

# 883 Basic IC plus



2.883.0020

Manual

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# **883 Basic IC plus**

**2.883.0020**

**Manual**

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# 1 Introduction

## 1.1 Instrument description

The **883 Basic IC plus** is an intelligent, very compact ion chromatograph for education and routine analysis. The instrument is distinguished by:

- the **intelligence** of its components, which are able to monitor, optimize and document all functions.
- its **compact design**.
- its **transparency**. All components are easily accessible and located for simple visibility.
- its **safety**. Chemicals and electronics are separated.
- its **environmental compatibility**.
- its **low noise emission**.

The instrument is operated with the **MagIC Net Basic** software. It is connected to a PC on which MagIC Net is installed via a USB connection. 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. The operation of MagIC Net is described in the "*Tutorial for MagIC Net*" as well as in the online help.

The instrument contains the following components:

### High-pressure pump

The intelligent and low-pulsation high-pressure pump pumps the eluent through the IC system. It is equipped with a chip where its technical specifications and "life history" (operating hours, service data, etc.) are stored.

### Inline filter

Inline filters protect the separation column reliably from potential contamination from the eluent. The filter pads with 2 µm pore size can be replaced quickly and easily. They remove particles from the solutions, such as bacteria and algae.

### Pulsation absorber

The pulsation absorber protects the separation column from damage caused by pressure fluctuations, e.g. when the injection valve is switched, and reduces interfering pulsations during highly sensitive measurements.

### Injection valve

The injection valve connects the eluent path to the sample path. By a quick and precise switching of the valve, a quantity of sample solution



defined by the size of the sample loop is injected and flushed to the separation column with the eluent.

### **Suppressor**

The suppressor consists of the suppressor drive, the MSM Rotor A and an adapter.

### **Peristaltic pump**

The peristaltic pump is used for pumping sample and auxiliary solutions. It can rotate in both directions.

### **Conductivity detector**

The conductivity detector continuously measures the conductivity of the liquid passing through and outputs these signals in digital form (DSP – Digital Signal Processing). The conductivity detector exhibits outstanding thermal stability and thus guarantees reproducible measuring conditions.

### **Separation column**

The intelligent separation column separates different components according to their interactions with the column. Metrohm separation columns are equipped with a chip where their technical specifications and history (start-up, operating hours, injections etc) are stored.

## **1.2 Intended use**

The **883 Basic IC plus** is used for the determination of anions or polar substances with chemical suppression using ion chromatography. It can also be used as needed for the determination of anions without chemical suppression or for cations.

This instrument is suitable for processing chemicals and flammable samples. Therefore, the use of the 883 Basic IC plus 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 Safety instructions

### 1.3.1 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.

### 1.3.2 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.

### 1.3.3 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.

### 1.3.4 Flammable solvents and chemicals

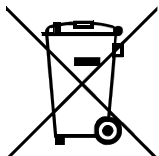


#### WARNING

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.

### 1.3.5 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.

## 1.4 Symbols and conventions

The following symbols and formatting may appear in this documentation:

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

## 2 Overview of the instrument

### 2.1 Front

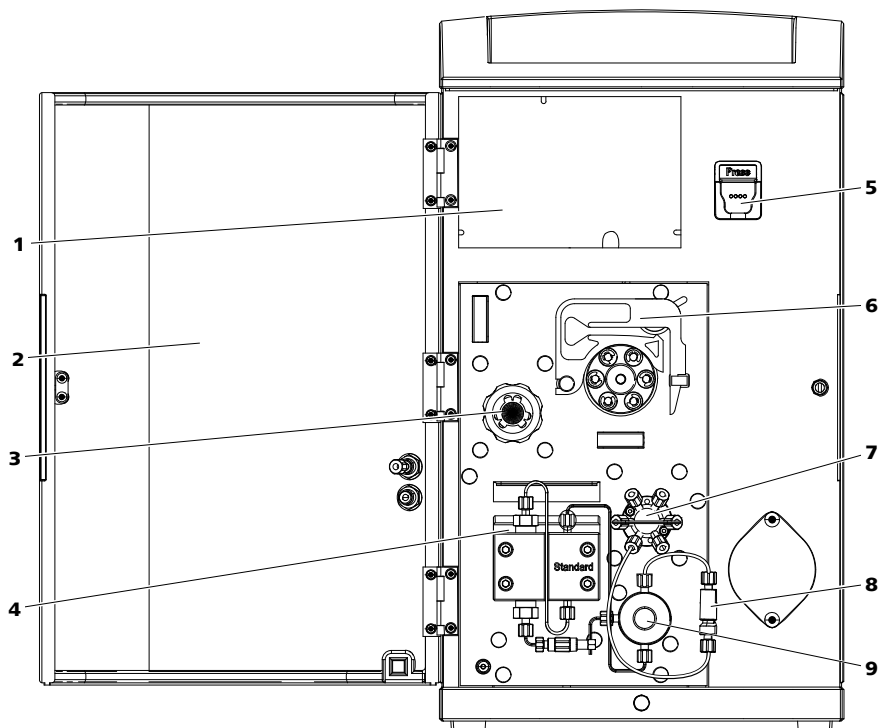


Figure 1 883 Basic IC plus front

<p><b>1 Detector chamber</b> Space for the detector.</p>	<p><b>2 Door</b> With Luer connector and capillary feed-through.</p>
<p><b>3 MSM</b> Metrohm Suppressor Module.</p>	<p><b>4 High-pressure pump</b></p>
<p><b>5 Column holder</b> With chip recognition for iColumns.</p>	<p><b>6 Peristaltic pump</b></p>
<p><b>7 Injection valve</b></p>	<p><b>8 Pulsation absorber</b></p>
<p><b>9 Purge valve</b></p>	

## 2.2 Rear

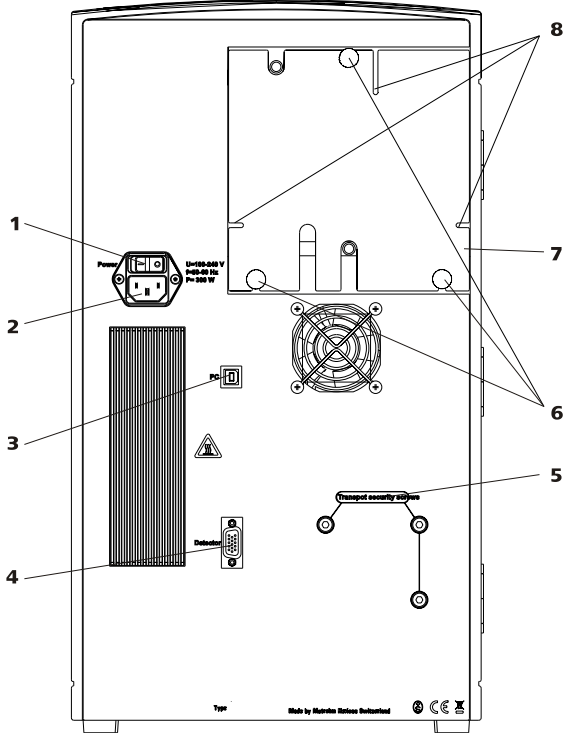


Figure 2 883 Basic IC plus rear

<b>1</b> On/off switch	<b>2</b> Power socket
<b>3</b> PC connection socket	<b>4</b> Detector connection socket
<b>5</b> Transport locking screws	<b>6</b> Knurled screws For fastening the removable back panel.
<b>7</b> Back panel Removable. Access to the detector chamber.	<b>8</b> Capillary feed-throughs

## 3 Installation

### 3.1 About this chapter

The Installation chapter contains:

- this overview.
- a brief set of instructions for the initial installation of the 883 Basic IC plus (*see chapter 3.2, page 8*). At each step, you will find cross-references to comprehensive installation instructions for the individual components if you need more detailed information.
- an installation diagram (*see chapter 3.3, page 11*), showing a fully installed 883 Basic IC plus.
- several chapters (*see chapter 3.4, page 14 and the following ones*) with detailed installation instructions for all components, including those that are already installed at the time the instrument is delivered.

### 3.2 Initial installation



#### NOTICE

---

Some of the capillaries are already connected when the instrument is delivered.

You still have to carry out the following steps:

#### Installing the 883 Basic IC plus

##### 1 Setting up the instrument

(*see chapter 3.4, page 14*).

##### 2 Installations on the rear of the instrument

- Place the detector in the instrument and connect it (*see chapter 3.6.1, page 17*).
- Remove the transport locking screws (*see chapter 3.6.2, page 18*).
- Connect the drainage tubings (*see chapter 3.6.3, page 19*).

### 3 Installing the eluent path

- Assemble the eluent aspiration tubing (6.1834.080) (3-1) and connect it with the eluent bottle (see chapter 3.8, page 23).
- Remove the stopper of connector 5 of the injection valve and connect the column inlet capillary (6.1831.100) (3-2) using a PEEK pressure screw (6.2744.014).
- Connect the column inlet capillary (6.1831.100) (3-2) and the capillary of the suppressor (3-4) labeled *in* to each other using a coupling (6.2744.040) and 2 short pressure screws (6.2744.070). The coupling is installed in the place of the separation column, which may not be installed before the initial start-up.
- Connect the capillary of the suppressor (3-5) labeled *out* and the detector inlet capillary (3-6) to each other using a coupling (6.2744.040) (3-18) and two short pressure screws (6.2744.070) (3-15) (see "Connecting the detector input capillary to the suppressor", page 44).

### 4 Installing the sample path

If you do not use a Sample Processor:

- Guide the end of the sample aspiration capillary (3-19) out of the instrument to the sample vessel and fasten it there.
- Connect the end of the sample outlet capillary (3-20) from the inside to the Luer connector of the door (6-1) using the PEEK pressure screw (6.2744.070) (6-3). The sample can then be aspirated from outside with a syringe.

If you use a Sample Processor:

- Guide both capillary ends out of the instrument.
- Connect the sample aspiration capillary with the Sample Processor (see the manual for the Sample Processor).
- Guide the sample outlet capillary into a waste container and fasten it there.

### 5 Installing the peristaltic pump

(see chapter 3.14, page 38)

- Connect the capillary (6.1803.020) used as aspiration capillary for the regeneration solution (3-8) to the aspiration end of the pump tubing (6.1826.320) (3-9) using a tubing olive (6.2744.034) (3-16) and a short pressure screw (6.2744.070) (3-15). Shorten it to the required length.
- Place the pump tubing in a tubing cartridge.
- Insert the tubing cartridge into the peristaltic pump.

## 6 Connecting the suppressor

(see chapter 3.13.3, page 33)

- Connect the capillary labeled *regenerant* (3-10) to the peristaltic pump on the outlet end of the pump tubing for the regeneration solution (3-9) using a pump tubing connection (6.2744.180) (3-17) and a short pressure screw (6.2744.070) (3-15).
- Connect the capillary labeled *rinsing solution* (3-12) and the detector outlet capillary to each other using a coupling (6.2744.040) and two short pressure screws (6.2744.070).
- Connect the two capillaries of the suppressor labeled *waste reg.* and *waste rins.* with the waste collector (6.5336.000).

## 7 Connecting the instrument

- Connect the instrument to the PC using a USB cable (6.2151.020) (see "Connecting the USB cable", page 45).
- Connect the instrument to the power grid (see chapter 3.17, page 46).

## 8 Initial start-up

(see chapter 3.18, page 47)

- Switch on the PC and start MagIC Net.
- Switch on the instrument.
- Deaerate the high-pressure pump.
- Adjust the contact pressure of the peristaltic pump.
- Rinse the instrument without column(s).

## 9 Installing guard column and separation column

- Remove the coupling (6.2744.040) between the column inlet capillary and the eluent inlet capillary of the suppressor.
- Cut the column inlet capillary (6.1831.100) (3-2) to the required length with the capillary cutter (6.2621.080).
- Optionally (to improve the measuring results): Cut off a piece of the green EVA tubing (6.1806.100) that is 5 mm shorter than the column inlet capillary and pull it over the column inlet capillary (3-3).
- Connect the guard column (optional) (see chapter 3.19, page 49).
  - Connect the guard column to the end of the column inlet capillary as described in the leaflet supplied with the guard column.
  - Rinse the guard column.

- Connect the separation column (*see chapter 3.20, page 51*).
  - Connect the inlet of the separation column to the end of the column inlet capillary or to the guard column (if used) as described in the leaflet supplied with the separation column.
  - Connect the capillary of the suppressor labeled *in* to the outlet of the separation column using a pressure screw (6.2744.070).
- Hang the separation column with chip in the column holder of the instrument.

## 10 Conditioning the instrument

(*see chapter 3.21, page 54*).

### 3.3 Installation diagram

The following installation diagram shows a schematic of the front of the instrument after installation is complete. Some of the capillaries are already installed when the instrument is delivered; these capillaries are not numbered in the diagram. Numbered capillaries have to be connected during installation.

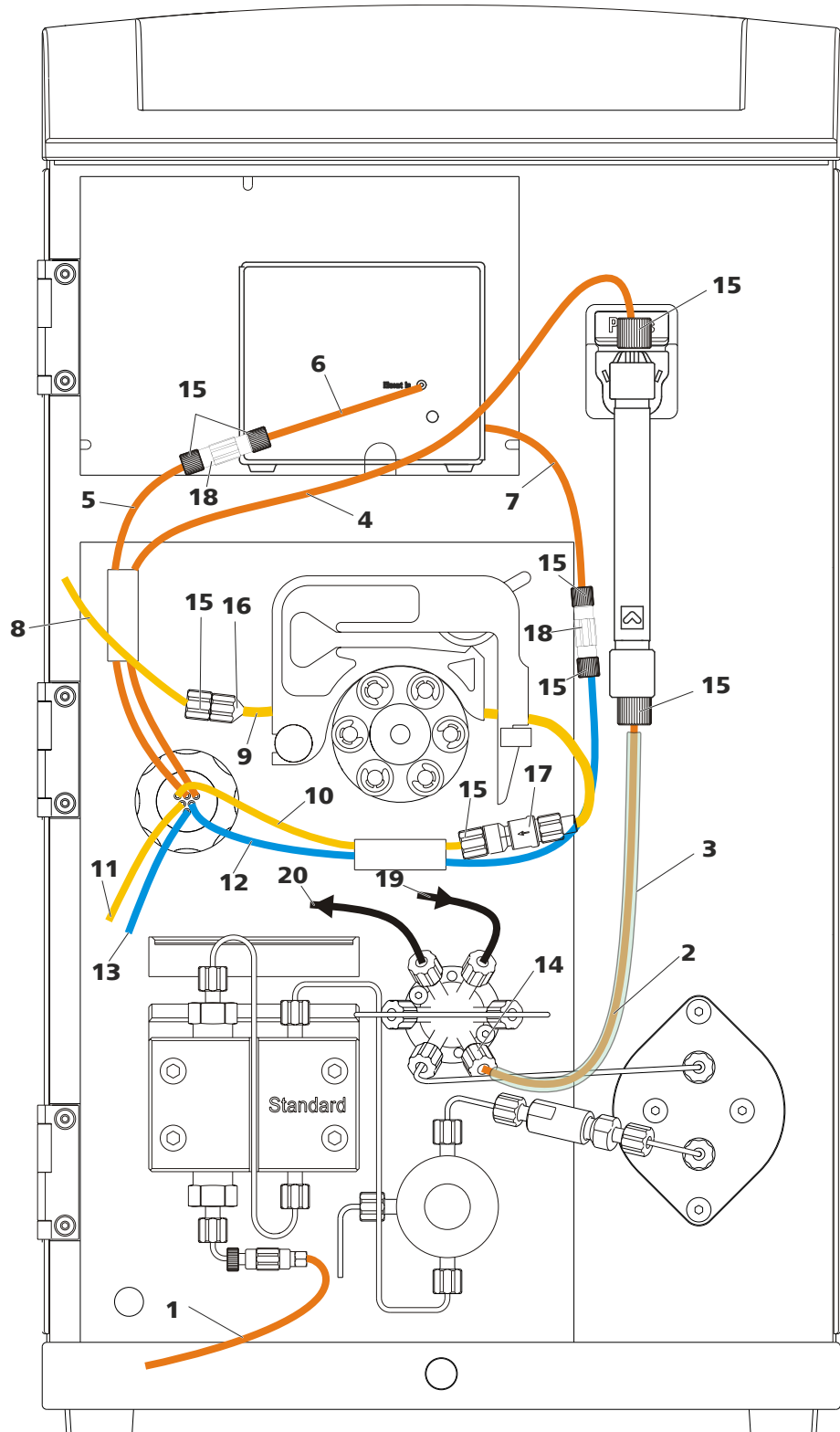


Figure 3 Installation diagram 883 Basic IC plus

**1** Eluent aspiration tubing (6.1834.080)

**2** PEEK capillary (6.1831.100)  
As column input capillary.

<p><b>3 EVA tubing (6.1806.100)</b> Improves the measuring properties of the instrument when pulled over the column input capillary.</p>	<p><b>4 Eluent input capillary of the suppressor</b> Labeled <i>in</i>.</p>
<p><b>5 Detector input capillary of the suppressor</b> Labeled <i>out</i>.</p>	<p><b>6 Detector input capillary</b></p>
<p><b>7 Detector output capillary</b></p>	<p><b>8 PTFE capillary (6.1803.020)</b> Section, used as regeneration solution aspiration capillary.</p>
<p><b>9 Pump tubing (6.1826.320)</b> With orange/yellow stoppers, for the regeneration solution.</p>	<p><b>10 Regeneration solution input capillary of the suppressor</b> Labeled <i>regenerant</i>.</p>
<p><b>11 Regeneration solution output capillary of the suppressor</b> Labeled <i>waste reg.</i></p>	<p><b>12 Rinsing solution input capillary of the suppressor</b> Labeled <i>rinsing solution</i>.</p>
<p><b>13 Rinsing solution output capillary of the suppressor</b> Labeled <i>waste rins.</i></p>	<p><b>14 PEEK pressure screw (6.2744.014)</b></p>
<p><b>15 PEEK pressure screw, short (6.2744.070)</b></p>	<p><b>16 Tubing olive (6.2744.034)</b> For connecting capillaries to the aspiration side of the peristaltic pump.</p>
<p><b>17 Pump tubing connection (6.2744.180)</b> With locking nut and filter, for connecting capillaries to the outlet side of the peristaltic pump.</p>	<p><b>18 Coupling (6.2744.040)</b></p>
<p><b>19 PTFE capillary (6.1803.040)</b> Sample aspiration capillary.</p>	<p><b>20 PTFE capillary (6.1803.040)</b> Sample output capillary.</p>



- PEEK capillaries with an inner diameter of 0.25 mm (6.1831.010) for the entire high-pressure section.
- PEEK capillaries with an inner diameter of 0.5 mm (6.1831.180) for the sample path.

*PTFE capillaries  
(poly(tetrafluoroethylene))*

PTFE capillaries are transparent and enable visual tracing of the liquids to be pumped. They are chemically inert, flexible and temperature-resistant up to 80 °C. They can be readily cut down to the desired length with the capillary cutter (6.2621.080).

Use:

PTFE capillaries (6.1803.0x0) are used for the low-pressure section.

- PTFE capillaries with an inner diameter of 0.5 mm for sample processing and for the transfer of rinsing solutions (they are not necessarily included in the scope of delivery of the instrument).

### Capillary connections



#### NOTICE

#### Sprays of chemicals caused by capillaries slipping out

If you work with an increased system pressure (> 15 MPa), capillaries may slip out of the pressure screws. This can lead to sprays of chemicals.

To avoid this, we recommend

- degreasing the ends of the capillaries before installing them. Dampen a cloth with acetone and wipe off the ends of the capillaries before connecting them with the pressure screws.
- tightening the pressure screws firmly using a wrench (6.2739.000).

