

# 930 Compact IC Flex



930 Compact IC Flex Oven/ChS

Manual – Short Instructions

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# **930 Compact IC Flex**

## **930 Compact IC Flex Oven/ChS**

2.930.2200

### **Manual – Short Instructions**

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# Table of contents

<b>1</b>	<b>About these short instructions</b>	<b>1</b>
<b>2</b>	<b>Introduction</b>	<b>2</b>
2.1	Instrument description .....	2
2.2	Intended use .....	4
2.3	Safety instructions .....	4
2.3.1	General notes on safety .....	4
2.3.2	Electrical safety .....	4
2.3.3	Tubing and capillary connections .....	5
2.3.4	Flammable solvents and chemicals .....	6
2.3.5	Recycling and disposal .....	6
2.4	Symbols and conventions .....	6
<b>3</b>	<b>Overview of the instrument</b>	<b>8</b>
3.1	Front .....	8
3.2	Rear .....	9
<b>4</b>	<b>Installation</b>	<b>11</b>
4.1	Setting up the instrument .....	11
4.1.1	Packaging .....	11
4.1.2	Checks .....	11
4.1.3	Location .....	11
4.2	Capillary connections in the IC system .....	11
4.3	Removing transport locking screws .....	12
4.4	Connecting the drainage tubing and leak sensor .....	14
4.4.1	Installing the drainage tubing .....	14
4.4.2	Connecting the leak sensor .....	15
4.5	Column oven .....	16
4.6	Connecting the eluent bottle .....	16
4.7	Installing the high-pressure pump .....	19
4.8	Installing an inline filter .....	19
4.9	Installing the pulsation absorber .....	19
4.10	Injection valve .....	19
4.11	Metrohm Suppressor Module (MSM) .....	19
4.11.1	Inserting the rotors .....	20
4.11.2	Connecting the Metrohm Suppressor Module (MSM) .....	21
4.12	Installing the conductivity detector .....	24



4.13	Installing the amperometric detector .....	24
4.14	Connecting the instrument to a computer .....	25
4.15	Connecting the instrument to the power grid .....	26
4.16	Initial start-up .....	27
4.17	Connecting and rinsing the guard column .....	29
4.18	Connecting the separation column .....	30
4.19	Conditioning .....	32
<b>5</b>	<b>Operation</b>	<b>34</b>
<b>6</b>	<b>Accessories</b>	<b>35</b>
	<b>Index</b>	<b>36</b>



## Table of figures

Figure 1	Front .....	8
Figure 2	Rear .....	9
Figure 3	Removing the transport locking screws .....	13
Figure 4	Installing the tubing weighting and aspiration filter .....	18
Figure 5	Metrohm Suppressor Module (MSM) – Connection capillaries .....	22



# 1 About these short instructions

This short instruction manual contains important chapters from the comprehensive manual. In addition to an introduction, safety instructions and an overview of the instrument, you will also find information about installing and operating the 930 Compact IC Flex Oven/ChS as well as information regarding the warranty. You can download the comprehensive manual as a PDF file from the Internet.

## Downloading the manual

You can find the detailed manual on the Internet under <http://www.metrohm.com/>:

1. Enter the order number for your instrument as the search term (e.g. **2.930.2200**).
2. Click on **>More information**.
3. Click on **Documents**.  
All available documents for the instrument will be displayed.
4. Click on the PDF link to download the desired manual.



### **High-pressure pump**

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

### **Inline filter**

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

### **Pulsation absorber**

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

### **Injection valve**

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

### **Metrohm Suppressor Module (MSM)**

The chemical suppressor MSM consists of the suppressor drive, a rotor and, where applicable, an adapter. The suppressor drive gives you the flexibility to use different rotors according to the principle "one drive – many rotors". Suppression rotors with different capacities and construction or a rotor for sample preparation (SPM Rotor) are readily interchangeable with appropriate adapters as needed. The rotors are not included in the instrument's scope of delivery. The rotor required for the application and any adapter that is required must be ordered separately.

### **Detector**

Metrohm offers a series of different detectors for various analysis tasks. A suitable detector type must be ordered as a separate device.

### **Separation column**

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



**WARNING**

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

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

**Supply voltage****WARNING**

An incorrect supply voltage can damage the instrument.

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

**Protection against electrostatic charges****WARNING**

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

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

The device is to be operated only with the door closed.

**2.3.3 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.

### 2.3.4 Flammable solvents and chemicals

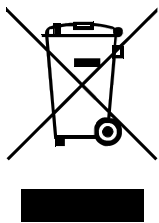


#### WARNING

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.



### 2.3.5 Recycling and disposal



Properly dispose of chemicals and of the product to reduce negative effects on the environment and public health. Local authorities, waste disposal companies or dealers provide more detailed information on disposal. Observe the WEEE EU directive (WEEE = Waste Electrical and Electronic Equipment) for the proper disposal of waste electronic equipment within the European Union.

## 2.4 Symbols and conventions

The following symbols and formatting may appear in this documentation:

