883 Basic IC plus

2.883.0020

Manual

8.883.8001EN / 2014-01-17

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Documentation in additional languages can be found on *http://documents.metrohm.com*.

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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 functionality. 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 system. It is equipped with a chip where its technical specifications and "life history" (operating hours, service data, etc.) are saved.

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, 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, 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.

The present instrument is suitable for processing chemicals and flammable samples. Usage of the 883 Basic IC plus therefore requires the user to have basic knowledge and experience in handling toxic and caustic substances. Knowledge with respect to the application of the fire prevention measures prescribed for laboratories is also mandatory.

1.3 Safety instructions

1.3.1 General notes on safety

WARNING

This instrument may only be operated in accordance with the specifications in this documentation.

This instrument has 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.

Mains voltage

WARNING

An incorrect mains voltage can damage the instrument.

Only operate this instrument with a mains 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 mains cable out of the mains connection 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.

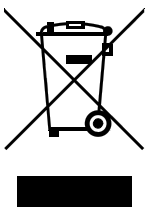
1.3.4 Flammable solvents and chemicals

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 2002/96/EC, WEEE – Waste from Electrical and Electronic Equipment.

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

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

2 Overview of the instrument

2.1 Front

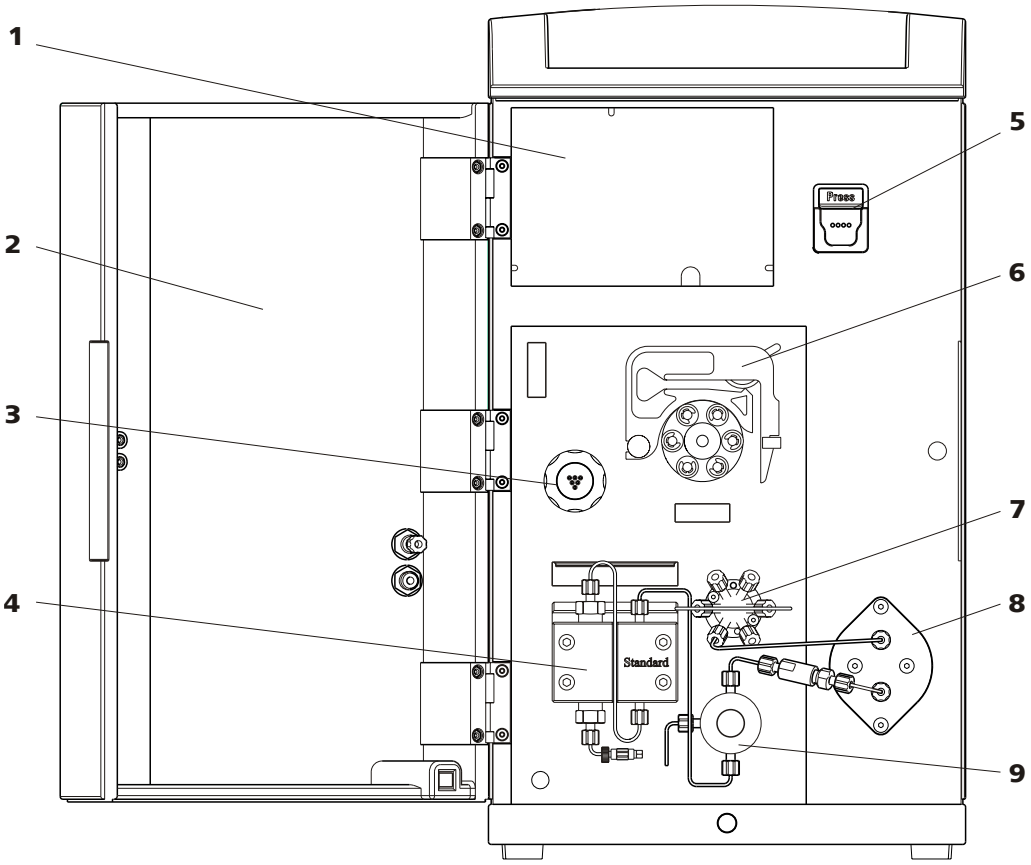


Figure 1 Front 883 Basic IC plus

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

2.2 Rear

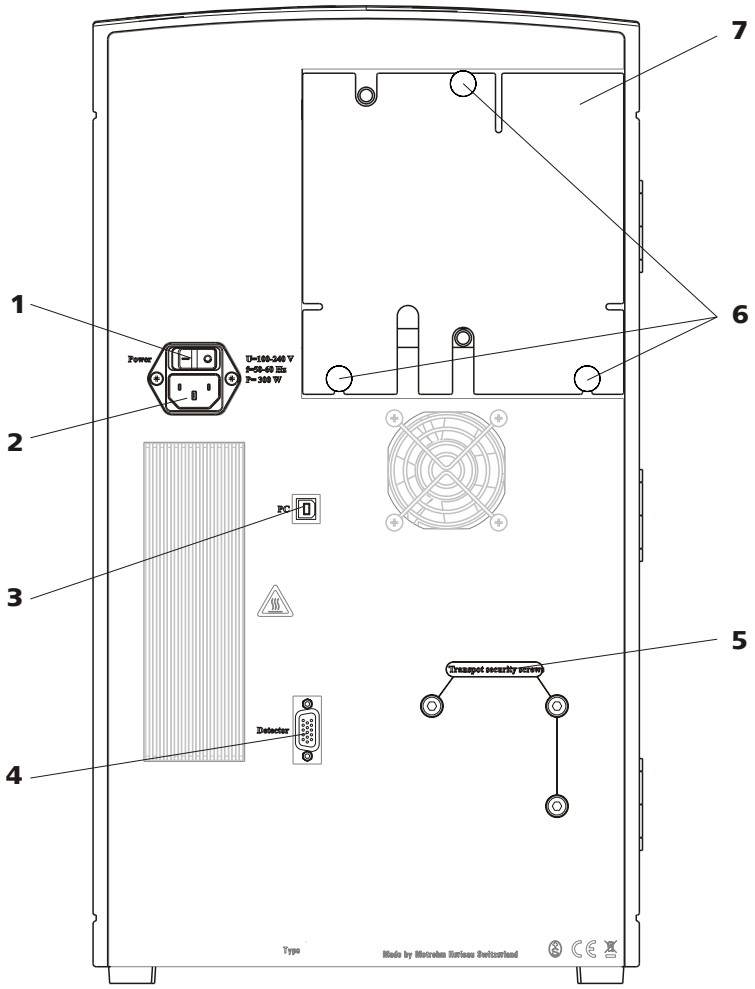


Figure 2 Rear 883 Basic IC plus

1	**On/Off switch**	**2**	**Mains connection socket**
3	**PC connection socket**	**4**	**Detector connection socket**
5	**Transport locking screws**	**6**	**Knurled screws** for fastening the removable rear panel.
7	**Rear panel** Removable. Access to the detector chamber.		

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

NOTE

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

You 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 input capillary (6.1831.100) *(3-**2**)* using a PEEK pressure screw (6.2744.014).
- Connect the column input 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 two 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 input 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 45)*.

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 output capillary *(3-**20**)* from inside to the Luer connector of the door *(6-**1**)* using a PEEK pressure screw (6.2744.070) *(6-**3**)*. The sample then can 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 output capillary into a waste container and fasten it there.

5 Installing the peristaltic pump

(see Chapter 3.14, page 37)

- 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 output 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 Chapter 3.16.1, page 46)*.
- Connect the instrument to the power supply *(see Chapter 3.16.2, page 46)*.

8 Initial start-up

(see Chapter 3.17, 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 and separation column

- Remove the coupling (6.2744.040) between the column input capillary and the eluent input capillary of the suppressor.
- Cut the column input capillary (6.1831.100) *(3-**2**)* to the required length with the capillary cutter (6.2621.080).
- Optionally (to improve the measuring results): Cut a piece of the green EVA tubing (6.1806.100) that is 5 mm shorter than the column input capillary and pull it over the column input capillary *(3-**3**)*.
- Connect the guard column (optional) *(see Chapter 3.18, page 49)*.
  - Connect the guard column to the end of the column input capillary as described in the leaflet supplied with the guard column.
  - Rinse the guard column.

- Connect the separation column *(see Chapter 3.19, page 51)*.
  - Connect the inlet of the separation column to the end of the column input 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 3.20, 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.

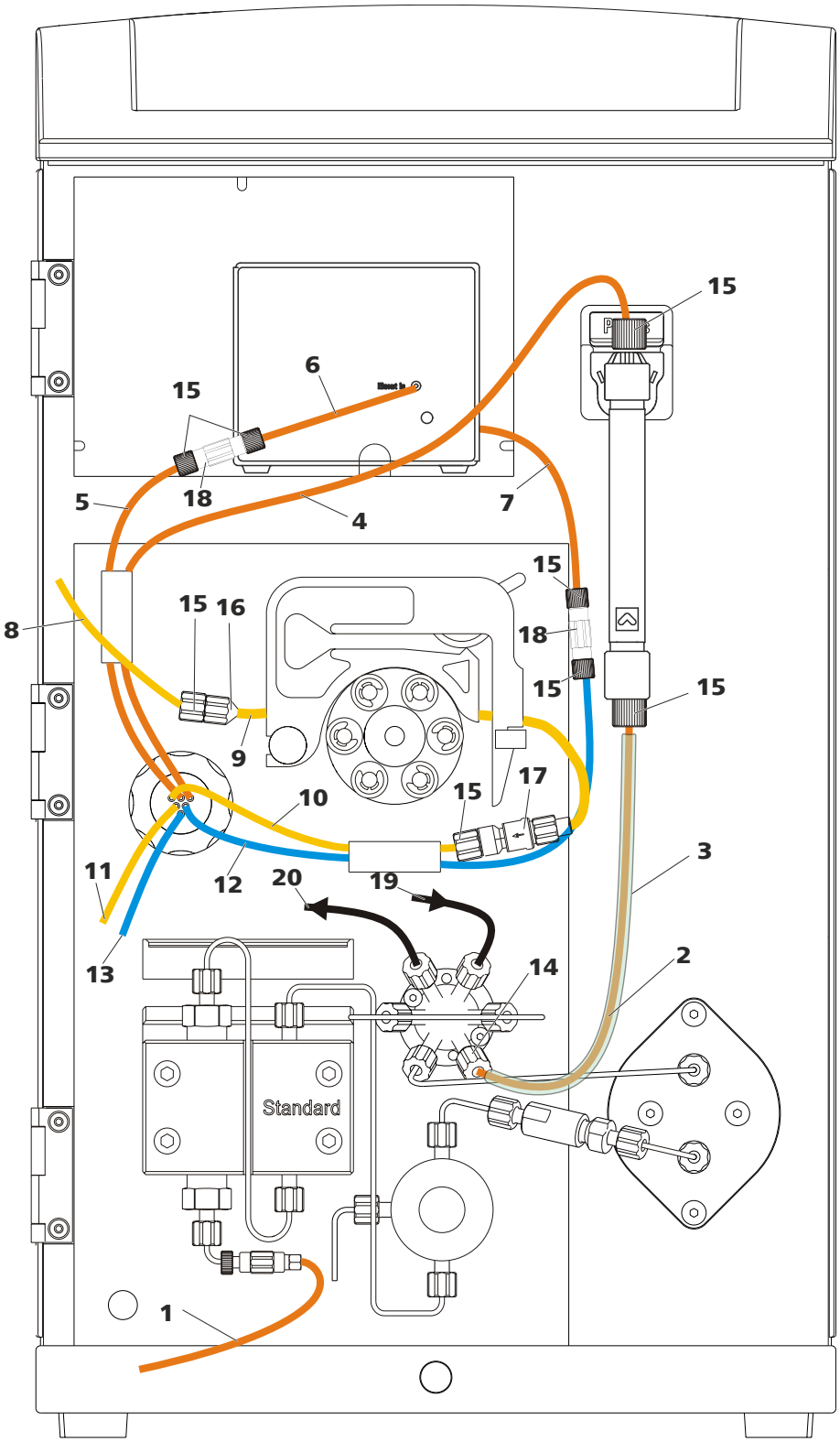


Figure 3 Installation diagram 883 Basic IC plus

1 **Eluent aspiration tubing (6.1834.080)**	**2** **PEEK capillary (6.1831.100)** As column input capillary.

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

3.4 Setting up the instrument

3.4.1 Packaging

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

3.4.2 Checks

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

3.4.3 Location

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

Place the instrument in a location of the laboratory which is suitable for operation, free of vibrations, protected from corrosive atmosphere, and contamination by chemicals.

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

3.5 Capillary connections in the IC system

Generally speaking, capillary connections between two components of an IC system are made up of one connection capillary and two pressure screws used to connect the capillary to the respective components.

Pressure screws

Three types of pressure screws are used in the IC system:

Number	Designation	Use
6.2744.010 / 6.2744.014	Pressure screw	On the injection valve
6.2744.070	Pressure screw, short	High-pressure pump, purge valve, inline filter, pulsation absorber, separation columns
6.2744.090	Pressure screw, long	MCS, sample degasser, 12-port valve

Pressure screws are tightened and loosened by hand. A tool is not needed.

Also see: *PEEK pressure screws* video on the Internet *http://ic-help.metrohm.com/maintenance.php?chapter=1_2*.

Connection capillaries

PEEK capillaries and PTFE capillaries are used in the IC system.

PEEK capillaries (polyetheretherketone)

PEEK capillaries are temperature-resistant up to 100 °C, stable under pressure up to 400 bar (depending on the inner diameter), flexible, chemically inert and have an extremely smooth surface. They can be readily cut down to the desired length with the capillary cutter (6.2621.080).

Use:

- 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 0.75 mm (6.1831.030) for sample processing in the ultratrace range.

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.
- PTFE capillaries with an inner diameter of 0.97 mm for sample processing and rinsing solutions (they are not necessarily included in the scope of delivery of the instrument).

Capillary connections

NOTE

If you work with an increased system pressure (> 15 MPa), capillaries may slip out of the pressure screws.

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.

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/maintenance.php?chapter=1_1*.

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.

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, such as with a hairdryer.

   The colored sleeve shrinks and adapts to the shape of the capillary.

