

OMNIS IC



Product manual

8.1052.8002EN / v2 / 2026-08-10



Metrohm AG
Ionenstrasse
CH-9100 Herisau
Switzerland
+41 71 353 85 85
info@metrohm.com
www.metrohm.com

OMNIS IC

Product manual

8.1052.8002EN / v2 /
2026-08-10

Technical Communication
Metrohm AG
CH-9100 Herisau

This documentation is protected by copyright. All rights reserved.

This documentation is an original document.

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

Disclaimer

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. Unauthorized modifications to the product (e.g., conversions or attachments) exclude any liability on the part of the manufacturer for resulting damage and its consequences. Instructions and notes in the Metrohm product documentation must be strictly followed. Otherwise, Metrohm's liability is excluded.

Table of contents

1	Overview	1
1.1	Product description	1
1.2	Product versions	1
1.2.1	Base plate	3
1.2.2	OMNIS Extension Module	3
1.2.3	Reagent Organizer	4
1.2.4	OMNIS IC Autosampler Module	4
1.2.5	OMNIS Dosing Drive Unit	5
1.2.6	OMNIS Degasser Unit	6
1.2.7	OMNIS Proportioning Valve Unit	7
1.2.8	OMNIS High-Pressure Pump Unit	7
1.2.9	OMNIS Peristaltic Pump Unit	8
1.2.10	OMNIS MISP Unit	8
1.2.11	OMNIS Actuator Unit	9
1.2.12	OMNIS Column Thermostat Unit	9
1.2.13	OMNIS Column Holder Unit	10
1.2.14	OMNIS MSM Unit	11
1.2.15	OMNIS MCS Unit	11
1.2.16	OMNIS Conductivity Detector Unit	12
1.2.17	OMNIS Multi Flow Monitor Unit	12
1.3	About the documentation	13
1.4	Additional information	14
1.5	Displaying the accessories	14
2	Safety	15
2.1	Intended use	15
2.2	Responsibility of the operator	15
2.3	Requirements for operating personnel	16
2.4	Safety instructions	16
2.4.1	Danger from electrical potential	16
2.4.2	Danger from biological and chemical hazardous substances	17
2.4.3	Danger from highly flammable substances	17
2.4.4	Danger from leaking liquids	17
2.4.5	Danger during transport of the product	18
2.4.6	Dangers from hot surfaces and liquids	18
2.4.7	Dangers due to automated motion sequences	18
2.5	Design of warning messages	19
2.6	Meaning of warning signs	20

3	Functional description	21
3.1	System overview	21
3.1.1	OMNIS IC – Overview	21
3.1.2	OMNIS IC – Functional description	24
3.1.3	System – Signals	25
3.1.4	OMNIS IC – Connectors and interfaces	27
3.1.5	Energy supply and Internet supply – Concept	30
3.2	Base plate	32
3.2.1	Overview	32
3.2.2	Functional description	32
3.3	OMNIS Extension Module	33
3.3.1	Overview	33
3.3.2	Functional description	33
3.4	Reagent Organizer	35
3.4.1	Overview	35
3.4.2	Functional description	38
3.5	OMNIS IC Autosampler Module	44
3.5.1	Overview	44
3.5.2	Functional description	55
3.6	OMNIS Dosing Drive Unit	61
3.6.1	Overview	61
3.6.2	Functional description	62
3.7	OMNIS Degasser Unit	64
3.7.1	Overview	64
3.7.2	Functional description	65
3.8	OMNIS Proportioning Valve Unit	66
3.8.1	Overview	66
3.8.2	Functional description	67
3.9	OMNIS High-Pressure Pump Unit	68
3.9.1	Overview	68
3.9.2	Functional description	69
3.10	OMNIS Peristaltic Pump Unit	70
3.10.1	Overview	70
3.10.2	Functional description	71
3.11	OMNIS MISP Unit	72
3.11.1	Overview	72
3.11.2	Functional description	78
3.12	OMNIS Actuator Unit	81
3.12.1	Overview	81
3.12.2	Functional description	83
3.13	OMNIS Column Thermostat Unit	85
3.13.1	Overview	85
3.13.2	Functional description	88

3.14 OMNIS Column Holder Unit	90
3.14.1 Overview	90
3.14.2 Functional description	91
3.15 OMNIS MSM Unit	93
3.15.1 Overview	93
3.15.2 Functional description	94
3.16 OMNIS MCS Unit	96
3.16.1 Overview	96
3.16.2 Functional description	97
3.17 OMNIS Conductivity Detector Unit	98
3.17.1 Overview	98
3.17.2 Functional description	99
3.18 OMNIS Multi Flow Monitor Unit	100
3.18.1 Overview	100
3.18.2 Functional description	101
4 Delivery and transport	104
4.1 Delivery	104
4.2 Packaging	104
4.3 Lifting the OMNIS IC	104
5 Installation	105
5.1 Installation by Metrohm	105
5.2 Setup location	109
5.3 Guide system	109
5.3.1 Capillary connections in the OMNIS IC System	115
5.3.2 Connecting the capillaries	117
5.3.3 Connecting the tubings	118
5.3.4 Installing the drainage tubing system	119
5.4 Sample preparation techniques	130
5.4.1 Metrohm inline ultrafiltration	131
5.4.2 Metrohm Inline Dilution Technique	153
5.4.3 Metrohm inline ultrafiltration and Metrohm Inline Dilution Technique in combination	167
5.4.4 Metrohm intelligent Partial Loop injection Technique	178
5.4.5 Metrohm inline ultrafiltration and Metrohm intelligent Partial Loop injection Technique in combination	187
5.5 Equipping the OMNIS Dosing Drive Unit	198
5.6 Equipping the OMNIS Peristaltic Pump Unit	200
5.7 Equipping the OMNIS Actuator Unit	203
5.8 Equipping the OMNIS MISP Unit	205
5.8.1 Preparing the ultrafiltration cell	210
5.8.2 Replacing the filtration membrane	216

6	Operation and control	331
6.1	Initial start-up by Metrohm	331
6.2	Water quality in ion chromatography	331
6.3	Switching the OMNIS IC on and off	331
6.4	Putting the OMNIS IC System into operation	332
6.5	Rinsing the guard column	334
6.6	Rinsing the separation column	336
6.7	Equilibrating the OMNIS IC System	338
6.8	Purging the OMNIS High-Pressure Pump Unit	339
6.9	Setting the cell constant	341

6.10	Operating the cylinder unit OMNIS	342
6.11	Refitting the cylinder unit OMNIS	342
6.12	Refitting the OMNIS MISP Unit	344
6.13	OMNIS Column Thermostat Unit – Changing columns .	347
6.14	OMNIS Column Holder Unit – Changing columns	350
6.15	Rinsing the OMNIS IC System	351
7	Maintenance	356
7.1	Performing maintenance on the OMNIS IC system	356
7.2	Performing maintenance on the Reagent Organizer	359
7.3	Performing maintenance on the OMNIS High-Pressure Pump Unit	362
7.3.1	Dismantling a pump head	365
7.3.2	Cleaning or replacing the pump piston	367
7.3.3	Cleaning the check valves	369
7.3.4	Replacing the check valves	369
7.3.5	Replacing the piston seal	371
7.3.6	Replacing the piston wash seal	374
7.3.7	Mounting the pump head	376
7.4	Performing maintenance on the OMNIS Peristaltic Pump Unit	378
7.5	Service life of the filtration membrane	379
7.6	Performing maintenance on the separation column	381
7.7	Replacing the waste collector	382
7.8	Performing maintenance on the OMNIS MCS Unit	384
7.9	Performing maintenance on the cylinder unit OMNIS ..	386
7.10	Cleaning the product	387
7.10.1	Cleaning the base plate	388
7.10.2	Cleaning the Reagent Organizer	389
7.10.3	Cleaning the OMNIS IC Autosampler Module	390
7.10.4	Cleaning the OMNIS Dosing Drive Unit	393
7.10.5	Cleaning the OMNIS Column Thermostat Unit	394
7.10.6	Cleaning the OMNIS MSM Unit	397
7.10.7	Cleaning the waste collector	400
7.10.8	Cleaning the drip collector, Unit	402
8	Troubleshooting	404
8.1	Troubleshooting	404
8.2	Autosampler – Troubleshooting	420
8.2.1	Replacing the sample needle	420
8.2.2	Replacing the rinse station	424
8.2.3	Replacing the dilution vessel	427

8.3	OMNIS Column Thermostat Unit – Troubleshooting	429
8.4	OMNIS MSM Unit – Troubleshooting	435
8.4.1	Regenerating the cation suppressor rotor	435
8.4.2	Regenerating the anion suppressor rotor	436
8.4.3	Replacing parts of the MSM	439
8.5	Rinsing the OMNIS Conductivity Detector Unit	443
8.6	Pulsation absorber – Releasing jamming	451
9	Disposal	455
10	Technical specifications	456
10.1	Performance data	456
10.1.1	High-pressure pump	456
10.1.2	Column thermostat	457
10.1.3	Conductivity detector	457
10.1.4	Injector (on actuator)	458
10.1.5	MSM	459
10.1.6	MCS	459
10.1.7	Degasser	459
10.1.8	Dosing drive	460
10.1.9	Peristaltic pump	460
10.1.10	MISP	461
10.1.11	Multi Flow Monitor	461
10.1.12	Reagent organizer (ROLC)	461
10.1.13	Autosampler	462
10.2	Physical specifications	463
10.2.1	OMNIS IC	463
10.2.2	Functional units	466
10.2.3	Autosampler	467

1 Overview

1.1 Product description

The OMNIS IC is used as the ion chromatograph in the OMNIS IC System. The ion chromatograph has a modular structure. The OMNIS IC can be configured flexibly for various applications. Extensions of the range of functions are possible at any time and on site.

The OMNIS Software is used to control the system. The system is connected to the Ethernet network for this purpose. The range of functions of the ion chromatograph is defined via the selected function licenses.

The OMNIS IC operates largely autonomously. The OMNIS IC monitors the analysis process and warns the user in good time of possible errors.

1.2 Product versions

The OMNIS IC can be configured individually. The OMNIS IC is available in the following versions as a frame for configuration:

Table 1 Product versions

Art. no.	Designation	Version feature
2.1050.0010	OMNIS IC S Module	Installation option with: 1 OMNIS Extension Module Main 1 OMNIS Extension Module 1 OMNIS High-Pressure Pump Unit 1 OMNIS Actuator Unit with injector 6/2
2.1050.0020	OMNIS IC S COND/MSM/PP/CH	Installation option with: - Parts of the OMNIS IC S Module 1 OMNIS Conductivity Detector Unit 1 OMNIS MSM Unit 1 OMNIS Peristaltic Pump Unit, 2-Channel 1 OMNIS Column Holder
2.1050.0030	OMNIS IC S COND/MSM/MCS/PP/COL/DEG	Installation option with: - Parts of the OMNIS IC S Module 1 OMNIS Conductivity Detector Unit 1 OMNIS MSM Unit 1 OMNIS MCS Unit 1 OMNIS Peristaltic Pump Unit, 2-Channel 1 OMNIS Column Thermostat Unit, 1-Position 1 OMNIS Degasser Unit, 1-Channel

The required numbers for the regional Metrohm service representative can be found on the type label (see example):

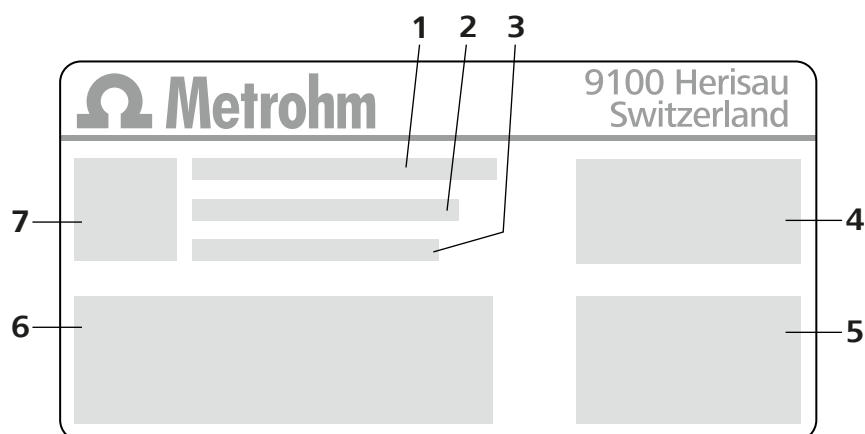


Figure 1 Type label – Example

1	(01) = Article number in accordance with GS1 standard	2	(21) = Serial number
3	(240) = Metrohm article number	4	Certification
5	Technical specifications	6	Certification
7	QR code		

i Information on the scope of delivery of the respective product versions can be found on the Internet under <http://www.metrohm.com> (see "Displaying the accessories", chapter 1.5, page 14) or via a regional Metrohm representative.

1.2.1 Base plate

The product is available in the following versions:

Table 2 Product versions BP

Art. no.	Designation	Short form
6.02061.100	Base plate	BP

1.2.2 OMNIS Extension Module

The product is available in the following versions:

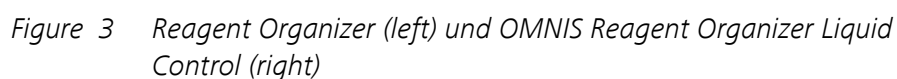
Table 3 OMNIS Extension Module product versions

Art. no.	Designation	Short form	Version feature
2.1055.0020	OMNIS Extension Module	EXT	without control Can only be operated together with an OMNIS Extension Module Main.



The product is available in the following versions:

Art. no.	Designation	Short form	Version feature
6.02061.000	Reagent Organizer	RO	No option to connect magnetic stirrers and accessories for monitoring.
2.1056.1200	OMNIS Reagent Organizer Liquid Control	ROL	Option to connect magnetic stirrers and accessories for monitoring. Features an integrated leak sensor and lighting for the interior of the OMNIS IC System.



The product is available in the following versions:

Art. no.	Designation	Short form	Version feature
2.1054.0010	OMNIS IC Autosampler Module	AS	Automates the sample change.
2.1054.0020	OMNIS IC Autosampler Module COOL	AS COOL	Automates the sample change. In addition, there is the option of cooling the samples.

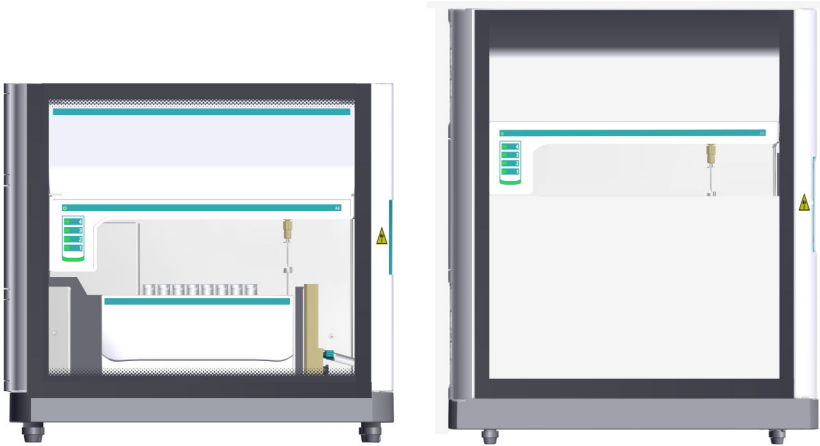
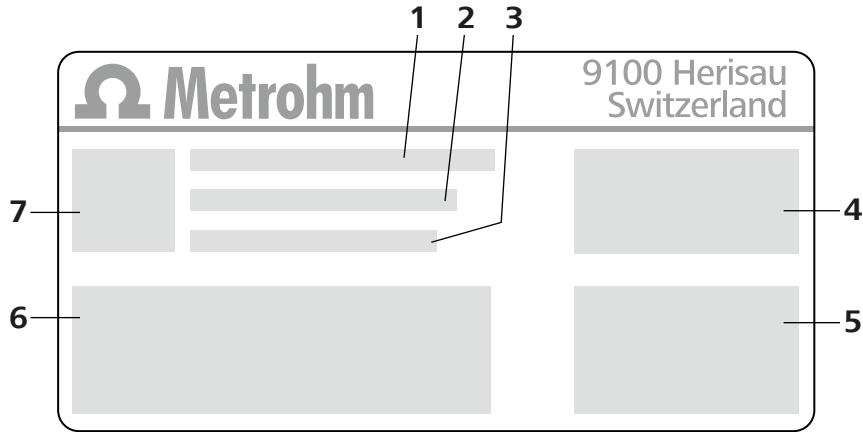


Figure 4 OMNIS IC Autosampler Module (left) and OMNIS IC Autosampler Module COOL (right)

The type label (see example) on the rear of the OMNIS IC Autosampler Module shows the numbers required for the regional Metrohm service representative:



1	(01) = Article number in accordance with GS1 standard	2	(21) = Serial number
3	(240) = Metrohm article number	4	Certification
5	Technical specifications	6	Certification
7	QR code		

1.2.5 OMNIS Dosing Drive Unit

The product is available in the following versions:

Table 6 Product versions DD



Art. no.	Designation	Short form	Version feature
2.1056.0310	OMNIS Dosing Drive Unit	DD	Compatible with all cylinder units OMNIS UNF, cylinder units OMNIS, and cylinder units OMNIS special.



Figure 5 OMNIS Dosing Drive Unit – with attached cylinder unit OMNIS UNF

1.2.6 OMNIS Degasser Unit

The product is available in the following versions:

Table 7 DEG product versions

Art. no.	Designation	Short form	Version feature
2.1056.0110	OMNIS Degasser Unit 1-Channel	DEG	1 chamber
2.1056.0120	OMNIS Degasser Unit 2-Channel	DEG	2 chambers

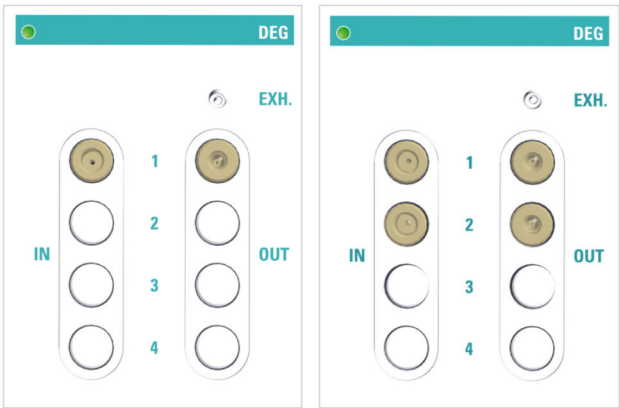


Figure 6 OMNIS Degasser Unit – Front



1.2.7 OMNIS Proportioning Valve Unit

The product is available in the following versions:

Table 8 Product versions PVLV

Art. no.	Designation	Short form	Version feature
2.1056.1410	OMNIS Proportioning Valve Unit	PVLV	Mixes up to 4 eluents when using a low-pressure gradient

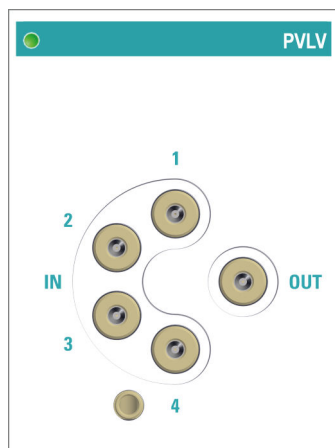


Figure 7 OMNIS Proportioning Valve Unit – Front

1.2.8 OMNIS High-Pressure Pump Unit

The product is available in the following versions:

Table 9 HPP product versions

Art. no.	Designation	Short form
2.1056.0210	OMNIS High-Pressure Pump Unit	HPP

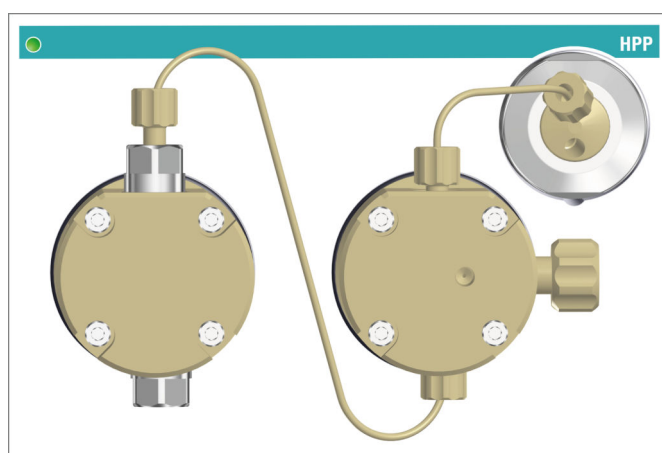


Figure 8 OMNIS High-Pressure Pump Unit – Front

1.2.9 OMNIS Peristaltic Pump Unit

The product is available in the following versions:

Table 10 Product versions PP

Art. no.	Designation	Short form	Version feature
2.1056.1010	OMNIS Peristaltic Pump Unit 1-Channel	PP	1 channel
2.1056.1020	OMNIS Peristaltic Pump Unit 2-Channel	PP	2 channels

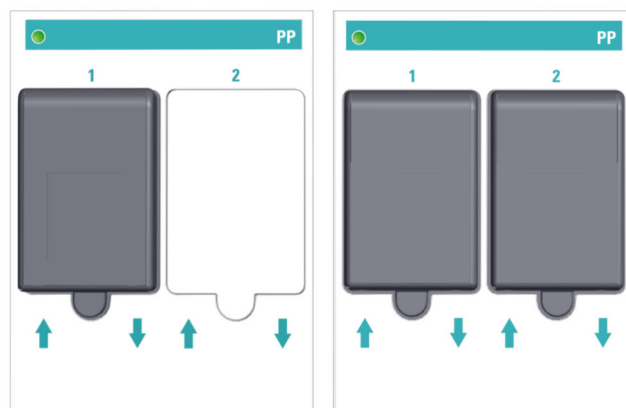


Figure 9 OMNIS Peristaltic Pump Unit – 1 and 2 channels

1.2.10 OMNIS MISP Unit

The product is available in the following versions:

Table 11 Product versions MISP

Art. no.	Designation	Short form	Version feature
2.1056.1100	OMNIS MISP Unit	MISP	Option to install accessories for sample preparation.



The product is available in the following versions:

Art. no.	Designation	Short form	Version feature
2.1056.0410	OMNIS Actuator Unit	ACT	Used in combination with an injector or a selector.



The product is available in the following versions:

9

Art. no.	Designation	Short form	Version feature
2.1056.0520	OMNIS Column Thermostat Unit 1	COL	1 preheating cartridge, 2 column positions
2.1056.0530	OMNIS Column Thermostat Unit 2	COL	2 preheating cartridges, 2 column positions

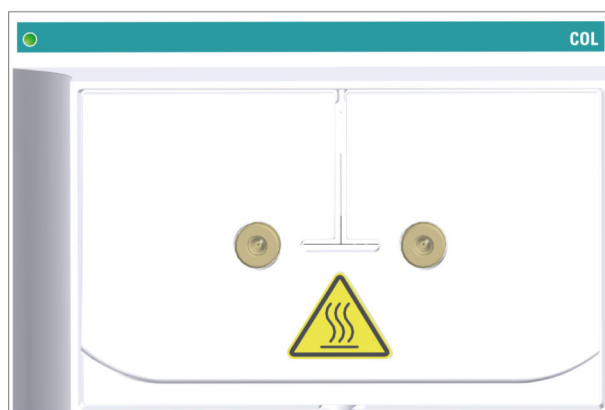


Figure 12 OMNIS Column Thermostat Unit – Front

1.2.13 OMNIS Column Holder Unit

The product is available in the following versions:

Table 14 Product versions CH

Art. no.	Designation	Short form
2.1056.0510	OMNIS Column Holder Unit	CH



Figure 13 OMNIS Column Holder Unit – Front

1.2.14 OMNIS MSM Unit

The product is available in the following versions:

Table 15 Product versions MSM

Art. no.	Designation	Short form
2.1056.0610	OMNIS MSM Unit	MSM



Figure 14 OMNIS MSM Unit – Front

1.2.15 OMNIS MCS Unit

The product is available in the following versions:

Table 16 Product versions MCS

Art. no.	Designation	Short form	Version feature
2.1056.0710	OMNIS MCS Unit	MCS	optimized for 4 mm systems
2.1056.0720	OMNIS MCS MB Unit	MCS MB	optimized for 2 mm systems

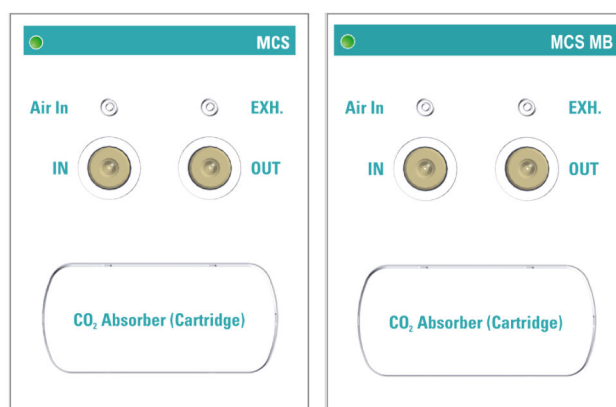


Figure 15 OMNIS MCS Unit and OMNIS MCS MB Unit

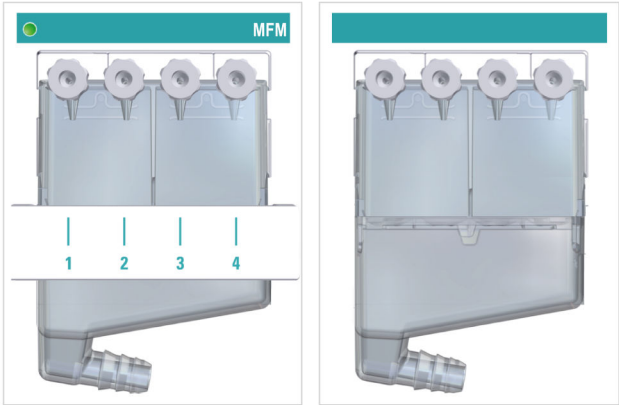


Figure 17 OMNIS Multi Flow Monitor Unit (left) and OMNIS Waste Collector Unit (right) – Front

1.3 About the documentation

Possible depictions in the documentation:

Depiction	Meaning
(5-12)	Cross-reference to figure legend (Figure number - Element in the figure)
1	Instruction step
Method	Parameters, menu items, tabs, and dialogs
File ► New	Menu path
[Continue]	Button or key
i	Supplementary information to the descriptive text
	Note In graphics, orange arrows or frames indicate the reference to the descriptive text. The relevant elements may also be colored orange.
	Movement In graphics, blue arrows indicate the movement direction. The elements to be moved may also be colored blue.

1.4 Additional information

Additional product information is available on the following pages:

- Metrohm website <https://www.metrohm.com> – Documents as PDF, overview of product family, information on applications, and details of accessories.
- Metrohm Knowledge Base <https://guide.metrohm.com> – Thematically filtered individual content, videos, information on OMNIS Software.

1.5 Displaying the accessories

Up-to-date information on the scope of delivery and on optional accessories can be found on the Metrohm website.

1 Searching for a product on the website

- Go to <https://www.metrohm.com>.
- Click on .
- Enter the article number of the product into the search field and press **[Enter]**.
 - Article number: *Product versions, chapter 1.2, page 1*
- In the result list, click on the desired product.

Detailed information regarding the product is displayed.

2 Displaying the accessories

- Scroll down (accessories subject to availability):
 - Included parts
 - Optional parts

3 Downloading the accessories list (included and optional parts)

- Click on  to download the accessories list as a PDF.

 Metrohm recommends keeping the downloaded PDF for reference purposes.

2 Safety

2.1 Intended use

 The instrument is exclusively for indoor use.

This device is suitable for processing chemicals and flammable samples. Usage of the OMNIS IC therefore requires the user to have basic knowledge and experience in handling toxic and caustic substances. Knowledge of the application of the fire prevention measures prescribed for laboratories is also mandatory.

Adherence to this technical documentation and compliance with the maintenance specifications make up an important part of intended use.

Specifications regarding the operating values and limit values of individual products are contained in the "Technical specifications" section, if relevant.

2.2 Responsibility of the operator

The operator has the following responsibilities:

- Observe applicable national, regional, and local regulations.
- Instruct personnel in the safe handling of the product.
- Train personnel in the use of the product according to the user documentation (e.g., install, operate, clean, eliminate faults).
- Train personnel on basic occupational safety and accident prevention regulations.
- Provide personal protective equipment (e.g., protective glasses, gloves).
- Provide suitable tools and equipment for safe execution of work.

The product may be used only when its status is perfect. 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.

2.3 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.

2.4 Safety instructions

2.4.1 Danger from electrical potential

Contact with electrical potential can cause serious injuries or death. To avoid danger from electrical potential, observe the following:

- Operate the product only if it is in perfect condition. The housing must also be intact.
- Use the product only with the coverings mounted. If covers are damaged or missing, disconnect the product from the energy supply and contact the regional Metrohm service representative.
- Protect live components (e.g., power supply unit, power cord, connection sockets) against moisture.
- Always have maintenance work and repairs on electrical components carried out by a regional Metrohm service representative.
- Disconnect the product from the energy supply immediately if at least one of the following cases occurs:
 - The housing is damaged or open.
 - Live parts are damaged.
 - Moisture penetrates.

 To disconnect the product from the energy supply, pull the power plug.

2.4.2 Danger from biological and chemical hazardous substances

Contact with biological hazardous substances may cause poisoning from toxins or infections from microorganisms. Contact with aggressive chemical substances may cause poisoning or chemical burns. To avoid danger from biological or chemical hazardous substances, observe the following:

- Label the product according to regulations if it is used for substances that have a potential for chemical hazards and are generally subject to the Hazardous Substances Ordinance.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Use exhaust equipment when working with vaporizing hazardous substances.
- Dispose of hazardous substances in accordance with regulations.
- Clean and disinfect contaminated surfaces.
- Only use detergents that do not cause any unwanted side reactions with the materials to be cleaned.
- Dispose of chemically contaminated materials (e.g. cleaning material) in accordance with regulations.
- Proceed as follows in case of a return shipment to Metrohm AG or a regional Metrohm representative:
 - Decontaminate the product or product component.
 - Remove the labeling for hazardous substances.
 - Create a declaration of decontamination and enclose it with the product.

2.4.3 Danger from highly flammable substances

Using highly flammable substances or gases may cause fires or explosions. To avoid danger from highly flammable substances, observe the following:

- Avoid ignition sources.
- Use protective grounding.
- Use exhaust equipment.

2.4.4 Danger from leaking liquids

Leaking liquids may cause injuries and may damage the product. To avoid danger from leaking liquids, observe the following:

- Check the product and its accessories for leakages and loose connections.
- Replace leaking components and connecting elements without delay.
- Only use stirring bars that are the right length for the vessel size.
- Tighten loose connecting elements.
- Do not loosen tubing connections under pressure.
- Do not remove aspiration tubing under pressure.
- Carefully pull the tubing ends out of the vessels.
- Carefully allow liquids from the tubing to drain into suitable vessels.
- Insert the tubing tips completely into the vessels.

- #### 2.4.5 Danger during transport of the product

2.4.6 Dangers from hot surfaces and liquids

2.4.7 Dangers due to automated motion sequences

- Do not reach into the work area while work sequences are running.
- Install the protective devices enclosed with the product according to instructions and operate the product only with these protective devices.
- Do not bypass the installed protective devices.

2.5 Design of warning messages

The present documentation uses warning messages as follows.

Structure

1. Severity of the danger (signal word)
2. Type and source of danger
3. Consequences of disregarding the danger
4. Measures for averting the danger

Hazard levels

Signal color and signal word designate the hazard level.

DANGER

Indicates an immediate danger. It will result in serious injuries or death if not avoided.

WARNING

Indicates a potential danger. Failure to avoid the danger may result in death or serious injury.

CAUTION

Indicates a potential danger. If not avoided, it may result in light or minor injuries.

NOTICE

Indicates a potentially damaging situation. If not avoided, the product or something in the surrounding area could be damaged.

2.6 Meaning of warning signs

Warning signs on the product or in the documentation indicate potential dangers or draw attention to certain behaviors in order to avoid accidents or damage.

Depending on the application purpose, the operating company attaches additional warning signs to the product. The corresponding instructions of the operator must be followed.

Table 19 Warning signs according to ISO 7010 (examples)

Warning signs / meaning		Warning signs / meaning	
	General warning sign		Warning of hot surface
	Warning of sharp object (cut/puncture)		Warning of hand injuries (crushing)
	Warning of electrical voltage		Warning of corrosive substances
	Warning of optical radiation		Warning of a laser beam
	Warning of flammable materials		Warning of biological hazard
	Warning of toxic materials		

3 Functional description

3.1 System overview

3.1.1 OMNIS IC – Overview

An OMNIS IC System consists of an OMNIS IC and an autosampler.

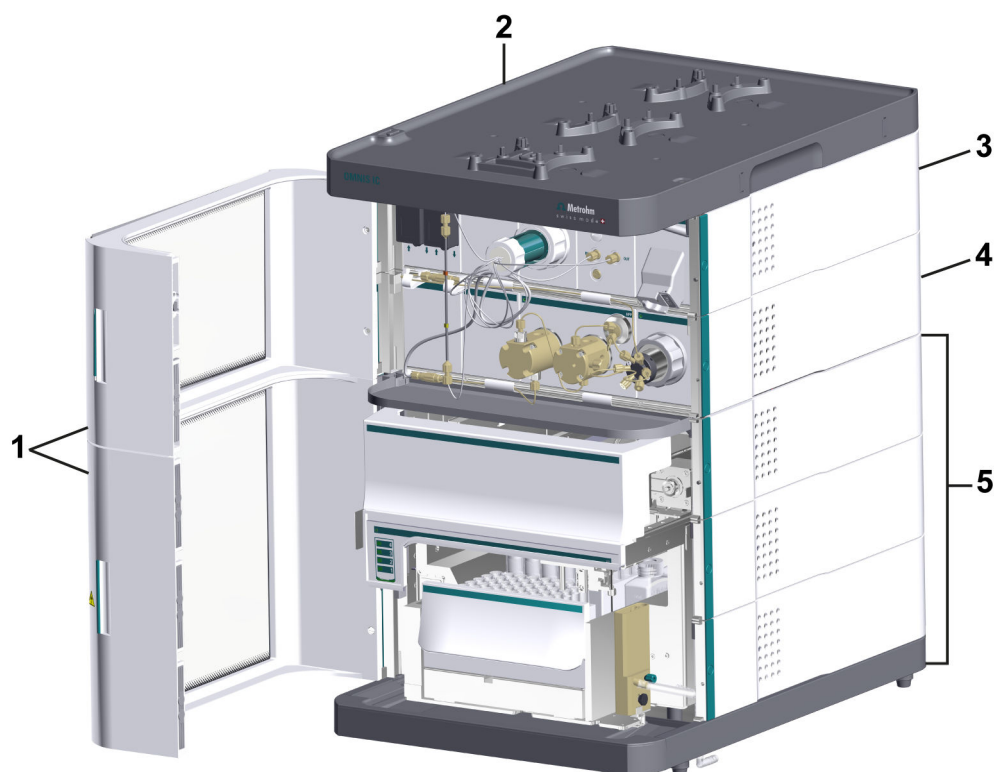


Figure 18 OMNIS IC S System (2.1050.0020) – Front

1 Door

The door of the OMNIS IC and the door of the autosampler can be moved independently of one another.

2 Reagent Organizer

(see "Functional description", chapter 3.4.2, page 38)

4 OMNIS Extension Module Main

The main module controls the extension modules and the autosampler (*see "Functional description", chapter 3.3.2, page 33*).

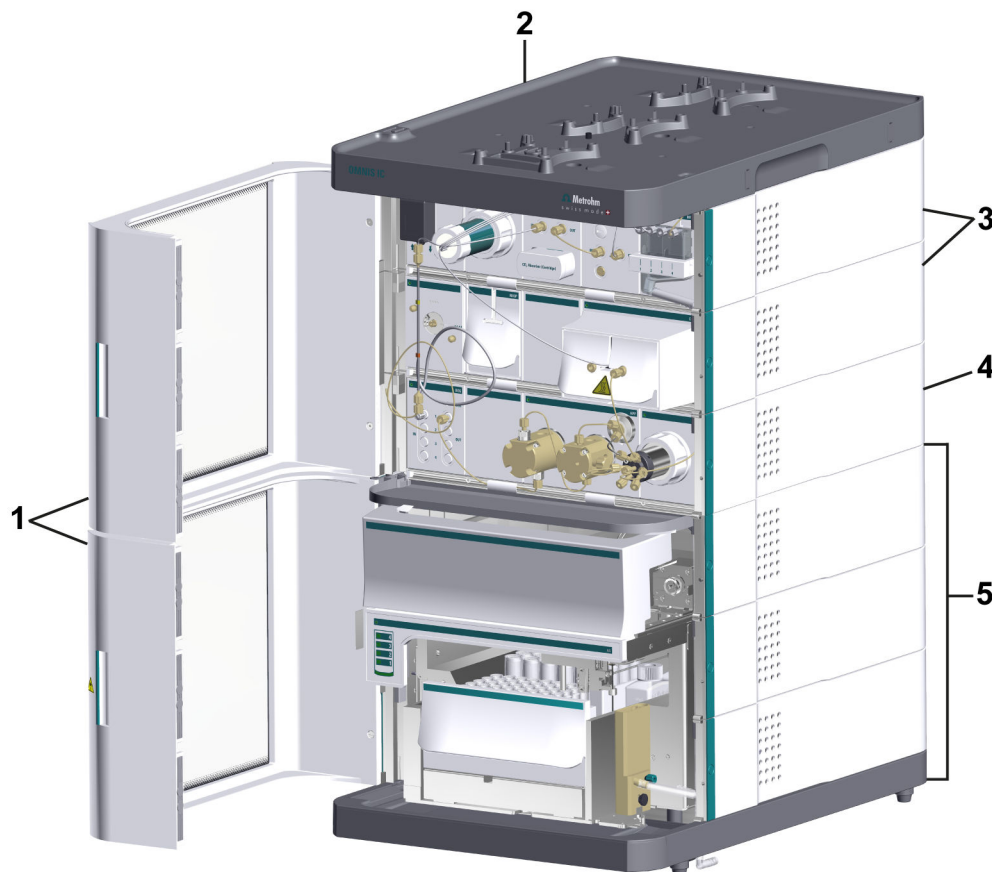


Figure 19 OMNIS IC M System (2.1051.0020) – Front

2 OMNIS Reagent Organizer Liquid Control

(see "Functional description", chapter 3.4.2,
page 38)

3 OMNIS Extension Module

(see "Functional description", chapter 3.3.2, page 33)

4 OMNIS Extension Module Main

The main module controls the extension modules and the autosampler (see "Functional description", chapter 3.3.2, page 33).

5 OMNIS IC Autosampler Module

(see "Functional description", chapter 3.5.2, page 55)

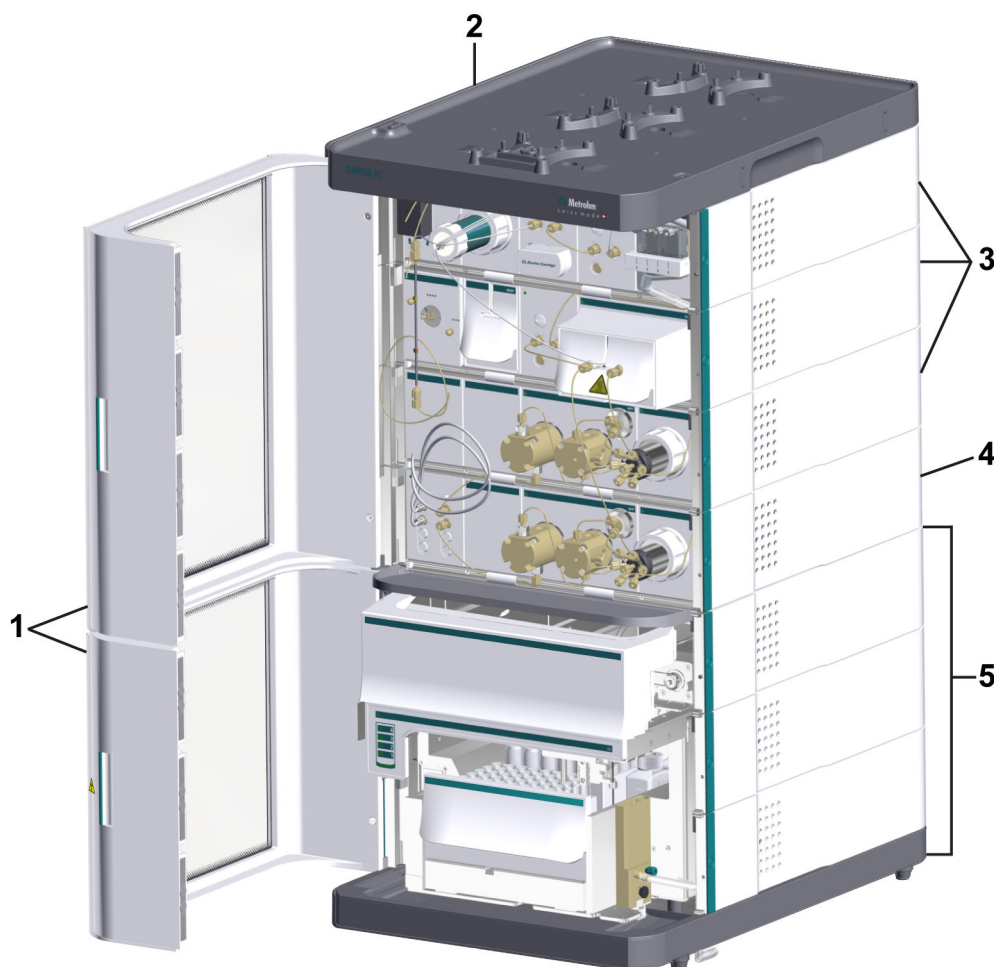


Figure 20 OMNIS IC L System (2.1052.0020) – Front

1 Door

The door of the OMNIS IC and the door of the autosampler can be moved independently of one another.

2 OMNIS Reagent Organizer Liquid Control

(see "Functional description", chapter 3.4.2, page 38)

3 OMNIS Extension Module

(see "Functional description", chapter 3.3.2,
page 33)

4 OMNIS Extension Module Main

The main module controls the extension modules and the autosampler (*see "Functional description", chapter 3.3.2, page 33*).

5 OMNIS IC Autosampler Module

(see "Functional description", chapter 3.5.2, page 55)

3.1.2 OMNIS IC – Functional description

An OMNIS IC consists of the following parts:

- **1 main module** (see "Functional description", chapter 3.3.2, page 33)

The main module offers space for up to 5 functional units and controls the extension modules.

- **1 to 4 extension modules**(see "Functional description", chapter 3.3.2, page 33)

Each extension module provides space for up to 5 functional units. The extension modules are controlled by the main module.

A maximum of 3 extension modules can be installed if an OMNIS IC Autosampler Module COOL is used (see "Setup configurations", page 105).

- **Functional units**

The functionalities of the OMNIS IC are installed in functional units, e.g., high-pressure pump, peristaltic pump, MSM, column thermostat or conductivity detector.

Functional units are installed in the main module and the extension modules. Functional units have the width of 1 or 2 positions in a module. Each module offers space for up to 5 functional units.

The functional units can be assembled almost freely, in accordance with the requirements for the analyses to be carried out on the instrument. A regional Metrohm service representative can extend the range of functions.

- **Base plate** (see "Functional description", chapter 3.2.2, page 32)

If the OMNIS IC is not installed on an autosampler, then a base plate is required. If an autosampler is used, then the base plate is already integrated in the autosampler.

- **Reagent organizer** (see "Functional description", chapter 3.4.2, page 38)

The reagent organizer acts as a lid in the OMNIS IC System and is installed on the topmost extension module.

- **Doors**

The doors protect the interior of the OMNIS IC from draughts. Drafts can lead to baseline fluctuations.

Doors are available in 4 different heights. There are doors in the height of 1 extension module, 2 extension modules, 3 expansion modules, and 4 extension modules.

The doors are mounted on the left side of the instrument. The doors can also be mounted on the right side if desired.

- **Optional autosampler** (see "Functional description", chapter 3.5.2, page 55)

An autosampler extends an OMNIS IC into an *OMNIS IC System*.

The autosampler enables the automated processing of high sample throughputs. The autosampler also has an integrated rinse station. Depending on the product version, it is possible to cool the samples with the autosampler.

- **Optional accessories**

Various accessory parts can be mounted in the OMNIS IC System, e.g., a mobile device holder or clips for fastening capillaries.

3.1.3 System – Signals

System components with status displays show their operating status with colors and/or flashing patterns. The meaning of the colors and flashing patterns is explained in the following table.

Visual signal		Meaning
	LED lights up yellow.	System start or initialization
	LED flashes yellow (slowly).	Ready for connection setup or coupling
	LED flashes yellow (fast).	Connection setup started or coupling in progress
	LED lights up green.	Ready for operation
	LED flashes green (slowly).	In operation
	LED flashes red (fast).	Malfunction or error

Some system components only use part of the explained flashing patterns. The following system components use a different flashing pattern:

3.1.4 OMNIS IC – Connectors and interfaces

The components in the OMNIS IC System have various connectors for the energy supply and interfaces for communication:

Table 20 Connectors and interfaces

Connector / interface	Function
Power socket	Energy supply in the OMNIS IC System
MDL connector	Communication between different OMNIS instruments
MDL IN connector and MDL OUT connector	Communication within the OMNIS IC System
LAN connector	Input socket for network cable from the local network
I/O connector	Connection socket for remote cables to third-party devices

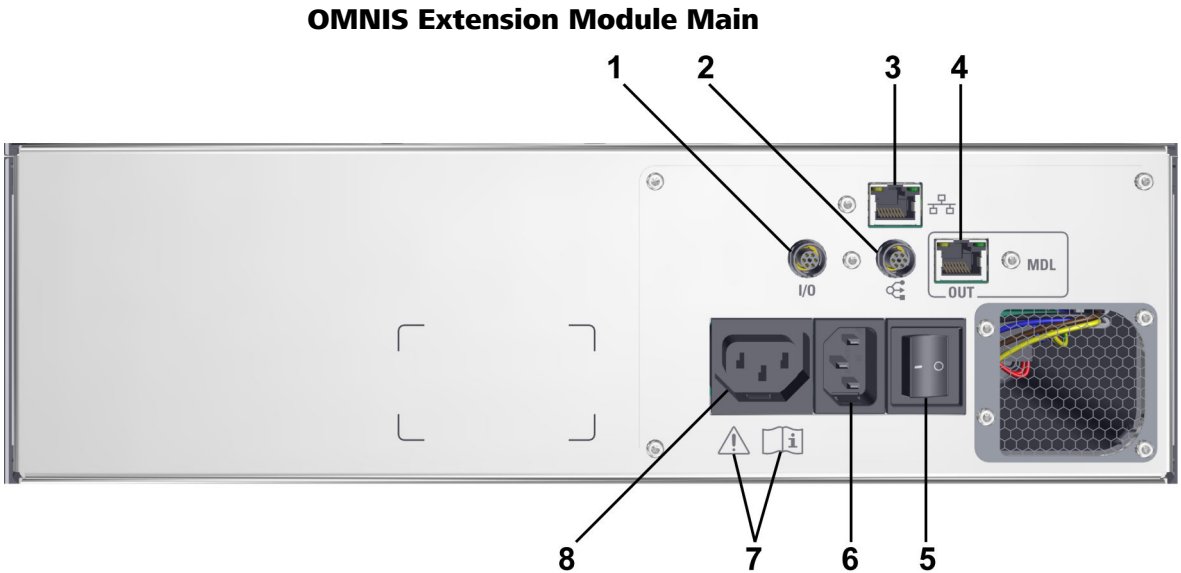


Figure 21 OMNIS Extension Module Main – Rear

1 I/O connector Remote connector Connection socket for remote cables to third-party devices	2 MDL connector MDL = Metrohm Device Link Connection socket for connecting cables between different OMNIS instruments
3 LAN connector LAN = Local Area Network Input socket for network cable from the local network (OMNIS Software)	4 MDL connector OUT MDL = Metrohm Device Link Output socket for network cable for the following extension module

- | | |
|--|--|
| <p>5 On/off switch
Switch for switching the entire OMNIS IC System on and off</p> <hr/> | <p>6 Power socket, male
Input socket for power cord</p> <hr/> |
| <p>7 Manual note
Read the manual before start-up.</p> | <p>8 Power socket, female
Output socket for power cord for the following extension module</p> |

OMNIS Extension Module

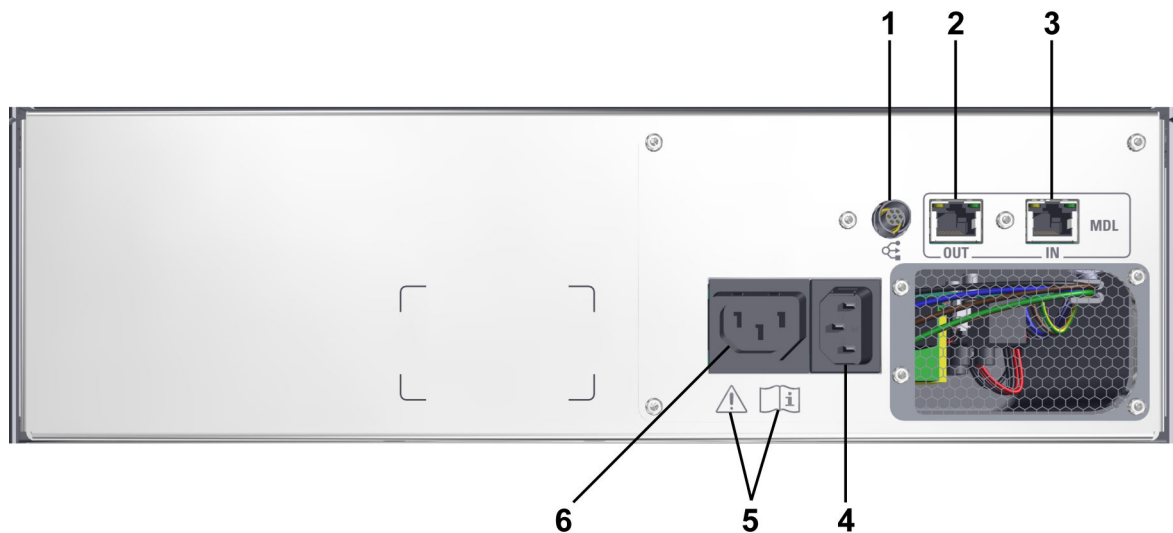


Figure 22 OMNIS Extension Module – Rear

- | | |
|---|--|
| <p>1 MDL connector
MDL = Metrohm Device Link
Connection socket for connecting cables between different OMNIS instruments</p> <hr/> | <p>2 MDL connector OUT
MDL = Metrohm Device Link
Output socket for network cable for the following extension module</p> <hr/> |
| <p>3 MDL connector IN
MDL = Metrohm Device Link
Input socket for network cable of the upstream main module or extension module</p> <hr/> | <p>4 Power socket, male
Input socket for power cord of the upstream main module or extension module</p> <hr/> |
| <p>5 Manual note
Read the manual before start-up.</p> | <p>6 Power socket, female
Output socket for power cord for the following extension module</p> |

OMNIS IC Autosampler Module

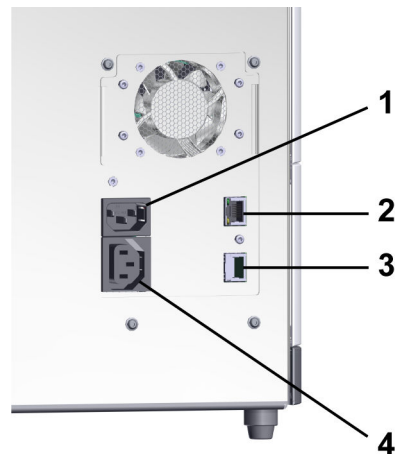


Figure 23 OMNIS IC Autosampler Module – Connectors and interfaces

- | | |
|--|---|
| <p>1 Power socket, male
Input socket for power cord of the upstream main module or extension module</p> <hr/> | <p>2 MDL connector IN
MDL = Metrohm Device Link
Input socket for network cable of the upstream main module or extension module</p> <hr/> |
| <p>3 MDL connector OUT
MDL = Metrohm Device Link
Output socket for network cable for the following extension module</p> | <p>4 Power socket, female
Output socket for power cord for the following extension module</p> |

OMNIS IC Autosampler Module COOL

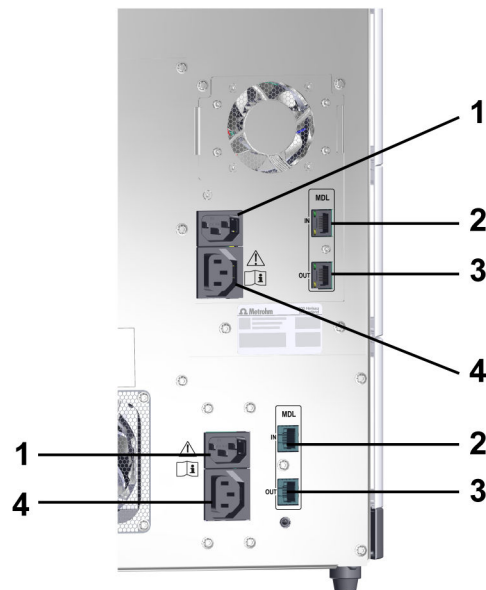


Figure 24 OMNIS IC Autosampler Module COOL – Connectors and interfaces

- | | |
|---|---|
| <p>1 Power socket, male
Input socket for power cord of the upstream main module or extension module (<i>see "Energy supply and Internet supply – Concept", chapter 3.1.5, page 30</i>)</p> | <p>2 MDL connector IN
MDL = Metrohm Device Link
Input socket for network cable of the upstream main module or extension module</p> |
| <p>3 MDL connector OUT
MDL = Metrohm Device Link
Output socket for network cable for the following extension module</p> | <p>4 Power socket, female
Output socket for power cord for the following extension module</p> |

See also

Controlling third-party devices (chapter 5.18, page 322)

Installing cable connections (chapter 5.19, page 323)

3.1.5 Energy supply and Internet supply – Concept

The main module provides the energy supply and the Internet supply of the extension modules and the autosampler. The main module, the extension modules, and the autosampler each have an input and an output for the energy supply and the Internet supply. The Internet supply is provided via MDL (Metrohm Device Link). The main module, the extension modules, and the autosampler are connected to one another as a cascade via the inputs and outputs (*see figure 25, page 31*).

Only the main module is connected directly to the energy supply and to a local network. The extension modules and the autosampler obtain the power and the Internet access from the main module.

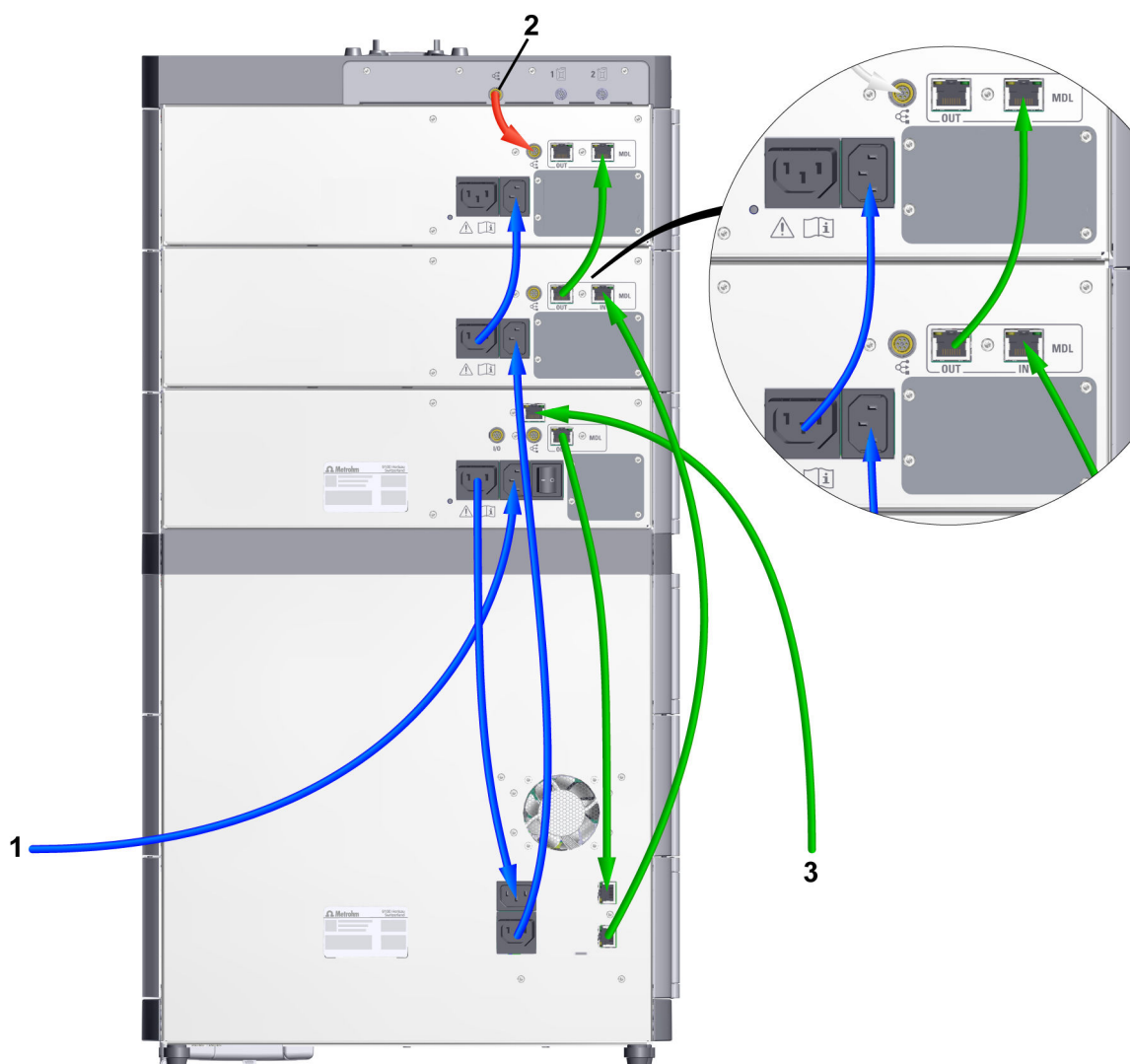


Figure 25 Energy supply and LAN supply – Concept

1 Energy supply (blue)

The power cords (6.02122.1x0) supply the OMNIS IC System with power.

2 Cable MDL St/Bu 0.5 m (red)

6.02102.010

Connects the OMNIS Reagent Organizer Liquid Control with the OMNIS IC System.

3 LAN supply (green)

The network cables (6.02107.1x0) supply the OMNIS IC System with the Internet.