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

**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.

## 3 Overview of the instrument

### 3.1 Front

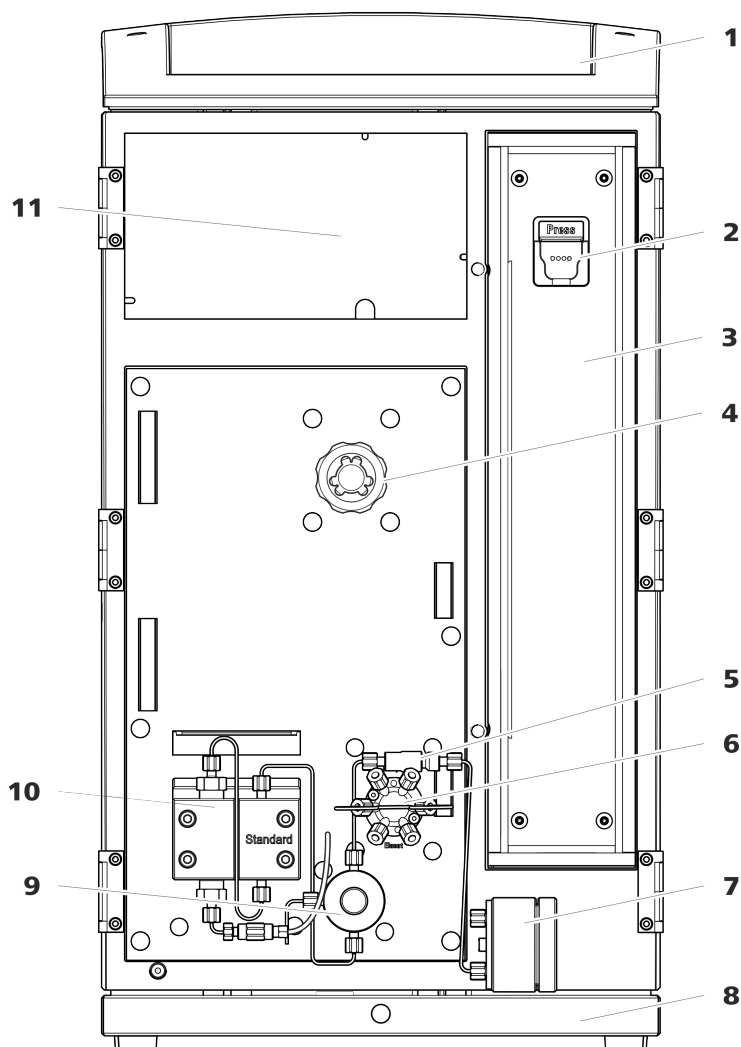


Figure 1 Front

**1 Bottle holder**

Offers space for the eluent bottle and additional accessories.

**3 Column oven**

**5 Inline filter**

**7 Pulsation absorber**

**2 Column holder**

For hanging the separation column (iColumn). With column recognition.

**4 Metrohm Suppressor Module (MSM)**

**6 Injection valve**

**8 Base tray**

With leak sensor.

**9 Purge valve**  
 For deaerating the high-pressure pump.  
 With rotary knob in the center and pressure sensor.

**10 High-pressure pump**  
 Pumps the eluent through the IC system.

**11 Detector chamber**  
 Offers space for an embedded detector and additional accessories.

### 3.2 Rear

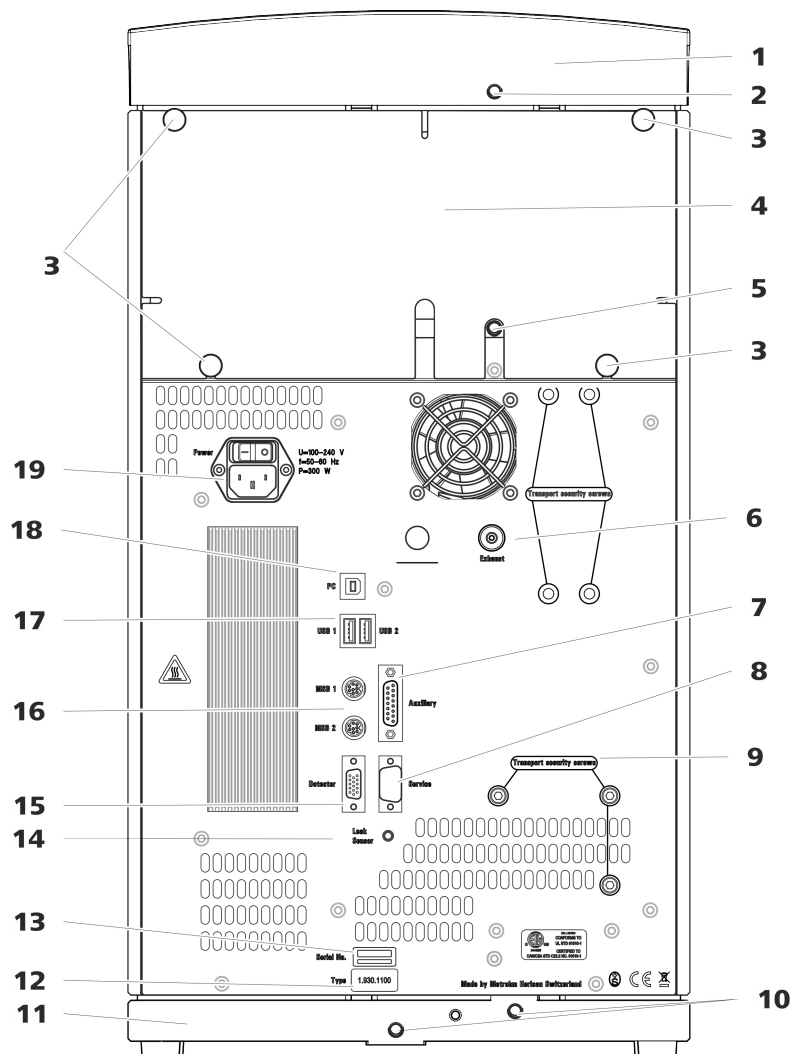


Figure 2 Rear

**1 Bottle holder**

**2 Drainage tubing connection**  
 For connecting the drainage tubing, which guides escaped fluids away from the bottle holder.



<p><b>3 Knurled screws</b> For fastening the removable back panel.</p>	<p><b>4 Back panel</b> Removable. Enables access to the detector chamber.</p>
<p><b>5 Drainage tubing connection</b> For connecting the drainage tubing, which guides escaped liquids away from the detector chamber.</p>	<p><b>6 Exhaust opening</b> Labeled <i>Exhaust</i>. For extracting the air from the vacuum chamber.</p>
<p><b>7 Auxiliary connection socket</b> For connecting an 891 Professional Analog Out (2.891.0010).</p>	<p><b>8 Service connection socket</b> For Metrohm service only.</p>
<p><b>9 Transport locking screws</b> For securing the high-pressure pump when transporting the instrument.</p>	<p><b>10 Drainage tubing connections</b> For connecting two drainage tubings that guide the escaped fluid to the leak sensor and from there to the waste container.</p>
<p><b>11 Base tray</b> With leak sensor.</p>	<p><b>12 Type plate</b></p>
<p><b>13 Serial number</b></p>	<p><b>14 Leak sensor connection socket</b> Labeled <i>Leak Sensor</i>. For connecting the leak sensor connection cable.</p>
<p><b>15 Detector connection socket</b> Labeled <i>Detector</i>. For connecting Metrohm detectors.</p>	<p><b>16 MSB connection sockets</b> Labeled <i>MSB 1</i> and <i>MSB 2</i>. For connecting MSB devices.</p>
<p><b>17 USB connection sockets</b> Labeled <i>USB 1</i> and <i>USB 2</i>. For connecting USB devices.</p>	<p><b>18 PC connection socket</b> For connecting the instrument to the computer with the USB cable (6.2151.020).</p>
<p><b>19 Power socket</b> Power socket for connecting the power cable and power switch for switching the instrument on and off.</p>	

## 4 Installation

### 4.1 Setting up the instrument

#### 4.1.1 Packaging

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

#### 4.1.2 Checks

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

#### 4.1.3 Location

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

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

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

### 4.2 Capillary connections in the IC system

#### Capillary connections



#### NOTE

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

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

To avoid this, we recommend

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

In order to achieve optimum analysis results, capillary connections in an IC system must be absolutely tight and free of dead volume. Dead volume



occurs if two capillary ends connected to each other do not fit exactly, thus allowing liquid to escape. There are two possible causes for this:

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

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

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

### Creating dead-volume-free capillary connections

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

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

## 4.3 Removing transport locking screws

To avoid damage to the drives for the high-pressure pump and the vacuum pump during transport, the pumps are secured with transport locking screws. These are located at the rear of the instrument and labeled with **Transport security screws**.