In order to achieve optimum analysis results, capillary connections in an IC system must be absolutely tight and free of dead volume. Dead volume occurs if two capillary ends connected to each other do not fit exactly, thus allowing liquid to escape. There are two possible causes for this:

- The capillary ends do not have exactly flat edges.
- The two capillary ends do not completely meet.

One prerequisite for dead-volume-free capillary connection is that both capillary ends are cut exactly flat. Therefore we recommend cutting PEEK capillaries only with a capillary cutter (6.2621.080).

Also see: *Cutting capillaries* video on the Internet <http://ic-help.metrohm.com>.



### Creating dead-volume-free capillary connections

To create dead-volume-free capillary connections, proceed as follows:

- 1** Wipe off the end of the capillary with a cloth dampened with acetone.
- 2** Slide the pressure screw over the capillary. Ensure that the capillary protrudes 1 to 2 mm from the tip of the pressure screw.
- 3** Push the capillary into the connection or coupling as far as it will go and hold it there.
- 4** Only then start turning the pressure screw. Hold the capillary in the stop position while turning it shut.

### Colored sleeves for PEEK capillaries

The enclosed set of varicolored sleeves for PEEK capillaries (6.2251.000) serves to easily differentiate the various flows of liquid in the system through color coding. Each capillary conveying a given liquid (e.g. eluent) can be marked with sleeves of the same color.

- 1** Slide a colored sleeve of a selected color over a capillary and move it to an easily visible position.
- 2** Heat the colored sleeve, e.g. with a hairdryer.  
The colored sleeve shrinks and adapts to the shape of the capillary.



#### NOTICE

In order to arrange capillaries more clearly, they can be bundled with the spiral band (6.1815.010).

## 3.6 Installations on the rear of the instrument

### 3.6.1 Positioning and connecting the detector

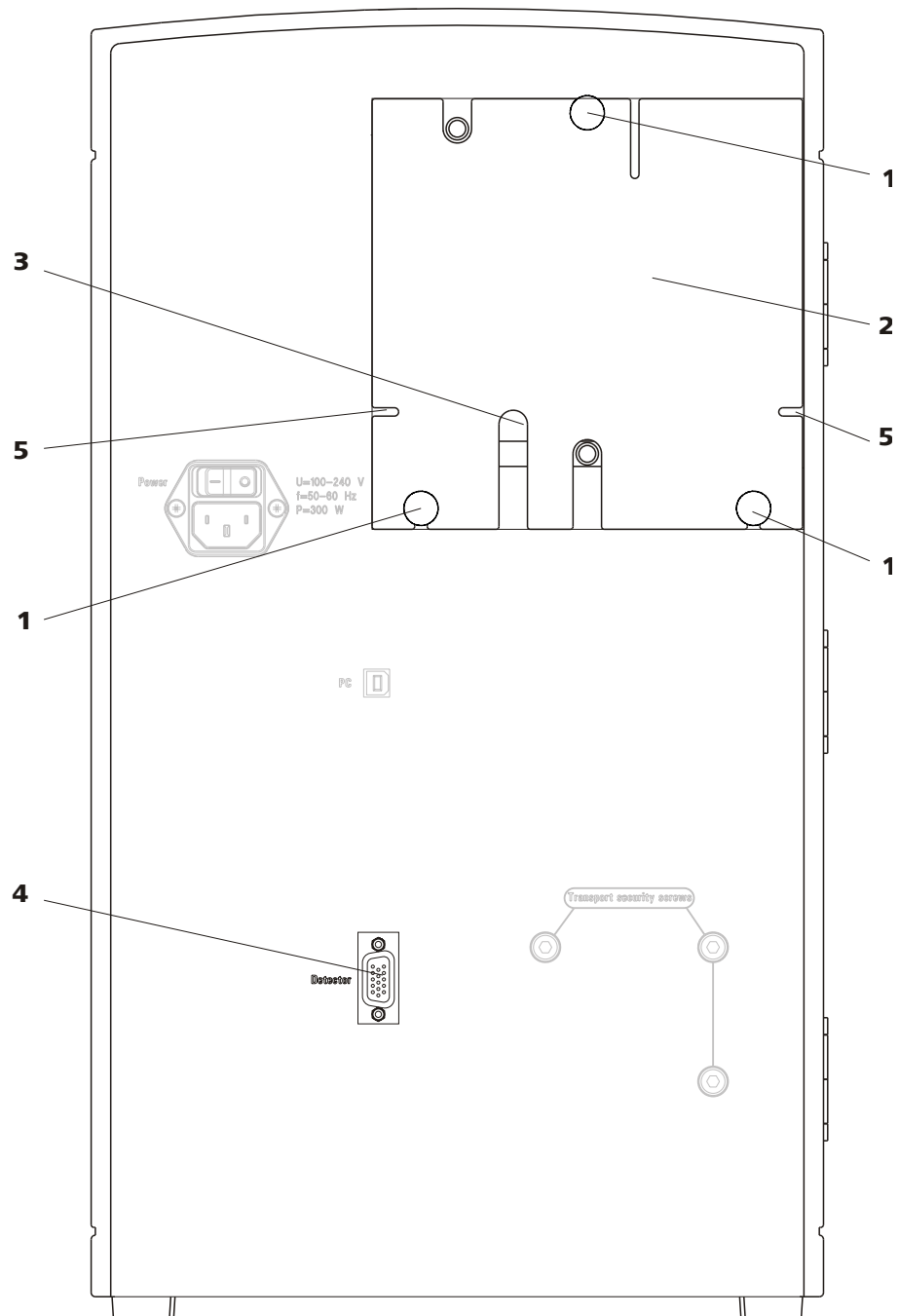


Figure 4 Positioning the detector

**1 Knurled screws**  
For fastening the removable back panel.

**2 Back panel**  
Removable. Access to the detector chamber.

**3 Cable feed-through**

For feeding through the detector cable.

**4 Detector socket**

For connecting the conductivity detector (see chapter 3.15, page 43). Labeled **Detector**.

**5 Capillary feed-throughs**

For feeding through the capillaries out of the detector chamber.

**CAUTION**

The instrument **must** be **switched off** when connecting a detector.

**1 Checking whether the instrument is switched off**

- If not, switch off the instrument.

**2 Removing the back panel**

- Unscrew the knurled screws (4-1) on the back panel.
- Remove the back panel (4-2).

**3 Positioning the detector**

- Position the detector on the support surface intended for this purpose and slide it right up to the front.

**4 Replacing the back panel**

- Insert the detector cable in the cable feed-through (4-3) on the back panel (4-2).
- Replace the back panel (4-2) and tighten the knurled screws (4-1).

**5 Connecting the detector**

- Connect the detector cable to the detector socket (4-4).

**3.6.2 Transport locking screws**

To avoid damage to the high-pressure pump drive during transport, the pump is secured with transport locking screws. These are located at the rear of the instrument and labeled with **Transport security screws** (2-5).

Remove these transport locking screws before the initial start-up.

*Accessories*

For this step you need:

- 4 mm hex key (6.2621.030)

### Removing the transport locking screws

- 1 Remove all of the transport locking screws with the hex key.

Store the transport locking screws in a safe place. Reinsert the transport locking screws each time you transport the instrument a significant distance.



#### WARNING

The pump may be damaged if you transport the instrument without inserting the transport locking screws.

### 3.6.3 Installing the drainage tubing

Liquid that leaks in the bottle holder or in the detector chamber is conveyed via the drainage tubing into the waste container.

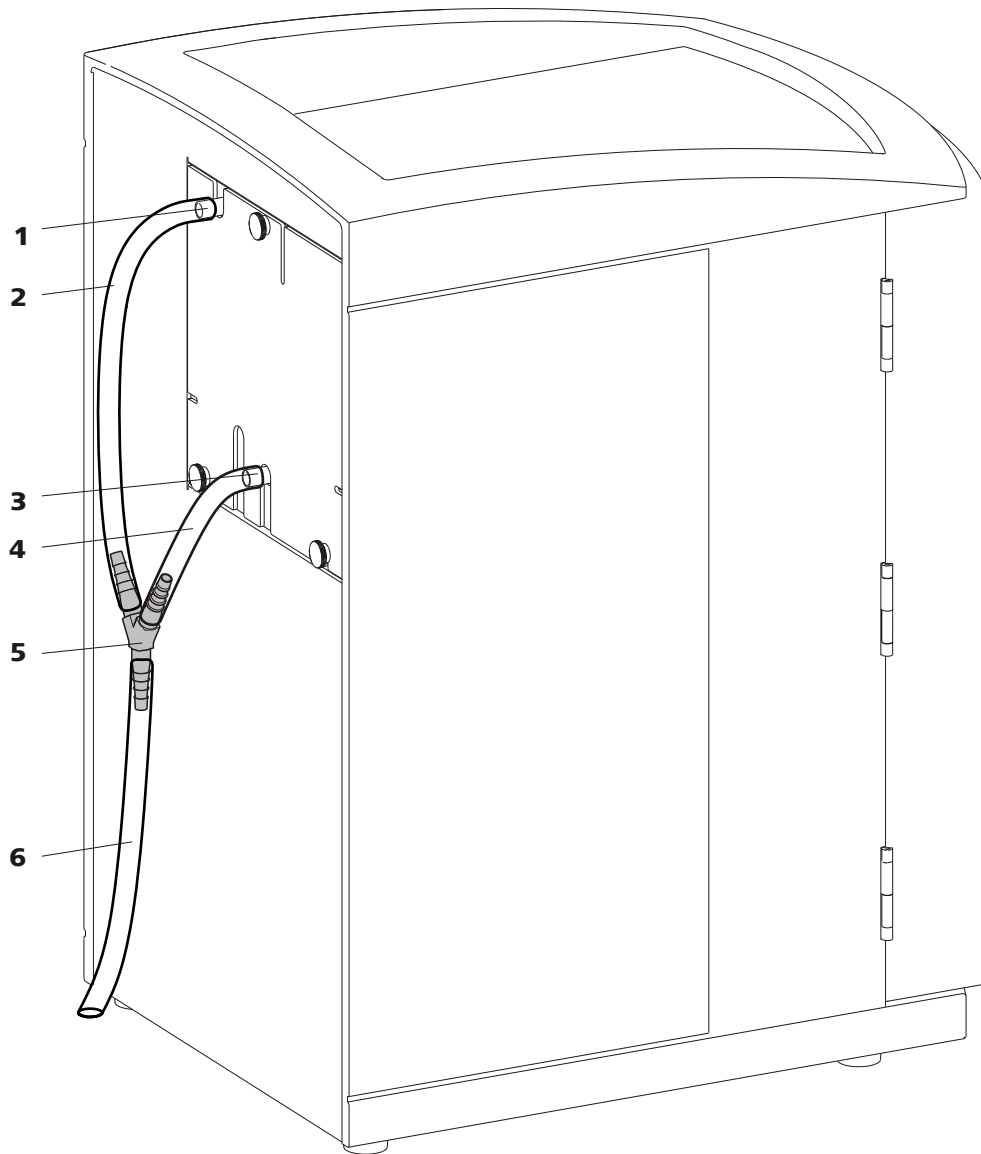


Figure 5 Drainage tubing

<p><b>1 Drainage tubing connection</b> For draining leaked liquid from the bottle holder.</p>	<p><b>2 Silicone tubing (6.1816.020)</b> Section. For draining leaked liquid from the bottle holder.</p>
<p><b>3 Drainage tubing connection</b> For draining leaked liquid from the detector chamber.</p>	<p><b>4 Silicone tubing (6.1816.020)</b> Section. For draining leaked liquid from the detector chamber.</p>
<p><b>5 Y connector (6.1807.010)</b> For connecting the two drainage tubings (5-2) and (5-4).</p>	<p><b>6 Silicone tubing (6.1816.020)</b> Section. Conveys the leaked liquid to the waste container.</p>

### Installing the drainage tubing

Proceed as follows to replace the drainage tubing:

- 1** Connect the drainage tubing (5-2) to the drainage tubing connection (5-1) and shorten it to the required length.
- 2** Connect the drainage tubing (5-4) to the drainage tubing connection (5-3) and shorten it to the required length.
- 3** Connect the drainage tubing (5-2) and the drainage tubing (5-4) to each other using the Y connector (5-5).
- 4** Connect the drainage tubing (5-6) to the Y connector (5-5). Guide the other end into a waste container.

## 3.7 Capillary and cable feed-throughs

Several openings have been integrated for feeding through capillaries and cables. These can be found at the door (6-4), and at the rear panel (2-8).

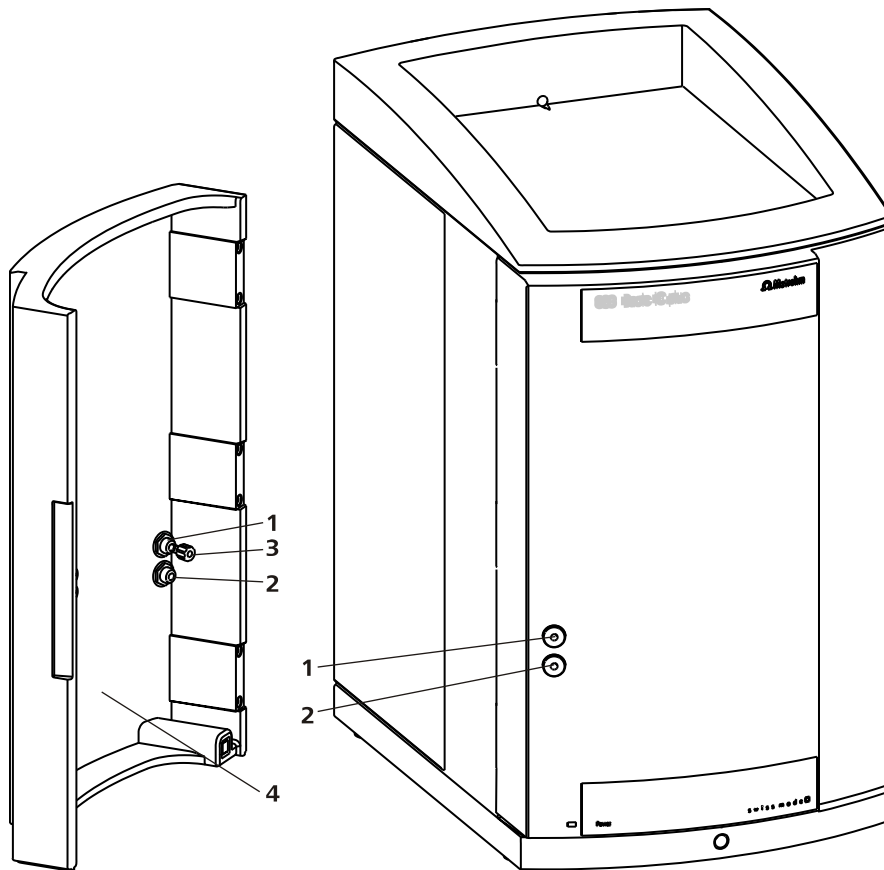


Figure 6 Capillary feed-throughs on the door

- 1 Luer connector**  
For connecting a (6.2816.020) syringe. For manual sample feeding.
- 3 PEEK pressure screw (6.2744.070)**

- 2 Capillary feed-through**
- 4 Door**

Do not feed capillaries through the Luer connectors (6-**1**). The capillaries are fastened with PEEK pressure screws (6-**3**) from inside to the Luer connector. From outside, liquid can be aspirated or injected with a syringe.

## 3.8 Connecting the eluent bottle

The eluent is aspirated out of the eluent bottle via the eluent aspiration tubing. The eluent aspiration tubing is installed on the entry to the high-pressure pump.

The tubing must be fed out of the instrument through a suitable opening before the loose end can be connected to the eluent bottle.

### Accessories

For this step, you need the following accessories:

- Eluent bottle (6.1608.070)
- The *eluent bottle cap GL 45* accessory set (6.1602.160)  
This accessory set contains the bottle cap, an M6 tubing nipple, an M8 tubing nipple, two O-rings and an M6 and M8 threaded stopper.
- The *tubing adapter for aspiration filter* accessory set (6.2744.210)  
This accessory set contains a filter holder, a clamping screw and tubing weighting.
- An aspiration filter (6.2821.090)
- The adsorber tube (6.1609.000)
- The SGJ clip (6.2023.020)

### Connecting the eluent aspiration tubing

#### 1 Installing the eluent bottle cap (6.1602.160)

- Start by pushing the M8 tubing nipple onto the loose end of the eluent aspiration tubing, followed by the O-ring.
- Push the loose end of the eluent aspiration tubing through the M8 opening of the bottle cap and screw it on for the time being.

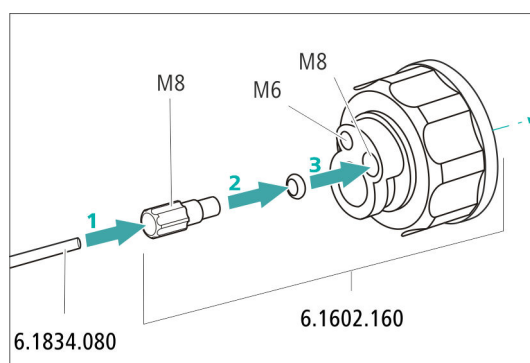


Figure 7 Installing the eluent bottle cap

#### 2 Mounting the tubing adapter

Install the parts of the *tubing adapter for aspiration filter* (6.2744.210) accessory set:



- Start by pushing the tubing weighting onto the loose end of the eluent aspiration tubing.
- Then push the clamping screw onto the loose end of the eluent aspiration tubing.
- Lastly, push the filter holder onto the loose end of the eluent aspiration tubing and screw it onto the tubing nipple.  
The end of the tubing should extend approximately 1 cm.

### 3 Pre-rinsing the aspiration filter



#### NOTICE

Always wear gloves when handling the aspiration filter.

In order to avoid air bubbles after the installation of the aspiration filter, we recommend pre-rinsing the aspiration filter with water or eluent.

For pre-rinsing, you will need the holder for the eluent aspiration filter (6.2744.360), a syringe and the purge needle (6.2816.040).

This procedure can also be found in the video "Inserting a new aspiration filter" at the following link: [ic-help.metrohm.com](http://ic-help.metrohm.com)

### 4 Mounting aspiration filter



#### NOTICE

Always wear gloves when handling the aspiration filter.

- Place the loose end of the eluent aspiration tubing into the aspiration filter.  
The end of the tubing should reach approximately to the center of the aspiration filter.
- Tighten the aspiration filter to the filter holder.