3.2 Base plate

3.2.1 Overview

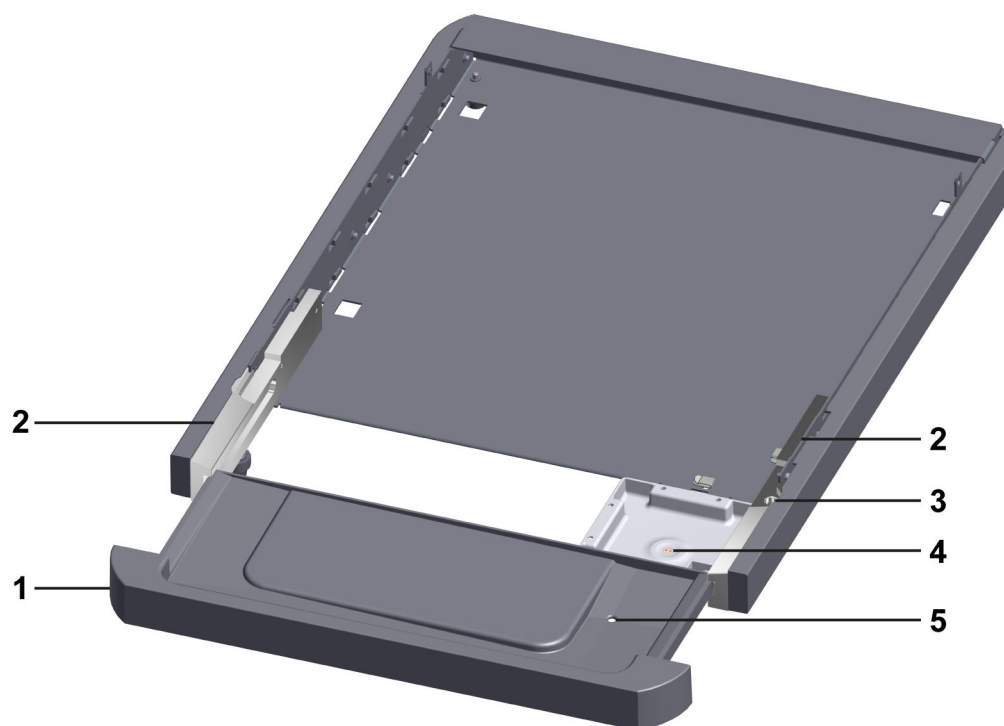


Figure 26 OMNIS IC base plate – front

1 Drip collector OMNIS IC base plate
Can be removed from the base plate.

2 Rail
for retracting and extending the drip collector

3 Drainage tubing system passage

4 Leak sensor

5 Drip collector drain

3.2.2 Functional description

The base plate serves as the base in the OMNIS IC System.

The base plate is used for instrument versions without an integrated autosampler. If the OMNIS IC System consists of 2 towers without an integrated autosampler, then 2 base plates are required. Instrument versions with an integrated autosampler already have a base plate in the autosampler.

The base plate has a removable drip collector with drain. A leak sensor is located underneath the drain. Leaking liquid runs into the drip collector

and is guided through the drain to the waste. The leak sensor detects the leaking liquid and triggers a message in the OMNIS Software.

3.3 OMNIS Extension Module

3.3.1 Overview

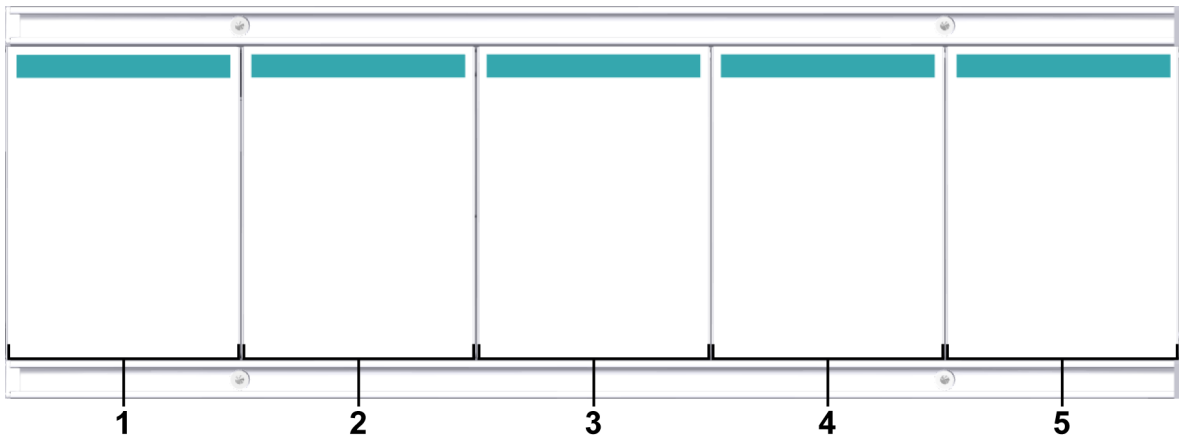


Figure 27 OMNIS Extension Module / OMNIS Extension Module Main (with 5 blind cover units) – Front

1	Position 1	2	Position 2
3	Position 3	4	Position 4
5	Position 5		

i The connectors and interfaces of the OMNIS IC are located on the rear of the OMNIS Extension Module and OMNIS Extension Module Main (see "OMNIS IC – Connectors and interfaces", chapter 3.1.4, page 27).

3.3.2 Functional description

An OMNIS IC consists of an OMNIS Extension Module Main and additionally 1 to max. 5 OMNIS Extension Modules. The OMNIS Extension Module Main serves as a main module. The OMNIS Extension Module serves as an extension module. The main module and each extension module can accommodate up to 5 functional units each, such as the OMNIS Degasser Unit, OMNIS High-Pressure Pump Unit or OMNIS Conductivity Detector Unit. Functional units are always installed in a module. The possible positions for the functional units within a module are designated from 1 to 5. (see "Overview", chapter 3.3.1, page 33).

The main module is always installed as the bottom module in the OMNIS IC. If an integrated autosampler is used in the OMNIS IC system, then the main module is installed directly upon it. The extension modules are

mounted on top of the main module. A regional Metrohm service representative can expand the OMNIS IC with up to 5 extension modules.

Modules are available in 2 versions (see "OMNIS Extension Module", chapter 1.2.2, page 3):

- **OMNIS Extension Module Main – Main module**

The main module is responsible for controlling all connected extension modules and the autosampler. The main module is connected to the power grid and to the Ethernet. The main module provides the energy supply and network supply to the extension modules and the autosampler.

The on/off switch for the entire OMNIS IC system is furthermore located on the main module.

- **OMNIS Extension Module – Extension module**

Extension modules are always operated together with a main module. Extension modules do not have their own control.

The main module and each extension module each have their own ventilation system to maintain an optimal operating temperature.

3.4 Reagent Organizer

3.4.1 Overview

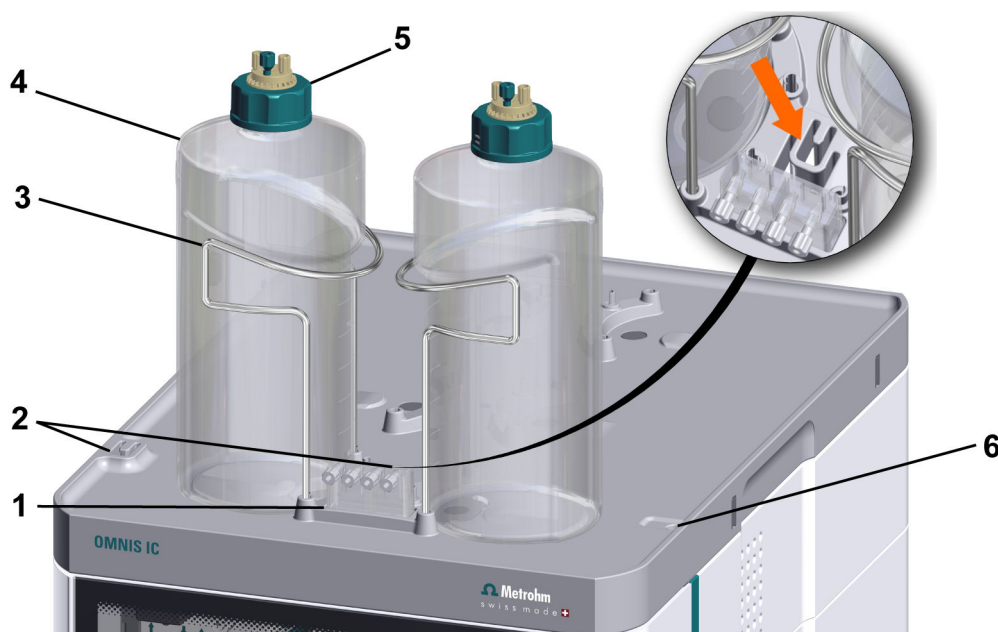


Figure 28 Reagent Organizer with accessories – Front

- | | |
|---|--|
| <p>1 Recess for waste collector
Provides space for 1 waste collector, 4 x UNF 10/32 (6.02765.000).
The waste collector is an accessory part and is not included in the scope of delivery of the Reagent Organizer.</p> | <p>2 Feed-through for capillaries and tubing
Capillaries and tubing installed here form the feeding system (see "OMNIS IC – Functional description", chapter 3.1.2, page 24).</p> |
| <p>3 Bottle holder, RO
6.02050.000
Accessory part, not included in the scope of delivery of the Reagent Organizer.</p> | <p>4 Bottle PP, 2 L, GL 45
6.01608.000
Accessory part, not included in the scope of delivery of the Reagent Organizer.</p> |
| <p>5 Bottle cap GL 45, 2x M6, UNF 10/32
6.01602.100
Accessory part, not included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.</p> | <p>6 Drainage
Waste is fed into the drainage tubing system (see "OMNIS IC – Functional description", chapter 3.1.2, page 24).</p> |

i There are no connections on the rear of the Reagent Organizer.

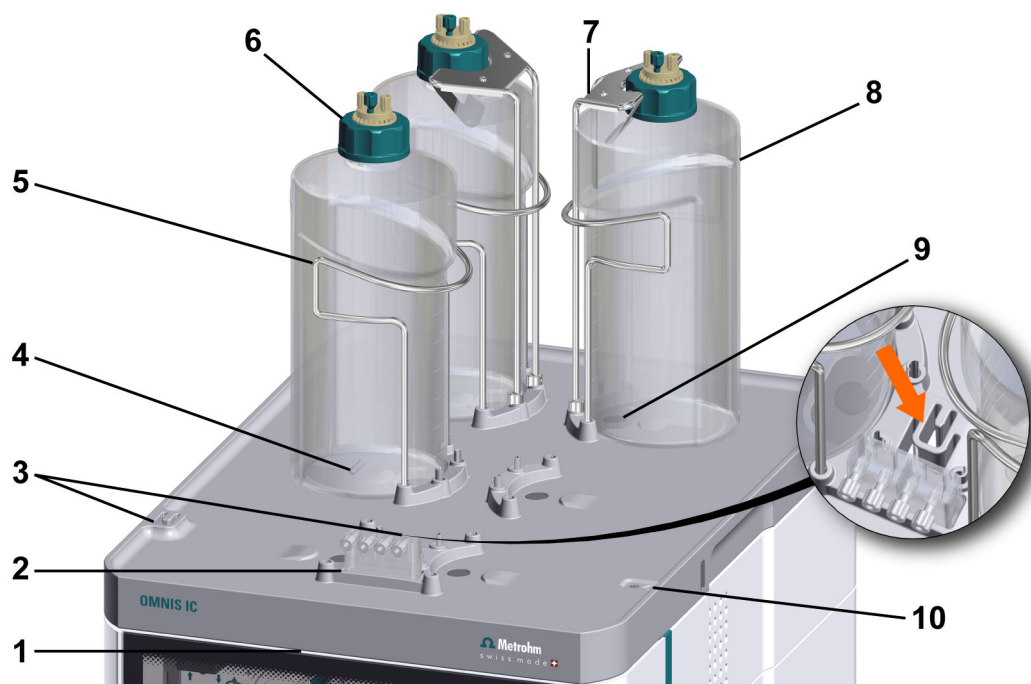


Figure 29 OMNIS Reagent Organizer Liquid Control with accessories – Front

1 Interior lighting

Illuminates the interior of the OMNIS IC System.

2 Recess for waste collector

Provides space for 1 waste collector, 4 x UNF 10/32 (6.02765.000).

The waste collector is an accessory part and is not included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.

3 Feed-through for capillaries and tubing

Capillaries and tubing installed here form the feeding system. (see "OMNIS IC – Functional description", chapter 3.1.2, page 24).

4 Stirring bar, elliptical, 32 mm

6.01903.100

Accessory part, not included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.

The corresponding magnetic stirrer (6.05801.090) is installed in the OMNIS Reagent Organizer Liquid Control.

5 Bottle holder, RO

6.02050.000

Accessory part, not included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.

6 Bottle cap GL 45, 2x M6, UNF 10/32

6.01602.100

Accessory part, not included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.

7 Bottle retainer

6.02050.200

Accessory part, not included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.

Required if a volume sensor is used.

8 Bottle PP, 2 L, GL 45

6.01608.000

Accessory part, not included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.

9 Volume sensor

6.05801.040

Accessory part, not included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.

Depending on the sales version, 3 to 4 volume sensors are partially installed in the OMNIS Reagent Organizer Liquid Control.

10 Drainage and leak sensor

Draining liquid is registered and fed into the drainage tubing system ([see "OMNIS IC – Functional description", chapter 3.1.2, page 24](#)).

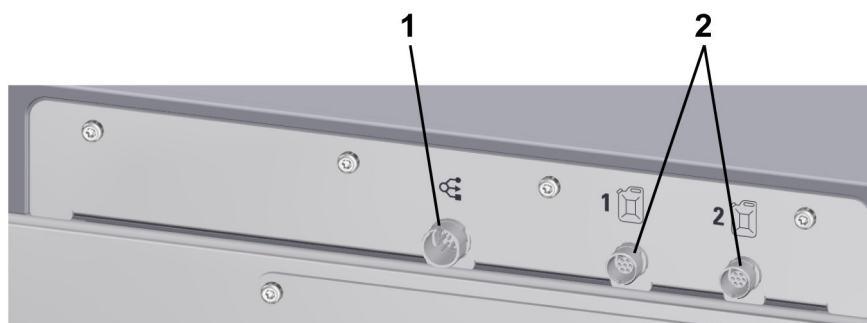


Figure 30 OMNIS Reagent Organizer Liquid Control – Rear

1 MDL connector

MDL = Metrohm Device Link

Connection socket for the energy supply of an OMNIS Extension Module. The connecting cable (6.02102.010) is included in the scope of delivery of the OMNIS Reagent Organizer Liquid Control.

2 Volume sensor holder connector

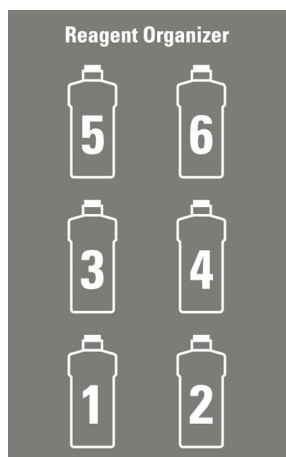


Figure 31 Bottle positions – Sticker

The reagent organizer has space for up to 6 bottles.

During start-up of the OMNIS IC, a regional Metrohm service representative will affix a sticker to the inside of the door. The sticker shows the bottle positions of the reagent organizer.

3.4.2 Functional description

The Reagent Organizer serves as a reagent organizer in the OMNIS IC System. The reagent organizer is always located on the topmost extension module and therefore also forms the lid of the OMNIS IC System.

If the OMNIS IC System consists of 2 towers, then 2 reagent organizers are required.

NOTICE

Material damage due to missing parts

If an OMNIS IC System is used without a Reagent Organizer or OMNIS Reagent Organizer Liquid Control, then liquids may enter the interior of the instrument. This can cause damage to the instrument.

- Always use a reagent organizer or an OMNIS Reagent Organizer Liquid Control.

The reagent organizer has space for up to 6 bottles. A bottle holder prevents individual bottles from falling out. When using a volume sensor, a bottle retainer ensures that the contact between the bottle and the volume sensor required for measurement is maintained. Metrohm recommends using the bottle PP, 2 L, GL 45 (6.01608.000). The volume sensor works only with this bottle.

i Careless handling of an open reagent bottle may result in the liquid coming into contact with the 230 V area of the OMNIS IC. Therefore, handling open reagent bottles must be avoided. For reagent replacement, the reagent bottle should be on the same level as the OMNIS IC.

i To prevent liquids from leaking, always ensure that the capillaries and tubing are correctly connected to the OMNIS IC. Furthermore, the supply bottle may be used only with a bottle fixation.

For special applications, the following bottles can also be placed and fastened on the reagent organizer:

- PP eluent bottle, 2 L (6.1608.120)
 - Round glass bottle / 1,000 mL / GL 45 (6.1608.030)
 - PE bottle / 1,000 mL / GL 45 (6.1608.040)
- For the PE bottle / 1,000 mL / GL 45, use the bottle holder, RO (6.02050.000) and the bottle fixation, RO (6.02050.010).

The reagent organizer is available in 2 versions (*see "Reagent Organizer", chapter 1.2.3, page 4*):

▪ **Reagent Organizer**

The Reagent Organizer serves as a lid and a reagent organizer. The reagent organizer is equipped with a drain. If a leak occurs, then the leaked liquid will be fed into the waste via the drain.

The Reagent Organizer can be supplemented with the following accessory parts:

- Bottle holder, RO (6.02050.000)
(*see "Bottle holder, RO (6.02050.000)", page 40*)
- Bottle fixation, RO (6.02050.010)
(*see "Bottle fixation, RO (6.02050.010)", page 41*)
- Bottle holder RO, universal (6.02050.100)
(*see "Bottle holder, RO (6.02050.000)", page 40*)
- Bottle fixation RO, universal (6.02050.110)
(*see "Bottle fixation, RO (6.02050.010)", page 41*)
- Waste collector, 4 x UNF 10/32 (6.02765.000)
(*see "Waste collector, 4 x UNF 10/32 (6.02765.000)", page 41*)

The accessory parts are available from a regional Metrohm service representative.

- **OMNIS Reagent Organizer Liquid Control**

The OMNIS Reagent Organizer Liquid Control has the same parts and functions as the Reagent Organizer. In addition, a leak sensor is installed at the drain of the OMNIS Reagent Organizer Liquid Control. If the leak sensor detects leaked liquid, then a message will appear in the OMNIS Software. The lighting integrated into the OMNIS Reagent Organizer Liquid Control illuminates the interior of the OMNIS IC System as soon as at least one door of the OMNIS IC system is opened. The OMNIS Reagent Organizer Liquid Control can be supplemented with the following accessory parts:

- Bottle holder, RO (6.02050.000)
(see "Bottle holder, RO (6.02050.000)", page 40)
- Bottle fixation, RO (6.02050.010)
(see "Bottle fixation, RO (6.02050.010)", page 41)
- Bottle holder RO, universal (6.02050.100)
(see "Bottle holder, RO (6.02050.000)", page 40)
- Bottle fixation RO, universal (6.02050.110)
(see "Bottle fixation, RO (6.02050.010)", page 41)
- Waste collector, 4 x UNF 10/32 (6.02765.000)
(see "Waste collector, 4 x UNF 10/32 (6.02765.000)", page 41)
- Volume sensor, ROLC kit (6.05801.040)
(see "Volume sensor, ROLC kit (6.05801.040)", page 41)
- Magnetic stirrer, ROLC kit (6.05801.090)
(see "Magnetic stirrer, ROLC kit (6.05801.090)", page 42)
- Volume sensor holder, container 10 L (6.02009.000)
(see "Volume sensor holder, container 10 L (6.02009.000)", page 43)

The accessory parts are available from a regional Metrohm service representative.

Either a Reagent Organizer or an OMNIS Reagent Organizer Liquid Control can be used. A regional Metrohm service representative can replace a Reagent Organizer with an OMNIS Reagent Organizer Liquid Control. A Reagent Organizer cannot be upgraded to become an OMNIS Reagent Organizer Liquid Control.

Bottle holder, RO (6.02050.000)

The optional bottle holder, RO holds bottles in place on the reagent organizer. Up to 6 bottle holders, RO can be mounted on a reagent organizer.

NOTICE

Material damage caused by incorrect handling

If a bottle holder, RO or a bottle retainer is moved multiple times, then the mountings on the reagent organizer will become excessively worn.

- To equip additional bottle positions with bottle holders, RO or bottle retainers, order additional bottle holders, RO or bottle retainers.

The optional bottle holder RO, universal (6.02050.100) functions according to the same principle as the bottle holder, RO.

Bottle fixation, RO (6.02050.010)

The optional bottle fixation, RO is attached to the bottle holder, RO. The bottle fixation, RO prevents bottles from tipping over.

The optional bottle fixation RO, universal (6.02050.110) can be used for different bottle sizes. Metrohm recommends the bottle fixation RO, universal, if a bottle other than the bottle PP, 2 L, GL 45 is used.

Waste collector, 4 x UNF 10/32 (6.02765.000)

If all channels of the OMNIS Multi Flow Monitor Unit ([see "Functional description", chapter 3.18.2, page 101](#)) are occupied or no OMNIS Multi Flow Monitor Unit is available, then an optional waste collector can be installed on the reagent organizer. This allows up to 4 additional channels to be connected to the drainage tubing system. The liquids drained by the OMNIS IC System are collected in the waste collector and discharged into the drain tubing. The flow can be visually inspected. Automated flow monitoring is not possible.

A reagent organizer can be equipped with a maximum of 1 waste collector.

Volume sensor, ROLC kit (6.05801.040)

The optional volume sensors monitor the reagent volume in the bottles and control automatic eluent production. Volume sensors prevent both overflowing and emptying of bottles. As soon as a volume sensor detects a volume that is too low or too high, a message will appear in the OMNIS Software. If the volume is too low, then eluent production is started. If the volume is too high, then eluent production is stopped. Volume sensors function only with the bottle PP, 2L, GL 45 (6.01608.000). If a volume sensor is used, then a bottle retainer (6.02050.200) must also be installed. The bottle retainer ensures that the contact between the bottle and the volume sensor required for measurement is maintained.

NOTICE

Material damage caused by incorrect handling

If a bottle holder, RO or a bottle retainer is moved multiple times, then the mountings on the reagent organizer will become excessively worn.

- To equip additional bottle positions with bottle holders, RO or bottle retainers, order additional bottle holders, RO or bottle retainers.

The volume measurement in the bottle is limited to a specific range. Volumes ranging from 250 mL to 2,150 mL can be measured in the bottle. If the volume is outside the measuring range, then the volume will be displayed in the software with -.-. If the limit values are exceeded or not reached, then a message will appear in the OMNIS Software.



Figure 32 Bottle PP, 2 L, GL 45 – Volume measurement limit values

 The correct mode of operation of the volume monitoring system is guaranteed only for liquids without suspended substances.

The OMNIS Reagent Organizer Liquid Control can be equipped with up to 6 volume sensors. A regional Metrohm service representative installs the volume sensors.

Magnetic stirrer, ROLC kit (6.05801.090)

The optional magnetic stirrer stirs the eluent constantly. Stirring the eluent stabilizes the conductivity measurement and the baseline.

Metrohm recommends using the following stirring bar:

- Stirring bar, elliptical, 32 mm (6.01903.100)

i If the magnetic stirrer is used with a plastic bottle, then slight material abrasion may occur on the bottom of the bottle. The use of an elliptical stirring bar reduces material abrasion to a minimum.

The OMNIS Reagent Organizer Liquid Control can be equipped with up to 2 magnetic stirrers. The magnetic stirrers can be mounted on bottle positions 3 and 4. (see "Overview", chapter 3.4.1, page 35).

A regional Metrohm service representative installs the magnetic stirrers.

Volume sensor holder, container 10 L (6.02009.000)

The optional volume sensor holder monitors the reagent volume in containers. The volume sensor holder prevents both the overflowing and the emptying of containers. The containers are used as supply vessels or as waste collectors. As soon as a volume sensor holder detects a volume that is too low or too high, a message will appear in the OMNIS Software.

The volume sensor holder, container 10 L, is compatible only with the container, 10 L (6.1621.000).

The volume measurement in the container is limited to a specific range. Volumes ranging from 900 mL to 10,500 mL can be measured in the container. If the volume is outside the measuring range, then the volume will be displayed in the software with - - -. If the limit values are exceeded or not reached, then a message will appear in the OMNIS Software.

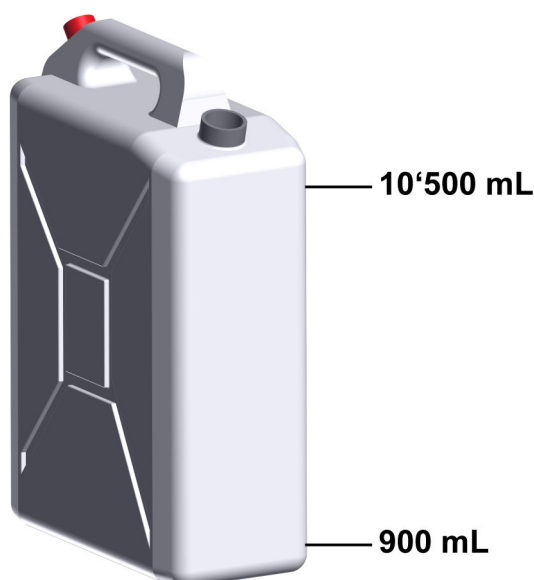


Figure 33 Container, 10 L – Volume measurement limit values

A maximum of 2 volume sensor holders can be connected to an OMNIS Reagent Organizer Liquid Control.

3.5 OMNIS IC Autosampler Module

3.5.1 Overview

OMNIS IC Autosampler Module

(see "Functional description", chapter 3.5.2, page 55)

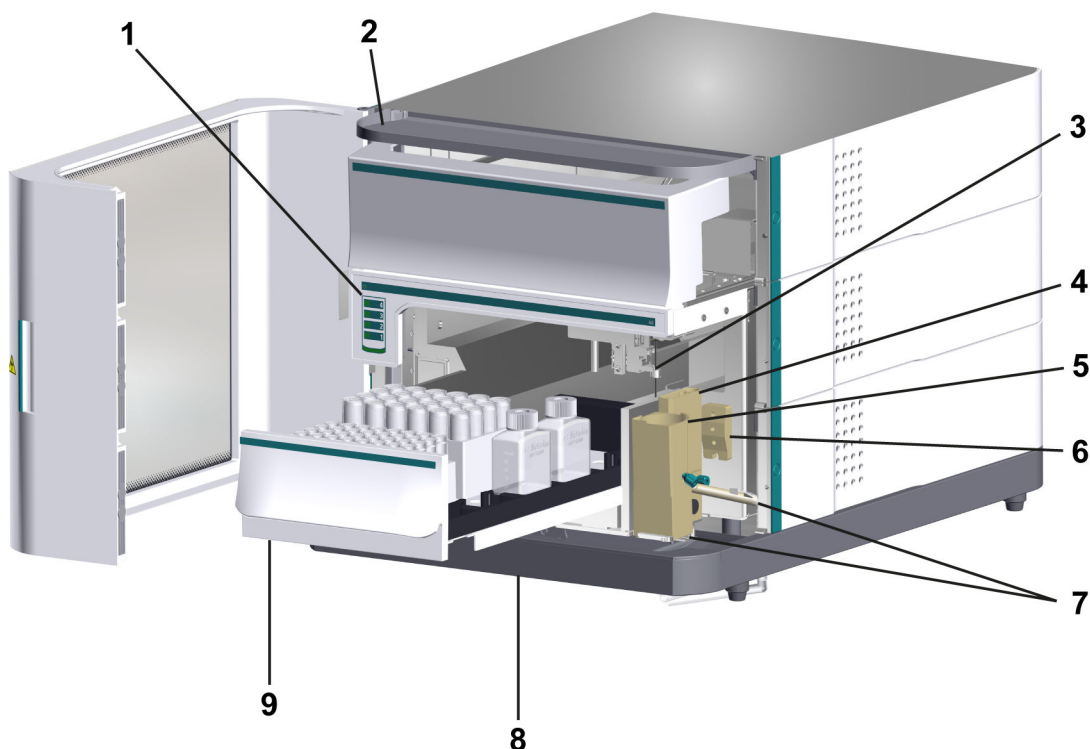


Figure 34 OMNIS IC Autosampler Module – Front

- | | |
|--|--|
| <p>1 Status displays
 <i>(see "Status displays", page 47)</i></p> | <p>2 Drip collector, Extension
 Protects the autosampler from leaks coming from the OMNIS IC above.</p> |
|--|--|

3 Needle drive

with sample needle MF (6.02624.100)

The needle drive is controlled by the OMNIS Software (*see "Functional description", chapter 3.5.2, page 55*).

The needle drive can be fitted with a barcode scanner kit (6.05801.130) as an option (*see "Barcode scanner kit (6.05801.130)", page 60*).

5 Dilution station

6.05801.250

(*see "Dilution station (6.05801.250)", page 59*)

Accessory part, not included in the scope of delivery of the OMNIS IC Autosampler Module.

7 Guide system and drainage system

(*see figure 35, page 46*)

9 OMNIS IC AS Tray

6.02040.000

Features 4 numbered rack positions (*see figure 41, page 52*).

4 Rinse station

(*see "Rinse station", page 58*)

6 Switching valve 3/2

Available as UNF kit (6.05801.110) or M6 kit (6.05801.120)

(*see "Switching valve 3/2 (6.05801.110 and 6.05801.120)", page 59*)

Accessory part, not included in the scope of delivery of the OMNIS IC Autosampler Module.

8 Drip collector, base plate

Collects leaks within the autosampler.

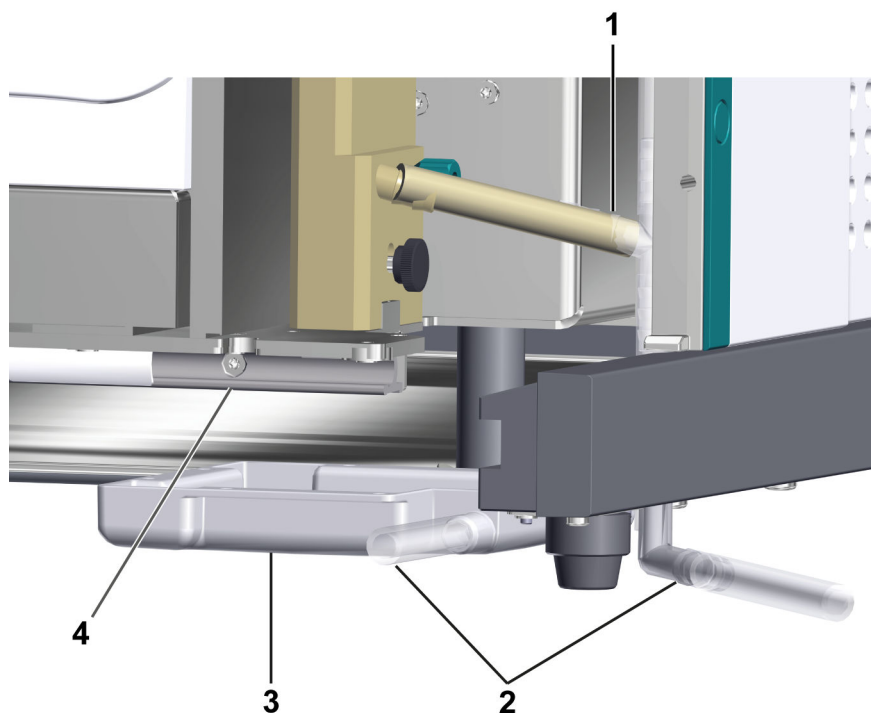


Figure 35 Guide system and drainage system – View without drip collector, base plate

1 Drain kit, AS

Drains liquids out of the OMNIS IC System.

2 Drain tubing connectors

Drains liquids flowing from the OMNIS IC System into the waste ([see "Installing the drainage tubing system", chapter 5.3.4, page 119](#)), ([see "Connecting the drain tubing", chapter 5.3.4.3, page 128](#)).

3 Collection tray

with drain tubing (6.01816.010)

The integrated leak sensor detects leaks within the autosampler.

Drains leaks into the waste.

4 Fixation bar

with clip fixation bar, 2 x OD 1/16" (6.02027.030)

below the OMNIS IC AS tray

for guiding capillaries and tubing within the autosampler ([see figure 92, page 112](#))

Status displays

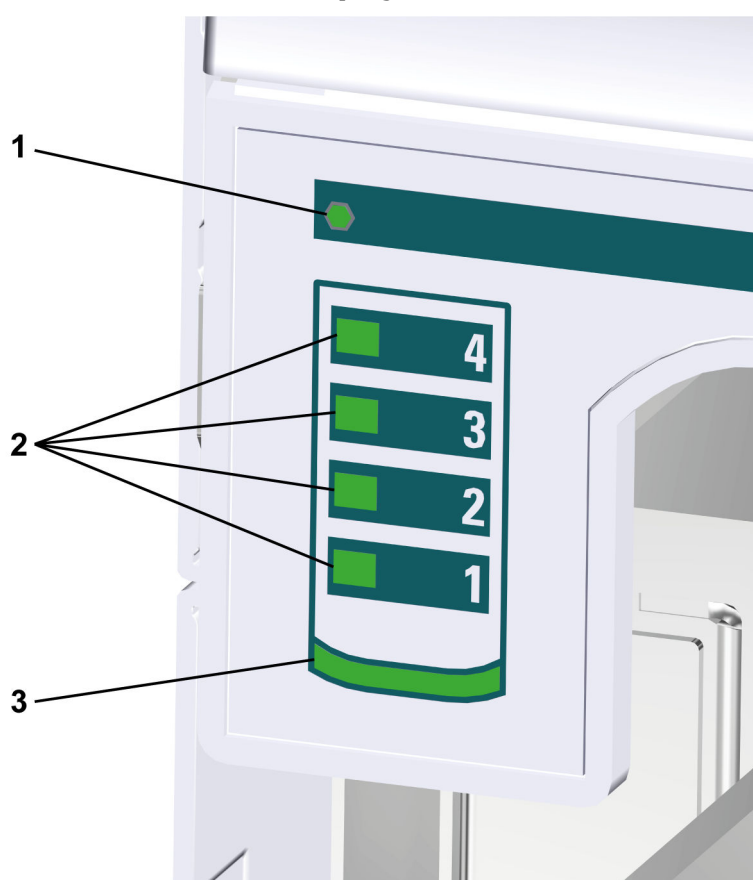


Figure 36 OMNIS IC Autosampler Module and OMNIS IC Autosampler Module COOL – Status displays

1 Autosampler status display

Indicates the current status of the autosampler (see *"System – Signals", chapter 3.1.3, page 25*).

2 Sample rack status display

Shows the current status of the sample rack (see *"System – Signals", chapter 3.1.3, page 25*).

3 Tray status display

Indicates the current status of the tray (see *"System – Signals", chapter 3.1.3, page 25*).



Figure 37 OMNIS IC Autosampler Module – Rear

- | | |
|--|--|
| <p>1 Drain tubing connector, base plate
Drains liquids flowing from the OMNIS IC System into the waste.</p> | <p>2 Type label
<i>(see "OMNIS IC Autosampler Module", chapter 1.2.4, page 4)</i></p> |
|--|--|

3 Connectors and interfaces
(see "OMNIS IC – Connectors and interfaces", chapter 3.1.4, page 27)

OMNIS IC Autosampler Module COOL

(see "Functional description", chapter 3.5.2, page 55)

The OMNIS IC Autosampler Module COOL has the same accessory parts as the OMNIS IC Autosampler Module. The OMNIS IC Autosampler Module COOL also includes:

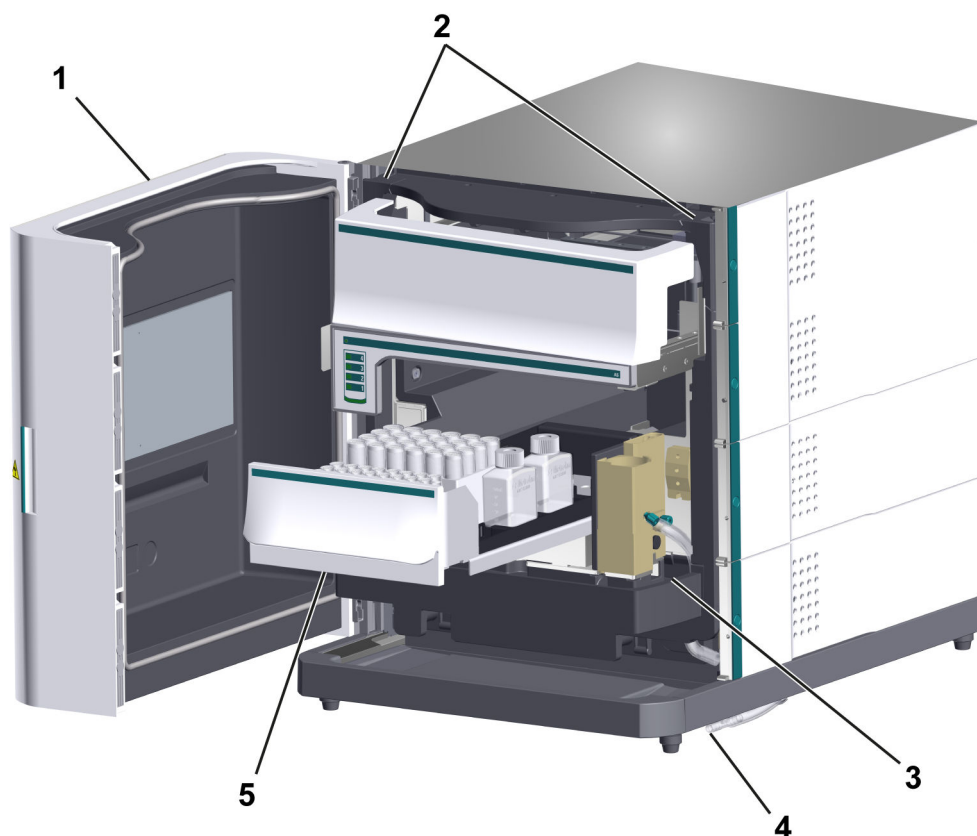


Figure 38 OMNIS IC Autosampler Module COOL – Front

- | | |
|---|--|
| <p>1 Door (insulated)
The door of the OMNIS IC Autosampler Module COOL is insulated.</p> | <p>2 Sealing piece
for sealing the sample compartment
Can be removed from the insulation to attach or remove capillaries.</p> |
| <p>3 Guide system
(see "Guide system", chapter 5.3, page 109)</p> | <p>4 Drainage system
(see figure 39, page 50)</p> |
| <p>5 OMNIS IC AS COOL Tray
6.02040.010
with seals for optimizing the cooling performance</p> | |

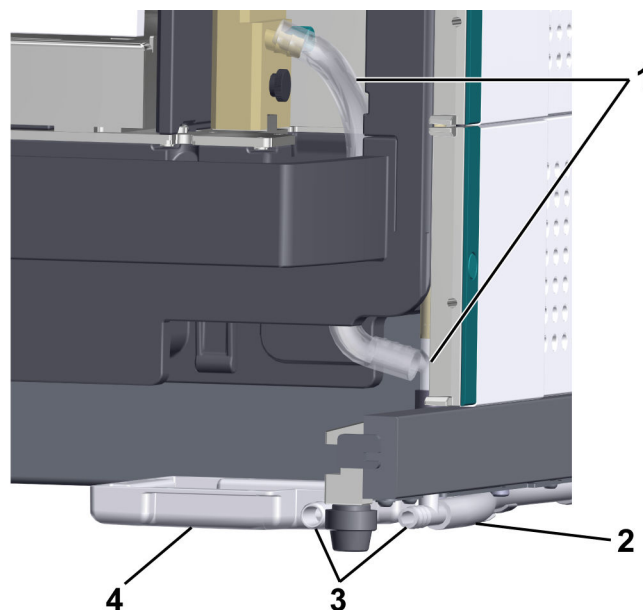


Figure 39 Drainage system – View without drip collector, base plate

1 Drain kit, AS COOL

Drains liquids out of the OMNIS IC System.

2 Condensation drain tubing

Condensation produced by the cooling unit is discharged into the waste together with the liquid drained from the OMNIS IC System.

3 Drain tubing connectors

Drains liquids flowing from the OMNIS IC System into the waste (*see "Installing the drainage tubing system", chapter 5.3.4, page 119*), (*see "Connecting the drain tubing", chapter 5.3.4.3, page 128*).

4 Collection tray

The integrated leak sensor detects leaks within the autosampler.
Drains leaks into the waste.



Figure 40 OMNIS IC Autosampler Module COOL – Rear

1 Warning of flammable materials

2 Connectors and interfaces

(see "OMNIS IC – Connectors and interfaces", chapter 3.1.4, page 27)

3 Type label

(see "OMNIS IC Autosampler Module", chapter 1.2.4, page 4)

4 Condensation drain tubing

Condensation produced by the cooling unit is discharged into the waste together with the liquid drained from the OMNIS IC System.

OMNIS IC AS Tray

(see "Trays", page 57)

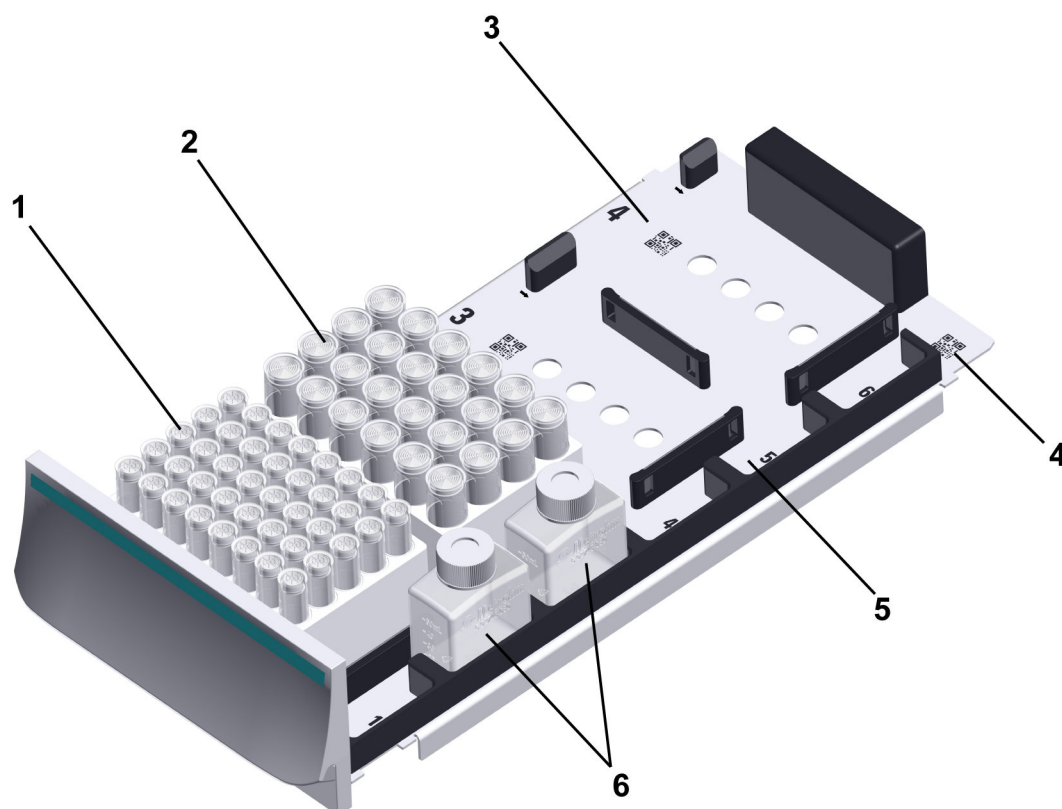


Figure 41 OMNIS IC AS Tray equipped – Example

- 1 OMNIS sample rack 40 x 5 mL**
6.02041.510
filled with vial, 5 mL (6.02743.020)

- 2 OMNIS sample rack 24 x 10 mL**
6.02041.500
filled with vial, 10 mL (6.02743.010)
Accessory part, not included in the scope of delivery of the OMNIS IC Autosampler Module.

- 3 Rack position**
An OMNIS IC AS Tray has 4 rack positions.
The positions are labeled 1 to 4. For identification, each position is provided with a 2D code and arrows for orientation.

- 4 2D code**
Makes it possible to identify the OMNIS IC AS Tray.

- 5 Bottle position**
An OMNIS IC AS Tray has 6 bottle positions.
The positions are labeled 1 to 6.

- 6 Bottle, PP, 50 mL**
6.02743.030

The OMNIS IC AS COOL Tray has additional seals for optimizing the cooling performance.

Rinse station

(see "Rinse station", page 58)

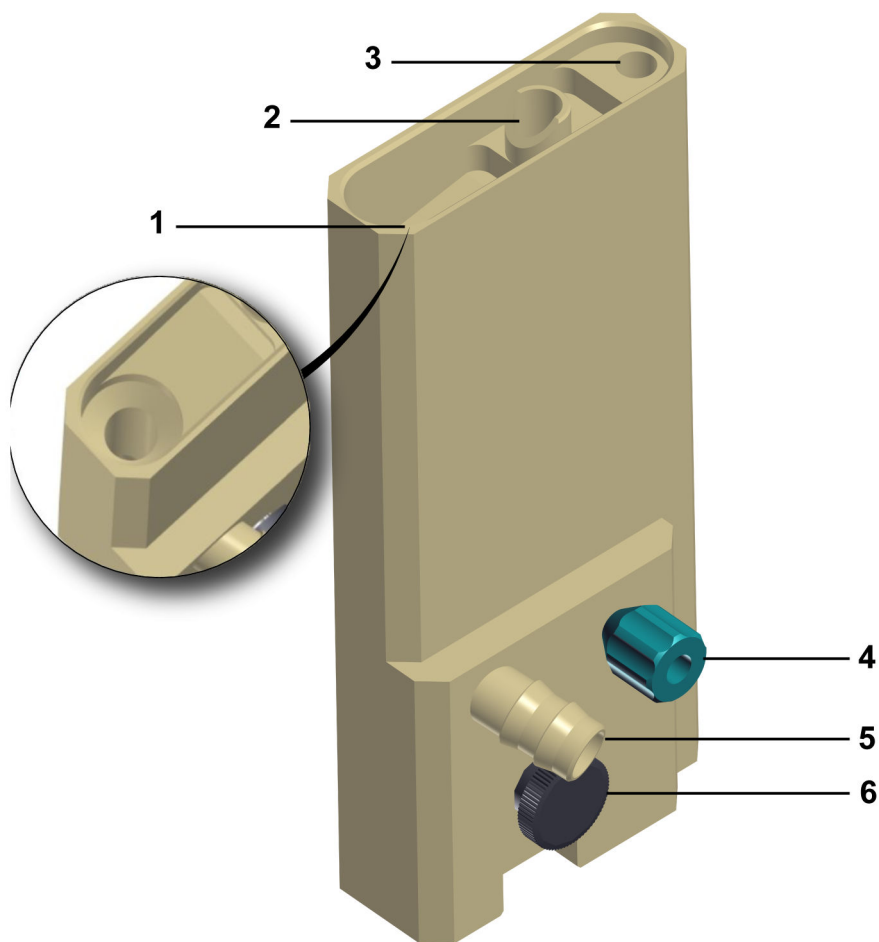


Figure 42 Rinse station – Overview

1	Drain position	2	Rinse position & park position
3	Overflow	4	Rinsing connector
5	Drain outlet	6	Knurled screw Fixes the rinse station to the autosampler.

Dilution station (6.05801.250)
(see "Dilution station (6.05801.250)", page 59)

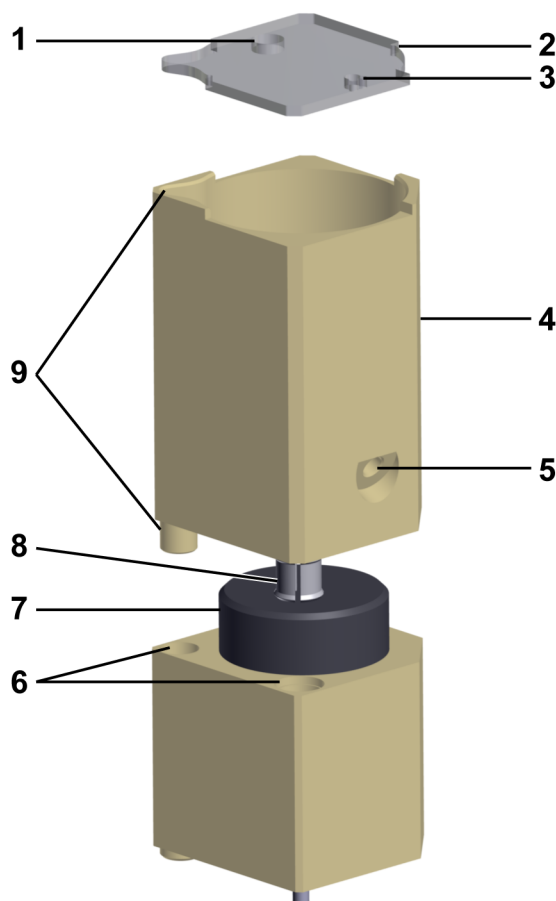


Figure 43 Dilution station – Overview

1 Dilution station The sample needle can be moved into this position using the OMNIS Software.	2 Dilution vessel lid 6.02762.110 Accessory part, not included in the scope of delivery of the dilution station.
3 Capillary fixation (optional)	4 Dilution vessel Can be removed for cleaning.
5 Sample outlet	6 Openings for positioning pin and overflow
7 Stirrer	8 Positioning pin for positioning the dilution vessel
9 Overflow	

Switching valve 3/2 (6.05801.1x0)

(see "Switching valve 3/2 (6.05801.110 and 6.05801.120)", page 59)

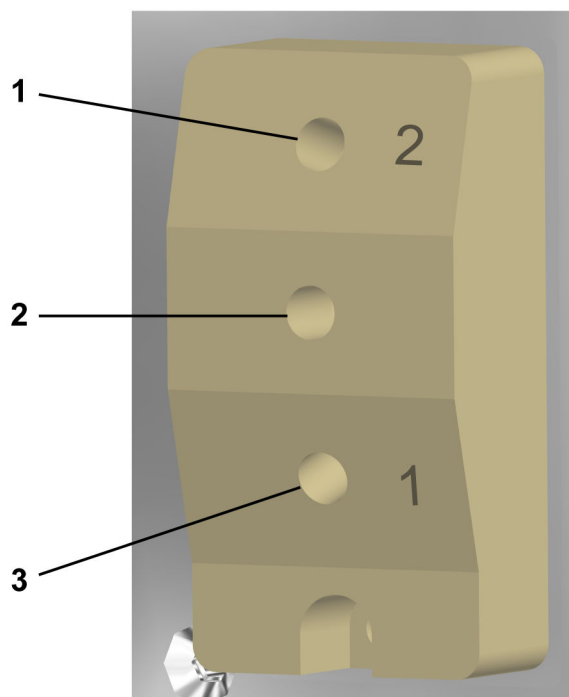


Figure 44 Switching valve 3/2 – Overview

1 Port 2

2 Central port

3 Port 1

3.5.2 Functional description

The OMNIS IC Autosampler Module serves as an autosampler in an IC system.

The OMNIS IC Autosampler Module automates the sample change. For example, the autosampler can independently process up to 160 5 mL vials. The autosampler enables high sample throughput, depending on the sample rack or microtiter plate used ([see "Sample racks and sample vessels", page 57](#)). The needle drive moves the sample needle to the desired sample vessel. Thanks to automatic vial detection, the sample vessels are detected by the needle drive.

The various positions of the needle drive can be selected using the control software.

The autosampler is installed in the OMNIS IC System directly below the OMNIS Extension Module Main. Alternatively, the autosampler can be set up separately next to the ion chromatograph. The autosampler is always equipped with a base plate. If the autosampler is to be set up next to the ion chromatograph, then it must be configured as a two-tower setup ([see "Setup location", chapter 5.2, page 109](#)).

Autosampler

The autosampler is available in 2 versions (see "OMNIS IC Autosampler Module", chapter 1.2.4, page 4):

- OMNIS IC Autosampler Module

The OMNIS IC Autosampler Module serves as an automated autosampler in an IC system. The integrated base plate has a drain with a built-in leak sensor. If a leak occurs, then the leaked liquid will be fed into the waste via the drain. The control software reports a leak.

The OMNIS IC Autosampler Module has an integrated rinse station ([see "Rinse station", page 58](#)).

The OMNIS IC Autosampler Module can be supplemented with the following accessory parts:

- Dilution station (6.05801.250)
(see "Dilution station (6.05801.250)", page 59)
- Switching valve 3/2 (6.05801.1x0)
(see "Switching valve 3/2 (6.05801.110 and 6.05801.120)", page 59)
- Barcode scanner kit (6.05801.130)
(see "Barcode scanner kit (6.05801.130)", page 60)

The accessory parts are available from a regional Metrohm service representative.

Trays

(see "OMNIS IC AS Tray", page 51)

▪ OMNIS IC AS Tray

The OMNIS IC AS Tray offers the option of placing sample vessels in the autosampler using various sample racks. The OMNIS IC AS Tray is designed for sample racks in SBS (Society for Biomolecular Screening) format. It allows for a high degree of flexibility in the selection of the sample racks (see "Sample racks and sample vessels", page 57). This means that the number of sample vessels required can also be individually adapted as required.

The OMNIS IC AS Tray has 4 rack positions and 6 bottle positions. The bottles are intended for use with standards, check standards or rinsing solutions, for example. The rack positions and bottle positions are numbered. The OMNIS IC AS Tray and rack positions are each provided with a 2D code. The 2D codes are used for identification by the optional barcode scanner (see "Barcode scanner kit (6.05801.130)", page 60). The 2D codes on the trays and rack positions prevent any tray from being misidentified.

▪ OMNIS IC AS COOL Tray

The OMNIS IC AS COOL Tray has the same functions as the OMNIS IC AS Tray. In addition, the OMNIS IC AS COOL Tray has seals on both sides and on the rear. The OMNIS IC AS COOL Tray is used as standard with the OMNIS IC Autosampler Module COOL and provides the best possible cooling performance.

Sample racks and sample vessels

The following sample racks and sample vessels can be used for the autosampler:

Table 21 Sample racks and sample vessels for OMNIS IC Autosampler Module

Sample rack	Sample vessel
OMNIS sample rack 40 x 5 mL (6.02041.510)	Vial PS, 5 mL (6.02743.020) with cap PP, OD 11.5 mm (6.02743.080)
OMNIS sample rack 24 x 10 mL (6.02041.500)	Vial PS, 10 mL (6.02743.010) with cap PP, OD 16.6 mm (6.02743.070)
OMNIS sample rack 6 x 50 mL (6.02041.530)	Bottle PP, 50 mL (6.02743.030) with screw cap with septum (6.02743.090)

Sample rack	Sample vessel
OMNIS sample rack 2 x 200 mL (6.02041.550)	Bottle PP, 200 mL (6.02743.040) with screw cap with septum (6.02743.090)
OMNIS sample rack 48 x 11 mm (6.02041.520)	Vials PP, 0.3 mL, V-shape, 1,000 pieces (6.2743.110) Vials PP, 0.7 mL, U-shape, 1,000 pieces (6.2743.100) Vials glass, 1.8 mL, U-shape, 100 pieces (6.7303.100) with snap cap with red/white septum, 1,000 pieces (6.2743.120) with snap cap with red septum, 100 pieces (6.7303.110)
OMNIS sample rack 12 x 22 mm (6.02041.540)	Sample glass with thread 8 mL (6.2420.000) with screw cap with septum, 100 pcs. (6.1448.067) Sample glass 6 mL (6.2419.007) with aluminum septum cap / 100 pcs. (6.1448.057)

In addition to the standard OMNIS racks, customized sample racks can be ordered from your regional Metrohm service representative.

 Microtiter plates in SBS standard format are compatible with the OMNIS IC AS Tray of the autosampler.

Suitable 96-well microtiter plates or 384-well microtiter plates are available from third-party suppliers.

A regional Metrohm service representative can provide the necessary rack data for use in the OMNIS Software.

The production and packaging of the sample vessels 5 mL, 10 mL, and 50 mL take place under sterile and clean-room conditions (Clean Room Class 8, in accordance with DIN ISO 14644). This process guarantees minimal levels of contamination.

Rinse station

(see "Rinse station", page 52)

In the rinse station (6.02841.120), the sample needle can be rinsed with rinsing solution after each injection to prevent carry-overs. The rinse station has 3 openings:

- *Rinse position*

The rinse position is also the park position. The park position uses the status display to indicate when the OMNIS IC AS Tray can be removed (36-3).

The sample needle is rinsed by connecting it to an OMNIS Dosing Drive Unit. If the optional rinsing connector is connected, then the outside of the sample needle is also rinsed.

If back-rinsing by the OMNIS Dosing Drive Unit is not possible, then an alternative method for rinsing via the capillary connections of the rinse station can be provided.

- *Drain position*

The drain position is connected to the drainage tubing system. After rinsing the sample needle, the contaminated rinsing liquid flows into the drain position and is fed into the drainage tubing system.

The drain position is also used to rinse sample residues out of the flow path.

- *Overflow*

If there is a blockage or backing up in the drain tubing of the rinse station, then the contaminated rinsing liquid flows out of the drain position and into the overflow. The liquid in the overflow is collected in the drip collector, after which it runs to the leak sensor, and is then fed into the drainage tubing system. The leak sensor triggers a message in the OMNIS Software.

Dilution station (6.05801.250)

(see "*Dilution station (6.05801.250)*", page 53)

The optional dilution station is used for automatic dilution of samples. A defined amount of the concentrated sample is precisely measured by an OMNIS Dosing Drive Unit. The concentrated sample is transferred to the dilution vessel with the required volume of the dilution solution. The built-in magnetic stirrer mixes the concentrated sample and the dilution solution evenly. The diluted sample is then transferred through the sample outlet into the sample path.

The dilution station is equipped with an overflow. The liquid in the overflow is collected in the drip collector, after which it runs to the leak sensor, and is then fed into the drainage tubing system. The leak sensor triggers a message in the OMNIS Software.

A regional Metrohm service representative installs the dilution station. If contaminated, the dilution vessel can be cleaned (see "*Cleaning the OMNIS IC Autosampler Module*", chapter 7.10.3, page 390) or replaced (see "*Replacing the dilution vessel*", chapter 8.2.3, page 427).

Switching valve 3/2 (6.05801.110 and 6.05801.120)

(see "*Switching valve 3/2 (6.05801.1x0)*", page 54)

The optional switching valve 3/2 is a valve with 3 connectors and 2 switching positions. The switching valve 3/2 is available with either a valve attachment with UNF 10/32 connectors or with M6 connectors. The use of a switching valve 3/2 achieves a high degree of flexibility in liquid handling. To connect capillaries to the switching valve 3/2 for sample transfer, use the valve attachment with UNF 10/32 connectors. To connect tubing to the switching valve 3/2, use the valve attachment with the M6 connectors.

When combined with an OMNIS Dosing Drive Unit, the switching valve 3/2 enables a wide range of applications, e.g.:

- *Sample preparation techniques*
High flexibility for fluid transfer when used in combination with the dosing drive.
- *2-channel system*
Use the switching valve 3/2 to control which channel the sample is injected into.
- *AutoSwitch*
Use the switching valve 3/2 to control which eluent is used.
- *Rinse with 2 different solutions*
Use the switching valve 3/2 to control which rinsing solution is used.