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

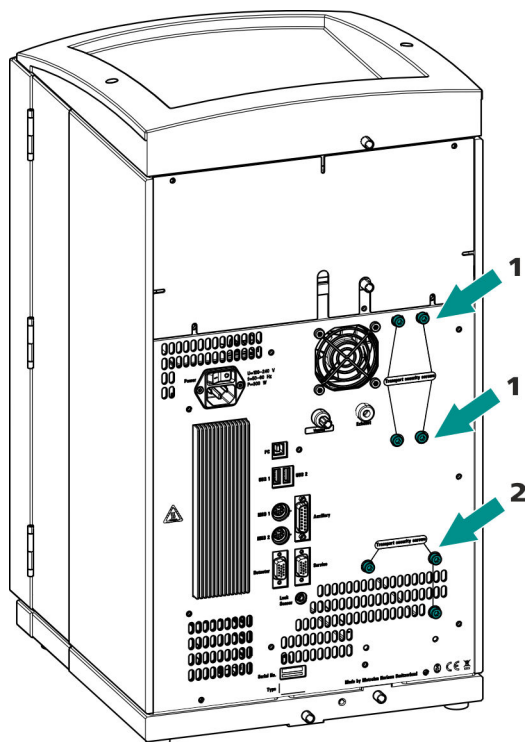


Figure 3 Removing the transport locking screws

### 1 Transport locking screws

For the vacuum pump. Only present if the instrument has a degasser or a CO<sub>2</sub> Suppressor (MCS).

### 2 Transport locking screws

For the high-pressure pump.

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

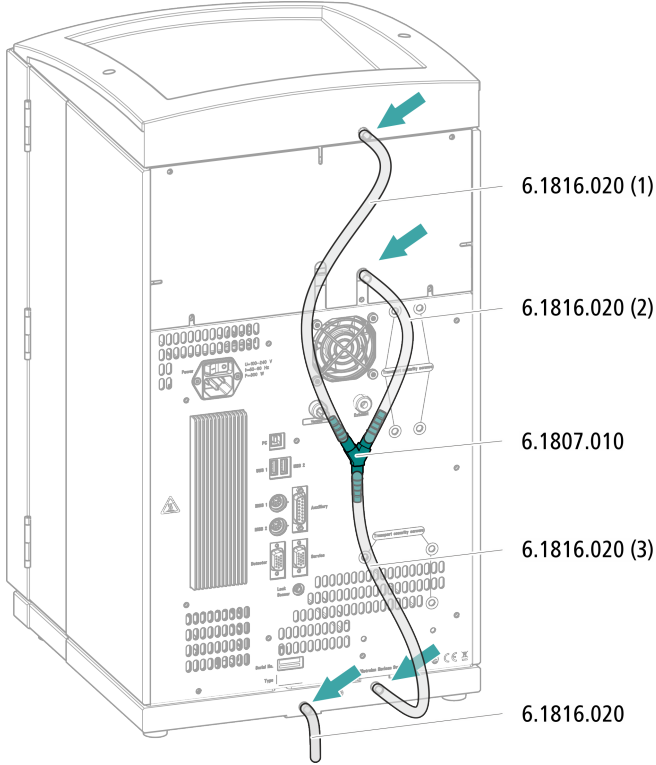


### CAUTION

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



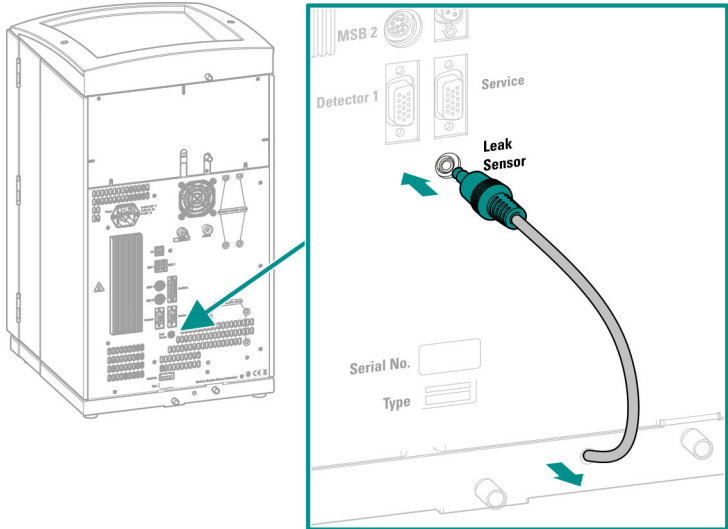
### Connecting the drainage tubing



### 4.4.2 Connecting the leak sensor

#### Plugging in the leak sensor connection cable

The leak sensor connection cable is coiled up in the base tray.





## 4.5 Column oven

The column oven is completely connected. No installation work is required.