NOTE

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

3.6 Installation on the rear of the instrument

3.6.1 Positioning and connecting the detector

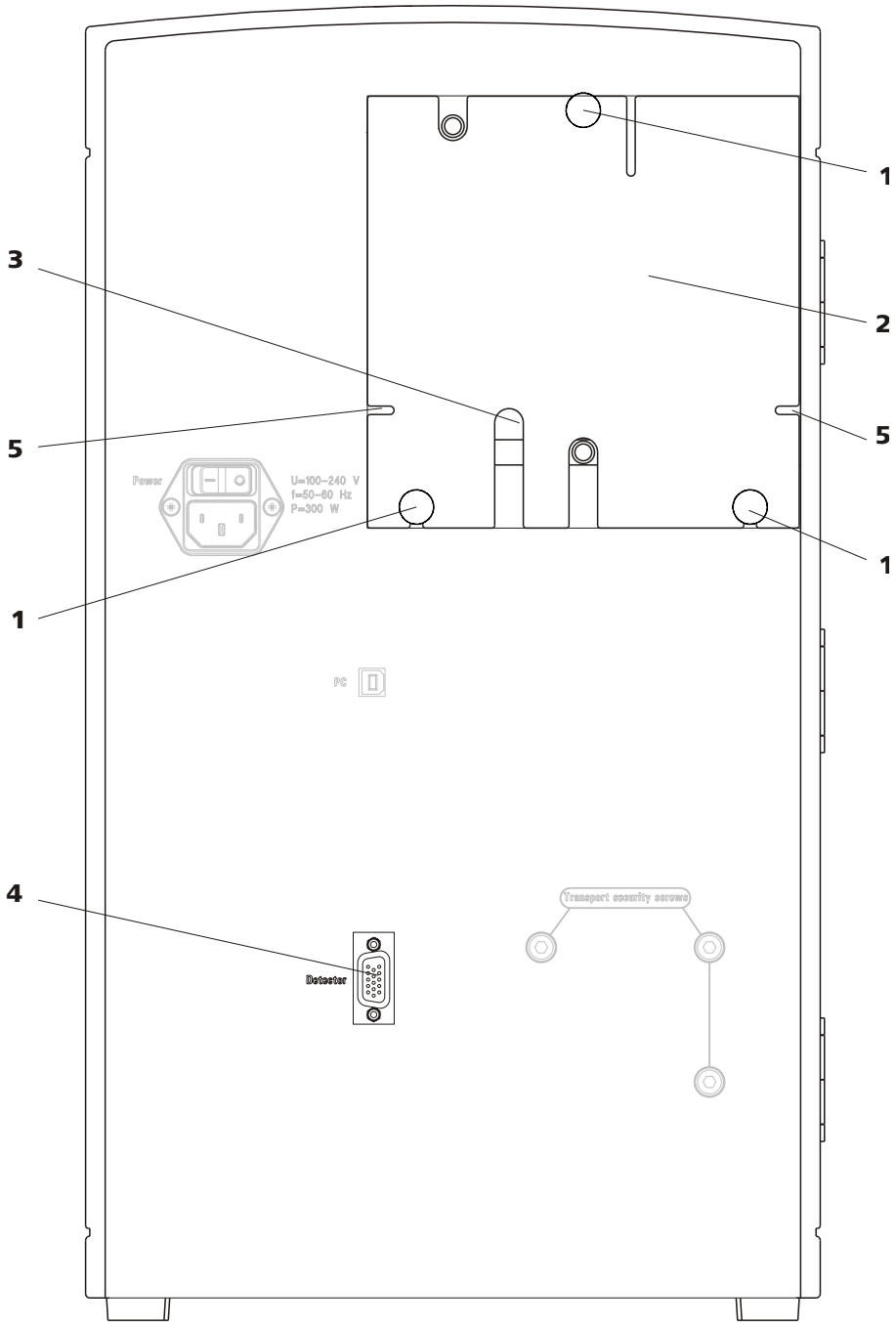


Figure 4 Positioning the detector

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.

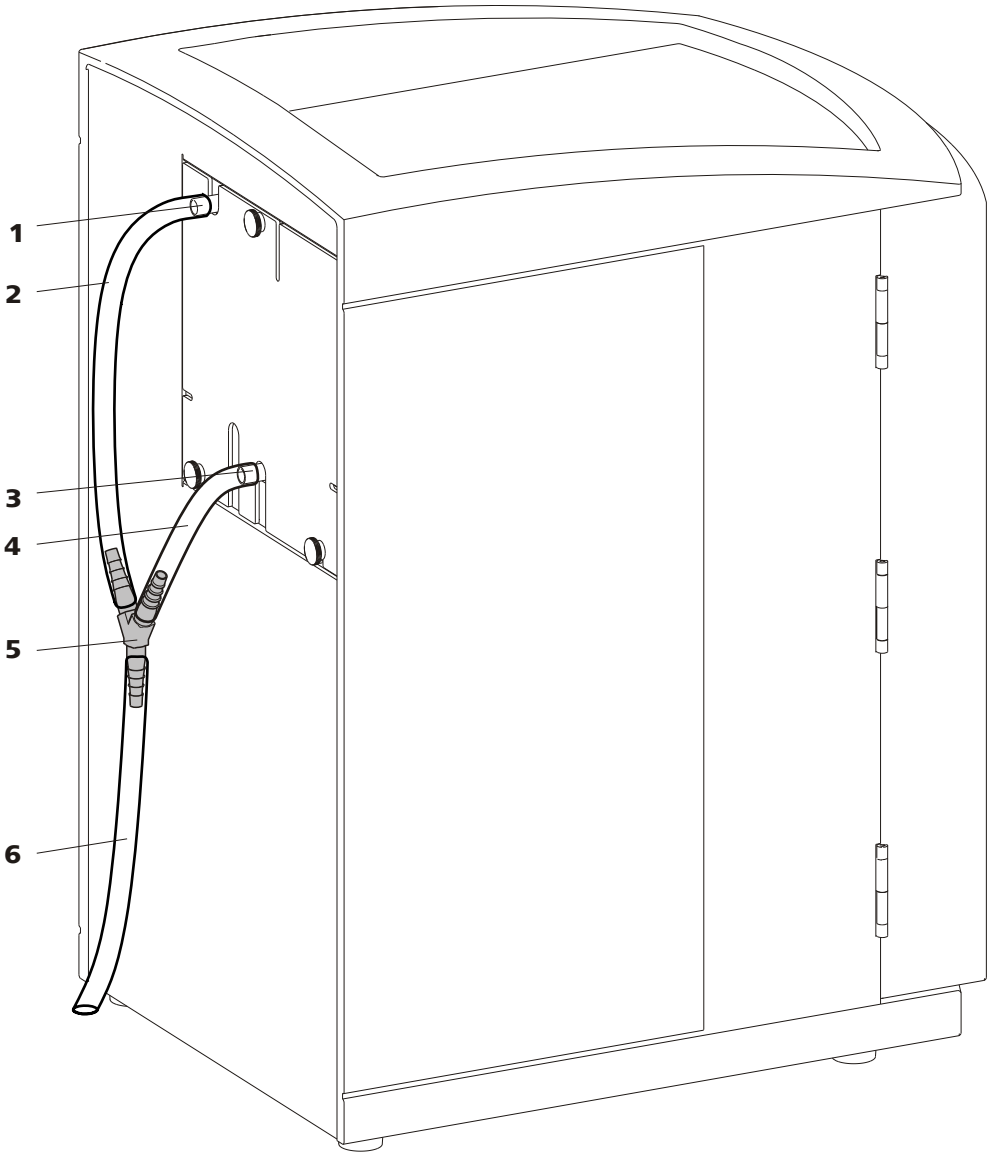


Figure 5 Drainage tubing

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

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**)* and 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 *(4-**5**)*.

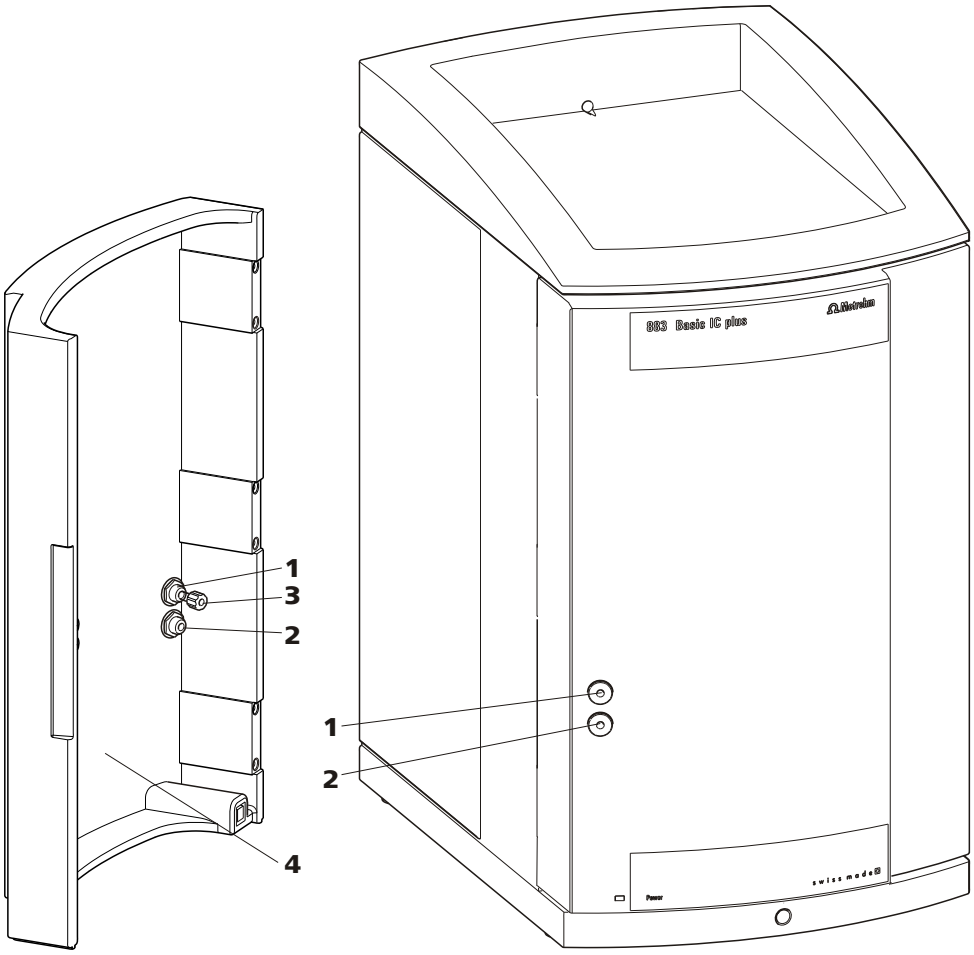


Figure 6 Capillary feed-throughs on the door

1	**Luer connector** For connecting a (6.2816.020) syringe. For manual sample feeding.	**2**	**Capillary feed-through**
3	**PEEK pressure screw (6.2744.070)**	**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 input for the high-pressure pump.

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)

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.

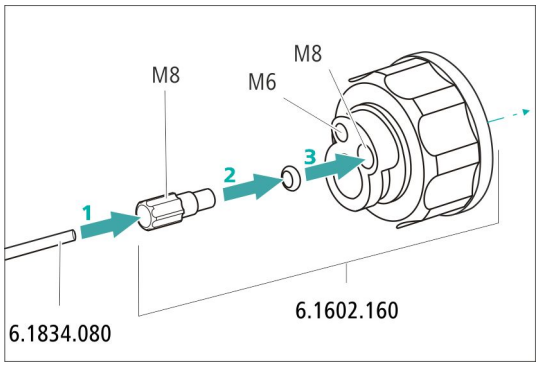


Figure 7 Installing the eluent bottle cap

2 Mounting the tubing adapter and the aspiration filter

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.

Installing the aspiration filter:

NOTE

Only handle the aspiration filter while wearing gloves.

- 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.

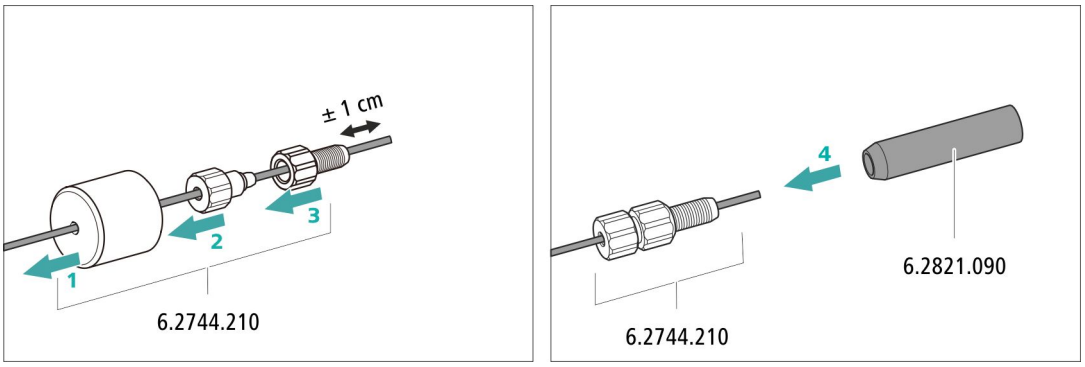
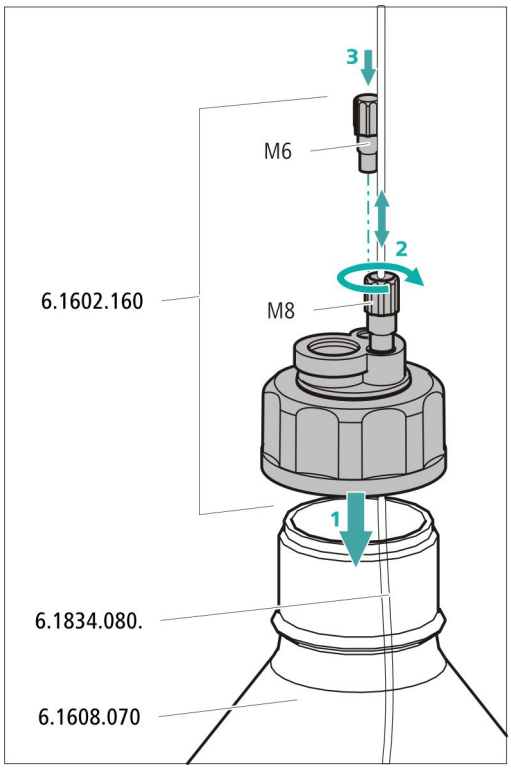


Figure 8 Installing tubing weighting and aspiration filter

3 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 fasten 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.



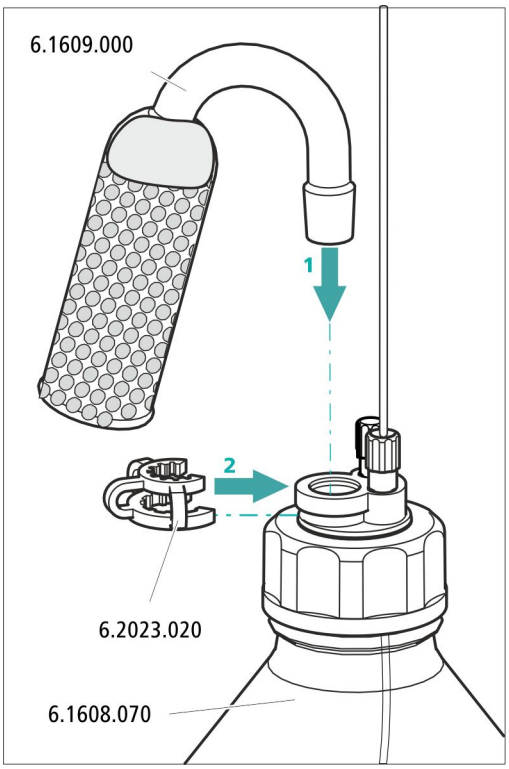
4 Mounting the adsorber tube

NOTE

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 CO_2 adsorber material.
- For all other eluents: only 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.