The central port of the switching valve 3/2 is always connected. Depending on the switching position, the central port is connected to Port 1 or Port 2.

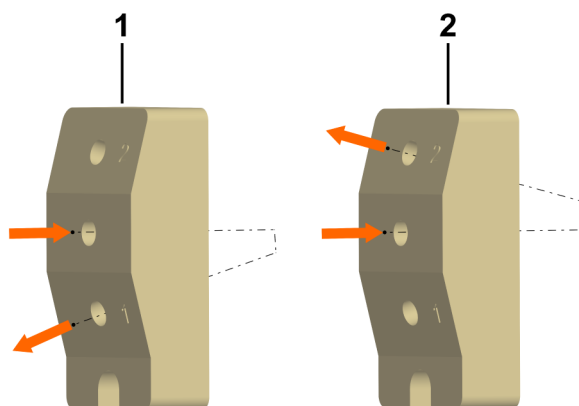


Figure 45 Switching positions 1 and 2 of the switching valve 3/2

A maximum of 3 switching valves 3/2 can be installed per autosampler. A regional Metrohm service representative installs the switching valves 3/2.

Barcode scanner kit (6.05801.130)

The optional barcode reader automatically detects which sample rack has been inserted in which position. Identification is based on the barcodes on the OMNIS IC AS Tray, the rack positions, and the individual sample racks. The sample racks can therefore be used in any position. The OMNIS

Software automatically assigns the sample vessels to the detected sample racks.

A regional Metrohm service representative installs the barcode reader.

3.6 OMNIS Dosing Drive Unit

3.6.1 Overview

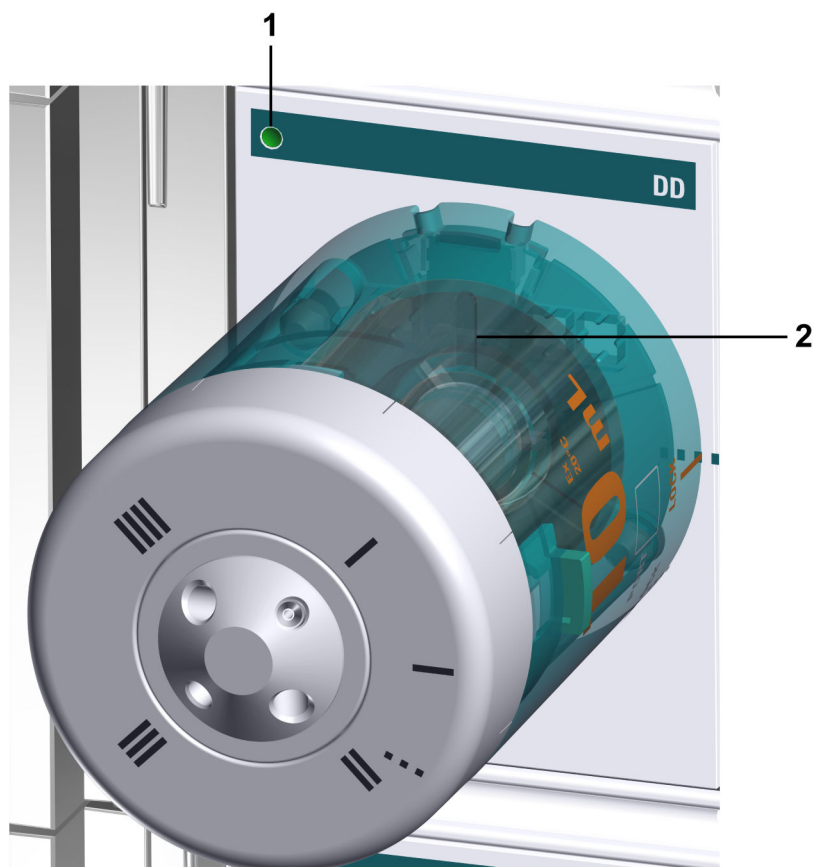


Figure 46 OMNIS Dosing Drive Unit (with attached cylinder unit OMNIS) – Front

1 Status display

(see "System – Signals", chapter 3.1.3, page 25)

2 Cylinder unit OMNIS

6.01506.xx0 or 6.01503.xx0

Accessory part, not included in the scope of delivery of the OMNIS Dosing Drive Unit.

Detailed information on the cylinder unit OMNIS is described in the [manual for the cylinder unit OMNIS UNF](#).

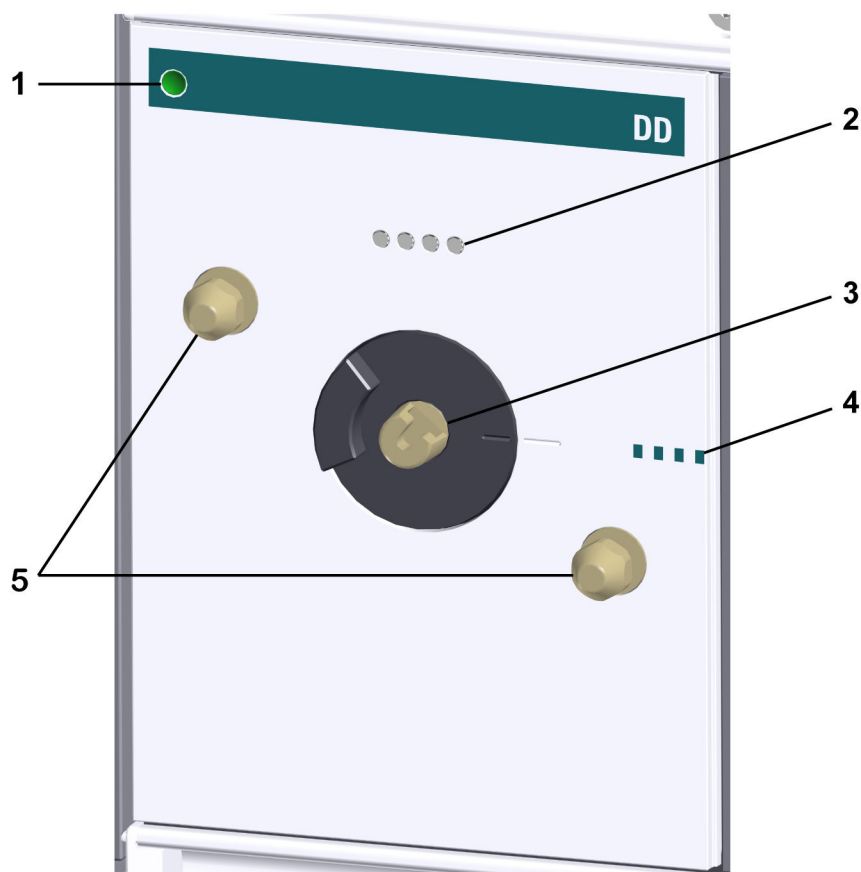


Figure 47 OMNIS Dosing Drive Unit – Front

- | | |
|---|---|
| <p>1 Status display
(see "System – Signals", chapter 3.1.3, page 25)</p> | <p>2 Contact pins
for communicating with the cylinder unit OMNIS</p> |
| <p>3 Push rod
for piston movement</p> | <p>4 Positioning aid
for mounting the cylinder unit OMNIS</p> |
| <p>5 Twistlocks
for locking the cylinder unit OMNIS</p> | |

3.6.2 Functional description

The dosing drive with attached cylinder unit OMNIS is used for precise aspiration and dosing of liquid volumes.

The following cylinder units OMNIS are compatible with the OMNIS Dosing Drive Unit:

Table 22 Overview of cylinder units OMNIS

Cylinder unit OMNIS	Connectors
Cylinder unit OMNIS 2 mL, UNF 10/32 (6.01506.120)	2 x UNF, 2 x M6
Cylinder unit OMNIS 5 mL, UNF 10/32 (6.01506.150)	2 x UNF, 2 x M6

Cylinder unit OMNIS	Connectors
Cylinder unit OMNIS 10 mL, UNF 10/32 (6.01506.210)	2 x UNF, 2 x M6
Cylinder unit OMNIS 2 mL (6.01503.120)	4 x M6
Cylinder unit OMNIS 5 mL (6.01503.150)	4 x M6
Cylinder unit OMNIS 10 mL (6.01503.210)	4 x M6
Cylinder unit OMNIS 20 mL (6.01503.220)	4 x M6
Cylinder unit OMNIS 50 mL (6.01503.250)	4 x M6

The OMNIS Dosing Drive Unit serves as a dosing drive in the OMNIS IC System. The dosing drive is compatible with various cylinder units OMNIS. The cylinder unit OMNIS provides the required liquid volume. The cylinder unit OMNIS is equipped with a distributor with 4 ports. The various cylinder units differ in terms of their volumes and their connectors.

The dosing drive moves the piston in the cylinder unit OMNIS. If the piston moves backwards, then the solution is aspirated. The cylinder unit OMNIS fills up. If the piston moves forward, then the solution is dosed. The cylinder unit OMNIS empties.

The dosing drive rotates the cylinder unit OMNIS. Rotating the cylinder unit OMNIS controls which port the solution flows through.

The OMNIS Dosing Drive Unit requires a position in the OMNIS Extension Module. The OMNIS Dosing Drive Unit can be installed in any position.

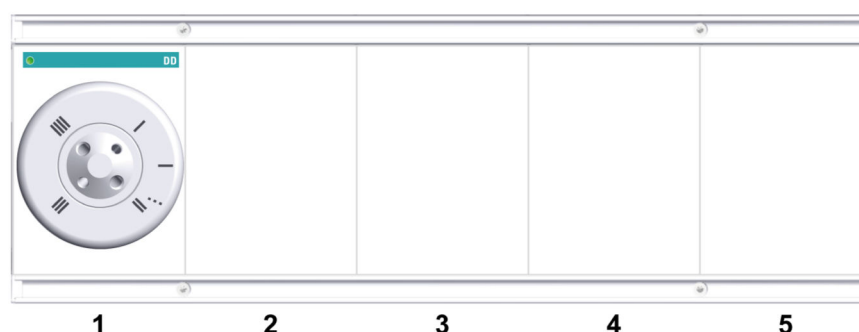


Figure 48 OMNIS Dosing Drive Unit – Position 1

A regional Metrohm service representative installs the OMNIS Dosing Drive Unit. The user installs the cylinder unit OMNIS. The user can replace the cylinder unit OMNIS with another cylinder unit OMNIS at any time.

3.7 OMNIS Degasser Unit

3.7.1 Overview

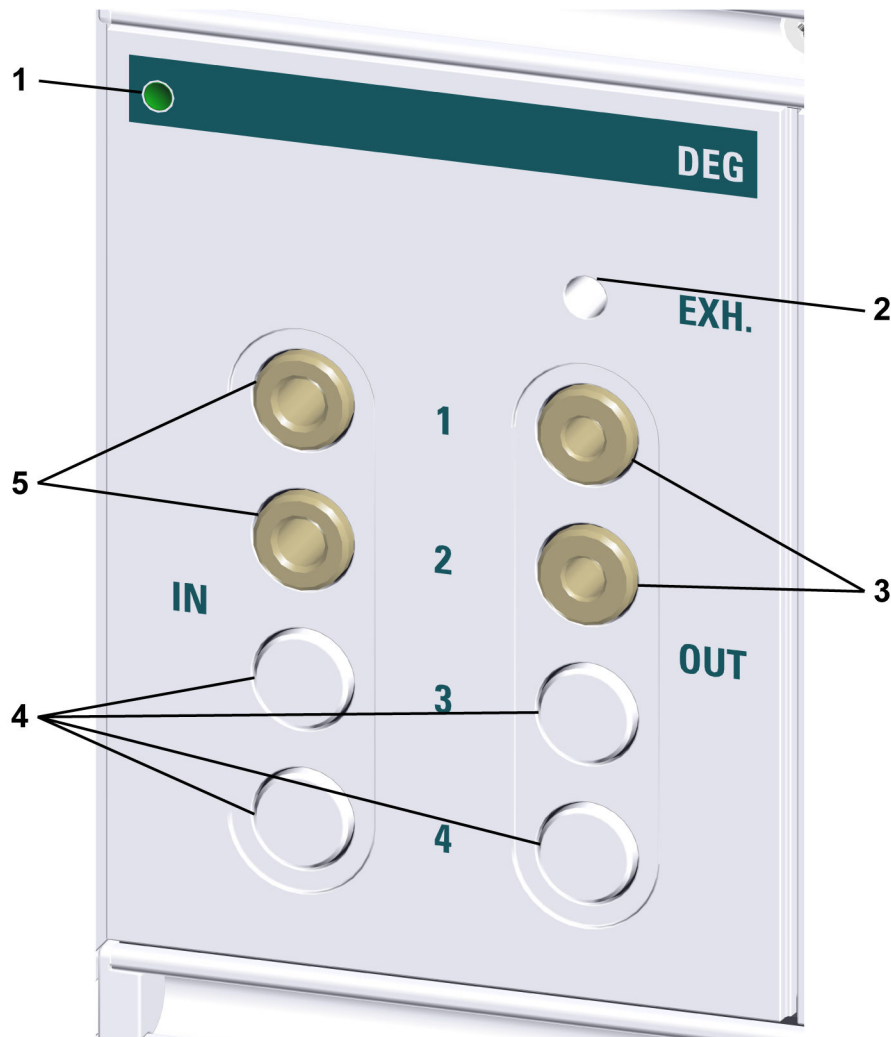


Figure 49 OMNIS Degasser Unit – Front

- | | |
|---|--|
| <p>1 Status display
 <i>(see "System – Signals", chapter 3.1.3, page 25)</i></p> | <p>2 Exhaust opening
 Exhaust air is automatically discharged via the exhaust opening.
 Never close the exhaust opening.</p> |
| <p>3 Degasser outlet 1–2
 with UNF-10/32 connectors</p> | <p>4 Dummy cover
 If the degasser is operated with fewer than 4 chambers, then the channels that are not required are closed with dummy covers.</p> |
| <p>5 Degasser inlet 1–2
 with M6 connectors</p> | |

3.7.2 Functional description

The OMNIS Degasser Unit serves as an eluent degasser and as a sample degasser in the OMNIS IC System. The degasser removes gas bubbles and dissolved gases from the eluent and from the sample. A stable baseline is achieved by degassing the eluent.

For samples with a high gas content, degassing with the sample degasser ensures that the same sample amount is in the sample loop for each measurement. This increases the reproducibility of the analysis. Using a degasser eliminates the need for manual degassing.

The OMNIS Degasser Unit requires a position in the OMNIS Extension Module. The OMNIS Degasser Unit is mounted to the left of the high-pressure pump. This means that the OMNIS Degasser Unit can be mounted at positions 1 or 2. The OMNIS Degasser Unit is available with 1, 2 or 4 chambers. The OMNIS Degasser Unit has a maximum of 1 sample degasser and 3 eluent degassers or a maximum of 4 eluent degassers. Only the top chamber can be used as a sample degasser. A regional Metrohm service representative can extend a degasser to a maximum of 4 chambers.

i The OMNIS Degasser Unit is installed upstream of the OMNIS High-Pressure Pump. The OMNIS Degasser Unit may be used only on the low-pressure side.

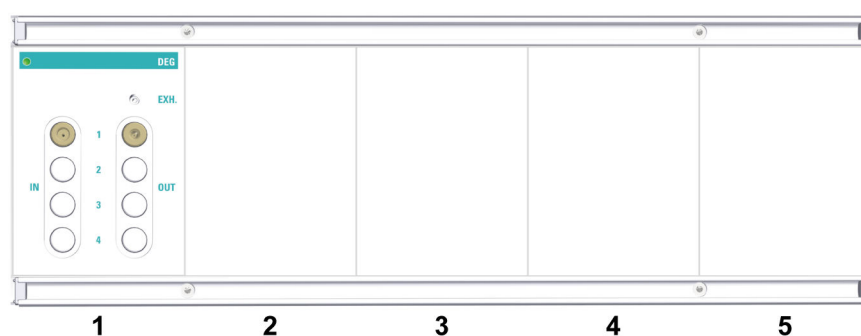


Figure 50 OMNIS Degasser Unit – Position 1

3.8 OMNIS Proportioning Valve Unit

3.8.1 Overview

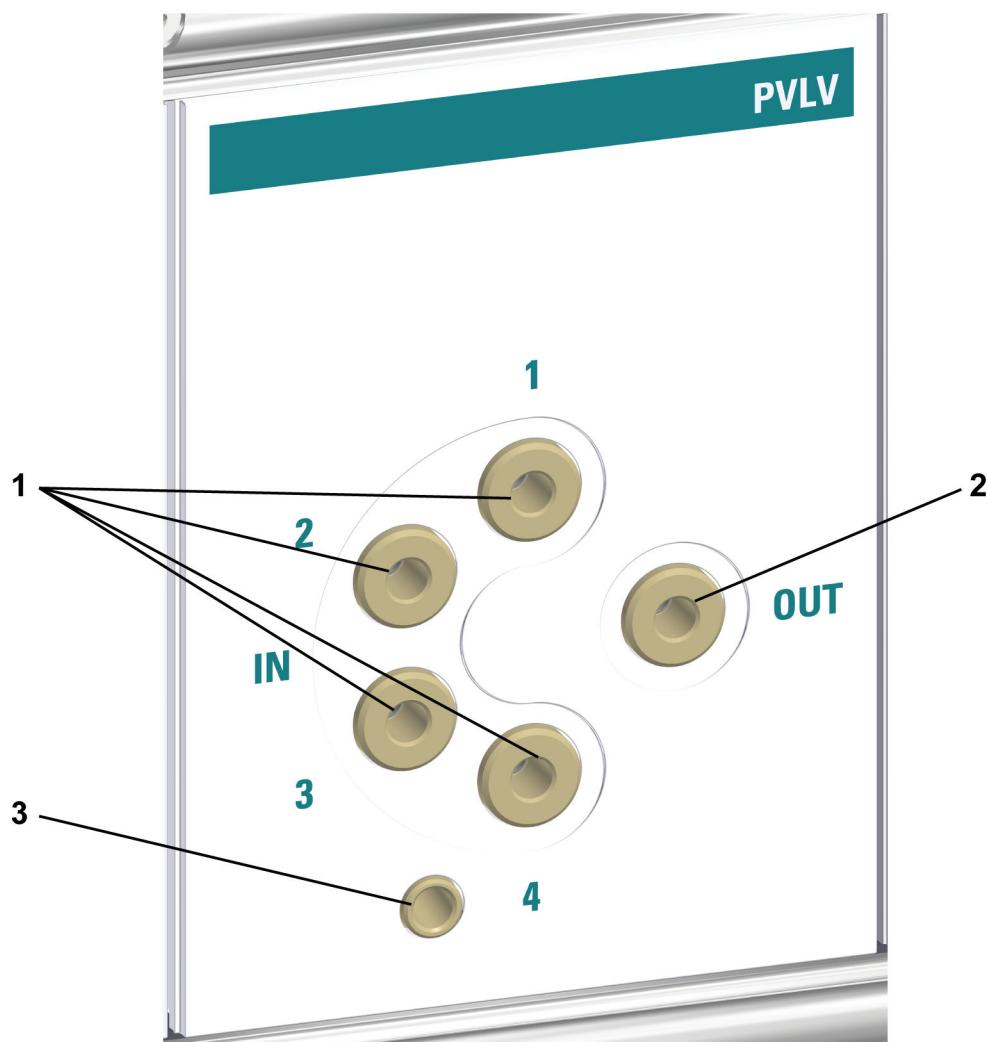


Figure 51 OMNIS Proportioning Valve Unit – Front

- 1 Proportioning valve inlet 1–4**
Up to 4 eluents can be mixed in the proportioning valve.
 - 2 Proportioning valve outlet**
 - 3 Service access**
Do not use this access.

3.8.2 Functional description

The OMNIS Proportioning Valve Unit is used as an automatic proportioning valve when a low-pressure gradient is used in the OMNIS IC System. The proportioning valve enables the mixing of up to 4 eluents in the low-pressure section. This enables the fully automated determination of anions or cations with suppression.

The individual valves of the proportioning valve are closed by default. The corresponding valve opens while the high-pressure pump aspirates a gradient. The valve remains open only until the defined amount of eluent has been aspirated. A high-pressure mixer is connected to the proportioning valve outlet. Before the gradient is conveyed from the high-pressure pump into the OMNIS IC System, the individual eluents are mixed in the high-pressure mixer.

The OMNIS Proportioning Valve Unit requires a position in the OMNIS Extension Module. The OMNIS Proportioning Valve Unit is mounted to the left of the high-pressure pump. This means that the OMNIS Proportioning Valve Unit can be mounted at positions 1 or 2.

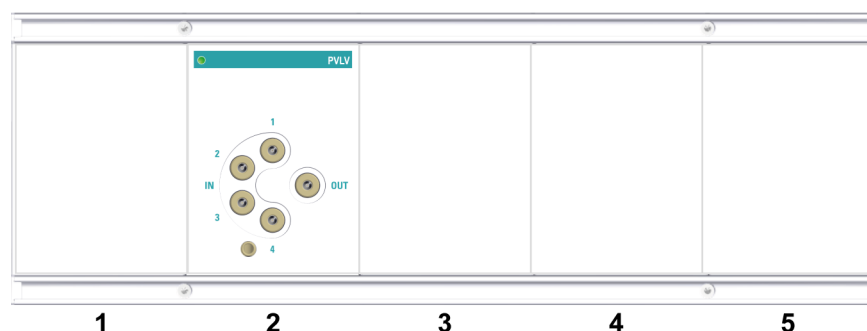


Figure 52 OMNIS Proportioning Valve Unit – Position 2

3.9 OMNIS High-Pressure Pump Unit

3.9.1 Overview

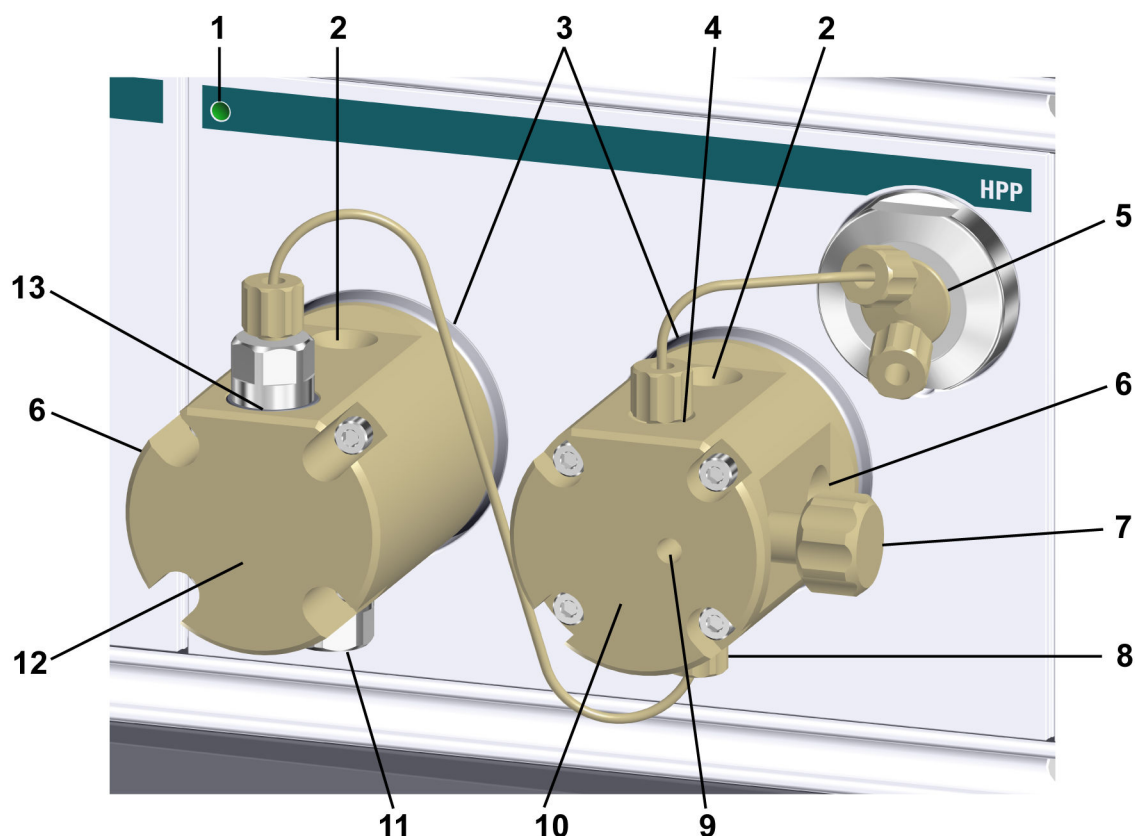


Figure 53 OMNIS High-Pressure Pump Unit – Front

1 Status display

(see "System – Signals", chapter 3.1.3, page 25)

3 Pump head mounting

5 Pressure sensor

Monitors the pressure of the high-pressure pump.

7 Purge knob

For manually purging the high-pressure pump.

9 Luer connector

Connector for a syringe for manual purging

2 Piston seal wash outlet

4 Pump head auxiliary outlet

6 Piston seal wash inlet

8 Pump head auxiliary inlet

10 Pump head auxiliary

Pumps eluents while the pump head main aspirates the eluent.

11 Pump head main inlet with check valve inlet

The check valve inlet comprises the check valve inlet, PEEK (200-8).

12 Pump head main

Pumps eluents

13 Pump head main outlet with check valve outlet

The check valve outlet comprises the check valve outlet, PEEK (200-4).

3.9.2 Functional description

The OMNIS High-Pressure Pump Unit serves as the high-pressure pump in the OMNIS IC System.

The low-pulsation high-pressure pump pumps the eluent through the OMNIS IC System. The high-pressure pump has 2 pump pistons: A main piston and an auxiliary piston. The main piston pumps the eluent. The auxiliary piston pumps the eluent as soon as the main piston interrupts pumping to aspirate new eluents. This allows the high-pressure pump to pump the eluent evenly and without interruptions.

The OMNIS High-Pressure Pump Unit requires 2 positions in the OMNIS Extension Module. The OMNIS High-Pressure Pump Unit is mounted in positions 3 and 4 as standard. The OMNIS High-Pressure Pump Unit can optionally be mounted in positions 2 and 3.

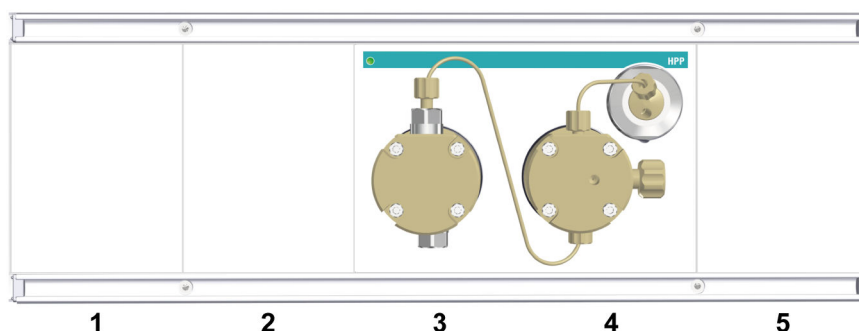


Figure 54 OMNIS High-Pressure Pump Unit – Positions 3 and 4

The high-pressure pump contains a manual purge valve. In addition, injector 7/3 contains an automatic purge valve. If no injector 7/3 is available, then a regional Metrohm service representative can install an injector 7/3.

The 2 pump pistons of the high-pressure pump can each be optionally equipped with a piston seal wash. The piston seal wash prevents crystallization on the piston seal.

3.10 OMNIS Peristaltic Pump Unit

3.10.1 Overview

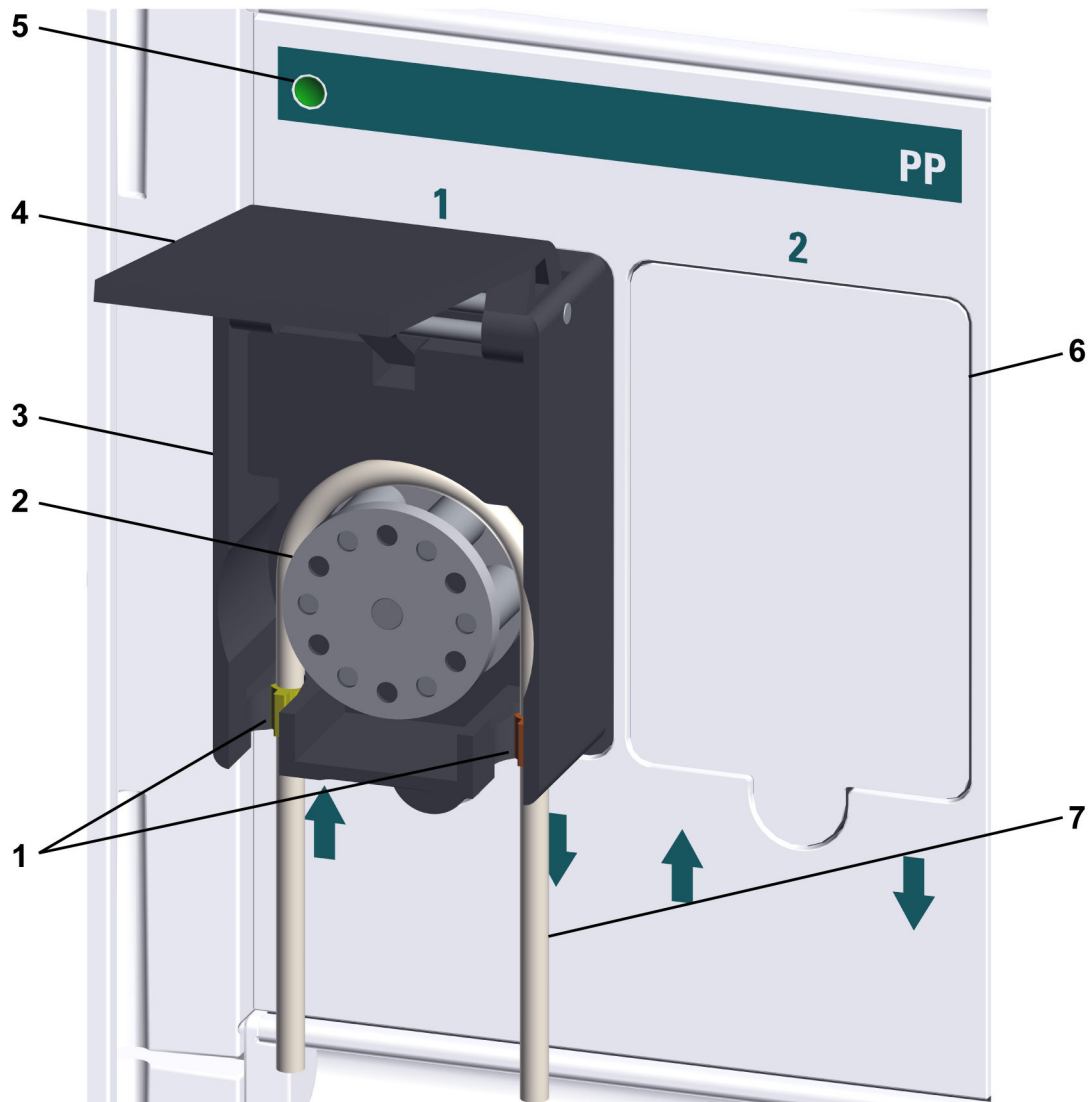


Figure 55 OMNIS Peristaltic Pump Unit – Front

1 Openings for the pump tubing

3 Peristaltic pump
with press-on flap open

2 Roller head
Deforms the pressed-on pump tubing by rotation.

4 Press-on flap
Presses the pump tubing onto the roller head.

5 Status display

(see "System – Signals", chapter 3.1.3, page 25)

6 Dummy cover

Only the 2.1056.1010 product version contains a dummy cover.

The 2.1056.1020 product version contains an additional peristaltic pump instead of the dummy cover.

7 Pump tubing**3.10.2 Functional description**

The OMNIS Peristaltic Pump Unit serves as a peristaltic pump in the OMNIS IC system. The peristaltic pump works according to the displacement principle, i.e., liquids are forced through the pump tubing by external mechanical deformation of the pump tubing. The pump tubing is deformed by pressing it against a rotating roller head. The peristaltic pump is used to pump samples and auxiliary solutions.

The peristaltic pump can be used in the push mode or in the pull mode, depending on the application. In the push mode, liquids are pumped by the peristaltic pump through the application of pressure. In the pull mode, the peristaltic pump uses extraction to pump liquids.

The roller head of the peristaltic pump always rotates clockwise. With a 2-channel peristaltic pump, the two channels can be operated at different rotational speeds. This creates flexibility in the application. The peristaltic pump is optimized for reliable continuous operation at low flow rates. If a higher flow rate is required (e.g., to rinse the sample path), then the rotational speed of the peristaltic pump can be increased for a limited period.

Table 23 Peristaltic pump – Operating times

Value setting	Uptime
1–39	no limit
40–100	max. 180 s

The OMNIS Peristaltic Pump Unit requires a position in the OMNIS Extension Module. The OMNIS Peristaltic Pump Unit can be installed in any position.



Figure 56 OMNIS Peristaltic Pump Unit – Position 1

The OMNIS Peristaltic Pump Unit is available with either 1 or 2 channels. A regional Metrohm service representative can upgrade a 1-channel peristaltic pump to a 2-channel peristaltic pump.

3.11 OMNIS MISP Unit

3.11.1 Overview



Figure 57 OMNIS MISP Unit – front

- | | |
|--|--|
| 1 Capillary feed-through | 2 MISP tray
Can be removed from the MISP unit. |
| 3 Handle
to open the MISP tray | |

MISP tray with accessories

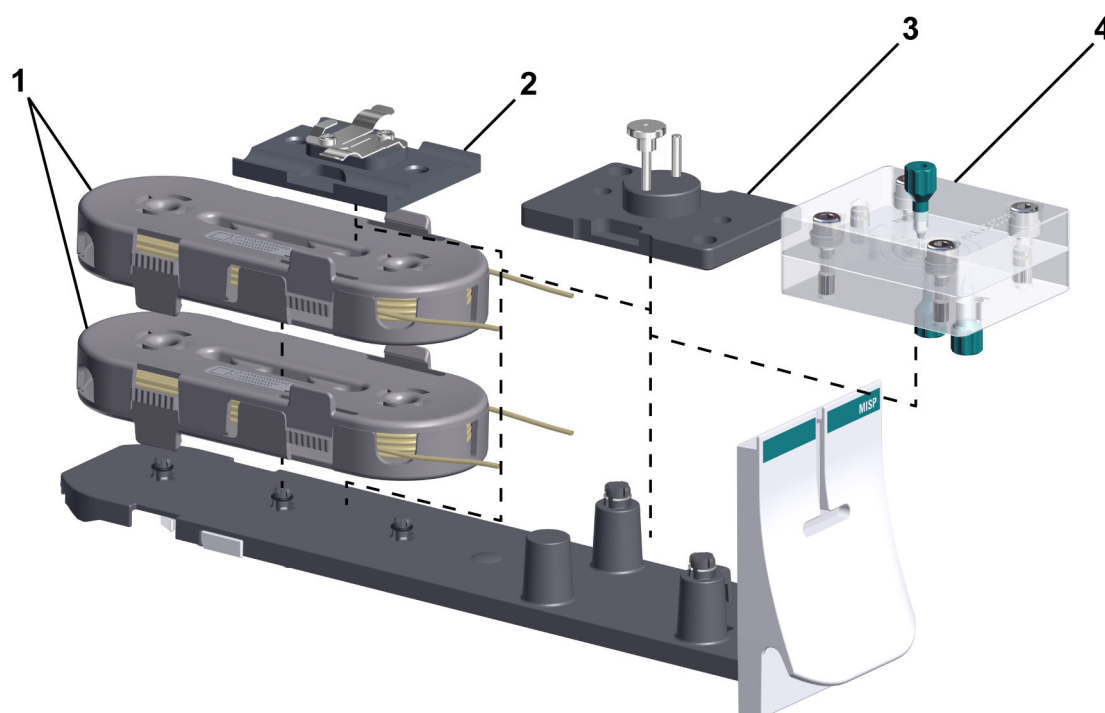


Figure 58 MISP tray – accessories overview

- | | |
|---|--|
| <p>1 Transfer tubing or transfer capillary
6.01532.1x0 or 6.01562.100
<i>(see figure 61, page 76)</i>
Accessory part, not included in the OMNIS MISP unit scope of delivery.
A maximum of 2 pieces of transfer tubing or transfer capillaries can be used per MISP tray.</p> | <p>2 MISP holder, trap column
6.02006.110
<i>(see figure 62, page 77)</i>
Accessory part, not included in the OMNIS MISP unit scope of delivery.
A maximum of 1 MISP holder, trap column can be used per MISP tray.</p> |
| <p>3 MISP base plate
6.02006.100
<i>(see figure 63, page 78)</i>
Accessory part, not included in the OMNIS MISP unit scope of delivery.
A maximum of 1 MISP base plate can be used per MISP tray.</p> | <p>4 Ultrafiltration cell 2
6.02729.110
<i>(see figure 60, page 75)</i>
Accessory part, not included in the OMNIS MISP unit scope of delivery.</p> |

MISP tray without accessories

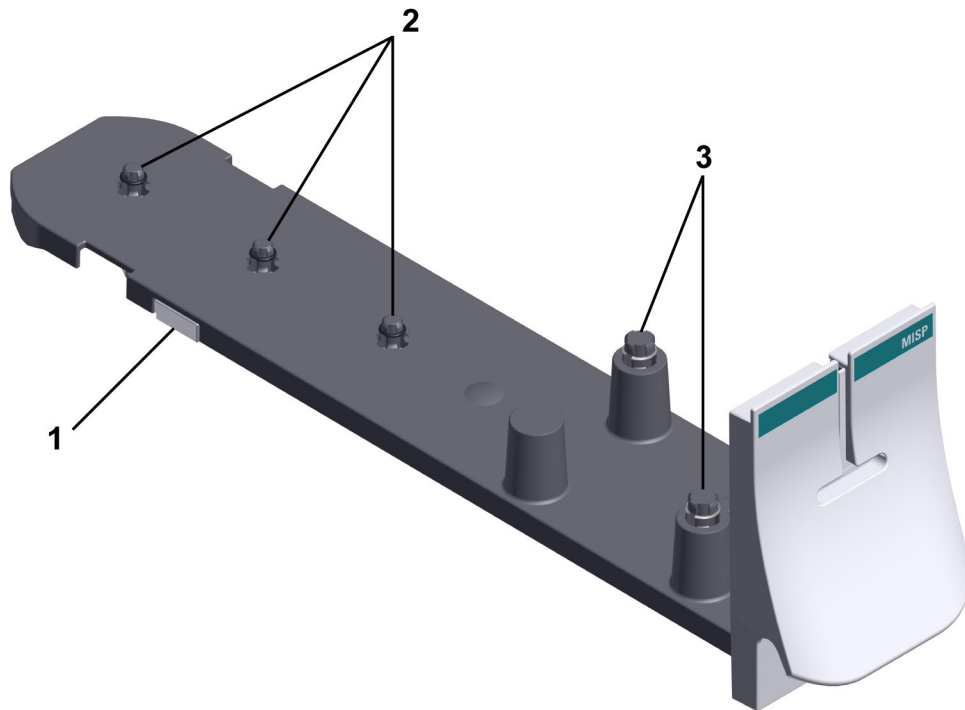


Figure 59 MISP tray – overview

- | | |
|--|---|
| <p>1 MISP tray release
to remove the MISP tray from the MISP unit</p> | <p>2 Positioning pins, short
for positioning accessories</p> |
| <p>3 Positioning pins, long
for positioning accessories</p> | |

Ultrafiltration cell 2 (6.02729.110)

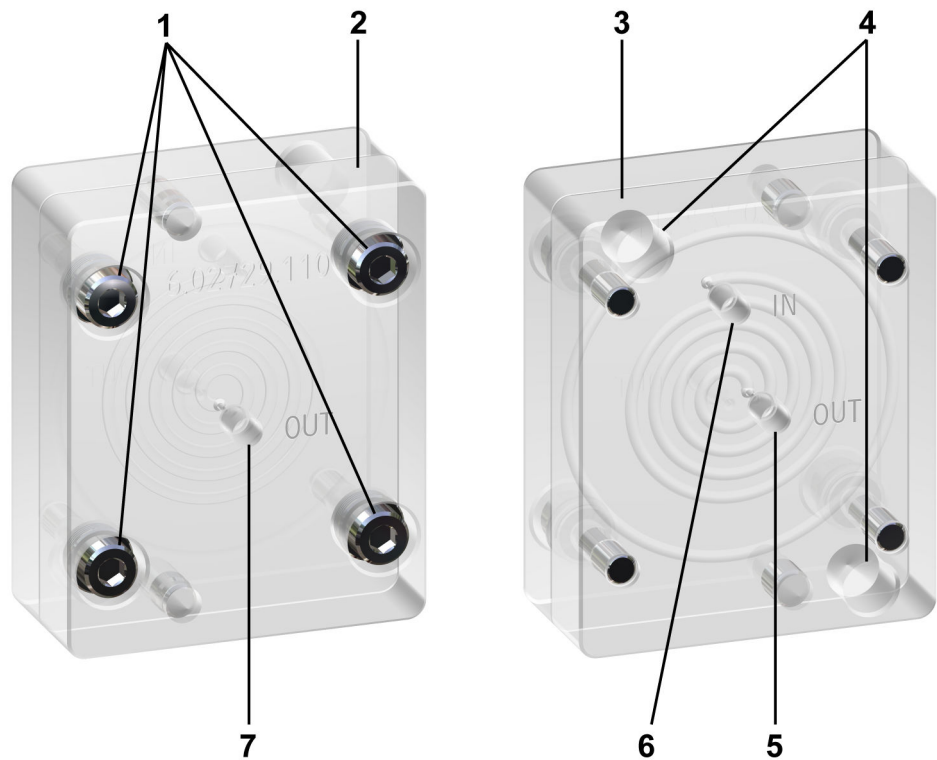


Figure 60 Ultrafiltration cell – overview

1 Screws for screwing together the sample chamber and the filtrate chamber The screws are designed in such a way that they do not fall out, even when unscrewed.	2 Filtrate chamber
3 Sample chamber	4 Positioning aid for positioning the ultrafiltration cell in the MISP tray
5 Sample outlet labeled <i>OUT</i>	6 Sample inlet labeled <i>IN</i>
7 Filtrate outlet labeled <i>OUT</i>	

Transfer tubing (6.01532.1x0) / transfer capillary (6.01562.100)

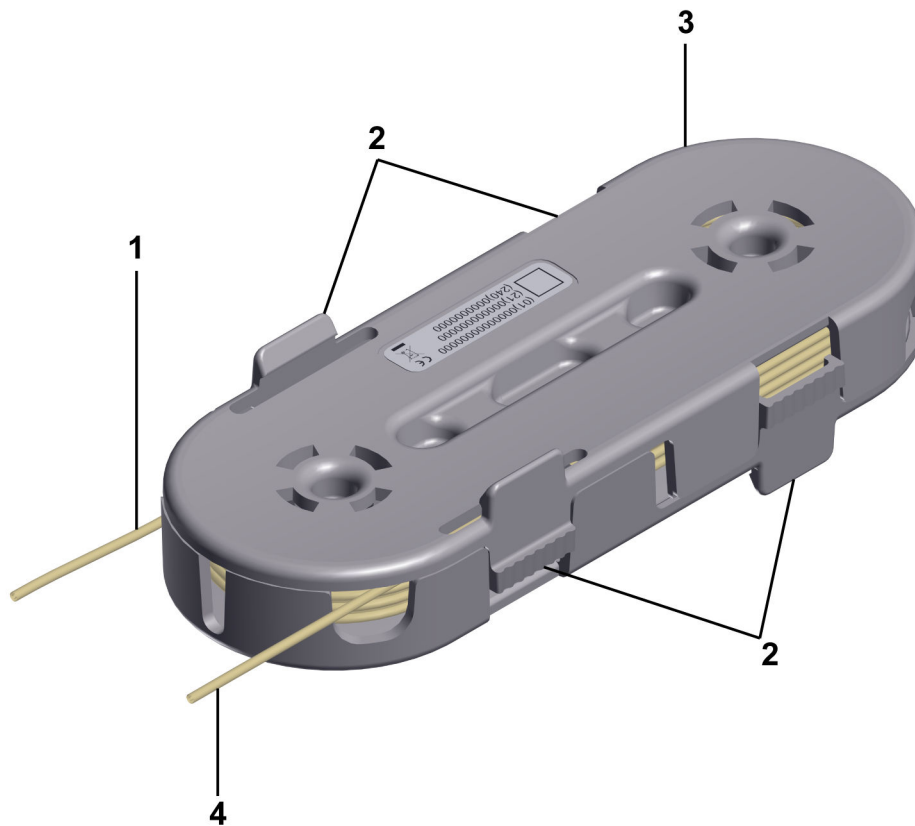


Figure 61 Transfer tubing / transfer capillary – overview

1	Inlet	2	Latch can be attached to the MISP tray and used to stack pieces of transfer tubing
3	Housing	4	Outlet

MISP holder, trap column (6.02006.110) with accessories

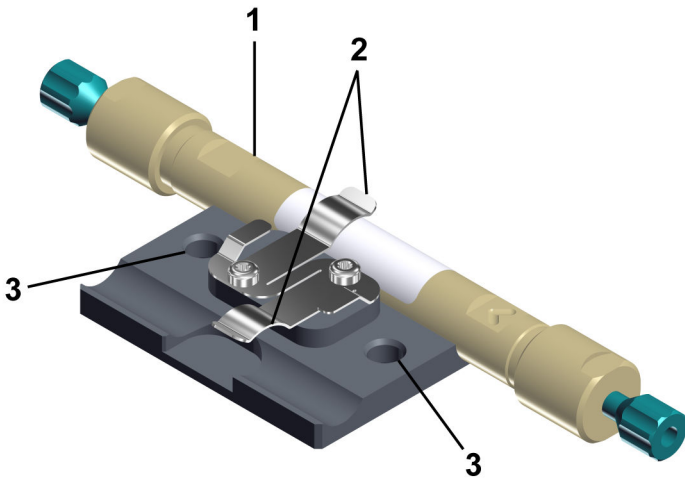


Figure 62 MISP holder, trap column – with trap column inserted (example)

1 Trap column	2 Terminal Fixes the trap column in place.
3 Positioning aid for positioning the MISP holder, trap column on the MISP tray	

MISP base plate (6.02006.100) with accessories

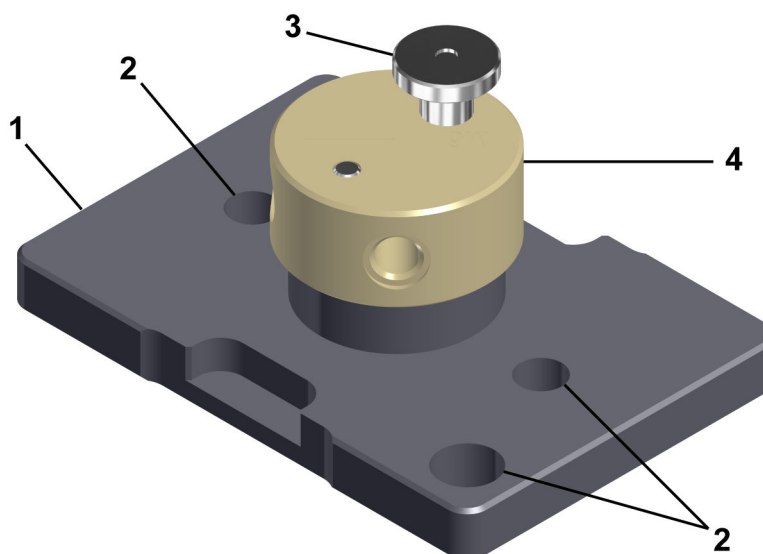


Figure 63 MISP base plate – with T connector fitted (example)

1 Base plate with positioning pins to fasten the T connector in place	2 Positioning aid to position the MISP base plate on the MISP tray
3 Knurled screw Fixes the T connector in place.	4 T connector 6.02744.020 or 6.02744.030

3.11.2 Functional description

The MISP unit is used for sample preparation and for liquid handling in the OMNIS IC System. The following Metrohm inline sample preparation techniques (Metrohm Inline Sample Preparation "MISP") can be implemented with the MISP unit:

- Inline ultrafiltration (UF) (6.05331.030) [see page 131](#)
- Inline dilution (MIDT) (6.05331.040) [see page 153](#)
- Inline ultrafiltration and inline dilution in combination (6.05331.060) [see page 167](#)
- Metrohm intelligent Partial Loop injection Technique (MiPT) (6.05331.070) [see page 178](#)
- Inline ultrafiltration and Metrohm intelligent Partial Loop injection Technique in combination (6.05331.080) [see page 187](#)

Equip the MISP unit with accessory parts for sample preparation ([see "Equipping the OMNIS MISP Unit", chapter 5.8, page 205](#)). The required accessories depend on the sample preparation selected. It is not possible to fit all accessory parts listed at the same time. Consult the chapter

on the respective sample preparation technique for information on the required accessories.

Accessories

The MISP unit can be fitted with the following accessory parts:

- ultrafiltration cell 2 (6.02729.110)
(see "Ultrafiltration cell 2 (6.02729.110)", page 79)
- Transfer tubing (6.01532.1x0) or transfer capillaries (6.01562.100)
(see "Transfer tubing (6.01532.1x0) and transfer capillary (6.01562.100)", page 80)
- MISP holder, trap column (6.02006.110)
(see "MISP holder, trap column (6.02006.110)", page 80)
- MISP base plate (6.02006.100)
(see "MISP base plate (6.02006.100)", page 80)

Maximum equipping (see "MISP tray with accessories", page 73):

1. 1 ultrafiltration cell *OR* 1 MISP base plate with up to 2 T connectors
AND
2. up to 2 transfer capillaries or transfer tubing *AND* 1 MISP holder with up to 2 trap columns

The OMNIS MISP Unit requires a position in the OMNIS Extension Module. The OMNIS MISP Unit can be installed in position 2 or 3.

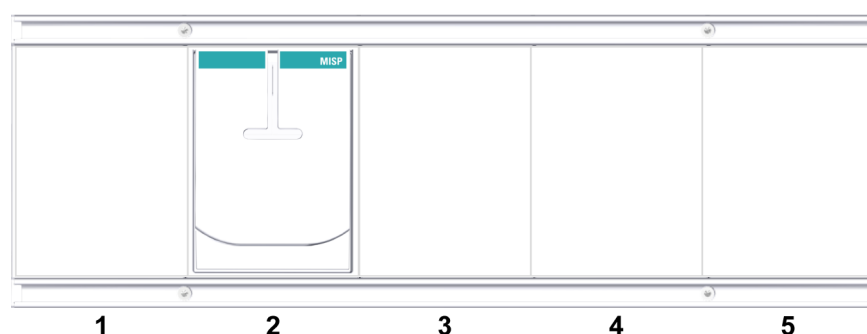


Figure 64 OMNIS MISP Unit – position 2

Ultrafiltration cell 2 (6.02729.110)

(see "Ultrafiltration cell 2 (6.02729.110)", page 75)

The optional ultrafiltration cell comprises a sample chamber and a filtrate chamber. There is a filtration membrane between the two chambers. The sample flows along the filtration membrane in the sample chamber to the sample outlet. Vacuum created in the filtrate chamber at the same time pulls the sample through the filtration membrane. The filtrate created in

this way reaches the sample loop and is then injected. 1 ultrafiltration cell can be installed per MISP unit.

Transfer tubing (6.01532.1x0) and transfer capillary (6.01562.100)

(see "Transfer tubing (6.01532.1x0) / transfer capillary (6.01562.100)",
page 76)

The following optional pieces of transfer tubing and transfer capillaries can be used in the MISP unit:

- Transfer capillary 2 mL, PEEK (6.01562.100)
- Transfer tubing 5 mL, FEP, OD 1/8" (6.01532.130)
- Transfer tubing 10 mL, FEP, M6 (6.01532.110)
- Transfer tubing 10 mL, PEEK, OD 1/8" (6.01532.120)
- Transfer tubing LQH, FEP, OD 1/8" (6.01532.140)

The transfer tubing or transfer capillary is a long piece of tubing or a long capillary to transfer and briefly store precisely measured liquids. A piece of transfer tubing is always required for the standard sample path. Due to its length, the transfer tubing or the transfer capillary is wound onto a housing. Up to 3 pieces of transfer tubing or transfer capillaries can be stacked on each other per MISP unit. If a MISP holder, trap column is also installed on the transfer tubing or the transfer capillary, then a maximum of 2 pieces of transfer tubing or transfer capillaries can be used.

MISP holder, trap column (6.02006.110)

(see "MISP holder, trap column (6.02006.110) with accessories", page 77)

All trap columns available from Metrohm can be used in the MISP unit with the optional MISP holder, trap column.

The trap column cleans the eluent path or the sample path. This removes interfering substances from the eluents. The trap column thereby protects the analytical columns. A MISP holder, trap column has space for up to 2 trap columns. 1 MISP holder, trap column can be installed per MISP unit.

MISP base plate (6.02006.100)

(see "MISP base plate (6.02006.100) with accessories", page 78)

The following T connectors can be used in the MISP unit with the optional MISP base plate:

- T connector, M6 (6.02744.020)
- T connector, UNF 10/32, M6 (6.02744.0030)

T connectors guide flows of liquid in the required direction. Several flows of liquid can be combined. A flow of liquid can be guided in different directions. Up to 2 T connectors can be installed per MISP unit. A regional Metrohm service representative mounts the second T connector.

3.12 OMNIS Actuator Unit

3.12.1 Overview

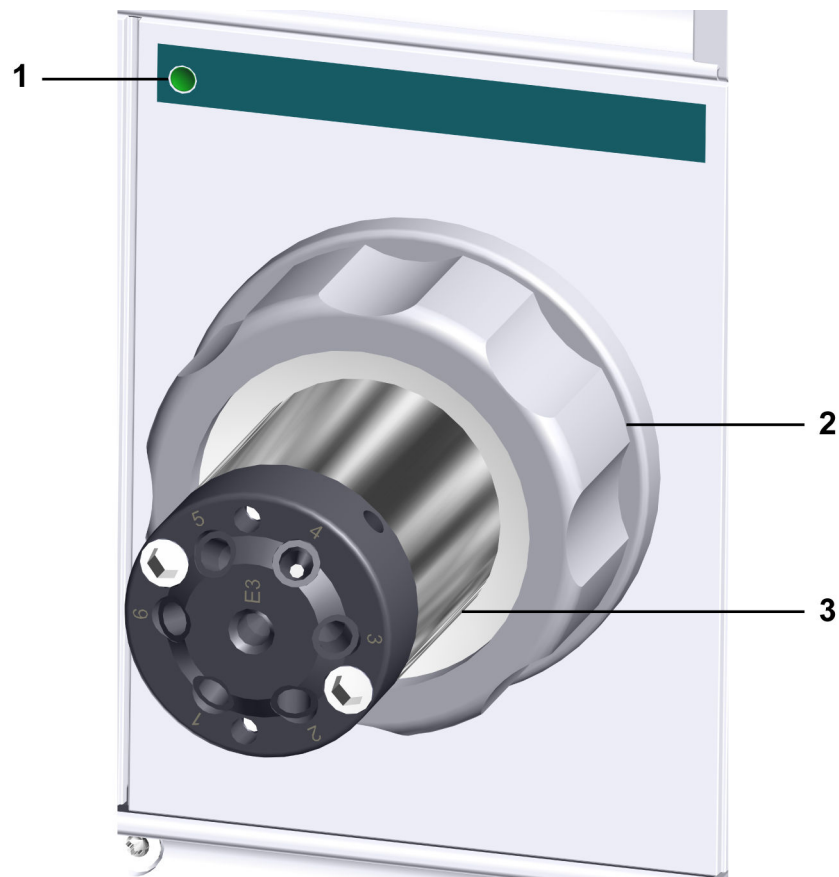


Figure 65 OMNIS Actuator Unit (with injector 7/3) – Front

1 Status display

(see "System – Signals", chapter 3.1.3, page 25)

2 Coupling nut, Actuator Unit

3 Injector/selector

The OMNIS Actuator Unit can be equipped with various injectors or selectors (see "Functional description", chapter 3.12.2, page 83).

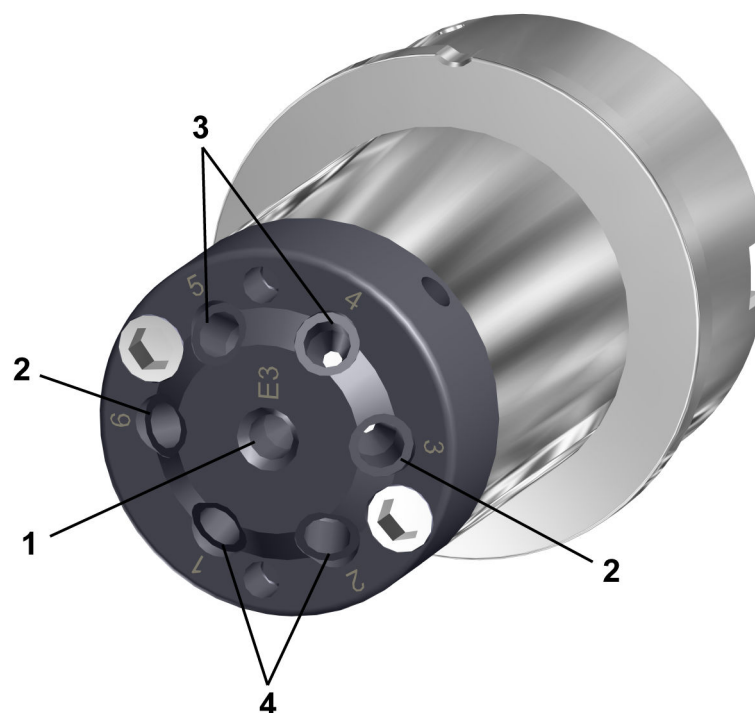


Figure 66 Injector 7/3 – Overview

1 Drain port

Draining liquids are fed into the waste via the drain port.

In addition, the high-pressure pump is automatically purged through the drain port.

2 Injector ports 3 and 6

The sample loop is connected to injector ports 3 and 6.

3 Injector ports 4 and 5

The eluent path is connected to the injector ports 4 and 5.

4 Injector ports 1 and 2

The sample path is connected to the injector ports 1 and 2.

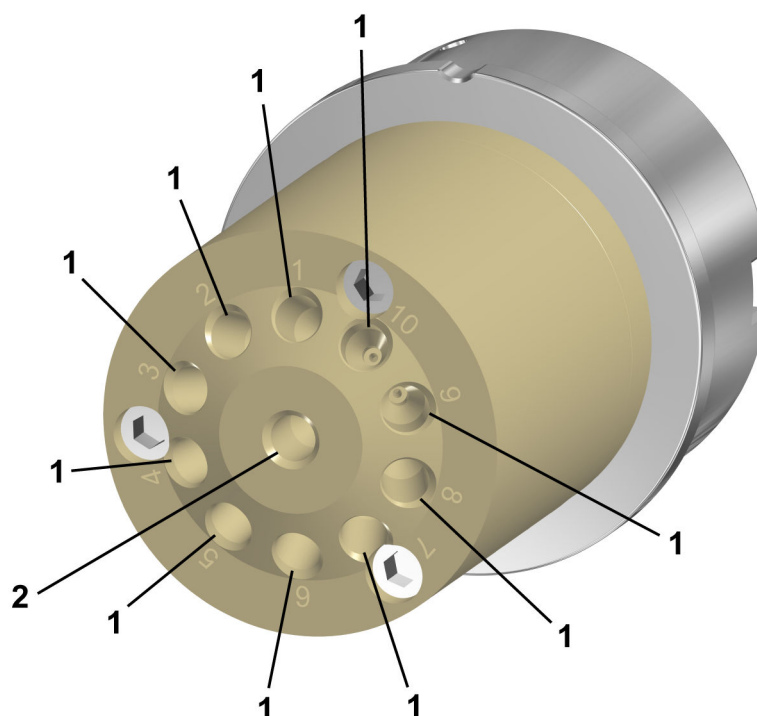


Figure 67 Selector 10/1 – Overview

1 Selector port 1–10

Can be used either as inlet or outlet.

