

# 940 Professional IC Vario



940 Professional IC Vario TWO/SeS/PP

## Manual – Short Instructions

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# **940 Professional IC Vario**

**940 Professional IC Vario  
TWO/SeS/PP**

2.940.2500

## **Manual – Short Instructions**

Technical Communication  
Metrohm AG  
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**Leak sensor**

The leak sensor detects leaking liquid that collects in the instrument's base tray. Liquid that leaks in the instrument is routed to the base tray using drainage tubing and detected there.

**Column thermostat**

The column thermostat regulates the temperature for the separation columns and the eluent, thereby providing stable measuring conditions. The interior of the column thermostat can be heated and cooled. There are two column holders with chip readers in the column thermostat.

**Eluent degasser**

The eluent degasser removes gas bubbles and dissolved gases from the eluent.

**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



## 2.3 Symbols and conventions

The following symbols and formatting may appear in this documentation:

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



The product may be used only when it is in perfect condition. The following measures are required to ensure the safe operation of the product:

- Check the condition of the product before use.
- Remedy defects and malfunctions immediately.
- Maintain and clean the product regularly.

### 3.3 Requirements for operating personnel

Only qualified personnel may operate the product. Qualified personnel are persons who meet the following requirements:

- Basic regulations on occupational safety and accident prevention for chemical laboratories are known and complied with.
- Knowledge of handling hazardous chemicals is present. Personnel have the ability to recognize and avoid potential dangers.
- Knowledge regarding the application of fire prevention measures for laboratories is available.
- Safety-relevant information is communicated and understood. The personnel can operate the product safely.
- The user documentation has been read and understood. The personnel operate the product according to the instructions in the user documentation.

### 3.4 Safety instructions

#### 3.4.1 General notes on safety



#### **WARNING**

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

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

#### 3.4.2 Electrical safety

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



#### **WARNING**

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



### 3.4.4 Flammable solvents and chemicals

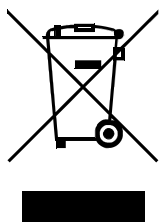


#### WARNING

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

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

### 3.4.5 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.















## 5.4 Connecting the drainage tubing and leak sensor

The leak sensor detects leaking liquid that collects in the instrument's base tray. Liquid that leaks in the bottle holder or in the detector chamber is conveyed to the base tray using drainage tubing and is detected there.

If the leak sensor detects a leak in the IC system, the IC instrument is switched off. The software displays a warning.

The leak sensor functions properly only if the following preconditions are met:

- The drainage tubing is connected.
- The leak sensor connection cable is inserted into the leak sensor connection socket.
- The 940 Professional IC Vario is switched on.
- The leak sensor is switched to **active** in the software.

### 5.4.1 Installing the drainage tubing

Liquid that leaks in the bottle holder or detector chamber flows to the rear of the instrument. Openings on the bottle holder and in the detector chamber allow the liquid to drain. The drainage tubing has to be mounted at these openings. This drainage tubing guides the leaking liquid to the base tray where the leak sensor is located.

#### *Accessories*

For this step you need the following parts from the accessory kit: Vario/Flex Basic (6.5000.000):

- 2 × silicone tubing (6.1816.020)
- Y connector (6.1807.010)

You also need scissors.