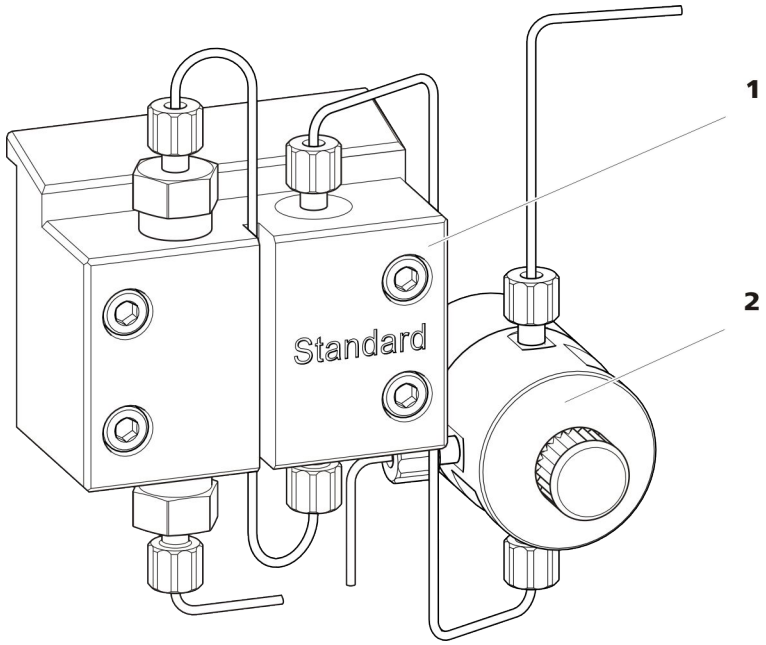


Figure 9 High-pressure pump with purge valve

1 Pump head	**2 Purge valve**

3.10 Installing an inline filter

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

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

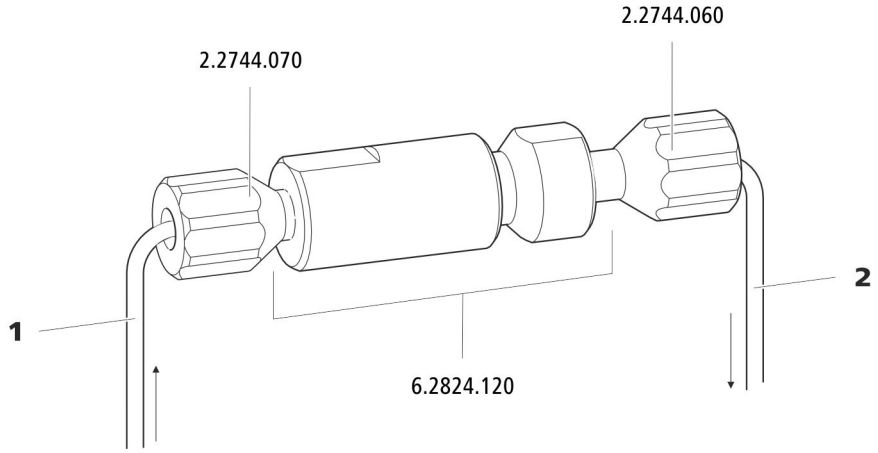


Figure 10 Inline filter

1 **Input capillary** Connected to the purge valve.	**2** **Output capillary** Connected to the pulsation absorber.

The inline 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.

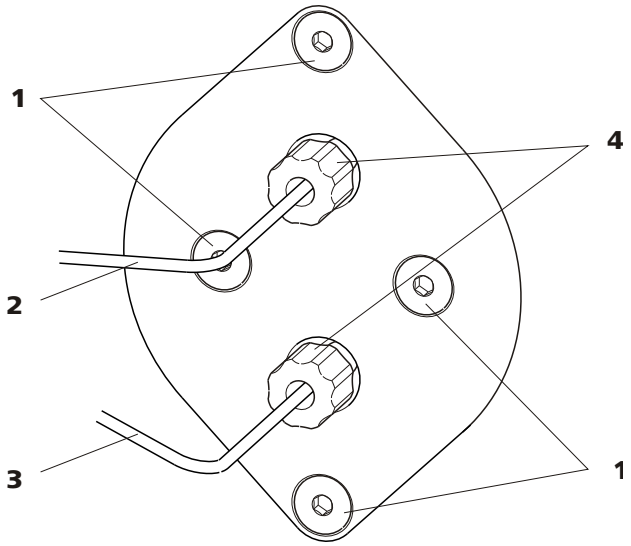


Figure 11 Pulsation absorber

1 **Fastening screws**	**2** **Connection capillary** Connection to injection valve.
3 **Connection capillary** Connection to inline 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 injected sample solution is determined either by the volume of the sample loop or by an 800 Dosino, if Metrohm's intelligent partial loop injection techniques (MiPT) are being used. For these techniques, a large sample loop is used, but it is only filled part way.

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

Table 1 Which sample loop do I need?

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)*.

NOTE

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

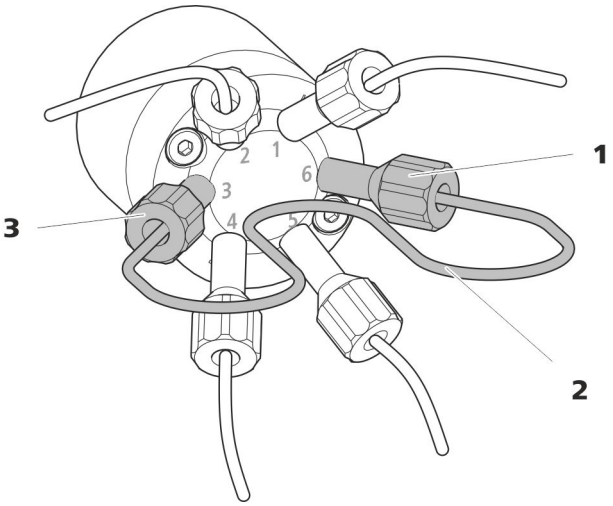


Figure 12 Exchanging the sample loop

1 **Pressure screw** Fastened to Port 6.	**2** **Sample loop**
3 **Pressure screw** Fastened to Port 3.	

Exchanging the sample loop

1 Removing the existing sample loop

- Unscrew 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 three suppressor units, which are used for suppression, regenerated with sulfuric acid, and rinsed with ultrapure water in rotation.

Suppression reaction in the suppressor

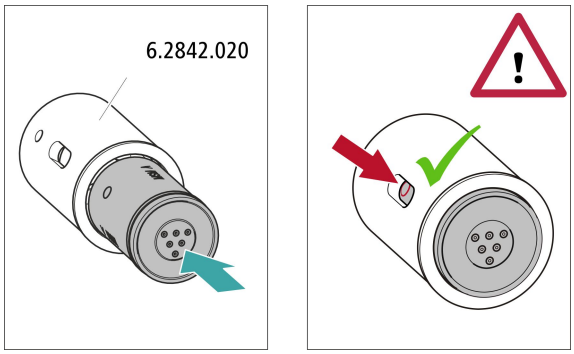
When using a carbonate eluent, the following reaction (amongst others) occurs in the suppressor:

$R\text{-}SO_3^-H^+ + NaHCO_3/Na_2CO_3 \rightarrow R\text{-}SO_3^-Na^+ + H_2O + CO_2$

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.



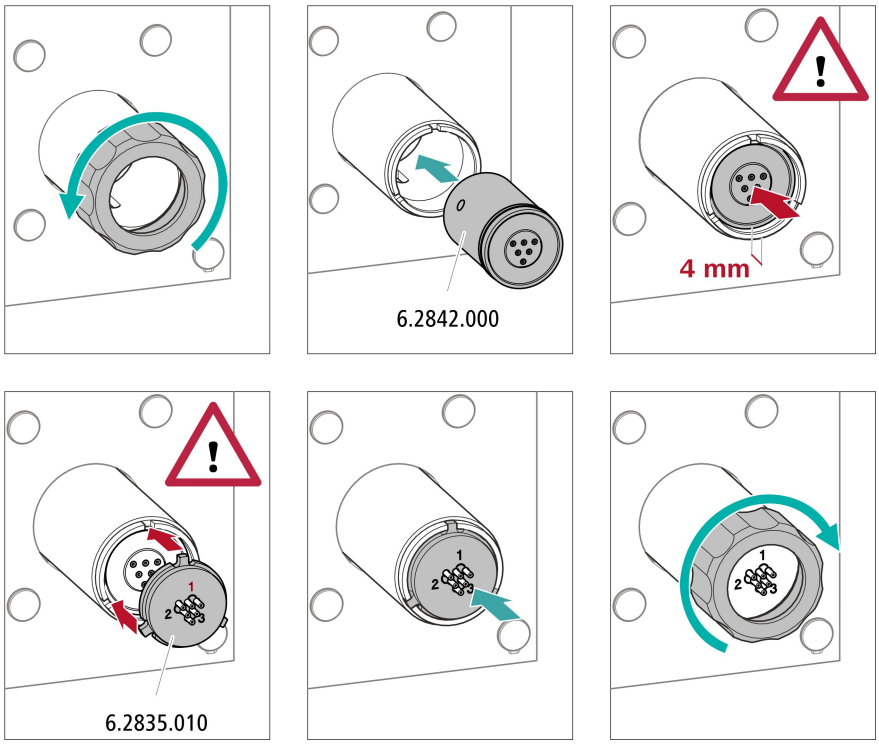
1 **Inserting the MSM rotor into the adapter**

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 three 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 three holes of the rotor is visible from below in the slot of the suppressor drive.

NOTE

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 three 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 three inputs and outputs of the suppressor units, numbered 1, 2 and 3 on the connecting piece, each have two fixed mounted PTFE capillaries.

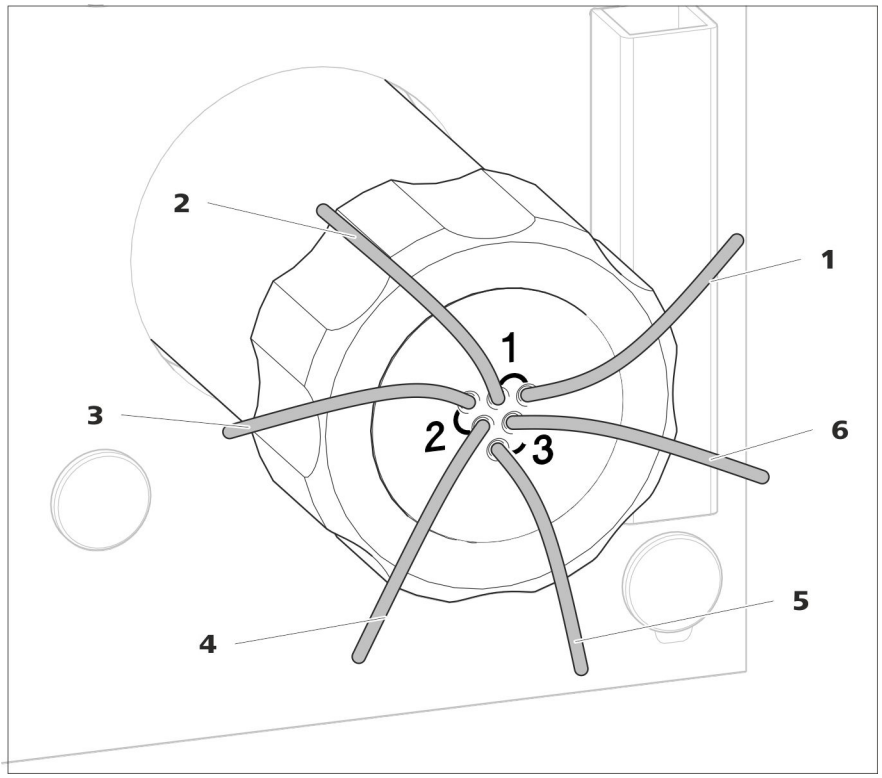
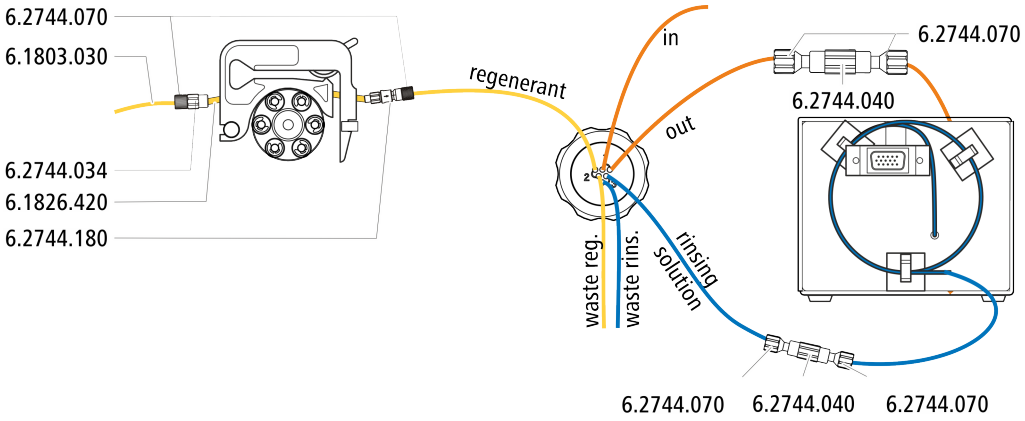


Figure 13 Suppressor – connection capillaries

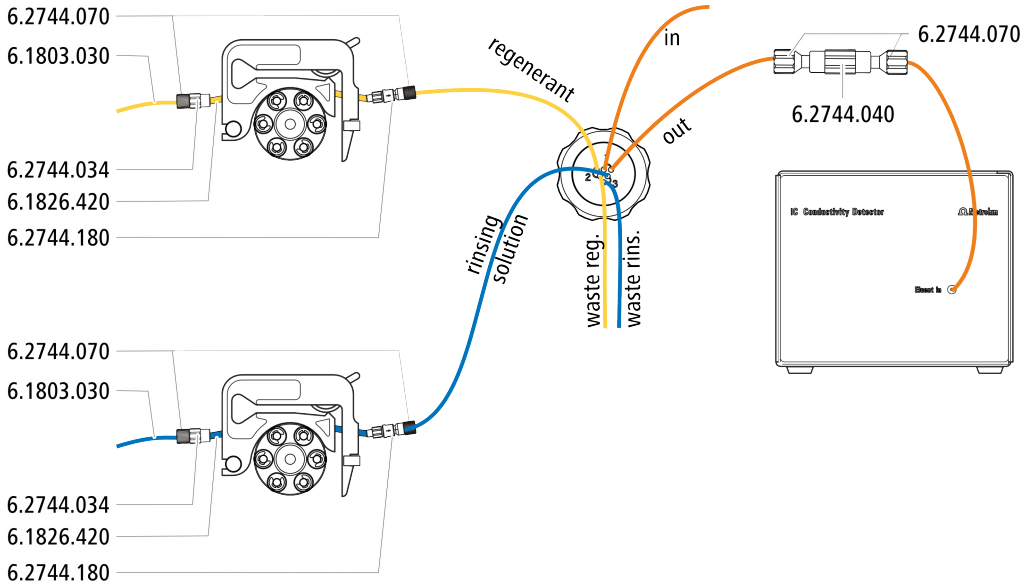
1 out Output capillary for the eluent.	**2 in** Input capillary for the eluent.

3 **regenerant** Input capillary for the regeneration solution.	**4** **waste reg.** Output capillary for the regeneration solution; to the waste container.
5 **waste rins.** Output capillary for the rinsing solution; to the waste container.	**6** **rinsing solution** Input capillary for the rinsing solution.

Recommended installation



Alternative installation

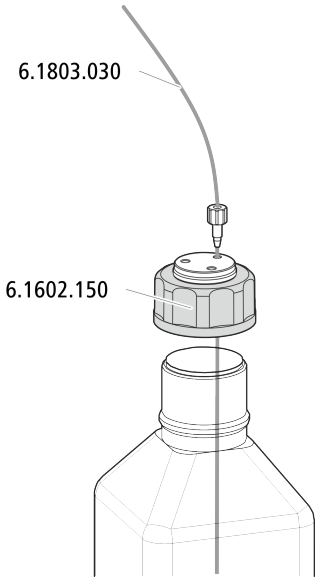


Installing bottles with auxiliary solutions

Accessories

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 input capillary using one coupling (6.2744.040) and two pressure screws (6.27474.070) (see manual of the detector).