2 Central port

Can be used either as inlet or outlet.

3.12.2 Functional description

The OMNIS Actuator Unit serves as a drive for various injectors and selectors in the OMNIS IC System. The same drive is also used for the OMNIS MSM Unit ([see "Functional description", chapter 3.15.2, page 94](#)).

Injector (6.05801.xx0)

If the OMNIS Actuator Unit is used together with an injector, then the OMNIS Actuator Unit will act as an injector in the OMNIS IC System. The injector delivers the desired amount of sample into the eluent flow.

The following injectors can be operated together with the OMNIS Actuator Unit:

- Injector 6/2 kit (6.05801.170)
Standard in OMNIS IC System S
- Injector 4/2, 0.25 µL kit (6.05801.190)
Injector with internal 0.25 µL sample loop
- Injector 4/2, 1.0 µL kit (6.05801.200)
Injector with internal 1.0 µL sample loop



- Injector 7/3 kit (6.05801.180)
Standard in OMNIS IC System M and L
The injector 7/3 enables automatic purging of the high-pressure pump. With the **drain position**, the air in the system is expelled via the drain port. At the same time, draining rinsing liquid is added to the waste. The high-pressure path can therefore be rinsed independently of the sample path.
The injector 7/3 also allows the sample loop to be depressurized. The pressure relief leads to greater precision when dosing in MiPT applications.
- Injector 8/2 kit (6.05801.210)
- Injector 10/2 kit (6.05801.220)

Selector (6.05801.2x0)

If the OMNIS Actuator Unit is used together with a selector, then the OMNIS Actuator Unit acts as a selector in the OMNIS IC System. The selector serves as a toggle switch between multiple different liquids.

The following selectors can be operated together with the OMNIS Actuator Unit:

- Selector 10/1, LP kit (6.05801.230)
Selector for the low-pressure section.
- Selector 10/1, HP kit (6.05801.240)
Selector for the high-pressure section.

The required pressure screws are included in the scope of delivery of the injector kit or selector kit.

All injectors and selectors are installed by a regional Metrohm service representative. An injector or selector can be replaced with another injector or selector by a regional Metrohm service representative. If required, a suppressor rotor can be installed on the OMNIS Actuator Unit instead of an injector or selector (see *"Functional description", chapter 3.15.2, page 94*).

The OMNIS Actuator Unit requires a position in the OMNIS Extension Module. The OMNIS Actuator Unit can be installed in any position.

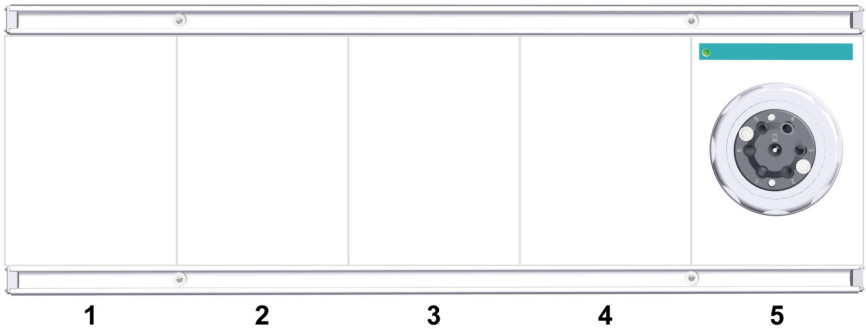


Figure 68 OMNIS Actuator Unit with injector 7/3 – Position 5

3.13 OMNIS Column Thermostat Unit

3.13.1 Overview

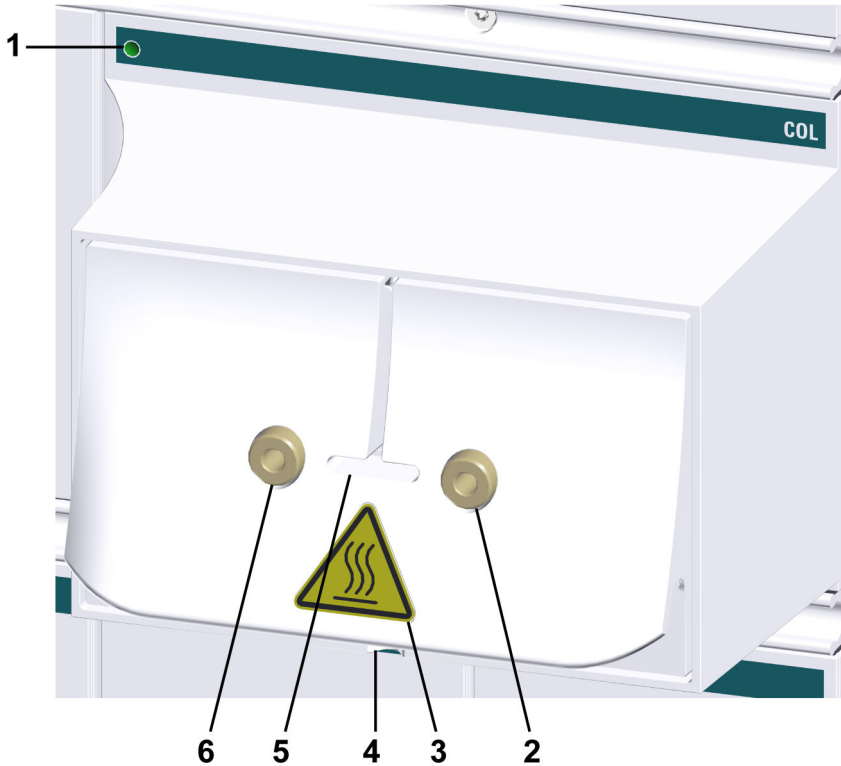


Figure 69 OMNIS Column Thermostat Unit – Front

- | | |
|--|---|
| 1 Status display
(see "System – Signals", chapter 3.1.3, page 25) | 2 Column thermostat inlet 1
with UNF-10/32 connector |
|--|---|

7 Separation column release
for removing the separation columns from the column tray

9 Column tray release
for removing the column tray from the column thermostat

8 Preheating cartridge positioning pins
for positioning the preheating cartridge
(71-7)

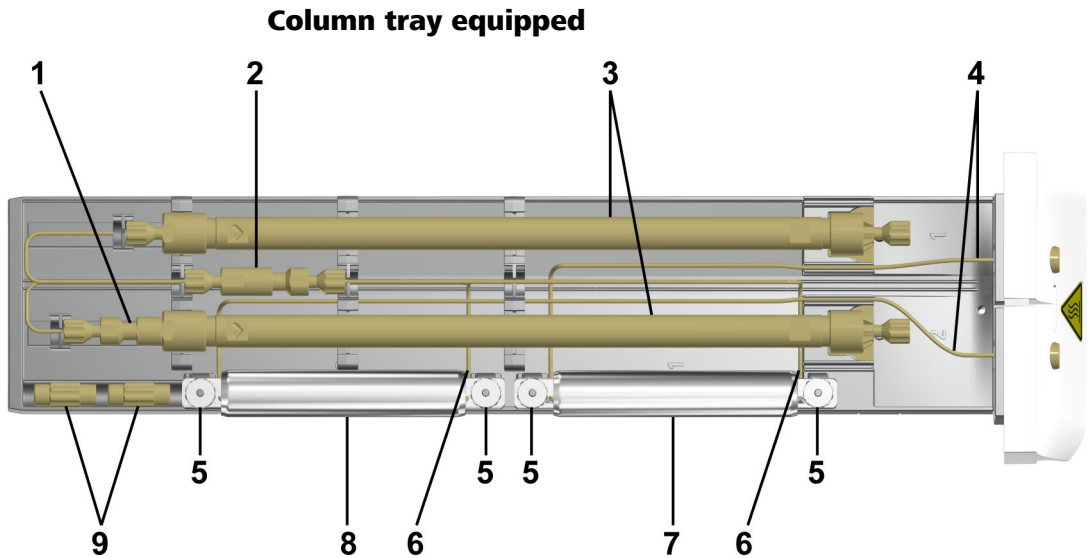


Figure 71 OMNIS Column Thermostat Unit 2 – Example of equipping

1 Guard column
installed at column position 2
Can be installed in column position 1 and/or column position 2 as required.

3 Separation column
installed in column position 1 and column position 2

5 Knurled nut M3, PC/PBT
for fastening the preheating cartridge
Both product versions are equipped with 4 knurled nuts.

7 Preheating cartridge 1

9 Coupling 2 x UNF 10/32
in storage position

2 S-Guard column
installed at column position 1
Can be installed in column position 1 and/or column position 2 as required.

4 Preheating cartridge inlet capillary
Connects the preheating cartridge to the corresponding column thermostat inlet.
Only product version 2.1056.0530 contains 2 preheating cartridges.

6 Preheating cartridge outlet capillary
Connects the preheating cartridge to the corresponding column inlet.
Only product version 2.1056.0530 contains 2 preheating cartridges.

8 Preheating cartridge 2
Available only in product version 2.1056.0530.

3.13.2 Functional description

The OMNIS Column Thermostat Unit serves as an intelligent column thermostat in the OMNIS IC System.

The column thermostat has a removable column tray. The columns are fastened to and stowed on the column tray. The column tray offers space for up to 2 separation columns with guard column and preheating cartridge.

The column thermostat regulates the temperature for the separation columns and the eluent, thereby providing stable measuring conditions. The column thermostat can both heat and cool. The eluent in the preheating cartridge is preheated or cooled to the defined temperature to avoid temperature fluctuations within the separation column.

The column thermostat supports a temperature range of 5 to 80 °C, depending on the ambient temperature and humidity. To absorb fluctuations in the ambient temperature, Metrohm recommends controlling the temperature of the column thermostat to 25 °C.

Only one temperature can be set at a time within a column thermostat. Multiple OMNIS Column Thermostat Units are required to temperature-control different columns to different temperatures simultaneously.

The column thermostat has 2 column holders with chip contacts for fastening the columns. The column is recognized by the OMNIS Software using the memory chip. In addition, data, such as the number of injections, is written to the memory chip and production data, such as the product number and the serial number, are read from the memory chip.

The column tray has a leak sensor. The leak sensor detects leaking liquids. The overflow drains any leaking liquids from the column thermostat.

The OMNIS Column Thermostat Unit requires 2 positions in the OMNIS Extension Module. The OMNIS Column Thermostat Unit can be mounted in positions 3 and 4 or 4 and 5. A maximum of one OMNIS Column Thermostat Unit can be installed on an OMNIS Extension Module.



Figure 72 OMNIS Column Thermostat Unit – Position 4 and 5

cartridges (see "OMNIS Column Thermostat Unit", chapter 1.2.12, page 9).

3.14 OMNIS Column Holder Unit

3.14.1 Overview

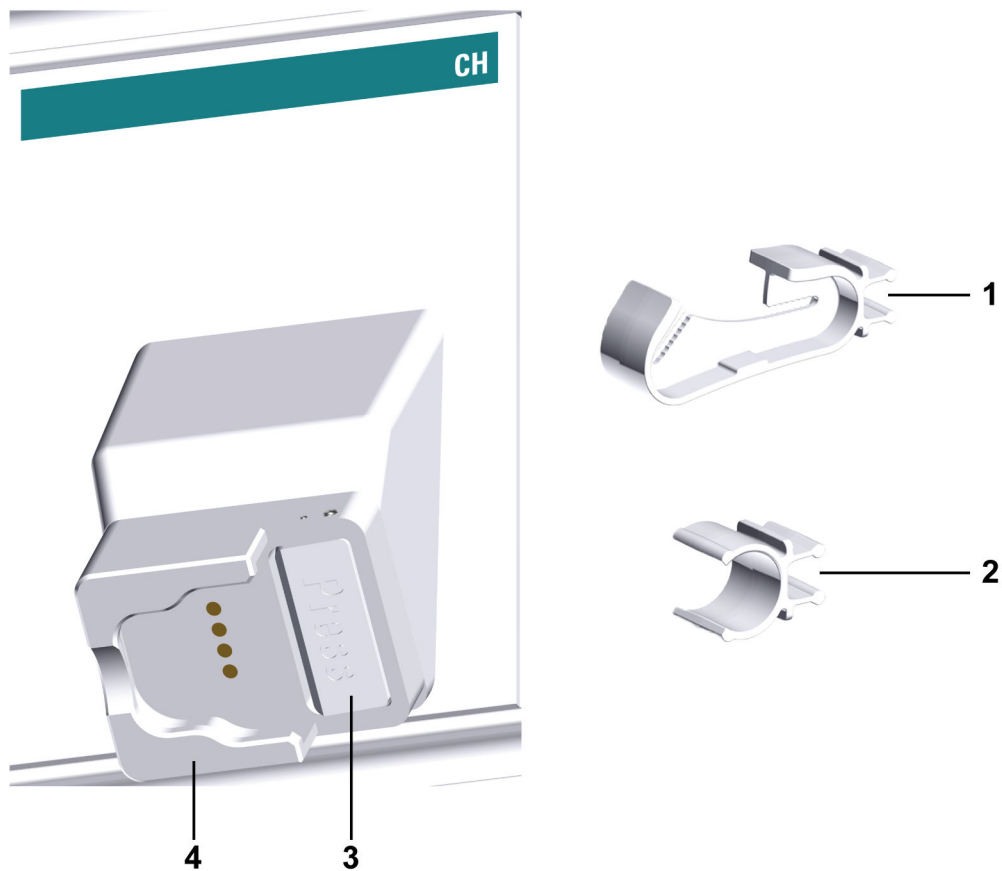


Figure 73 OMNIS Column Holder Unit with Clip – Overview

- | | |
|--|---|
| 1 Clip fixation bar, 2 x OD 1/16"
for supporting the rear end of the separation column and the guard column | 2 Clip 10 mm, fixation bar
for supporting the front end of an S-Guard column |
| 3 Separation column release
for removing the separation column | 4 Column holder with chip contacts |

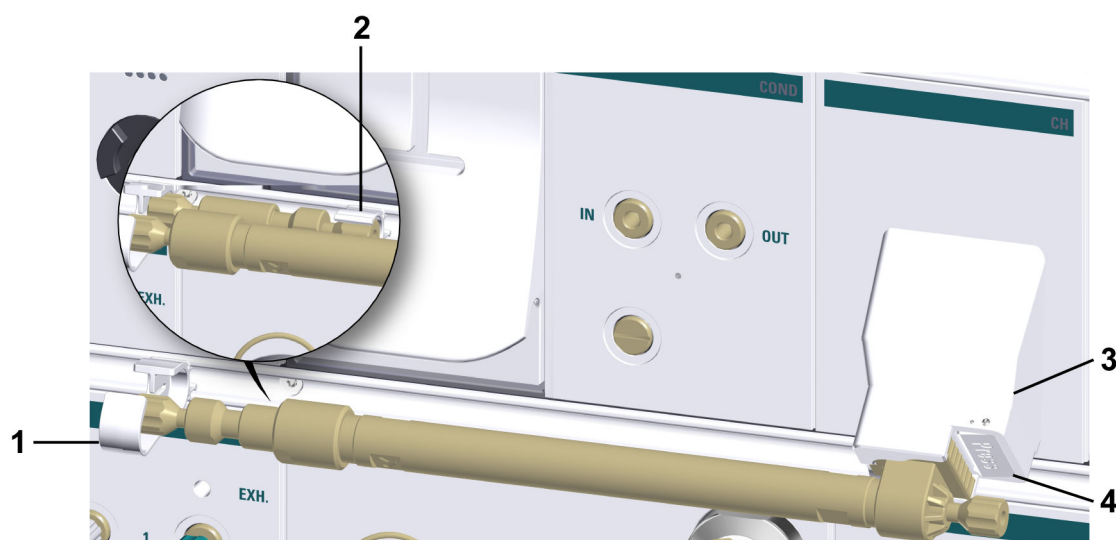


Figure 74 Equipped OMNIS Column Holder Unit – Example

- | | |
|---|--|
| 1 Clip fixation bar, 2 x OD 1/16" | 2 Clip 10 mm, fixation bar
Required only when using an S-Guard column. |
| 3 Column holder with chip contacts | 4 Separation column release |

3.14.2 Functional description

The OMNIS Column Holder Unit serves as an intelligent column holder in the OMNIS IC System.

A separation column with guard column can be fastened in place on the column holder.

The OMNIS Column Holder Unit has a column holder with chip contacts to fasten the column. The other end of the column is supported on a clip on the fixation bar. Using the column chip, the column is recognized by the OMNIS Software and data, such as the number of injections, is written to the column chip, and production data, such as the product number and serial number, is read from the column chip.

The OMNIS Column Holder Unit requires a position in the OMNIS Extension Module. The OMNIS Column Holder Unit can be installed only at position 5. A maximum of one OMNIS Column Holder Unit can be installed on an OMNIS Extension Module.

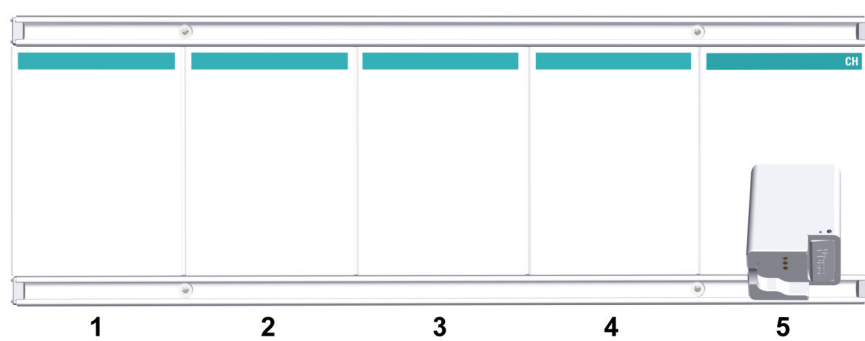


Figure 75 OMNIS Column Holder Unit – Position 5

3.15 OMNIS MSM Unit

3.15.1 Overview

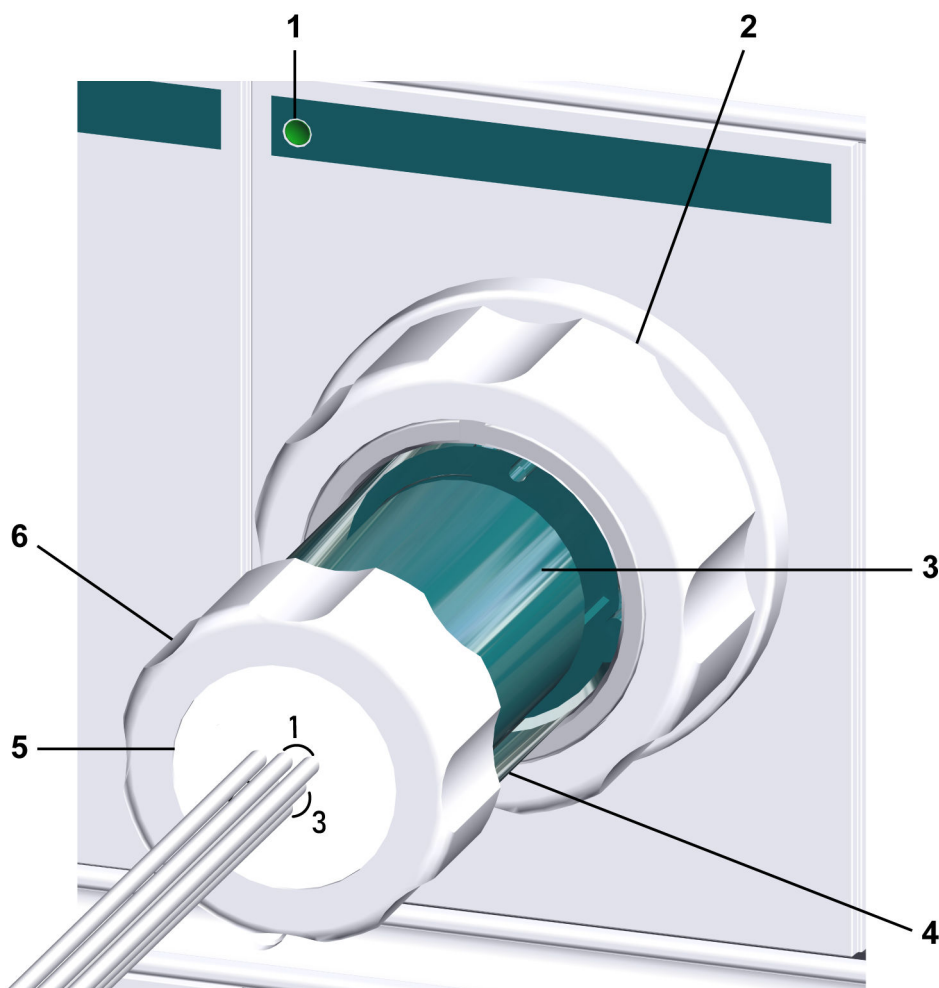


Figure 76 OMNIS MSM Unit – Front

- | | |
|---|---|
| <p>1 Status display
 <i>(see "System – Signals", chapter 3.1.3, page 25)</i></p> | <p>2 Coupling nut, Actuator Unit</p> |
| <p>3 Rotor housing</p> | <p>4 Inspection window
 on the underside of the rotor housing
 for leakage test and for ejecting the rotor</p> |
| <p>5 Connecting piece, OMNIS MSM/SPM
 with pre-installed capillaries</p> | <p>6 Coupling nut, connecting piece</p> |

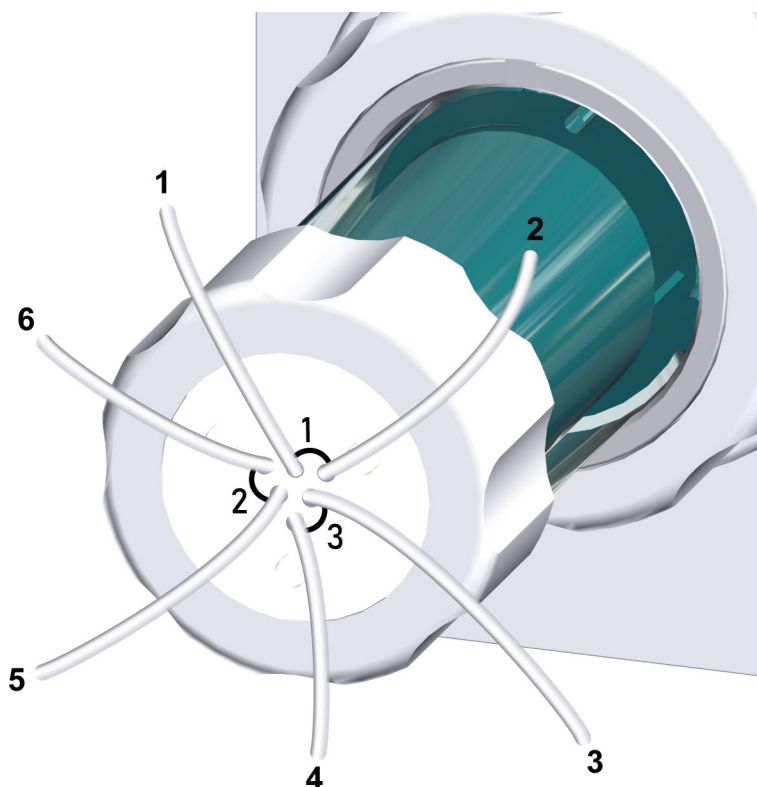


Figure 77 Metrohm Suppressor Module (MSM) – Capillaries

1 in Inlet capillary for the eluent	2 out Outlet capillary for the eluent
3 rinsing solution Inlet capillary for the rinsing solution	4 waste rins. Outlet capillary for the rinsing solution
5 waste reg. Outlet capillary for the regeneration solution	6 regenerant Inlet capillary for the regeneration solution

3.15.2 Functional description

Together with a suppressor rotor, the OMNIS MSM Unit forms a Metrohm Suppressor Module (MSM). The MSM serves as a chemical suppressor in the OMNIS IC System.

During chemical suppression, conductive components from the eluent are converted into components with low or no conductivity. This greatly reduces the background conductivity.

Each suppressor rotor consists of 3 suppressor units that run through the following processes in rotation:

1. Suppression
2. Regeneration with regeneration solution

3. Rinsing with ultrapure water or suppressed eluent

A freshly regenerated and rinsed suppressor unit is used for each injection.

The following suppressor rotors are compatible with the OMNIS MSM Unit:

- MSM Rotor A (6.2832.000)
- MSM-LC Rotor A (6.2844.000)
- MSM-HC Rotor A (6.2842.000)
- MSM-HC Rotor C (6.2842.200)

The MSM Rotor A and the MSM-LC Rotor A are installed in the rotor housing using the adapter sleeve, MSM (6.2842.020).

In addition to the suppressor rotors, an SPM rotor (Sample Preparation Module rotor) can be mounted on the OMNIS MSM Unit. In combination with an SPM rotor, the OMNIS MSM Unit is used for Metrohm Inline Neutralization. The pH value of strongly alkaline or acidic samples is neutralized to a pH value of 5 to 7.

The following SPM rotor is compatible with the OMNIS MSM Unit:

- SPM Rotor A (6.2835.000)

If required, an injector or selector can be installed on the OMNIS MSM Unit instead of a suppressor rotor ([see "Functional description", chapter 3.12.2, page 83](#)).

The OMNIS MSM Unit requires a position in the OMNIS Extension Module. The OMNIS MSM Unit can be installed in any position.



Figure 78 OMNIS MSM Unit – Position 2

3.16 OMNIS MCS Unit

3.16.1 Overview

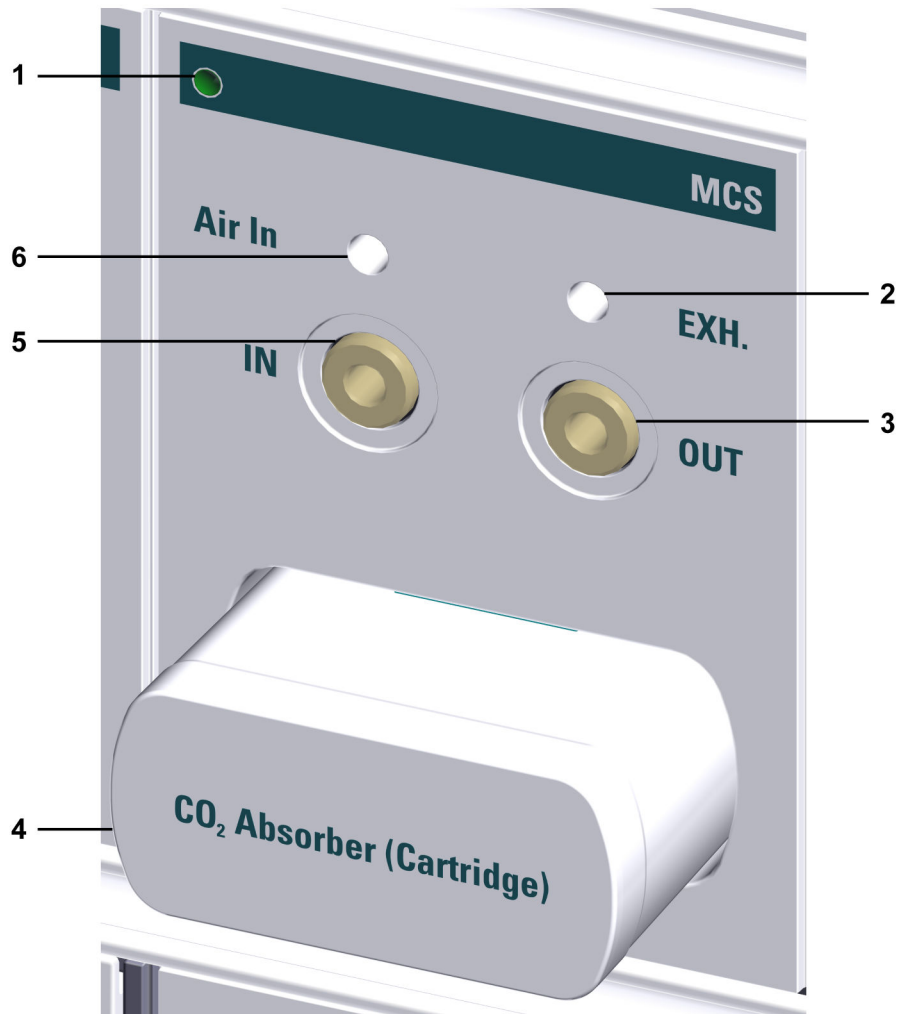


Figure 79 OMNIS MCS Unit – Front

1 Status display

(see "System – Signals", chapter 3.1.3, page 25)

3 MCS outlet

with UNF-10/32 connector

5 MCS inlet

with UNF-10/32 connector

2 Exhaust opening

Exhaust air is automatically discharged via this outlet.

Never close the exhaust opening.

4 CO₂ Absorber (cartridge)

6 Air inlet

Air inlet in operation

Service access in service case

Never close the air inlet.

3.16.2 Functional description

The OMNIS MCS Unit serves as a CO₂ suppressor in the OMNIS IC System.

The Metrohm CO₂ Suppressor (MCS) removes CO₂ from the eluent flow. This lowers the background conductivity and reduces the baseline noise, which improves detection sensitivity. The system peak is minimized.

In the MCS, the eluent flows through a capillary with a membrane. This capillary is permeable to gases. At the same time, a vacuum pump generates a vacuum. The vacuum causes a pressure difference and a difference in concentration outside the capillary compared to the inside of the capillary. This causes the CO₂ in the eluent flow to diffuse out of the capillary. To remove the CO₂ from the MCS, a constant air flow is drawn through the air inlet. The air is guided through the CO₂ Absorber (Cartridge) to filter out the CO₂ from the air. The exhaust air is discharged through the exhaust opening.

The MCS is available in 2 versions ([see "OMNIS MCS Unit", chapter 1.2.15, page 11](#)):

- **OMNIS MCS Unit**

The MCS degassing chamber used is optimized for OMNIS IC systems with 4 mm columns.

- **OMNIS MCS MB Unit**

Compared to the OMNIS MCS Unit, the MCS degassing chamber used has a smaller dead volume. This optimizes the OMNIS MCS MB Unit for OMNIS IC systems with 2 mm columns.

The OMNIS MCS Unit requires a position in the OMNIS Extension Module. The OMNIS MCS Unit can be installed in any position.

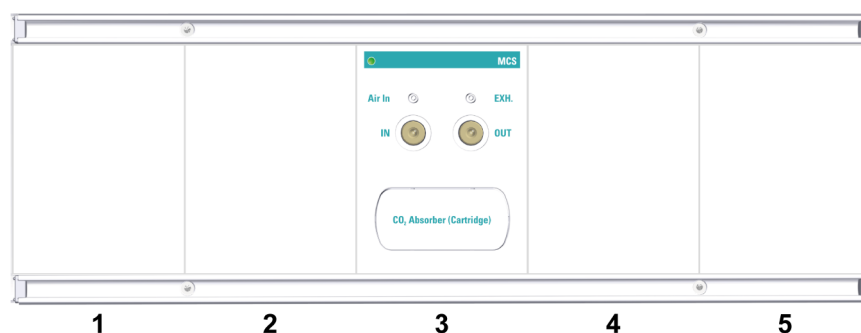


Figure 80 OMNIS MCS Unit – Position 3

3.17 OMNIS Conductivity Detector Unit

3.17.1 Overview

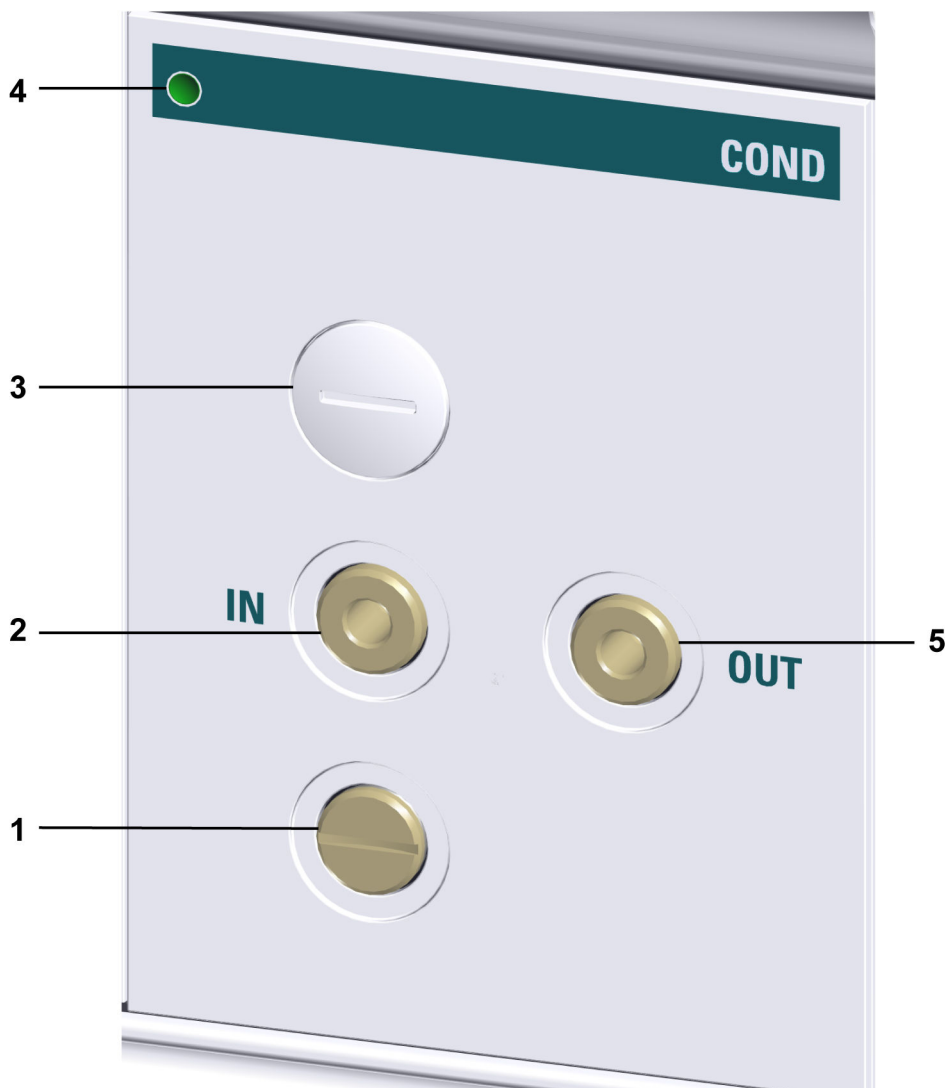


Figure 81 OMNIS Conductivity Detector Unit – Front

1 Service access for temperature control

Do not use this access.

3 Service access for start-up

Do not use this access.

5 Detector outlet

with UNF-10/32 connector

2 Detector inlet

with UNF-10/32 connector

4 Status display

(see "System – Signals", chapter 3.1.3, page 25)

3.17.2 Functional description

The OMNIS Conductivity Detector Unit serves as a conductivity detector in the OMNIS IC System.

The conductivity detector continuously measures the conductivity of the pumped liquid. The sample is separated into its ionic components in the separation column. The sample then flows through the conductivity detector. The separated ions generate a change in the measurement signal in the conductivity detector compared to the baseline. This manifests itself in the form of evaluable peaks in the chromatogram.

The conductivity change depends on the type and concentration of the electrolyte and on the sample volume applied.

Low baseline noise enables low limits of detection and therefore more precise measurements. The conductivity detector exhibits high thermal stability and thus guarantees reproducible measuring conditions.

The OMNIS Conductivity Detector Unit requires a position in the OMNIS Extension Module. The OMNIS Conductivity Detector Unit can be installed in positions 3 or 4. Up to 2 OMNIS Conductivity Detector Units can be installed per OMNIS Extension Module. Up to 4 OMNIS Conductivity Detector Units can be operated simultaneously in an OMNIS IC System.

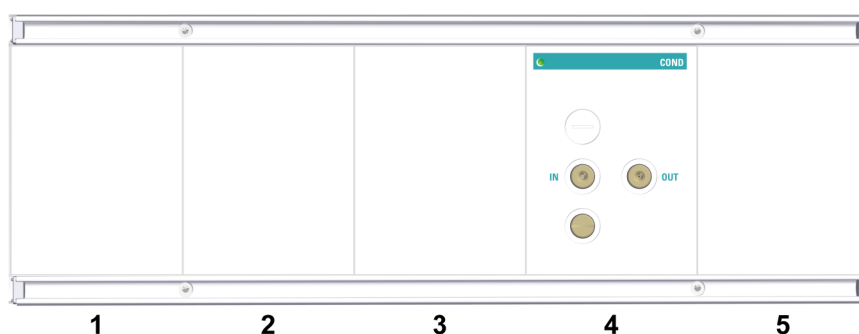


Figure 82 OMNIS Conductivity Detector Unit – Position 4

3.18 OMNIS Multi Flow Monitor Unit

3.18.1 Overview

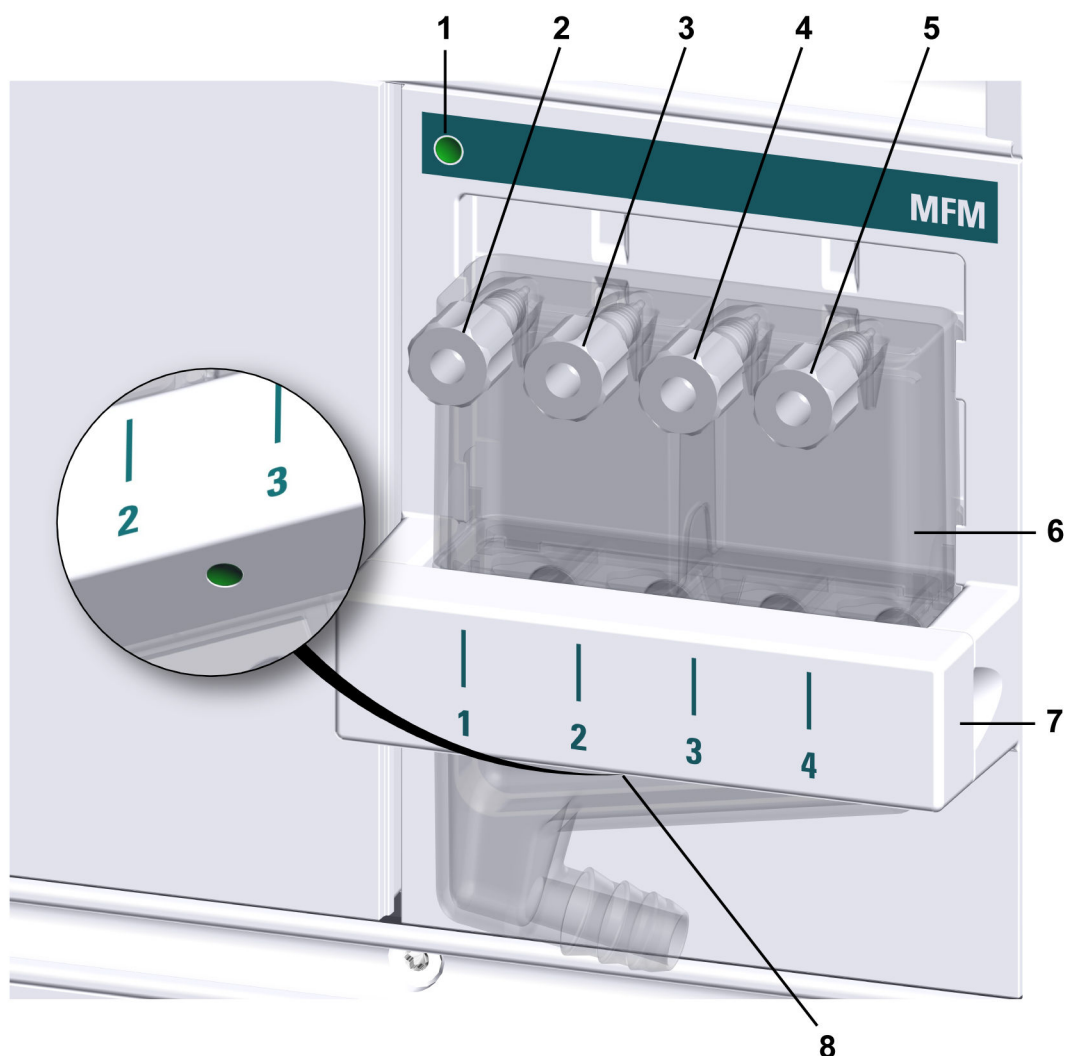


Figure 83 OMNIS Multi Flow Monitor Unit – Front

1 Status display

(see "System – Signals", chapter 3.1.3, page 25)

Only the 2.1056.0910 product version contains a status display.

2 MFM inlet 1

UNF-10/32 connector, with PVDF pressure screw

Standard assignment: Eluent drain 1 (e.g., anion eluent)

- | | |
|---|---|
| <p>3 MFM inlet 2
UNF-10/32 connector, with PVDF pressure screw
Standard assignment: Reagent drain</p> | <p>4 MFM inlet 3
UNF-10/32 connector, with PVDF pressure screw
Standard assignment: Sample drain</p> |
| <p>5 MFM inlet 4
UNF-10/32 connectors, with PVDF pressure screws
Standard assignment: Eluent drain 2 (e.g., cation eluent)</p> | <p>6 Waste collector
for the collection and drain of draining liquids</p> |
| <p>7 MFM sensor bar
with light barrier
Only the 2.1056.0910 product version contains an MFM sensor bar.</p> | <p>8 MFM sensor bar status display
<i>(see "System – Signals", chapter 3.1.3, page 25)</i>
Only the 2.1056.0910 product version contains an MFM sensor bar status display.</p> |

3.18.2 Functional description

The OMNIS Multi Flow Monitor Unit is used for flow monitoring in the OMNIS IC System. The waste collector integrated into the OMNIS Multi Flow Monitor Unit collects draining liquids and discharges them into the drainage system.

The Multi Flow Monitor (MFM) monitors the flow rates in the OMNIS IC system. A comparison between the reference value and the current actual value is carried out, which results in a trend analysis. If the Multi Flow Monitor detects a trend change, then a message will appear in the OMNIS Software. If measures have been defined in the OMNIS Software in the event of a trend change, then the OMNIS IC System will execute them.

 The OMNIS Multi Flow Monitor Unit is designed for operation in a stable, non-vibrating environment. If the Multi Flow Monitor is used in a location vulnerable to shocks (e.g., on a ship or in an aircraft), then its functionality may be impaired by the vibrations. This can lead to distorted measurement results.

Constant monitoring of the flow rate helps to ensure the smooth operation of the entire OMNIS IC System. Changes in the flow rate indicate a functional disruption in the OMNIS IC System. For example, defective or worn parts can cause changes in the flow rate:

- *Worn pump tubing*

After prolonged use, the pump tubing of the peristaltic pump loses flexibility. This reduces the flow rate. If the peristaltic pump is used to deliver a sample substance, then reliable delivery of the defined volume is essential for accurate analysis. If the sample is pumped with a worn pump tubing, then there may be too little sample volume in the sample loop. This can distort the analysis.

If the Multi Flow Monitor detects changes in the flow rate of the respective peristaltic pump, then a message will appear in the OMNIS Software and the pump tubing can be replaced in good time.

- Contaminated filtration membrane

Ultrafiltration technology is used to filter samples with a high particle content. The filtration membrane retains particles before they can enter the sample path. The filtration membrane may become blocked after prolonged use. As a result, not enough sample substance enters the sample path and the analysis may be distorted.

If the Multi Flow Monitor detects a change in the flow rate of the sample path, then a message will appear in the OMNIS Software and the filtration membrane can be replaced in good time.

The liquids drained by the OMNIS IC System flow through up to 4 channels into the waste collector integrated in the Multi Flow Monitor. From there, the liquids are fed into the drain tubing. The flow rate of each channel can be monitored individually and independently of the other channels.

The 4 channels are used as follows:

- 1. Eluent drain 1 (e.g., anion eluent)
- 2. Reagent drain
- 3. Sample drain
- 4. Eluent drain 2 (e.g., cation eluent)

If more than 4 channels are routed into the drainage system, then an OMNIS Waste Collector Unit can also be installed. 4 additional channels are provided with the OMNIS Waste Collector Unit. Automated flow monitoring is not possible. Alternatively, an additional waste collector can be installed on the reagent organizer (*see "Reagent Organizer", chapter 3.4, page 35*). Automatic flow monitoring is not possible with the waste collector on the reagent organizer.

The OMNIS Multi Flow Monitor Unit requires a position in the OMNIS Extension Module. The OMNIS Multi Flow Monitor Unit is mounted in position 5.



5 Installation

5.1 Installation by Metrohm

i Installation of the OMNIS IC System

The assembly of the OMNIS IC System as well as the subsequent addition of modules and functional units is handled by trained and instructed specialists from the Metrohm Company and/or its representative.

The installation of the flow path, the installation of accessory parts and certain maintenance work may be executed by the user himself.

The flow path depends on various factors, such as the application to be performed and the existing functional units. There is no standard flow path. In this chapter, a possible flow path is described as an example.

For the product versions of the OMNIS IC (*see "Product versions", chapter 1.2, page 1*), the eluent path is already installed upon delivery. In the case of an individually configured OMNIS IC, the eluent path must be installed by the user or a regional Metrohm service representative during start-up.

Setup configurations

There are several setup configurations for an OMNIS IC System:

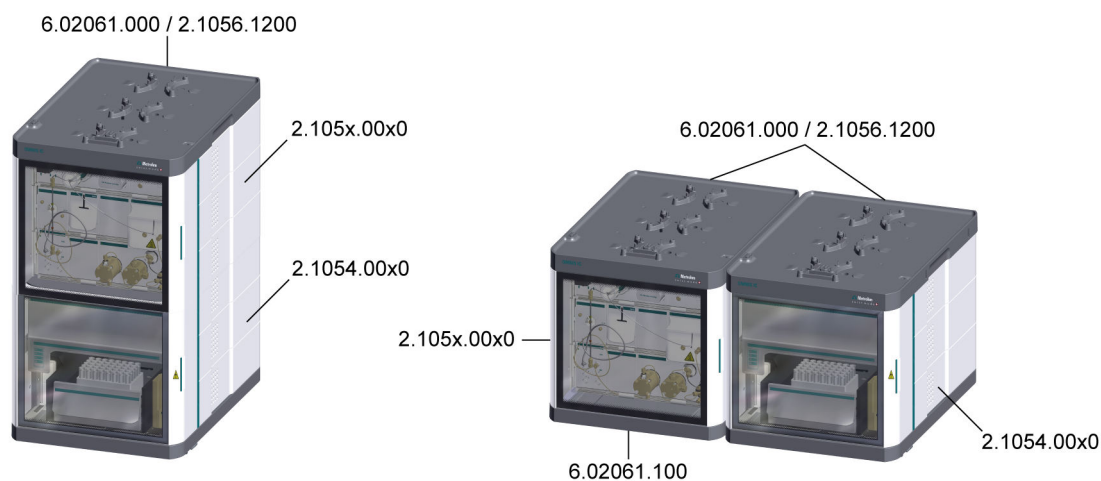


Figure 85 OMNIS IC System – One-tower setup and two-tower setup

One-tower setup



WARNING

Risk of injury from falling instrument

If the maximum height allowed is exceeded, then the stable status of the OMNIS IC System is not guaranteed.

- If the number of extension modules used exceeds the maximum permitted height of the one-tower setup, then the OMNIS IC System must be set up as a two-tower setup.

By default, an OMNIS IC System is installed in the one-tower setup. The following **maximum heights** apply for the OMNIS IC System in the one-tower setup:

Autosampler used	Max. number of main modules	Max. number of extension modules
OMNIS IC Autosampler Module	1	4
OMNIS IC Autosampler Module COOL	1	3

Two-tower setup

If the OMNIS IC System is set up in 2 towers, then the OMNIS IC must be equipped with a base plate and the autosampler with a reagent organizer. To do this, the *OMNIS IC equipment: Two-tower setup* (6.05332.120) must also be ordered.

The equipment kit contains the following parts:

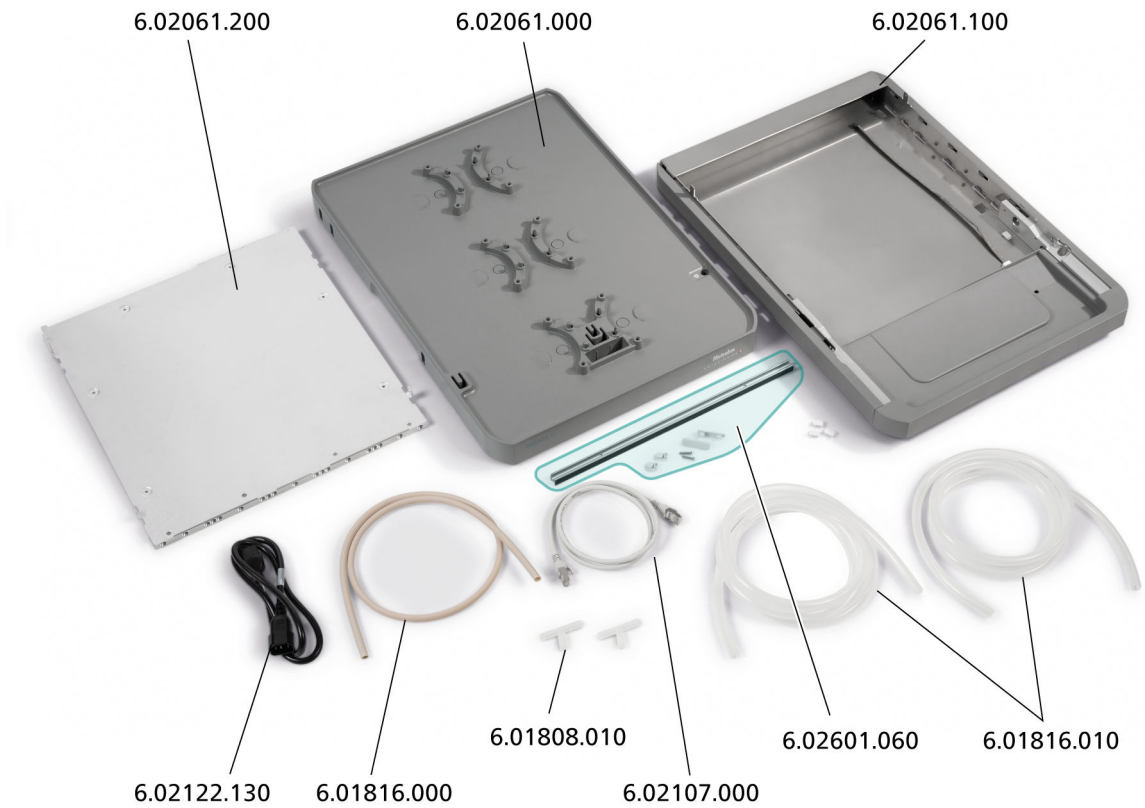


Figure 86 OMNIS IC equipment: Two-tower setup – Parts

Table 24 Parts of the OMNIS IC equipment: Two-tower setup (6.05332.120)

Article number	Product name	Number
6.02061.200	End plate, Extension/AS	1
6.02061.000	Reagent organizer	1
6.02061.100	Base plate	1
6.01816.010	Silicone tubing, 8/12 mm, 2 m	2
6.02601.060	Fixation bar, Extension	1
6.02107.000	Network cable, 1 m	1
6.01808.010	Y tubing connector, PP, 3 x 7-8 mm	2
6.01816.000	Silicone tubing, 7/9 mm, 1 m	1
6.02122.130	Power cord, C13/C14, 1 m	1

Additional OMNIS IC

If an additional OMNIS IC is integrated as a separate tower into an existing OMNIS IC System, then the *OMNIS IC equipment: Base plate kit* (6.05332.060) must also be ordered.



The equipment kit contains the following parts:



Figure 87 OMNIS IC equipment: Base plate – Parts

Table 25 Parts of the OMNIS IC equipment: Base plate (6.05332.060)

Article number	Product name	Number
6.02061.100	Base plate	1
6.01816.000	Tubing, 7/9 mm, 1 m	1
6.01816.010	Silicone tubing, 8/12 mm, 2 m	2
6.01808.020	L tubing connector, PP, 2 x 7–8 mm	1
6.02107.000	Network cable, 1 m	1
6.02122.130	Power cord, C13/C14, 1 m	1

 A backing up of liquid in the tubing can trigger the leak sensor. The tubing must therefore not sag and must be installed vertically on the container (see ["Connecting the drain tubing", page 129](#)).

i The silicone tubing, 7/9 mm, 1 m (6.01816.000) must be cut to the appropriate length. The remaining pieces are used to connect the Y pieces with the T connectors of the 10 L container. The runs of the OMNIS IC and the autosampler, in addition to those of their leak sensors are connected.

i Metrohm recommends setting up the module with the OMNIS IC on the left side for the two-tower setup. This makes the main switch more accessible on the rear. The doors of the modules can be mounted in such a way that the left module can be opened to the left and the right-hand module to the right.

5.2 Setup location

The product is suitable only for operation indoors and may not be used in explosive environments.

The following requirements apply to the setup location:

- The room is well-ventilated and protected against both direct sunlight and excessive temperature fluctuations.
- The setup space is stable and free of vibrations. The setup space must be suitable for the dimensions and weight of the components (see technical specifications).
- All cables and connectors are accessible during operation. The cables are safely installed (no tripping hazards).
- The workplace is ergonomically designed and ensures trouble-free operation of the product.

5.3 Guide system

The OMNIS IC System has a system for supplying auxiliary solutions (feeding system) and for removing waste (drainage tubing system).

On the vertical plane, the guide system runs from the top of the reagent organizer on both sides of the instrument down to the base plate. The guide system branches off at each module. Tubing and capillaries can be diverted along the module to the horizontal plane. On the horizontal plane, the guide system runs through a fixation bar to each functional unit.

The feeding system consists of all capillaries and tubing that lead from the reagent organizer on the left side of the instrument to a functional unit.

The drainage tubing system consists of capillaries, tubing, and a drain tubing. Waste from each module is fed into the drain tubing. The drain

tubing runs along the right side of the instrument from the reagent organizer to the base plate. The base plate has drain for removing waste.

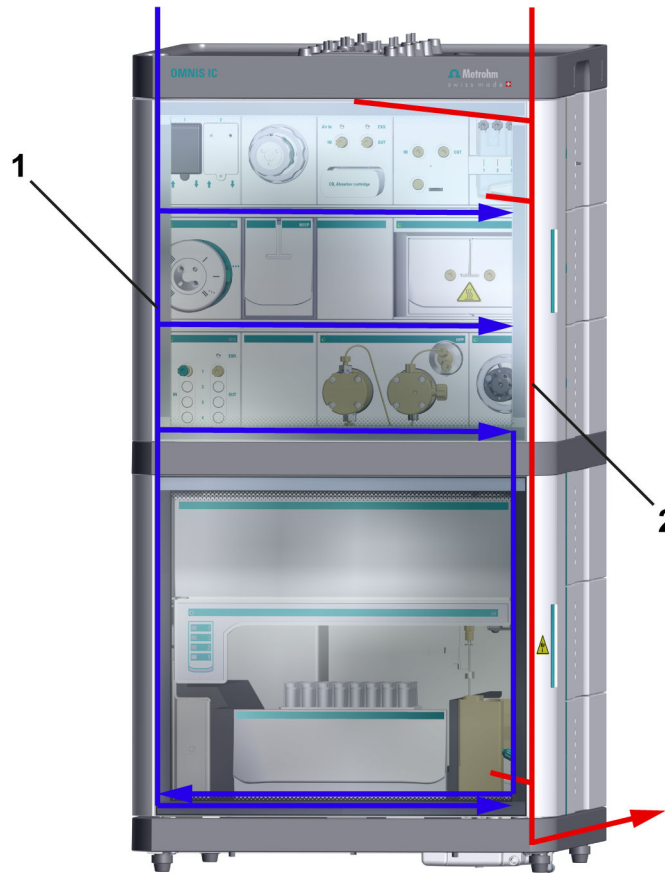


Figure 88 OMNIS IC System – Guide system

- 1 Feeding system (blue)** **2 Drainage tubing system (red)**

OMNIS IC

There is one fixation bar each at the top and bottom of each module. For greater clarity, the capillaries and tubing can be attached to the fixation bars using clips (6.02027.040).

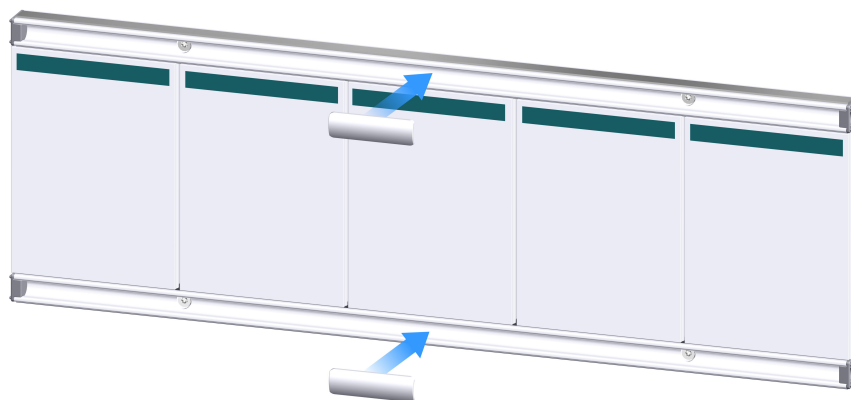


Figure 89 Attach clips to the fixation bar

The capillaries can also be bundled together using a spiral band (6.01815.000).

Capillaries can be fed into the sample compartment of the autosampler on both sides of the instrument through a guide channel. Feed capillaries are routed on the left side. The drain tubing runs into the sample compartment on the right side.

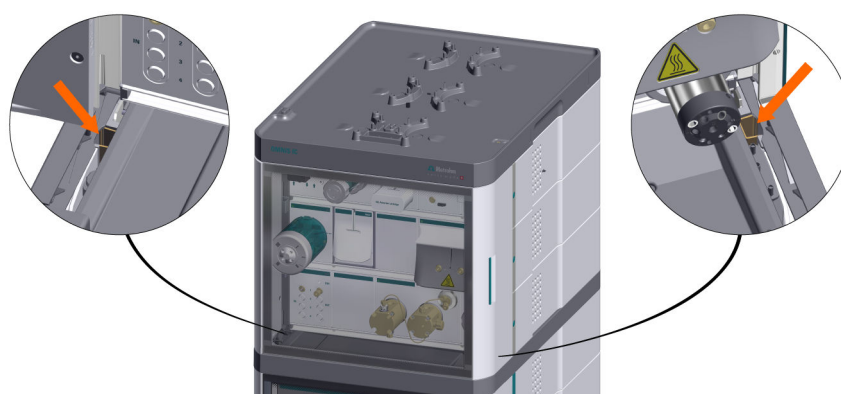


Figure 90 Guide channel on the left and guide channel on the right (colored orange)

There are openings in the modules on both sides of the instrument. Capillaries can be inserted into or removed from the instrument through these openings as required. The dummy cover can be pushed out of the module from the inside of the instrument.