## 5.5 Column thermostat

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

## 5.6 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 eluent degasser.

### 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)





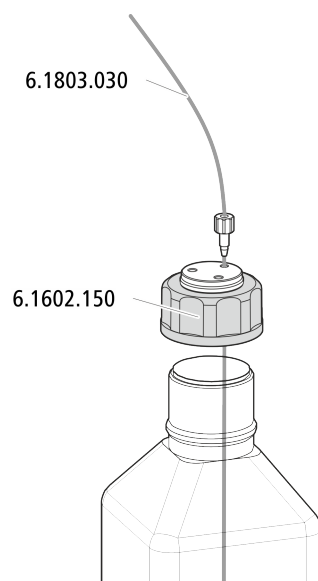












## 5.13 Peristaltic pump

### 5.13.1 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.

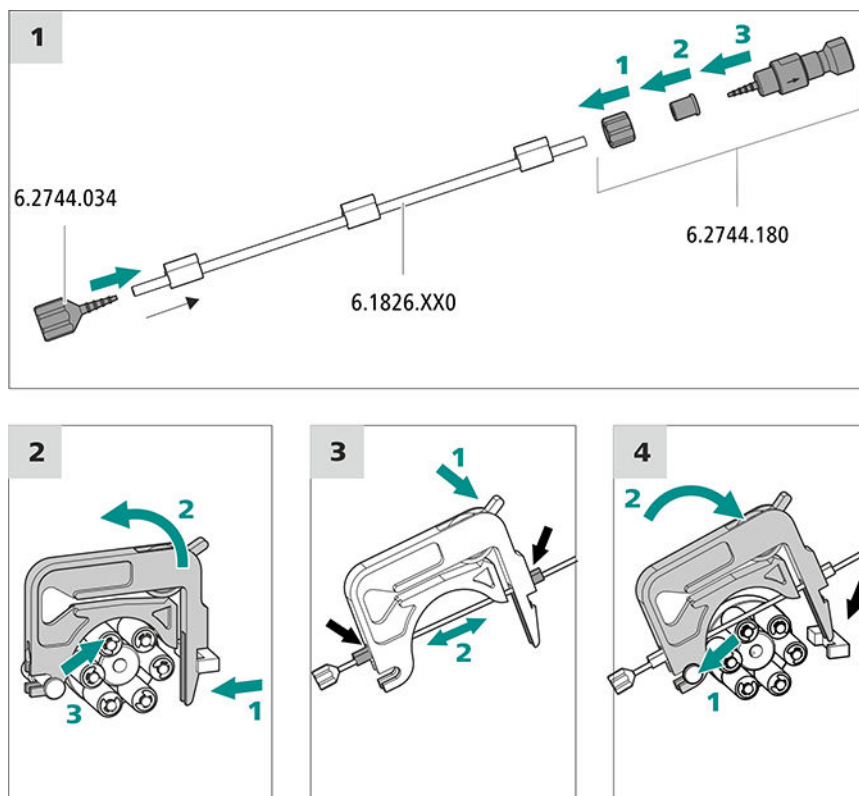
#### Selecting the pump tubing and adapter

- 1 Select pump tubing suitable for the application .
- 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).

#### 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)

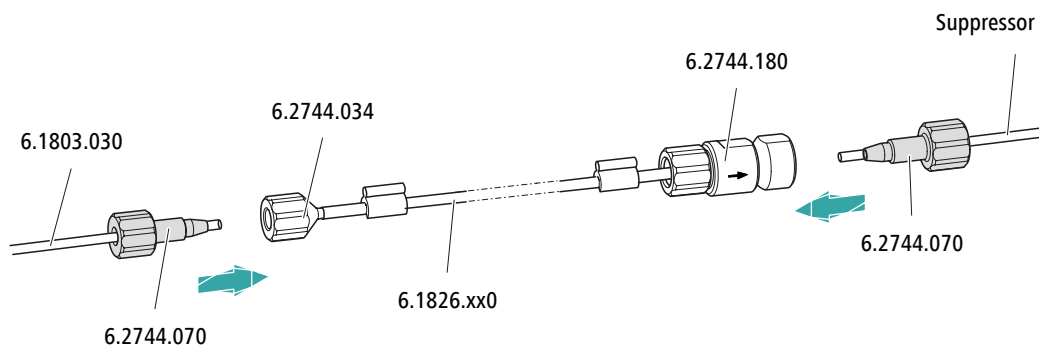


### Connecting capillaries for regeneration solution

#### Accessories

For this step, you need the following accessories:

- Aspiration capillary (6.1803.030)
- 2 × pressure screw, short (6.2744.070)



| On the pump tubing's ... | ... connect this accessory                                                                                                                                     |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inlet                    | Tighten the aspiration tubing (6.1803.030) to the tubing olive (6.2744.034) using a pressure screw (6.2744.070).                                               |
| Output                   | Tighten the <b>regenerant</b> suppressor capillary to the pump tubing connection with locking nut and filter (6.2744.180) using a pressure screw (6.2744.070). |





### 5.14.2 Installing the CO<sub>2</sub> Absorber

The aspirated air must have the lowest CO<sub>2</sub> content possible in order for the CO<sub>2</sub> to be removed from the eluent efficiently. In order to achieve this, the air is aspirated through the CO<sub>2</sub> Absorber (6.2837.100).

#### Accessories

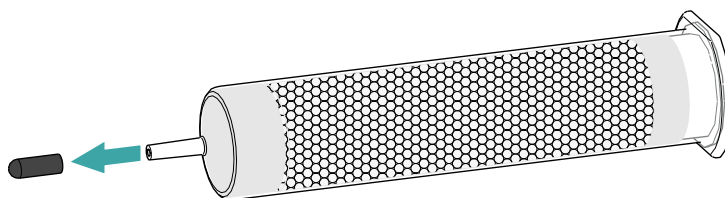
For this step, the following accessories are required:

- CO<sub>2</sub> Absorber (6.2837.100)  
The CO<sub>2</sub> Absorber is in the accessory kit: Vario/Flex SeS (6.5000.020).

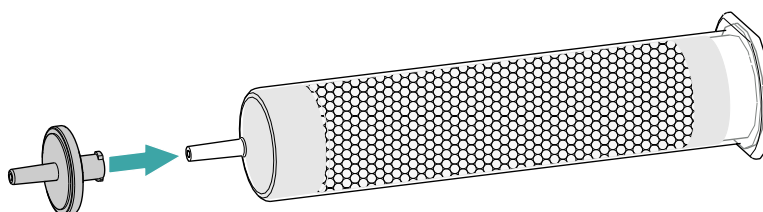
#### Preparing the CO<sub>2</sub> Absorber

Prepare the CO<sub>2</sub> Absorber for use as follows:

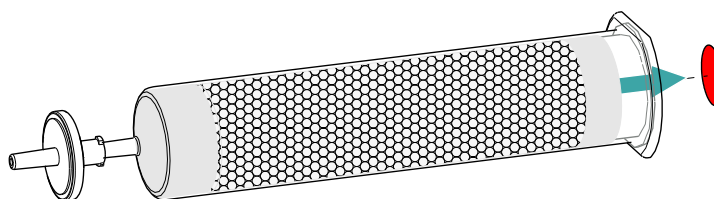
- 1 Remove the protective cap from the tip of the CO<sub>2</sub> Absorber.



- 2 Attach the dust filter to the tip of the CO<sub>2</sub> Absorber.



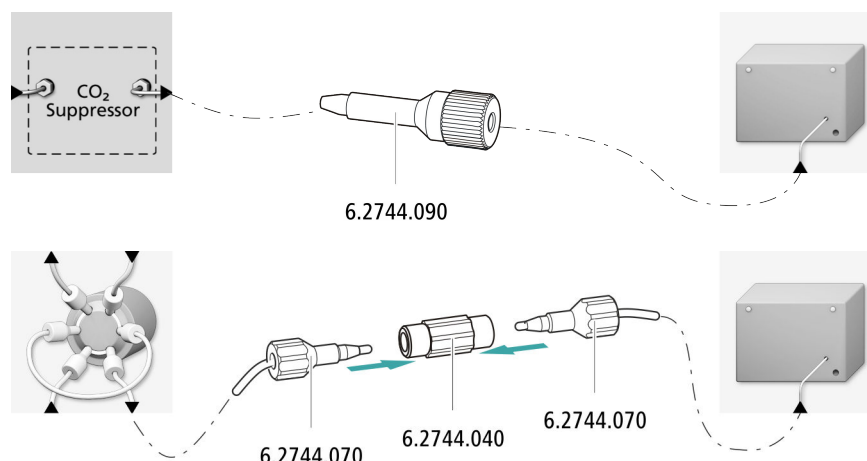
- 3 Remove the label from the lid of the CO<sub>2</sub> Absorber.