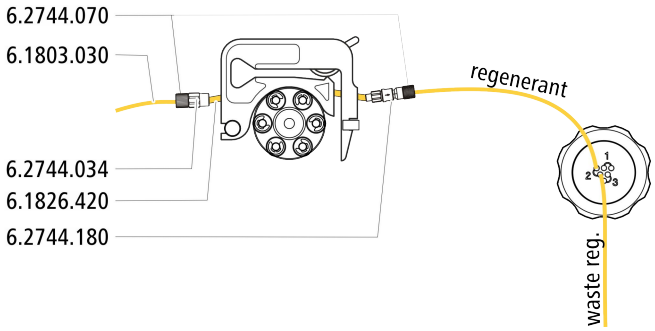
3.13.3.2 Connecting the regeneration solution

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

Connecting the regeneration solution 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 37)*.

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.

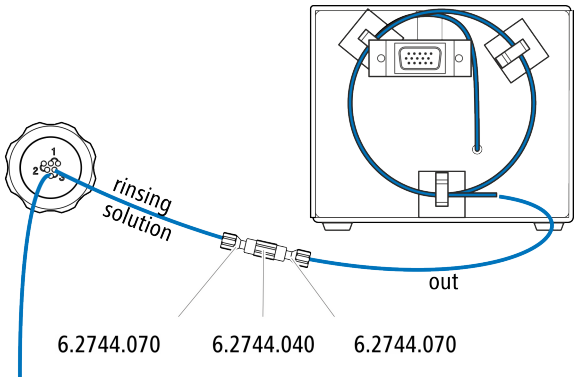
3.13.3.3 Connecting the rinsing solution

There are two options for rinsing the suppressor:

- Rinsing solution via STREAM (recommended)
  Use the eluent from the conductivity detector as a 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

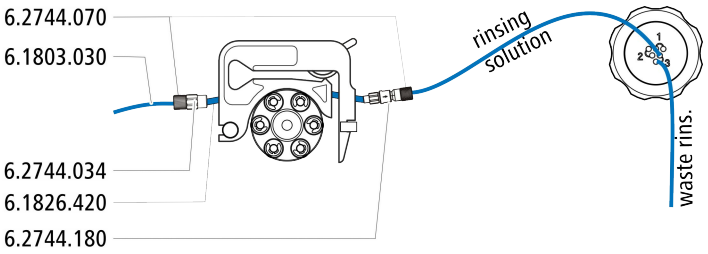


1 Connect the detector output capillary and the capillary labeled *rinsing solution* to each other using a coupling (6.2744.040) and two pressure screws (6.2744.070).

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 37)*.

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 tubing

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.

Order number	Name	Material	Inner diameter	Use
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 sample 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.
6.1826.020	Pump tubing (blue/blue), 2 stoppers	PVC (Tygon® ST)	1.65 mm	Pump tubing for online IC instruments and automation in voltammetry.

Selecting the pump tubing and adapter

1 Select pump tubing suitable for the application *(see Table 2, page 37)*.

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

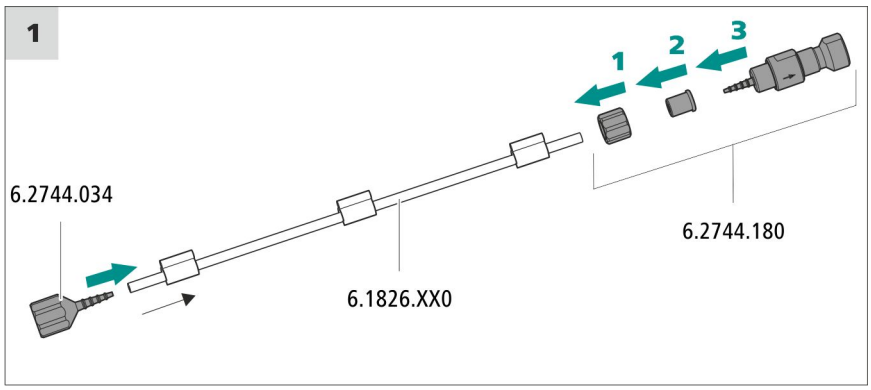
Pump tubing	Adapter
6.1826.310 (orange/green)	
6.1826.320 (orange/yellow)	
6.1826.330 (orange/white)	
6.1826.340 (black/black)	
6.1826.360 (white/white)	
6.1826.380 (gray/gray)	

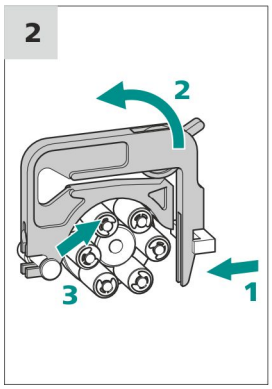
Pump tubing	Adapter
6.1826.390 (yellow/yellow)	
6.1826.420 (orange/yellow)	
6.1826.020 (blue/blue)	

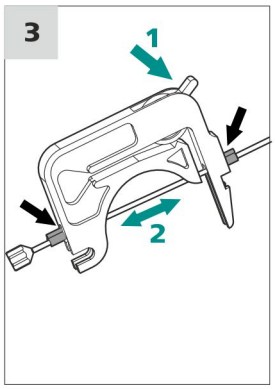
Installing the pump tubing

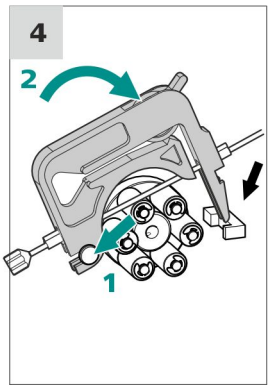
For this step you need the following accessories:

- 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 inlet. 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.

- Install the pump tubing connection with locking nut and filter (6.2744.180) at the pump tubing outlet:
  - 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

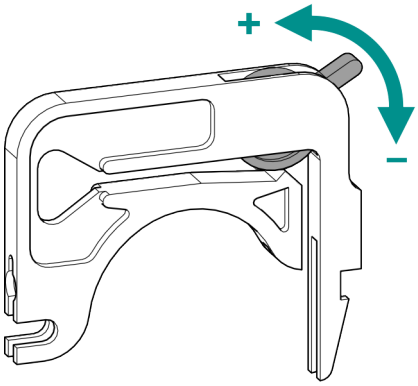
The flow rate of the peristaltic pump depends on many factors:

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

NOTE

Pieces of pump tubing are consumables. The lifetime 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.
- Activate the peristaltic pump drive in the software.
- 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.

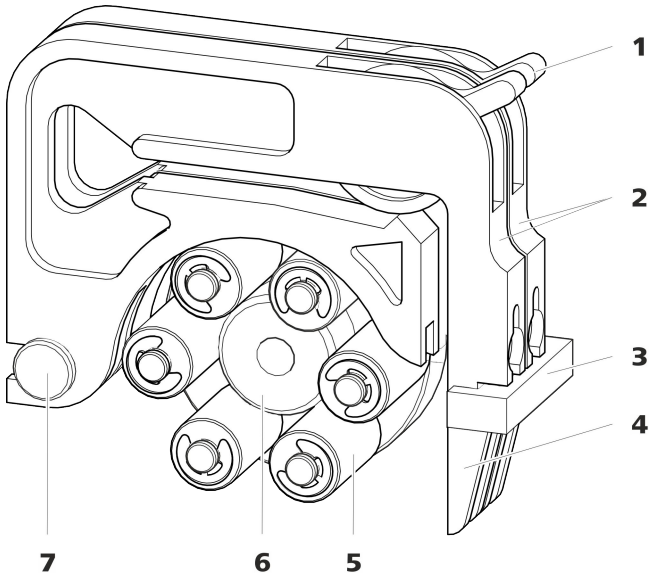


Figure 14 Peristaltic pump

1	**Contact pressure lever**	**2**	**Tubing cartridges (6.2755.000)**
3	**Cartridge holder**	**4**	**Snap-action lever**
5	**Rollers**	**6**	**Roller hub**
7	**Mounting bolt**		

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.

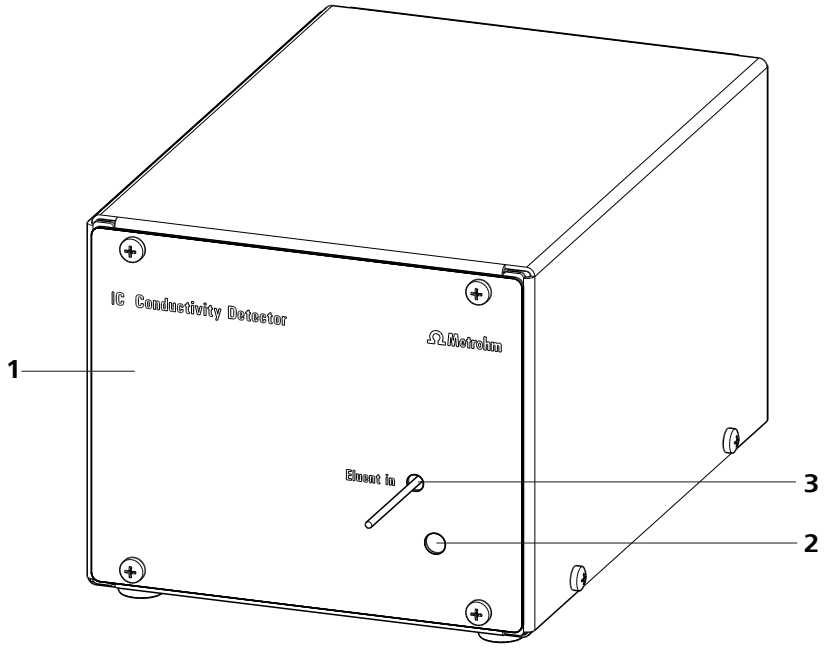


Figure 15 Front of conductivity detector

1 **IC detector 1.850.9010**	**2** **Opening for temperature sensor**
3 **Detector input capillary** Permanently installed.	

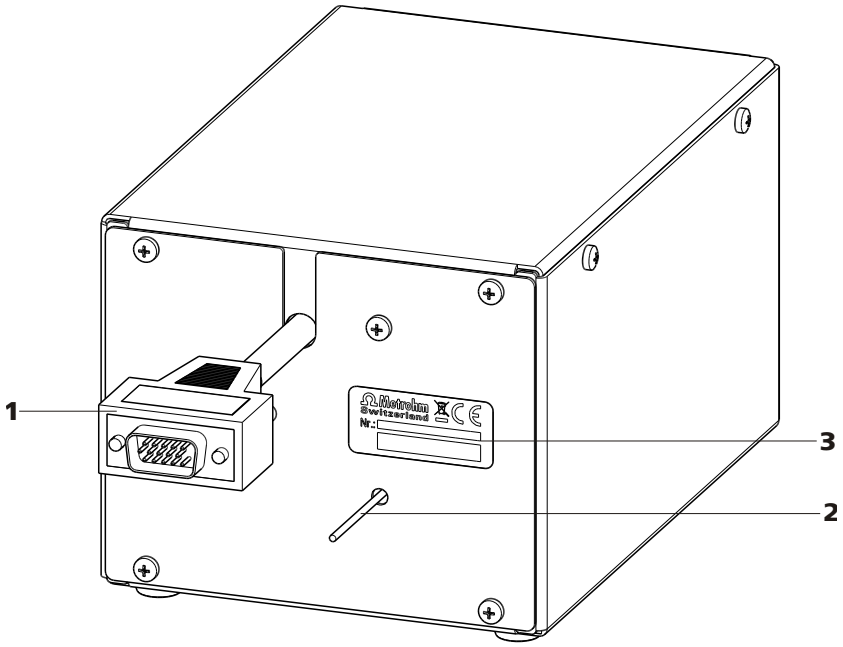


Figure 16 Rear of conductivity detector

1 **Detector cable** With installed plug.	**2** **Detector output capillary** Permanently installed.
3 **Type plate** With serial number.	

NOTE

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**)*.

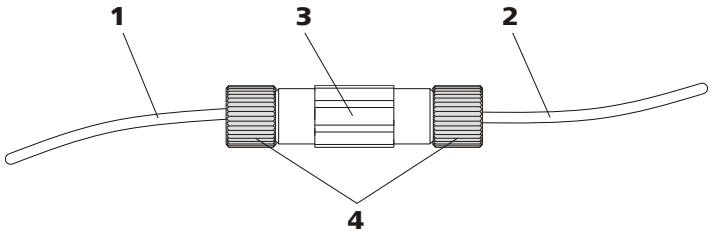


Figure 17 Connection detector–MSM

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

3.16 Connecting the instrument

3.16.1 Connecting the instrument to the PC

NOTE

The instrument must be switched off when connecting the PC.

1 Connecting the USB cable

Connect the PC connection socket *(2-**3**)* of the instrument to a USB connector of the computer via the USB cable (6.2151.020).

3.16.2 Connecting the instrument to the power supply

WARNING

The power supply unit must not get wet. Protect it from direct contact with liquids.

Accessories

For this step you need the following accessories:

- For Switzerland, …: Power supply cable with IEC 60320 line socket, type C13, with SEV 1011 plug, type 12 (6.2122.020), 1.5 m
- For Germany, …: Power supply cable with IEC 60320 line socket, type C13, with CEE 7 plug, type VII (6.2122.040), 1.5 m
- For the USA, …: Power supply cable with IEC 60320 line socket, type C13, with NEMA 5-15 plug, type 498 (6.2122.070), 1.5 m

1 Connecting the power supply cable

- Plug the power supply cable into the power socket *(2-**2**)*.
- Connect the power supply cable to the power supply.

2 Switching on the instrument

Switch on the instrument using the power switch *(2-**1**)*.

When the instrument is switched on, the LED on its front flashes. The instrument conducts a system test and establishes a connection to the software. Once the system test is complete and the connection to the software has been established, the LED lights up continuously.

3.17 Initial start-up

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

Rinsing the IC system

CAUTION

The guard column and separation column must not be installed for 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**.
- Select (or create) a suitable method.
  Also see: *MagIC Net tutorial* and online help.