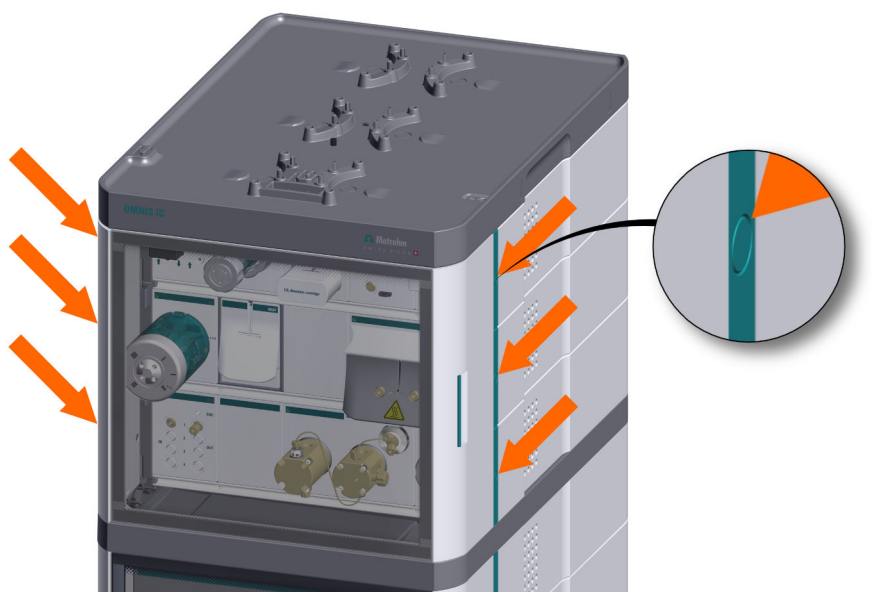


Figure 91 Capillary feed-throughs on the side of the instrument

OMNIS IC Autosampler Module

A guide channel (see figure 90, page 111) exists on each of the 2 sides of the instrument that connects the sample compartment of the autosampler with the interior of the OMNIS IC. The sample needle capillary and the drain tubing run through the guide channel on the right. Capillary connections lead through the left guide channel to the switching valves 3/2 and the dilution station. The capillary connections to the rinse station also run through the left guide channel.

Below the OMNIS IC AS Tray (35-4) is a fixation bar to which horizontal capillaries can be attached with clips.

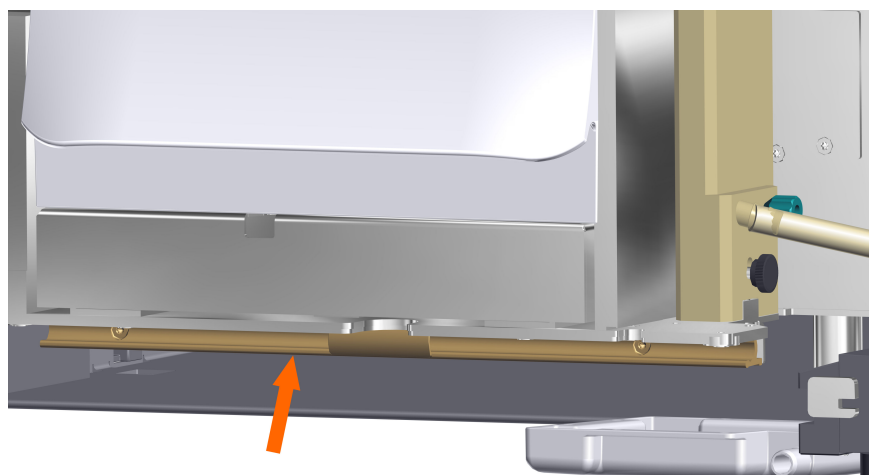


Figure 92 Fixation bar (colored orange) with clip – View without drip collector, base plate

OMNIS IC Autosampler Module COOL

The interior of the OMNIS IC Autosampler Module COOL is insulated to optimize cooling performance. The guide channels run through the insulation as shown in [Figure 93](#).

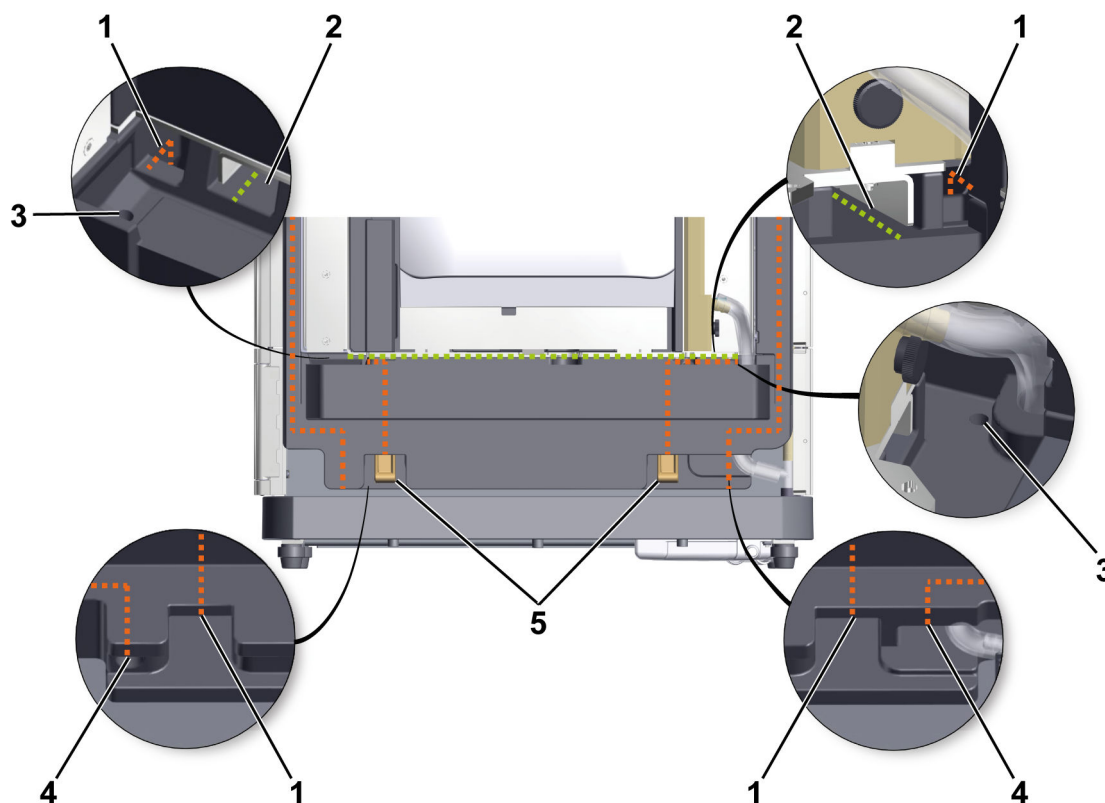


Figure 93 OMNIS IC Autosampler COOL Module – Guide system overview

- | | |
|---|--|
| <p>1 Inner vertical guide channel
Guides the capillary into or out of the sample compartment.</p> | <p>2 Horizontal guide channel
Guides the capillary along the guide channel below the sample compartment.</p> |
| <p>3 Drain
Guides spilled liquids from the sample compartment to the base plate and to the leak detector.</p> | <p>4 Outer vertical guide channel
Guides the capillary from the OMNIS IC Autosampler COOL back to the OMNIS IC.</p> |
| <p>5 Stopper (colored orange)
Closes the inner vertical guide channel to seal the sample compartment off from the ambient air.</p> | |

The guide channels are located on both sides of the instrument. With the help of the inner vertical guide channel, capillaries and tubing can be laid in the direction of the base plate ([93-1](#)). The horizontal guide

There are 2 guide channels below the sample compartment. The inner vertical guide channel (93-1) guides capillaries to the sample compartment. The outer vertical guide channel (93-4) leads capillaries to the OMNIS IC.

114 ■■■■■■

5.3.1 Capillary connections in the OMNIS IC System

Capillary connections between 2 components in the OMNIS IC System generally consist of one connection capillary and 2 pressure screws with which the capillary is connected to the respective functional units.

Pressure screws

3 types of pressure screws are used in the OMNIS IC System:

Number	Designation	Use
6.2744.014	Pressure screw	at the injector
6.2744.070	Pressure screw, short	in the entire OMNIS IC System, other than the injector, waste collector, and ultrafiltration cell
6.2744.000	Pressure screw PVDF	at the waste collector and on the ultrafiltration cell

In the high-pressure section, pressure screws are tightened and loosened with the wrench (6.2739.000) for pressure screws. In the low-pressure section, pressure screws are tightened and loosened by hand.

Also see: *PEEK pressure screws 1x1* video on the Internet at <http://ic-help.metrohm.com>.

Connection capillaries and connection tubing

PEEK capillaries, PTFE capillaries, and FEP tubing are used in the OMNIS IC System:

- *PEEK capillaries*
PEEK capillaries are pressure-stable up to 400 bar (depending on the inner diameter), flexible, chemically inert, and have an extremely smooth surface.
- *PTFE capillaries*
PTFE capillaries are transparent and enable visual tracing of the liquids to be conveyed. They are chemically inert, flexible and temperature-resistant up to 80 °C.
- *FEP tubing*
FEP tubing is transparent and enables visual tracing of the liquids to be conveyed. FEP tubing is chemically inert and flexible. It has a larger inner diameter than capillaries, which means that larger liquid volumes can be conveyed faster.

All capillaries and tubing can be cut to the desired length with the capillary cutter (6.2621.080).

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

The scope of delivery of the OMNIS IC sales versions contains capillaries and tubing tailored to and labeled for the respective system. The label shows which functional units the capillary or the tubing connect, e.g., *IN/* - *COL* (*see "Connecting functional units", chapter 5.15, page 262*).

A custom-cut capillary or a custom-cut tubing is not available for all connections. For these connections, the capillaries and tubing can be cut to size using the capillary cutter (6.2621.080).

 For a better overview, the capillaries and tubing can be bundled with a spiral band (6.01815.000).

Capillary connections in a 2-channel system

If an OMNIS IC L System is used as a 2-channel system, then Metrohm recommends installing the analysis channels as follows:

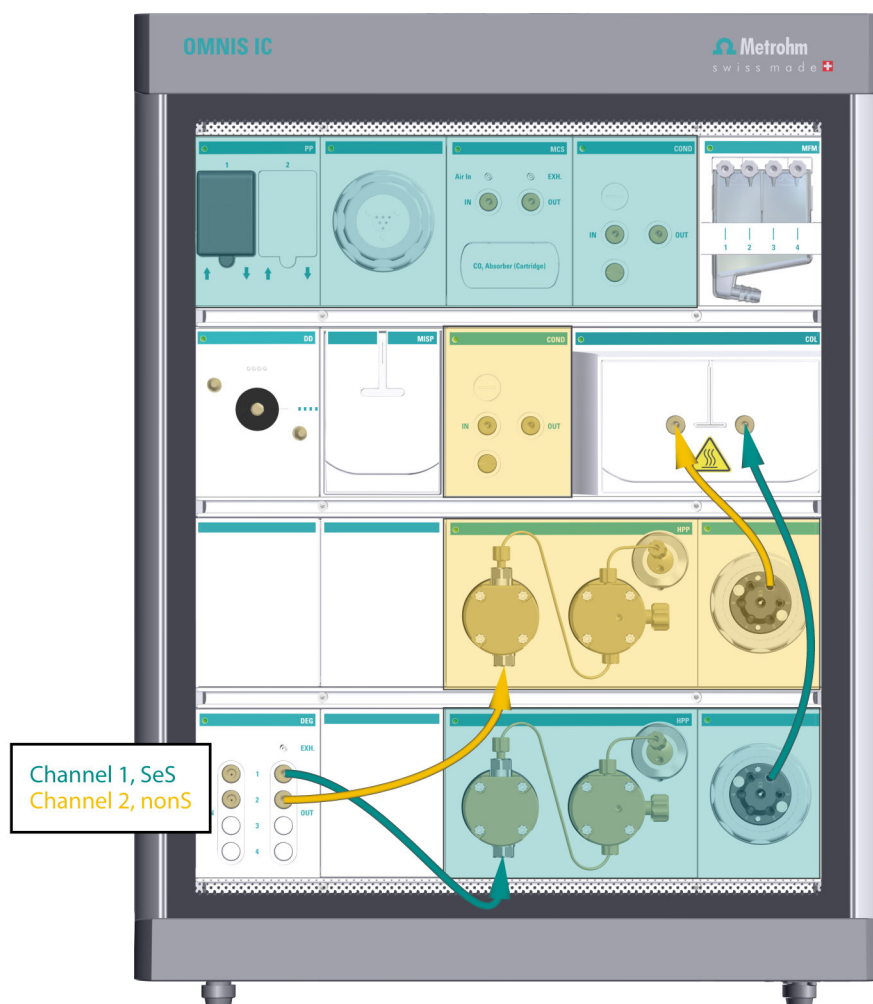


Figure 94 2-channel system – Installation recommendation

Detailed installation instructions of the eluent path are described in chapter [Connecting functional units](#).

5.3.2 Connecting the capillaries



WARNING

Risk of injury caused by capillaries slipping out

Capillaries that slip out of the pressure screws can cause injuries to the eyes.

- Wear protective glasses.

For optimum analysis results, the capillary connections in the system must be absolutely tight and free of dead volume. Dead volume can have 2 causes:

- *The cut surfaces of the capillary ends are not flat.*
One prerequisite for dead-volume-free capillary connection is that both capillary ends are cut exactly flat. To cut PEEK capillaries flat, use the capillary cutter (6.2621.080).
- *The capillaries are mounted incorrectly.*
The capillary does not hit the stop in the connecting piece.

Creating dead-volume-free capillary connections

Required accessories:

- Lint-free cloth, moistened with acetone
- Pressure screws ([see "Pressure screws", page 115](#))
- Capillary
- Wrench (6.2739.000) for pressure screws for connections in the high-pressure section

- 1** Wipe the capillary end with the moistened cloth.
- 2** Slide the pressure screw over the capillary. The capillary must protrude 1 to 2 mm from the pressure screw at the tip of the pressure screw.
- 3** Screw the pressure screw with the capillary slightly into the coupling or the connector. Do not tighten the pressure screw yet.
- 4** Push the capillary into the connector or coupling **as far as it will go** and hold it there.
- 5** Close the pressure screw. Hold the capillary in the stop position while turning it shut.

5.3.3 Connecting the tubings

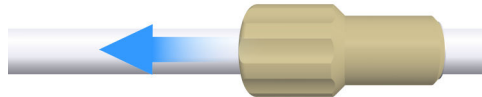
Preparing the FEP tubing

Required accessories:

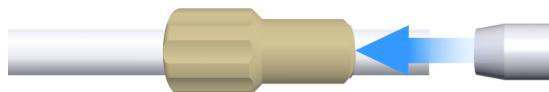
- FEP tubing M6, 1/8" x 1.59 mm, 3 m (6.01805.400)
- 2 x flangeless fitting M6, 1/8" (6.02744.010), consisting of:
 - 2 x M6 adapter
 - 2 x ferrule
- Capillary cutter (6.2621.080)

! Particular care must be taken to ensure that no wrench (6.2739.000) is to be used while tightening the screw connection when connecting an FEP tubing with a ferrule made of PVDF. When using a wrench, the ferrule and the screw become jammed. The tubing also twists when unscrewing. Therefore, both parts must be bolted manually.

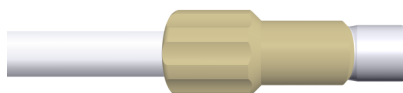
- 1 Cut the FEP tubing to the desired length using the capillary cutter.
- 2 The M6 adapter has one end with a thread and one end with an opening for the FEP tubing. Slide the M6 adapter over the FEP tubing, with the opening for the FEP tubing first.



- 3** The ferrule is conical. Push the ferrule, with the narrow end first, over the FEP tubing as far as it will go.



- 4** To create a dead-volume-free connection, slide the M6 adapter onto the ferrule as far as it will go. There must be no distance between the M6 adapter and the ferrule.



The FEP tubing is prepared. The M6 adapter can now be screwed to a connector with a suitable inner thread.

- 5** Repeat Steps 2 - 4 for the other side of the FEP tubing.

5.3.4 Installing the drainage tubing system

The drain tubing in the interior of the OMNIS IC System is partially pre-installed. To install the drainage tubing system completely, execute the following work steps:

- If a waste collector is used, then install the waste collector in the reagent organizer (*see "Installing the waste collector", chapter 5.3.4.1, page 119*)
- Set up a container as a waste collector
 - without volume monitoring *see page 124*
 - with volume monitoring *see page 126*
- Connect the drain tubing (*see "Connecting the drain tubing", chapter 5.3.4.3, page 128*)

5.3.4.1 Installing the waste collector

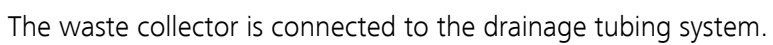
The waste collector on the OMNIS Multi Flow Monitor Unit is already installed at the time of delivery and connected to the drainage tubing system.

If necessary, an additional waste collector can be installed on the reagent organizer. If a waste collector is used on the reagent organizer, then the waste collector must be inserted and connected to the drainage tubing system.

Installing the waste collector

Required accessories:

- Waste collector, 4x UNF 10/32 (6.02765.000)



5.3.4.2 Setting up the waste canister

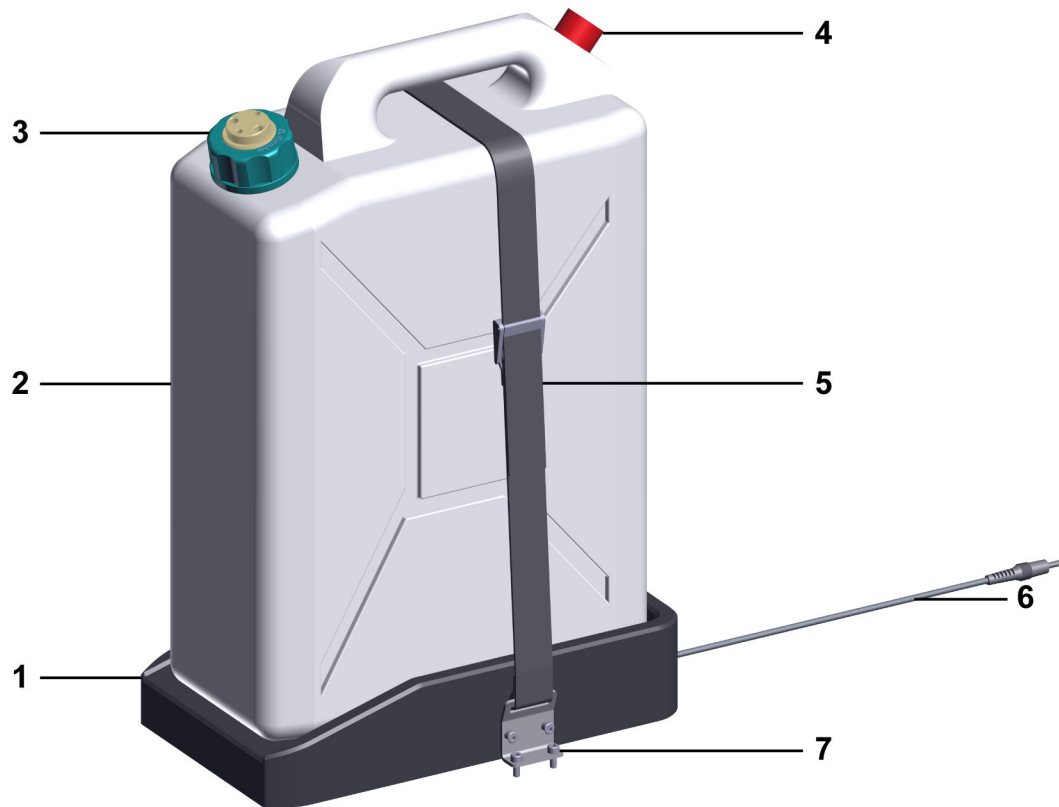


Figure 95 Volume sensor holder with container – Overview

1	Volume sensor holder, 10 L container¹	2	Container, 10 L
3	Bottle cap S 40, 2x M6, UNF 10/32¹ Has 2 M6 connectors, 1 UNF connector, and 1 Luer connector. Needed only if the container is used as a supply vessel (see "Connecting the container", chapter 5.14.4, page 259).	4	Drain tubing connector Connection to the drainage tubing system (see "OMNIS IC – Functional description", chapter 3.1.2, page 24).
5	Safety strap¹ Secures the container in the volume sensor holder.	6	Sensor cable St/St, 3 m¹
7	Table lock¹ To protect against shocks, tighten the volume sensor holder on a table with the table lock.		

¹ Included only in the *OMNIS IC equipment: LC 10 L container kit* (6.05332.000).

10 L containers can be used as waste collectors in an OMNIS IC System. As soon as the container is full, it can be easily emptied with the spout lid provided. The containers are available either with or without automated volume monitoring.

i If the container needs to be emptied, remove the drain tubing connector and the connected drain tubing. This means that the drain tubing does not have to be removed individually.

▪ **Container without volume monitoring**

The *OMNIS IC equipment: 10 L container, drain* contains a 10 L container for collecting waste without volume monitoring. The container cannot be linked with the OMNIS Software. The fill level must be monitored visually.



Figure 96 OMNIS IC equipment: 10 L container, drain – Parts

Table 26 Parts of the OMNIS IC equipment: 10 L container, drain (6.05332.010)

Article number	Product name	Number
6.1621.000	Container, 10 L	1
6.01808.000	Drain tubing connector, PP, 2 x 7–8 mm	1

Setting up the container without volume monitoring

 CAUTION

Risk of injury due to hazardous substances

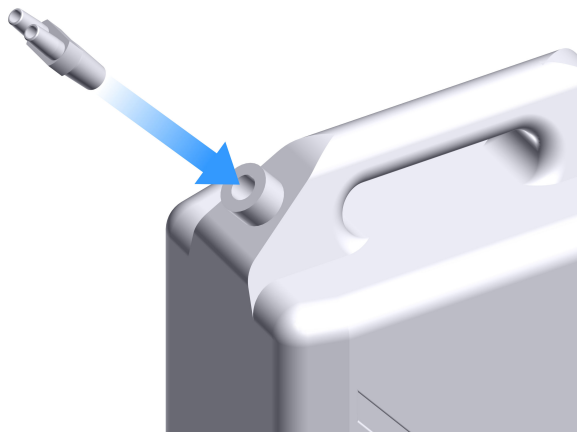
If containers tip over during reagent replacement or because of vibrations, then leaking hazardous substances can cause poisoning or chemical burns.

- Wear personal protective equipment (e.g., protective glasses, gloves) during reagent replacement.
- Use bottle caps.
- Secure the container with the safety strap.
- In case of increased risk of vibration, tighten the volume sensor holder with the table lock.

Required accessories:

- OMNIS IC equipment: 10 L container, drain kit (6.05332.010)

- 1 Place the container underneath the laboratory table.
- 2 Remove the red lid from the opening for the drain tubing connector.
Plug the drain tubing connector into the opening for the drain tubing connector.



- 3** Screw the spout lid onto the container spout.



The *OMNIS IC equipment: LC 10 L container* kit contains a 10 L container and the necessary accessories for automated volume monitoring. The included safety strap enables the container to stand securely in the volume sensor holder. The container can be screwed to the laboratory table with the table lock.

The container can be used as a supply vessel or waste collector.



Article number	Product name	Number
6.1621.000	Container, 10 L	1

Article number	Product name	Number
6.02009.000	Volume sensor holder, container 10 L	1
6.02104.100	Sensor cable St/St, 3 m	1
6.02050.210	Safety strap	1
6.01602.110	Bottle cap S 40, 2x M6, UNF 10/32	1
6.1805.530	FEP tubing / M6 / 2 m	1

Setting up the container with volume monitoring



 CAUTION

Risk of injury due to hazardous substances

If containers tip over during reagent replacement or because of vibrations, then leaking hazardous substances can cause poisoning or chemical burns.

- Wear personal protective equipment (e.g., protective glasses, gloves) during reagent replacement.
- Use bottle caps.
- Secure the container with the safety strap.
- In case of increased risk of vibration, tighten the volume sensor holder with the table lock.

Required accessories:

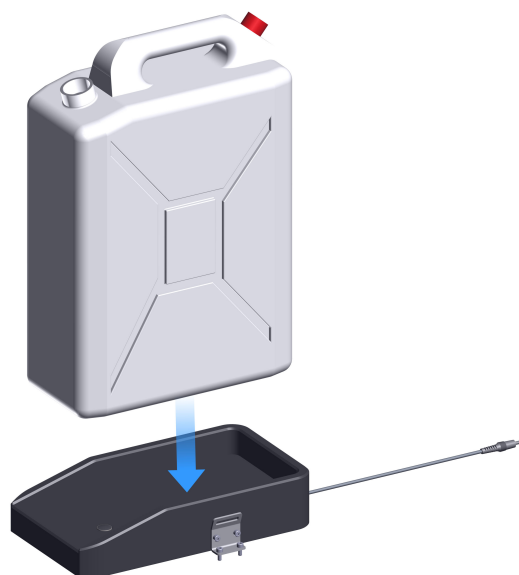
- OMNIS IC equipment: LC 10 L container kit (6.05332.000)
- Drain tubing connector, PP, 2 x 7–8 mm (6.01808.000)

1 Connecting the sensor cable

- Connect one end of the sensor cable to the rear of the volume sensor holder.
- On the rear of the OMNIS Reagent Organizer Liquid Control are 2 connectors for the volume sensor holder (30-2). Connect the other end of the sensor cable to a connector for the volume sensor holder.

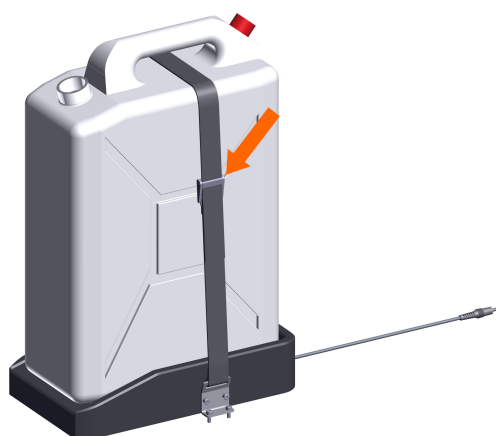
2 Inserting the container into the volume sensor holder

- Place the container straight into the volume sensor holder from above. The connector for the bottle caps points to the front.



3 Fastening the safety strap

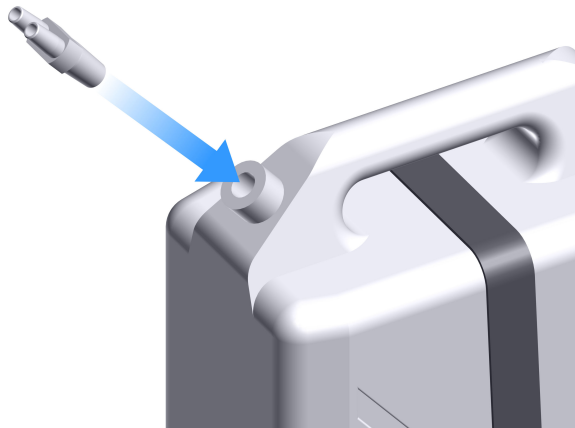
- Guide the safety strap around the container and tighten the buckle so that the container is stable.



- The container is installed in the volume sensor holder.
- If desired, connect the container as a supply vessel for auxiliary solutions (*see "Connecting the container", chapter 5.14.4, page 259*)

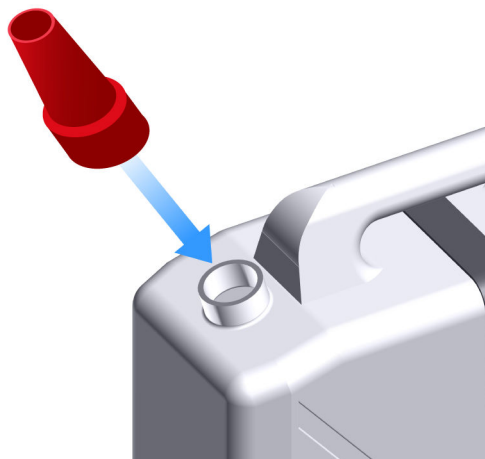
4 Attaching the drain tubing connector

- Remove the red lid from the opening for the drain tubing connector.
- Plug the drain tubing connector into the opening for the drain tubing connector.



5 Connecting the container

- Screw the spout lid onto the container spout.



- Connecting the container as a waste collector (*see "Connecting the drain tubing", chapter 5.3.4.3, page 128*)

The container is set up with volume monitoring.

5.3.4.3 Connecting the drain tubing

The drain tubing leading away from the instrument is fastened to the base plate and to the collection tray below the base plate. A total of 2 drain tubings are attached. The drain tubing fastened to the base plate directs waste fluids out of the OMNIS IC, e.g., residues of eluent or sample. The drain tubing fastened to the collection tray directs liquid resulting from leaks into the waste.

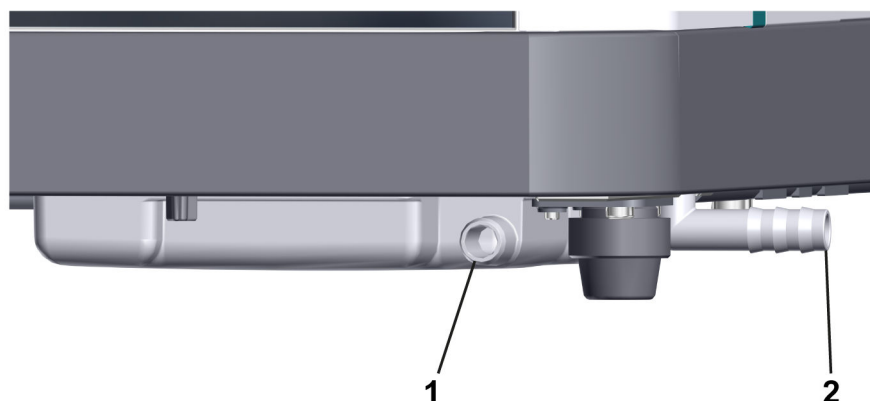


Figure 98 Collection tray – Overview

- 1 Drain tubing connector, collection tray**
Directs waste fluids caused by leaks.

- 2 Drain tubing connector, base plate**
Directs waste fluids such as residues of eluent or sample out of the OMNIS IC System.
The drain tubing connector, base plate, can be rotated.

Connecting the drain tubing

Prerequisite:

- The container is set up as required:
 - without volume monitoring [see page 124](#)
 - with volume monitoring [see page 126](#)

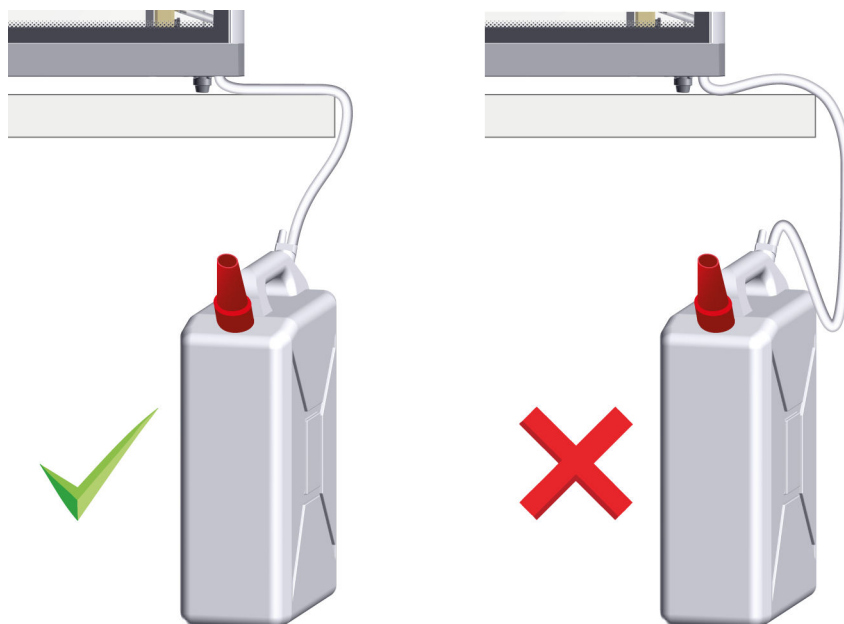
Required accessories:

- Silicone tubing, 8/12 mm, 2 m (6.01816.010)

- 1** Plug one end of the silicone tubing onto the drain tubing connector.

i The OMNIS IC Autosampler Module COOL has an additional tubing on the underside of the instrument. The condensation generated by the cooling is directed into the drainage tubing system via this tubing.

- 2** Place the drain tubing downwards. Otherwise, siphon behavior may occur.



- 3** Insert the other end of the silicone tubing onto the tubing connector on the base plate.
 - 4** Plug one end of an additional silicone tubing on the second connector of the drain tubing connector.
 - 5** Plug the other end of the second silicone tubing into the tubing connector on the collection tray.
- The drain tubing is installed.

5.4 Sample preparation techniques

The OMNIS IC System can be extended to include the following sample preparation techniques:

- Inline ultrafiltration (UF)
 - 1-channel system (with peristaltic pump and OMNIS Dosing Drive Unit): [See page 133](#)
 - 1-channel system (with 2 peristaltic pumps): [See page 146](#)
 - 2-channel system (with peristaltic pump and OMNIS Dosing Drive Unit): [See page 144](#)
 - 2-channel system (with 2 peristaltic pumps): [See page 152](#)
- Metrohm Inline Dilution Technique (MIDT)
 - 1-channel system: [See page 153](#)
 - 2-channel system: [See page 165](#)

- Ultrafiltration and Metrohm Inline Dilution Technique (MIDT) in combination
 - 1-channel system: [See page 167](#)
- Metrohm intelligent Partial Loop injection Technique (MiPT)
 - 1-channel system: [See page 178](#)
 - 2-channel system: [See page 184](#)
- Ultrafiltration and Metrohm intelligent Partial Loop injection Technique (MiPT) in combination
 - 1-channel system: [See page 187](#)

5.4.1 Metrohm inline ultrafiltration

The OMNIS IC equip.: UF, PP/DD or the OMNIS IC equip.: UF, PP/PP expands the OMNIS IC System to include inline ultrafiltration (UF).

Inline ultrafiltration can be used to separate the sample from any particles it contains. The ultrafiltration is carried out according to the principle of push/pull mode. The main component of the Metrohm inline ultrafiltration is the ultrafiltration cell. The ultrafiltration cell is suitable for sample filtration with high requirements regarding filtration effectiveness and sample throughput. The standard filtration membrane has a nominal pore size of 0.20 µm.

There are 2 installation versions for the application:

- **with 1 peristaltic pump and OMNIS Dosing Drive Unit** ([see page 135](#))

A peristaltic pump and an OMNIS Dosing Drive Unit with the cylinder unit OMNIS attached are required for this installation version. The peristaltic pump conveys the sample along the sample chamber of the ultrafiltration cell (push mode). At the same time, the OMNIS Dosing Drive Unit generates a vacuum in the filtrate chamber of the ultrafiltration cell, thus aspirating a part of the sample through the filtration membrane (pull mode).

In the rinse station ([see "Rinse station", page 58](#)), the sample needle is rinsed with ultrapure water after each sample aspiration. The peristaltic pump and the OMNIS Dosing Drive Unit rinse the entire sample path with ultrapure water.

The installation version with 1 peristaltic pump and OMNIS Dosing Drive Unit can also be installed in the 2-channel system ([see page 144](#)).

- with 2 peristaltic pumps (see page 146)

An additional peristaltic pump is required for this installation version. The first peristaltic pump conveys the sample solution through the sample chamber of the ultrafiltration cell (push mode). At the same time, the second peristaltic pump generates a vacuum in the filtrate chamber of the ultrafiltration cell, thus aspirating the sample solution through the filtration membrane (pull mode) in the sample loop. To avoid carry-overs, the sample needle is immersed in 2 vials with ultrapure water after each sample aspiration. Then the peristaltic pumps convey the rinsing solution from a 50 mL bottle or a 200 mL bottle through the entire sample path. The installation version with 2 peristaltic pumps can also be installed in the 2-channel system ([see page 152](#)).

If necessary, inline ultrafiltration can be combined with MiPT (*see page 187*) or MIDT (*see page 167*).

Mode of operation

1. Filtrating the sample
 - a. One peristaltic pump delivers a continuous flow of sample solution through the sample chamber of the ultrafiltration cell. By default, 75% to 80% of the sample flows along the filtration membrane to the sample outlet and then into the Multi Flow Monitor (for monitoring ultrafiltration performance).
 - b. The suction effect of the OMNIS Dosing Drive Unit or the second peristaltic pump draws 20 to 25% of the sample through the filtration membrane into the filtrate chamber.
2. Injecting
 - a. The injector switches to the fill position when the peristaltic pump or the OMNIS Dosing Drive Unit starts, causing the diluted filtrate to be aspirated into the sample loop.
 - b. The OMNIS Dosing Drive Unit or the second peristaltic pump aspirates the filtrate into the sample loop. The injector is set to **FILL** as soon as a constant flow is achieved after a certain filtration time.
 - c. As soon as the injector is set to **INJECT**, the filtrate is injected into the separation column with the eluent flow.

3. Rinsing

with 1 peristaltic pump and OMNIS Dosing Drive Unit

- a. The sample needle moves to the **Rinse position** after injection. The sample needle is rinsed with ultrapure water at the rinse station.
- b. The entire sample path is rinsed after each filtration. To accomplish this, the peristaltic pump conveys ultrapure water through the sample path. In addition, the OMNIS Dosing Drive Unit conveys the excess sample into the Multi Flow Monitor (for monitoring the ultrafiltration performance) via the switching valve 3/2.

with 2 peristaltic pumps

- a. After injection, the sample needle for rinsing is immersed in 2 vials with ultrapure water.
- b. The entire sample path is rinsed after each filtration. To achieve this, the peristaltic pumps convey ultrapure water from a 50 mL bottle or a 200 mL bottle through the sample path.

Ratio of the flow rate on the sample side to the flow rate on the filtration side

On the sample side, a high flow rate is required to pump a high sample volume through the sample chamber. On the filtration side, a lower flow rate is required as less filtrate needs to be pumped through the filtrate chamber than sample through the sample chamber.

An excessively high ratio of the flow rate on the filtration side to the flow rate on the sample side leads to increased deposits on the filtration membrane. Metrohm recommends a flow rate ratio of 4:1 from the sample side to the filtration side.

The OMNIS Multi Flow Monitor Unit (2.10560.910) acts as a drip counter and monitors ultrafiltration performance.

5.4.1.1 Metrohm inline ultrafiltration with Peristaltic Pump and OMNIS Dosing Drive Unit

The equipment kit contains the following parts:

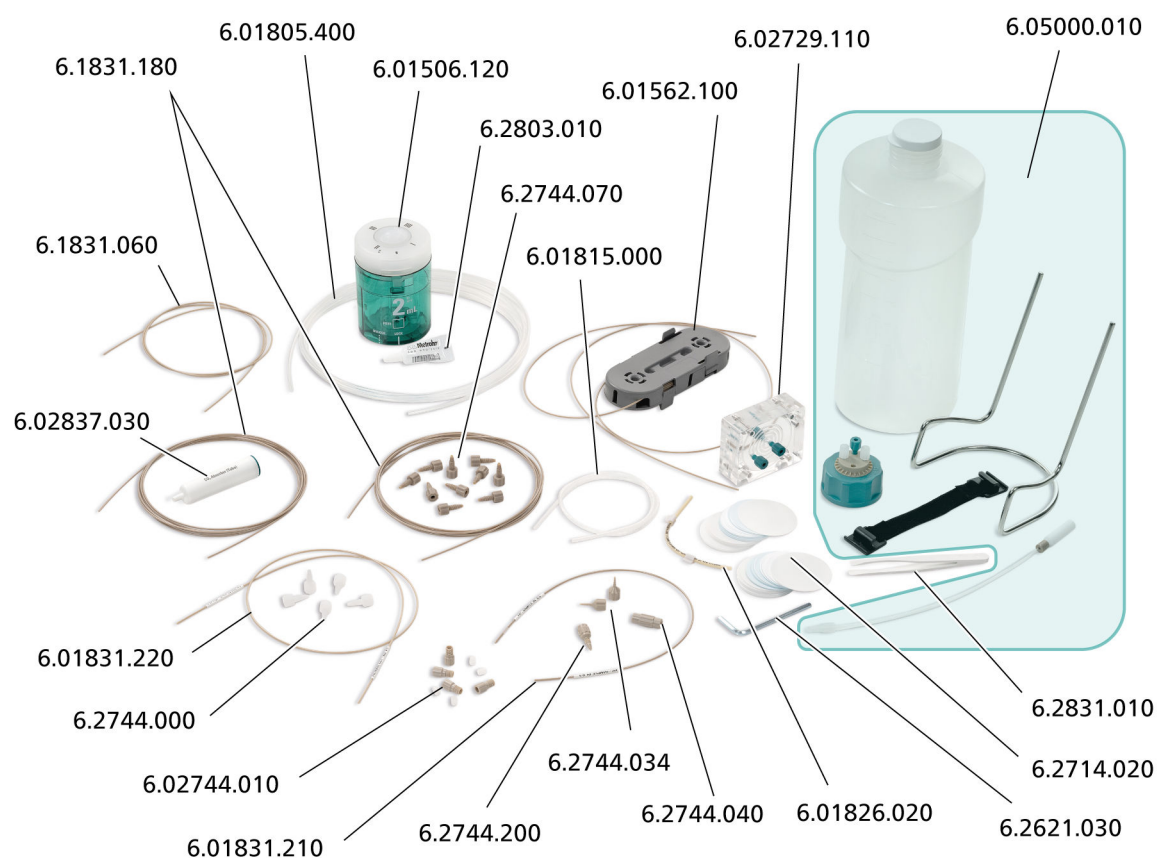


Figure 99 OMNIS IC equipment: UF PP/DD – Parts

Table 28 Parts of the OMNIS IC equipment: UF PP/DD (6.05331.030)

Article number	Product name	Number
6.1831.180	PEEK capillary, 0.5 mm ID / 3 m	2
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.01506.120	Cylinder unit OMNIS 2 mL, UNF 10/32	1
6.2803.010	Grease (2 g)	1
6.2744.070	Pressure screw short, 5 pcs.	2
6.01815.000	Spiral band, 3–15 mm, 0.5 m	1
6.01562.100	Transfer capillary 2 mL, PEEK	1
6.02729.110	Ultrafiltration cell 2	1
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.2831.010	Plastic tweezers	1
6.2714.020	Filtration membrane reg. cellulose, 0.2 µm, 50 pieces	1
6.2621.030	Hex key 4 mm	1
6.01826.020	Pump tubing, ID 1.0 mm, white - white	1

Article number	Product name	Number
6.2744.040	Coupling 2 x UNF 10/32	1
6.2744.034	Coupling olive/UNF 10/32, 2 pcs.	1
6.2744.200	Adapter UNF 10/32 outer / M6 inner	1
6.01831.210	PEEK cap. PP – SAMPLE IN, 400/0.5 mm	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	2
6.2744.000	Pressure screw PVDF, 5 pcs.	1
6.01831.220	PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm	1
6.02837.030	CO2 Absorber (Tube)	1
6.1831.060	PEEK capillary, 0.5 mm ID / 1 m	1

Sample path with peristaltic pump and OMNIS Dosing Drive Unit

The sample path ([see "Connecting functional units", chapter 5.15, page 262](#)) must be adjusted when a sample preparation technique is used. The following illustration shows the sample path of the inline ultrafiltration with peristaltic pump and OMNIS Dosing Drive Unit:

i To ensure successful measurement, the following capillaries with fixed lengths must **NOT** be cut to size:

- PEEK cap. PP – SAMPLE IN, 400/0.5 mm (6.01831.210)
- PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm (6.01831.220)
- PEEK capillary 0.5 mm ID, 1 m (6.1831.060)

The following capillaries are cut to size for installation on the OMNIS IC System:

- PEEK capillary 0.5 mm ID, 3 m (6.1831.180)
- FEP tubing M6, 1/8" x 1.59 mm, 3 m (6.01805.400)

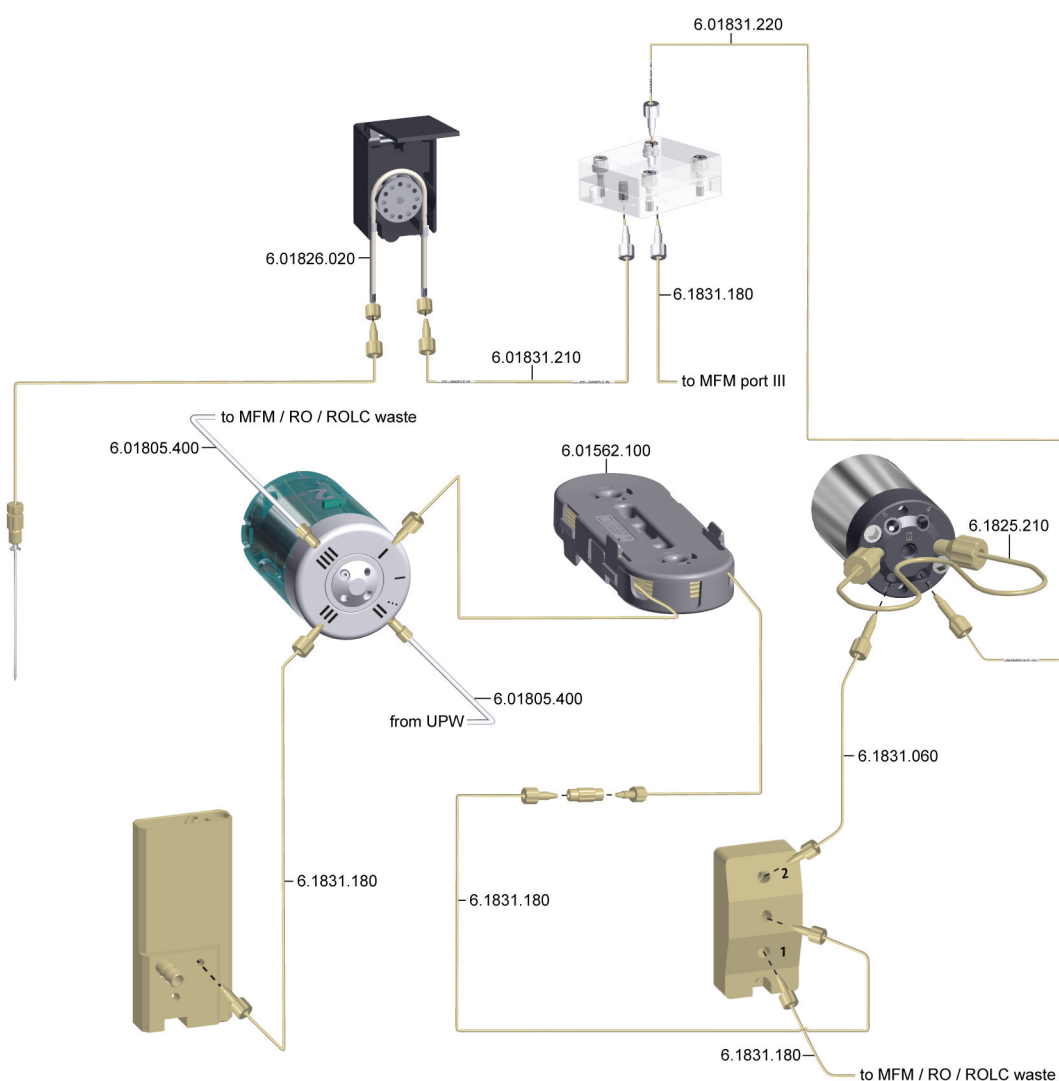


Figure 100 Inline ultrafiltration with Peristaltic Pump and OMNIS Dosing Drive Unit (UF-PP/DD) – Flow diagram

Table 29 Inline ultrafiltration with peristaltic pump and OMNIS Dosing Drive Unit – Installation

Product name	Article number	Capillary length
Transfer capillary 2 mL, PEEK	6.01562.100	-
Pump tubing, ID 1.0 mm, white - white	6.01826.020	-
Sample loop 20 µL, PEEK	6.1825.210	-
PEEK cap. PP – SAMPLE IN, 400/0.5 mm.	6.01831.210	40 cm

Product name	Article number	Capillary length
PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm	6.01831.220	80 cm
PEEK capillary, 0.5 mm ID, 1 m	6.1831.060	100 cm
PEEK capillary, 0.5 mm ID, 3 m	6.1831.180	cut to size for OMNIS IC System
FEP tubing M6, 1/8" x 1.59 mm, 3 m	6.01805.400	cut to size for OMNIS IC System
Sample needle capillary, PEEK, ID 0.5 mm	-	cut to size for OMNIS IC System

Inline ultrafiltration with peristaltic pump and OMNIS Dosing Drive Unit (1-channel system)

Prerequisite:

- The OMNIS IC System has a free peristaltic pump channel.
- A free OMNIS Dosing Drive Unit is available in the OMNIS IC System.
- A free OMNIS MISP unit is available in the OMNIS IC system.
- A switching valve 3/2, UNF kit is installed by default on the right-hand side of the autosampler.

Required accessories:

- Kit *OMNIS IC equipment: UF PP/DD* (6.05331.030)
- Capillary cutter (6.2621.080)

Table 30 Accessories to be ordered separately:

Article number	Product name
2.10561.0x0	OMNIS IC Peristaltic Pump Unit or
6.05801.000	Peristaltic pump channel kit
2.10560.310	OMNIS Dosing Drive Unit
2.10561.110	OMNIS MISP Unit
6.05801.110	Switching valve 3/2, UNF kit

1 Connecting the bottle with ultrapure water

- Cut a piece of FEP tubing to approx. 150 cm. Use a flangeless screw fitting to connect the cut-to-size FEP tubing at the bottle cap of the ultrapure water bottle (*see "Connecting a bottle for eluent and concentrate", page 250*).
- Use a flangeless fitting to screw the free end of the FEP tubing to Port II of the cylinder unit OMNIS.

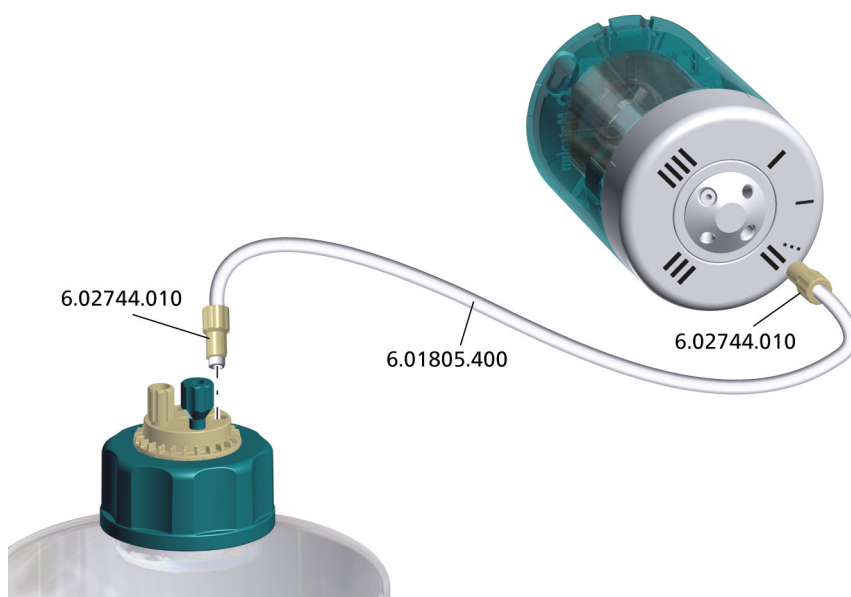


Figure 101 Connecting the ultrapur water

- Insert the CO₂ Absorber (Tube) into the Luer connector of the bottle cap.

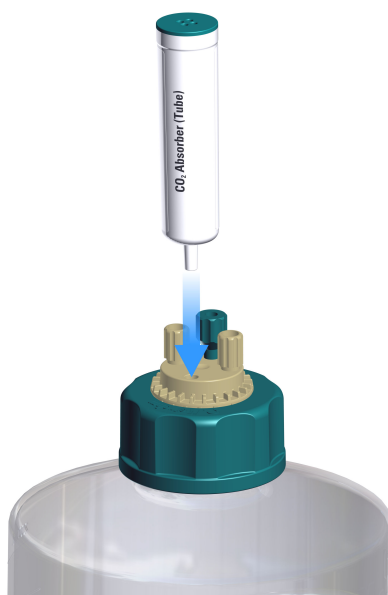


Figure 102 Mounting the CO₂ Absorber (Tube)

2 Preparing the ultrafiltration cell

NOTICE

Damage to the ultrafiltration cell

Organic solvents (e.g. acetone) corrode and damage the ultrafiltration cell material (PMMA).

- Use ultrapure water for cleaning the ultrafiltration cell.
 - If an organic solvent is used for cleaning, then the ultrafiltration cell must then be rinsed with ultrapure water.
-
- Insert a filtration membrane that has been previously soaked in ultrapure water into the ultrafiltration cell (*see "Preparing the ultrafiltration cell", chapter 5.8.1, page 210*).

3 Inserting the pump tubing

- Insert the pump tubing at both ends with one coupling olive/UNF 10/32 each and insert it into the peristaltic pump (*see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200*).

4 Connecting the autosampler to the ultrafiltration cell

NOTICE

Damage to the ultrafiltration cell caused by using the wrong pressure screws

PEEK pressure screws are too hard. PEEK pressure screws can damage the ultrafiltration cell material.

- Use only transparent PVDF pressure screws (6.2744.000) to tighten capillaries at the ultrafiltration cell.



Figure 103 Connecting the autosampler to the ultrafiltration cell

- Use a short pressure screw to screw the free end of the sample needle capillary at the coupling olive/UNF 10/32 at the peristaltic pump inlet.
- Use a short pressure screw to screw the *PP* end of the capillary *PP – SAMPLE IN* at the coupling olive/UNF 10/32 at the peristaltic pump outlet.



- Use a PVDF pressure screw to screw the *SAMPLE IN* end of the capillary *PP – SAMPLE IN* at the sample inlet of the ultrafiltration cell labeled *IN*.



5 Connecting the sample chamber to the waste collector

- Use a PVDF pressure screw to screw one end of a PEEK capillary 0.5 mm at the sample outlet of the ultrafiltration cell labeled *OUT*.
- Use a PVDF pressure screw to screw the other capillary end 0.5 mm at Port 3 of the Multi Flow Monitor (active monitoring is included in the operating procedure).

6 Connecting the filtrate chamber to the injector

- Use a PVDF pressure screw to screw the *FILTRATE OUT* end of the *FILTRATE OUT – INJ* capillary at the filtrate outlet of the ultrafiltration cell labeled *OUT*.



- Use a pressure screw to screw the *INJ* end of the capillary *FILTRATE OUT – INJ* to injector port 2.



7 Inserting the ultrafiltration cell and connecting the transfer capillary 2 mL

- Insert the ultrafiltration cell into the MISP unit ([see "Installing optional accessory parts", page 205](#)).
- Insert the transfer capillary 2 mL into the MISP unit. ([see "Installing optional accessory parts", page 205](#)).
- Use a short pressure screw to screw one end of the transfer capillary 2 mL to Port I of the cylinder unit OMNIS.

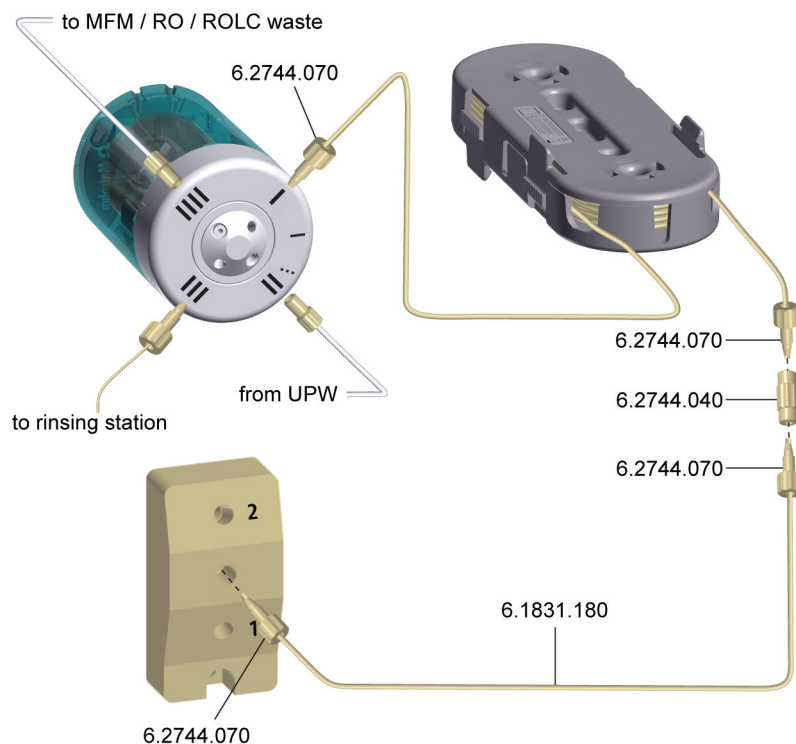


Figure 104 Connecting the transfer capillary

- Use a short pressure screw to connect the other end of the transfer capillary 2 mL to a coupling 2 x UNF 10/32.
- Use a short pressure screw to screw one end of the shortened PEEK capillary 0.5 mm ID / 1 m at the free end of the coupling 2 x UNF 10/32. The coupling 2 x UNF 10/32 is located just in front of the transfer capillary on the MIS tray. The PEEK capillary 0.5 mm ID / 3 m can be cut to the required length.
- Use a short pressure screw to screw the other cut PEEK capillary end 0.5 mm ID / 3 m at the central port of the switching valve 3/2.



Figure 105 Connector – Transfer capillary 2 mL

8 Connecting the injector

i Use only pressure screws (6.2744.010 and 6.2744.014) for capillary connections at the injector.

- Use a pressure screw to screw one end of the PEEK capillary 0.5 mm ID / 1 m to injector port 1.
- Use a short pressure screw to screw the other end of the PEEK capillary 0.5 mm ID / 1 m to Port 2 of the switching valve 3/2.

9 Connecting the waste collector (reagent organizer)

The Multi Flow Monitor alone does not have enough connectors for this sample preparation technique. Therefore, the irrelevant flows can be distributed to the waste collector installed in the RO/ROL.