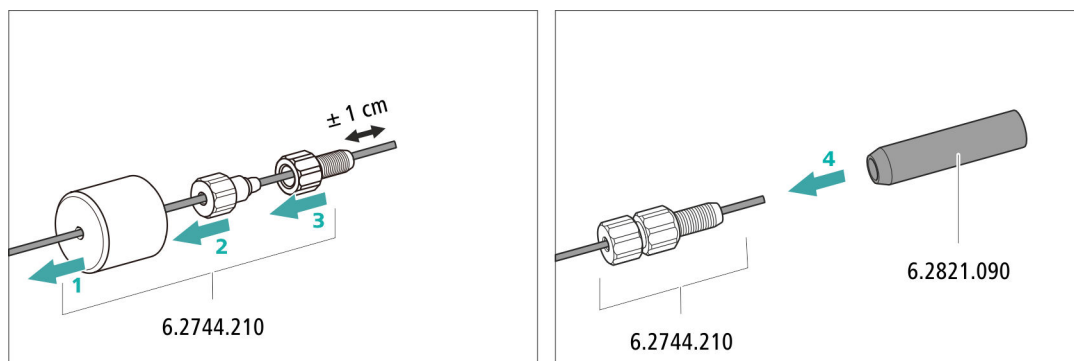
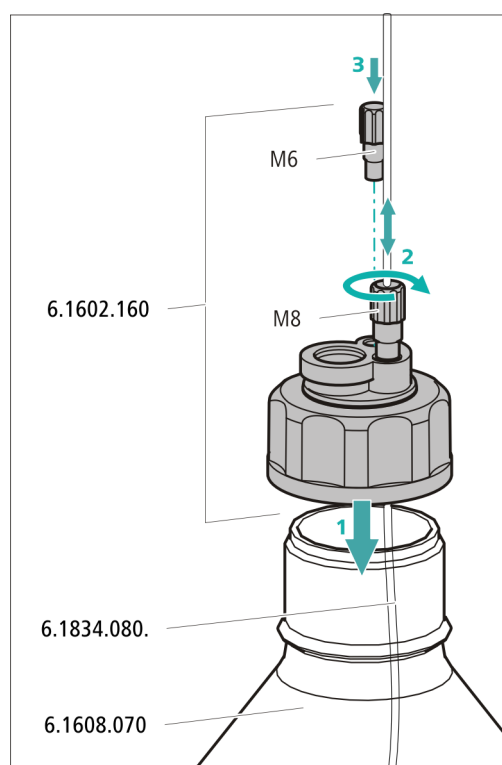


Figure 8 Installing tubing weighting and aspiration filter

### 5 Installing the eluent bottle cap on the eluent bottle

- Insert the eluent aspiration tubing into the eluent bottle (6.1608.070).
- Tighten the bottle cap on the eluent bottle.
- Adjust the length of the eluent aspiration tubing so that the aspiration filter is at the bottom of the eluent bottle. Then fix it in place using the M8 tubing nipple.
- Seal the M6 opening on the bottle cap with the M6 threaded stopper from the accessory set.





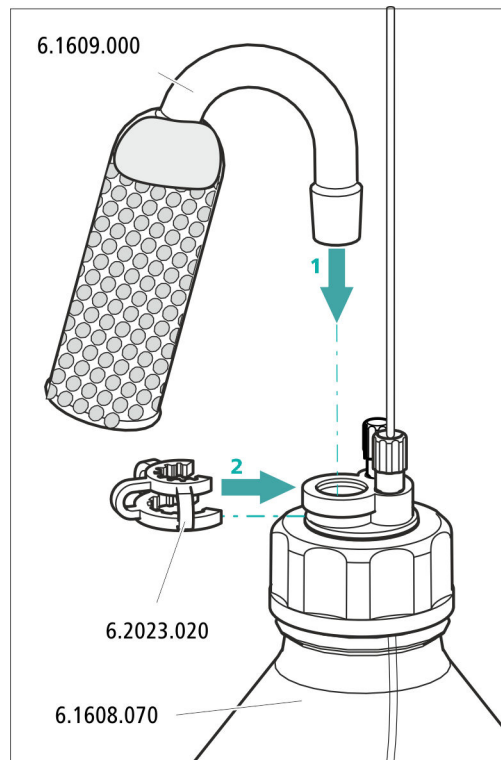
## 6 Mounting the adsorber tube



### NOTICE

Depending on the eluent used, the adsorber tube (6.1609.000) must be filled differently:

- For alkaline eluents or eluents with a low buffer capacity: first a little cotton, then with CO<sub>2</sub> adsorber material.
  - For all other eluents: only with cotton.
- Remove the plastic cover from the large opening of the adsorber tube. Fill the adsorber tube and close it again using the plastic cover.
  - Insert the adsorber tube into the bottle cap's large opening. Fasten it to the bottle cap using the SGJ clip (6.2023.020).



### 3.9 Installing the high-pressure pump

The intelligent and low-pulsation high-pressure pump pumps the eluent through the system. It is equipped with a chip where its technical specifications and "life history" (operating hours, service data, etc.) are saved.

The high-pressure pump consists of:

- The pump head, which pumps the eluent through the system.
- The purge valve used for bleeding the pump head.

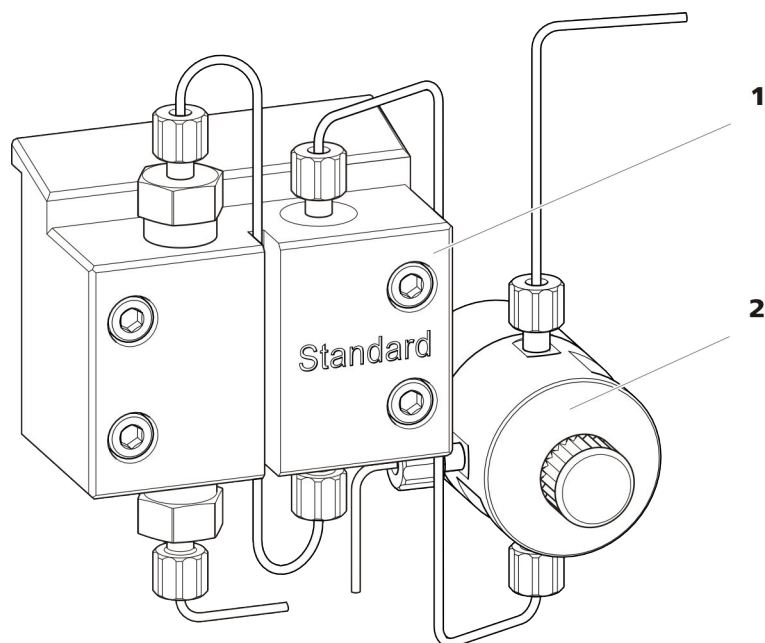


Figure 9 High-pressure pump with purge valve

**1** Pump head

**2** Purge valve

### 3.10 Installing an inline filter

Inline filters protect the separation column reliably from potential contamination from the eluent. The small filter pads with 2 µm pore size can be replaced quickly and easily. They remove particles from the solutions.

An inline filter (6.2821.120) is installed between the purge valve and the pulsation absorber as protection against particles.

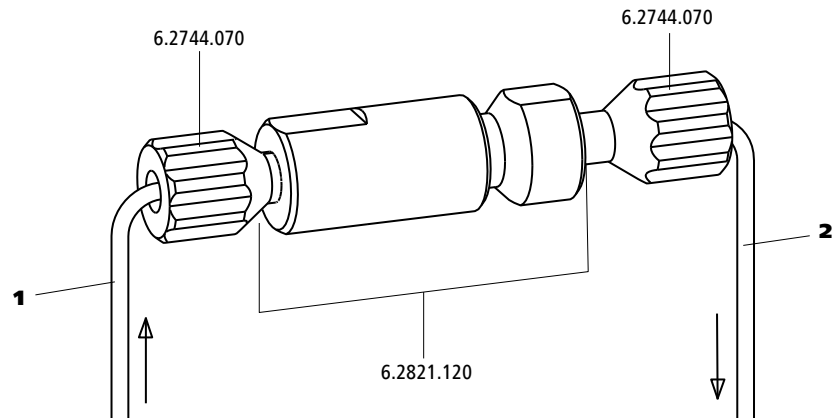


Figure 10 In-line filter

**1 Inlet capillary**  
Connected to the purge valve.

**2 Outlet capillary**  
Connected to the pulsation absorber.

The in-line filter is completely connected. No installation work is required.

### 3.11 Installing the pulsation absorber

The pulsation absorber is installed between the high-pressure pump and the injection valve. It protects the separation column from damage caused by pressure fluctuations, e.g. when the injection valve is switched, and reduces interfering pulsations during highly sensitive measurements.

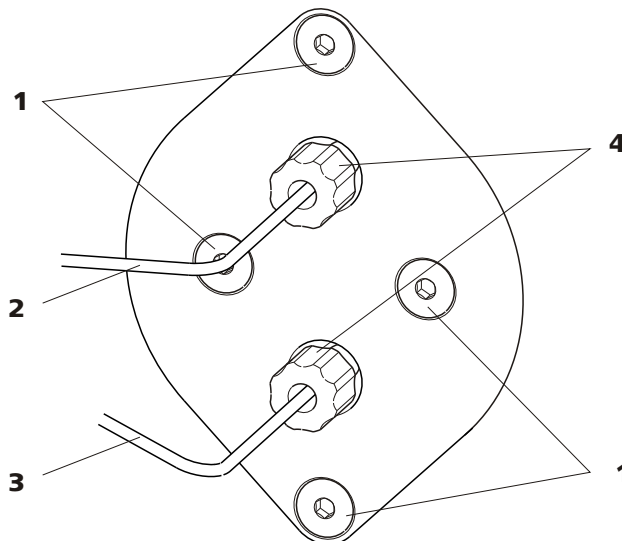


Figure 11 Pulsation absorber

**1 Fastening screws**

**2 Connection capillary**  
Connection to injection valve.

**3 Connection capillary**  
Connection to in-line filter.

**4 PEEK pressure screws, short (6.2744.070)**

The pulsation absorber is completely connected. No installation work is required.

## 3.12 Injection valve

The injection valve connects the eluent path to the sample path. By a quick and precise switching of the valve a defined quantity of sample solution is injected and flushed to the separation column with the eluent.

The quantity of sample solution injected is determined by:

- the volume of the sample loop or

The choice of sample loop depends on the application. The following sample loops are normally used:

Table 1 Which sample loop do I need?

Application	Sample loop
Cation determination	10 µL
Anion determination with suppression	20 µL
Anion determination without suppression	100 µL
MiPT	250 µL

The injection valve is completely connected. No installation work is required.

### Optional: Exchanging the sample loop

The sample loop can be replaced to match the application (see table 1, page 29).



#### NOTICE

Only use PEEK pressure screws (6.2744.010) to connect capillaries and the sample loop to the injection valve.

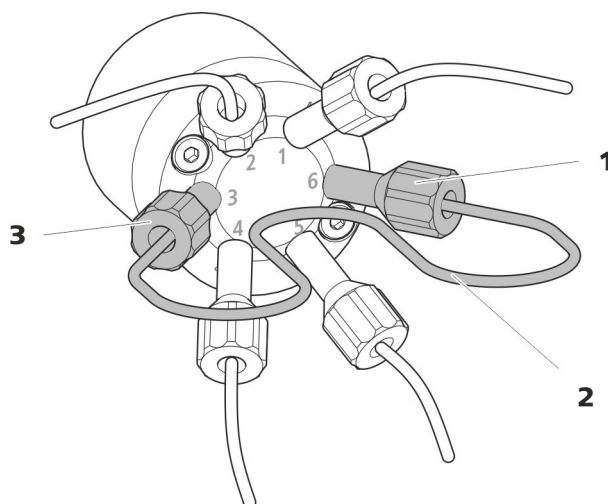


Figure 12 Exchanging the sample loop

**1 Pressure screw**  
Fastened to Port 6.

**2 Sample loop**

**3 Pressure screw**  
Fastened to Port 3.

### Exchanging the sample loop



#### NOTICE

Observe a dead-volume-free installation of the sample loop (see "Creating dead-volume-free capillary connections", page 16).

#### 1 Removing the existing sample loop

- Loosen the pressure screws (6.2744.010) at Port 3 and Port 6.
- Remove the sample loop.

#### 2 Installing a new sample loop

- Fasten one end of the sample loop to Port 3 using a PEEK pressure screw (6.2744.010).
- Use the second PEEK pressure screw (6.2744.010) to fasten the other end of the sample loop to Port 6.

## 3.13 Suppressor

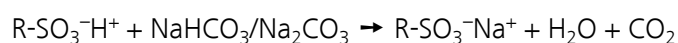
### 3.13.1 General information on the suppressor

The suppressor is used for chemical suppression during anion analysis. It is pressure-stable, robust and resistant to solvents. It consists of 3 suppressor units, which are used for suppression, regenerated with sulfuric acid and rinsed with ultrapure water in rotation.

Analyzing special environmental samples may require using phosphoric acid for regeneration.

#### Suppression reaction in the suppressor

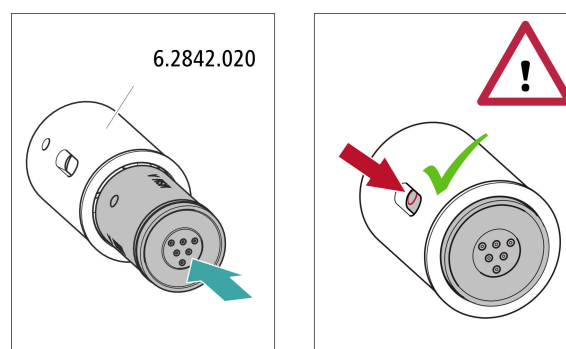
When using a carbonate eluent, the following reaction (amongst others) occurs in the suppressor:



### 3.13.2 Installing the suppressor

#### Inserting the MSM rotor into the adapter

You need the adapter (6.2842.020) in order to insert the rotor into the suppressor drive.



#### 1 Inserting the MSM rotor into the adapter



#### CAUTION

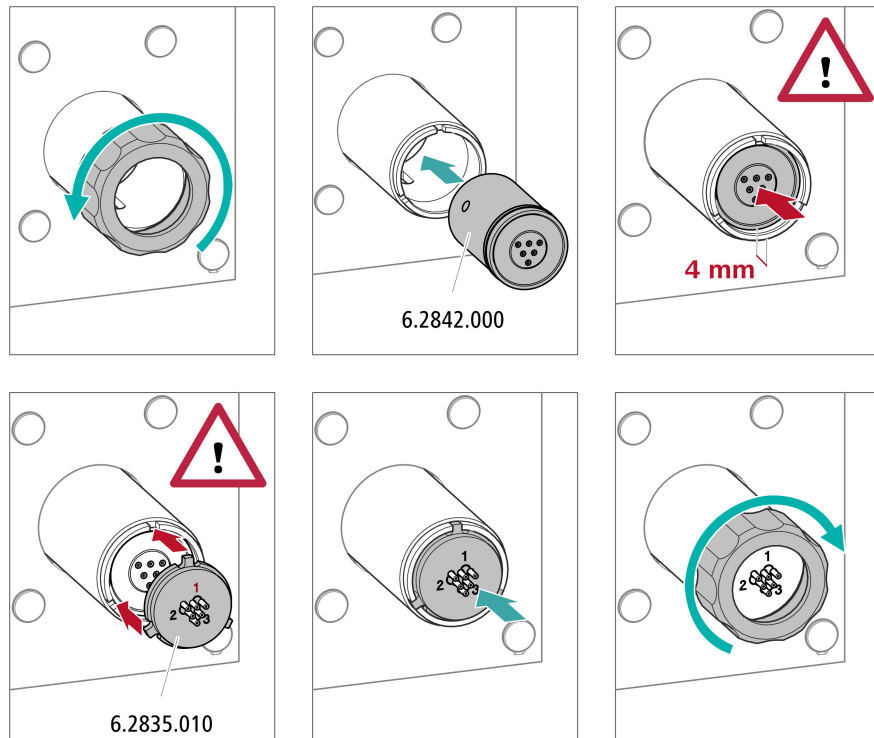
An incorrectly inserted rotor may be **destroyed** during start-up.

- Clean the sealing surface of the rotor with ethanol using a lint-free cloth.



- Insert the rotor into the adapter so that the tubing connections on the rear of the rotor fit into the corresponding recesses inside the adapter and one of the 3 holes of the rotor is visible in the slot of the adapter.

### Inserting the adapter into the suppressor drive



#### 1 Removing the union nut

- Loosen the union nut and remove it.

#### 2 Inserting the rotor

- Insert the adapter into the suppressor drive so that the tubing connections on the rear of the adapter fit into the corresponding recesses inside the suppressor drive and one of the 3 holes of the rotor is visible from below in the slot of the suppressor drive.

**NOTICE**

The adapter's sealing surface is located approx. 4 mm deep inside the suppressor drive if the adapter is inserted correctly.

If this is not the case, then the adapter has to be moved into the correct position from below by means of a pointed object (e.g. a screwdriver).

**3 Inserting the connecting piece**

- Clean the sealing surface of the connecting piece with ethanol using a lint-free cloth.
- Insert the connecting piece into the suppressor drive so that connector 1 is on top and the 3 pins of the connecting piece fit into the corresponding recesses on the suppressor drive.

**4 Attaching the union nut**

- Tighten the union nut on the thread of the suppressor drive by hand (do not use any tools).

**3.13.3 Connecting the suppressor**

The 3 inlets and outlets of the suppressor units, numbered 1, 2 and 3 on the connecting piece, each have 2 permanently installed PTFE capillaries.

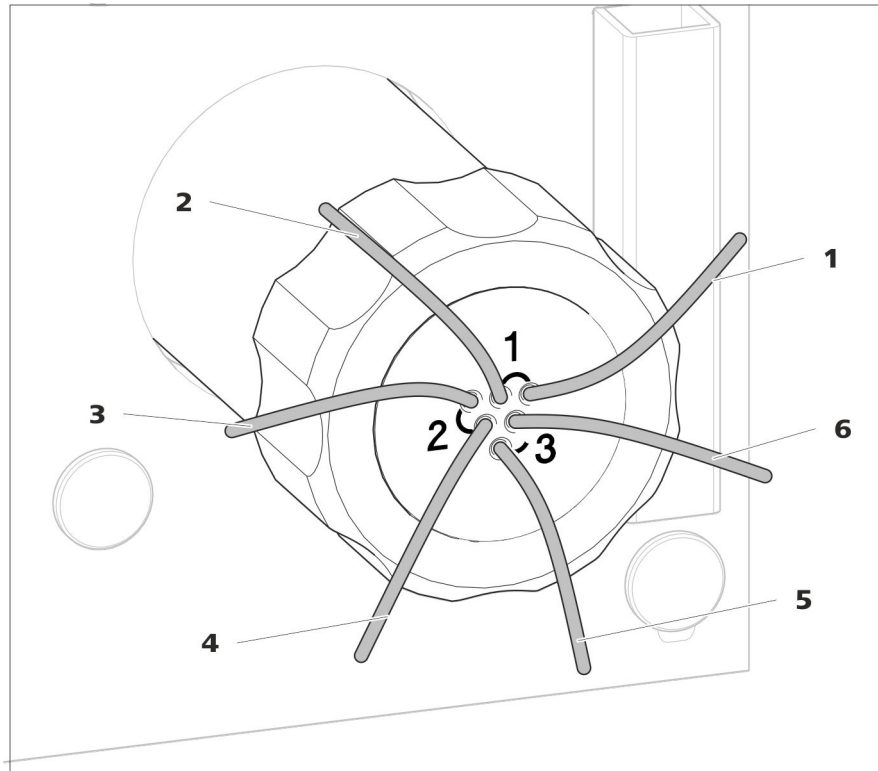
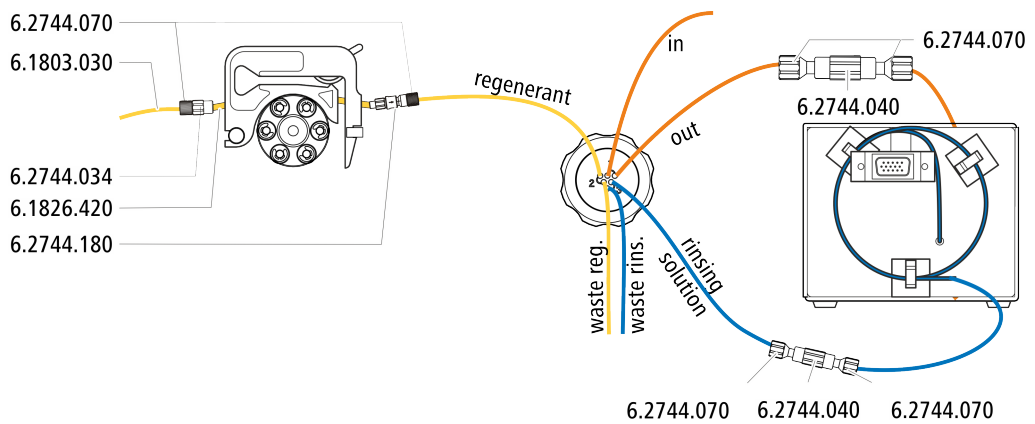


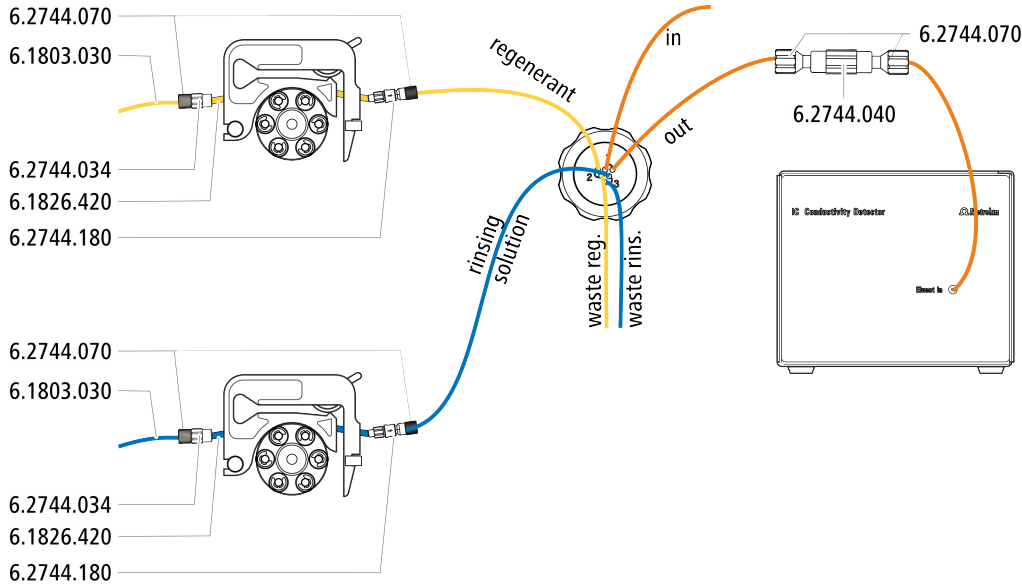
Figure 13 Suppressor – Connection capillaries

<b>1 out</b> Outlet capillary for the eluent.	<b>2 in</b> Inlet capillary for the eluent.
<b>3 regenerant</b> Inlet capillary for the regeneration solution.	<b>4 waste reg.</b> Outlet capillary for the regeneration solution; to the waste container.
<b>5 waste rins.</b> Outlet capillary for the rinsing solution; to the waste container.	<b>6 rinsing solution</b> Inlet capillary for the rinsing solution.