## 4.6 Connecting the eluent bottle

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

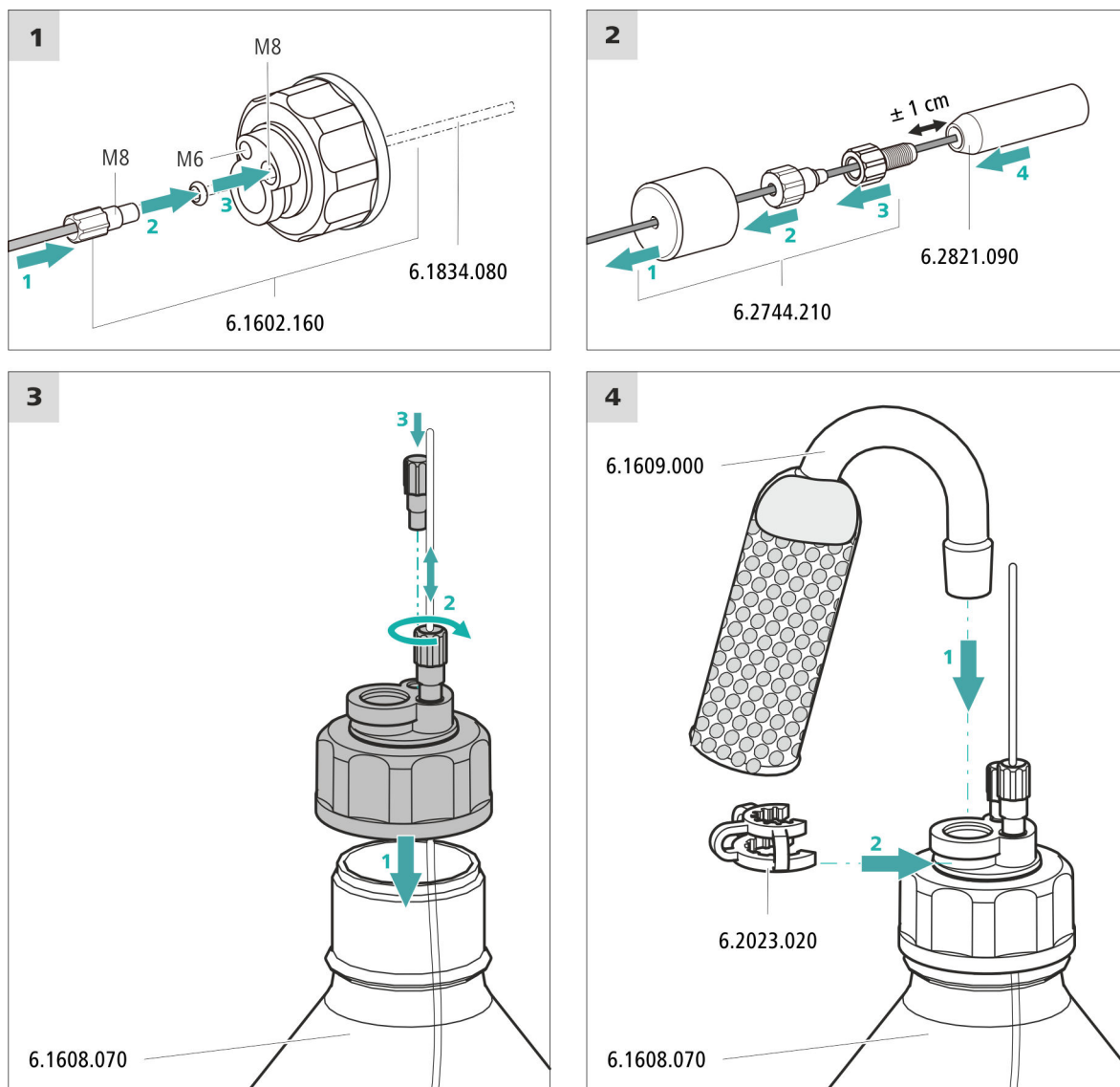
### *Accessories*

For this step, you need the following accessories:

These parts are part of the *Vario/Flex ONE* accessory kit (6.5000.010).

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

### Connecting the eluent aspiration tubing



#### 1 Pre-rinsing the aspiration filter



#### NOTE

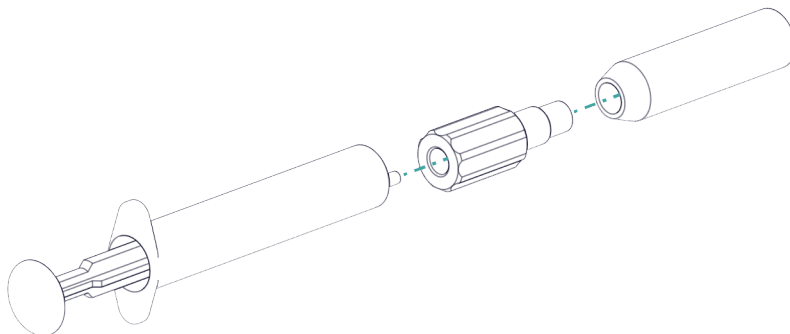
Always wear gloves when handling the aspiration filter.

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



For pre-rinsing, you will need the adapter Luer inner, M6 outer (6.02744.050), a syringe and a vessel with ultrapure water or eluent.

- Screw the adapter to the aspiration filter.
- Insert the syringe into the adapter.



- Immerse the aspiration filter in a vessel with ultrapure water or eluent.
- Fill the syringe completely with ultrapure water or eluent 3 times and then empty it again each time.

## 2 Mounting the aspiration filter



### NOTE

Always wear gloves when handling the aspiration filter.

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

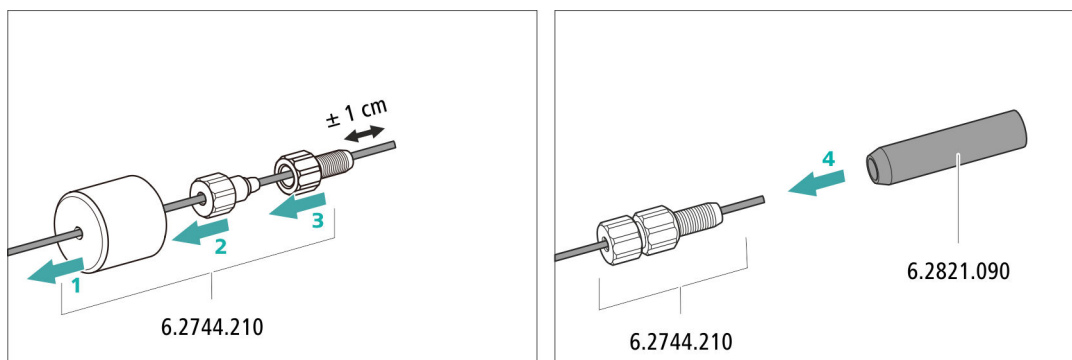


Figure 4 Installing the tubing weighting and aspiration filter

## 4.7 Installing the high-pressure pump

The high-pressure pump is completely connected. No installation work is required.

## 4.8 Installing an inline filter

The inline filter is completely connected. No installation work is required.

## 4.9 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.

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

## 4.10 Injection valve

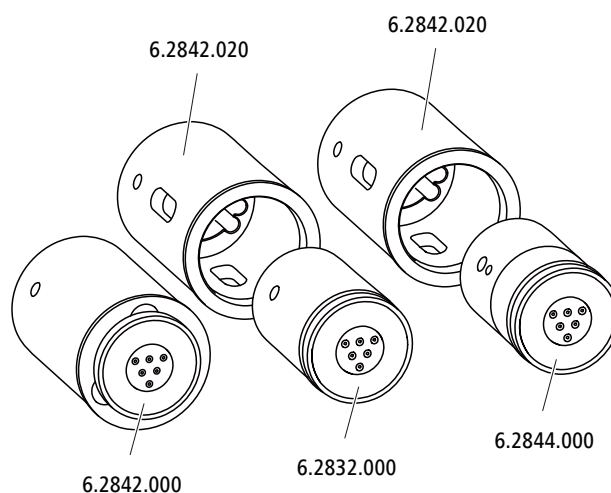
The injection valve is completely connected. No installation work is required.