- Use a short pressure screw to screw one end of a PEEK capillary 0.5 mm to Port 1 of the switching valve 3/2.
- Use a PVDF pressure screw to screw the other capillary end at the waste collector (reagent organizer).
- Use a flangeless fitting to screw one end of the FEP tubing M6 to Port III of the cylinder unit OMNIS.
- Use a flangeless fitting and an adapter UNF 10/32 outer / M6 inner to screw the other end of the FEP tubing at the waste collector (MFM).

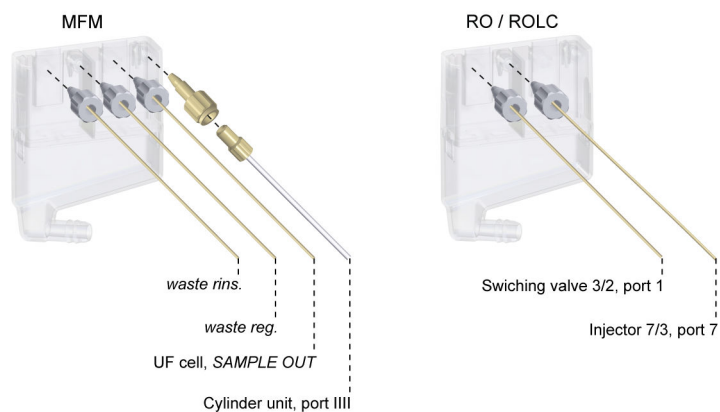


Figure 106 Recommended installation – Waste collector

The sample path for inline ultrafiltration is installed.

Sample path with peristaltic pump and OMNIS Dosing Drive Unit in a 2-channel system

If the inline ultrafiltration with a peristaltic pump and the OMNIS Dosing Drive Unit is used in a 2-channel system, then the sample path must be adapted:



Product name	Article number	Capillary length
Sample loop 20 µL, PEEK	6.1825.210	-
PEEK capillary INJ – INJ 250/0.5 mm	6.01831.260	25 cm

Prerequisite:

- Kit OMNIS IC equipment: UF, PP/DD is installed (*see "Inline ultrafiltration with peristaltic pump and OMNIS Dosing Drive Unit (1-channel system)", page 137*).
- A free actuator with installed injector 6/2 or injector 7/3 is in the OMNIS IC System.

Required accessories:

- PEEK capillary INJ – INJ 250 / 0.5 mm (6.01831.260)
- PEEK sample loop 20 μ L (6.1825.210)

1 Preparing the second injector

- Install the sample loop 20 μL (see "Equipping the OMNIS Actuator Unit", chapter 5.7, page 203).

2 Connecting a second injector

 Use only pressure screws (6.2744.010 and 6.2744.014) for capillary connections at the injector.

- A PEEK capillary is installed between injector port 2 of the first injector and the filtrate outlet. Detach this PEEK capillary from the injector and tighten it at injector port 2 of the second injector.
- Tighten one end of the PEEK capillary *INJ - INJ* to injector port 2 of the first injector using a pressure screw.
- Use a pressure screw to tighten the other capillary end to injector port 1 of the second injector.

The sample path for inline ultrafiltration with cylinder unit OMNIS in the 2-channel system is installed.

5.4.1.2 Inline ultrafiltration with 2 peristaltic pumps

The equipment kit contains the following parts:

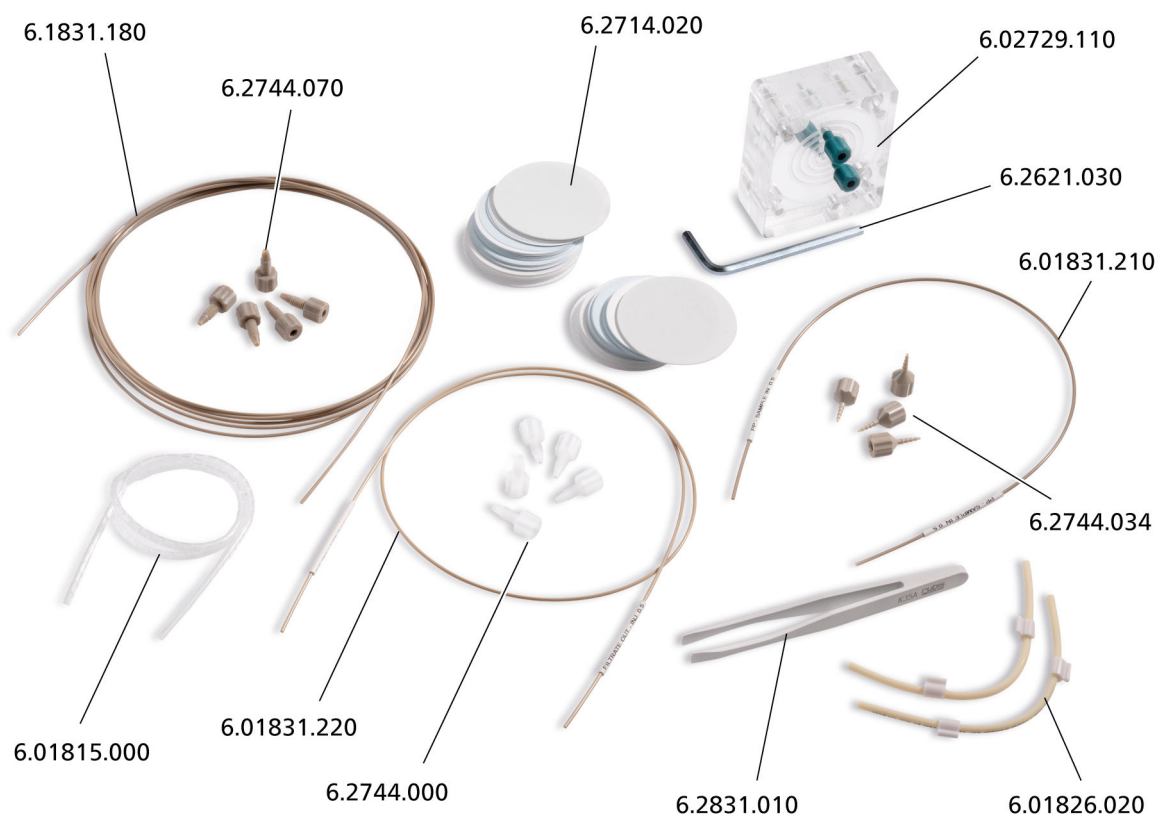


Figure 108 OMNIS IC equipment: UF PP/PP – Parts

Table 32 Parts of the OMNIS IC equipment: UF PP/PP (6.05331.050)

Article number	Product name	Number
6.1831.180	PEEK capillary, 0.5 mm ID / 3 m	1
6.2744.070	Pressure screw short, 5 pcs.	1
6.2714.020	Filtration membrane reg. cellulose, 0.2 µm, 50 pieces	1
6.02729.110	Ultrafiltration cell 2	1
6.2621.030	Hex key 4 mm	1
6.01831.210	PEEK cap. PP – SAMPLE IN, 400/0.5 mm	1
6.2744.034	Coupling olive/UNF 10/32, 2 pcs.	2
6.01826.020	Pump tubing, ID 1.0 mm, white - white	2
6.2831.010	Plastic tweezers	1
6.2744.000	Pressure screw PVDF, 5 pcs.	1
6.01831.220	PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm	1
6.01815.000	Spiral band, 3–15 mm, 0.5 m	1

The sample path ([see "Connecting functional units", chapter 5.15, page 262](#)) must be adjusted when a sample preparation technique is used. The



following illustration shows the sample path of inline ultrafiltration with 2 peristaltic pumps:

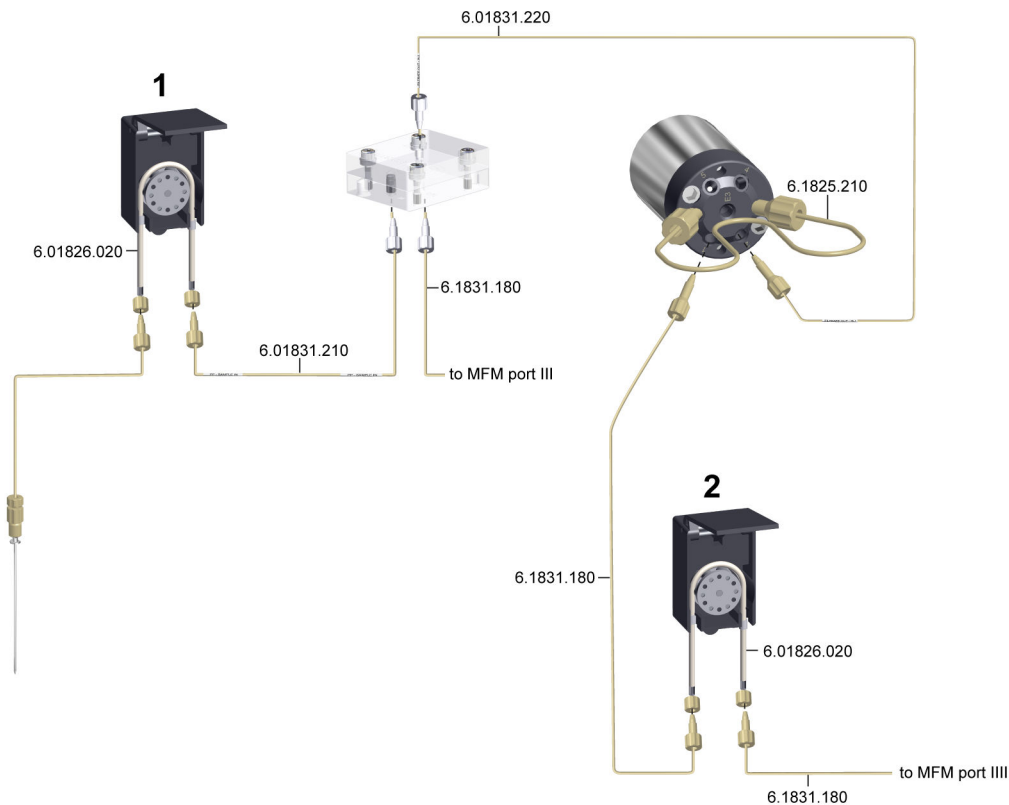


Figure 109 Inline ultrafiltration with 2 peristaltic pumps (UF-PP/PP) – Flow diagram

Table 33 Inline ultrafiltration – Installation

Product name	Article number	Capillary length
Pump tubing, ID 1.0 mm, white - white	6.01826.020	-
Sample loop 20 µL, PEEK	6.1825.210	-
PEEK cap. PP – SAMPLE IN, 400/0.5 mm.	6.01831.210	40 cm
PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm	6.01831.220	80 cm
PEEK capillary, 0.5 mm ID, 3 m	6.1831.180	cut to size for OMNIS IC System
Sample needle capillary, PEEK, ID 0.5 mm	-	cut to size for OMNIS IC System

Installing inline ultrafiltration with 2 peristaltic pumps

Prerequisite:



- The OMNIS IC System has 2 free peristaltic pump channels.
- An OMNIS MISP Unit is present in the OMNIS IC system.
- A beaker containing rinsing solution is placed in the OMNIS IC AS Tray.

Required accessories:

- Kit *OMNIS IC equipment: UF PP/PP* (6.05331.050)
- Capillary cutter (6.2621.080)

1 Preparing the ultrafiltration cell

NOTICE

Damage to the ultrafiltration cell

Organic solvents (e.g. acetone) corrode and damage the ultrafiltration cell material (PMMA).

- Use ultrapure water for cleaning the ultrafiltration cell.
- If an organic solvent is used for cleaning, then the ultrafiltration cell must then be rinsed with ultrapure water.
- Insert a filtration membrane that has been previously soaked in ultrapure water into the ultrafiltration cell ([see "Preparing the ultrafiltration cell", chapter 5.8.1, page 210](#)).

2 Inserting the pump tubings

- Fit both pump hoses at both ends with one coupling olive/UNF 10/32 each. Insert a pump tubing into both peristaltic pumps ([see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200](#)).

3 Connecting the autosampler to the ultrafiltration cell

NOTICE

Damage to the ultrafiltration cell caused by using the wrong pressure screws

PEEK pressure screws are too hard. PEEK pressure screws can damage the ultrafiltration cell material.

- Use only transparent PVDF pressure screws (6.2744.000) to tighten capillaries at the ultrafiltration cell.



Figure 110 Connecting the autosampler to the ultrafiltration cell

- Use a short pressure screw to screw the free end of the sample needle capillary at the inlet of the first peristaltic pump.
- Use a short pressure screw to screw the *PP* end of the capillary *PP – SAMPLE IN* at the peristaltic pump outlet.



- Use a PVDF pressure screw to screw the *SAMPLE IN* end of the capillary *PP – SAMPLE IN* at the sample inlet of the ultrafiltration cell labeled *IN*.



4 Connecting the sample chamber to the waste collector

- Use a PVDF pressure screw to screw one end of a PEEK capillary 0.5 mm at the sample outlet of the ultrafiltration cell labeled *OUT*.

- Use a PVDF pressure screw to screw the other capillary end 0.5 mm at Port 3 of the Multi Flow Monitor (active monitoring is included in the operating procedure).

5 Connecting the filtrate chamber to the injector

 Use only pressure screws (6.2744.010 and 6.2744.014) for capillary connections at the injector.

- Use a PVDF pressure screw to screw the *FILTRATE OUT* end of the *FILTRATE OUT – INJ* capillary at the filtrate outlet of the ultrafiltration cell labeled *OUT*.



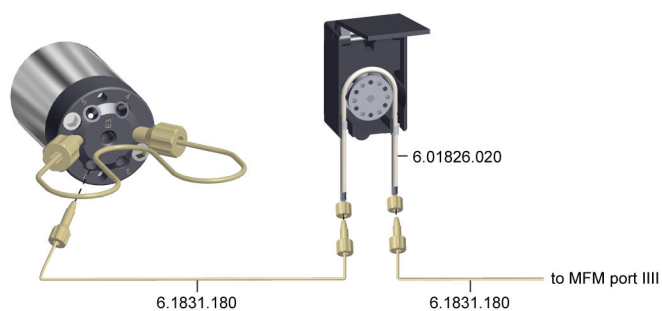
- Use a pressure screw to screw the *INJ* end of the capillary *FILTRATE OUT – INJ* to injector port 2.



- Insert the ultrafiltration cell into the MISP unit ([see "Installing optional accessory parts", page 205](#)).

6 Connecting the second peristaltic pump

- Use a short pressure screw to screw one end of a PEEK capillary 0.5 mm at the outlet of the second peristaltic pump.
- Tighten the other capillary end to Port 4 of the Multi Flow Monitor (active monitoring is included in the operating procedure) with a PVDF pressure screw.
- Use a short pressure screw to screw another piece of the PEEK capillary 0.5 mm at the inlet of the second peristaltic pump.
- Use a pressure screw to connect the other capillary end to injector port 1.



Connecting the second peristaltic pump

Sample path with 2 peristaltic pumps in a 2-channel system

If the inline ultrafiltration with 2 peristaltic pumps is used in a 2-channel system, then the sample path must be adapted:

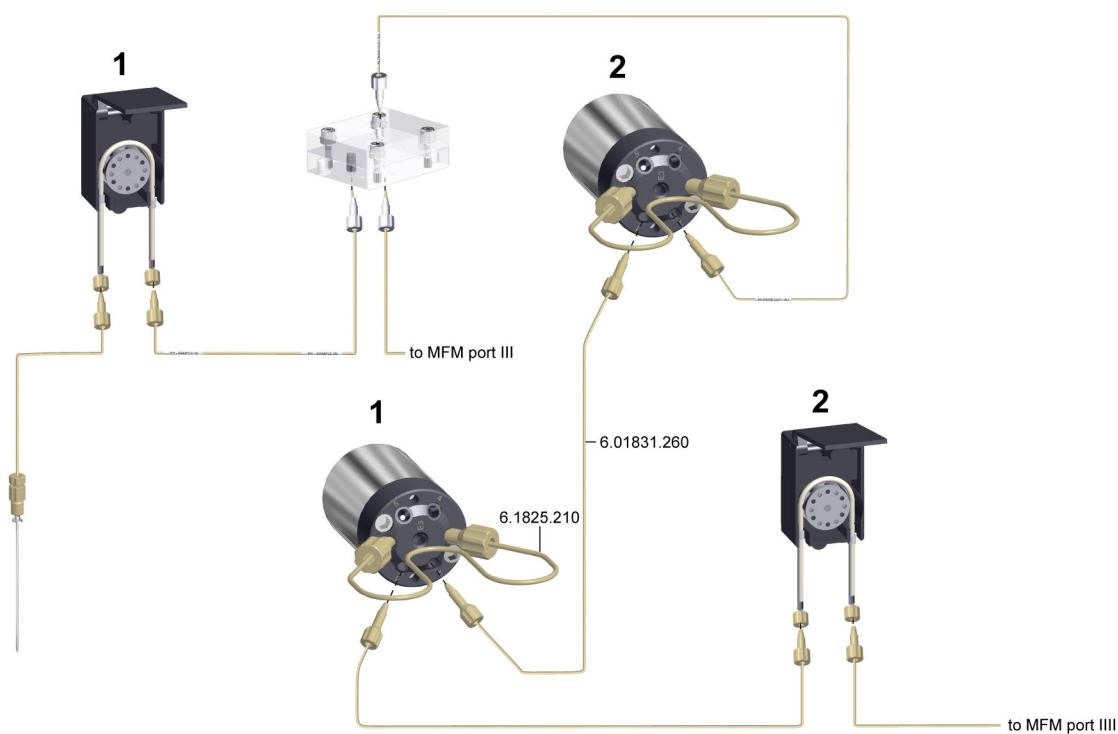


Figure 111 Inline ultrafiltration with 2 peristaltic pumps, 2-channel system – Flow diagram

Table 34 Inline ultrafiltration 2-channel system – Installation

Product name	Article number	Capillary length
Sample loop 20 µL, PEEK	6.1825.210	-
PEEK capillary INJ – INJ 250/0.5 mm	6.01831.260	25 cm

Installing inline ultrafiltration with 2 peristaltic pumps (2-channel system)

Prerequisite:

- OMNIS IC equipment: UF, PP/kit PP is installed (*see "Inline ultrafiltration with peristaltic pump and OMNIS Dosing Drive Unit (1-channel system)", page 137*).
- A free actuator with installed injector 6/2 or injector 7/3 is in the OMNIS IC System.

Required accessories:

- PEEK capillary INJ – INJ 250 / 0.5 mm (6.01831.260)
- PEEK sample loop 20 µL (6.1825.210)

1 Preparing the second injector

- Install the sample loop 20 µL (*see "Equipping the OMNIS Actuator Unit", chapter 5.7, page 203*).

2 Connecting a second injector

 Use only pressure screws (6.2744.010 and 6.2744.014) for capillary connections at the injector.

- A PEEK capillary is installed between injector port 1 of the first injector and the filtrate outlet. Detach this PEEK capillary from the injector and tighten it at injector port 2 of the second injector.
- Tighten one end of the PEEK capillary *INJ - INJ* to injector port 2 of the first injector using a pressure screw.
- Use a pressure screw to tighten the other capillary end to injector port 1 of the second injector.

The sample path for inline ultrafiltration with 2 peristaltic pumps in the 2-channel system is installed.

5.4.2 Metrohm Inline Dilution Technique

The OMNIS IC equipment: MIDT expands the OMNIS IC System to include the Metrohm Inline Dilution Technique ("MIDT").

Samples with excessively high ion concentrations or excessively high concentrated sample matrices can be diluted when this technique is used. The calculated sample amount is aspirated precisely by the OMNIS Dosing

Drive Unit. The sample and the dilution solution are mixed in the dilution station using the built-in magnetic stirrer so that the sample is diluted and completely homogenized. The OMNIS Dosing Drive Unit draws the diluted sample from the dilution station into the sample loop of the injector. Meanwhile, the injector remains in the fill position. Switching to the inject position causes the sample to then be injected.

With the OMNIS IC equip.: MIDT, dilutions with a dilution factor of up to 1000 can be measured with high accuracy and high reproducibility. The installation is adjusted slightly for applications with a higher dilution factor. In this case, a cylinder unit OMNIS with a higher volume must be attached.

The Inline Dilution Technique can also be used to dilute standards, thus enabling automatic calibration. This means that only a single multi-ion standard needs to be produced.

If required, the Inline Dilution Technique can be combined with Inline Ultrafiltration (*see page 167*).

The combination can also be installed in a 2-channel system if required.
(see page 166).

Mode of operation

1. Rinse the sample needle and dilute the sample
 - a. The sample needle moves to the **Rinse position**. In this position, the sample needle is rinsed with ultrapure water.
 - b. After rinsing, the sample needle moves to the desired sample. The calculated sample volume is aspirated precisely.
 - c. The sample needle moves to the position **Dilution station**. The previously aspirated sample and the defined amount of dilution solution are injected into the dilution station.
 - d. The magnetic stirrer integrated into the dilution station homogenizes the sample and the dilution solution. The resulting amount of diluted sample is referred to as the *end volume*.
2. Injecting
 - a. The injector switches to the **Fill position**. The diluted sample is aspirated by the OMNIS Dosing Drive Unit into the sample loop of the injector.
 - b. The injector switches to the Inject position. This injects the sample.
 - c. Parallel to chromatographic separation and detection, the excess sample is aspirated from the dilution station by the OMNIS Dosing Drive Unit via the switching valve 3/2, and is then routed to the waste.

3. Rinsing the dilution vessel and sample path
 - a. The dilution vessel must be empty. Only then does the rinsing process begin.

The dilution vessel is rinsed twice with dilution solution after each dilution. During rinsing, the required volume of rinsing solution is transferred to the dilution station via the sample needle and aspirated again via the switching valve 3/2 by the OMNIS Dosing Drive Unit. The dilution solution in the dilution vessel is continuously stirred with the magnetic stirrer. The rinsing solution is then routed into the waste.
 - b. The volume of the first rinsing process corresponds to half of the end volume.
 - c. The volume of the second rinsing process corresponds to the end volume + 1 mL.
 - d. After the measurement, the sample needle is moved to the rinse position for rinsing.
4. Rinsing the sample needle
 - a. The sample needle moves to the rinse position and is cleaned with sufficient ultrapure water, thus preparing it for the next injection.

Overview

The equipment kit contains the following parts:

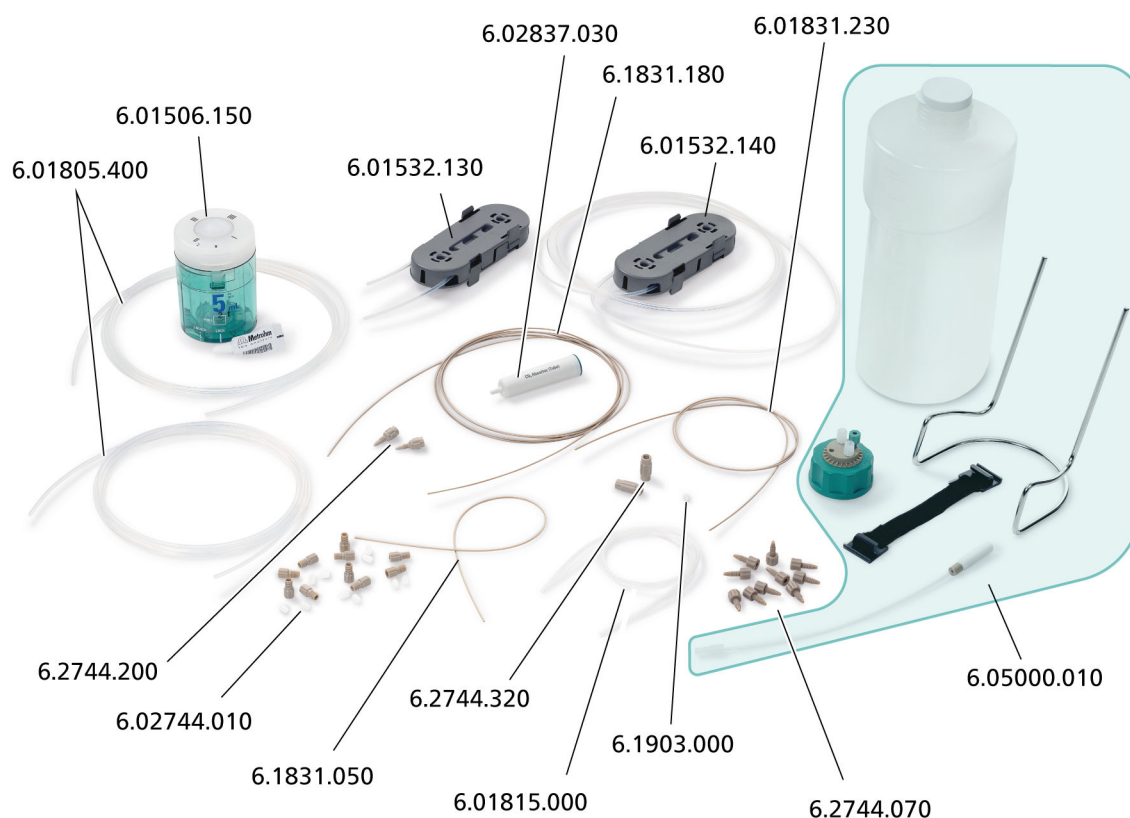


Figure 112 OMNIS IC equipment: MIDT – Parts

Table 35 Parts of the OMNIS IC equip.: MIDT (6.05331.040)

Article number	Product name	Number
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	2
6.01506.150	Cylinder unit OMNIS 5 mL, UNF 10/32	1
6.2803.010	Grease (2 g)	1
6.01532.130	Transfer tubing 5 mL, FEP, outer diameter 1/8"	1
6.02837.030	CO2 Absorber (Tube)	1
6.1831.180	PEEK capillary, 0.5 mm ID, 3 m	1
6.01532.140	Transfer tubing LQH, FEP, outer diameter 1/8"	1
6.1831.050	PEEK capillary, 0.5 mm ID, 40 cm	1
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.2744.070	Pressure screw short, 5 pcs.	2
6.1903.000	Stirring bar, 8 x 3 mm	1
6.01815.000	Spiral band, 3–15 mm, 0.5 m	1
6.2744.320	Coupling M6, UNF 10/32	2

Article number	Product name	Number
6.01831.230	PEEK capillary, 0.75 mm ID, 100 cm	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	5
6.2744.200	Adapter UNF 10/32 outer / M6 inner	2

Sample path

The sample path ([see "Connecting functional units", chapter 5.15, page 262](#)) must be adjusted when a sample preparation technique is used. The following illustration shows the sample path of the Inline Dilution Technique:

i To ensure successful measurement, the following capillaries with fixed lengths must **NOT** be cut to size:

- PEEK capillary, 0.75 mm ID / 100 cm (6.01831.230)
- PEEK capillary 0.5 mm ID, 40 cm (6.1831.050)

The following capillaries are cut to size for installation on the OMNIS IC System:

- PEEK capillary 0.5 mm ID, 3 m (6.1831.180)
- FEP tubing M6, 1/8" x 1.59 mm, 3 m (6.01805.400)

i The following capillary can be shortened between the tubing setup and the connectors for easier handling:

- Transfer tubing 5 mL, FEP, OD 1/8" (6.01532.130)

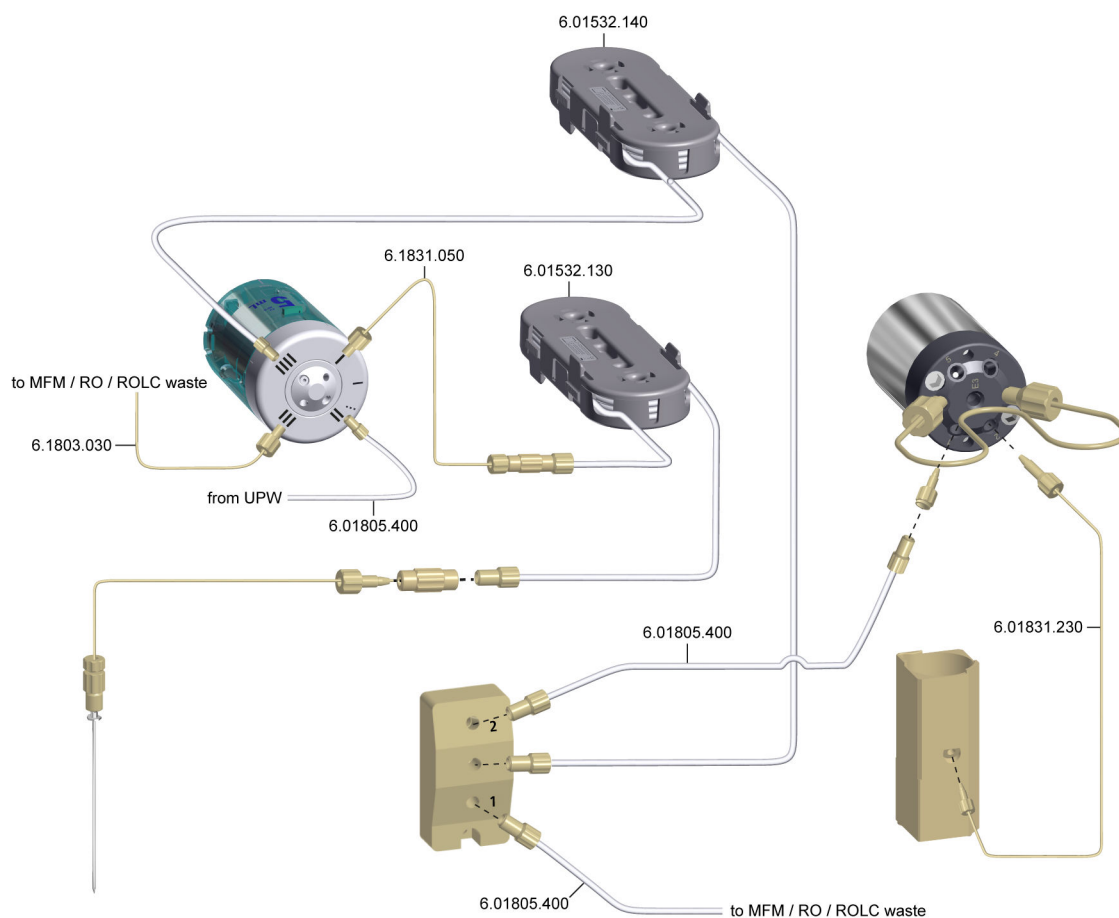


Figure 113 Inline Dilution Technique (MIDT) – Flow diagram

Table 36 Metrohm Inline Dilution Technique – Installation

Product name	Article number	Capillary length
Transfer tubing 5 mL, FEP, outer diameter 1/8"	6.01532.130	-
PEEK capillary, 0.5 mm ID, 40 cm	6.1831.050	40 cm
Transfer tubing LQH, FEP, outer diameter 1/8"	6.01532.140	-
PEEK capillary, 0.75 mm ID, 100 cm	6.01831.230	100 cm
2 x FEP tubing M6, 1/8" x 1.59 mm, 3 m	6.01805.400	cut to size for OMNIS IC System
PEEK capillary, 0.5 mm ID, 3 m	6.1831.180	cut to size for OMNIS IC System
Sample needle capillary, PEEK, ID 0.5 mm	-	cut to size for OMNIS IC System

Installing the Inline Dilution Technique (1-channel system)

Prerequisite:

- The OMNIS IC System includes a free OMNIS Dosing Drive Unit and an OMNIS MISP Unit.
- A dilution station with dilution vessel is installed in the autosampler ([see "Replacing the dilution vessel", chapter 8.2.3, page 427](#)).
- A switching valve 3/2, M6 kit is installed on the right-hand side of the autosampler.

Required accessories:

- Kit *OMNIS IC equipment: MIDT* (6.05331.040)
- Capillary cutter (6.2621.080)

Table 37 Accessories to be ordered separately:

Article number	Product name
2.1056.0310	OMNIS Dosing Drive Unit
2.1056.1110	OMNIS MISP Unit
6.05801.250	Dilution station kit
6.05801.120	Switching valve 3/2, M6 kit

1 Installing the cylinder unit OMNIS 5 mL

- Attach the cylinder unit OMNIS 5 mL to the dosing drive ([see "Equipping the OMNIS Dosing Drive Unit", chapter 5.5, page 198](#)).

2 Connecting the ultrapure water

- Cut a piece of FEP tubing to approx. 150 cm. Use a flangeless screw fitting to connect the cut-to-size FEP tubing at the bottle cap of the ultrapure water bottle ([see "Connecting a bottle for eluent and concentrate", page 250](#)).
- Use a flangeless fitting to screw the free end of the FEP tubing to Port II of the cylinder unit OMNIS.

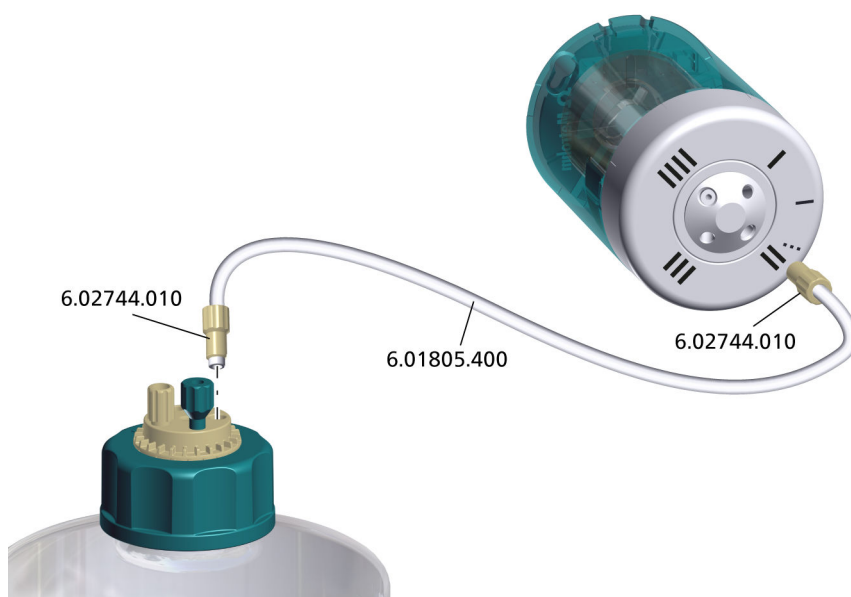


Figure 114 Connector – Ultrapure water

- Insert the CO2 Absorber (Tube) into the Luer connector of the bottle cap.

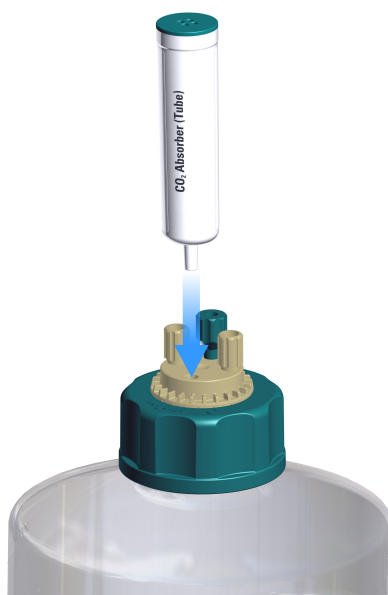


Figure 115 Mounting the CO2 Absorber (Tube)

3 Connecting the outlet capillary

- Use a short pressure screw to screw one end of a PEEK capillary 0.5 mm ID to Port III of the cylinder unit OMNIS.
- Use a PVDF pressure screw to screw the other capillary end at Port 4 of the waste collector (Multi Flow Monitor or reagent organizer).

4 Connecting the transfer tubing 5 mL

i The transfer tubing 5 mL (6.01532.130) and the transfer tubing LQH (6.01532.140) must first be placed on top of each other on the MISIP tray. To do this, remove the MISIP tray from the MISIP unit. After connecting one of the transfer tubings, the MISIP tray can no longer be removed completely. This makes it difficult to insert another transfer tubing.

- Insert the transfer tubing 5 mL into the MISIP unit (*see "Equipping the OMNIS MISIP Unit", chapter 5.8, page 205*).
- Place the transfer tubing LQH onto the transfer tubing 5 mL
- Insert the MISIP tray back in the MISIP unit.
- Use a flangeless fitting to screw a coupling M6 / UNF 10/32 to both ends of the transfer tubing 5 mL.
- Use a short pressure screw to screw the PEEK capillary 0.5 mm ID / 40 cm via the coupling M6 / UNF 10/32 at one end of the transfer tubing 5 mL.

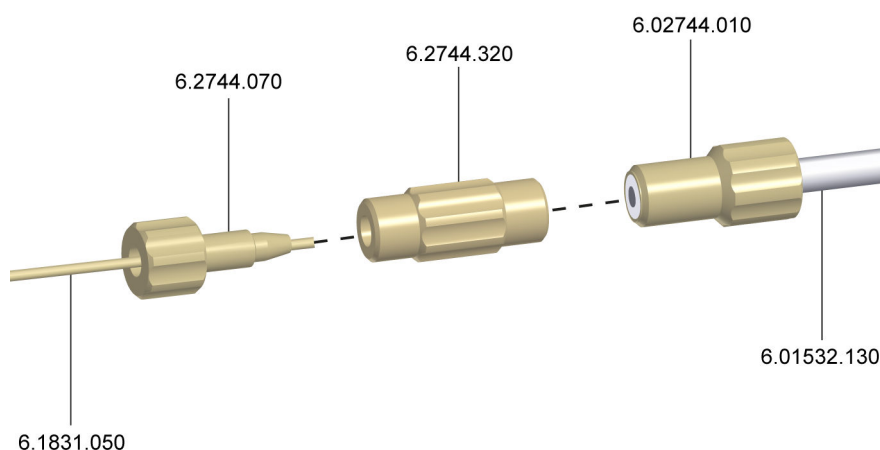


Figure 116 Connection of the transfer tubing 5 mL

- Use a short pressure screw to screw the other end of the PEEK capillary 0.5 mm ID / 40 cm to Port I of the cylinder unit OMNIS.
- Use a short pressure screw to screw the sample needle capillary via the coupling M6 / UNF 10/32 at the other end of the transfer tubing 5 mL.

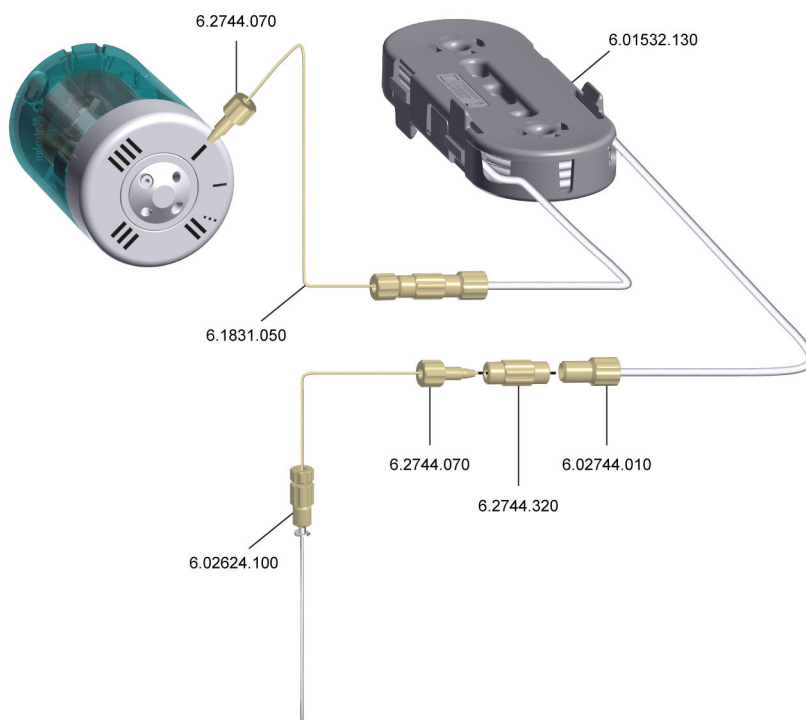


Figure 117 Flow diagram – Transfer tubing 5 mL

5 Connecting the transfer tubing LQH

- Use a flangeless fitting to screw the short end of the transfer tubing LQH to Port III of the cylinder unit OMNIS.
- Use a flangeless fitting to screw the long end of the transfer tubing LQH at the central Port of the switching valve 3/2. Guide the transfer tubing LQH along the left side of the OMNIS IC into the autosampler. Guide the transfer tubing LQH along the fixation bar below the AS tray to the switching valve 3/2 ([see figure 92, page 112](#)).

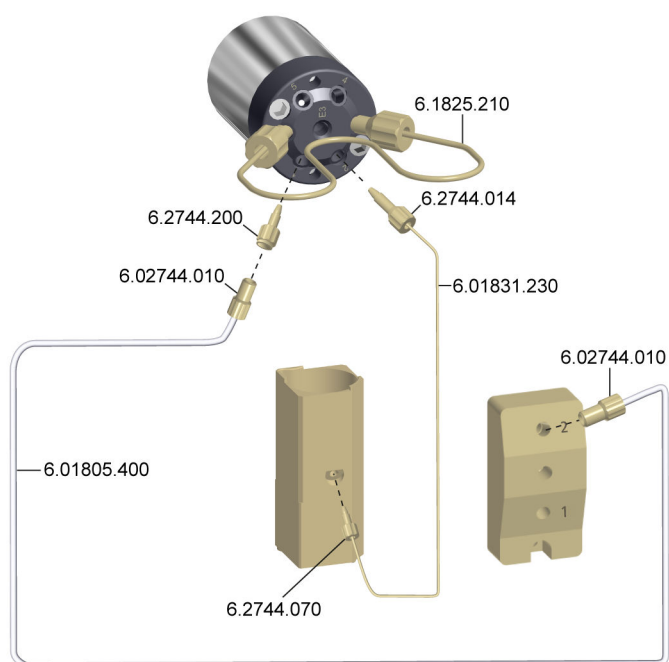


Figure 118 Connector – Transfer tubing LQH

6 Connecting the injector

i Use only pressure screws (6.2744.01x) for capillary connections at the injector.

- Use a short pressure screw to screw one end of the PEEK capillary 0.75 mm ID / 100 cm at the sample outlet of the dilution station.
- Use a pressure screw to connect the other end of the PEEK capillary 0.75 mm ID / 100 cm to injector port 2 (bottom right). The PEEK capillary 0.75 mm ID / 100 cm leads to the injector on the right side of the autosampler.
- Cut a piece of FEP tubing to approx. 150 cm. Fit a flangeless fitting to both ends of the FEP tubing that has been cut to size.
- Use an adapter UNF 10/32 outer / M6 inner to screw one end of the FEP tubing to injector port 1 (bottom left).
- Use a flangeless fitting to screw the other end of the FEP tubing to Port 2 of the switching valve 3/2.



7 Connecting the waste collector

- Use a flangeless fitting to screw one end of an FEP tubing to Port 1 of the switching valve 3/2.
- Use a flangeless fitting and an adapter UNF 10/32 outer / M6 inner to screw the other end of the FEP tubing to a waste collector (MFM or RO). To do this, guide the FEP tubing along the fixation bar below the AS tray. Guide the FEP tubing along the left side of the autosampler and the OMNIS IC to the waste collector (see "Guide system", chapter 5.3, page 109).

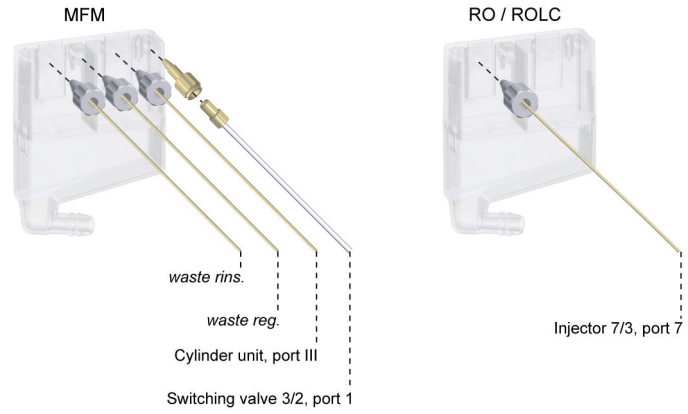


Figure 119 Example installation – Waste collector

The sample path for the Inline Dilution Technique is installed.

Sample path in a 2-channel system

If the Inline Dilution Technique is used in a 2-channel system, then the sample path must be adapted:

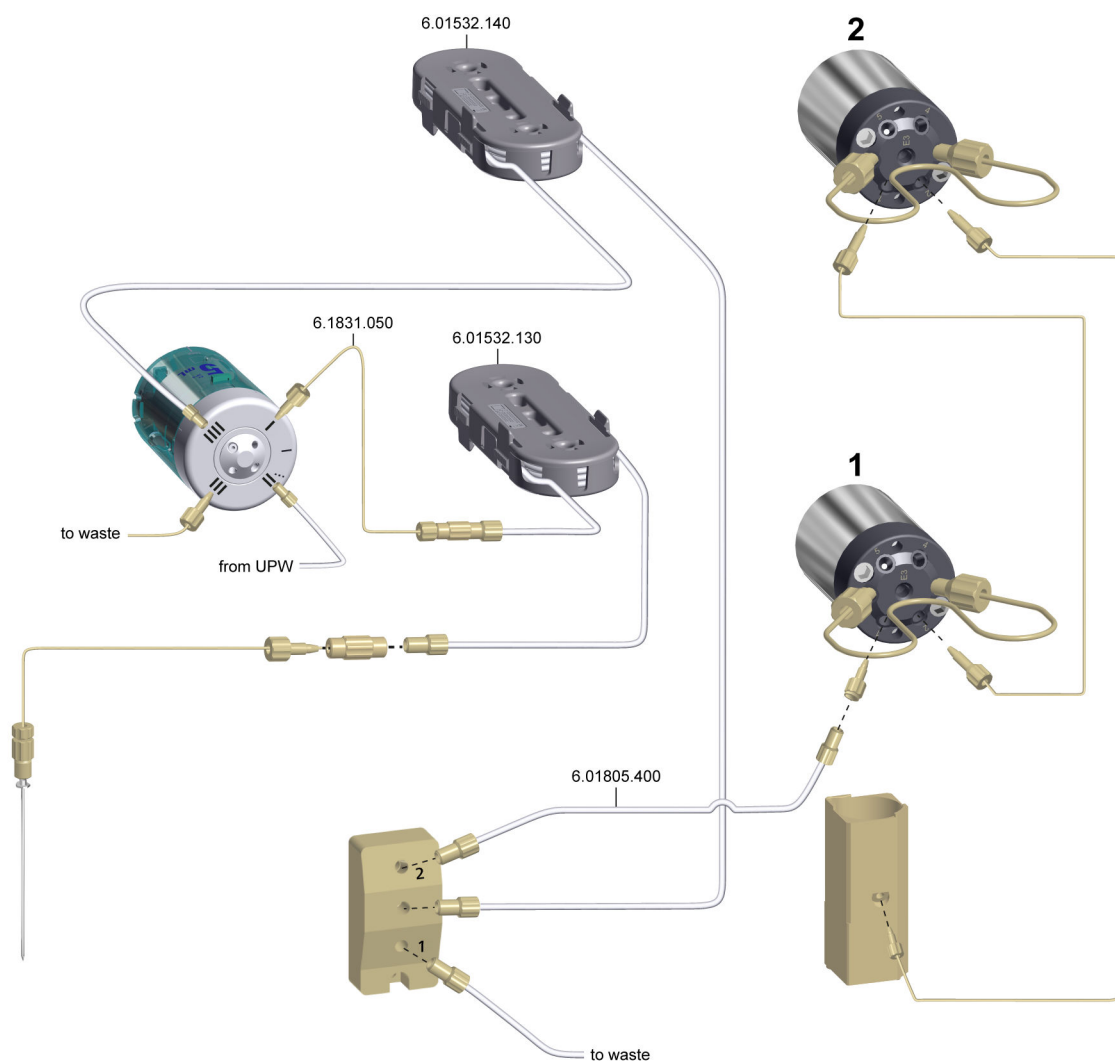


Figure 120 Inline Dilution Technique 2-channel system – Flow diagram

Table 38 Metrohm Inline Dilution Technique – Installation

Product name	Article number	Capillary length
PEEK sample loop 20 µL	6.1825.210	-
PEEK capillary INJ – INJ 250 / 0.5 mm	6.01831.260	25 cm

Installing the Inline Dilution Technique (2-channel system)

Prerequisite:

- Kit OMNIS IC equip.: MIDT is installed ([see "Installing the Inline Dilution Technique \(1-channel system\)", page 159](#)).

- A free actuator with installed injector 6/2 or injector 7/3 is in the OMNIS IC System.

Required accessories:

- PEEK capillary INJ – INJ 250 / 0.5 mm (6.01831.260)
- PEEK sample loop 20 µL (6.1825.210)

1 Connecting a second injector

 The sample is always drawn through both injectors. If the upper sample loop needs to be filled, then the upper injector will be set to **FILL**. At the same time, the lower injector is set to **INJECT**. While the lower sample loop is being filled, the upper injector is set to **INJECT**. At the same time, the lower injector is set to **FILL**.

- Loosen the PEEK capillary 0.75 mm ID / 100 cm from injector port 2 of the first injector (bottom). Attach the capillary that has just now been loosened to injector port 2 of the second injector (top).
- Use a pressure screw to screw one end of the PEEK capillary INJ – INJ 250 / 0.5 mm to injector port 2 of the first injector (bottom).
- Use a pressure screw to screw the other end of the PEEK capillary INJ – INJ 250 / 0.5 mm to injector port 1 of the second injector (top).

5.4.3 Metrohm inline ultrafiltration and Metrohm Inline Dilution Technique in combination

The OMNIS IC equipment: MIDT-UF, PP/DD extends the OMNIS IC System to include the Metrohm Inline Dilution Technique (MIDT) and the inline ultrafiltration (UF).

A detailed description of the inline dilution can be found in the chapter *Inline Dilution Technique* ([see page 153](#)).

A detailed description of the Inline Ultrafiltration can be found in the chapter *Inline Ultrafiltration* ([see page 133](#)).

Mode of operation

1. Rinsing the sample needle
 - a. The sample needle moves to the **Rinse position**. In this position, the sample needle and the sample path are rinsed with ultrapure water.

2. Diluting and filtering the sample
 - a. The sample needle moves to the sample position and aspirates a calculated sample amount.
 - b. The sample needle moves to the position **Dilution station**.
 - c. The previously aspirated sample amount and the required amount of the dilution solution are injected into the dilution vessel. The OMNIS IC System automatically calculates the required amount of sample and dilution solution. The magnetic stirrer integrated into the dilution station homogenizes the sample and the dilution solution. The resulting amount of diluted sample is referred to as the *end volume*.
 - d. A peristaltic pump then continuously delivers the sample solution from the dilution station into the sample chamber of the ultrafiltration cell. Due to the simultaneous suction effect of the OMNIS Dosing Drive Unit, 20 to 25% of the sample is drawn through the filtration membrane into the filtrate chamber and to the injector. The remaining 75 to 80% of the sample flows along the filtration membrane to Port 3 of the Multi Flow Monitor. The remaining sample is then transported into the waste collector. The Multi Flow Monitor counts the number of drops and is used for monitoring the ultrafiltration performance. A constant number of drops over many measurements indicates that the ultrafiltration performance is constant. An increase in the number of drops indicates that the ultrafiltration performance is decreasing.
3. Injecting
 - a. The injector switches to the fill position when the peristaltic pump and the OMNIS Dosing Drive Unit start, causing the diluted filtrate to be aspirated into the sample loop.
 - b. After a certain filtration time, the diluted filtrate is injected by switching the injector to the inject position.
4. Rinsing the dilution vessel
 - a. The entire sample path is rinsed in parallel with chromatographic separation and detection with rinsing solution. The dilution vessel is rinsed twice after each dilution. For this, rinsing solution is dosed into the dilution vessel via the sample needle capillary. In the first rinsing step, the sample chamber of the ultrafiltration cell is rinsed via the peristaltic pump. The rinsing solution is then additionally conveyed through the filtration membrane, the injector, and the switching valve 3/2 with the aid of the OMNIS Dosing Drive Unit.
 - b. The volume of the first rinsing process corresponds to half of the end volume.
 - c. The volume of the second rinsing process corresponds to the end volume + 1 mL.

Overview

The equipment kit contains the following parts:

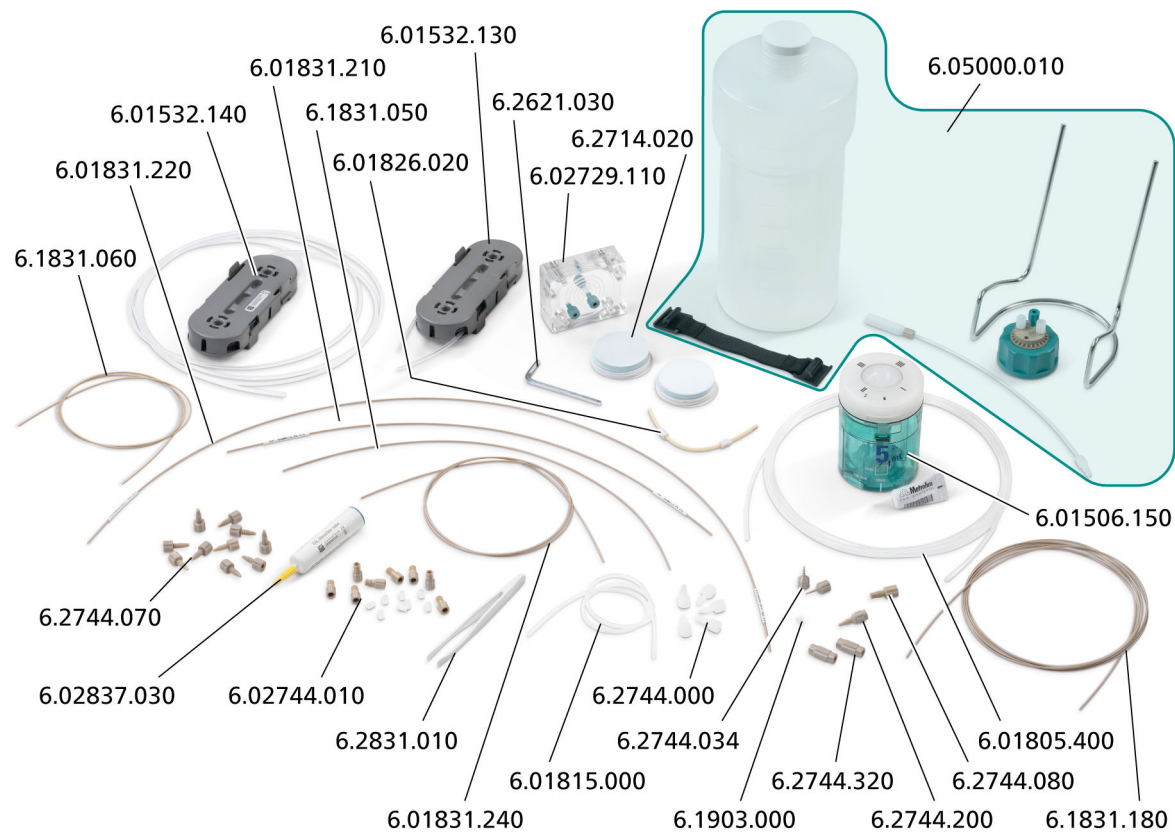


Figure 121 OMNIS IC equipment: MIDT-UF, PP/DD – Parts

Table 39 Parts of the OMNIS IC equipment: MIDT-UF, PP/DD (6.05331.060)

Article number	Product name	Number
6.1831.060	PEEK capillary 0.5 mm ID / 1 m	1
6.01831.220	PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm	1
6.01532.140	Transfer tubing LQH, FEP, outer diameter 1/8"	1
6.01831.210	PEEK cap. PP – SAMPLE IN, 400/0.5 mm	1
6.1831.050	PEEK capillary, 0.5 mm ID, 40 cm	1
6.01826.020	Pump tubing, ID 1.0 mm, white - white	1
6.01532.130	Transfer tubing 5 mL, FEP, outer diameter 1/8"	1
6.2621.030	Hex key 4 mm	1
6.02729.110	Ultrafiltration cell 2	1
6.2714.020	Filtration membrane reg. cellulose, 0.2 µm, 50 pcs.	1

Article number	Product name	Number
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.01506.150	Cylinder unit OMNIS 5 mL, UNF 10/32	1
6.1831.180	PEEK capillary, 0.5 mm ID, 3 m	1
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.2744.080	Adapter thread M6 outer / UNF 10/32 inner	1
6.2744.200	Adapter UNF 10/32 outer / M6 inner	1
6.2744.320	Coupling M6, UNF 10/32	2
6.1903.000	Stirring bar, 8 x 3 mm	1
6.2744.034	Coupling olive/UNF 10/32, 2 pcs.	1
6.2744.000	Pressure screw PVDF, 5 pcs.	1
6.01815.000	Spiral band, 3–15 mm, 0.5 m	1
6.01831.240	PEEK capillary, 0.75 mm ID, 140 cm	1
6.2831.010	Plastic tweezers	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	4
6.02837.030	CO2 Absorber (Tube)	1
6.2744.070	Pressure screw short, 5 pcs.	2

Sample path

The sample path (*see "Connecting functional units", chapter 5.15, page 262*) must be adjusted when a sample preparation technique is used. The following illustration shows the sample path of the inline dilution and inline ultrafiltration in combination:

-  To ensure successful measurement, the following capillaries with fixed lengths must **NOT** be cut to size:
- PEEK cap. PP – SAMPLE IN, 400/0.5 mm (6.01831.210)
 - PEEK capillary, 0.5 mm ID / 40 cm (6.1831.050)
 - PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm (6.01831.220)
 - PEEK capillary, 0.5 mm ID / 1 m (6.1831.060)
 - PEEK capillary, 0.75 mm ID / 140 cm (6.01831.240)

The following capillaries are cut to size for installation on the OMNIS IC System:

- PEEK capillary, 0.5 mm ID / 3 m (6.1831.180)
- FEP tubing M6, 1/8" x 1.59 mm, 3 m (6.01805.400)

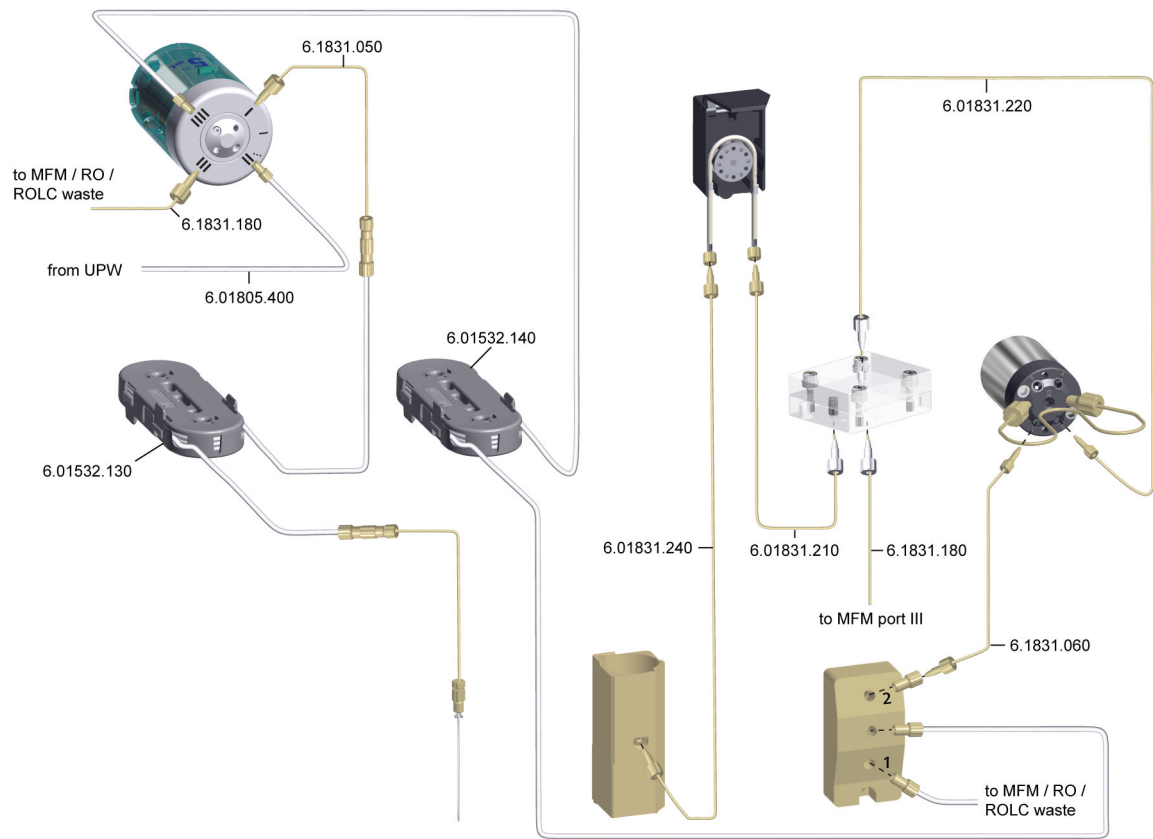


Figure 122 Inline ultrafiltration and Metrohm Inline Dilution Technique in combination – Sample path

Table 40 Inline ultrafiltration and Inline Dilution Technique – Installation

Product name	Article number	Capillary length
PEEK capillary, 0.5 mm ID, 40 cm	6.1831.050	40 cm
Transfer tubing LQH, FEP, OD 1/8"	6.01532.140	-
Transfer tubing 5 mL, FEP, OD 1/8"	6.01532.130	-
FEP tubing M6, 1/8" x 1.59 mm, 3 m	6.01805.400	cut to size for OMNIS IC System
PEEK capillary, 0.5 mm ID, 3 m	6.1831.180	cut to size for OMNIS IC System
PEEK capillary, 0.75 mm ID, 140 cm	6.01831.240	140 cm
PEEK cap. PP – SAMPLE IN, 400/0.5 mm	6.01831.210	40 cm
PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm	6.01831.220	80 cm
PEEK capillary, 0.5 mm ID, 1 m	6.1831.060	1 m
Sample needle capillary, PEEK, ID 0.5 mm	-	cut to size for OMNIS IC System

Installing Inline Dilution Technique and inline ultrafiltration in combination

Prerequisite:

- A dilution station with dilution vessel is installed in the autosampler (*see "Replacing the dilution vessel", chapter 8.2.3, page 427*).
- The OMNIS IC System has a free peristaltic pump channel.
- The OMNIS IC System includes a free OMNIS Dosing Drive Unit and an MISP unit.
- A switching valve 3/2 M6 kit is installed in the autosampler by default on the right-hand side.