### Recommended installation



**Alternative installation**

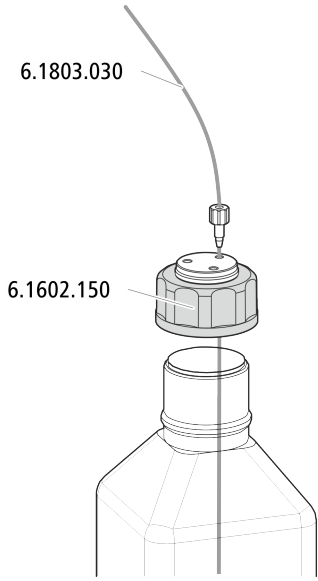


*Accessories*

**Installing bottles with auxiliary solutions**

To connect the bottles of the auxiliary solutions, you will need the following accessories:

- Accessories from the accessory kit: IC Vario/Flex ChS (6.5000.030)





### 3.13.3.1 Installing the eluent path

The eluent path is connected with the capillaries *in* and *out*.

- 1 Connect the capillary labeled *in* to the outlet of the separation column using a short pressure screw (6.2744.070).
- 2 Connect the capillary labeled *out* to the detector inlet capillary using one coupling (6.2744.040) and two pressure screws (6.2744.070) (see manual of the detector).

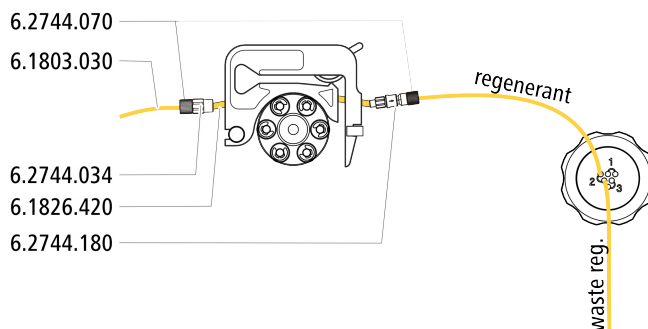
### 3.13.3.2 Connecting the regeneration solution

The regeneration solution is connected to the *regenerant* capillary.

#### Connecting the regeneration solution supplied by a peristaltic pump

For this step, you need the following accessories:

- Accessory kit: Flex/Vario: ChS (6.5000.030)
- Pump tubing (6.1826.420)
- Tubing olive with filter and locking nut (6.2744.180)
- Tubing olive (6.2744.034)
- Tubing cartridge of the peristaltic pump



- 1 Prepare a tubing cartridge of the peristaltic pump for the regeneration solution (see chapter 3.14.1, page 38).
- 2 Connect the capillary labeled *regenerant* to the outlet of the pump tubing using a pressure screw (6.2744.070).
- 3 Connect the PTFE capillary from the regeneration solution bottle to the inlet of the pump tubing.

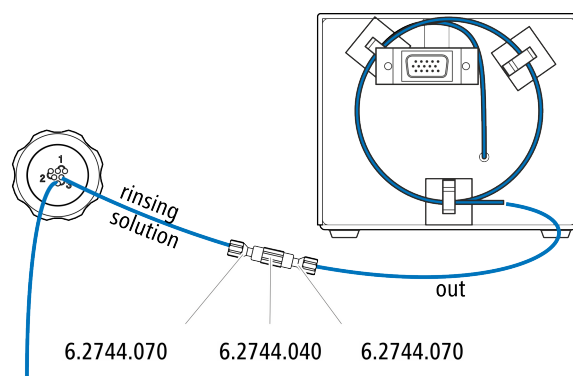
### 3.13.3.3 Connecting the rinsing solution

There are 2 options for rinsing the suppressor:

- Rinsing solution via STREAM (recommended)  
Use the eluent from the conductivity detector as rinsing solution.
- Rinsing solution via peristaltic pump  
Prepare the rinsing solution in a separate bottle and transport with the peristaltic pump.

The rinsing solution is connected to the *rinsing solution* capillary.

#### Connecting the rinsing solution inlet with STREAM

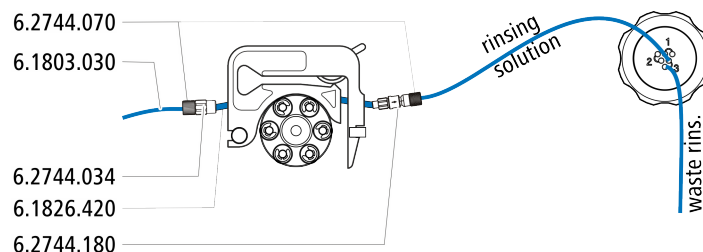


- 1 Connect the detector outlet capillary and the capillary labeled *rinsing solution* to each other using a coupling (6.2744.040) and two pressure screws (6.2744.070).

#### Connecting the rinsing solution inlet to the peristaltic pump

For this step, you need the following accessories:

- Accessory kit: Flex/Vario: ChS (6.5000.030)
- Pump tubing (6.1826.420)
- Tubing olive with filter and locking nut (6.2744.180)
- Tubing olive (6.2744.034)
- Tubing cartridge of the peristaltic pump



- 1 Prepare a tubing cartridge of the peristaltic pump for the regeneration solution (see chapter 3.14.1, page 38).



- 2 Connect the capillary labeled *rinsing solution* to the outlet of the pump tubing using a pressure screw (6.2744.070).
- 3 Connect the PTFE capillary from the rinsing solution bottle to the inlet of the pump tubing.

## 3.14 Peristaltic pump

### 3.14.1 Installing the peristaltic pump

#### Installing the pump tubing

Pump tubing can differ in terms of material, diameter and thus flow rate. Different pump tubing is used depending on the application.

Table 2 Pump tubings





Order number	Name	Material	Inner diameter	Use
6.1826.310	Pump tubing LFL (orange/green), 3 stoppers	PVC (Tygon®)	0.38 mm	Pump tubing for bromate determination using the triiodide method.
6.1826.320	Pump tubing LFL (orange/yellow), 3 stoppers	PVC (Tygon®)	0.48 mm	For acceptor solutions for Inline Dialysis and for Inline Ultrafiltration.
6.1826.330	Pump tubing LFL (orange/white), 3 stoppers	PVC (Tygon®)	0.64 mm	No special applications.
6.1826.340	Pump tubing LFL (black/black), 3 stoppers	PVC (Tygon®)	0.76 mm	For sample solution in Inline Dialysis.
6.1826.360	Pump tubing LFL (white/white), 3 stoppers	PVC (Tygon®)	1.02 mm	For sample transfer.
6.1826.380	Pump tubing LFL (gray/gray), 3 stoppers	PVC (Tygon®)	1.25 mm	For Inline Dilution.
6.1826.390	Pump tubing LFL (yellow/yellow), 3 stoppers	PVC (Tygon®)	1.37 mm	For sample solution in Inline Ultrafiltration.
6.1826.420	Pump tubing PharMed® (orange/yellow), 3 stoppers	Ismaprene	0.51 mm	For suppressor solutions.

#### Selecting the pump tubing and adapter

- 1 Select pump tubing suitable for the application (*see table 2, page 38*).

- 2** Select an adapter suitable for the pump tubing. The adapters are included with the pump tubing connection with locking nut and filter (6.2744.180).

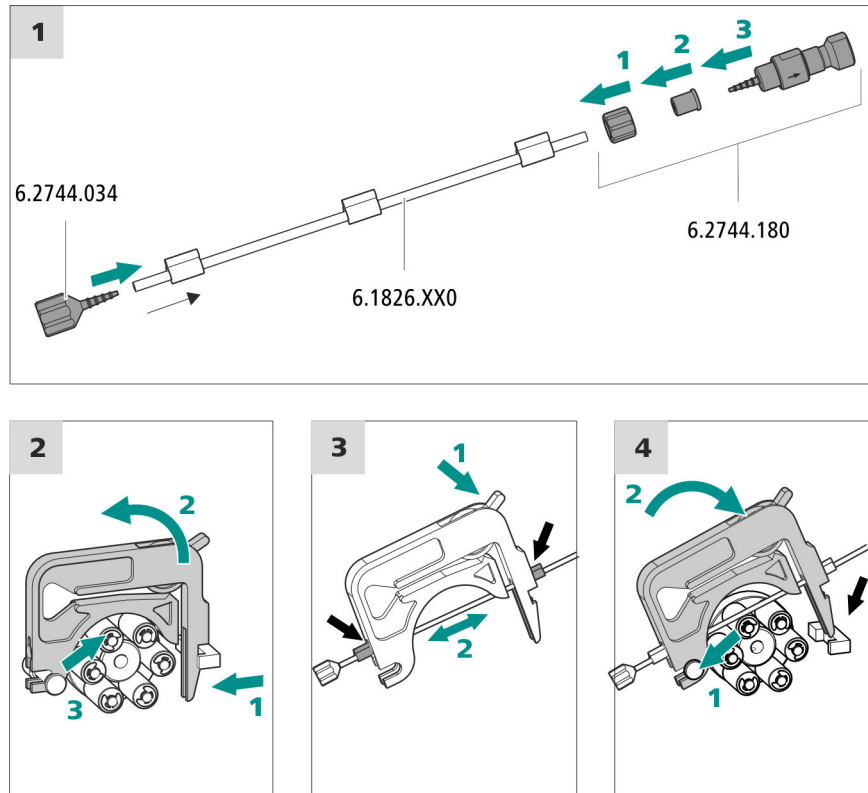
*Table 3 Pump tubing and suitable adapters*

<b>Pump tubing</b>	<b>Adapter</b>
6.1826.310 (orange/green)	
6.1826.320 (orange/yellow)	
6.1826.330 (orange/white)	
6.1826.340 (black/black)	
6.1826.360 (white/white)	
6.1826.380 (gray/gray)	
6.1826.390 (yellow/yellow)	
6.1826.420 (orange/yellow)	

### Installing the pump tubing

For this step, you need the following accessories:

- Tubing cartridge (6.2755.000)
- Pump tubing (6.1826.XXX)
- Coupling olive/UNF 10/32 (6.2744.034)
- Pump tubing connection with locking nut and filter (6.2744.180):  
Includes a locknut, 3 adapters and a tubing olive with filter holder.
- 2 × pressure screw, short (6.2744.070)



### 1 Connecting the pump tubing

- Attach the coupling olive/UNF 10/32 (6.2744.034) to the pump tubing entry. Push the end of the pump tubing over at least the second notch of the olive so that the pump tubing is firmly in place.
- Assemble the pump tubing connection with locking nut and filter (6.2744.180) at the pump tubing exit:
  - Push the locknut onto the pump tubing.
  - Push the appropriate adapter onto the pump tubing.
  - Place the tubing olive with the filter holder into the pump tubing so that the pump tubing is firmly in place; push the end of the pump tubing over at least the second notch of the olive.
  - Tighten it using the union nut.

### 2 Removing the tubing cartridge

- Press in the tubing cartridge's snap-action lever.
- Tilt the tubing cartridge upwards.
- Unhook the tubing cartridge from the mounting bolt.

### 3 Inserting the pump tubing

- Press the tubing cartridge's contact pressure lever down all the way.
- Place the pump tubing in the tubing cartridge. Fit the tubing cartridge between two stoppers. The stoppers must snap into the corresponding holder of the tubing cartridge.

### 4 Inserting the tubing cartridge

- Hang the tubing cartridge in the mounting bolt and press it in the cartridge holder until you hear the snap-action lever snap in.

### Setting the flow rate

The flow rate of the peristaltic pump depends on many factors:

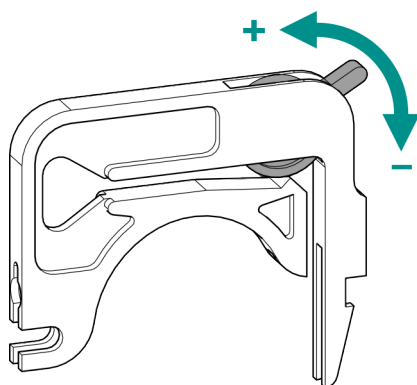
- The inner diameter of the pump tubing
- The rotational speed of the drive
- The contact pressure of the tubing cartridge



#### NOTICE

Pieces of pump tubing are consumables. The service life of the pump tubing depends on the contact pressure, among other factors.

### Setting the contact pressure correctly



- 1 ▪ Fully loosen the contact pressure lever, i.e. press it all the way down.
  - In the software, activate the drive of the peristaltic pump with the desired speed.
  - Raise the contact pressure lever one step at a time until liquid flows.



- When liquid starts flowing, raise the contact pressure lever by an additional two ratchet increments.

The contact pressure is now set optimally.

### 3.14.2 Mode of operation for the peristaltic pump

The peristaltic pump is used for pumping sample and auxiliary solutions. It can rotate in both directions.

The peristaltic pump pumps liquids based on the principle of displacement. The pump tubing is clamped between the rollers (14-5) and the tubing cartridge (14-2). During operation, the peristaltic pump drive rotates the roller hub (14-6), so that the rollers (14-5) advance the liquid in the pump tubing.

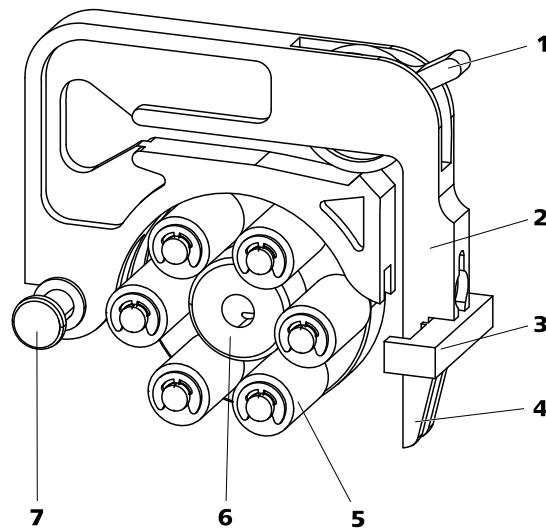


Figure 14 Peristaltic pump

<b>1</b>	<b>Contact pressure lever</b>	<b>2</b>	<b>Tubing cartridge (6.2755.000)</b>
<b>3</b>	<b>Cartridge holder</b>	<b>4</b>	<b>Snap-action lever</b>
<b>5</b>	<b>Rollers</b>	<b>6</b>	<b>Roller hub</b>
<b>7</b>	<b>Mounting bolt</b>		

### 3.15 Conductivity detector

The conductivity detector continuously measures the conductivity of the liquid passing through and outputs these signals in digital form (DSP – Digital Signal Processing). The conductivity detector exhibits outstanding thermal stability and thus guarantees reproducible measuring conditions.

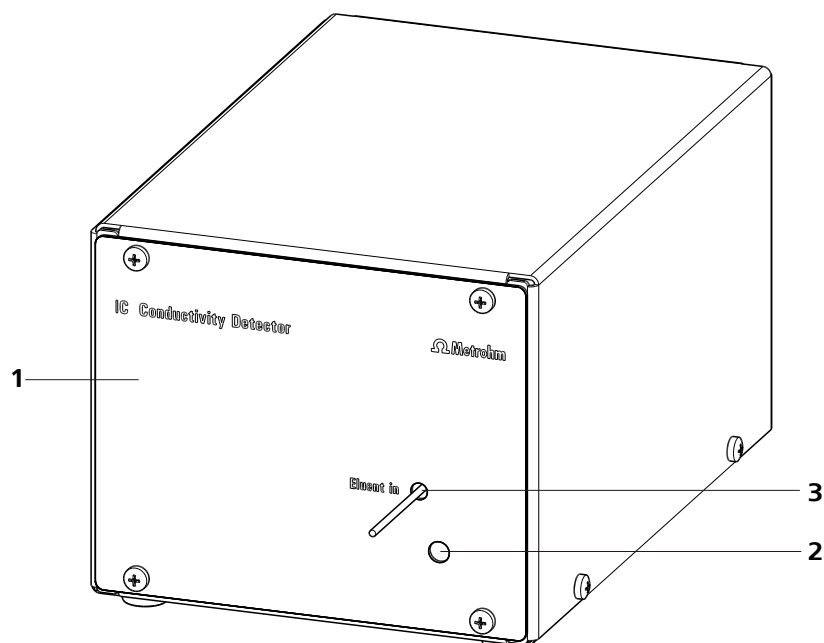


Figure 15 Front of conductivity detector

**1** IC detector 2.850.9010

**2** Opening for temperature sensor

**3** Detector input capillary  
Permanently installed.

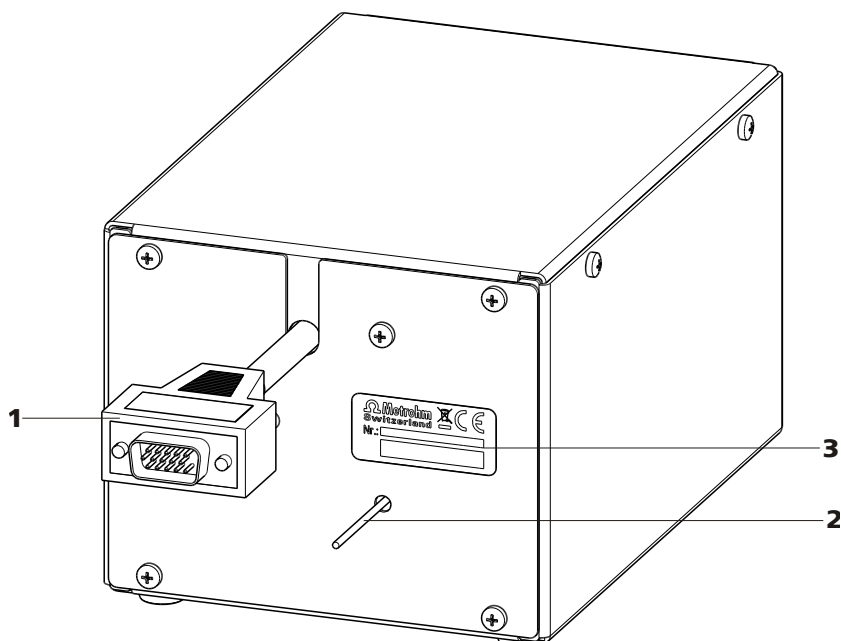


Figure 16 Rear of conductivity detector

**1 Detector cable**

With installed plug.