2 Preparing the instrument

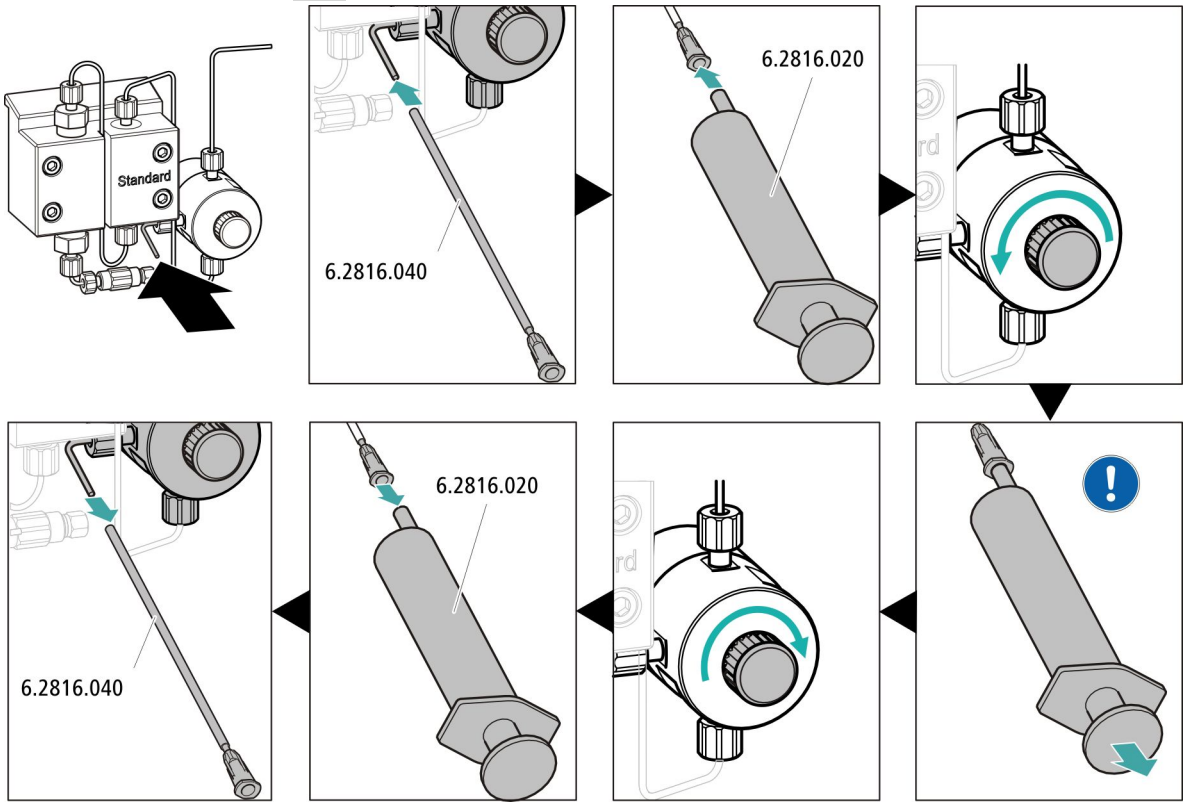
- Ensure that the eluent aspiration tubing is immersed in the eluent and there is enough eluent in the eluent bottle.
- Switch on the instrument.

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 purging needle (6.2816.040) over the end of the deaerating capillary on the purge valve.
- Insert the syringe (6.2816.020) in the Luer connector of the purging needle.
- Open the purge valve using the rotary knob (approx. ½ 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 aspirated eluent.
- Switch off the high-pressure pump in MagIC Net.
- Seal the purge valve using the rotary knob.
- Remove the syringe from the purging needle.
- Pull the purging needle out of the deaerating capillary.

5 Rinsing the instrument without columns

- Rinse the instrument (without columns) with eluent for 5 minutes.

3.18 Connecting and rinsing the guard column

Guard columns protect the separation column and substantially increase its service life. Guard columns available from Metrohm are either actual guard columns or what are known as guard column cartridges that can be used together with a cartridge holder. The process for installing a guard column cartridge in the associated holder is described in the leaflet for the guard column.

NOTE

Metrohm recommends working with guard columns at all times. They protect the separation column and can be replaced regularly as needed.

NOTE

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

CAUTION

New guard columns are filled with 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 information from the manufacturer).

NOTE

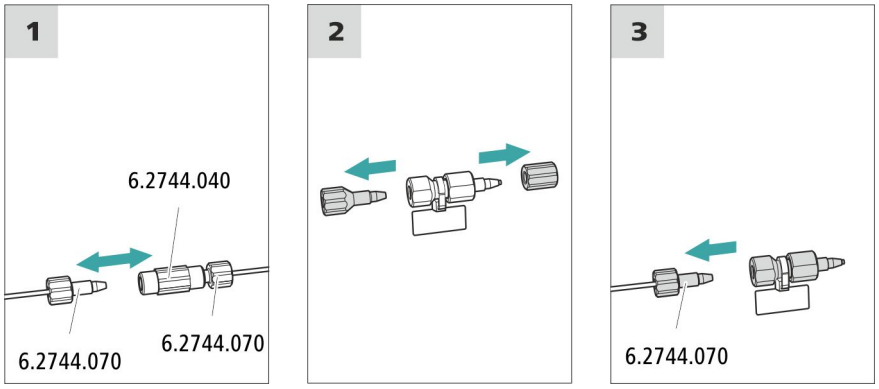
The guard column may not be connected until after the instrument has already been put into operation once *(see Chapter 3.17, page 47)*. The guard column and separation column have to be replaced by a coupling (6.2744.040) until then.

Accessories

For this step you need the following accessories:

- Guard column (suitable for the separation column)

Connecting the guard column



1 Removing the coupling

Remove the coupling installed between the column input capillary and the column output capillary for the initial start-up.

2 Preparing the guard column

- Remove 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 input of the guard column to the column input capillary using a short pressure screw (6.2744.070).
- Optional: In case the guard column is connected to the separation column using a provided a connection capillary, fasten the connection capillary to the guard column's output using the pressure screw also provided.

Rinsing the guard column

1 Rinsing the guard column

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

- 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.
- Use manual control in MagIC Net to stop the high-pressure pump again: **Off**.

3.19 Connecting the separation column

The intelligent separation column (iColumn) is the heart of the ion chromatographic analysis. It 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, etc) are stored.

NOTE

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

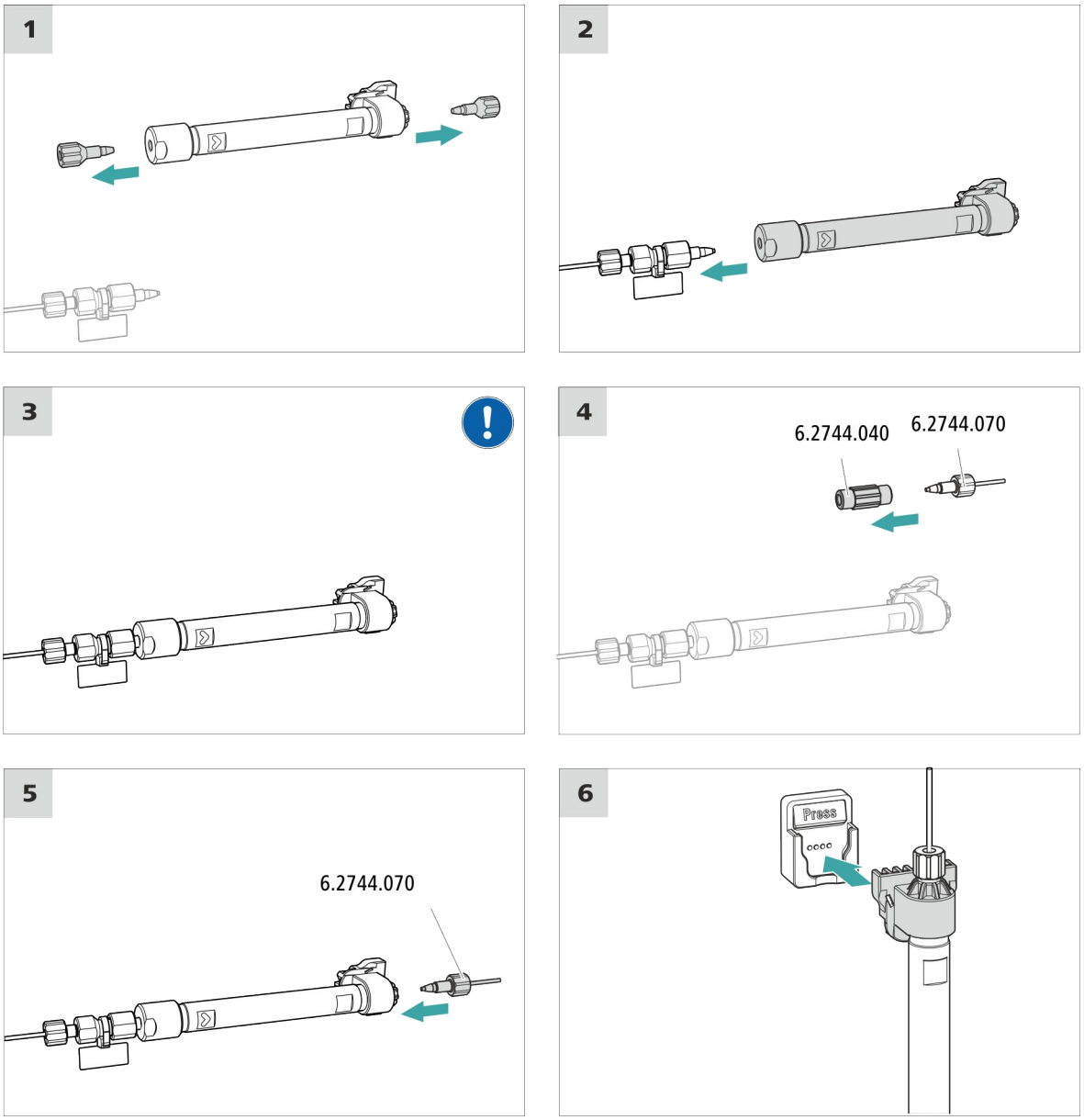
You can find the separation columns and guard columns currently available from Metrohm in the Metrohm IC Column Program or on the Internet at *http://www.metrohm.com* in the Ion Chromatography product area. A test chromatogram and a leaflet are provided along with each column. You can find detailed information on special IC applications in the corresponding "**Application Bulletins**" or "**Application Notes**", which are available on the Internet at *http://www.metrohm.com* in the Applications area or free of charge upon request from your responsible Metrohm representative.

CAUTION

New separation columns are filled with 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 information from the manufacturer).

NOTE

The separation column may not be connected until after the instrument has already been put into operation once *(see Chapter 3.17, page 47)*. The guard column and separation column have to be replaced by a coupling (6.2744.040) until then.



Connecting the separation column

1 Removing the stoppers

CAUTION

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

- Remove the stoppers from the separation column.

2 Installing the input of the separation column

There are 3 possibilities:

- Attaching the bottom end of the separation column directly to the guard column.
  or
- If the guard column is connected to the separation column using a provided connection capillary, connect the bottom end of the separation column to the guard column's output capillary using the provided PEEK pressure screw (6.2744.070).
  or
- If no guard column is used (not recommended), connect the column input capillary to the input of the separation column using a short pressure screw (6.2744.070).

3 Rinsing the separation column

- Place a beaker under the separation 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 separation column with eluent for approximately 10 minutes.
- Use manual control in MagIC Net to stop the high-pressure pump again: **Off**.

4 Removing the coupling

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

5 Installing the output of the separation column

- Fasten the column output capillary to the upper end of the separation column using a PEEK pressure screw (6.2744.070).

6 Inserting the separation column

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

The separation column is now detected by MagIC Net.

3.20 Conditioning

After installation, after each time the instrument is switched on and after each time the eluent is changed, the system has to be conditioned with eluent long enough that a stable baseline is attained.

NOTE

The conditioning time can lengthen considerably after changing the eluent.

Conditioning the system

1 Preparing the software

CAUTION

Ensure that the configured flow is not higher than the flow permitted for the corresponding column (refer to the column leaflet and the 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 relation to 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 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

Rinse the system with eluent until the required stability of the baseline is attained (normally 30 minutes).

The instrument is now ready for measuring samples.

4 Operation and maintenance

4.1 IC system

4.1.1 Operation

CAUTION

In order to avoid disruptive temperature influences, the entire system including the eluent bottle must be protected from direct sunlight.

4.1.2 Care

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

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

CAUTION

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

WARNING

Untrained personnel may not open the instrument's housing.

4.1.3 Maintenance by Metrohm Service

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

4.1.4 Shutting down and starting back up

If the instrument is not used for a long period, the whole IC system (without separation column) must be rinsed to be free of salts using methanol/ultrapure water (1:4). This prevents eluent salts from crystallizing and then causing 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 dissipated.
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 (1:4).
4. In the software, switch the suppressor twice during the rinsing process (STEP command).
5. Rinse the pump tubing of the peristaltic pump used for pumping the regeneration solution with water for five minutes at level 3. 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 eluent for 15 minutes.
3. Remove the coupling and install the guard column and the separation column (*see Chapter 3.18, page 49* and *Chapter 3.19, page 51*).

4.2 Capillary connections

All connections between injection valve, separation column and detector must be as short as possible, have a low dead volume and be completely leak-tight.

The PEEK capillary downstream of the detector must be free of blockages.

Only use PEEK capillaries with an inner diameter of 0.25 mm in the high-pressure section between the high-pressure pump and the detector.

4.3 Door

CAUTION

Never use the door as a handle.

4.4 Handling the eluent

Careful handling of the eluent ensures stable analysis results. Keep the following general measures in mind when handling the eluent:

- The supply bottle with the eluent must be connected as indicated in *chapter 3.8, page 23*. This is particularly important for eluents with volatile solvents (such as acetone).
- Avoid condensation in the eluent bottle. Drop formation can change the concentration ratio in the eluent.
- In the case of very sensitive measurements, we recommend that the eluent be stirred constantly with a magnetic stirrer (e. g. the 2.801.0010 with 6.2070.000).
- To protect the IC system from foreign particles, we recommend aspirating the eluent via an aspiration filter *(see Chapter 3.8, page 23)* (6.2821.090). This aspiration filter has to be replaced as soon as it turns yellow but at least every 3 months.

4.4.1 Manufacturing eluent

Chemicals used for manufacturing eluents must have a purity grade of at least "p.a." They may be diluted only by using ultrapure water (resistance > 18.2 MΩ*cm). (These specifications apply generally for all reagents used in ion chromatography).

Newly manufactured eluents always have to be microfiltered (0.45 µm filter).

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

Concentration	An increase in the concentration generally leads to shorter retention times and faster separation, but also to a higher background conductivity signal.
pH	pH changes lead to shifts in dissociation equilibria and thus to changes in retention times.
Organic solvents	Adding organic solvents (such as 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 has to be rinsed with organic solvents, several solvents with rising or falling lipophilicity must be used.

NOTE

To change the eluent, remove the separation column and 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 lead to contaminated valves, an increase in pressure and, in extreme cases, scratched pistons. Immediately successive solutions must always be miscible. If the system has to 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

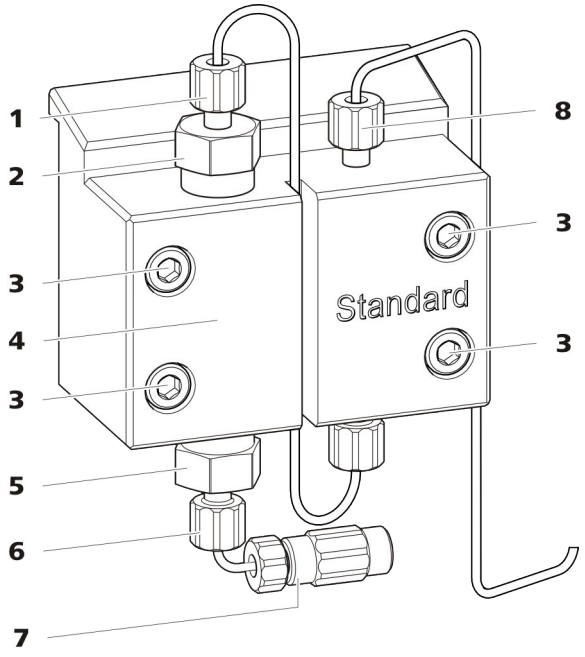


Figure 18 High-pressure pump – parts

1	**Pressure screw, short (6.2744.070)** Fastened to the outlet valve holder.	**2**	**Outlet valve holder**
3	**Fastening screw**	**4**	**Pump head**
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 have to 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 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.
4. Reinstall the pump head.