Required accessories:

- Kit *OMNIS IC equipment*: MIDT-UF, PP/DD (6.05331.060)
- Capillary cutter (6.2621.080)

Table 41 Accessories to be ordered separately:

Article number	Product name
2.1056.10x0	OMNIS Peristaltic Pump Unit or
6.05801.000	Peristaltic pump channel kit
2.1056.0310	OMNIS Dosing Drive Unit
6.05801.120	Switching valve 3/2, M6 kit
6.05801.250	Dilution station kit
2.1056.1110	MISP unit

1 Installing the cylinder unit OMNIS 5 mL

- Attach the cylinder unit OMNIS 5 mL to the dosing drive ([see "Equipping the OMNIS Dosing Drive Unit", chapter 5.5, page 198](#)).

2 Connecting the ultrapure water

- Cut a piece of FEP tubing to approx. 150 cm. Use a flangeless screw fitting to connect the cut-to-size FEP tubing at the bottle cap of the ultrapure water bottle (*see "Connecting a bottle for eluent and concentrate", page 250*).
- Use a flangeless fitting to screw the free end of the FEP tubing to Port II of the cylinder unit OMNIS.

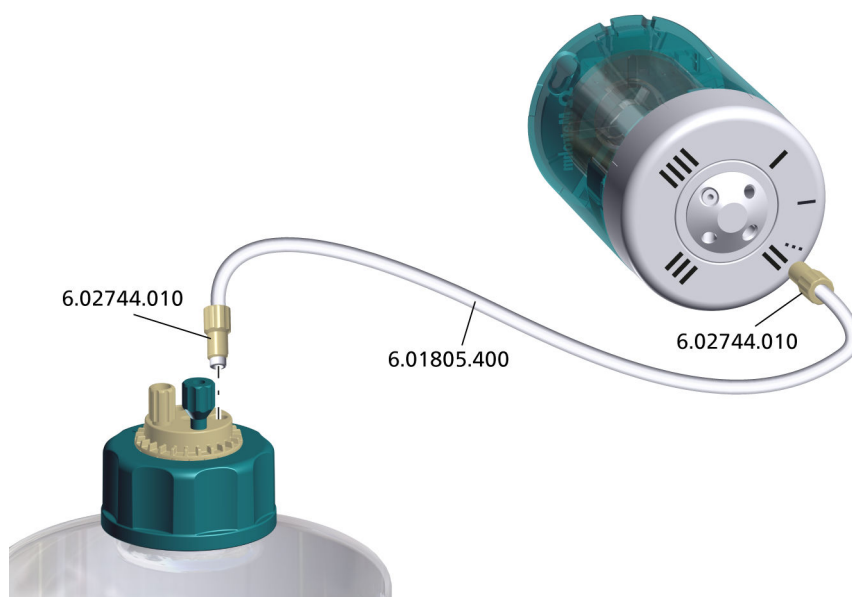


Figure 123 Connector – Ultrapure water

- Insert the CO2 Absorber (Tube) into the Luer connector of the bottle cap.

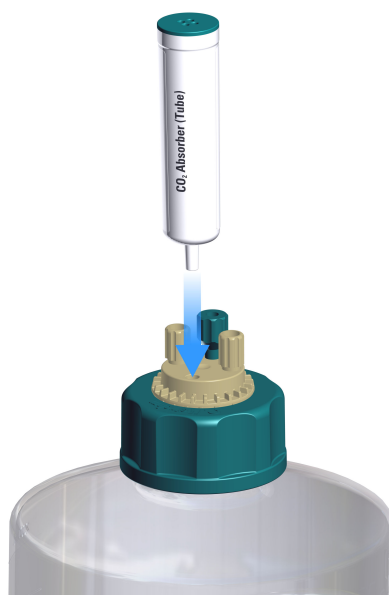


Figure 124 Mounting the CO2 Absorber (Tube)

3 Connecting the outlet capillary

- Use a short pressure screw to screw one end of a PEEK capillary 0.5 mm (6.1831.180) to Port III of the cylinder unit OMNIS.
- Use a PVDF pressure screw to screw the other capillary end at the waste collector (Multi Flow Monitor or reagent organizer).

4 Inserting the pump tubing

- Insert the pump tubing at both ends with one coupling olive/UNF 10/32 each and insert it into the peristaltic pump (*see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200*).

5 Connecting the dilution station to the peristaltic pump

NOTICE

Damage to the ultrafiltration cell caused by using the wrong pressure screws

PEEK pressure screws are too hard. PEEK pressure screws can damage the ultrafiltration cell material.

- Use only transparent PVDF pressure screws (6.2744.000) to tighten capillaries at the ultrafiltration cell.
- Use a short pressure screw to connect one end of the PEEK capillary 0.75 mm ID, 140 cm, to the dilution station. Screw the other capillary end to the coupling olive/UNF 10/32 on the peristaltic pump inlet.
- Use a short pressure screw to screw the *PP* end of the capillary *PP – SAMPLE IN* at the coupling olive/UNF 10/32 at the peristaltic pump outlet.



- Use a PVDF pressure screw to screw the *SAMPLE IN* end of the capillary *PP – SAMPLE IN* at the sample inlet of the ultrafiltration cell labeled *IN*.



6 Connecting the sample chamber to the waste collector

- Use a PVDF pressure screw to screw one end of a capillary 0.5 mm at the sample outlet of the ultrafiltration cell labeled *OUT*.
- Use a PVDF pressure screw to screw the other capillary end 0.5 mm to Port 3 of the waste collector (Multi Flow Monitor).

7 Connecting the filtrate chamber to the injector

- Use a PVDF pressure screw to screw the *FILTRATE OUT* end of the *FILTRATE OUT – INJ* capillary at the filtrate outlet of the ultrafiltration cell labeled *OUT*.



- Use a pressure screw to screw the *INJ* end of the capillary *FILTRATE OUT – INJ* to injector port 2.



8 Connecting the transfer tubing 5 mL

i The transfer tubing 5 mL (6.01532.130) and the transfer tubing LQH (6.01532.140) must first be placed on top of each other on the MISIP tray. To do this, remove the MISIP tray from the MISIP unit. After connecting one of the transfer tubings, the MISIP tray can no longer be removed completely. This makes it difficult to insert another transfer tubing.

- Insert the transfer tubing 5 mL into the MISIP unit ([see "Equipping the OMNIS MISIP Unit", chapter 5.8, page 205](#)).
- Attach a flangeless fitting to both ends of the transfer tubing 5 mL.
- Use a flangeless fitting to screw a coupling M6 / UNF 10/32 to both ends of the transfer tubing 5 mL.
- Use a short pressure screw to screw the PEEK capillary 0.5 mm ID / 40 cm via the coupling M6 / UNF 10/32 at the short end of the transfer tubing 5 mL.

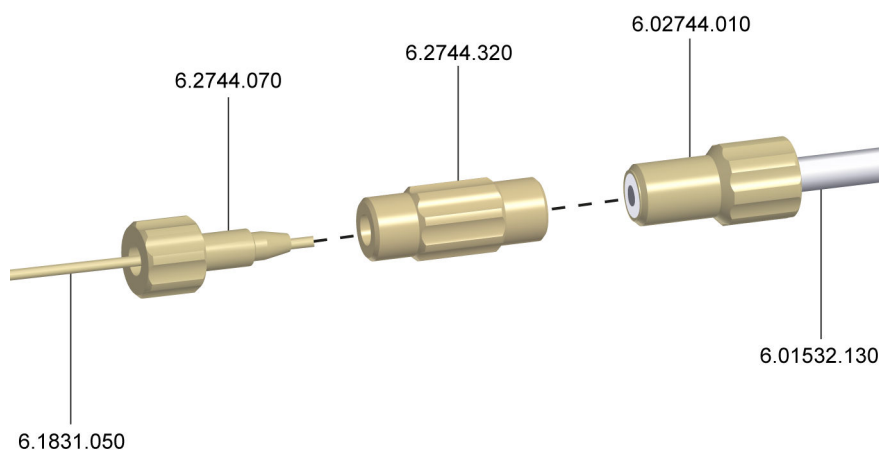


Figure 125 Connection of the transfer tubing 5 mL

- Use a short pressure screw to screw the other end of the PEEK capillary 0.5 mm ID / 40 cm to Port I of the cylinder unit OMNIS.
- Use a short pressure screw to screw the sample needle capillary via the coupling M6 / UNF 10/32 at the long end of the transfer tubing 5 mL.

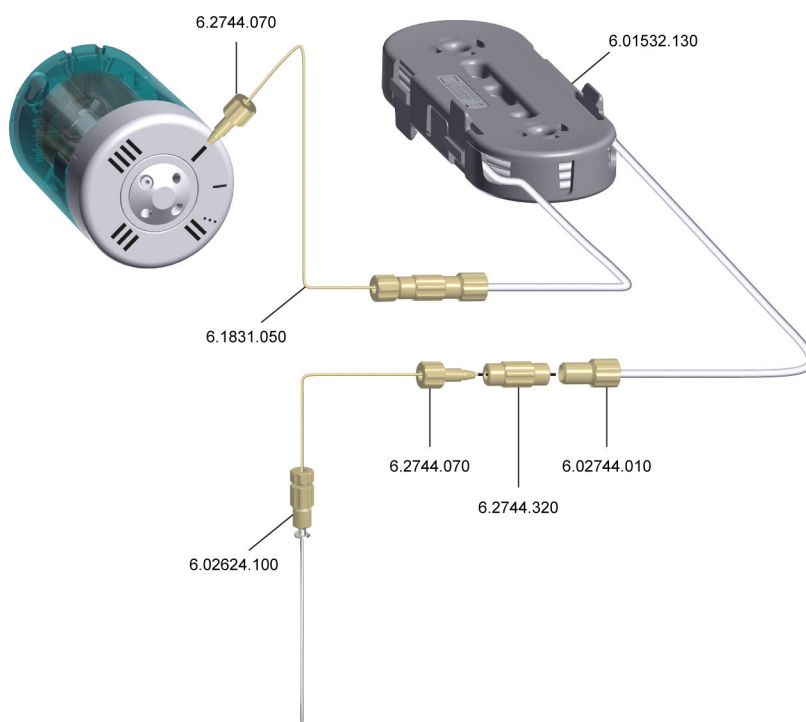


Figure 126 Flow diagram – Transfer tubing 5 mL

9 Connecting the transfer tubing LQH

- Use a flangeless fitting to screw the short end of the transfer tubing LQH to Port IIII of the cylinder unit OMNIS.

- Use a flangeless fitting to screw the long end of the transfer tubing LQH at the central Port of the switching valve 3/2. Guide the transfer tubing LQH along the left side of the OMNIS IC into the autosampler. Guide the transfer tubing LQH along the fixation bar below the OMNIS IC AS tray to the switching valve 3/2 (*see figure 92, page 112*).



Figure 127 Connector – Transfer tubing LQH

10 Inserting the ultrafiltration cell

- Insert the ultrafiltration cell into the MISP unit (*see "Installing optional accessory parts", page 205*).

11 Connecting the switching valve 3/2

- Use a short pressure screw to connect one end of another capillary 0.5 mm to Port 2 of the switching valve 3/2.
- Use a pressure screw to connect the other capillary end at injector Port 1.

12 Connecting the waste collector (reagent organizer)

- The Multi Flow Monitor alone does not have enough connectors for this MISP technique. Therefore, the irrelevant flows can be distributed to the waste collector installed in the RO/ROL.
- Use a flangeless fitting to connect one end the FEP tubing M6 to Port I of the switching valve 3/2.
- Connect the other end of the FEP tubing M6 to the waste collector (Multi Flow Monitor or reagent organizer) via the adapter UNE.

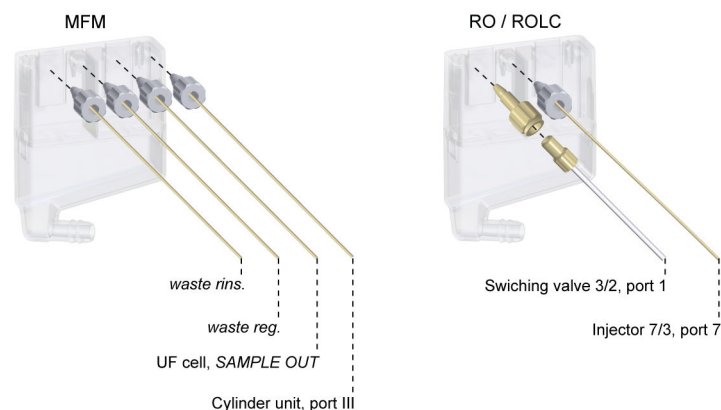


Figure 128 Recommended installation – Waste collector

The sample path for inline ultrafiltration and Metrohm Inline Dilution Technique in combination is installed.

5.4.4 Metrohm intelligent Partial Loop injection Technique

The OMNIS IC equipment: MiPT expands the OMNIS IC System to include the Metrohm intelligent Partial Loop injection Technique ("MiPT").

This technique allows you to fill the 250 μL sample loop with a defined volume. The OMNIS Dosing Drive Unit with an attached cylinder unit OMNIS performs the precise dosing steps to accomplish this. The Metrohm intelligent Partial Loop injection Technique enables calibration with only one standard solution, as the injection volume can be selected freely. The same also applies to the sample injection, so that you can for instance select a small injection volume for a highly concentrated sample or a larger injection volume for low-concentration samples.

In the rinse station of the autosampler ([see "Rinse station", page 58](#)), the sample needle is rinsed with ultrapure water after each sample aspiration. At the same time, the entire sample path is rinsed with ultrapure water.

The Metrohm intelligent Partial Loop injection Technique can be installed in a 1-channel system ([see page 181](#)) or a 2-channel system ([see page 185](#)).

If required, the Metrohm intelligent Partial Loop injection technique can be combined with inline ultrafiltration ([see page 187](#)).

The following injectors can be used for MiPT:

Table 42 Injectors – MiPT

Article number	Injector	Volume	Special features
6.05801.170	Injector 6/2	Samples: 4 μL –200 μL Calibration: 2 μL –200 μL	–

Article number	Injector	Volume	Special features
6.05801.180	Injector 7/3	Samples: 1 µL–200 µL Calibration: 0.5 µL–200 µL	The injector 7/3 enables pressure relief in the sample loop. The pressure relief leads to greater precision when dosing in MiPT applications.

Mode of operation

1. Emptying the cylinder unit OMNIS
 - a. The cylinder unit OMNIS is emptied at the determination start. The injector is in the inject position.
2. Aspirating the sample
 - a. The sample (or the standard solution) is aspirated with the OMNIS Dosing Drive Unit into the transfer capillary.
 - b. The sample needle moves to the **Drain position** of the rinse station.
3. Filling the sample loop
 - a. After pre-dosing, the injector switches to the **Fill position**. In the case of injector 7/3, pressure relief takes place during this step.
 - b. The OMNIS Dosing Drive Unit delivers the injection volume from the transfer capillary to the 250 µL sample loop.
4. Injecting and rinsing
 - a. The injector is switched to the **Inject position**. At the same time, data acquisition starts. The sample is injected into the separation column with the eluent.
 - b. Excess sample in the sample path is transferred to the sample needle and discarded via the **Drain position**.
 - c. Afterwards, the sample needle moves to the **Rinse position**. The sample path is rinsed.

Overview

The equipment kit contains the following parts:

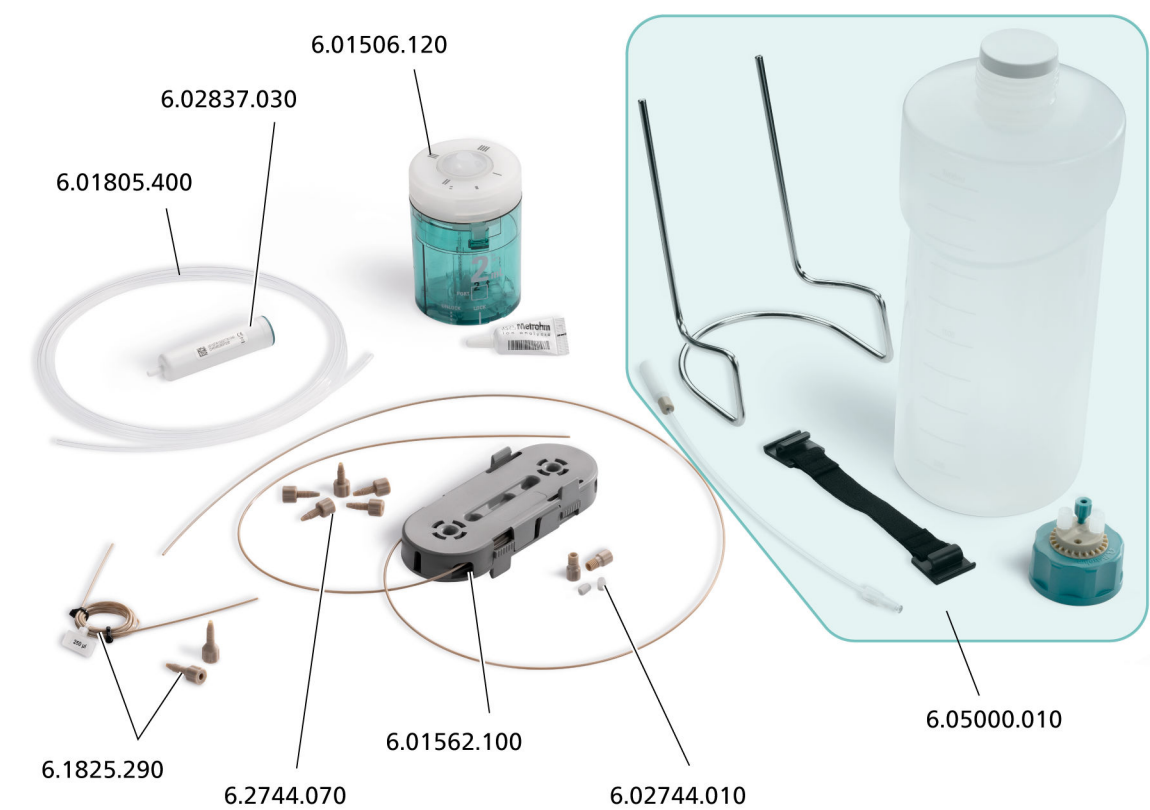


Figure 129 OMNIS IC equipment: MiPT – Parts

Table 43 Parts of the OMNIS IC equipment: MiPT (6.05331.070)

Article number	Product name	Number
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.02837.030	CO2 Absorber (Tube)	1
6.01506.120	Cylinder unit OMNIS 2 mL, UNF 10/32	1
6.2803.010	Grease (2 g)	1
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	1
6.01562.100	Transfer capillary 2 mL, PEEK	1
6.2744.070	Pressure screw short, 5 pcs.	1
6.1825.290	Sample loop 250 µL, PEEK	1

Sample path

The sample path ([see "Connecting functional units", chapter 5.15, page 262](#)) must be adjusted when a sample preparation technique is used. The following illustration shows the sample path of the Metrohm intelligent Partial Loop injection Technique:



- i** The following capillaries are cut to size for installation on the OMNIS IC System:
- FEP tubing M6, 1/8" x 1.59 mm, 3 m (6.01805.400)
 - Sample needle capillary, PEEK, ID 0.5 mm

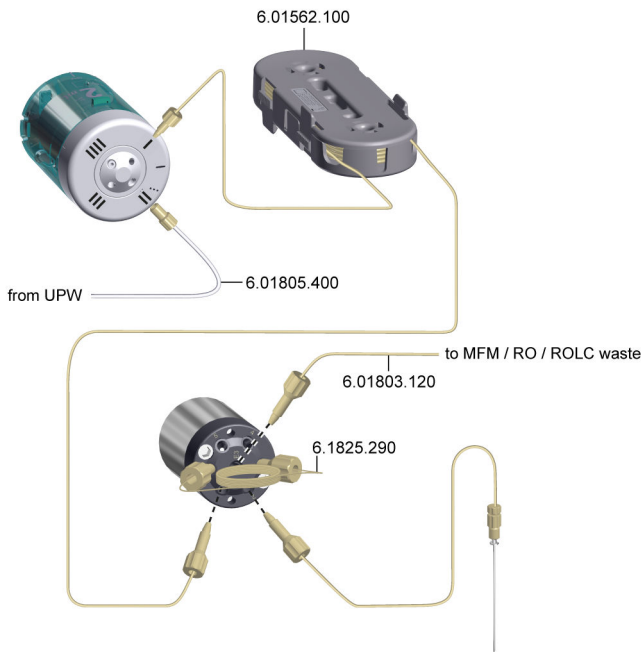


Figure 130 Metrohm intelligent Partial Loop Injection Technique (MiPT) – Flow diagram

Table 44 Metrohm intelligent Partial Loop Injection Technique (MiPT) – Installation

Product name	Article number	Capillary length
FEP tubing M6, 1/8" x 1.59 mm, 3 m	6.01805.400	cut to size for OMNIS IC System
Transfer capillary 2 mL, PEEK	6.01562.100	-
PEEK capillary INJ – MFM/WC, 950/0.75 mm	6.01803.120	cut to size for OMNIS IC System
Sample loop 250 µL, PEEK	6.1825.290	-
Sample needle capillary, PEEK, ID 0.5 mm	-	cut to size for OMNIS IC System

Installing the Metrohm intelligent Partial Loop Injection Technique (1-channel system)

Prerequisite:

- The OMNIS IC System includes a free OMNIS Dosing Drive Unit and an OMNIS MISP Unit.

Required accessories:

- Kit OMNIS IC equipment: MiPT (6.05331.070)
- PEEK capillary INJ – MFM/WC, 950/0.75 mm (6.01803.120)
- Capillary cutter (6.2621.080)

Table 45 Accessories to be ordered separately:

Article number	Product name
2.1056.0310	OMNIS Dosing Drive Unit
2.1056.1110	OMNIS MISP Unit

 The OMNIS Dosing Drive Unit and the OMNIS MISP Unit need to be ordered only if the system is not already equipped with an OMNIS Dosing Drive Unit and an OMNIS MISP Unit.

1 Replacing the sample loop

 For capillary connections on the injector, use only PEEK pressure screws (6.2744.010 and 6.2744.014).

- If no sample loop 250 μL is installed, then remove the installed sample loop.
- Use 2 pressure screws to screw the 250 μL sample loop to the injector ports 3 and 6 (in the middle of the injector) (*see "Equipping the OMNIS Actuator Unit", chapter 5.7, page 203*).

2 Attaching the cylinder unit OMNIS

- Attach the cylinder unit OMNIS to the dosing drive (see "Equipping the OMNIS Dosing Drive Unit", chapter 5.5, page 198).

3 Connecting the bottle with ultrapure water

- Use a flangeless fitting to connect an FEP tubing (cut from the FEP tubing M6, $\frac{1}{8}$ " x 1.59 mm, 3 m) to the bottle containing ultrapure water (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).
- Use a flangeless fitting to screw the free end of the FEP tubing to Port II of the cylinder unit OMNIS.

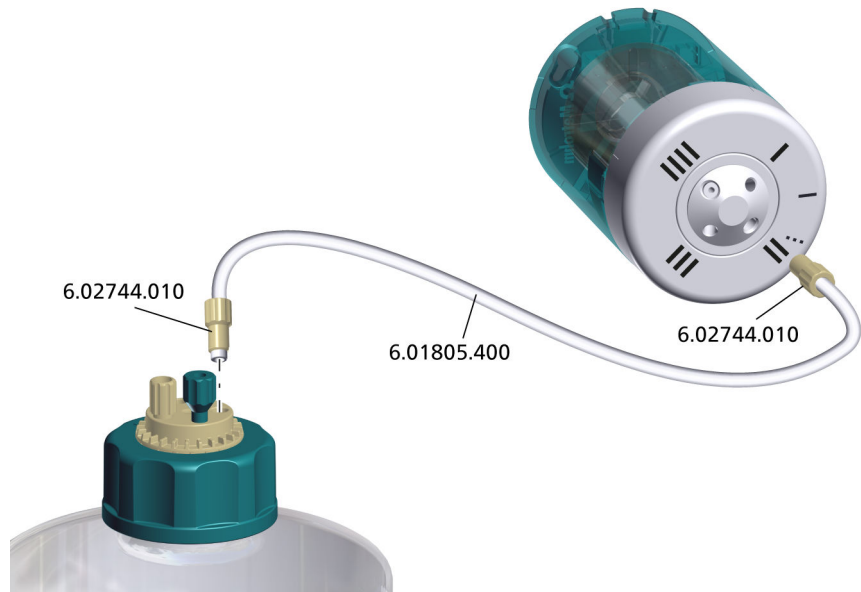


Figure 131 *Ultrapure water – Connector to the cylinder unit OMNIS*

- Insert the CO₂ Absorber (Tube) into the Luer connector of the bottle cap.

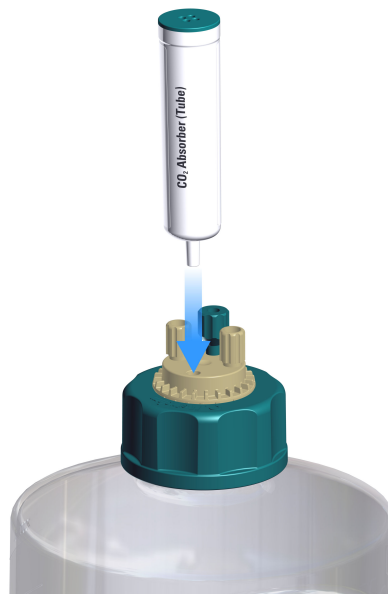


Figure 132 *Mounting the CO₂ Absorber (Tube)*

4 Connecting the injector

- i** Use only pressure screws (6.2744.010 and 6.2744.014) for capillary connections at the injector.

- Place the transfer capillary 2 mL on the MISF tray (*see "Installing optional accessory parts", page 205*).
- Use a short pressure screw to screw the short end of the transfer capillary 2 mL to Port I of the cylinder unit OMNIS.
- Use a pressure screw to connect the long end of the transfer capillary 2 mL to injector port 1 (bottom left).
- Use a pressure screw to screw the sample needle capillary to injector port 2 (lower right).
- Use a pressure screw to screw one end of the capillary INJ – MFM/WC to the central injector port.
- Use a PVDF pressure screw to screw the other end of the capillary to a waste collector (MFM or RO).

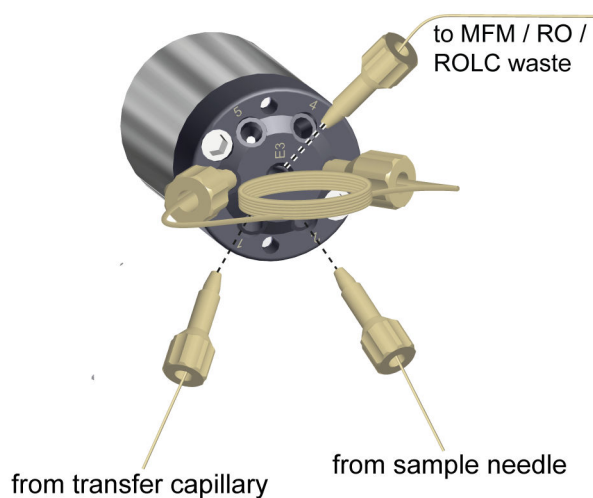


Figure 133 Connectors to the injector

The sample path for the Metrohm intelligent Partial Loop injection Technique is installed.

Sample path in a 2-channel system

If the Metrohm intelligent Partial Loop injection Technique is used in a 2-channel system, then the sample path must be adapted:

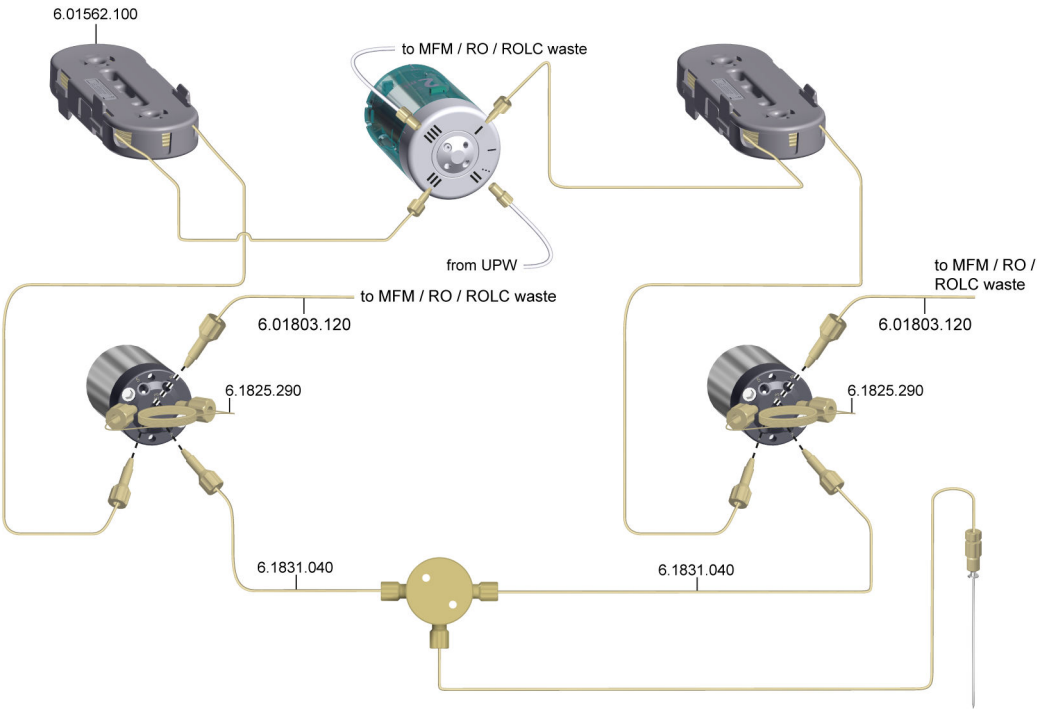


Figure 134 Metrohm intelligent Partial Loop injection Technique, 2-channel system – Flow diagram

Table 46 Metrohm intelligent Partial Loop injection Technique (MiPT) 2-channel system – Installation

Product name	Article number	Capillary length
PEEK capillary ID 0.5 mm	6.1831.040	15 cm
PEEK sample loop 250 µL	6.1825.290	-
Transfer capillary 2 mL, PEEK	6.01562.100	-
Sample needle capillary, PEEK, ID 0.5 mm	-	cut to size for OMNIS IC System
FEP tubing M6, 1/8" x 1.59 mm, 3 m	6.01805.400	cut to size for OMNIS IC System

Installing the Metrohm intelligent Partial Loop injection Technique (2-channel system)

Prerequisite:

- Kit OMNIS IC equipment: MiPT is installed ([see "Installing the Metrohm intelligent Partial Loop injection Technique \(1-channel system\)", page 181](#)).
- A free actuator with installed injector 6/2 or injector 7/3 is in the OMNIS IC System.

Required accessories:

- 2 x PEEK capillaries 0.5 mm ID 15 cm (6.1831.040)
- PEEK sample loop 250 μ L (6.1825.210)
- Transfer capillary 2 mL, PEEK (6.01562.100)
- T connector UNF 10/32 (6.2744.150)
- Holder, fixation bar (6.02006.120)

1 Preparing the second injector

 Use only pressure screws (6.2744.01x) for capillary connections at the injector.

- Insert the second transfer capillary 2 mL into the MISP unit. (*see "Installing optional accessory parts", page 205*).
- Use a short pressure screw to screw one end of the transfer capillary 2 mL to Port III of the cylinder unit OMNIS.
- Use a pressure screw to connect the other end of the transfer capillary 2 mL to injector port 1 of the second injector.
- Install the 250 μ L sample loop to port 3 and 6 (*see "Equipping the OMNIS Actuator Unit", chapter 5.7, page 203*).
- Use a pressure screw to connect one end of the 15 cm capillary 0.5 mm at injector port 2 of the second injector.
- Use a short pressure screw to connect the other end of the 15 cm capillary 0.5 mm to a port of the T connector.

2 Connecting the T connector

 Attach the holder, fixation bar near the injectors. This avoids unnecessary dead volume.

- Use a short pressure screw to connect the sample needle capillary to the T connector.
- Use a short pressure screw to tighten the second 15 cm capillary 0.5 mm at the remaining port of the T connector.
- Use a pressure screw to tighten the other end of the capillary to port 2 of the first injector.
Port 2 corresponds to the location at which the sample needle capillary was previously fastened in the 1-channel system.
- Attach the T connector with the holder, fixation bar to the fixation bar.

The sample path for the Metrohm intelligent Partial Loop injection Technique in the 2-channel system is installed.

5.4.5 Metrohm inline ultrafiltration and Metrohm intelligent Partial Loop injection Technique in combination

The OMNIS IC equipment: UF-MiPT, PP/DD expands the OMNIS IC System to include the Metrohm intelligent Partial Loop injection Technique ("MiPT") and Inline Ultrafiltration (UF).

A detailed description of the intelligent Partial Loop injection Technique can be found in the chapter *intelligent Partial Loop injection Technique* ([see page 178](#)).

A detailed description of the Inline Ultrafiltration can be found in the chapter *Inline Ultrafiltration* ([see page 133](#)).

Mode of operation

1. Filtrating the sample (UF)
 - a. One peristaltic pump delivers a continuous flow of sample solution through the sample chamber of the ultrafiltration cell. By default, 75% to 80% of the sample flows along the filtration membrane to the sample outlet and then into the Multi Flow Monitor (for monitoring ultrafiltration performance).
 - b. The suction effect of the OMNIS Dosing Drive Unit draws 20 to 25% of the sample through the filtration membrane into the filtrate chamber.
2. Filling the sample loop (MiPT)
 - a. 20 to 25% of the filtered sample is aspirated by the OMNIS Dosing Drive Unit past the injector to the transfer capillary.
 - b. The injector switches to the **Fill position**. In the case of injector 7/3, pressure relief of the sample loop takes place during this step.
 - c. The OMNIS Dosing Drive Unit delivers the injection volume from the transfer capillary to the 250 µL sample loop.
 - d. The exact injection volume is injected.
 - e. The excess sample is transported via position 1 of the switching valve 3/2 toward the waste collector on the RO/ROLC.

3. Rinsing

- a. The OMNIS Dosing Drive Unit fills the **Rinse position** with ultrapure water via Port 4.
- b. The peristaltic pump delivers the ultrapure water through the sample needle capillary along the sample side of the ultrafiltration cell to the Multi Flow Monitor.
- c. At the same time, the OMNIS Dosing Drive Unit draws ultrapure water through the ultrafiltration cell via Port 1 and via the injector (injector is in Inject position) up to Port 1 of the switching valve 3/2. From there, the ultrapure water is guided to the Multi Flow Monitor.
- d. The dosing unit transports the waste or excess sample via Port 1 of the switching valve 3/2 to the Multi Flow Monitor (for monitoring ultrafiltration performance).

Overview

The equipment kit contains the following parts:

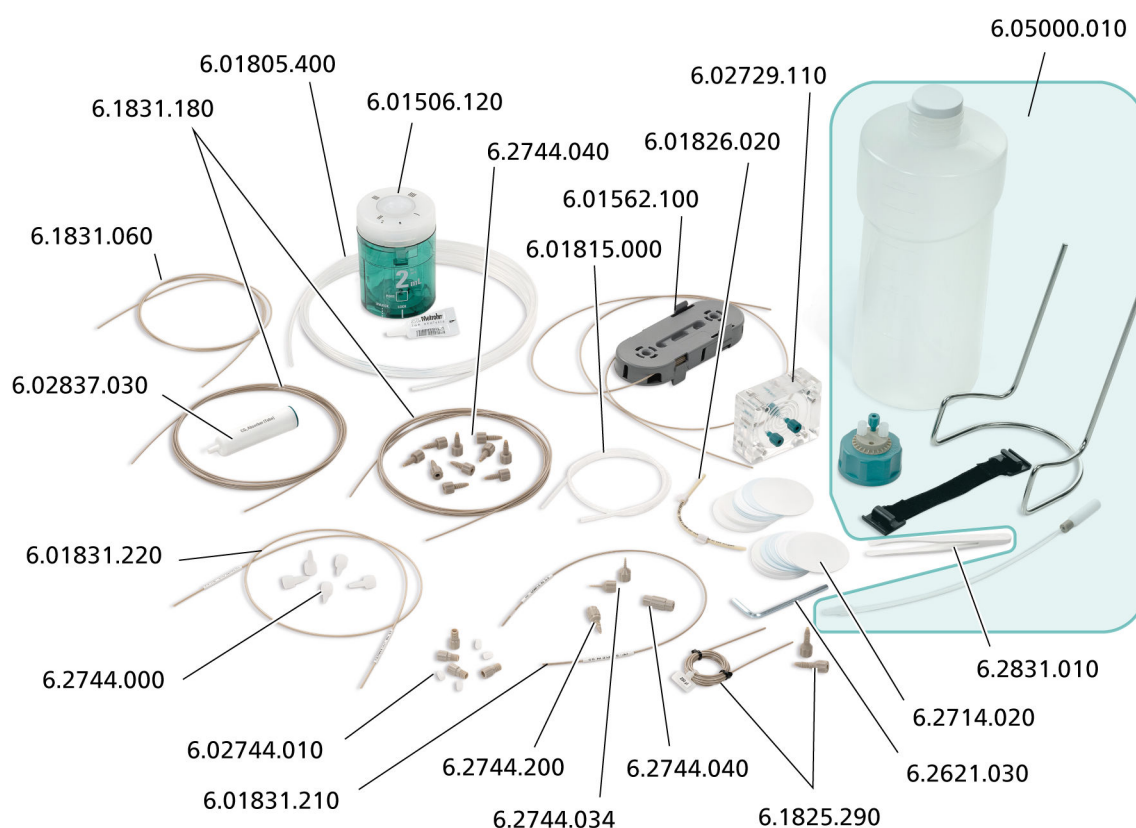


Figure 135 OMNIS IC equipment: UF-MiPT, PP/DD – Parts

Table 47 Parts of the OMNIS IC equipment: UF-MiPT, PP/DD
(6.05331.080)

Article number	Product name	Number
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.01506.120	Cylinder unit OMNIS 2 mL, UNF 10/32	1
6.2803.010	Grease (2 g)	1
6.2744.070	Pressure screw short, 5 pcs.	2
6.01815.000	Spiral band, 3–15 mm, 0.5 m	1
6.01562.100	Transfer capillary 2 mL, PEEK	1
6.01826.020	Pump tubing, ID 1.0 mm, white - white	1
6.02729.110	Ultrafiltration cell 2	1
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.2831.010	Plastic tweezers	1
6.2714.020	Filtration membrane reg. cellulose, 0.2 µm, 50 pcs.	1
6.2621.030	Hex key 4 mm	1
6.1825.290	Sample loop 250 µL, PEEK	1
6.2744.040	Coupling 2 x UNF 10/32	1
6.2744.034	Coupling olive/UNF 10/32, 2 pcs.	1
6.2744.200	Adapter UNF 10/32 outer / M6 inner	1
6.01831.210	PEEK cap. PP – SAMPLE IN, 400/0.5 mm	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	2
6.2744.000	Pressure screw PVDF, 5 pcs.	1
6.01831.220	PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm	1
6.02837.030	CO2 Absorber (Tube)	1
6.1831.060	PEEK capillary, 0.5 mm ID / 1 m	1
6.1831.180	PEEK capillary, 0.5 mm ID / 3 m	2

Sample path

The sample path ([see "Connecting functional units", chapter 5.15, page 262](#)) must be adjusted when a sample preparation technique is used. The following illustration shows the sample path of the Inline Ultrafiltration combined with the intelligent Partial Loop injection Technique:



 To ensure successful measurement, the following capillaries with fixed lengths must **NOT** be cut to size:

- PEEK cap. PP – SAMPLE IN, 400/0.5 mm (6.01831.210).
- PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm (6.01831.220)
- PEEK capillary 0.5 mm ID, 1 m (6.1831.060)

The following capillaries are cut to size for installation on the OMNIS IC System:

- PEEK capillary 0.5 mm ID, 3 m (6.1831.180)
- FEP tubing M6, 1/8" x 1.59 mm, 3 m (6.01805.400)
- Transfer capillary 2 mL, PEEK (6.01562.100)



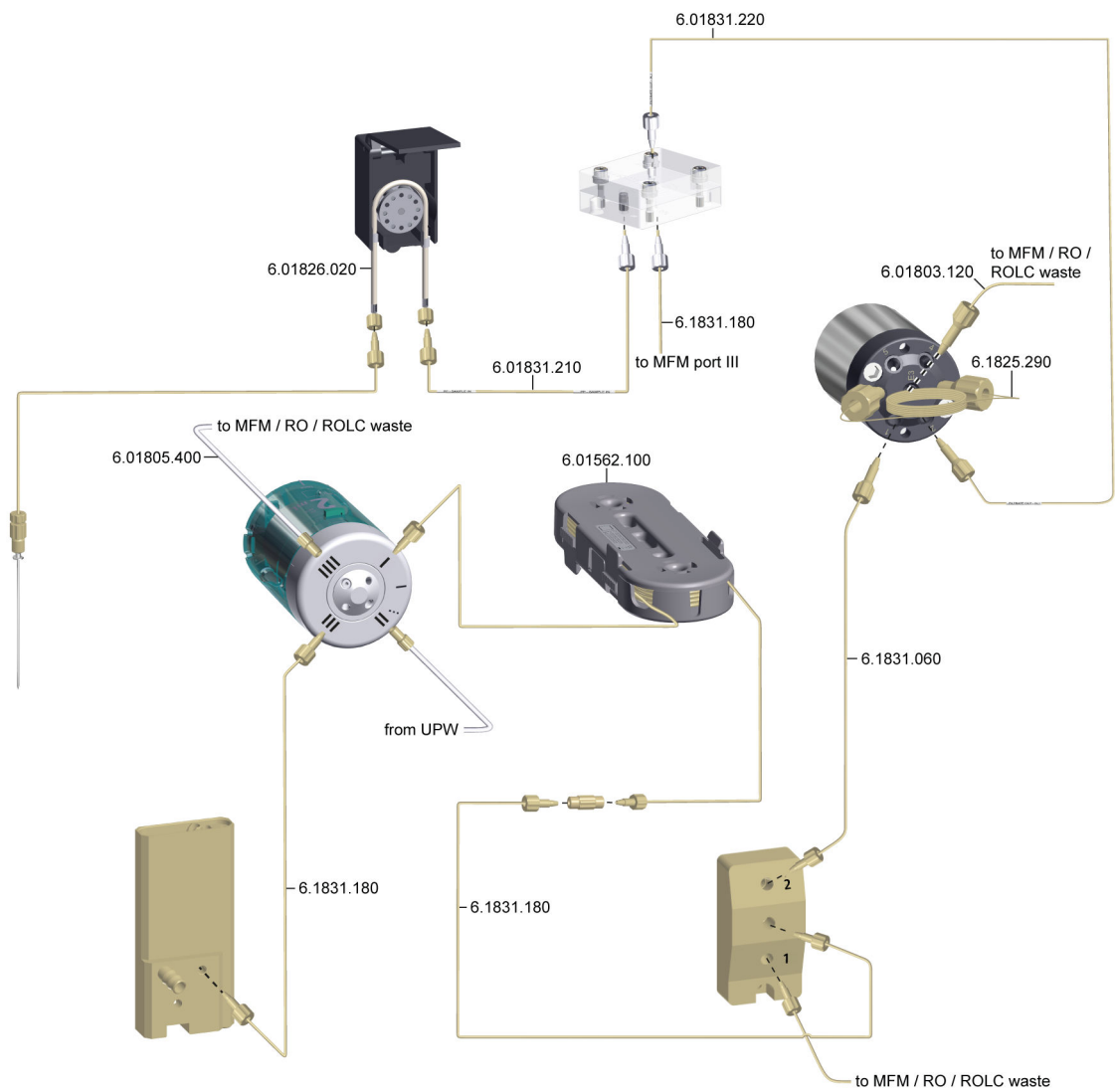


Figure 136 Inline Ultrafiltration combined with the intelligent Partial Loop injection technique – Flow diagram

Table 48 Inline Ultrafiltration and MiPT – Installation

Product name	Article number	Capillary length
Transfer capillary 2 mL, PEEK	6.01562.100	-
Pump tubing, ID 1.0 mm, white - white	6.01826.020	-
Sample loop 250 µL, PEEK	6.1825.290	-
PEEK cap. PP – SAMPLE IN, 400/0.5 mm	6.01831.210	40 cm
PEEK cap. FILTRATE OUT – INJ, 800/0.5 mm	6.01831.220	80 cm

Product name	Article number	Capillary length
PEEK capillary, 0.5 mm ID, 1 m	6.1831.060	100 cm
PEEK capillary, 0.5 mm ID, 3 m	6.1831.180	cut to size for OMNIS IC System
FEP tubing M6, 1/8" x 1.59 mm, 3 m	6.01805.400	cut to size for OMNIS IC System
Sample needle capillary, PEEK, ID 0.5 mm	-	cut to size for OMNIS IC System

Installing Inline Ultrafiltration and the intelligent Partial Loop injection Technique

Prerequisite:

- The OMNIS IC System has a free peristaltic pump channel.
- The OMNIS IC System includes a free OMNIS Dosing Drive Unit and a free OMNIS MISP Unit.
- A switching valve 3/2, UNF kit is installed on the right-hand side of the autosampler.

Required accessories:

- Kit OMNIS IC equipment: UF-MiPT PP/DD (6.05331.080)
- PEEK capillary INJ – MFM/WC, 950/0.75 mm (6.01803.120)

Table 49 Accessories to be ordered separately:

Article number	Product name
2.1056.10x0	OMNIS IC Peristaltic Pump Unit or
6.05801.000	Peristaltic pump channel kit
2.1056.0310	OMNIS IC Dosing Drive Unit
6.05801.110	Switching valve 3/2, UNF kit

1 Attaching the cylinder unit OMNIS

- Attach the cylinder unit OMNIS to the dosing drive (see "Equipping the OMNIS Dosing Drive Unit", chapter 5.5, page 198).

2 Connecting the bottle with ultrapure water

- Use a flangeless fitting to connect an FEP tubing 150 cm (cut from the FEP tubing M6, 1/8" x 1.59 mm, 3 m) to the bottle containing ultrapure water (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).

- Use a flangeless fitting to screw the free end of the FEP tubing to Port II of the cylinder unit OMNIS.

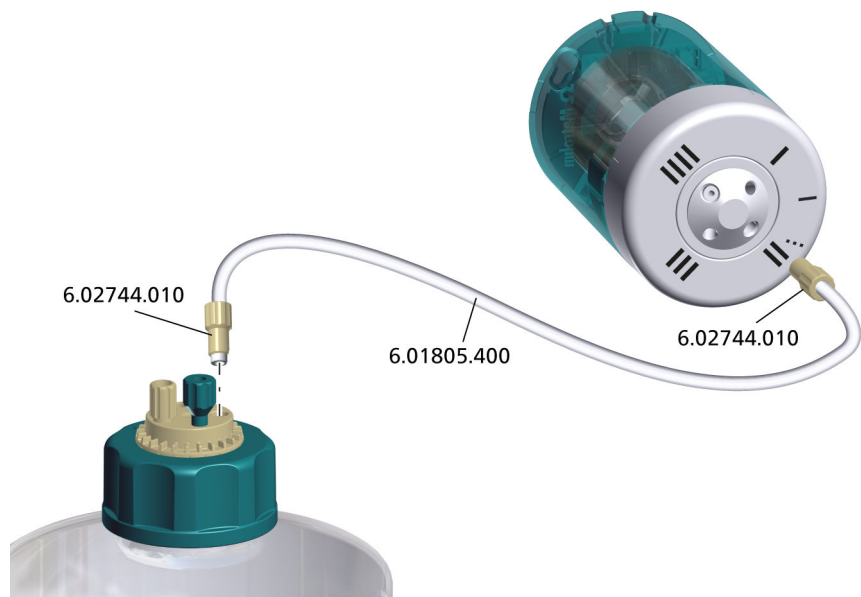


Figure 137 Ultrapure water – Connector to the cylinder unit OMNIS

- Insert the CO₂ Absorber (Tube) into the Luer connector of the bottle cap.

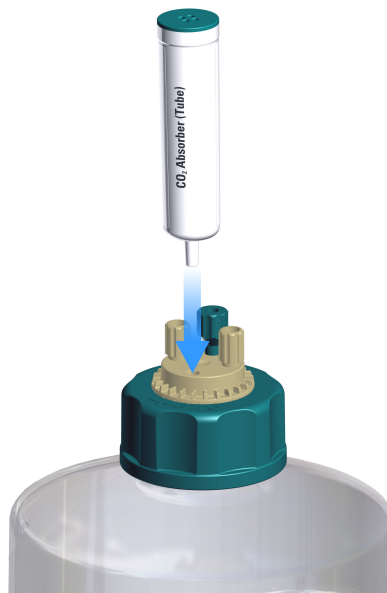


Figure 138 Mounting the CO₂ Absorber (Tube)



3 Connecting the injector

 Use only pressure screws (6.2744.01x) for capillary connections at the injector.

- If no sample loop 250 μL is installed, then remove the installed sample loop.
- Use 2 pressure screws to screw the 250 μL sample loop to the injector ports 3 and 6 (in the middle of the injector) (*see "Equipping the OMNIS Actuator Unit", chapter 5.7, page 203*).
- Use a pressure screw to screw one end of the 1 m PEEK capillary 0.5 mm to injector port 1.
- Use a short pressure screw to screw the other capillary end to Port 2 of the switching valve 3/2

4 Preparing the ultrafiltration cell

NOTICE

Damage to the ultrafiltration cell

Organic solvents (e.g. acetone) corrode and damage the ultrafiltration cell material (PMMA).

- Use ultrapure water for cleaning the ultrafiltration cell.
 - If an organic solvent is used for cleaning, then the ultrafiltration cell must then be rinsed with ultrapure water.
-
- Insert a filtration membrane that has been previously soaked in ultrapure water into the ultrafiltration cell (*see "Preparing the ultrafiltration cell", chapter 5.8.1, page 210*).

5 Inserting the pump tubing

- Insert the pump tubing at both ends with one coupling olive/UNF 10/32 each and insert it into the peristaltic pump (*see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200*).

6 Connecting the autosampler to the ultrafiltration cell

NOTICE

Damage to the ultrafiltration cell caused by using the wrong pressure screws

PEEK pressure screws are too hard. PEEK pressure screws can damage the ultrafiltration cell material.

- Use only transparent PVDF pressure screws (6.2744.000) to tighten capillaries at the ultrafiltration cell.

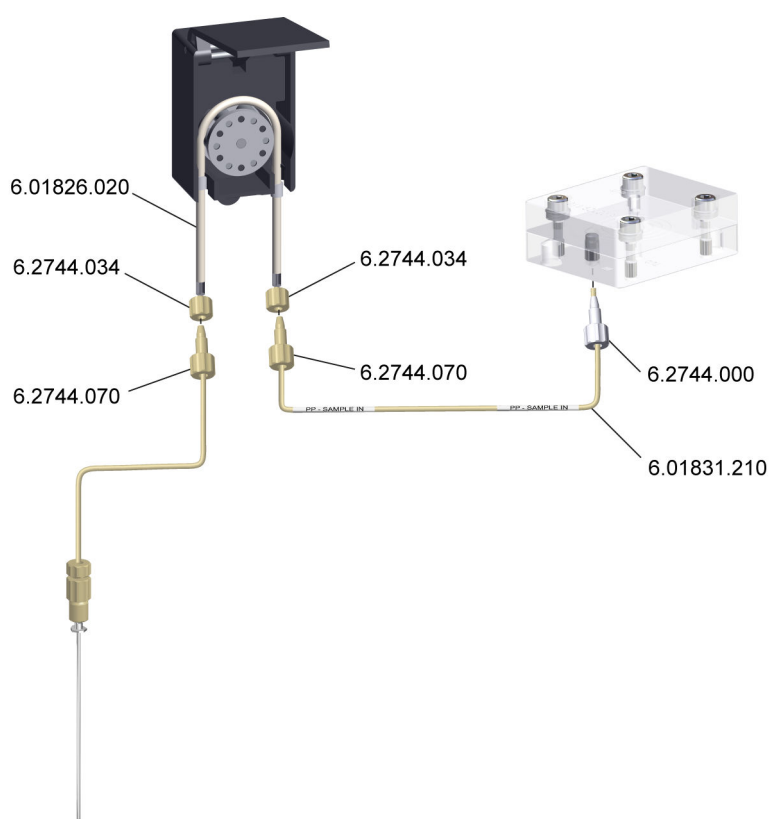
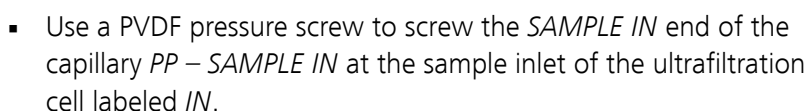


Figure 139 Connecting the autosampler to the ultrafiltration cell

- Use a short pressure screw to screw the free end of the sample needle capillary at the coupling olive/UNF 10/32 at the peristaltic pump inlet.
- Use a short pressure screw to screw the *PP* end of the capillary *PP – SAMPLE IN* at the coupling olive/UNF 10/32 at the peristaltic pump outlet.



- Use a PVDF pressure screw to screw one end of a capillary 0.5 mm at the sample outlet of the ultrafiltration cell labeled *OUT*.
- Use a PVDF pressure screw to screw the other capillary end 0.5 mm to inlet 3 of the waste collector (Multi Flow Monitor).

- Use a PVDF pressure screw to screw the *FILTRATE OUT* end of the *FILTRATE OUT – INJ* capillary at the filtrate outlet of the ultrafiltration cell labeled *OUT*.



- Use a pressure screw to screw the *INJ* end of the capillary *FIL-TRATE OUT – INJ* to injector port 2.



- Insert the ultrafiltration cell into the MISP unit (*see "Installing optional accessory parts", page 205*).
- Insert the transfer capillary 2 mL into the MISP unit. (*see "Installing optional accessory parts", page 205*).

- Use a short pressure screw to screw the long end of the transfer capillary 2 mL to Port I of the cylinder unit OMNIS.
- Use a short pressure screw to connect the shortened end of the transfer capillary 2 mL to a coupling 2 x UNF 10/32.
- Use a short pressure screw to screw one end at the free end of the coupling 2 x UNF 10/32. The coupling 2 x UNF 10/32 is located just in front of the transfer capillary on the MISIP tray. The PEEK capillary 0.5 mm can be cut to the required length.
- Use a short pressure screw to screw the other PEEK capillary end 0.5 mm at the central port of the switching valve 3/2.

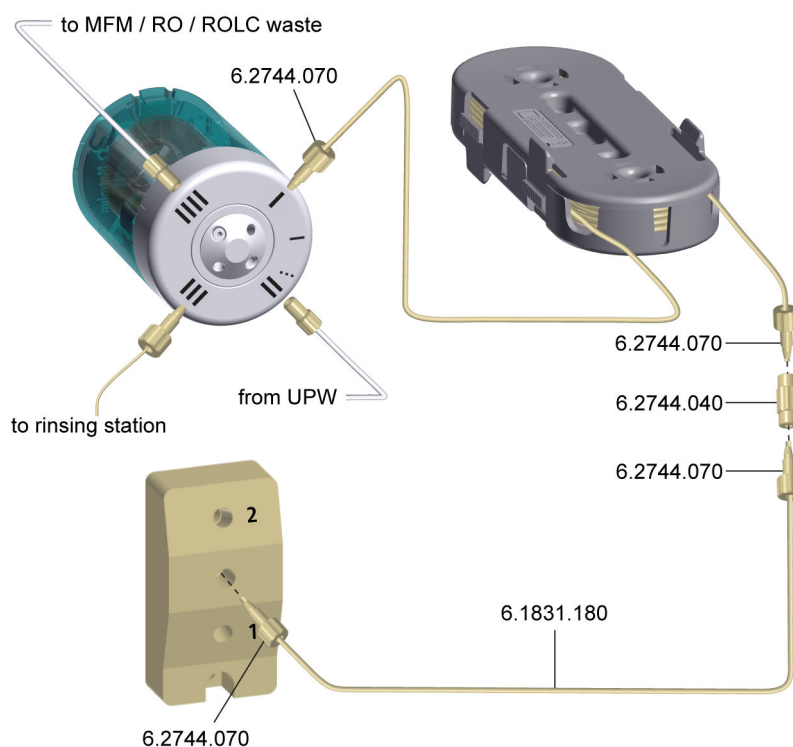


Figure 140 Connecting the transfer capillary

10 Connecting the waste collector (reagent organizer)

- The Multi Flow Monitor alone does not have enough connectors for this sample preparation technique. Therefore, the irrelevant flows can be distributed to the waste collectors installed in the reagent organizer.
Use a short pressure screw to screw one end of a PEEK capillary 0.5 mm ID / 3 m to Port 1 of the switching valve 3/2.
- Use a PVDF pressure screw to screw the other end of the PEEK capillary 0.5 mm ID / 3 m at the waste collector (reagent organizer).