**2 Detector output capillary**

Permanently installed.

**3 Type plate**

With serial number.



**NOTICE**

In order to prevent unnecessary peak widening after separation, the connection between the outlet of the separation column and the inlet to the detector should be kept as short as possible.

**Connecting the detector input capillary to the suppressor**

- 1 ▪ Connect the detector input capillary (17-1) and the capillary of the MSM labeled *out* (17-2) to each other using a coupling (6.2744.040) (17-3) and two short pressure screws (6.2744.070) (17-4).

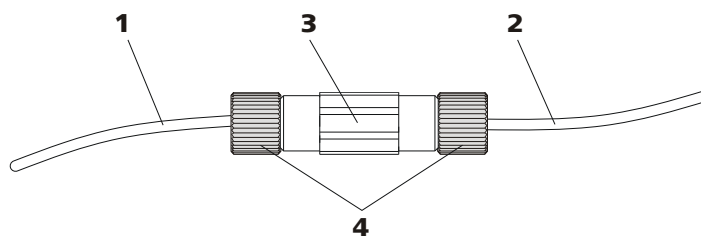


Figure 17 Connection detector-MSM

<b>1</b> Detector input capillary	<b>2</b> MSM output capillary Labeled out.
<b>3</b> Coupling (6.2744.040)	<b>4</b> Pressure screws, short (6.2744.070)

## 3.16 Connecting the instrument to a computer



### NOTICE

If the instrument is connected to the computer, then it must be switched off.

#### Accessories

For this step, you need the following accessories:

- USB connecting cable (6.2151.020)

### Connecting the USB cable

- 1** Insert the USB cable into the computer connection socket on the rear of the instrument labeled *PC*.
- 2** Insert the other end into a USB port on the computer.

## 3.17 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<sup>2</sup> / 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.

## 3.18 Initial start-up

Even before the guard column and separation column are installed, the entire system must be completely rinsed with eluent for the first time.

### Rinsing the IC system



#### CAUTION

The separation column and the guard column are not permitted to be installed at the time of the initial start-up.

Make sure that a coupling (6.2744.040) is being used instead of the columns.

#### 1 Preparing the software

- Start the **MagIC Net** computer program.
- Open the **Equilibration** tab in MagIC Net: **Workplace ► Run ► Equilibration**.
- Import (or create) a suitable method.  
Also see: *MagIC Net Tutorial* and online help.

#### 2 Preparing the instrument

- Ensure that the eluent aspiration tubing is immersed in the eluent and that there is enough eluent in the eluent bottle.
- - STREAM method (recommended): Ensure that the aspiration tubing for the regeneration solution is immersed in the solution and that there is enough solution. Check whether the detector outlet capillary is connected to the Metrohm Suppressor Module (MSM)'s inlet capillary for rinsing solution (labeled *rinsing solution*).
  - Alternatively, if two bottles are being used for rinsing and regeneration: Ensure that the aspiration tubings for the auxiliary solutions (regeneration solution and rinsing solution) are immersed in the respective solutions and that there is enough solution in both bottles. Check whether the detector outlet capillary is guided into the waste container or is connected with the waste collector.
- Switch on the instrument.

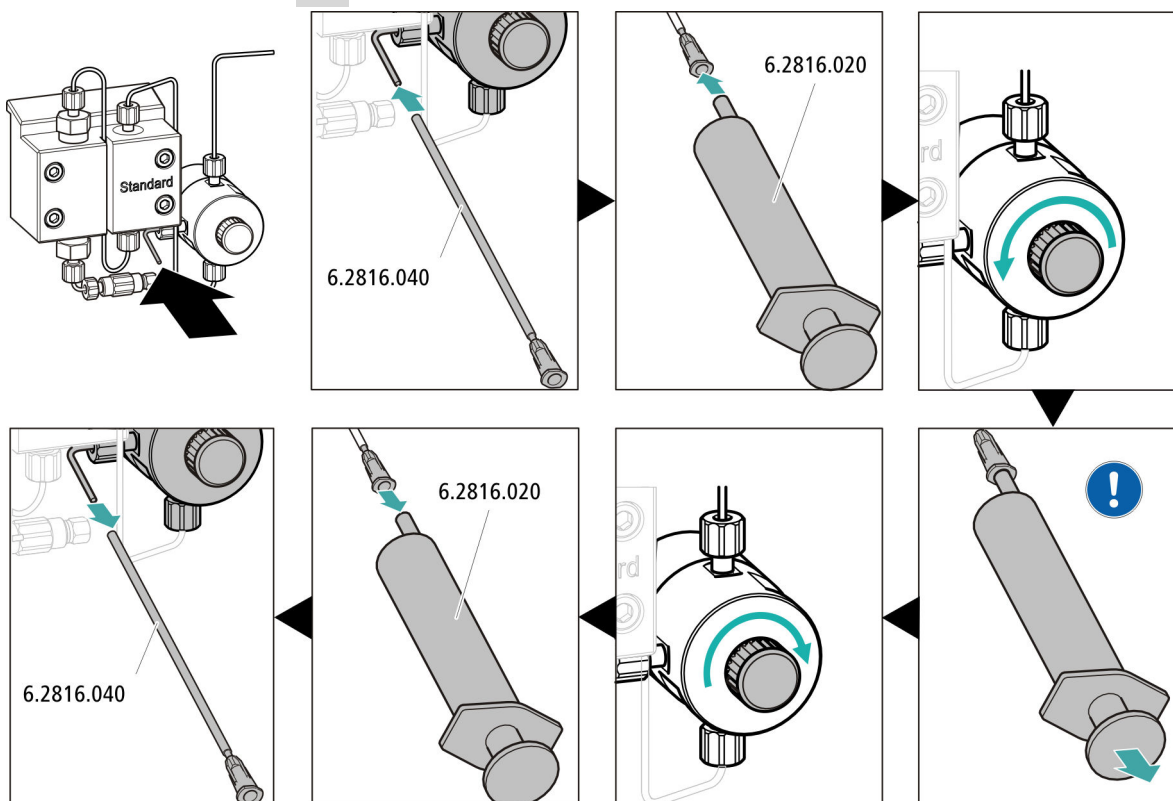
MagIC Net detects the instrument and all of its modules.



### 3 Starting equilibration

- Start the equilibration in MagIC Net: **Workplace ► Run ► Equilibration ► Start HW.**

### 4 Deaerating the high-pressure pump



- Push the end of the purge needle (6.2816.040) over the end of the purge capillary on the purge valve.
- Insert the syringe (6.2816.020) in the Luer connector of the purge needle.
- Open the purge valve using the rotary knob (approx.  $\frac{1}{2}$  turn).
- Switch on the high-pressure pump in MagIC Net.
- Use the syringe to aspirate eluent until there are no more air bubbles in the eluent aspiration tubing.
- Switch off the high-pressure pump in MagIC Net.
- Seal the purge valve using the rotary knob.
- Remove the syringe from the purge needle.
- Pull the purge needle out of the purge capillary.

### 5 Rinsing the instrument without columns

- Rinse the instrument (without columns) with eluent for 10 minutes.

## 3.19 Connecting and rinsing the guard column

Guard columns protect separation columns and significantly increase their service life. The guard columns available from Metrohm are either actual guard columns or guard column cartridges used together with a cartridge holder. The process of installing a guard column cartridge into the corresponding holder is described in the guard column leaflet.



### NOTICE

Metrohm recommends always working with guard columns. They protect the separation columns and can be replaced regularly as needed.



### NOTICE

Information regarding which guard column is suitable for your separation column can be found in the **Metrohm Column Program** (which is available from your Metrohm representative), the column leaflet and the the product information at <http://www.metrohm.com> (Ion Chromatography product area), or it can be obtained directly from your representative.



### CAUTION

New guard columns are filled with a solution and sealed with stoppers or caps on both sides.

Before inserting the guard column, ensure that this solution can be mixed with the eluent being used (follow the information provided by the manufacturer).



### NOTICE

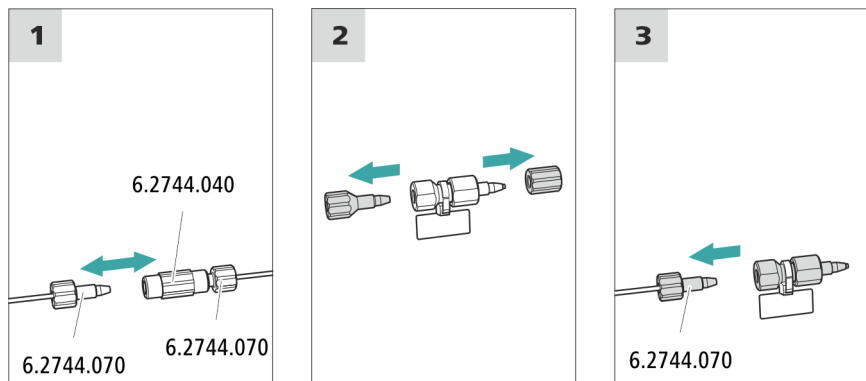
The guard column may not be connected until after the instrument has already been put into operation once (*see chapter 3.18, page 47*). The guard column and the separation column have to be replaced by a coupling (6.2744.040) until then.

#### Accessories

For this step, you need the following accessories:

- Guard column (suitable for separation column)

### Connecting the guard column



#### 1 Removing the coupling

Remove the coupling (6.2744.040) installed between the column inlet capillary and the column outlet capillary for the initial start-up.

#### 2 Preparing the guard column

- Remove the stoppers or the stopper and the sealing cap from the guard column.

#### 3 Connecting the guard column



#### CAUTION

When inserting the guard column, ensure that it is inserted correctly based on the marked flow direction (if specified).

- Fasten the inlet of the guard column to the column inlet capillary using a short pressure screw (6.2744.070).
- If the guard column is connected to the separation column using a connection capillary, fasten this connection capillary to the guard column outlet with a pressure screw.

### Rinsing the guard column

#### 1 Rinsing the guard column

- Place a beaker under the guard column's outlet.

- Start manual control in MagIC Net and select the high-pressure pump: **Manual ► Manual control ► Pump**
  - **Flow: in accordance with column leaflet**
  - **On**
- Rinse the guard column with eluent for approx. 5 minutes.
- Stop the high-pressure pump in the manual control in MagIC Net again: **Off**.

## 3.20 Connecting the separation column

The smart separation column (iColumn) is the heart of ion chromatographic analysis. It separates the different components according to their interactions with the column. Metrohm separation columns are equipped with a chip where their technical specifications and history (start-up, operating hours, injections etc) are stored.



### NOTICE

Information regarding which separation column is suitable for your application can be found in the **Metrohm Column Program**, the product information for the separation column or it can be obtained through your representative.

You can find product information for your separation column at <http://www.metrohm.com> in the Ion Chromatography product area.

A test chromatogram accompanies every column. The column leaflet can be found online at <http://www.metrohm.com> with the corresponding article. Detailed information on special IC applications can be found in the corresponding **Application Bulletins** or **Application Notes**. You can find these online at <http://www.metrohm.com> in the Applications area or request them from your responsible Metrohm representative free of charge.



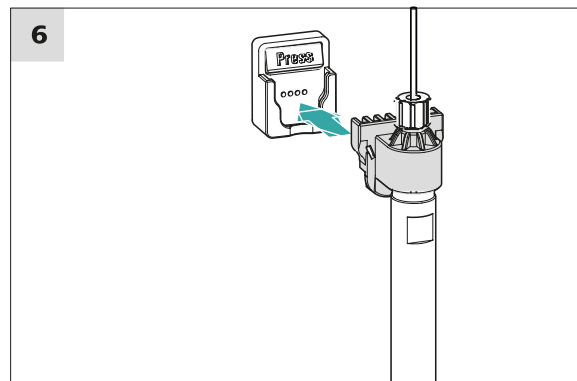
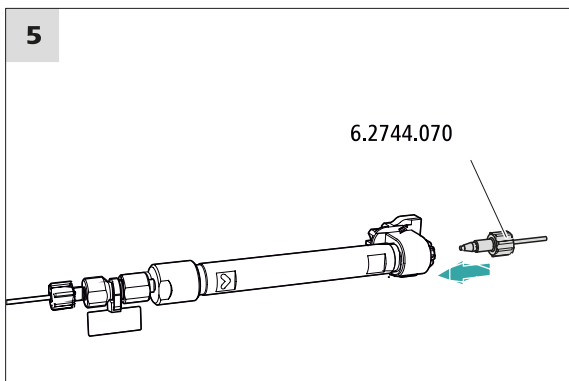
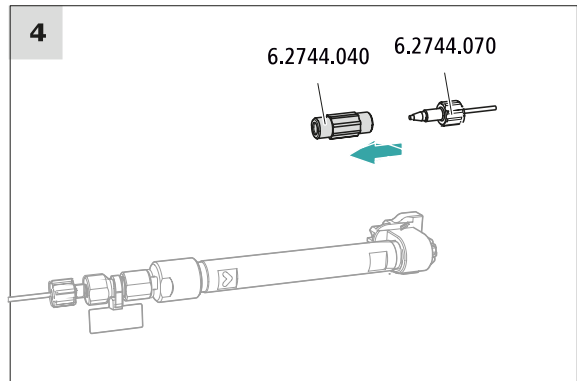
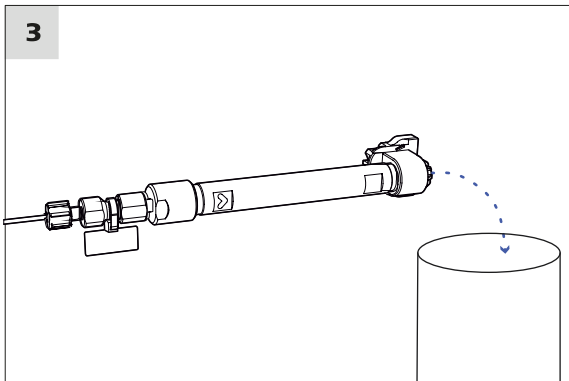
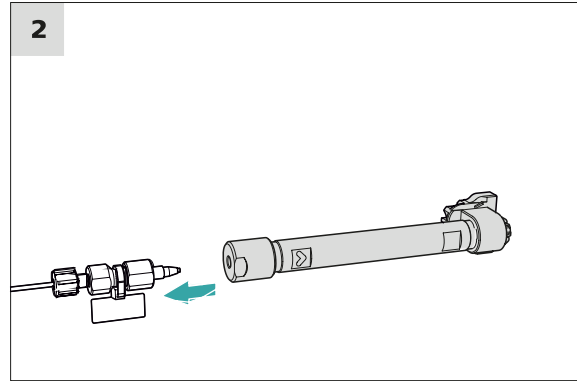
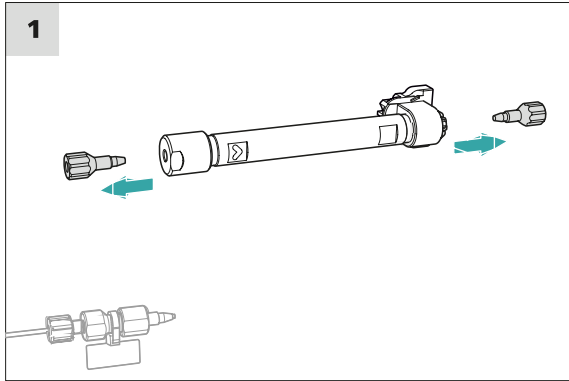
### CAUTION

New separation columns are filled with a solution and sealed with stoppers on both sides. Before inserting the column, ensure that this solution can be mixed with the eluent being used (follow the information provided by the manufacturer).



**NOTICE**

Connect the separation column only after the initial start-up of the instrument. Until that point, insert a coupling (6.2744.040) instead of the guard column and separation column.



## Connecting the separation column

### 1 Removing the stoppers

- Remove the stoppers from the separation column.

### 2 Installing the inlet of the separation column



#### CAUTION

When inserting the column, ensure that it is inserted correctly based on the marked flow direction.

There are 3 possibilities:

- Attach the column inlet directly onto the guard column or,
- if the guard column is connected to the separation column using a connection capillary: Connect the column inlet to the guard column outlet capillary using a PEEK pressure screw (6.2744.070) or,
- if no guard column is used (not recommended): Connect the column inlet capillary to the inlet of the separation column using a short pressure screw (6.2744.070).

### 3 Rinsing the separation column

- Place a beaker under the outlet of the separation column.
- Start manual control in MagIC Net and select the high-pressure pump: **Manual ► Manual control ► Pump**
  - Flow:** Increase gradually up to the flow rate recommended in the column leaflet.
  - On**
- Rinse the separation column with eluent for approx. 10 minutes.
- Stop the high-pressure pump in the manual control in MagIC Net again: **Off**.

### 4 Removing the coupling

- Remove the coupling (6.2744.040) from the column outlet capillary.

### 5 Installing the outlet of the separation column

- Fasten the column outlet capillary to the column outlet using a short PEEK pressure screw (6.2744.070).

## 6 Inserting the separation column

- Insert the separation column with the chip into the column holder until you hear it snap in place.

The separation column is now detected by MagIC Net.

## 3.21 Conditioning

In the following cases, the system must be conditioned with eluent until a stable baseline has been reached:

- After installation
- After each time the instrument is switched on
- After each eluent change



### NOTICE

The conditioning time can lengthen considerably if the composition of the eluent is modified.

### Conditioning the system

#### 1 Preparing the software



### CAUTION

Ensure that the configured flow rate is not higher than the flow rate permitted for the corresponding column (refer to the column leaflet and chip data record).

- Start the **MagIC Net** computer program.
- Open the **Equilibration** tab in MagIC Net: **Workplace ► Run ► Equilibration**.
- Select (or create) a suitable method.  
Also see: *MagIC Net Tutorial* and online help.

#### 2 Preparing the instrument

- Ensure that the column is inserted correctly in accordance with the flow direction marked on the sticker (arrow has to point in the direction of flow).
- Ensure that the eluent aspiration tubing is immersed in the eluent and that there is enough eluent in the eluent bottle.

### 3 Starting equilibration

- Start the equilibration in MagIC Net: **Workplace ► Run ► Equilibration ► Start HW**.
- Visually inspect whether all capillaries and their connections from the high-pressure pump to the detector are leak-tight. If eluent is leaking out anywhere, tighten the corresponding pressure screw further, or loosen the pressure screw, check the end of the capillary and shorten it using the capillary cutter if necessary and retighten the pressure screw.