## 4.11 Metrohm Suppressor Module (MSM)

The suppressor drive of the 930 Compact IC Flex can hold various rotors. The large rotors, such as the MSM-HC Rotor A (6.2842.000) and the MSM-HC Rotor C (6.2842.200) can be inserted directly.

The small rotors, such as the MSM Rotor A (6.2832.000) and the MSM-LC Rotor A (6.2844.000), must first be fitted into the adapter (6.2842.020), which can then be inserted into the suppressor housing.

A connecting piece (6.2835.010) is used for all rotors for connecting the Metrohm Suppressor Module (MSM) to the IC system.

**NOTE**

The instruments are supplied without rotor and without adapter.  
The suitable rotor and the adapter, if required, must be ordered separately.

**4.11.1 Inserting the rotors***Accessories*

For this step, you need the following accessories:

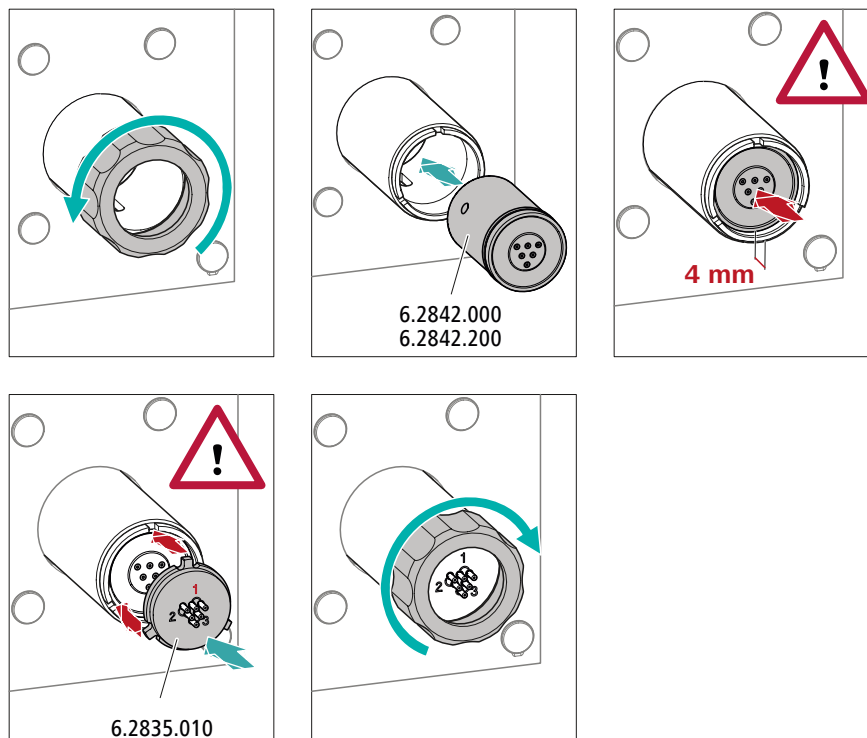
- For suppression: MSM Rotor A (6.2832.000) or MSM-HC Rotor A (6.2842.000), MSM-LC Rotor A (6.2844.000) or MSM-HC Rotor C (6.2842.200) or MSM-HC Rotor C (6.2842.200)
- Optional: Adapter (6.2842.020)
- Connecting piece (6.2835.010)

Large rotors can be inserted directly into the rotor housing.

**CAUTION**

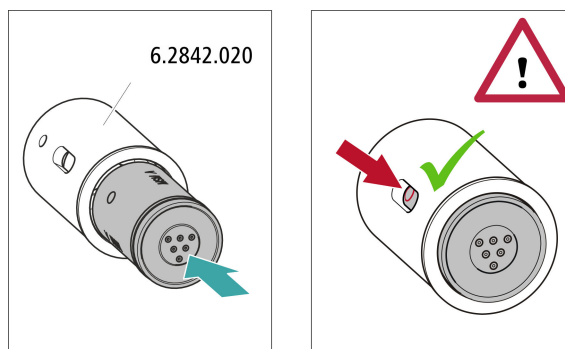
The rotor may be destroyed during start-up if not inserted correctly.  
Therefore, follow the following instructions exactly.

### Inserting large rotors



### Inserting small rotors

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



#### 4.11.2 Connecting the Metrohm Suppressor Module (MSM)

The three entries and exits of the suppressor units, numbered 1, 2 and 3 on the connecting piece, each have two permanently installed PTFE capillaries.