You can find brief video sequences on the following maintenance steps on the Internet at *http://www.metrohm.com/com/Support/Video/ICGeneral.html*.

Servicing the outlet valve

Accessories

For this step you need the following accessories:

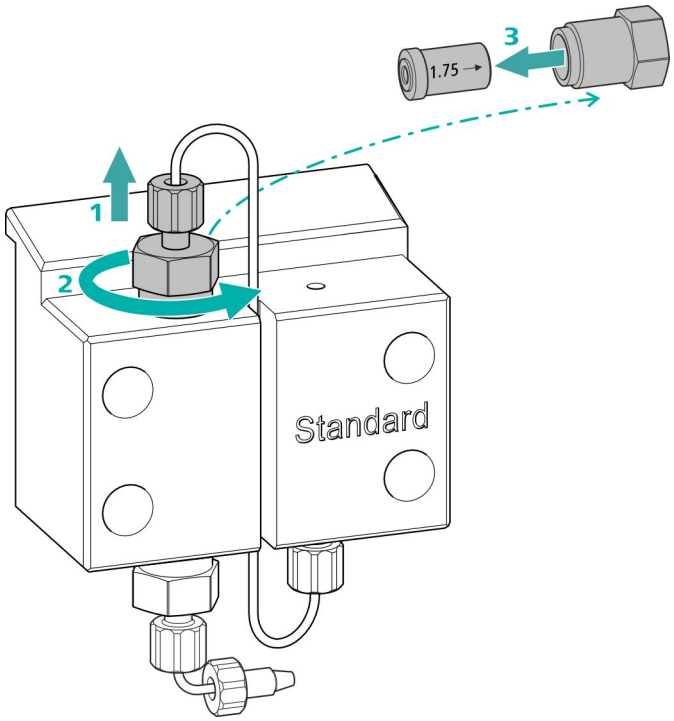
- Adjustable wrench (6.2621.000)

Spare parts

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

Cleaning the outlet valve

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

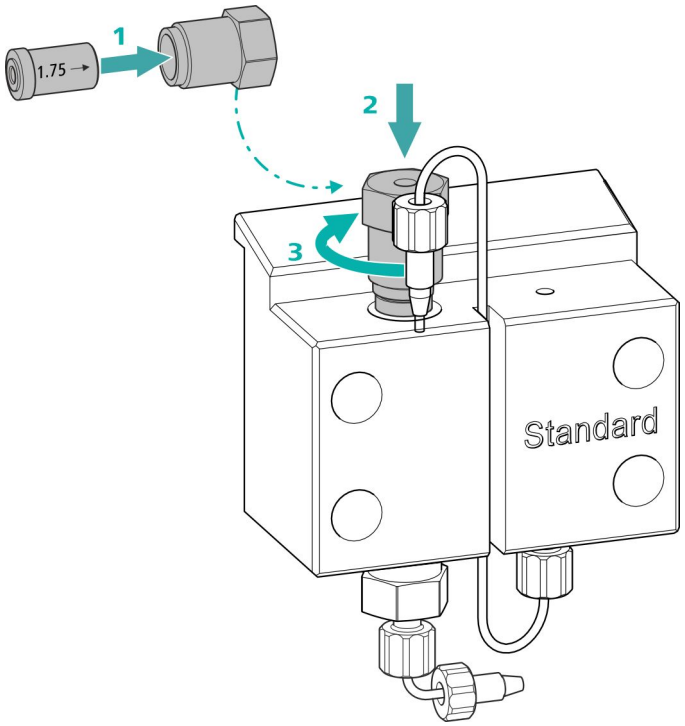
- Start by rinsing the outlet valve in the direction of eluent flow using a wash bottle filled with ultrapure water, RBS™ solution or acetone. (The direction of eluent flow is marked on the valve by an arrow.)
  The rinsing solution must come out at the valve outlet.
  If no more solution comes out, 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 should only come out at the valve outlet.
- The rinsing effect is further increased through a short treatment in an ultrasonic bath.

NOTE

The maximum treatment time in an ultrasonic bath is 20 s. Ultrasonic baths that last longer than this can damage the ruby ball inside the valve.

The outlet valve has to be replaced if it remains clogged after the ultrasonic bath.

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 in place using the adjustable wrench (**3**).
- Tighten the connection capillary to the auxiliary piston back onto the outlet valve holder.

Servicing the inlet valve

Accessories

For this step you need the following accessories:

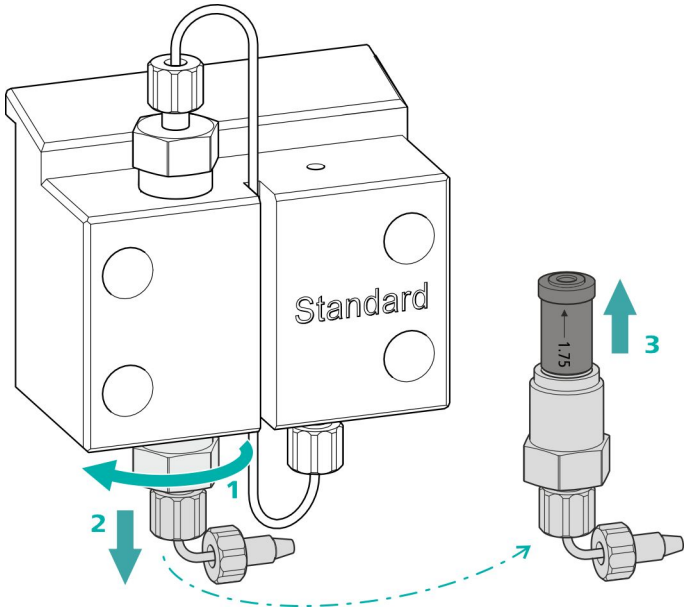
- Adjustable wrench (6.2621.000) from the accessory kit: *Vario/Flex Basic* (6.5000.000)

Spare parts

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

Cleaning the inlet valve

1 Removing the inlet valve



- 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

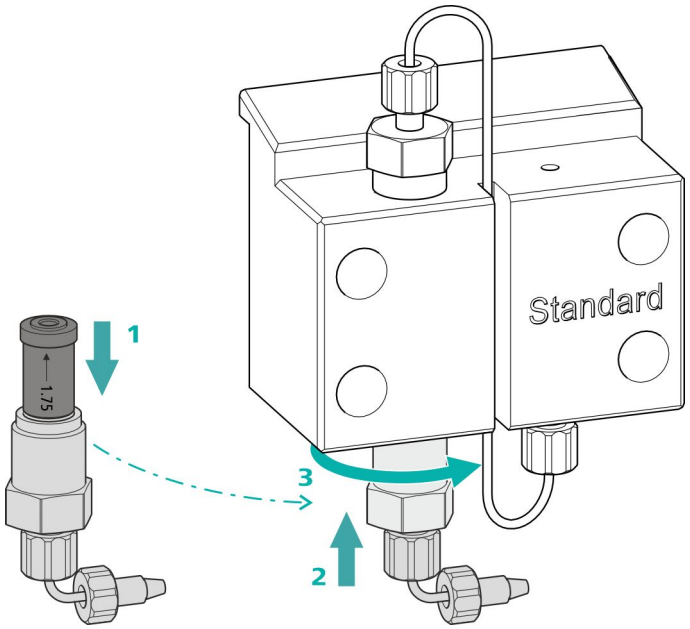
- Start by rinsing the inlet valve in the direction of eluent flow using a wash bottle filled with ultrapure water, RBS™ solution or acetone. (The direction of eluent flow is marked on the valve by an arrow.)
  The rinsing solution must come out at the valve outlet.
  If no more solution comes out, then 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 should only come out at the valve outlet.
- The rinsing effect is further increased through a short treatment in an ultrasonic bath.

NOTE

The maximum treatment time in an ultrasonic bath is 20 s. Ultrasonic baths that last longer than this can damage the ruby ball inside the valve.

The inlet valve has to be replaced if it remains clogged after the ultrasonic bath.

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 in place using the adjustable wrench (**3**).

Removing the pump head

Accessories

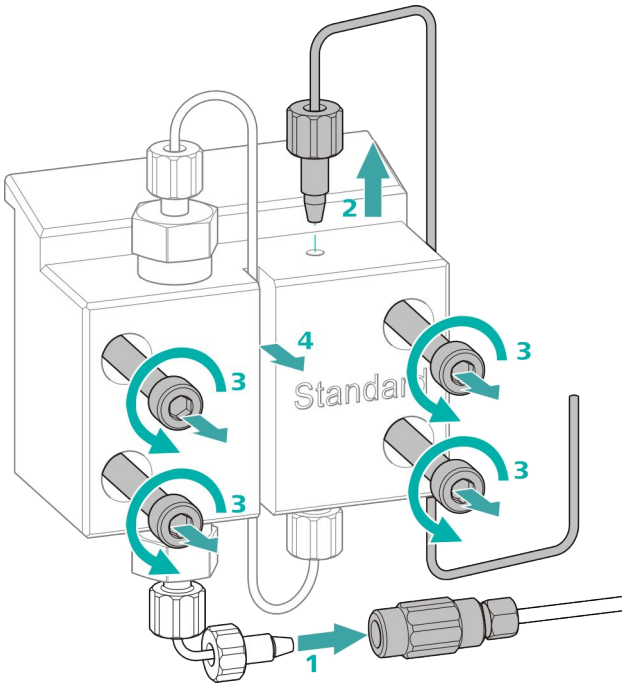
For this step you need the following accessories:

- 4 mm hex key (6.2621.030)

Removing the pump head

Prerequisites:

- Is the high-pressure pump switched off?
- Has the pressure dissipated?
- 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 output *(18-**8**)*.

3 Unscrew and remove the four fastening screws *(18-**3**)* using the hex key.

4 Remove the pump head *(18-**4**)*.

Replacing the piston seal

Carry out the following work on both pistons in turn.

Servicing a piston consists of the following tasks:

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

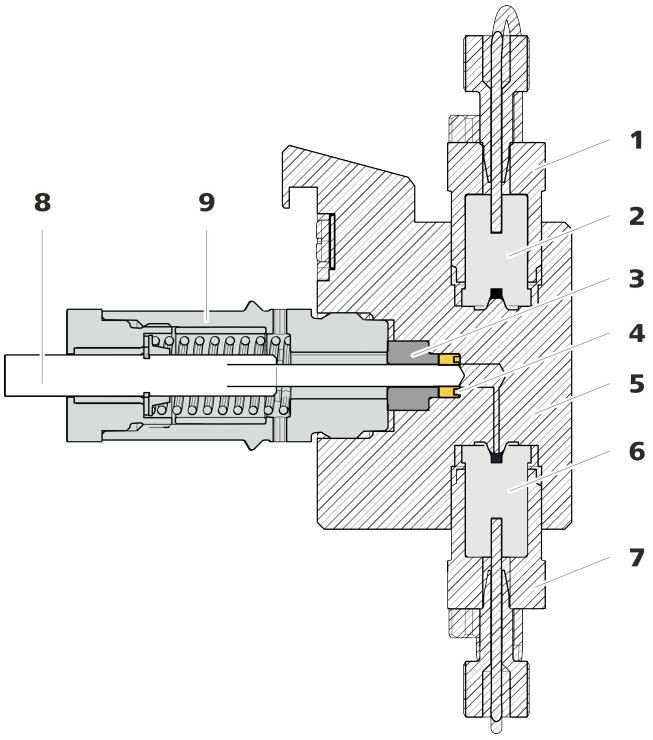


Figure 19 High-pressure pump – cross-section

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

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.

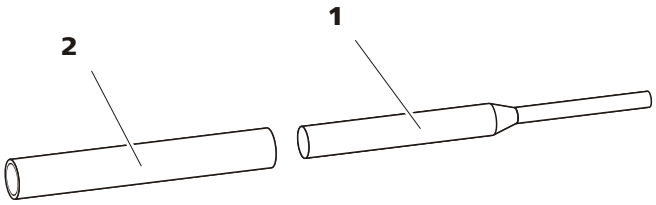


Figure 20 Tool for piston seal (6.2617.010)

1	**Tip**	**2**	**Sleeve**

Spare part

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

Replacing the piston seal

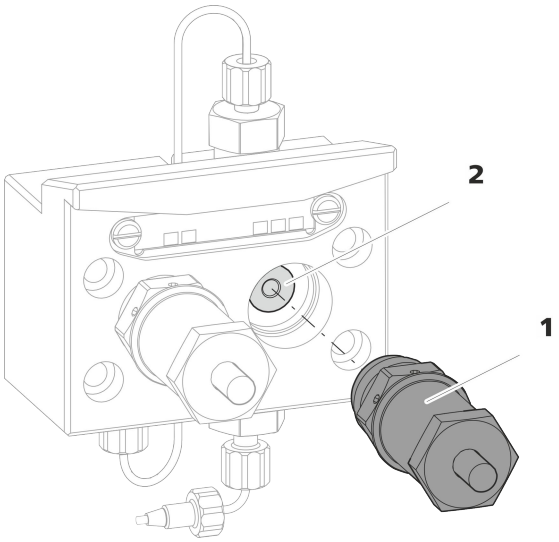


Figure 21 Removing the piston cartridge from the pump head

1 Piston cartridge	**2 Backup ring**

1 Removing the piston cartridge

Loosen the piston cartridge *(19-**9**)* using the adjustable wrench and then unscrew it from the pump head by hand. Place it off to the side.

2 Removing the backup ring

Shake the backup ring *(19-**4**)* out of the piston opening. Place it off to the side.

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 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.

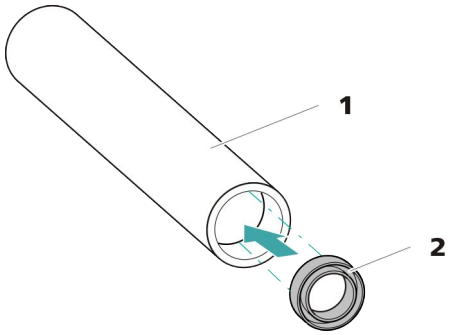


Figure 22 Inserting the piston seal into the tool

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.

6 Reinserting the piston cartridge

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

Optional: Cleaning/replacing the zirconium oxide piston

If the baseline still remains unstable after replacing the valves and piston seal, the zirconium oxide piston in the high-pressure pump may be dirty or scratched. In that case, the zirconium oxide piston must have to be cleaned or replaced.

Clean one piston cartridge after the other as follows:

Accessories

For this task you need the following accessories:

- Adjustable wrench (6.2621.000)

Spare parts

For this first step you need a new zirconium oxide piston (6.2824.070).

Optional: Cleaning/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 66)*.

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, 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.

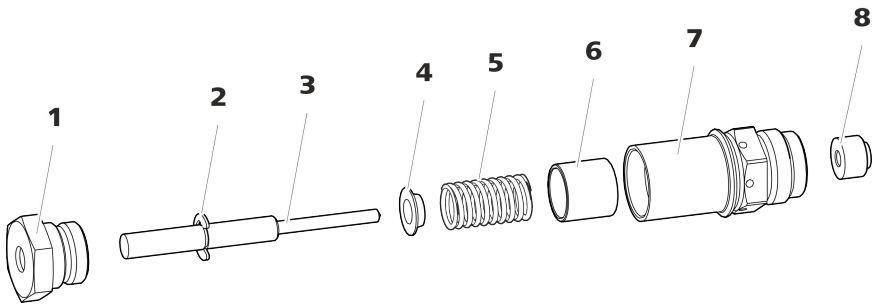


Figure 23 Components of the piston cartridge

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

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 has to be replaced if it is heavily contaminated or scratched.
- Rinse the other parts of the piston and dry with a lint-free cloth.