### 4 Conditioning the system

Continue rinsing the system with eluent until the desired stability level for the baseline has been attained .

The instrument is now ready for measuring samples.



#### 4.1.4 Shutting down and recommissioning

If the instrument is no longer used for a prolonged period, remove the guard column and the separation column. Rinse the IC system until it is salt-free with a mixture of methanol and ultrapure water (1:4). This prevents eluent salts from crystallizing and then causing damage. This prevents eluent salts from crystallizing and then causing consequential damage.

##### Rinsing the IC system to be free of salts

- 1 In the software, stop the hardware and wait until the pressure in the high-pressure pump has been released.
- 2 Remove the guard column and the separation column from the eluent path. Connect the connection capillaries directly with each other using a coupling (6.2744.040).
- 3 Rinse the IC system for 15 minutes with methanol/ultrapure water mixture (1:4).
- 4 In the software, switch the Metrohm Suppressor Module (MSM) twice during the rinsing process at five-minute intervals in each case (STEP command).
- 5 Rinse the pump tubing of the peristaltic pump used for pumping the regeneration solution with water for 15 minutes at level 1. Finish by releasing the contact pressure at the peristaltic pump.

##### Putting the IC system back into operation

- 1 Check that a coupling (6.2744.040) is installed in place of the guard column and the separation column.
- 2 Rinse the IC system with freshly prepared eluent for 15 minutes.
- 3 Remove the coupling and install the guard column and the separation column (see Chapter 3.19, page 49 and Chapter 3.20, page 51).



The composition of the eluent plays a critical role in chromatographic analysis:

<b>Concentration</b>	An increase in the concentration generally leads to shorter retention times and faster separation, but also to a higher background conductivity signal.
<b>pH</b>	pH changes lead to shifts in dissociation equilibria and thus to changes in retention times.
<b>Organic solvents</b>	Adding organic solvents (e.g. methanol, acetone or acetonitrile) to a watery eluent generally speeds up lipophilic ions.

#### 4.4.2 Changing the eluent

Ensure that no precipitates can form when changing the eluent. Immediately successive solutions must be miscible. If the system must be rinsed with organic solvents, several solvents with rising or falling lipophilicity must be used.



#### NOTICE

To change the eluent, remove the guard column and the separation column. Connect the capillaries using a coupling (6.2744.040) and two pressure screws (6.2744.070).

### 4.5 Notes on operating the high-pressure pump



#### CAUTION

The pump head is filled ex works with methanol/ultrapure water. Ensure that the eluent used is miscible with this solvent.

Keep the following recommendations in mind in order to protect the high-pressure pump from damage as much as possible during operation:

- To protect the high-pressure pump from **foreign particles**, we recommend filtering the eluent through a filter with a pore size of 0.45 µm and aspirating it via an aspiration filter (6.2821.090).



- Ensure that no precipitates can form when changing the eluent. Salt crystals between the piston and seal cause abrasive particles that can find their way into the eluent. These particles lead to contaminated valves, an increase in pressure and, in extreme cases, scratched pistons and thus to leakages in the high-pressure pump. Immediately successive solutions must always be miscible. If the system must be rinsed with organic solvents, use several solvents with rising or falling lipophilicity.
- In order to protect the pump seals, ensure that the pump is never operated dry. Therefore ensure that the eluent supply is correctly connected and that there is enough eluent in the eluent bottle each time before turning on the pump.

## 4.6 Servicing the high-pressure pump



### NOTICE

You can find a video sequence for this task in the *Multimedia Guide IC Maintenance* or on the Internet at <http://ic-help.metrohm.com/>.

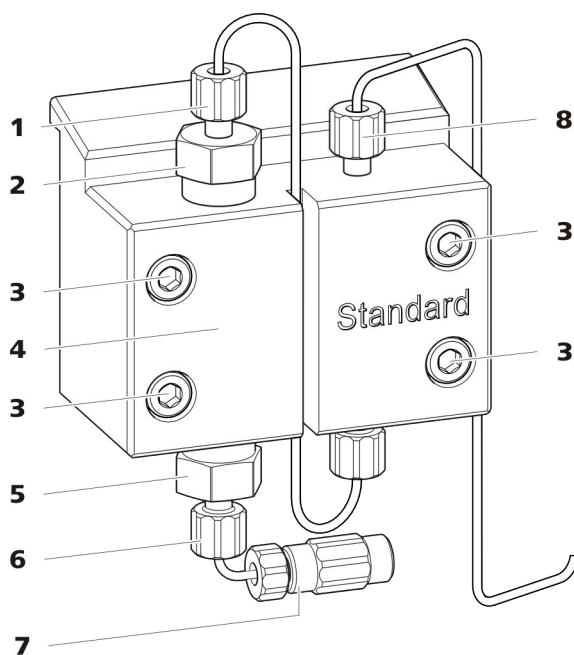


Figure 18 High-pressure pump – Parts

<b>1</b>	<b>Pressure screw, short (6.2744.070)</b> Fastened to the outlet valve holder.	<b>2</b>	<b>Outlet valve holder</b>
<b>3</b>	<b>Fastening screw</b>	<b>4</b>	<b>Pump head</b>

**5 Inlet valve holder****6 Pressure screw, short (6.2744.070)**

Fastened to the inlet valve holder.

**7 Eluent aspiration tubing connector**

Consists of a coupling with a pressure screw.

**8 Pressure screw, short (6.2744.070)**

Fastened to the pump output.

*Maintenance interval*

The following parts of the high-pressure pump must be serviced at least once per year:

- Inlet valve (6.2824.170)
- Outlet valve (6.2824.160)
- Piston seal (6.2741.020)
- Zirconium oxide piston (6.2824.070)

Maintenance tasks can also be carried out if the following problems occur:

- Unstable baseline (pulsations, flow fluctuations)

**CAUTION**

Maintenance work on the high-pressure pump may not be carried out unless the **instrument is switched off**.

*Recommended procedure*

We recommend the following procedure for the maintenance of the pump head:

1. Service the inlet valve and the outlet valve.
2. Remove the pump head.
3. Service both pistons, one after the other.
  - a. Remove piston.
  - b. Dismantle the piston.
  - c. Replace the piston seal.
  - d. Replace the zirconium oxide piston.
  - e. Assemble the piston.
  - f. Insert the piston.
4. Reinstall the pump head.

You can find brief video sequences on the following maintenance steps on the Internet at <http://ic-help.metrohm.com/>.

**Servicing the outlet valve and inlet valve***Accessories*

For this step, you need the following accessories:

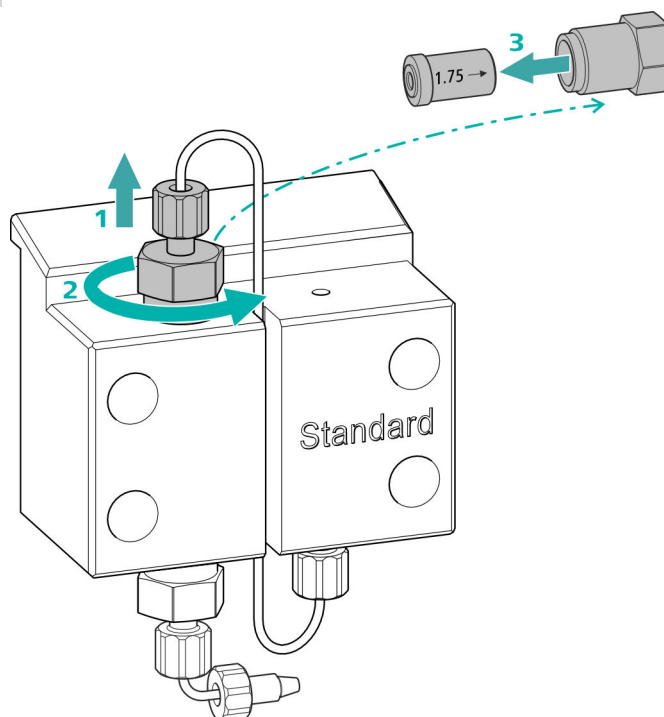
- Adjustable wrench (6.2621.000)

### Cleaning the outlet valve

#### Spare parts

If the outlet valve cannot be cleaned, you will need a new outlet valve (6.2824.160) for this step.

#### 1 Removing the outlet valve



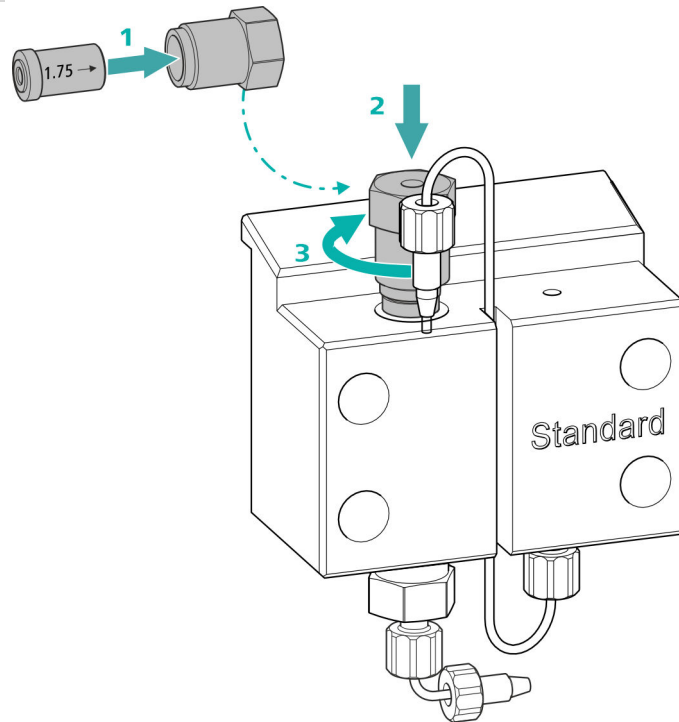
- Unscrew the connection capillary to the auxiliary piston from the outlet valve holder (18-2) (1).
- Start by loosening the outlet valve holder with the adjustable wrench and then unscrew it by hand (2) and remove it.
- Remove the outlet valve from the outlet valve holder (3).

#### 2 Cleaning the outlet valve

- Start by rinsing the outlet valve in the direction of eluent flow using a wash bottle filled with ultrapure water, RBS™ solution or acetone. (The direction of eluent flow is marked on the valve by an arrow.)  
The rinsing solution must come out at the valve outlet.  
If no more solution comes out, then the valve is blocked.
- Rinse the outlet valve in the direction opposite the eluent flow using a wash bottle filled with ultrapure water, RBS™ solution or acetone.  
The rinsing solution may only come out at the valve outlet.

The outlet valve must be replaced if it is still clogged after cleaning.

### 3 Reinserting the outlet valve into the pump head



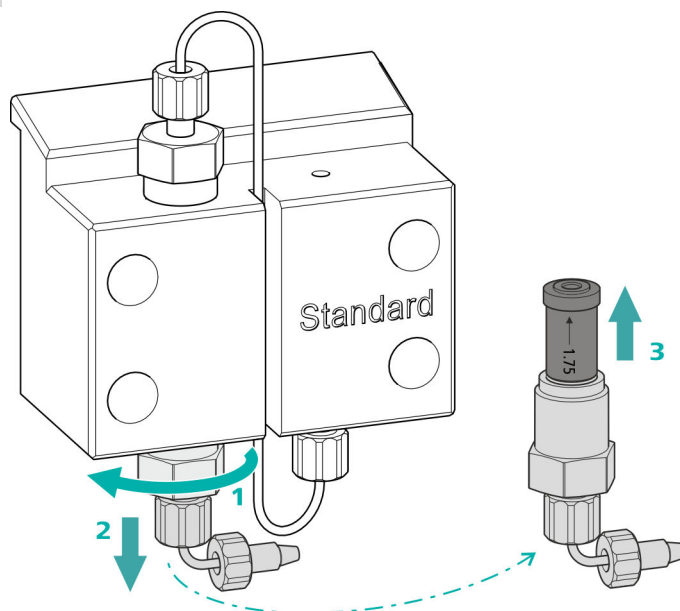
- Insert the outlet valve into the outlet valve holder (the seal must be visible) (1).
- Screw the outlet valve holder up into the pump head (2) and tighten it firmly by hand and then retighten it one additional  $\frac{1}{4}$  turn using the adjustable wrench (3).
- Tighten the connection capillary to the auxiliary piston back onto the outlet valve holder.

### Cleaning the inlet valve

*Spare parts*

If the inlet valve cannot be cleaned, you will need a new inlet valve (6.2824.170) for this step.

#### 1 Removing the inlet valve



- Unscrew the connection capillary to the connection of the eluent aspiration tubing (18-7).
- Start by loosening the inlet valve holder with the adjustable wrench (1) and then unscrew it by hand (2) and remove it.
- Remove the inlet valve from the inlet valve holder (3).

#### 2 Cleaning the inlet valve

- Start by rinsing the inlet valve in the direction of eluent flow using a wash bottle filled with ultrapure water, RBS™ solution or acetone. (The direction of eluent flow is marked on the valve by an arrow.)

The rinsing solution must come out at the valve outlet.

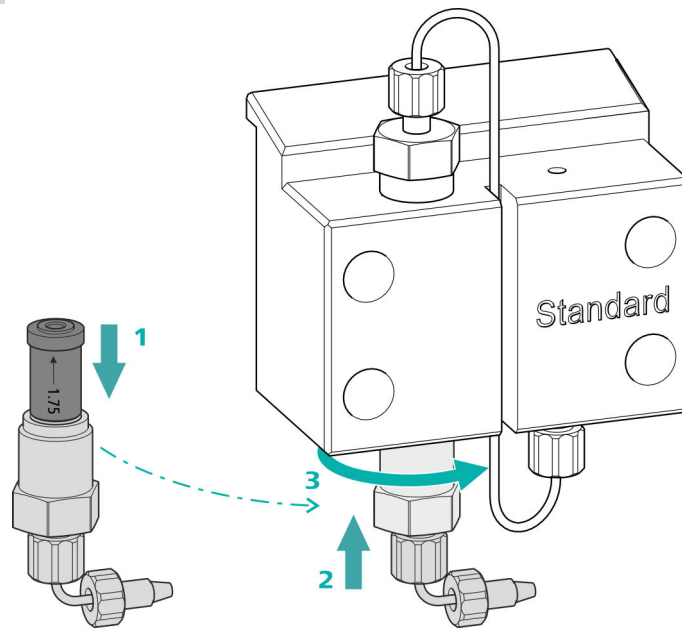
If no more solution comes out, then the valve is blocked.

- Rinse the inlet valve in the direction opposite the eluent flow using a wash bottle filled with ultrapure water, RBS™ solution or acetone.

The rinsing solution may only come out at the valve outlet.

The inlet valve must be replaced if it is still clogged after cleaning.

### 3 Reinserting the inlet valve into the pump head



- Insert the inlet valve into the inlet valve holder (the seal must be visible) (1).
- Screw the inlet valve holder up into the pump head (2) and tighten it firmly by hand and then retighten it one additional  $\frac{1}{4}$  turn using the adjustable wrench (3).
- Refasten the connection capillary to the connection of the eluent aspiration tubing (18-7).

### Removing the pump head

#### Accessories

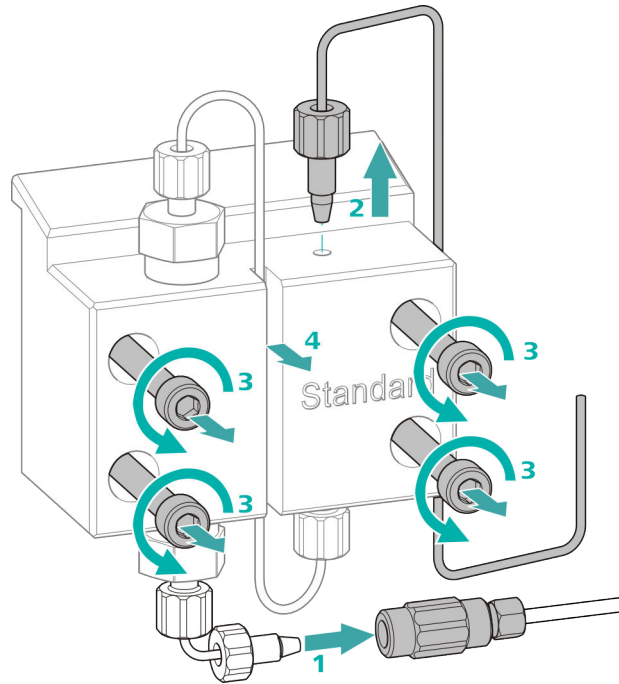
For this step, you need the following accessories:

- 4 mm hex key (6.2621.030)

### Removing the pump head

Prerequisites:

- Is the high-pressure pump switched off?
- Has the pressure been released?
- Is the instrument switched off?



- 1** Release the coupling from the pressure screw and seal it with a stopper.
- 2** Unscrew and remove the pressure screw on the pump head's outlet (18-8).
- 3** Loosen and remove the four fastening screws (18-3) using the hex key.
- 4** Remove the pump head (18-4).

### Servicing the piston

Carry out the following work on both pistons in turn.

Servicing a piston consists of the following tasks:

1. Replace the piston seal.
2. Clean or replace the zirconium oxide piston.
3. Reinstall the piston.

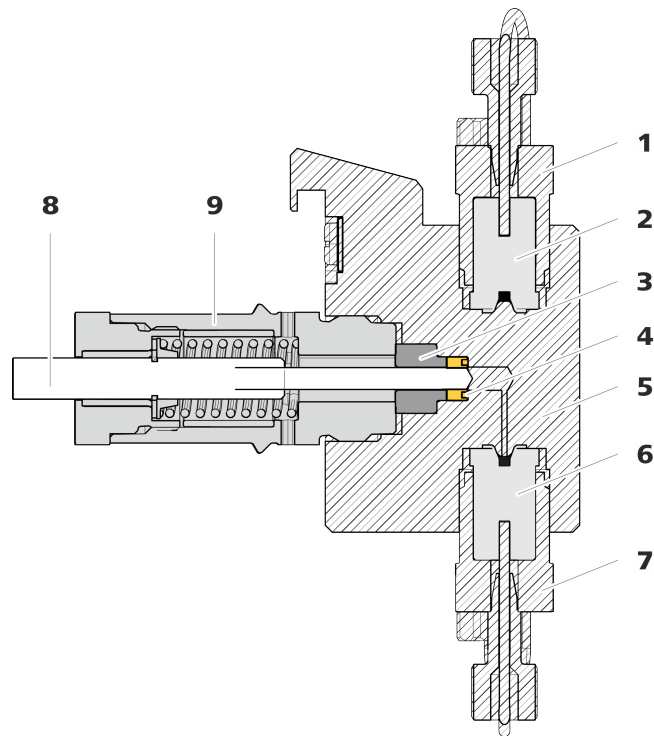


Figure 19 High-pressure pump – Cross-section

<b>1</b>	<b>Outlet valve holder</b>	<b>2</b>	<b>Outlet valve (6.2824.160)</b>
<b>3</b>	<b>Backup ring</b>	<b>4</b>	<b>Piston seal (6.2741.020)</b>
<b>5</b>	<b>Pump head</b>	<b>6</b>	<b>Inlet valve (6.2824.170)</b>
<b>7</b>	<b>Inlet valve holder</b>	<b>8</b>	<b>Zirconium oxide piston (6.2824.070)</b>
<b>9</b>	<b>Piston cartridge</b>		

#### Accessories

For this step, you need the following accessories:

- Adjustable wrench (6.2621.000)
- Tool for piston seals (6.2617.010) consisting of a tip (20-**1**) for removing the old piston seal and a sleeve (20-**2**) for inserting the new piston seal.