As a result, the small opening in the lid of the CO<sub>2</sub> Absorber is opened, through which the air is then aspirated.

The CO<sub>2</sub> Absorber is now ready for installation.





## 5.16 Installing the amperometric detector

The 940 Professional IC Vario provides enough space for two detectors and additional accessories in the detector chamber. The detectors are available as separate devices and are supplied with separate manuals.

### Placing the detector in the instrument

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

## 5.17 Connecting the sample degasser (optional)

Gas bubbles in the sample lead to poor reproducibility, as the amount of sample in the sample loop is not always the same. Therefore, we recommend degassing samples that contain gas before injection.



### NOTE

The sample degasser does not have to be connected. We recommend only using the sample degasser if the application requires it.

The rinsing time increases by at least two minutes when the sample degasser is connected.

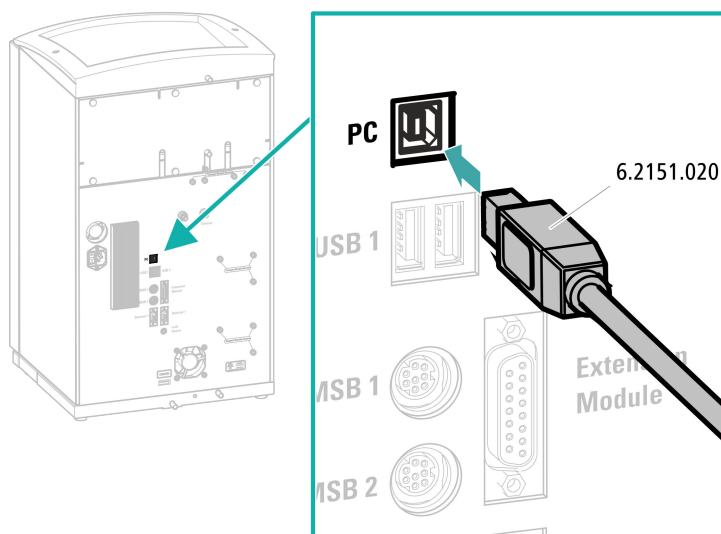
### Accessories

For this step, you need the following accessories:

- 2 × pressure screw, long (6.2744.090)
- PTFE capillary (6.1803.040)



### Connecting the USB cable



## 5.19 Connecting the instrument to the power grid



### WARNING

#### Electric shock from electrical potential

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

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

### Connecting the power cord

#### Accessories

Power cord with the following specifications:

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



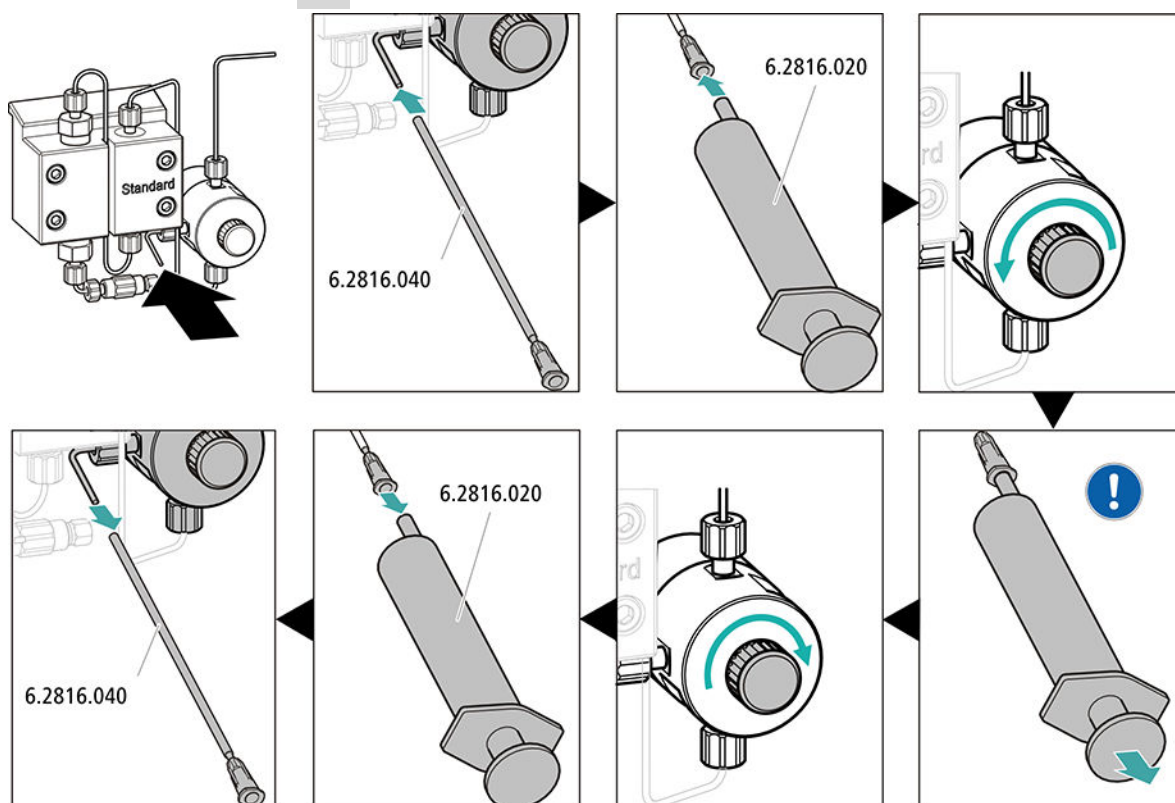
- – STREAM method (recommended): Ensure that the aspiration tubing for the regeneration solution is immersed in the solution and that there is enough solution. Check whether the detector outlet capillary is connected to the Metrohm Suppressor Module (MSM)'s inlet capillary for rinsing solution (labeled *rinsing solution*).
- Alternatively, if 2 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 the equilibration

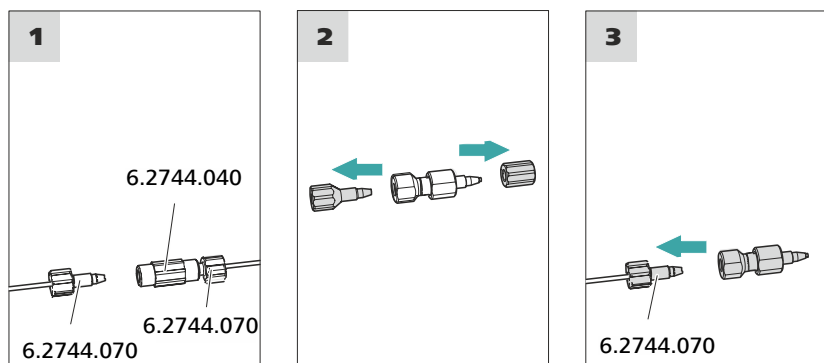
- Start the equilibration in MagIC Net: **Workplace ► Run ► Equilibration ► Start HW.**

### 4 Deaerating the high-pressure pump





### 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**.

## 5.22 Connecting and rinsing the separation column



### CAUTION

New IC 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 the information provided by the manufacturer).



### NOTE

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.



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

## 5.23 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 the equilibration

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