3 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.

4 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

Accessories

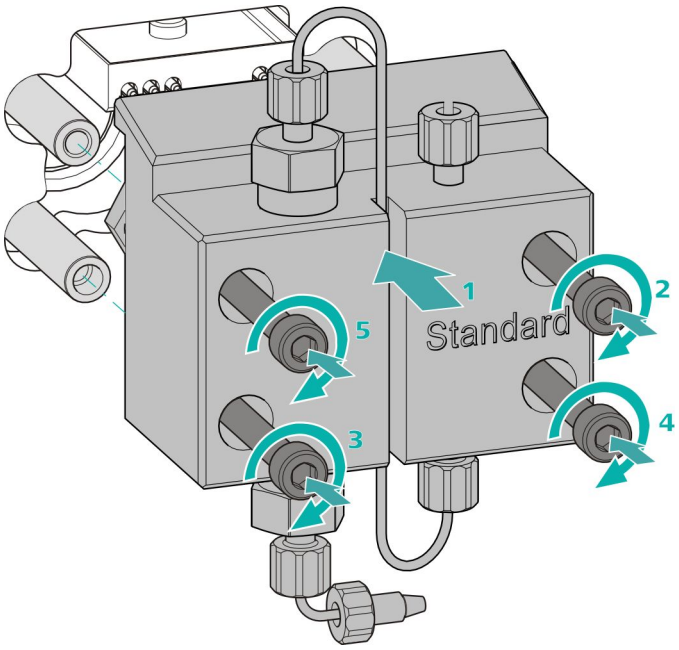
For this step you need the following accessories:

- 4 mm hex key (6.2621.030)

Mounting the pump head

NOTE

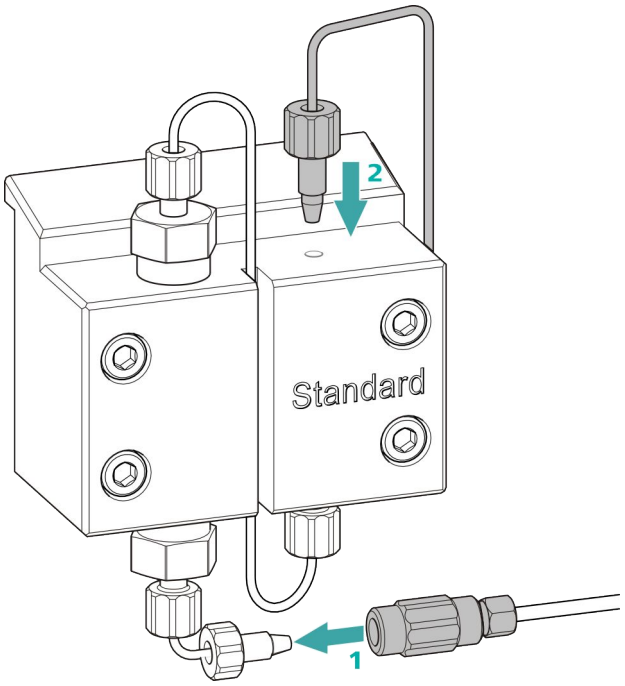
To prevent the pump head from being mounted the wrong way, it has fastening bolts with different bore hole depths, i.e. one fastening bolt is longer than all others. The bore hole with the greatest depth must therefore be assigned to the longest bolt.



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 input for the high-pressure pump



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

4.7 Servicing the inline filter

NOTE

You can find a video sequence for this task in the *Multimedia Guide IC Maintenance* or on the Internet at *http://www.metrohm.com/com/Support/Video/ICGeneral.html?q=14*.

Maintenance interval

The filter has to be replaced at least every 3 months; the filter has to be replaced more frequently if you are working with high backpressure.

Accessories

For this task you need the following accessories:

- Adjustable wrench (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

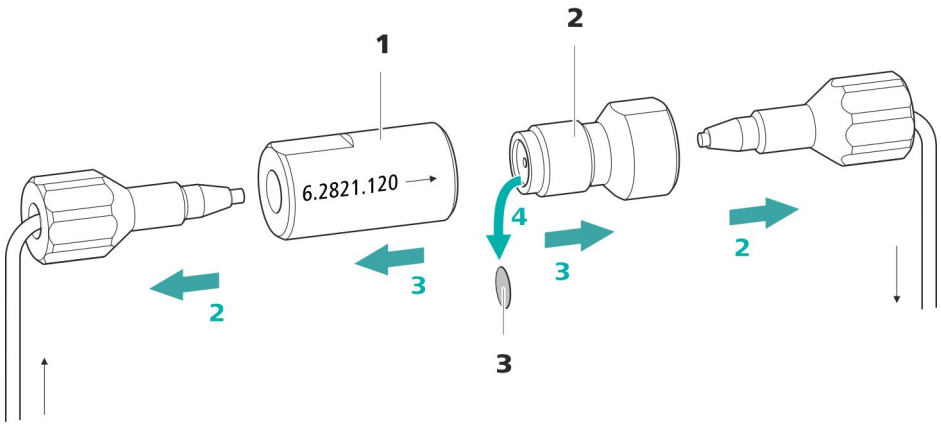


Figure 24 Inline filter – removing the filter

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)** Packaging contains 10 pieces.

1 Shutting off the flow

Switch off the high-pressure pump in the software.

2 Removing the inline filter

Unscrew the both pressure screws from the inline filter.

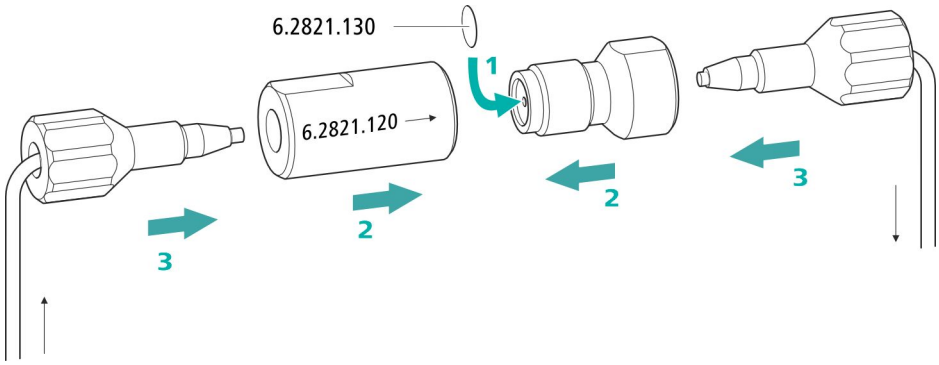
3 Unscrewing the filter screw

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

- Place the new filter flat in the filter housing *(24-**1**)* using tweezers.

2 Mounting 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.

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 40)* must be mounted between the peristaltic pump *(see Chapter 3.14.2, page 42)* and the inlet capillaries of the suppressor.

NOTE

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

The suppressor consists of three 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 five 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 79)* or replaced *(see Chapter 4.10.3.4, page 81)* 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

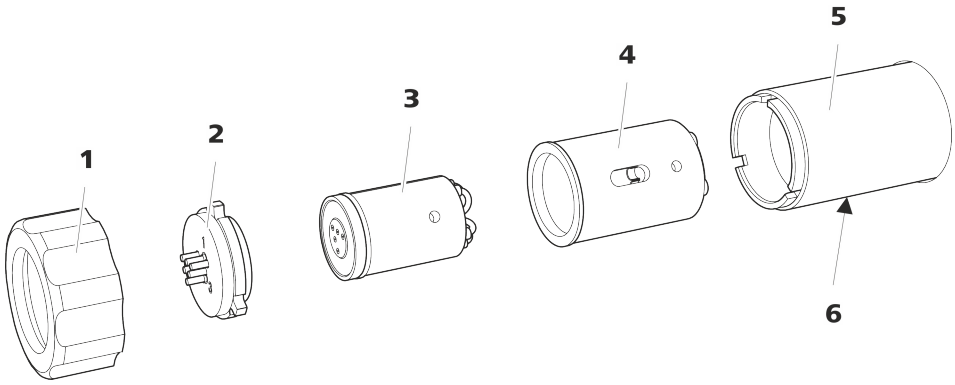


Figure 25 Parts of the suppressor

1	**Union nut**	**2**	**Connecting piece (6.2835.010)**
3	**Rotor**	**4**	**Adapter (6.2842.020)**
5	**Suppressor drive**	**6**	**Slot in the housing**

4.10.3.2 Regenerating the suppression rotor

If the 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 suppressor units must be regenerated with one of the following solutions:

- **Contamination with heavy metals**:
  1 mol/L H_2SO_4 + 0.1 mol/L oxalic acid
- **Contamination with organic cationic complexing agents**:
  0.1 mol/L H_2SO_4 **/** 0.1 mol/L oxalic acid **/** acetone 5%
- **Heavy contamination with organic substances**:
  0.2 mol/L H_2SO_4 **/** acetone ≥ 20%

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 suppressor

1 Disconnecting the suppressor from the IC system

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

2 Regenerating the suppressor

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.
- 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 suppressor

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.
- 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 suppressor to the IC system

- Reconnect the capillaries of the suppressor labeled **regenerant** and **rinsing solution** to the IC system.
- Reconnect the outlet of the high-pressure pump to the IC system.

4.10.3.3 Cleaning the suppressor

In the following cases, it may be necessary to clean the suppressor:

- Increased backpressure at the suppressor's connection tubing.
- Irremediable blockage of the suppressor (solutions can no longer be pumped through the suppressor).
- Irremediable jamming of the suppressor (suppressor can no longer be switched over).

Cleaning 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 housing *(25-**5**)*.
- Pull the connecting piece *(25-**2**)* out of the suppressor drive together with the rotor *(25-**3**)*.
  If rotor A 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 A.
- Detach the connecting piece from the rotor.
- Remove the rotor from the adapter.

3 Rinsing the capillaries

- Connect each of the six PTFE capillaries connected to the connecting piece *(25-**2**)* in sequential order to the high-pressure pump and pump ultrapure water through them.
- Check whether water comes out at the connecting piece.

If one of the capillaries remains blocked, the connecting piece *(25-**2**)* has to be replaced (order number 6.2835.010).

4 Cleaning the rotor

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

5 Inserting the rotor

CAUTION

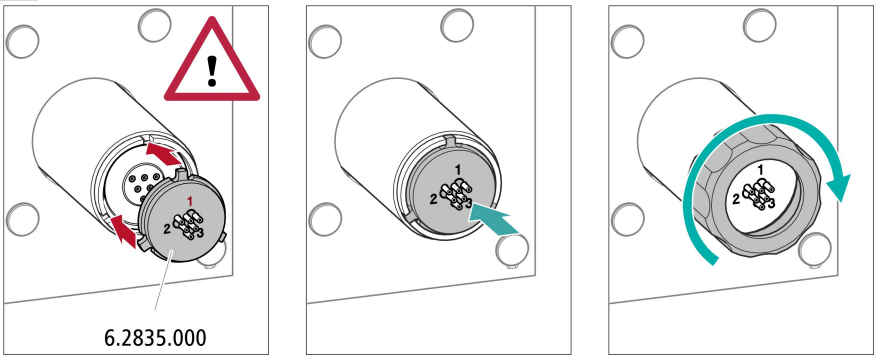
Rotor A may be destroyed during start-up if not inserted correctly.

- 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 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 three 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 three suppressor units with solution for five 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.
- Detach 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

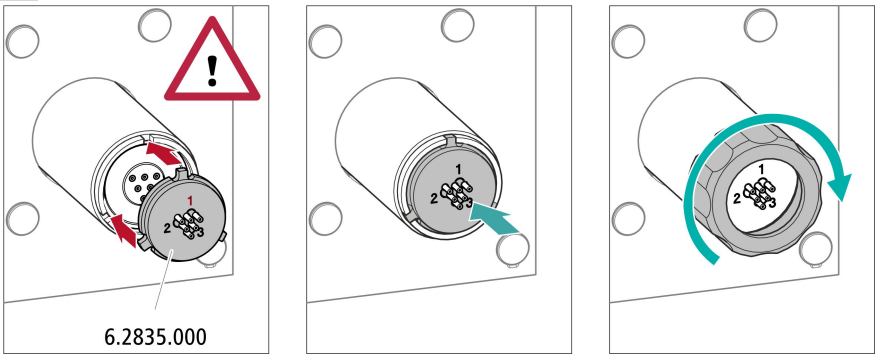
The rotor may be destroyed during start-up if it is not inserted correctly.

- 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 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 three 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 three 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 37)*.

CAUTION

The lifetime 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 lifetime.

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) have to be replaced regularly.

Maintenance interval We recommend replacing the filters (6.2821.130) *(26-**2**)* every 3 months. The filters have to be replaced more frequently if the backpressure is higher.

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

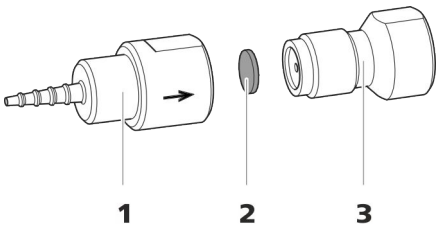


Figure 26 Pump tubing connection – Replacing the filter

1 Tubing olive	**2 Filter (6.2821.130)** Packaging 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.
- Place the new filter *(26-**2**)* **flat** in the tubing olive *(26-**1**)* using tweezers.

3 Mounting 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.

4.12 Servicing the detector

Follow the maintenance instructions in the the detector's manual.

4.13 Rinsing the sample path

Before a new sample is measured, the sample path has to be rinsed with it long enough to prevent the measuring result from being falsified by the previous sample (sample carry-over).

The time required to rinse the sample path with the new sample is called the rinsing time. The rinsing time depends on the transfer time.

The transfer time corresponds to the time the sample needs to flow from the sample vessel to the end of the sample loop. The transfer time depends on the following factors:

- The pump capacity of the peristaltic pump or Dosino
- The total capillary volume
- The volume of the gas removed from the sample by the sample degasser (if a sample degasser is present and connected)

The transfer time can be determined as follows:

Determining the transfer time

1 Emptying the sample path

Pump air through the sample path (pump tubing, tubing connections, capillary in the degasser, sample loop) for several minutes until all liquid is displaced by the air.

2 Aspirating the sample and measuring the time

Aspirate a sample typical for the later application and use a stopwatch to measure the time the sample needs to go from the sample vessel to the end of the sample loop.

The time upon stopping the watch is the "transfer time".

If the sample is injected automatically, the rinsing time has to 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 is, the smaller the 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 separation 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 chromatograph.

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://www.metrohm.com* in the Applications area or free of charge upon request from your responsible Metrohm representative.

4.14.2 Protecting the separation column

We recommend using the following protective measures so that the separation column retains its separating efficiency for as long as possible:

- Microfilter both the sample and the eluent (0.45 µm filter) and aspirate the eluent via the aspiration filter (6.2821.090) as well.
- Always use a guard column. Information regarding which guard column is suitable for your separation column can be found in the **Metrohm IC Column Program** (which is available from your Metrohm representative), the leaflet provided along with your separation column, the product information about the separation column at *http://www.metrohm.com* (Ion Chromatography product area), or obtained directly from your representative.
- Always use the pulsation absorber.

4.14.3 Storing the separation column

Always store separation columns you do not need in a sealed and filled state according to the column manufacturer's specifications.