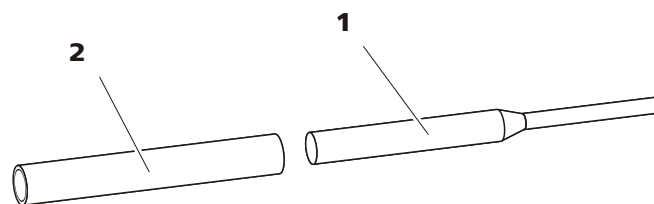


Figure 20 Tool for piston seal (6.2617.010)

<b>1</b>	<b>Tip</b>	<b>2</b>	<b>Sleeve</b>
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#### Spare part

For this step, you need a new piston seal (6.2741.020).

## Replacing the piston seal

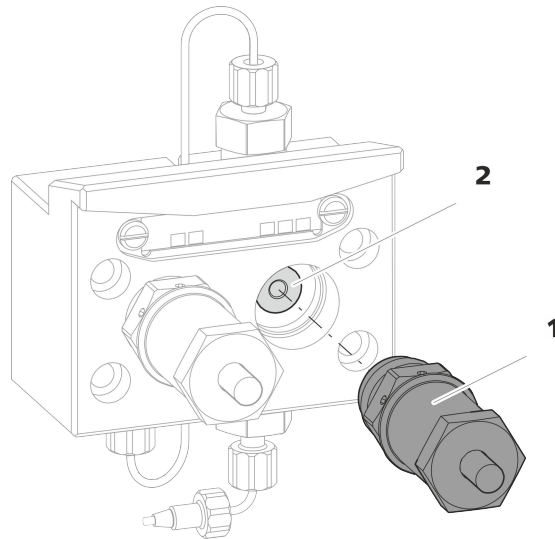


Figure 21 Removing the piston cartridge from the pump head

**1** Piston cartridge

**2** Backup ring

### 1 Removing the piston cartridge

Loosen the piston cartridge (21-1) using the adjustable wrench and then unscrew it from the pump head by hand. Set it aside.

### 2 Removing the backup ring

Shake the backup ring (21-2) out of the piston opening. Set it aside.

### 3 Removing the old piston seal



#### CAUTION

Screwing the (6.2617.010) special tool for the piston seal into the piston seal destroys this completely!



#### CAUTION

Avoid touching the sealing surface in the pump head with the tool!

Only screw the tip (20-1) of the tool for the piston seal far enough into the piston seal that the seal can be pulled out.

#### 4 Inserting the new piston seal into the tool

Insert the new piston seal into the recess of the sleeve (22-**1**) of the tool for piston seal. The sealing spring must be visible from the outside.

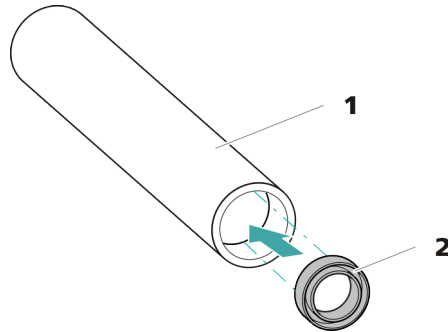


Figure 22 Inserting the piston seal into the tool

**1 Tool for piston seal (6.2617.010)**  
Sleeve for inserting the new piston seal.

**2 Piston seal (6.2741.020)**

#### 5 Inserting the new piston seal into the pump head

Guide the sleeve (20-**2**) of the tool for the piston seal with inserted piston seal into the pump head. Press the seal into the pump head recess using the wide end of the tip (20-**1**) of the tool.

### Cleaning or replacing the zirconium oxide piston

Prerequisites:

- The pump head has been removed (see "Removing the pump head", page 65).
- The piston cartridge is removed (see "Replacing the piston seal", page 68).

For this task, you need the following accessories:

- Zirconium oxide piston (6.2824.070)



- Adjustable wrench (6.2621.000) from the accessory kit: *Vario/Flex Basic* (6.5000.000).

### 1 Breaking down the piston cartridge



#### CAUTION

Inside the piston cartridge there is a taut spring that can launch out of the piston cartridge if the tension is released suddenly.

When opening the piston cartridge, counteract the pressure from the spring and carefully unscrew the cartridge.

- Loosen the piston cartridge's screw with an adjustable wrench and carefully unscrew the screw by hand while counteracting the pressure from the taut spring.
- Remove the zirconium oxide piston and place it on a paper towel.
- Remove the spring retainer, the spring and the inner plastic sleeve from the piston cartridge and lay them next to the piston.
- Place the backup ring you put aside with the remaining parts.

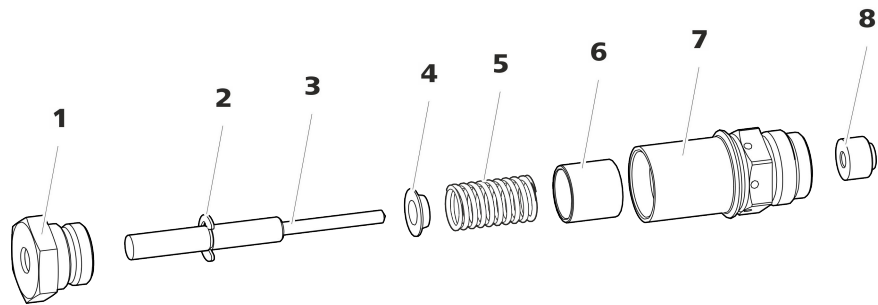


Figure 23 Parts of the piston cartridge

<b>1</b>	<b>Piston cartridge screw</b>	<b>2</b>	<b>Retaining washer</b>
<b>3</b>	<b>Zirconium oxide piston (6.2824.070)</b>	<b>4</b>	<b>Spring retainer</b>
<b>5</b>	<b>Spring (6.2824.060)</b>	<b>6</b>	<b>Inner plastic sleeve</b> Protects from metallic abrasion.
<b>7</b>	<b>Piston cartridge</b>	<b>8</b>	<b>Backup ring</b>

### 2 Cleaning the parts of the piston cartridge

- If the zirconium oxide piston has become contaminated due to abrasion or deposits, then clean it using a fine abrasive cleaning powder, rinse it using ultrapure water until it is free of particles and dry it.

The zirconium oxide piston must be replaced if it is heavily contaminated or scratched.

- Rinse the other parts of the piston with ultrapure water and dry with a lint-free cloth.

### 3 Replacing the zirconium oxide piston

- Remove the retaining washer (23-2) from the old piston. If the retaining washer sits too tightly, use a pointed object to loosen the retaining washer.
- Assemble the retaining washer at the same point on the new piston.

### 4 Putting the piston cartridge together

- Insert the inner plastic sleeve, the spring and the spring retainer into the piston cartridge.
- Slide the zirconium oxide piston carefully into the piston cartridge until its tip emerges from the small opening of the piston cartridge.
- Attach the screw and tighten it by hand.

## Mounting the piston

### 1 Reinserting the backup ring

Clean the backup ring (19-3) with ultrapure water and reinsert it.

### 2 Reinserting the piston cartridge

Screw the assembled piston cartridge back into the pump head and tighten, first by hand, then also using an adjustable wrench by approx. 15°.

Clean the second piston cartridge in the same way.

## Mounting the pump head

For this step, you need the following accessories:

- 4 mm hex key (6.2621.030)

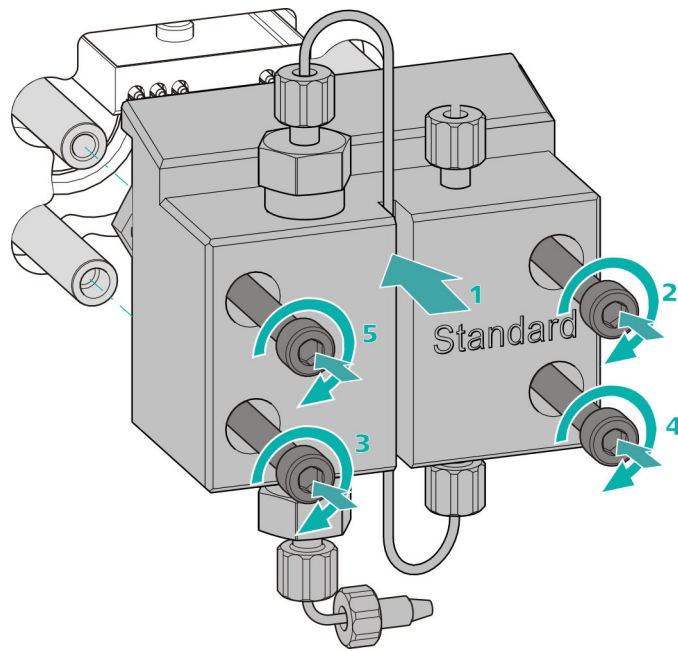
*Accessories*

## Mounting the pump head



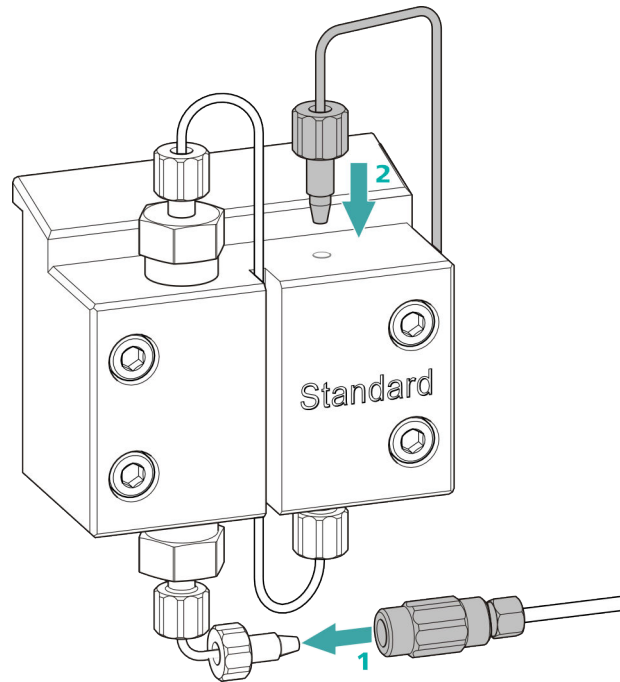
### NOTICE

The pump head cannot be mounted the wrong way, as it has fastening bolts with different bore hole depths, i.e., one fastening bolt is longer than all others. The bore hole with the greatest depth must therefore be aligned with the longest bolt.



- 1**
  - Push the pump head onto the four fastening bolts (1).
  - Tighten the four fastening screws using the hex key (6.2621.030) alternating crosswise.

### Connecting the entry and exit for the high-pressure pump



- 1
  - Remove the stopper from the coupling. Tighten the coupling to the pressure screw located on the pump head inlet capillary (1).
  - Reconnect the pump head outlet capillary to the pump head outlet (2).

## 4.7 Servicing the inline filter



### NOTICE

You can find a video sequence for this task in the *Multimedia Guide IC Maintenance* or on the Internet at <http://ic-help.metrohm.com/>.

#### Maintenance interval

The filter must be replaced at least every 3 months; it may need to be replaced more frequently, depending on the application.

#### Accessories

For this task, you need the following accessories:

- Two adjustable wrenches (6.2621.000) from the accessory kit: Vario/Flex Basic (6.5000.000)
- Tweezers
- A new filter from the packaging (6.2821.130)

### Removing the filter

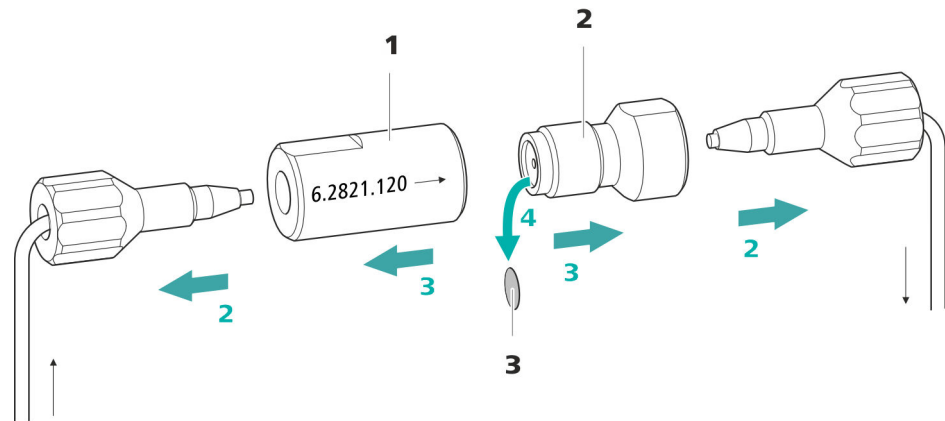


Figure 24 Inline filter – Removing the filter

#### 1 Filter housing

Inline filter housing. Part of the accessories (6.2821.120).

#### 2 Filter screw

Screw for the inline filter. Part of the accessories (6.2821.120).

#### 3 Filter (6.2821.130)

Pack contains 10 pieces.

#### 1 Shutting off the flow

Switch off the high-pressure pump in the software.

#### 2 Removing the inline filter

Unscrew both pressure screws from the inline filter.

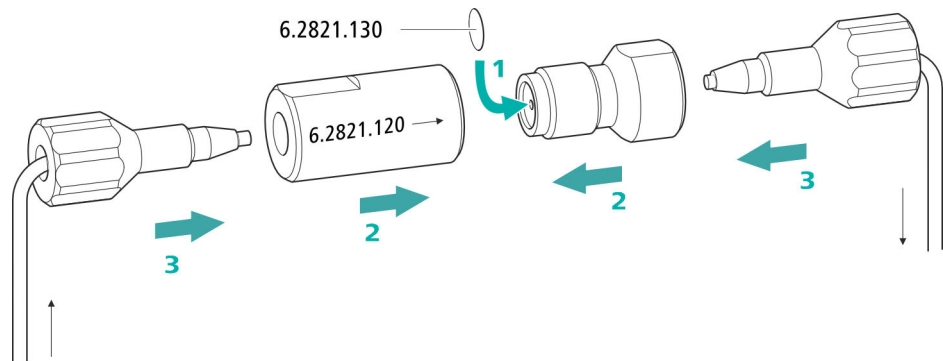
#### 3 Unscrewing the filter screw

Use two adjustable wrenches (6.2621.000) to loosen the filter screw (24-2) from the filter housing (24-1) and unscrew it by hand.

#### 4 Removing the filter

Remove the old filter (24-3) using tweezers.

### Inserting a new filter



#### 1 Inserting a new filter

- Use tweezers to carefully place a new filter into the filter screw (24-2) so that it is flat and press it firmly into place with the rear of the tweezers.

#### 2 Installing the filter screw

- Screw the filter screw (24-2) back into the filter housing (24-1) and tighten by hand. Then use two adjustable wrenches (6.2621.000) to tighten it slightly.

#### 3 Remounting the inline filter

- Screw pressure screws back onto the inline filter. Take care to ensure that the flow direction matches that inscribed on the inline filter.

#### 4 Rinsing the inline filter

- Dismantle the guard column (if present) and the separation column and replace with a coupling (6.2744.040).
- Rinse the instrument with eluent.
- Reinsert the columns after 10 minutes.

## 4.8 Servicing the pulsation absorber



### CAUTION

---

The pulsation absorber is maintenance-free and must not be opened.

## 4.9 Injection valve

Maintenance on the injection valve is best performed by specialist personnel from Metrohm during annual service.

## 4.10 Suppressor

### 4.10.1 Notes for operating the suppressor

To protect the suppressor against foreign particles or bacterial growth, a pump tubing connection with filter (6.2744.180) (see *"Installing the pump tubing"*, page 39) must be mounted between the peristaltic pump (see chapter 3.14.2, page 42) and the inlet capillaries of the suppressor.



### NOTICE

---

The suppressor units must never be regenerated in the same flow direction the eluent is pumped. Therefore, always mount the inlet and outlet capillaries according to the diagram outlined in *chapter Connecting the suppressor*, page 33.

The suppressor consists of 3 suppressor units, which are used for suppression, regenerated with regeneration solution and rinsed with ultrapure water in rotation. In order to record every new chromatogram under comparable conditions, you should normally work with a freshly regenerated suppressor.



### CAUTION

---

The suppressor must never be switched over if liquid is not flowing through it, since otherwise it may become jammed. If the suppressor is in a dry state, it must be rinsed for at least 5 minutes before it may be switched over.

**CAUTION**

The suppressor has to be regenerated (see chapter 4.10.3.2, page 78), cleaned (see chapter 4.10.3.3, page 80) or replaced (see chapter 4.10.3.4, page 82) if the capacity of the suppressor is reduced or if the backpressure is high.

## 4.10.2 Taking care of the suppressor housing

**CAUTION**

### The transparent suppressor housing can become fogged.

The suppressor housing is made of PMMA (poly(methyl methacrylate)). It can become scratched and foggy if cleaned improperly. This can make viewing the rotor difficult or impossible.

- Do **not use any scouring agents** for cleaning.
- Do **not use any solvents** for cleaning.

## 4.10.3 Servicing the suppressor

### 4.10.3.1 Parts of the suppressor

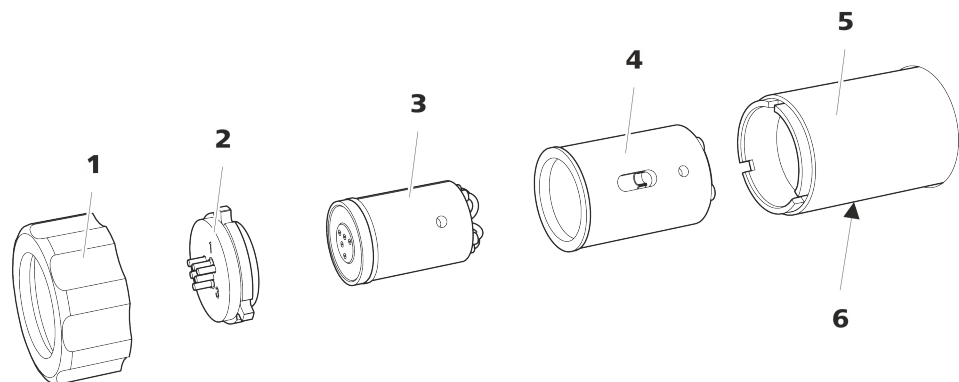


Figure 25 Parts of the suppressor

**1** Union nut

**3** Rotor

**5** Suppressor drive

**2** Connecting piece (6.2835.010)

**4** Adapter (6.2842.020)

**6** Slot in the housing

### 4.10.3.2 Regenerating the anion suppression rotor

If the anion suppressor units are loaded with certain heavy metals (such as iron) or organic contamination for long periods, then the standard regeneration solution may no longer be able to completely remove them. This constantly reduces the capacity of the suppressor units, which results in reduced phosphate sensitivity in mild cases and a large increase in the baseline in severe cases.

If such capacity problems occur at one or more positions, all anion suppressor units must be regenerated with one of the following solutions:

#### Regeneration solutions

- **Contamination with heavy metals or elevated backpressure:**  
1 mol/L H<sub>2</sub>SO<sub>4</sub> + 0.1 mol/L oxalic acid
- **Contamination with organic cationic complexing agents:**  
0.1 mol/L H<sub>2</sub>SO<sub>4</sub> / 0.1 mol/L oxalic acid / acetone 5%
- **Heavy contamination with organic substances:**  
0.2 mol/L H<sub>2</sub>SO<sub>4</sub> / acetone ≥ 20%
- **Contamination by certain environmental samples**  
1 mol/L H<sub>3</sub>PO<sub>4</sub>



#### NOTICE

If phosphoric acid has been used once as regeneration solution in an IC system, you will have to continue using phosphoric acid for regeneration. Regenerating it with sulfuric acid again can lead to problems in the baseline.



