrench. This guarantees a pressure stability up to 5 MPa (50 bar).

Once the flow-through cell has been opened and closed again, this maximum pressure stability can no longer be guaranteed.

Prerequisites:

- Rinsing the flow-through cell with solvent was ineffective.

Required tools:

- To open the measuring cell, you need a slotted screwdriver, size 5.
- Seals (6.2764.000).

1 Removing the flow-through cell

- Unscrew the input capillary and the output capillary.
- Loosen and remove the knurled screws.
- Remove the flow-through cell from the optical block.

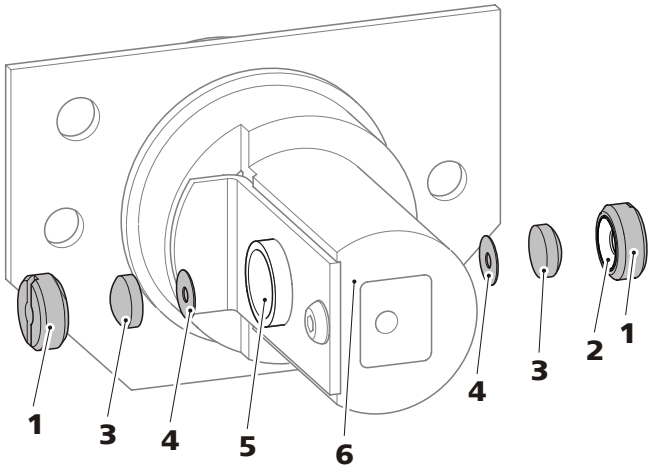


Figure 16 Flow-through cell – parts

1	**Retaining screw**	**2**	**Outer seal**
3	**Lens**	**4**	**Inner seal**
5	**Measuring cell – opening**	**6**	**Cell holder**

2 Removing the lens

- Loosen the retaining screw *(16-**1**)* with a slotted screwdriver, size 5, and remove it.
  Remove the seal from the inside of the retaining screw *(16-**2**)*.
- Carefully remove the lens *(16-**3**)* and the inner seal *(16-**4**)* from the measuring cell.
- Put the lens onto a white paper, this allows you to see possible deposits.

3 Cleaning the lens

- Clean the lens with ultrapure water, methanol or another suitable solvent (depending on the application) and wipe with a lint-free cloth.
- Rinse again with ultrapure water and dry with a lint-free cloth.

4 Reinserting the lens

- Insert a new inner seal *(16-**4**)* into the measuring cell; make sure that it lies flat and centered in the recess of the measuring cell.
- Reinsert the lens *(16-**3**)* with its flat side facing inwards; make sure that it lies flat and centered in the recess of the measuring cell.
- Insert a new outer seal into the retaining screw *(16-**2**)*.
- Reinsert the retaining screw *(16-**1**)* and tighten it with a slotted screwdriver, size 5.

5 Cleaning the second lens

Repeat steps 2 to 4 on the opposite side of the cell holder.

6 Reinserting the flow-through cell

Follow steps 3 and 4 of *"Installing the flow-through cell", page 16.*

7 Troubleshooting

7.1 Problems and their solutions

Problem	Cause	Remedy
No measuring signal.	*The lamp is not lit.*	Replace the UV lamp *(see chapter 6.4, page 25)* or the VIS lamp *(see chapter 6.5, page 28)*.
The baseline has a large amount of noise.	*Air bubbles are trapped in the flow-through cell.*	▪ Clean the flow-through cell *(see chapter 6.7, page 29)*. ▪ Ensure that the PEEK capillary (6.1831.100) is connected to the cell outlet. ▪ Use the eluent degasser.
	Flow-through cell – The lenses are dirty.	Clean the flow-through cell *(see chapter 6.7, page 29)*.
	UV lamp – The radiation is too weak.	Check the intensity spectrum *(see chapter 4, page 21)*. If the intensity is too low, replace the UV lamp *(see chapter 6.4, page 25)*.
	The eluent's absorption is too strong.	Change the eluent.
	The wavelength is unsuitable.	Set a different wavelength in MagIC Net.
The baseline is drifting.	*The flow-through cell is leaky.*	Check all connections and fix the leak.
	Thermal equilibrium is not attained.	Ensure a constant temperature.
Lamp does not ignite.	*The lamp is defective.*	Replace the UV lamp *(see chapter 6.4, page 25)* or the VIS lamp *(see chapter 6.5, page 28)*.