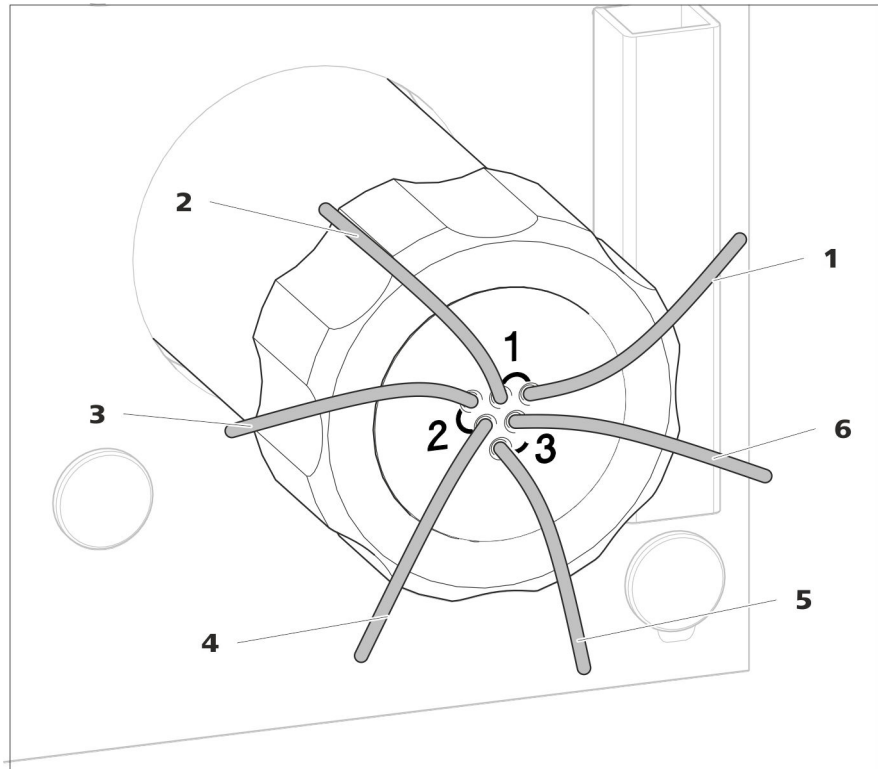
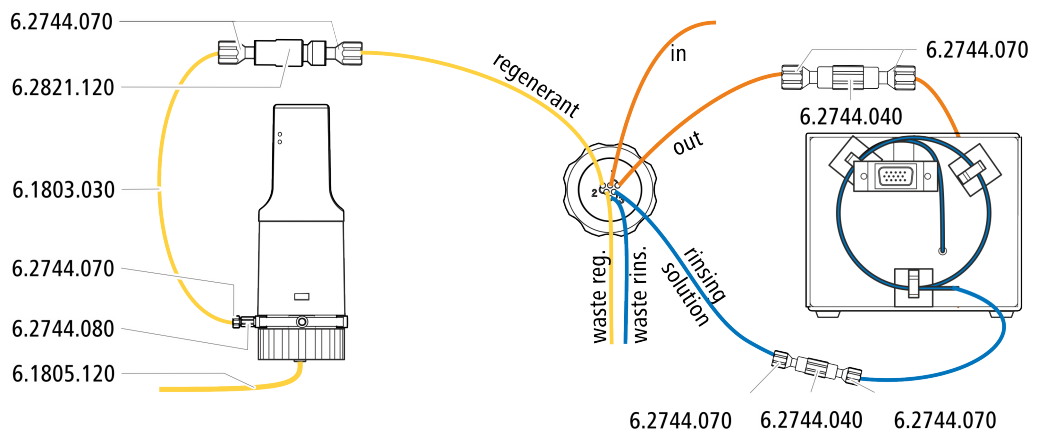


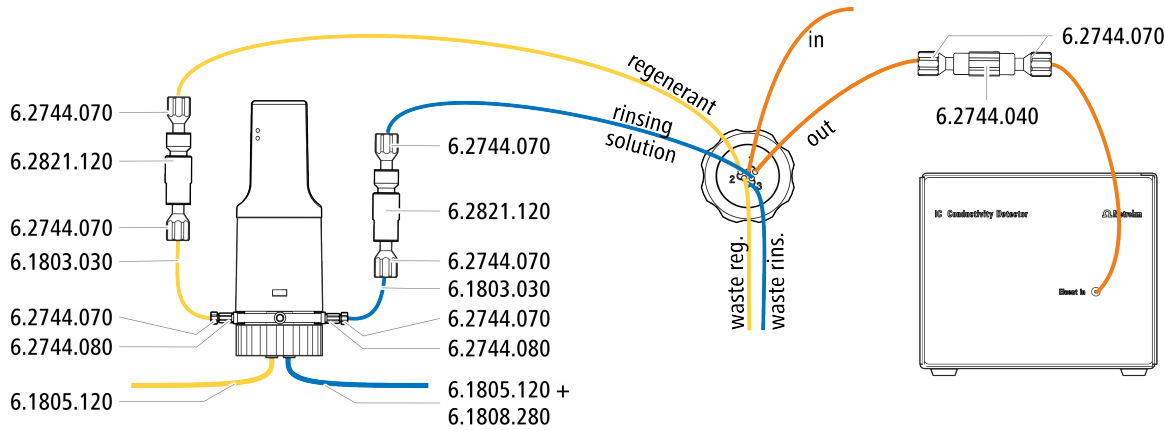
Figure 5 Metrohm Suppressor Module (MSM) – Connection capillaries

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

### Recommended installation



### Alternative installation

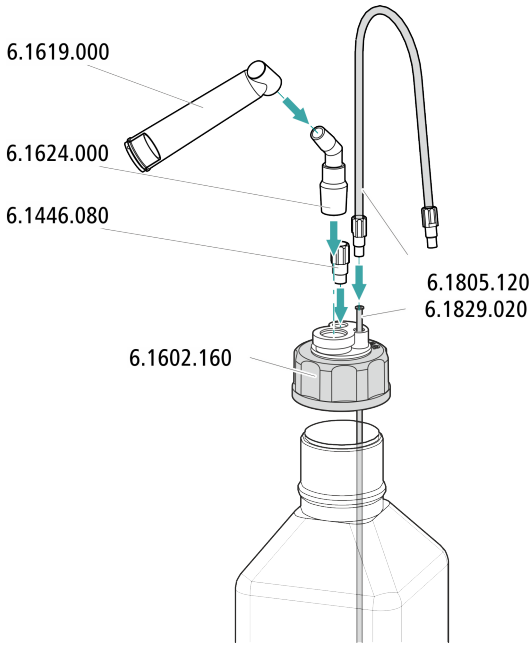


#### 4.11.2.1 Installing bottles with auxiliary solutions

*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)
- Accessories from IC equipment: Dosino Regeneration (6.5330.190)



## 4.12 Installing the conductivity detector

The 930 Compact IC Flex provides enough space for one detector and additional accessories in the detector chamber. The detector is available as separate device and is supplied with a separate manual.

### Placing the detector in the instrument

Follow the instructions in the chapter *Inserting the detector* in the manual for the detector.

### Connecting the detector to the eluent path



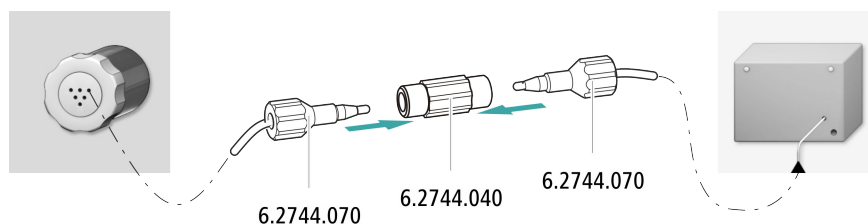
#### NOTE

The separation column is not inserted into the instrument until it is being started up for the first time. Until then, the detector inlet capillary has to be connected to the *out* capillary of the Metrohm Suppressor Module (MSM) using a coupling (6.2744.040).

#### Accessories

For this step, you need the following accessories:

- Coupling (6.2744.040)
- 2 × pressure screw (6.2744.010)



## 4.13 Installing the amperometric detector

The 930 Compact IC Flex provides enough space for one detector and additional accessories in the detector chamber. The detector is available as separate device and is supplied with a separate manual.