4.14.4 Regenerating the separation column

The separation column can be regenerated according to the column manufacturer's specifications if the separation characteristics of the column have deteriorated. You can find information on regenerating separation columns available from Metrohm on the leaflet provided with every column.

NOTE

Regeneration is intended as a last resort. It should not be carried out regularly.

4.15 Quality Management and qualification with Metrohm

Quality management

Metrohm offers you comprehensive support in implementing quality management measures for instruments and software. Further information on this can be found in the brochure **"Metrohm Quality Management"** available from your local Metrohm representative.

Qualification

Please contact your local Metrohm representative for support in qualification of instruments and software. The **Installation Qualification** (IQ) and **Operational Qualification** (OQ) are offered by Metrohm representatives as a service. They are carried out by trained employees using standardized qualification documents and in accordance with the currently applicable requirements of the regulated industry. Further information on this can be found in the brochure **"Analytical Instrument Qualification – Confidence in quality with IQ/OQ"**.

Maintenance

The electronic and mechanical functional groups of Metrohm instruments can and should be checked by specialist personnel from Metrohm as part of a regular preventive maintenance schedule. Please ask your local Metrohm representative regarding the precise terms and conditions involved in concluding a corresponding maintenance agreement. Further information on this can be found in the brochure **"Metrohm Care Contracts – Protect your investment the smart way"** available from your local Metrohm representative.

5 Troubleshooting

Problem	Cause	Remedy
Marked drop in pressure.	*Leak in the system.*	Check the capillary connections and seal leaks, if necessary *(see Chapter 3.5, page 14)*.
The baseline has a large amount of noise.	*The eluent path has a leak.*	Check the eluent path and fix the leak.
	High-pressure pump – Contaminated pump valves.	Clean the pump valves *(see Chapter 4.6, page 60)*.
	The eluent path is blocked.	Check the eluent path and eliminate the blockage.
	High-pressure pump – Defective piston seals.	Replace the piston seals *(see Chapter 4.6, page 60)*.
	The pulsation absorber is not connected.	Connect the pulsation absorber *(see Chapter 3.11, page 28)*.
	The pulsation absorber is not connected or is defective.	Connect *(see Chapter 3.11, page 28)* or replace the pulsation absorber.
The baseline is drifting.	*Leak in the system.*	Check all capillary connections and seal leaks, if necessary *(see Chapter 3.5, page 14)*.
	The organic solvent in the eluent is evaporating.	▪ Check the eluent bottle cap *(see Chapter 3.8, page 23)*. ▪ Constantly stir the eluent.
The pressure in the system markedly increases.	*The inline filter (6.2821.120) is blocked.*	Replace the filter (6.2821.130) .
	The suppressor is blocked.	▪ Regenerate the suppressor . Note: Pump tubing connection with filter (6.2821.180) must be used.
	The conductivity detector is blocked.	▪ Shorten the capillary ends by a few millimeters . ▪ Rinse the detector opposite the normal flow direction .

Problem	Cause	Remedy
	Guard column – Blocked.	Replace the guard column *(see Chapter 3.18, page 49)*.
	Separation column – Blocked.	▪ Regenerate the separation column *(see Chapter 4.14.4, page 87)*. ▪ Replace the separation column *(see "Connecting the separation column", page 53)*. Note: Samples should always be microfiltered .
	Injection valve – Valve blocked.	Have the valve cleaned (by a Metrohm service technician).
The retention times in the chromatogram have changed unexpectedly.	*Separation column – Diminished separating efficiency.*	▪ Regenerate the separation column *(see Chapter 4.14.4, page 87)*. ▪ Replace the separation column *(see "Connecting the separation column", page 53)*.
	The eluent contains gas bubbles.	▪ Deaerate the high-pressure pump *(see Figure , page 48)*.
	High-pressure pump – Defective.	Request Metrohm Service.
Peak areas are lower than expected.	*Sample – There is a leak in the sample path.*	Find and fix the leak in the sample path.
	Sample – The sample path is blocked.	Find and eliminate the blockage in the sample path.
	Sample – The sample loop is not (completely) filled.	Adjust the transfer time for the sample *(see "Determining the transfer time", page 85)*.
The peristaltic pump is pumping too little.	*Peristaltic pump – Contact pressure too weak.*	Correctly set the contact pressure .
	Peristaltic pump – Filter blocked.	Replace the filter *(see "Replacing the filter", page 84)*.
	Peristaltic pump – Pump tubing defective.	Replace the pump tubing .
Data of the separation column cannot be read.	*Column chip contaminated.*	Clean the contact surfaces of the column chip with alcohol.
	Column chip is defective.	1. Save column configuration in MagIC Net™. 2. Notify Metrohm Service.

Problem	Cause	Remedy
Individual peaks are greater than expected.	*Sample – Sample carry-over from previous measurements.*	Check the rinsing time *(see "Checking the rinsing time", page 86)*.
MSM – Insufficient flow of regeneration solution or rinsing solution.	*There is a leak in the system.*	Check all connections.
	Peristaltic pump – Contact pressure too weak.	Correctly set the contact pressure.
	Peristaltic pump – Filter blocked.	Replace the filter.
	Suppressor – Backpressure too high.	Clean the suppressor *(see Chapter 4.10.3.3, page 79)* or replace parts *(see Chapter 4.10.3.4, page 81)*.
	Peristaltic pump – Pump tubing defective.	Replace the pump tubing.
The background conductivity is too high.	*Suppressor – Not connected.*	Connect the suppressor .
	The incorrect eluent is being used.	Change the eluent *(see Chapter 4.4.2, page 59)*.
	Suppressor – No or insufficient flow of regeneration solution or rinsing solution.	Check the flow of the regeneration solution and the rinsing solution *(see Chapter 3.13.3, page 33)*.
The retention times are poorly reproducible.	*The eluent path has a leak.*	Check all of the connections along the eluent path and fix the leak.
	The eluent path is blocked.	Check the eluent path and eliminate the blockage.
	The eluent contains gas bubbles.	▪ Deaerate the high-pressure pump *(see Chapter 3.17, page 47)*.
Baseline increasing strongly.	*Suppressor – Reduced capacity.*	Regenerate the suppressor .
Chromatograms have poor resolution	*Separation column – Diminished separating efficiency.*	▪ Regenerate the separation column *(see Chapter 4.14.4, page 87)*. ▪ Replace the separation column *(see "Connecting the separation column", page 53)*.

Problem	Cause	Remedy
Conductivity detector is not recognized in the software	*No connection to the detector.*	▪ Check the cable connection *(16-**1**)*. ▪ Switch the instrument off and (after 15 seconds) on again.
Extreme spread of the peaks in the chromatogram. Splitting (dual peaks)	*Capillary connections – dead volume in the system.*	Check the capillary connections *(see Chapter 3.5, page 14)* (use PEEK capillaries with an inner diameter of 0.25 mm between the injection valve and detector).
	Guard column – Diminished efficiency.	▪ Replace the guard column *(see Chapter 3.18, page 49)*.
	Separation column – Dead volume at the column head.	▪ Install the separation column in the opposite flow direction (if permitted by the leaflet) and rinse into a beaker. ▪ Replace the separation column *(see "Connecting the separation column", page 53)*.
Precision problems - the measured values are highly scattered.	*Injection valve – Sample loop.*	Inspect the installation of the sample loop *(see "Optional: Exchanging the sample loop", page 30)*.
	Sample – The rinsing volume is too small.	Increase the rinsing time *(see Chapter 4.13, page 85)*.
	Injection valve – Defective.	Request Metrohm Service.

6 Technical specifications

6.1 Reference conditions

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

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

6.2 Instrument

IC system	▪ Metal-free IC system ▪ Compact system with modular design
Material	Painted polyurethane hard foam without CFCs, fire class V0
Operating pressure range	▪ 0…50 MPa (500 bar) high pressure pump ▪ 0…35 MPa (350 bar) standard-PEEK system
Intelligent components	iPump, iDetector, iColumn, MagIC Net

6.3 Ambient conditions

Operation	
Ambient temperature	+5…+45 °C
Humidity	20…80 % relative humidity
Storage	
Ambient temperature	–20…+70 °C
Transport	
Ambient temperature	–40…+70 °C

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

Operating elements

Indicators	LED standby indicator
On/off switch	On the rear of the instrument

6.5 High-pressure pump

Type

- Serial dual-piston pump
- Intelligent pump head recognition
- Chemically inert
- Metal-free pump heads
- Materials in contact with the eluent: PEEK, ZrO_2, PTFE/PE
- Self-optimizing flow and pressure

Flow rate

Adjustable flow range	0.001 - 20.0 mL/min
Flow increment	1 µL/min
Reproducibility of the eluent flow	< 0.1% deviation

Pressure range

Pump	0 - 50.0 MPa (0 - 500 bar)
Pump head	0 - 35.0 MPa (0 - 350 bar) (applies for the standard PEEK pump head)
Residual pulsation	< 1%

Safety shutdown

Function	Automatic shutdown upon reaching the pressure limits
Maximum pressure limit	▪ Adjustable from 0.1 - 50 MPa (1 - 500 bar)

- The pump is automatically shut down at the first piston stroke above the maximum limit value

Minimum pressure limit

- Adjustable from 0 - 49 MPa (0 - 490 bar)
- The shutdown mechanism is inactive at 0 MPa
- The shutdown mechanism becomes active two minutes after system start
- The pump is automatically shut down after three piston strokes below the minimum pressure limit

6.6 Injection valve

Actuator switching time	typ. 100 ms
Maximum operating pressure	35 MPa (350 bar)
Material	PEEK

6.7 Suppressor

Resistance to solvents	No restriction
Switching time	typ. 100 ms
Operating pressure	2.5 MPa (25 bar), valve function prevents damage at overpressure

6.8 Peristaltic pump

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

6.9 Detector

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

6.10 Power connection

Required voltage	100 - 240 V ± 10% (autosensing)
Required frequency	50 - 60 Hz ± 3 Hz (autosensing)
Power consumption	▪ 65 W for typical analysis application ▪ 25 W standby (conductivity detector to 40 °C)
Power supply unit	▪ Up to 300 W maximum, electronically monitored ▪ Internal fuse 3.15 A

6.11 Interfaces

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

6.12 Safety specifications

This instrument fulfills the following electrical safety requirements:

CE marking in accordance with the EU directives:
- 2006/95/EC (Low Voltage Directive, LVD)
- 2004/108/EC (EMC Directive, EMC)

Federal Inspectorate for Heavy Current Installations ESTI (Accreditation Number SCESp 033)

Intertek ETL SEMKO

Design and testing According to EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, protection class I, EN/IEC/CSA 61010-2-010, EN/IEC/CSA 61010-2-081, EN/IEC 60529, degree of protection IP20.

Safety instructions This document contains safety instructions which have to be followed by the user in order to ensure safe operation of the instrument.

6.13 Electromagnetic compatibility (EMC)

Requirements
- EN/IEC 61326-1

Emission
- EN/IEC 61000-6-3
- EN 55011 / CISPR 11
- EN/IEC 61000-3-2
- EN/IEC 61000-3-3

Immunity
- EN/IEC 61000-6-2
- EN/IEC 61000-4-2
- EN/IEC 61000-4-3
- EN/IEC 61000-4-4
- EN/IEC 61000-4-5
- EN/IEC 61000-4-6
- EN/IEC 61000-4-8
- EN/IEC 61000-4-11
- EN/IEC 61000-4-14
- EN/IEC 61000-4-28

6.14 Weight

Weight 14.8 kg (without accessories)

7 Warranty (guarantee)

Metrohm guarantees that the deliveries and services it provides are free of defects in materials, design or manufacturing.

The general warranty period is 36 months (exclusions below) from the date of delivery, or 18 months in the event of continuous operation. The warranty remains valid on the condition that the servicing is provided by a service organization authorized by Metrohm at defined intervals and with a defined scope.

The warranty period for anion suppressors of the type "MSM" is 120 months from the date of delivery or 60 months in the case of continuous operation.

The warranty period for IC separation columns is 90 days after start-up.

For third-party components that are recognizable as such, the manufacturer's warranty regulations apply.

For instruments sold under the Metrohm NIRSystems brand, a full 16-month warranty is applicable. In the event of continuous operation, the warranty period is reduced by half.

Consumables and materials with limited storage life and glass breakage in the case of electrodes or other glass parts are excluded from the warranty.

Warranty claims cannot be asserted if the ordering party has failed to meet its payment obligations according to schedule.

During the warranty period, Metrohm undertakes either to replace free of charge or to credit the purchaser for any modules or components that can be shown to be faulty. Any transport or customs fees that may apply are the responsibility of the ordering party.

The precondition for this is that the ordering party has to specify the article number, the article designation, an adequate error description, the delivery date and (if applicable) the serial number or chip data in the Support Tracker. Metrohm then decides whether a replacement or a credit note is to be issued or whether the faulty part has to be returned using the Return Material Authorization (RMA). If a replacement or credit note is issued, the ordering party undertakes to store the faulty part for at least 24 months in accordance with the current storage directives (in compliance with ESD guidelines) and to hold it in readiness for onsite inspection or for return shipment to Metrohm. Metrohm reserves the right to invoice the ordering party for these articles, including retroactively, in the event of noncompliance with these preconditions.

The same warranty periods that are specified for a corresponding new part apply to parts that are replaced or repaired within the above-mentioned warranty periods. However, replacement or repair of a part does not extend the warranty period of the entire system.

Deficiencies arising from circumstances that are not the responsibility of Metrohm, such as improper storage or improper use, etc., are expressly excluded from the warranty.

Metrohm also offers a 120-month spare parts availability guarantee and a 60-month PC software support warranty, calculated from the date on which the product is withdrawn from the market. The content of this warranty is the ability of the customer to obtain functioning spare parts or appropriate software support at market prices during the time of the warranty period. This does not apply for software products sold under the Metrohm NIRSystems brand.

If Metrohm AG is unable to meet this obligation due to circumstances beyond the control of Metrohm AG, then the ordering party shall be offered alternative solutions at preferential conditions.

8 Accessories

Up-to-date information on the scope of delivery and optional accessories for your instrument can be found on the Internet.

NOTE

When you receive your new instrument, we recommend downloading the accessories list from the Internet, printing it out and keeping it together with the manual for reference purposes.

Instruments currently sold

If you do not know the article number of your instrument, proceed as follows:

Downloading the accessories list

1. Go to the Metrohm website *http://www.metrohm.com/com*.
2. Click on  .

   The **Search** webpage will be displayed.
3. Enter a search term relating to the instrument into the search field and click on **Find**.

   The search results will be displayed.
4. In the search results, select the **Devices** tab (if it is not already selected) and then click on the Metrohm article number of the required instrument (e.g. 2.852.0050).

   The page with information pertaining to the searched article is displayed.
5. Select the **Parts** tab.

   The complete list of accessories with the scope of delivery and the optional accessories will be displayed.
6. Click on  .

The **Partslists** webpage will be displayed.

7 Select the desired output language.

8 With the article number entered, click on the command **Generate PDF**.

The PDF file with the accessories data will be created in the language selected.

Direct access for all instruments

If you are unable to find your instrument using the search as described above, this may be due to the instrument not being sold anymore. Using the article number, you can download accessories lists for all instruments as follows:

Downloading the accessories list

1 Type *http://partslists.metrohm.com* into your Internet browser.

The **Partslists** webpage will be displayed.

2 Select the desired output language.

3 Enter the article number and click on the **Generate PDF** command.

The PDF file with the accessories data will be created in the language selected.

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