#### CAUTION

Pump tubing made of PVC must not be used for solutions containing organic solvents.

We recommend using the high-pressure pump for regeneration.

### Regenerating the anion suppressor rotor

#### 1 Disconnecting the Metrohm Suppressor Module (MSM) from the IC system

- Disconnect the capillaries of the MSM labeled **regenerant** and **rinsing solution** from the IC system.

## 2 Regenerating the Metrohm Suppressor Module (MSM)

Regenerate the three suppressor units one after the other for approx. 15 minutes using one of the solutions mentioned above.

- Connect the capillary labeled **regenerant** to the outlet of the high-pressure pump using a coupling (6.2744.040).
- Set the flow of the high-pressure pump to 0.5 mL/min in the software.
- Connect the regeneration solution to the high-pressure pump.
- Switch on the high-pressure pump.  
If the pressure decreases during regeneration, slowly increase the flow of the pump to a maximum of 2 mL/min. When doing so, make sure that the pressure does not exceed 2 MPa!
- After approx. 15 minutes, switch off the high-pressure pump.
- In the software, use the **Step** command to switch to the next suppressor unit and regenerate it as described above.
- As soon as all three suppressor units have been regenerated, disconnect the capillary labeled **regenerant** from the coupling.

## 3 Rinsing the Metrohm Suppressor Module (MSM)

After regeneration, each of the three suppressor units must be rinsed with degassed ultrapure water for about 15 minutes.

- Connect the capillary labeled **rinsing solution** to the outlet of the high-pressure pump using a coupling (6.2744.040).
- Set the flow of the high-pressure pump to 0.5 mL/min in the software.
- Connect the ultrapure water to the high-pressure pump.
- Switch on the high-pressure pump.  
If the pressure decreases during rinsing, slowly increase the flow of the pump to a maximum of 2 mL/min. When doing so, make sure that the pressure does not exceed 2 MPa!
- After approx. 15 minutes, switch off the high-pressure pump.
- In the software, use the **Step** command to switch to the next suppressor unit and rinse it as described above.
- As soon as all three suppressor units have been rinsed, disconnect the capillary labeled **rinsing solution** from the coupling.

## 4 Connecting the Metrohm Suppressor Module (MSM) to the IC system

- Reconnect the capillaries of the MSM labeled **regenerant** and **rinsing solution** to the IC system.
- Reconnect the entry and the exit of the high-pressure pump to the IC system.



## 5 Inserting the rotor



### CAUTION

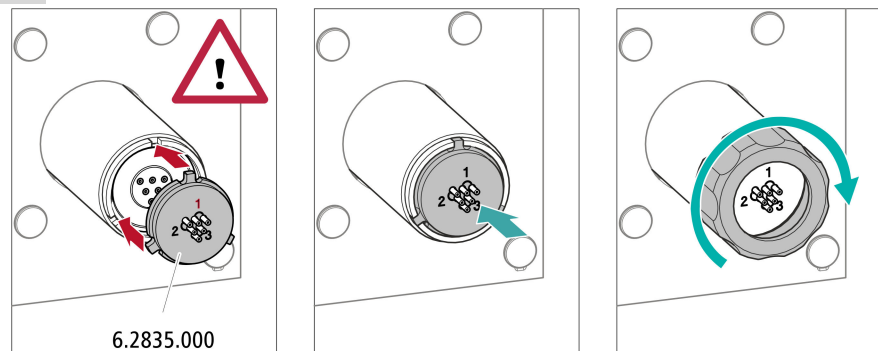
Rotor A may be destroyed during start-up if not inserted correctly.

- Insert the rotor (25-3) into the adapter (see "Inserting the MSM rotor into the adapter", page 31).
- Insert the adapter into the suppressor drive (see "Inserting the adapter into the suppressor drive", page 32).  
The rotor's sealing surface is located approx. 4 mm deep inside the suppressor drive if the adapter with the rotor is inserted correctly. If this is not the case, the adapter must be moved into the correct position from below by means of a pointed object.

## 6 Cleaning the connecting piece

- Clean the sealing surface of the connecting piece (25-2) with ethanol using a lint-free cloth.

## 7 Inserting the connecting piece



- Insert the connecting piece into the suppressor drive so that connector 1 is on top and the 3 pins of the connecting piece fit into the corresponding recesses on the suppressor drive.
- Reattach the union nut (25-1) and tighten by hand (do not use a tool).

## 8 Connecting and conditioning the suppressor

- Reconnect the suppressor to the IC system.
- Before switching the suppressor over for the first time, rinse each of the 3 suppressor units with solution for 5 minutes.

### 4.10.3.4 Replacing parts of the suppressor

Parts of the suppressor may have to be replaced in the following cases:

- Irremediable loss of suppressor capacity (reduced phosphate sensitivity and/or significant rise in the baseline).
- Irremediable blockage of the suppressor (solutions can no longer be pumped through the suppressor).

Both the rotor and the connecting piece can be replaced.

#### Replacing parts of the suppressor

##### 1 Disconnecting the suppressor from the IC system

- Switch off the instrument.
- Disconnect all capillaries of the suppressor from the IC system.

##### 2 Dismantling the suppressor

- Unscrew the union nut (25-1) from the suppressor drive (25-5).
- Pull the connecting piece (25-2) out of the suppressor drive together with the rotor (25-3) and the adapter.  
If the rotor and/or the adapter gets stuck in the suppressor drive, you can push it out as follows:  
Put a pointed object into the slot in the suppressor drive and use it to push out the rotor and/or the adapter.
- Loosen the connecting piece from the rotor.

##### 3 Cleaning the new rotor

- Clean the sealing surface of the new rotor (25-3) with ethanol using a lint-free cloth.

##### 4 Inserting the new rotor



#### CAUTION

The rotor may be destroyed during start-up if it is not inserted correctly.

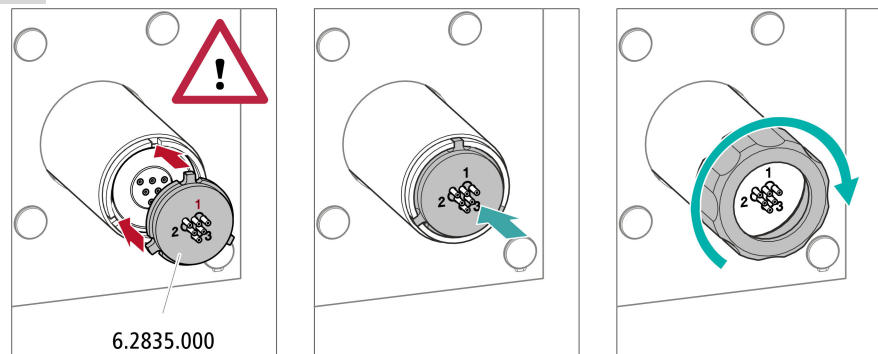
- Insert the rotor (25-3) into the adapter (see "Inserting the MSM rotor into the adapter", page 31).

- Insert the adapter into the suppressor drive (see "Inserting the adapter into the suppressor drive", page 32).  
The rotor's sealing surface is located approx. 4 mm deep inside the suppressor drive if the adapter with the rotor is inserted correctly. If this is not the case, the adapter must be moved into the correct position from below by means of a pointed object.

## 5 Cleaning the new connecting piece

- Clean the sealing surface of the new connecting piece (25-2) with ethanol using a lint-free cloth.

## 6 Inserting the new connecting piece



- Insert the connecting piece into the suppressor drive so that connector 1 is on top and the 3 pins of the connecting piece fit into the corresponding recesses on the suppressor drive.
- Reattach the union nut (25-1) and tighten it by hand.

## 7 Connecting and conditioning the suppressor

- Reconnect all capillaries of the suppressor to the IC system.
- Before switching the suppressor over for the first time, rinse the 3 suppressor units with solution for 5 minutes.

## 4.11 Peristaltic pump

### 4.11.1 Notes on operating the peristaltic pump

The flow rate of the peristaltic pump depends on the drive speed (set using the software), the contact pressure and, above all, the inner diameter of the pump tubing. Depending on the application, different pump tubing is used. Select pump tubing that best matches your application (*see table 2, page 38*).



#### CAUTION

The service life of the pump tubing primarily depends on the contact pressure.

If the peristaltic pump is switched off for long periods, lift up the tubing cartridges on the right side by releasing the snap-action levers. This ensures that the contact pressure will be maintained once it has been set.



#### CAUTION

The pump tubing (6.1826.xxx) is made of PVC or PP and therefore must not be used for rinsing with solutions containing organic solvents. In this case, use different pump tubing or use another pump for rinsing.

### 4.11.2 Servicing the peristaltic pump

#### 4.11.2.1 Replacing the pump tubing

Pieces of pump tubing inserted into the peristaltic pump are consumables with a limited service life.

Pieces of pump tubing with 3 stoppers are tensioned in the tubing cartridge so that they end up positioned between two stoppers. This results in two possible positions for the tubing cartridge. Once the pump tubing exhibits significant signs of wear, it can be tensioned a second time in the other respective position.

*Maintenance interval* Replace the pump tubing every 2 months.

Replace the pump tubing every 4 weeks if the peristaltic pump is being used continuously.

### 4.11.2.2 Replacing the filter

The filters inserted into the pump tubing connection with locking nut and filter (6.2744.180) must be replaced regularly.

*Maintenance interval* We recommend replacing the filters (6.2821.130) (26-2) every three months. The filters may need to be replaced more frequently, depending on the application.

*Accessories* For this step, you need the following accessories:

- 1 filter from the spare filter set (6.2821.130)
- 2 adjustable wrenches (6.2621.000)
- Tweezers

#### Replacing the filter

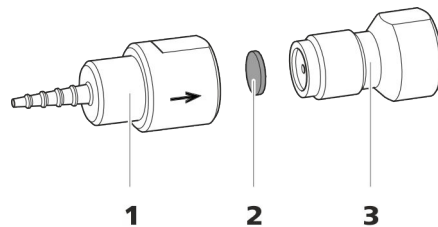


Figure 26 Pump tubing connection – Replacing the filter

**1** Tubing olive

**2** Filter (6.2821.130)  
Pack contains 10 pieces.

**3** Filter screw

#### 1 Unscrewing the filter screw

- Unscrew the filter screw (26-3) from the tubing olive (26-1) using the two adjustable wrenches.

#### 2 Replacing the filter

- Remove the old filter (26-2) using tweezers.
- Use tweezers to place the new filter (26-2) on the filter screw (26-3) so that it is **flat** and press it firmly into place with the rear of the tweezers.

#### 3 Installing the filter screw

- Screw the filter screw (26-3) back into the tubing olive (26-1) and start by tightening it by hand. Finish tightening it using the two adjustable wrenches.



If the sample is injected automatically, the rinsing time must be at least three times the **transfer time**.

### Checking the rinsing time

You can determine if the applied rinsing time is sufficient by measuring the sample carry-over directly. Proceed as follows to do this:

#### 1 Preparing two samples

- **Sample A:** A typical sample for the application.
- **Sample B:** Ultrapure water.

#### 2 Determining "Sample A"

Allow "Sample A" to run through the sample path for the duration of the rinsing time; inject and then measure it.

#### 3 Determining "Sample B"

Allow "Sample B" to run through the sample path for the duration of the rinsing time; inject and then measure it.

#### 4 Calculating the sample carry-over

The sample carry-over corresponds to the ratio of the peak areas of the measurement from Sample B to the measurement from Sample A. The smaller this ratio, the smaller the amount of sample carry-over. This ratio can be changed by varying the rinsing time. This can be used to determine the required rinsing time for the application.

## 4.14 Separation column

### 4.14.1 Separating efficiency

The analysis quality that can be attained depends in a large part on the separating efficiency of the separation column being used. The separating efficiency of the selected separation column must be sufficient for the current analysis problems. If difficulties arise, start by checking the quality of the separation column in each case by recording a standard chromatogram.

You can find detailed information on the separation columns available from Metrohm in the leaflet provided along with your separation column, in the **Metrohm IC Column Program** (available from your Metrohm representative) or on the Internet at <http://www.metrohm.com> in the Ion Chromatography product area. You can find information on special IC applications in the corresponding "**Application Bulletins**" or "**Application Notes**", which are available on the Internet at <http://>



## 5 Troubleshooting

<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
<b>Marked drop in pressure.</b>	<i>Leak in the system.</i>	Check the capillary connections and seal leaks, if necessary ( <i>see chapter 3.5, page 14</i> ).
<b>The baseline has a large amount of noise.</b>	<i>The eluent path has a leak.</i>	Check the eluent path and fix the leak. If necessary, tighten the pressure screws using a wrench (6.2739.000).
	<i>High-pressure pump – Contaminated pump valves.</i>	Clean the pump valves ( <i>see chapter 4.6, page 60</i> ).
	<i>The eluent path is blocked.</i>	Check the eluent path and eliminate the blockage.
	<i>Contaminations in the eluent</i>	Check the quality of the chemicals and the water.
	<i>High-pressure pump – Defective piston seals.</i>	Replace the piston seals ( <i>see chapter 4.6, page 60</i> ).
	<i>The pulsation absorber is not connected.</i>	Connect the pulsation absorber ( <i>see chapter 3.11, page 28</i> ).
	<i>The pulsation absorber is not connected or is defective.</i>	Connect ( <i>see chapter 3.11, page 28</i> ) or replace the pulsation absorber.
<b>The baseline is drifting.</b>	<i>Leak in the system.</i>	Check all capillary connections and seal leaks, if necessary ( <i>see chapter 3.5, page 14</i> ).
	<i>The organic solvent in the eluent is evaporating.</i>	<ul style="list-style-type: none"> <li>▪ Check the eluent bottle cap (<i>see chapter 3.8, page 23</i>).</li> <li>▪ Constantly stir the eluent.</li> </ul>
<b>The pressure in the system markedly increases.</b>	<i>The inline filter (6.2821.120) is blocked.</i>	Replace the filter (6.2821.130) .
	<i>The suppressor is blocked.</i>	<ul style="list-style-type: none"> <li>▪ Regenerate the suppressor .</li> </ul> <p>Note: Pump tubing connection with filter (6.2821.180) must be used.</p>



<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
	<i>Peristaltic pump – Pump tubing defective.</i>	Replace the pump tubing ( <i>see chapter 4.11.2.1, page 84</i> ).
<b>Data of the separation column cannot be read.</b>	<i>Column chip dirty.</i>	Clean the contact surfaces of the column chip with ethanol.
	<i>Column chip is defective.</i>	<ol style="list-style-type: none"> <li>1. Save column configuration in MagIC Net.</li> <li>2. Notify Metrohm Service.</li> </ol>
<b>Individual peaks are greater than expected.</b>	<i>Sample – Sample carry-over from previous measurements.</i>	Check the rinsing time ( <i>see "Checking the rinsing time", page 87</i> ).
<b>MSM – Insufficient flow of regeneration solution or rinsing solution.</b>	<i>There is a leak in the system.</i>	Check all connections.
	<i>Peristaltic pump – Contact pressure too weak.</i>	Correctly set the contact pressure.
	<i>Peristaltic pump – Filter blocked.</i>	Replace the filter.
	<i>Suppressor – Backpressure too high.</i>	Clean the suppressor ( <i>see chapter 4.10.3.3, page 80</i> ) or replace parts ( <i>see chapter 4.10.3.4, page 82</i> ).
	<i>Peristaltic pump – Pump tubing defective.</i>	Replace the pump tubing.
<b>The background conductivity is too high.</b>	<i>Suppressor – Not connected.</i>	Connect the suppressor .
	<i>The incorrect eluent is being used.</i>	Change the eluent ( <i>see chapter 4.4.2, page 59</i> ).
	<i>Suppressor – No or insufficient flow of regeneration solution or rinsing solution.</i>	Check the flow of the regeneration solution and of the rinsing solution ( <i>see chapter 3.13.3, page 33</i> ).
<b>The retention times are poorly reproducible.</b>	<i>The eluent path has a leak.</i>	Check all of the connections along the eluent path and fix the leak.
	<i>The eluent path is blocked.</i>	Check the eluent path and eliminate the blockage.
	<i>The eluent contains gas bubbles.</i>	<ul style="list-style-type: none"> <li>▪ Deaerate the high-pressure pump (<i>see chapter 3.18, page 47</i>).</li> </ul>



## 6 Technical specifications

### 6.1 Reference conditions

The technical data listed in this Chapter refers to the following reference conditions:

<i>Ambient temperature</i>	+25 °C (± 3 °C)
<i>Instrument status</i>	> 40 minutes in operation (equilibrated)

### 6.2 Instrument

<i>IC system</i>	<ul style="list-style-type: none"> <li>▪ Metal-free IC system</li> <li>▪ Compact system with modular design</li> </ul>
<i>Material</i>	Painted polyurethane hard foam without CFCs, fire class V0
<i>Operating pressure range</i>	<ul style="list-style-type: none"> <li>▪ 0 - 50 MPa (500 bar) high pressure pump</li> <li>▪ 0 - 35 MPa (350 bar) standard-PEEK system</li> </ul>
<i>Intelligent components</i>	iPump, iDetector, iColumn, MagIC Net

### 6.3 Ambient conditions

<i>Operation</i>	
<i>Ambient temperature</i>	+5 - +45 °C
<i>Humidity</i>	20 - 80 % relative humidity
<i>Storage</i>	
<i>Ambient temperature</i>	-20 - +70 °C
<i>Transport</i>	
<i>Ambient temperature</i>	-40 - +70 °C



## 6.4 Housing

### *Dimensions*

*Width* 262 mm

*Height* 468 mm

*Depth* 362 mm

*Base tray, housing and cover plate 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

## 6.5 Injection valve

*Actuator switching time* typ. 100 ms

*Maximum operating pressure* 35 MPa (350 bar)

*Material* PEEK

## 6.6 Suppressor

*Resistance to solvents* No restriction

*Switching time* Typ. 100 ms

*Operating pressure* 2.5 MPa (25 bar), valve function prevents damage at overpressure

## 6.7 Peristaltic pump

<i>Type</i>	2-channel peristaltic pump
<i>Shift direction</i>	Clockwise/counterclockwise
<i>Rotational speed</i>	0 - 42 rpm in 7 levels of 6 rpm each
<i>Pumping characteristics</i>	0.3 mL/min at 18 rpm; with standard pump tubing (6.1826.420)
<i>Pump tubing material</i>	Recommended: PharMed® (Ismaprene)

## 6.8 Detector

You can find the technical specifications for the detector in the manual for the detector.

## 6.9 Power connection

<i>Required supply voltage</i>	100 - 240 V $\pm$ 10% (autosensing)
<i>Required frequency</i>	50 - 60 Hz $\pm$ 3 Hz (autosensing)
<i>Power consumption</i>	<ul style="list-style-type: none"> <li>▪ 65 W for typical analysis application</li> <li>▪ 25 W standby (conductivity detector to 40 °C)</li> </ul>
<i>Power supply unit</i>	<ul style="list-style-type: none"> <li>▪ Up to 300 W maximum, electronically monitored</li> <li>▪ Internal fuse 3.15 A</li> </ul>

## 6.10 Interfaces

<i>USB</i>	
<i>Entry</i>	1 USB upstream, type B (for connection to the PC)
<i>Detector</i>	1 15-pin high-density DSUB (female)
<i>Column recognition</i>	for an intelligent column



## 6.11 Weight

*Weight* 14.8 kg (without accessories)

## 7 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. **2.883.0020**) 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.



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