### Placing the detector in the instrument

Follow the instructions in the chapter *Inserting the detector* in the manual for the detector.

## 4.14 Connecting the instrument to a computer



### NOTE

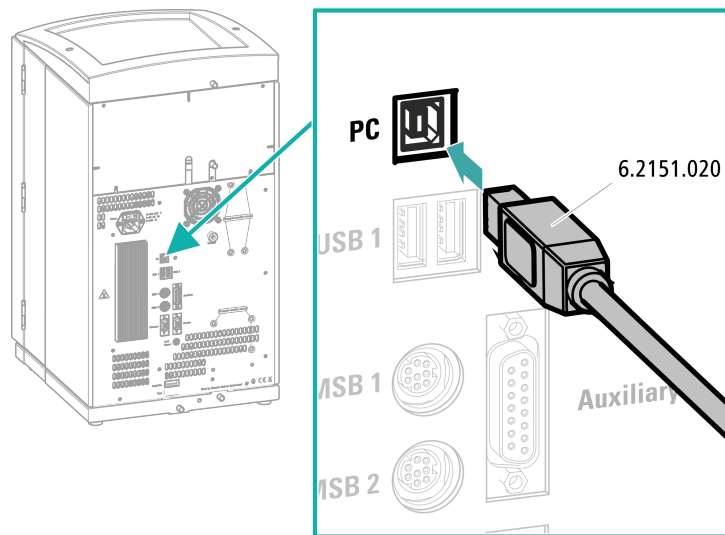
If the instrument is connected to the computer, then it must be switched off.

#### Accessories

For this step, you need the following accessories:

- USB connection cable (6.2151.020) from the accessory kit: Vario/Flex Basic (6.5000.000)

### Connecting the USB cable



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

## 4.15 Connecting the instrument to the power grid



### WARNING

#### Electric shock from electrical potential

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

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

### Connecting the power cord

#### Accessories

Power cord with the following specifications:

- Length: max. 2 m
- Number of cores: 3, with protective conductor
- Instrument plug: IEC 60320 type C13
- Conductor cross-section 3x min. 1.0 mm<sup>2</sup> / 18 AWG
- Power plug:
  - according to customer requirement (6.2122.XX0)
  - min. 10 A



### NOTE

Do not use a not permitted power cord!

#### 1 Plugging in the power cord

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

## 4.16 Initial start-up

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

### Rinsing the IC system



#### CAUTION

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

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

#### 1 Preparing the software

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

#### 2 Preparing the instrument

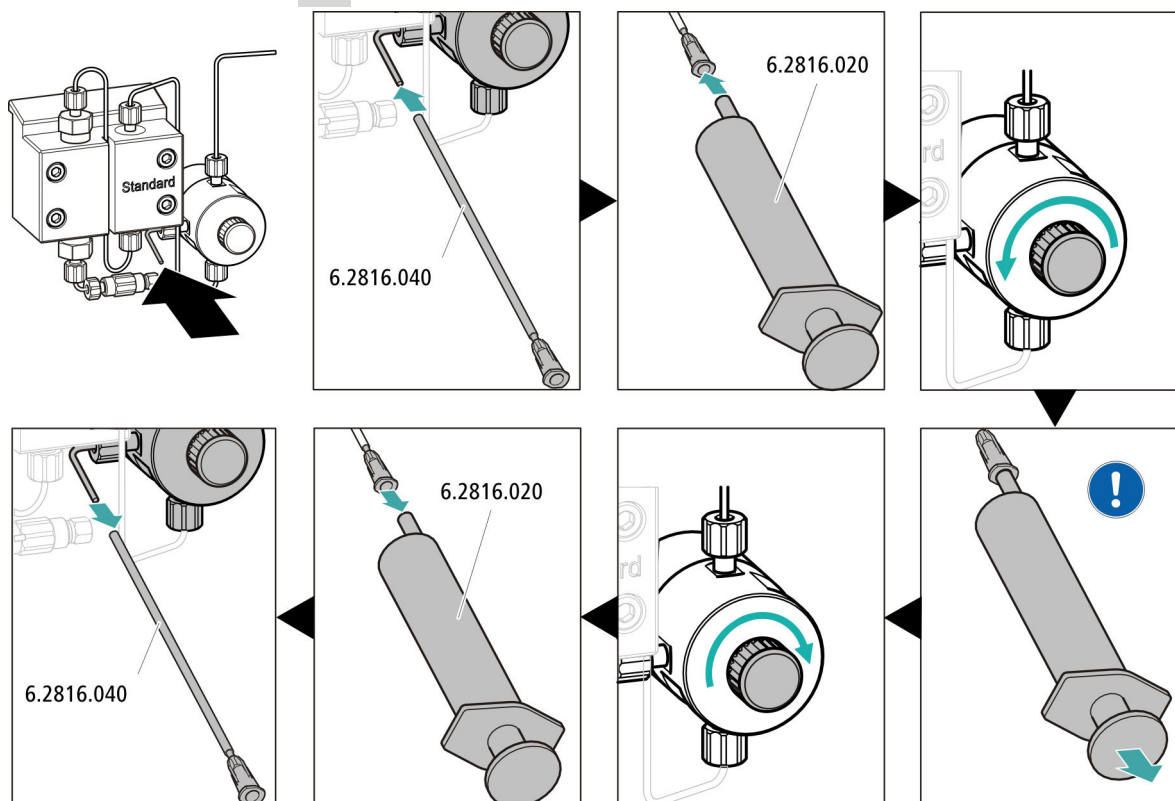
- Ensure that the eluent aspiration tubing is immersed in the eluent and that there is enough eluent in the eluent bottle.
- - STREAM method (recommended): Ensure that the aspiration tubing for the regeneration solution is immersed in the solution and that there is enough solution. Check whether the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


MagIC Net detects the instrument and all of its modules.

### 3 Starting equilibration

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

### 4 Deaerating the high-pressure pump



 Use the syringe to aspirate eluent until there are no more air bubbles in the eluent aspiration tubing.