8 Technical specifications

8.1 Reference conditions

The technical specifications listed in this chapter refer to the following reference conditions:

Ambient temperature	+25 °C (±3 °C)
Instrument status	> 30 min in operation with both lamps switched on.

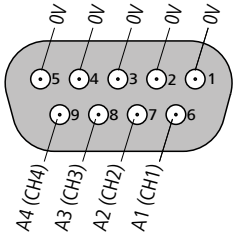
8.2 UV/VIS detector

Detector type	
Diode array detector	512 diodes
Measuring range	
Absorption	–2.0 - +2.0 AU
Number of channels	8 measuring channels, 4 of them readable in analog mode
Resolution	2.5 x 10^{-7} AU
Noise	2.5 x 10^{-5} AU (at a 1/s data rate)
Drift	
at reference conditions	5 x 10^{-4} AU/h
Wavelength range	
Wavelength range λ	190 - 900 nm
Bandwidth	±1 - 50 nm
Accuracy, absolute	±3 nm
Stability	±1 nm (across temperature range)
Optical resolution	5 nm (at 254 nm)
Measuring interval	
Data rate for each channel	0.5 - 20 samples/sec

Integration duration	10 - 247 ms
Measurement duration	50 - 2,000 ms

Analog output

Voltage range	–1.0 - +1.0 V
Resolution	30 µV
Noise	< 30 µV
Output impedance	50 Ω (sustained short circuit-proof)
Offset error	±1.5 mV
Plug	9-pin DSUB plug (female)



Control input

Input voltage range	0 - 5 V (5 V logic or switching contact control possible.)
Impedance	22 kΩ (permanent resistance up to 50 V. Secured against ESD.)
Function	Start, zero, 2x reserve Caution: If "Reserve 2" input is active when the instrument is switched on, the instrument enters long-term test mode, which switches through all elements following a time schedule and cannot be terminated, not even by power failure. Can only be terminated by service software or RS-232 commands.

8.3 Lamps

UV lamp

Type	D_2 (deuterium)
Power consumption	approx. 20 - 30 W
Service life	approx. 1000 h

VIS lamp

Type	Halogen
Power consumption	approx. 5 W
Service life	approx. 10000 h

8.4 Ambient conditions

Operation

Ambient temperature	+5 - +45 °C
Humidity	20 - 80% relative humidity

Storage

Ambient temperature	–20 - +70 °C

Transport

Ambient temperature	–40 - +70 °C

8.5 Housing

Dimensions

Width	370 mm
Height	131 mm
Depth	495 mm

Base tray, housing and bottle holder material	Polyurethane hard foam (PUR) with flame retardation for fire class UL94V0, CFC-free, coated

Controls

Indicators	LED standby indicator

On/off switch	On the rear of the instrument

8.6 Weight

2.944.0010	10.93 kg

8.7 Power connection

Required supply voltage	100 - 240 V ± 10%
Required frequency	50 - 60 Hz
Power consumption	100 VA

8.8 Interfaces

USB

Input	1 plug, type B (for connection to PC)
Output	2 plugs type A

Further connections

Control	1 15-pin D-sub plug (female)
Analog Output	1 15-pin D-sub plug (female)
Service	1 15-pin D-sub plug (male)

9 Accessories

Up-to-date information on the scope of delivery and optional accessories for your product can be found on the Internet. You can download this information using the article number as follows:

Downloading the accessories list

1. Enter *https://www.metrohm.com/* into your Internet browser.
2. Enter the article number (e.g. **2.944.0010**) into the search field.
   The search result is displayed.
3. Click on the product.
   Detailed information regarding the product is shown on various tabs.
4. On the **Included parts** tab, click on **Download the PDF**.
   The PDF file with the accessories data is created.

NOTICE

Once you have received your new product, we recommend downloading the accessories list from the Internet, printing it out and keeping it together with the manual for reference purposes.

Index