### 5 Rinsing the instrument without columns

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

## 4.17 Connecting and rinsing the guard column



### CAUTION

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

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



### NOTE

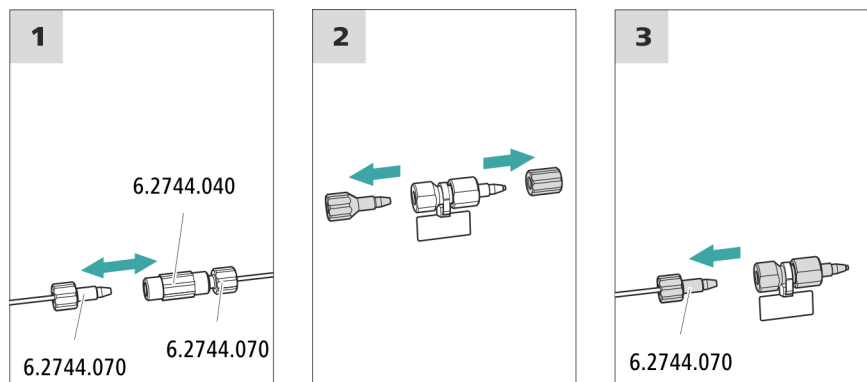
The guard column may not be connected until after the instrument has already been put into operation once (*see chapter 4.16, page 27*). The guard column and the separation column have to be replaced by a coupling (6.2744.040) until then.

#### Accessories

For this step, you need the following accessories:

- Guard column (suitable for separation column)

### Connecting the guard column



### Rinsing the guard column

#### 1 Rinsing the guard column

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



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

## 4.18 Connecting the separation column



### CAUTION

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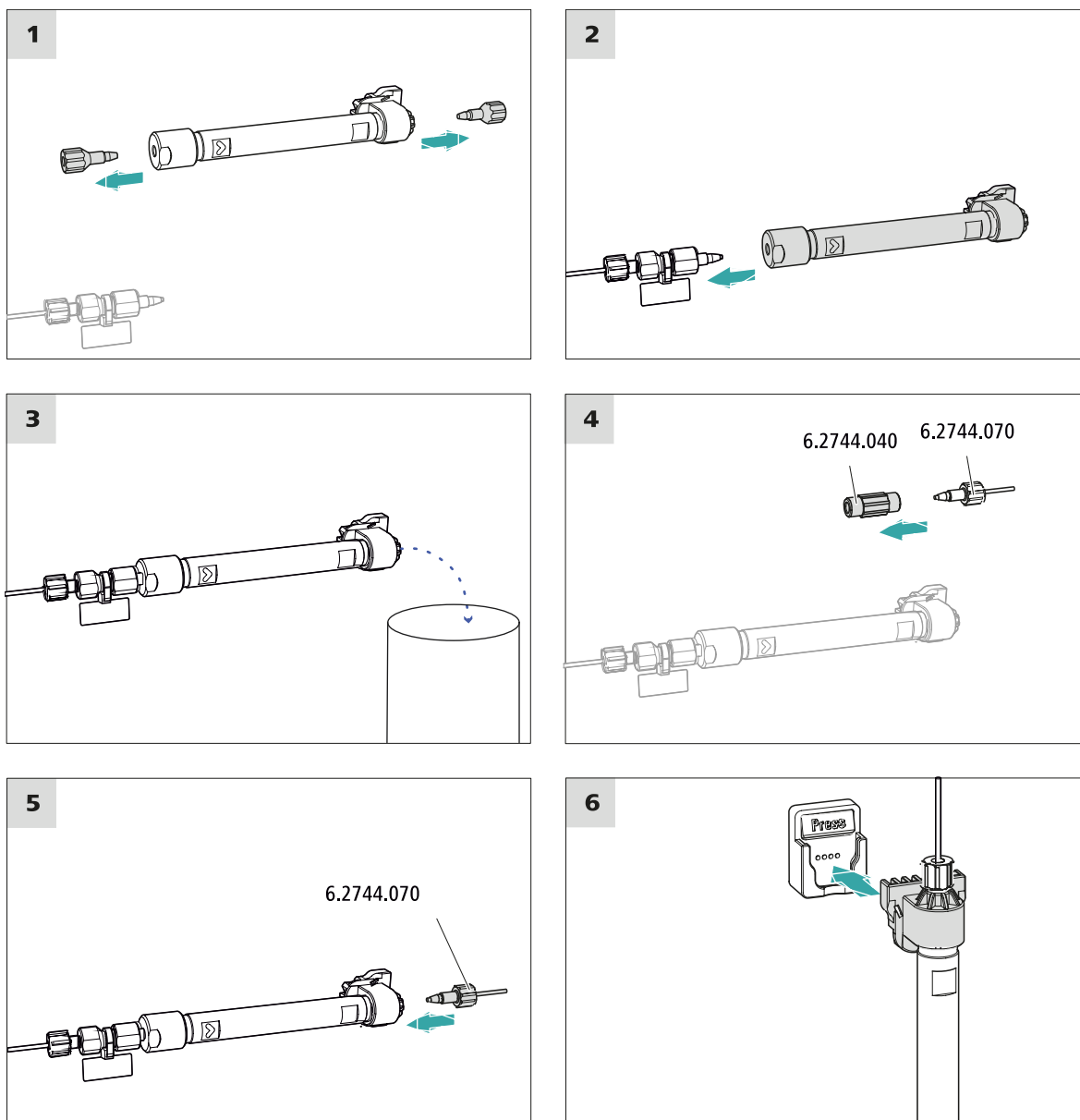
New separation columns are filled with a solution and sealed with stoppers on both sides. Before inserting the column, ensure that this solution can be mixed with the eluent being used (follow the information provided by the manufacturer).



### NOTE

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



### Connecting the separation column

#### 1 Rinsing the separation column

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

- Stop the high-pressure pump in the manual control in MagIC Net again: **Off**.

## 4.19 Conditioning

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

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



### NOTE

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

### Conditioning the system

#### 1 Preparing the software



### CAUTION

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

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

#### 2 Preparing the instrument

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

#### 3 Starting equilibration

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

- Visually inspect whether all capillaries and their connections from the high-pressure pump to the detector are leak-tight. If eluent is leaking out anywhere, tighten the corresponding pressure screw further, or loosen the pressure screw, check the end of the capillary and shorten it using the capillary cutter if necessary and retighten the pressure screw.

#### **4 Conditioning the system**

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

The instrument is now ready for measuring samples.

## 5 Operation

The 930 Compact IC Flex Oven/ChS is operated solely using the MagIC Net software. You can find information on operating the software in the tutorial for MagIC Net or in the online help.

## 6 Accessories

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

### Downloading the accessories list

- 1 Type <https://www.metrohm.com/> into your Internet browser.
- 2 Under **Find products, accessories, and applications by**, enter the article number (e.g. **2.930.2200**).  
The search result is displayed.
- 3 Under **Products**, click on **More information**.  
Detailed information regarding the product is shown on various tabs.
- 4 On the **Included parts** tab, click on **Download the PDF**.  
The PDF file with the accessories data will be created.



#### 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.