- Use a flangeless fitting to screw one end of the FEP tubing M6 to Port III of the cylinder unit OMNIS .
- Use a flangeless fitting and an adapter UNF 10/32 outer / M6 inner to screw the other end of the FEP tubing at a waste collector (reagent organizer).

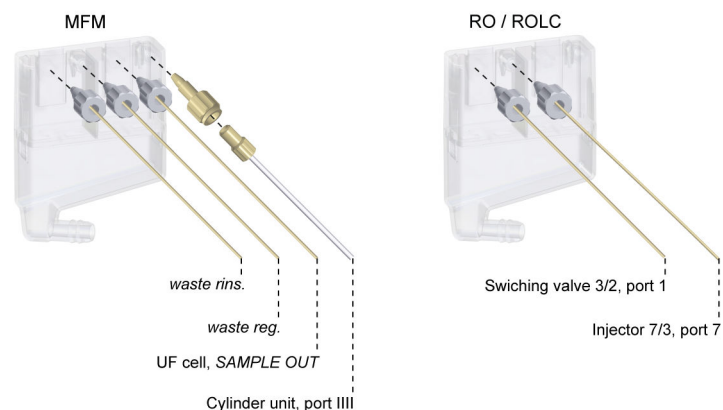


Figure 141 Recommended installation – Waste collector

5.5 Equipping the OMNIS Dosing Drive Unit

Which cylinder unit OMNIS is used depends on the intended use.

Metrohm recommends using one of the following cylinder units OMNIS for dosing the sample:

- Cylinder unit OMNIS 2 mL, UNF 10/32
- Cylinder unit OMNIS 5 mL, UNF 10/32
- Cylinder unit OMNIS 10 mL, UNF 10/32

Attaching the cylinder unit OMNIS

Required accessories:

- desired cylinder unit OMNIS (6.0150x.xx0)

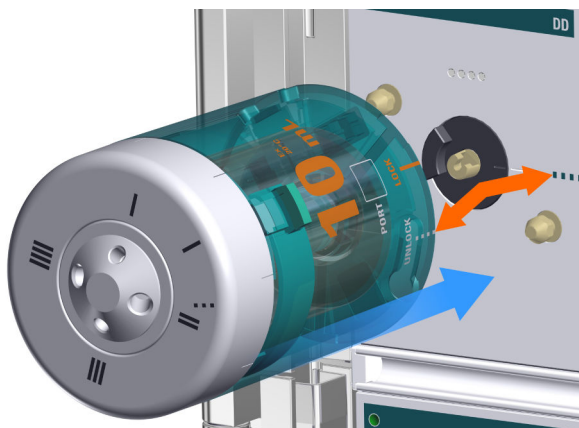
1 Initializing the cylinder unit OMNIS

- In the OMNIS Software in the overview of the instrument, open **Dosing Drive Unit ► Manual control**, *see OMNIS help*.
- Initialize the OMNIS Dosing Drive Unit with .

The piston is completely retracted.

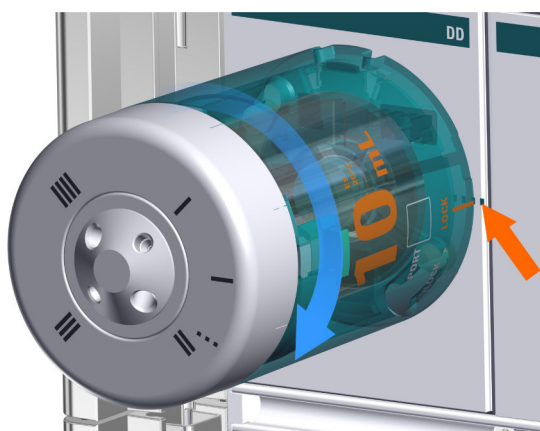
2 Attaching the cylinder unit OMNIS

- Rotate the cylinder unit OMNIS until the marking of the **UNLOCK** position on the cylinder unit OMNIS is in line with the marking on the dosing drive.
- Attach the cylinder unit OMNIS down onto the two twistlocks straight from the front.



3 Locking the cylinder unit OMNIS

- Rotate the cylinder unit OMNIS clockwise as far as the **LOCK** position.



The cylinder unit OMNIS is attached. Rinse the cylinder unit OMNIS before start-up (*see "Performing maintenance on the cylinder unit OMNIS", chapter 7.9, page 386*).

4 Defining the port assignment

- Define the use of the ports in the OMNIS Software. To do this, select the desired OMNIS Dosing Drive Unit in the overview of the instrument. Define the **Port assignment** under **Properties ► Specific data**.

5.6 Equipping the OMNIS Peristaltic Pump Unit

The peristaltic pump can be equipped with various pump tubings.

Table 50 Overview – Pump tubings

Article number	Name	Use
6.01826.010	Pump tubing, ID 0.5 mm, orange - yellow	The small inner diameter enables the pumping of small amounts of liquid at higher pressure, e.g., for the regeneration of the MSM. Recommended flow rate: 0.1–0.6 mL/min
6.01826.020	Pump tubing, ID 1.0 mm, white - white	The medium inner diameter enables the pumping of liquid at high pressure, e.g., for pumping sample substances. Recommended flow rate: 0.5–3.0 mL/min

NOTICE

Wear on the pump tubings due to press-on flap

The pressure of the press-on flap can have a negative effect on the flexibility of the pump tubings during long downtimes.

- If the peristaltic pump will not be used for a long period of time, then open the press-on flap. This relieves the pump tubings.

Mounting the pump tubing

Required accessories:

- Desired pump tubing (6.01826.0x0)
- Coupling olive/UNF 10/32, 2 pcs. (6.2744.034)

1 Preparing the pump tubing inlet

- Attach a coupling olive/UNF 10/32 to the pump tubing inlet. To ensure that the pump tubing is firmly seated, push the coupling olive/UNF 10/32 into the tubing end at least as far as the second groove.

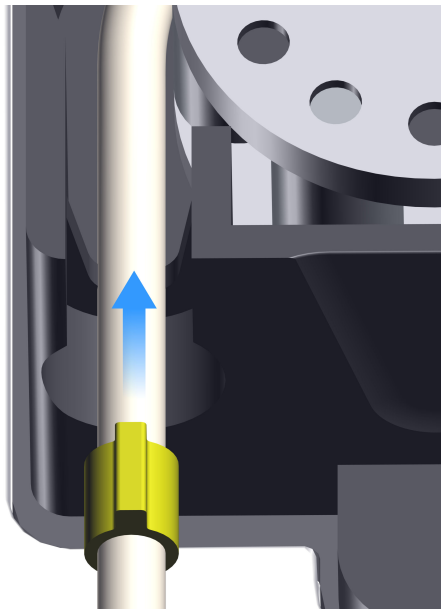
2 Preparing the pump tubing outlet

- Attach a coupling olive/UNF 10/32 to the pump tubing outlet. To ensure that the pump tubing is firmly seated, push the coupling olive/UNF 10/32 into the tubing end at least as far as the second groove.

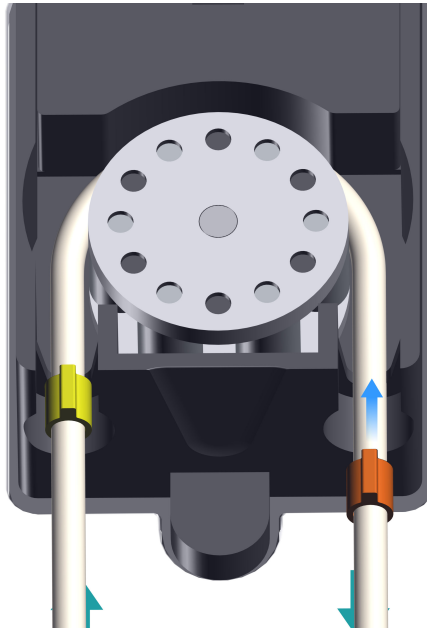
3 Mounting the pump tubing

The pump tubing has 2 stoppers. The stoppers hold the pump tubing in position in the peristaltic pump.

- Open the press-on flap of the peristaltic pump.
- Insert one end of the pump tubing into the left opening for the pump tubing so that the stopper is positioned below the opening. Make sure that the positioning aid on the stopper is pointing towards the front.



- Pull the pump tubing upwards until the stopper snaps into the opening for the pump tubing.
- Guide the pump tubing around the roller head.
- Insert the second stopper into the right opening of the pump tubing from below.



4 Centering the pump tubing

 CAUTION

Hair pulled out by peristaltic pump

The running peristaltic pump can entangle hair and pull it out.

- Keep the press-on flap closed during operation of the peristaltic pump.
- If the peristaltic pump needs to be operated with the press-on flap open (e.g., when centering the pump tubing), then maintain a sufficient distance from the peristaltic pump.

 If the pump tubing is not centered on the roller head, then jamming may occur in the peristaltic pump.

- Start the peristaltic pump with the press-on flap open. To do this, in the overview of the instrument, open **Peristaltic Pump ► Manual control**, start the peristaltic pump by clicking on , *see OMNIS help*.
- The pump tubing is centered on the roller head by the operation of the peristaltic pump. This process takes 5-10 seconds.
- Switch off the peristaltic pump by clicking on  in manual control.
- Close the press-on flap again.

The pump tubing is centered.

5.7 Equipping the OMNIS Actuator Unit

The injector connects the eluent path to the sample path. The defined amount of precisely measured sample is injected and rinsed onto the separation column with the eluent, thanks to the fast and accurate valve switchover.

The quantity of sample injected is determined by:

- the sample loop volume or
- the OMNIS Dosing Drive Unit when the Metrohm intelligent Partial Loop injection Technique (MiPT), the Metrohm intelligent Pick-up Injection Technique (MiPuT) or the Metrohm inline preconcentration (MiPCT, MiPCT-ME) is used.

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

Table 51 Which sample loop do I need?

Application	Sample loop
Cation determination	20 µL
Anion determination with suppression	20 µL
Anion determination without suppression	100 µL
MiPT, MiPuT	250 µL
MiPCT, MiPCT-ME	Preconcentration column
System with 2-mm columns and IC Conductivity Detector MB	5 µL

 A 20 µL sample loop is installed as standard on delivery.

Changing the sample loop

The sample loop can be replaced if necessary.

 Use only the supplied pressure screws (6.2744.010) to connect capillaries and the sample loop to the injector.

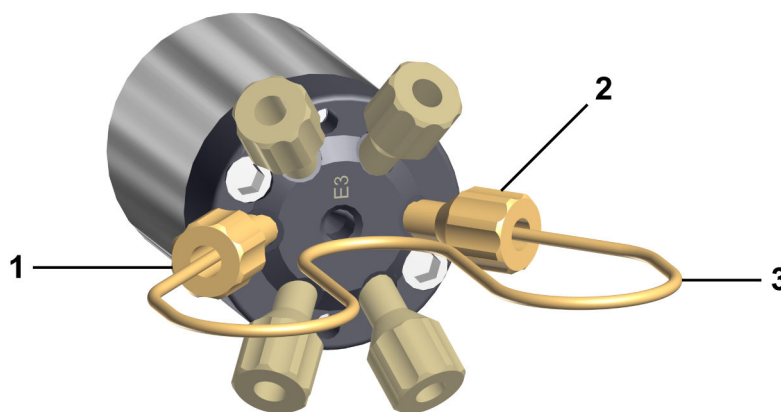


Figure 142 Injector 7/3 with sample loop (colored orange)

- | | |
|---|---|
| <p>1 Pressure screw
fastened to port 6</p> | <p>2 Pressure screw
fastened to port 3</p> |
| <p>3 Sample loop
The choice of sample loop depends on the application (<i>see table 51, page 203</i>).</p> | |

Changing the sample loop

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.

Required accessories:

- required sample loop (6.1825.xx0 or 6.2620.xx0) (see table 51, page 203)
- Wrench (6.2739.000) for pressure screws

1 Removing the existing sample loop

- Loosen the pressure screws at port 3 and port 6.
- Remove the existing sample loop.

2 Installing a new sample loop

-  When installing the new sample loop, make sure that the installation is free of dead volume (*see "Creating dead-volume-free capillary connections", page 117*).
- Fasten one end of the new sample loop to port 3 using a pressure screw.
 - Fasten the other end of the new sample loop to Port 6 with another pressure screw.

The sample loop has been changed.

5.8 Equipping the OMNIS MISP Unit

NOTICE

Material damage due to stress

Material damage due to physical stress on open trays.

- Do not exert any pressure on open pull-out compartments and trays.

Equip the MISP unit with accessory parts for sample preparation. The accessories required depend on the sample preparation to be performed. Place the required accessory parts in the MISP tray.

Not all accessory parts can be installed at the same time. Information on the required accessories can be found in the chapter of the respective sample preparation technique (*see "Sample preparation techniques", chapter 5.4, page 130*).

Installing optional accessory parts

 This procedure describes how to use all accessory parts. Each sample preparation technique only need specific accessory parts. All accessory parts are never required at the same time. Only use accessory parts that are relevant to the sample preparation technique being performed.

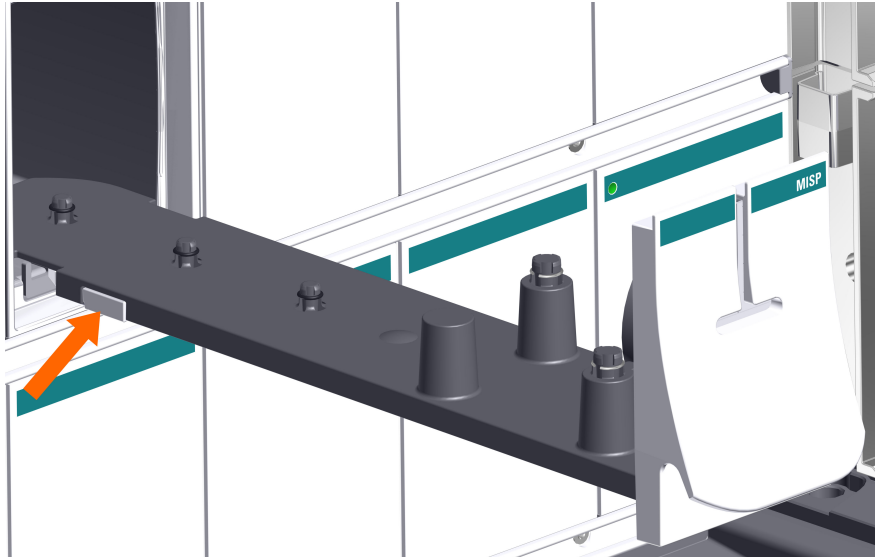
Optional accessories:

- required transfer tubing (6.01532.1x0) or transfer capillary 2 mL, PEEK (6.01562.100)
- MISP holder, trap column (6.02006.110)
- required trap column (6.1014.xx0 or 6.1015.xx0)
- ultrafiltration cell 2 (6.02729.110)
- MISP base plate (6.02006.100)
- required T connector (6.02744.0x0)

1 Removing the MISP tray from the MISP unit

 Always equip the MISP tray outside of the MISP unit to prevent any damage caused by pressure on the MISP tray.

- Pull the MISP tray out of the MISP unit until it reaches the end stop.
- Press and hold the lock release mechanism on the left side of the MISP tray. At the same time, pull the MISP tray straight out of the MISP unit.

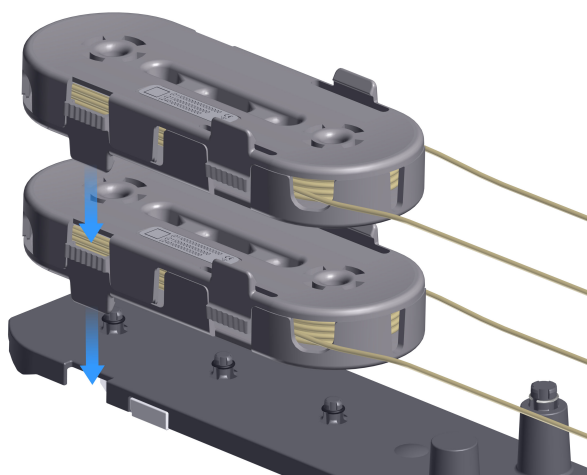


The MISP tray is outside of the MISP unit.

2 Mounting the transfer capillary

 Transfer tubing is used in the same way as a transfer capillary.

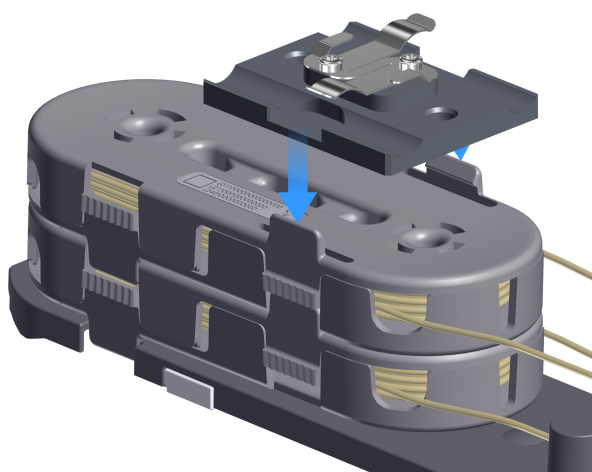
- Place a transfer capillary on the short positioning pins. Press the transfer capillary straight down until both the latches on the transfer capillary have clicked into place on the MISP tray.
- If required, place another transfer capillary on the transfer capillary you have already installed. Press the transfer capillary straight down until both the latches on the upper transfer capillary have clicked into place on the lower transfer capillary.



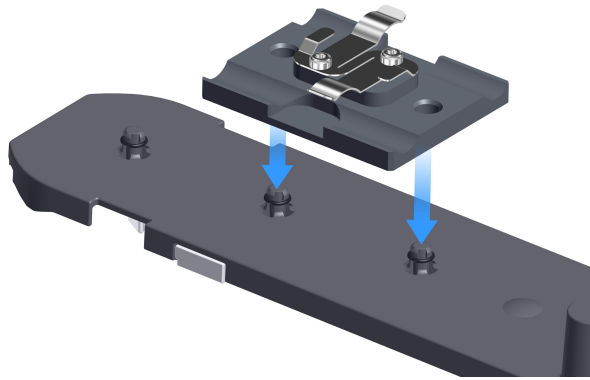
- Thread the loose ends of the transfer capillary through the capillary feed-through (see "Overview", chapter 3.11.1, page 72).

3 Installing trap columns

- Place the MISPE holder, trap column on a transfer capillary or directly on the MISPE tray.
 - *On a transfer capillary:*
Align the groove on the side of the MISPE holder, trap column with the latches on the transfer capillary. Press the MISPE holder, trap column downwards until both the latches on the transfer capillary have clicked into place on the MISPE holder, trap column.



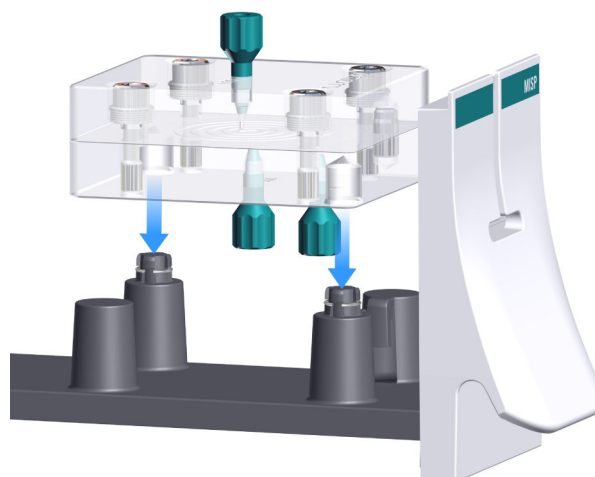
- *On the MISPE tray:*
Align the positioning aids on the MISPE holder, trap column with the short positioning pins (see "Overview", chapter 3.11.1, page 72) on the MISPE tray. Place the MISPE holder, trap column on the front two positioning pins.



- Place 1 or 2 trap columns on the MISP holder, trap column as required. Slide the trap columns sideways into the recess on the MISP holder, trap column until the trap column is in the recess. The clamp fixes the trap column in place.

4 Installing the ultrafiltration cell

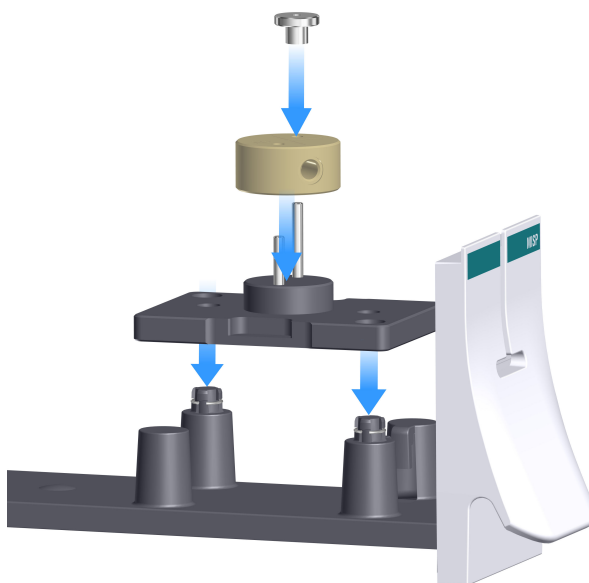
-  Use an ultrafiltration cell or a T connector as required. It is not possible to use an ultrafiltration cell and a T connector at the same time.
- Use the filtration membrane in the ultrafiltration cell (*see "Preparing the ultrafiltration cell", chapter 5.8.1, page 210*).
 - Align the ultrafiltration cell positioning aids with the two long positioning pins (*see "Overview", chapter 3.11.1, page 72*) on the MISP tray. Place the ultrafiltration cell straight on the long positioning pins.



5 Installing the T connector

 Use an ultrafiltration cell or a T connector as required. It is not possible to use an ultrafiltration cell and a T connector at the same time.

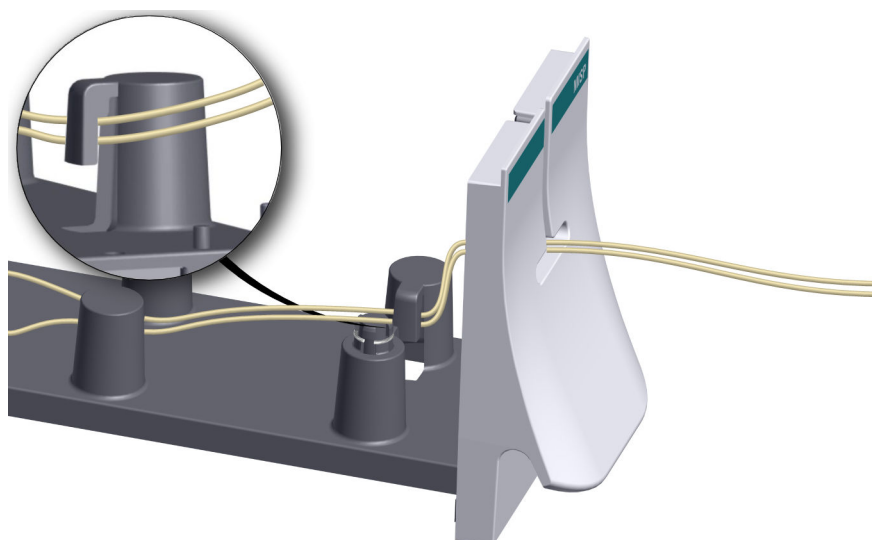
- Align the positioning aids of the MISP base plate with the two long positioning pins ([see "Overview", chapter 3.11.1, page 72](#)) on the MISP tray. Place the MISP base plate straight on the long positioning pins.
- Loosen the knurled screw from the MISP base plate.
- Align the T connector positioning aids with the positioning pins on the MISP base plate. Place the T connector straight on the positioning pins of the MISP base plate.
- Fix the T connector in place. To do this, screw the knurled screw on the longer of the two positioning pins of the MISP base plate.



- A regional Metrohm service representative can mount the second T connector upon request.

6 Fastening the capillaries and tubings in place (optional)

- The positioning pins contain holders for fixing the capillaries and tubings in place.



7 Inserting the MISP tray in the MISP unit

- The MISP tray is connected to the MISP unit by a rail. Thread the guide rail on the MISP tray onto the bearing in the MISP unit.
- Push the MISP tray into the MISP unit until it reaches the end stop.

The MISP unit is fully equipped. Make the capillary connections in accordance with the required sample preparation technique ([see "Sample preparation techniques", chapter 5.4, page 130](#)).

5.8.1 Preparing the ultrafiltration cell

Ultrafiltration time and sample volume

The ultrafiltration cell was tested with the OMNIS IC equip.: Inline UF PP/DD.

For **1-channel systems**, the following data for ultrafiltration time and sample volume has been determined:

- Pre-rinsing time 30 s
- Ultrafiltration time: 90 s
- Sample volume: 4 mL

For **2-channel systems**, the following data for ultrafiltration time and sample volume has been determined:

- Pre-rinsing time 30 s
- Ultrafiltration time: 230 s
- Sample volume: 6 mL

These values are guidelines. The ultrafiltration time and the sample volume of the installation may deviate from these values. This is why the actual

values for the ultrafiltration time and the sample volume must be determined for each installation.

To ensure successful measurement, the fixed tubing setup with its specific capillary lengths must remain unchanged. Only adjust or shorten the capillaries if there is a note to do so in the respective system.

Selecting the filtration membrane

Existing sample preparation procedures can be applied to ultrafiltration cell 2 (6.02729.110). If the filtration membrane (6.2714.020) is not used, a membrane with suitable pore size will not automatically yield the desired results, even if the particle size is known.

Our investigations have shown that the retention capacity of conventional filtration membranes does not always correspond to their specified pore size. The table *Selecting the filtration membrane* shows the qualitative filtration action of filtration membranes with different nominal pore sizes. Aqueous solutions containing silica particles with particle sizes of 1.5 µm and 5 µm were used in the test.

Table 52 Selection of the filtration membrane

Test solutions: Silica particles in water	Pore size of the filtration membrane ¹	Effect
0.5%, 5 µm	0.15 µm	no permeation
0.5%, 5 µm	3 µm	no permeation
0.5%, 5 µm	8 µm	no permeation
0.5%, 5 µm	10 µm	permeation ²
0.5%, 5 µm	12 µm	no permeation
0.5%, 1.5 µm	0.15 µm	no permeation
0.5%, 1.5 µm	3 µm	permeation

¹ Nominal pore size according to manufacturer's statement.

² Except for this membrane, all membranes were from the same manufacturer.

Due to the lower filter thickness, the retention capacity of filtration membranes may be lower than that of filters with the same pore size but a higher filter thickness. This must be taken into account when selecting an appropriate filtration membrane.

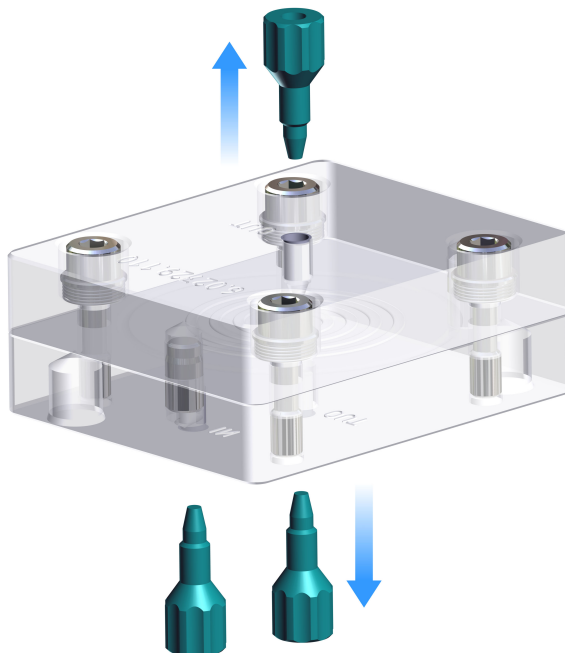
Inserting the filtration membrane

Required accessories:

- Plastic tweezers (6.2831.010)
- Petri dish, 100 mm (6.07402.1x0)

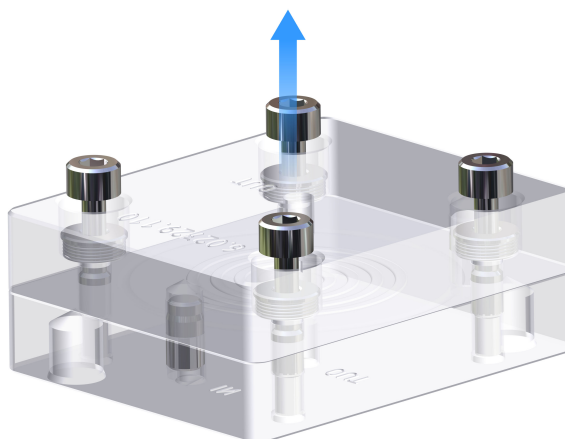
- Hex key 4 mm (6.2621.030)
- In addition to equipping an ultrafiltration cell:
 - ultrafiltration cell 2 (6.02729.110)
 - Filtration membrane (6.2714.0x0)

1 Removing the stoppers



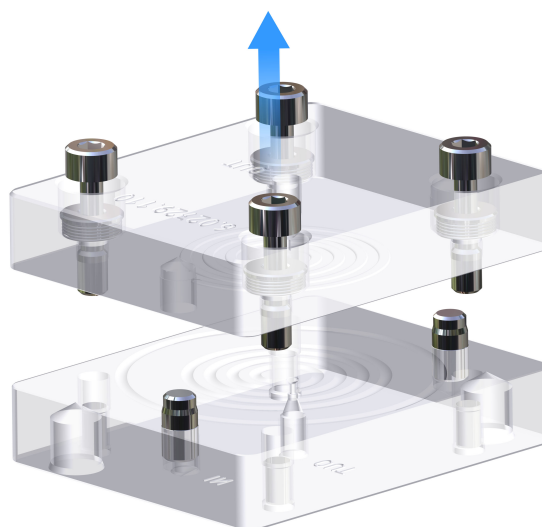
- Remove the 3 green stoppers by hand.
- Place the cell on the table so that the screws are on top.

2 Removing the screws



- Use the hex key to loosen the screws.
The screws cannot be removed from the filtrate chamber.

3 Disassembling the cell



- Remove the filtrate chamber.

4 Cleaning the cell

NOTICE

Damage to the ultrafiltration cell

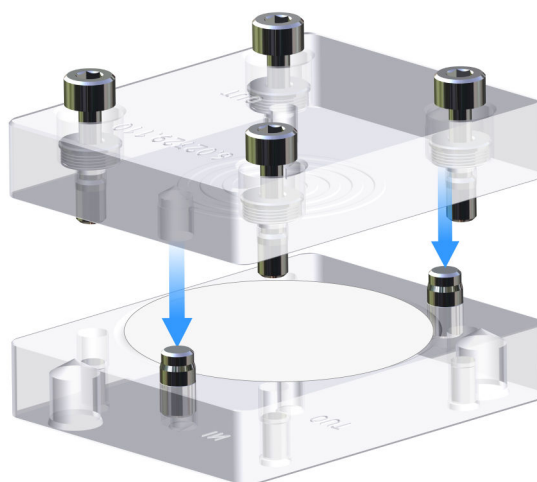
Organic solvents (e.g. acetone) corrode and damage the ultrafiltration cell material (PMMA).

- Use ultrapure water for cleaning the ultrafiltration cell.
- If an organic solvent is used for cleaning, then the ultrafiltration cell must then be rinsed with ultrapure water.



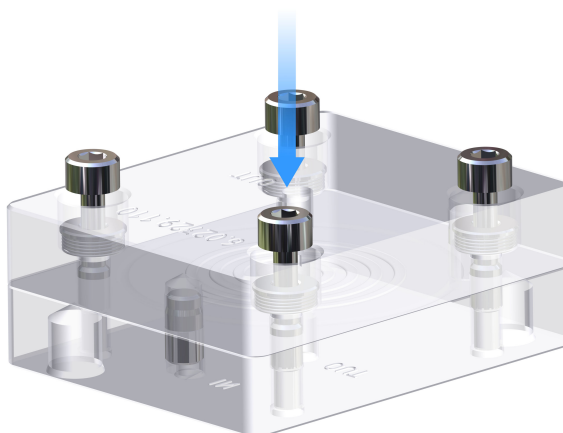
- Rinse both chambers with ultrapure water.
- Dry both chambers with a lint-free cloth as required.

7 Assembling the cell



- Place the filtrate chamber on the sample chamber. The two guide bolts of the upper chamber fit into the bores of the lower chamber.

8 Screwing the cell together



- Use the hex key to screw the screws all the way into the cell used.
- Additionally, tighten each screw by a $\frac{1}{4}$ rotation.

Then insert the cell into the MISP tray: (*see "Equipping the OMNIS MISP Unit", chapter 5.8, page 205*)

If the ultrafiltration cell is not used immediately, then seal the sample inlet, the sample outlet, and the filtrate outlet with the 3 green stoppers. This allows for the filtration membrane to stay moist.

5.8.2 Replacing the filtration membrane

Filtration membrane

The filtration membrane used must be in perfect condition to ensure consistent quality of the analysis results. Replace the filtration membrane in regular intervals for that reason (*see "Service life of the filtration membrane", chapter 7.5, page 379*).

Replacing the membrane

Required accessories:

- Plastic tweezers (6.2831.010)
- Petri dish, 100 mm (6.07402.1x0)
- Hex key 4 mm (6.2621.030)
- In addition to equipping an ultrafiltration cell:
 - ultrafiltration cell 2 (6.02729.110)
 - Filtration membrane (6.2714.0x0)

1 Preparing the cell

- In the OMNIS Software, stop the system and wait until the pressure has been released.
- Remove all capillary connections from the ultrafiltration cell.
- Pull the MISP tray out of the MISP unit until it reaches the end stop.
- Execute steps 2 and 3 from the *Inserting the filtration membrane* procedure. If the cell is contaminated, then also execute step 4 *Cleaning the cell*.

2 Replacing the membrane

- Remove the used filtration membrane with plastic tweezers. Execute steps 5 to 8 of the *Inserting the filtration membrane* procedure.
- Push the MISP tray into the MISP unit until it reaches the end stop.

3 Purging the ultrafiltration cell

- Purge the ultrafiltration cell (see "Purging the ultrafiltration cell", chapter 5.8.3, page 217).

5.8.3 Purging the ultrafiltration cell

Purge the ultrafiltration cell each time a new filtration membrane is inserted. To do this, rinse the filtrate path with ultrapure water.

Purging the ultrafiltration cell

Required accessories:

- Bottle PP 50 mL (6.02743.030), filled with ultrapure water.

1 Preparing the sample needle

- Drive the sample needle to a 50 mL bottle of ultrapure water. To do so, select **My Autosampler / Needle Drive ► Manual control ► Target position ► Bottle** and define the position of the 50 mL bottle required, start the procedure by clicking , [see OMNIS help](#).

2 Rinsing the ultrafiltration cell (mit OMNIS Dosing Drive Unit)

 This step only needs to be carried out if the OMNIS IC-equip.: Inline-UF PP/DD is being used.

- Select the required method by double-clicking it under **Equipment ► Work systems**. The selected method should contain the designation **<PREP_UF & UF-MiPT>**.
- Rinse the filtration system with ultrapure water for approx. 3 minutes.

3 Rinsing the ultrafiltration cell (with 2 peristaltic pumps)

- Start both peristaltic pumps with a pump rate of 20. To do this, open **Peristaltic pump ► Manual control** in the OMNIS Software and define the pump rate. Then start the peristaltic pump by clicking .
- Rinse the filtration system with ultrapure water for approx. 3 minutes.

4 Monitoring the rinsing process

- Check whether solution is emerging evenly from the feed line into the waste collector.
- Check whether all capillary connections are tight. If liquid is escaping anywhere, tighten the corresponding connection or redo the connection.

5 Removing air bubbles

- Check whether any air bubbles remain trapped in the ultrafiltration cell.
- If there are air bubbles in the ultrafiltration cell, unscrew the capillaries from the filtrate outlet and from the sample outlet while the peristaltic pump is still pumping ultrapure water. As soon as the air bubbles have escaped, screw the capillaries tightly onto the ultrafiltration cell once again.

5.9 Equipping the OMNIS Column Thermostat Unit



CAUTION

Danger of burning due to hot column tray

Danger of burning due to hot parts. The column thermostat can be heated to 80 °C. The inside of the column tray is very hot during and immediately after operation.

- Do not open the column tray during operation. If the thermostat function has been started, then it remains active even when the column tray is open.
- After operation, do not open the column tray until it has cooled down to ambient temperature.
- Wear protective gloves if it is absolutely necessary to open the hot column tray.

NOTICE

Material damage due to stress

Material damage due to physical stress on open trays.

- Do not exert any pressure on open pull-out compartments and trays.

NOTICE

Leak due to condensation

If the column thermostat is cooled to below 15 °C, then condensation may form when the column tray is opened. The condensation on the open column tray is not drained and can cause leaks.

- Control the temperature of the column thermostat to 25 °C before opening.

Equipping the column thermostat

Prerequisite:

- The column thermostat is switched off.
- The column thermostat has cooled down to ambient temperature.

Required accessories:

- Guard column
The [Metrohm column program](#) (available from a regional Metrohm service representative), the [product information on the separation column](#) or personal advice from a regional Metrohm service representative provide information on which guard column is suitable for the separation column used.
- Separation column
- 2 x pressure screw, short, 2 pcs. (6.2744.070)

i For start-up, replace the guard column and the separation column with a 2 x UNF 10/32 coupling (6.2744.040) (observe manufacturer specification for start-up of the columns).

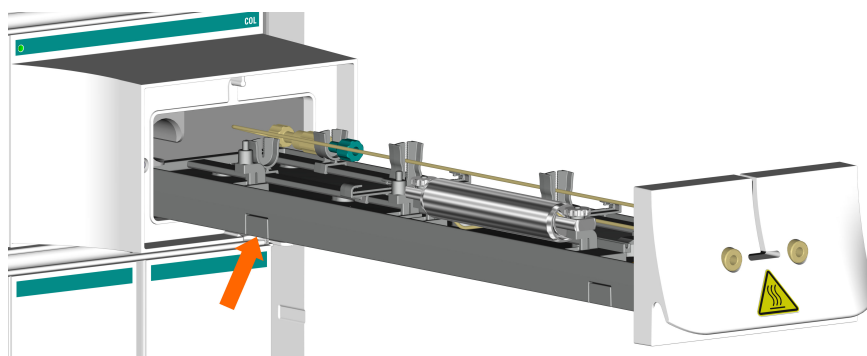
i New guard columns and separation columns are delivered in storage eluent. Before inserting the guard column, check whether the storage eluent can be mixed with the eluent used for the measurement (observe the column leaflet).

i New columns must be rinsed before they are inserted into the OMNIS IC System (observe manufacturer specification).

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

1 Pulling out the column tray

- Pull the column tray out of the column thermostat as far as it will go.
- If necessary, remove the column tray straight out of the column thermostat by pressing on the column tray release.



Releasing the column tray

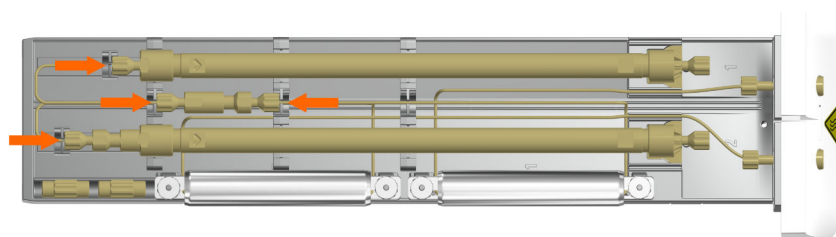
2 Rinsing the columns

- Rinse the guard column (*see "Rinsing the guard column", chapter 6.5, page 334*).
- Then rinse the separation column (*see "Rinsing the separation column", chapter 6.6, page 336*).

3 Inserting the columns

 If a flow direction is marked on the column, then insert the column according to this flow direction.

- Insert the separation column with the memory chip into the column holder until the column engages.
- Support the pressure screw at the inlet of the Guard column or the separation column on the clip COL, OD 1/16" for stabilization. Move the clip for this purpose to the corresponding position.
- If an S-Guard column is used, then place the S-Guard column with the pressure screws on the clips COL, 3 x OD 1/16". Move the clips for this purpose to the corresponding position. Press the connection capillary into the central slots of the clips to secure it.



4 Establishing capillary connections

i Capillaries that are too long can make it difficult to close the column tray. If the capillaries of the preheating cartridge are too long, then use a capillary cutter (6.2621.080) to shorten the capillaries to the desired length.

- Detach the outlet capillary of the preheating cartridge from the clip and use a pressure screw to screw it to the inlet of the guard column.
- Press the capillaries into the slots of the clips to secure them.

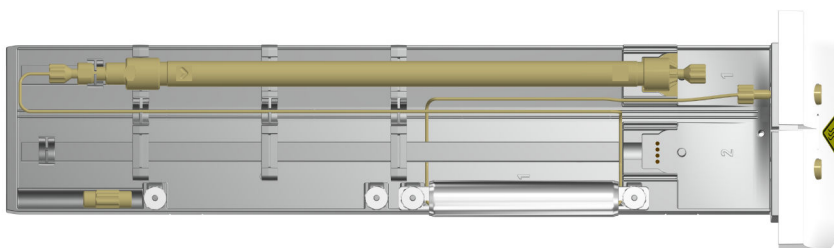


Figure 143 Capillary connection with 1 column – Example

- If 2 columns are installed, then install them one behind the other or use column thermostat inlet 2, depending on the application.

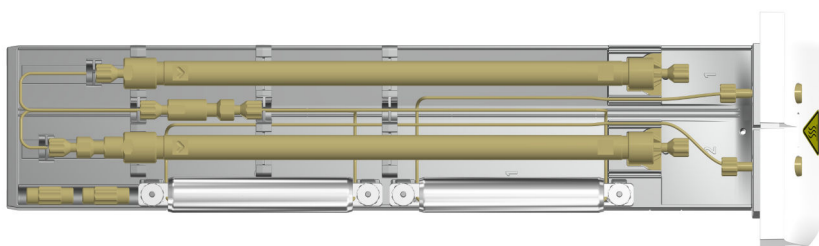


Figure 144 Capillary connection with 2 columns – Example

- The outlet of the separation column is connected to the MSM or the detector, depending on the application.
 - *For the anion CHS/SeS or cation SeS applications:*
Connect the capillary of the MSM labeled *in* to the outlet of the separation column (*see "Overview", chapter 3.15.1, page 93*). To do this, thread the capillary labeled *in* through the column thermostat outlet and connect it to the outlet of the separation column with a pressure screw.
 - *For use with non-suppressed cation, non-suppressed anion, amperometry, and UV*
Connect the detector inlet capillary or the inlet capillary of the downstream functional unit to the outlet of the separation column. To do this, thread the capillary through the column thermostat outlet and connect it to the outlet of the separation column with a pressure screw.

5 Inserting the column tray into the column thermostat

- If the column tray has been removed from the column thermostat, then reinsert the column tray. To do this, insert the guide rail on the column tray into the slide bearing in the column thermostat.
- Push the column tray into the column thermostat as far as it will go.

The columns are recognized as soon as the column tray is closed. When the column tray is open, there is no contact with the memory chip. Therefore, analyses cannot be started unless the column tray is closed.

 No data is written to or read from the memory chip when the column tray is open.

When the column tray is open, the leak sensor does not register any leaks.

- Equilibrate the OMNIS IC System (see "Equilibrating the OMNIS IC System", chapter 6.7, page 338).

5.10 Equipping the OMNIS Column Holder Unit

The column holder can be equipped with the following columns:

- Separation column with Guard column (*see "Equipping the column holder with a separation column and a Guard column", page 223*)
- Separation column with S-Guard column (*see "Equipping the column holder with a separation column and an S-Guard column", page 224*)

Equipping the column holder with a separation column and a Guard column

Required accessories:

- Guard column
The *Metrohm column program* (available from a regional Metrohm service representative), the *product information on the separation column* or personal advice from a regional Metrohm service representative provide information on which guard column is suitable for the separation column used.
- Separation column
- Clip fixation bar, 2 x OD 1/16" (6.02027.030)
- Pressure screw short, 2 pcs. (6.2744.070)

i For start-up, replace the guard column and the separation column with a 2 x UNF 10/32 coupling (6.2744.040) (observe manufacturer specification for start-up of the columns).

i New guard columns and separation columns are delivered in storage eluent. Before inserting the guard column, check whether the storage eluent can be mixed with the eluent used for the measurement (observe the column leaflet).

i Columns must be rinsed before they are inserted into the OMNIS IC System.

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

1 Rinsing the columns

- Rinse the guard column (*see "Rinsing the guard column", chapter 6.5, page 334*).

- Then rinse the separation column (see "Rinsing the separation column", chapter 6.6, page 336).

2 Inserting the columns

 If a flow direction is marked on the column, then insert the column according to this flow direction.

- Insert the clip fixation bar, 2 x OD 1/16" into the fixation bar of the OMNIS Extension Module.
- Insert the separation column with the memory chip into the column holder until the column engages.
- Support the pressure screw at the inlet of the Guard column on the clip for stabilization. To accomplish this, move the clip to the corresponding position.

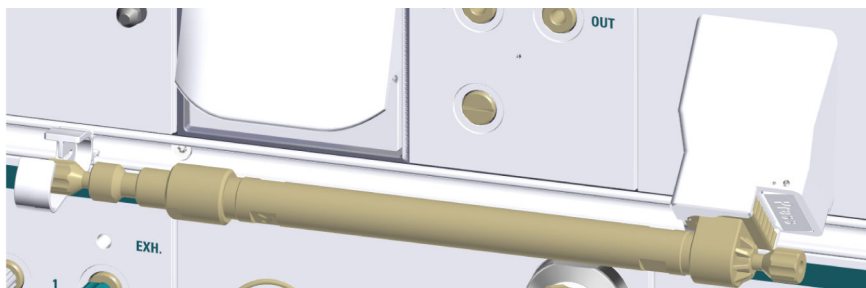


Figure 145 Inserting the separation column with Guard column

- Equilibrate the OMNIS IC System (see "Equilibrating the OMNIS IC System", chapter 6.7, page 338).

Equipping the column holder with a separation column and an S-Guard column

Required accessories:

- S-Guard column incl. connection capillary
The *Metrohm column program* (available from a regional Metrohm service representative), the *product information on the separation column* or personal advice from a regional Metrohm service representative provide information on which guard column is suitable for the separation column used.
- Separation column
- Clip fixation bar, 2 x OD 1/16" (6.02027.030)
- Clip 10 mm, fixation bar (6.02027.050)
- 2 x pressure screw, short, 2 pcs. (6.2744.070)

i For start-up, replace the guard column and the separation column with a 2 x UNF 10/32 coupling (6.2744.040) (observe manufacturer specification for start-up of the columns).

i New guard columns and separation columns are delivered in storage eluent. Before inserting the guard column, check whether the storage eluent can be mixed with the eluent used for the measurement (observe the column leaflet).

i New columns must be rinsed before they are inserted into the OMNIS IC System.

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

1 Rinsing the columns

- Rinse the guard column (*see "Rinsing the guard column", chapter 6.5, page 334*).
- Then rinse the separation column (*see "Rinsing the separation column", chapter 6.6, page 336*).

2 Inserting the columns

i If a flow direction is marked on the column, then insert the column according to this flow direction.

- Insert the clip fixation bar, 2 x OD 1/16" into the fixation bar of the OMNIS Extension Module.
- Insert the 10 mm clip for fixation bar between the previously installed clip for fixation bar, 2 x OD 1/16" and the column holder in the fixation bar.
- Tighten the capillary leading from the injector port 5 to the inlet of the guard column using a pressure screw.
- Insert the pressure screw at the outlet of the S-Guard column into the clip fixation bar, 2 x OD 1/16". Move the clip, 10 mm, fixation bar in such a way that the pressure screw at the inlet of the S-Guard column can be inserted into it.
- Insert the separation column with the memory chip into the column holder until the column engages.
- Support the pressure screw at the outlet of the separation column on the clip fixation bar, 2 x OD 1/16" for stabilization.

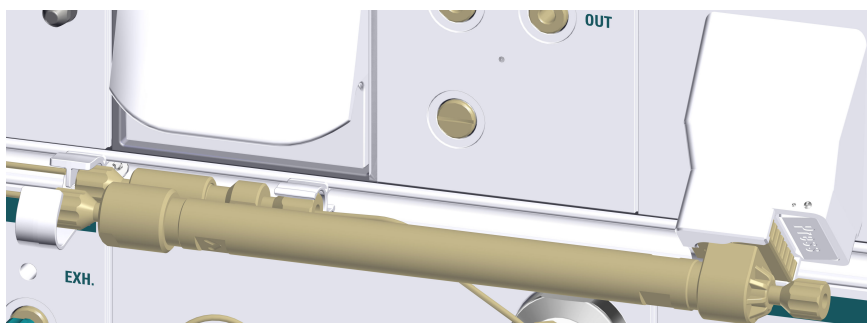


Figure 146 Inserting the separation column with S-Guard column

- Equilibrate the OMNIS IC System (see "Equilibrating the OMNIS IC System", chapter 6.7, page 338).

5.11 Setting up the OMNIS MSM unit

Perform the following steps to set up the OMNIS MSM unit:

1. Installing the OMNIS MSM Unit (*see "Installing the OMNIS MSM Unit", chapter 5.11.1, page 227*)
2. Connecting the regeneration solution (*see "Connecting the regeneration solution", chapter 5.11.2, page 232*)

5.11.1 Installing the OMNIS MSM Unit

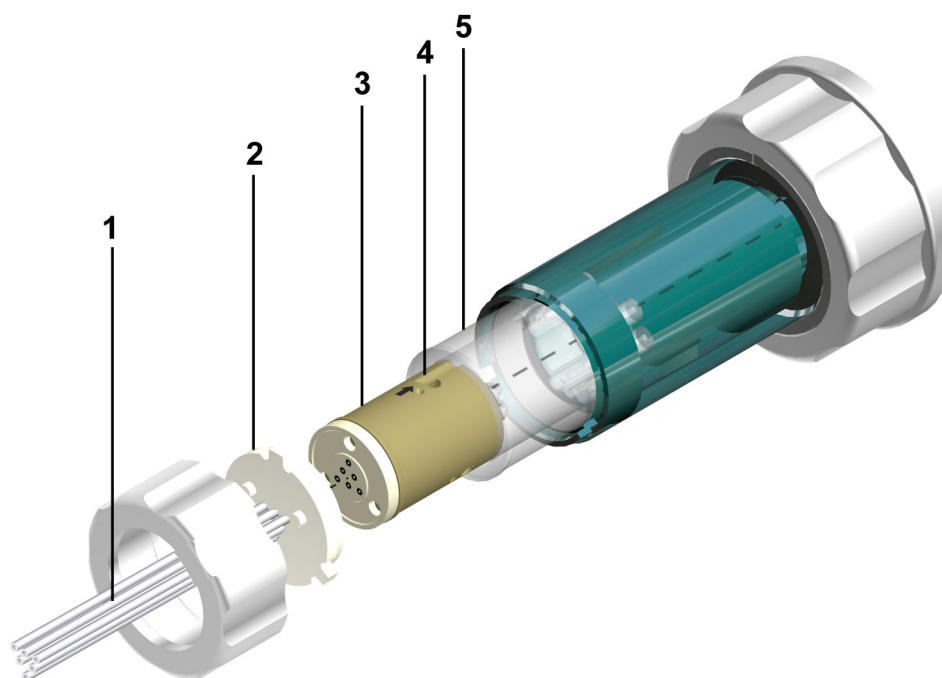


Figure 147 Metrohm Suppressor Module (MSM) – Overview

- | | |
|--|---|
| <p>1 Capillaries
fastened to the connecting piece, OMNIS MSM/SPM

The capillaries are labeled according to their function (see figure 77, page 94).</p> | <p>2 Connecting piece, OMNIS MSM/SPM</p> |
| <p>3 Rotor
6.28xx.x00

Accessory part, not included in the scope of delivery of the OMNIS MSM Unit.</p> | <p>4 Positioning aid</p> |
| <p>5 Adapter sleeve, MSM
Required only when using certain rotors (see "Functional description", chapter 3.15.2, page 94).</p> | |

Installing the MSM

NOTICE

Material damage due to incorrectly inserted rotor

If the rotor is not inserted correctly into the rotor housing, then it may become destroyed during use.

- Insert the rotor correctly according to the instructions.

NOTICE

Material damage to the coupling nut, connecting piece

The coupling nut, connecting piece may become damaged if it is tightened with tools.

- Tighten the coupling nut, connecting piece by hand.

Required accessories:

- required rotor (6.28xx.x00)
- Lint-free cloth, moistened with ethanol

1 Removing the adapter sleeve

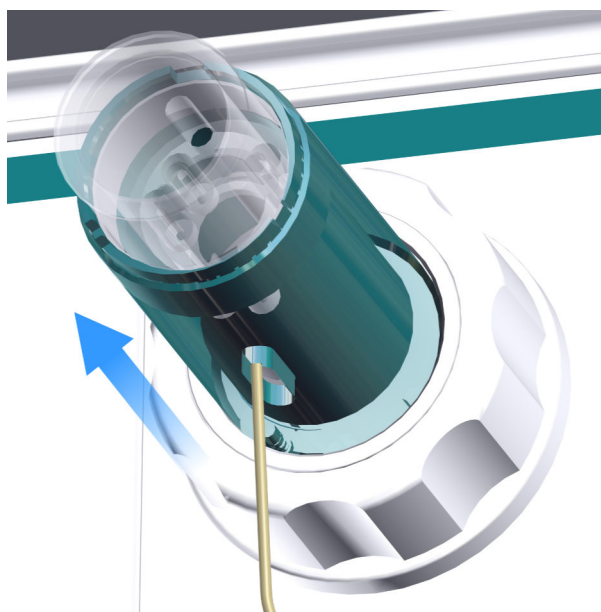
 This step is necessary only for the following rotors:

- MSM-HC Rotor C (6.2842.200)
- MSM-HC Rotor A (6.2842.000)
- SPM Rotor A (6.2835.000)

If a different rotor is used, then continue directly with *Step 2 – Insert rotor*.

The adapter sleeve is in the rotor housing at the time of delivery. To insert an HC rotor into the rotor housing, first remove the adapter sleeve.

- Insert a narrow object, e.g. a capillary, into the inspection window on the rotor housing.
- Move forward with the capillary in the inspection window. The capillary pushes the adapter sleeve out of the rotor housing.

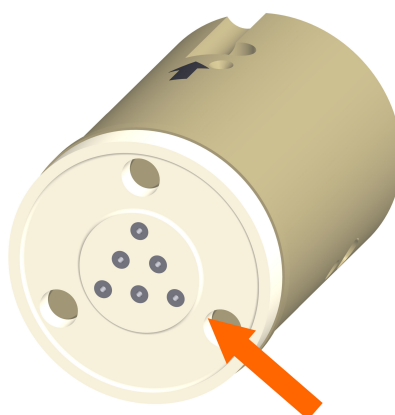


- Remove the adapter sleeve from the rotor housing.

i To reinsert the adapter sleeve, first align the notch of the adapter sleeve with the positioning pin in the rotor housing. Push the adapter sleeve straight into the rotor housing as far as it will go.

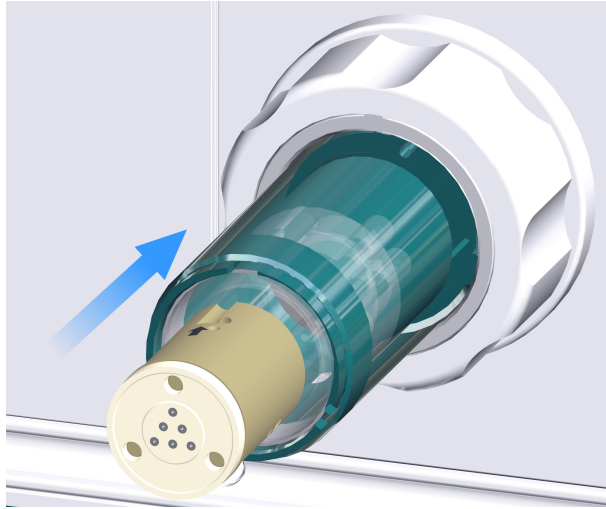
2 Inserting the rotor

- Clean the sealing surface on the front of the rotor with ethanol and a lint-free cloth.



- There is a positioning pin in the rotor housing for aligning the rotor.
Align the marking on the rotor with the positioning pin in the rotor housing.

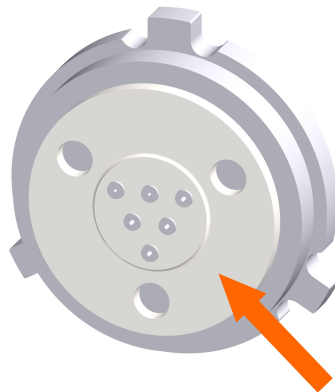
- Push the rotor straight into the rotor housing or into the adapter sleeve in the rotor housing as far as it will go.



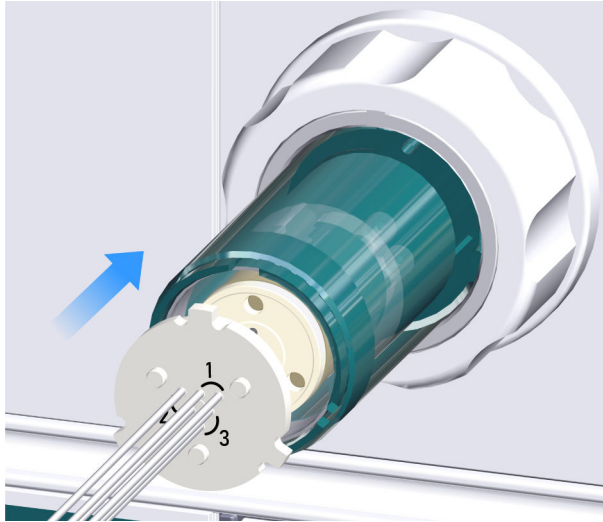
- Check that the rotor is correctly positioned in the rotor housing. When positioned correctly, the sealing surface of the rotor is approx. 4 mm inside the rotor housing. Rotate the rotor to the correct position if it is not correctly positioned in the rotor housing. To accomplish this, insert a narrow object, e.g. a capillary, into the inspection window on the rotor housing and rotate the rotor to the correct position.

3 Inserting the connecting piece

- Clean the sealing surface on the rear of the connecting piece with ethanol and a lint-free cloth.

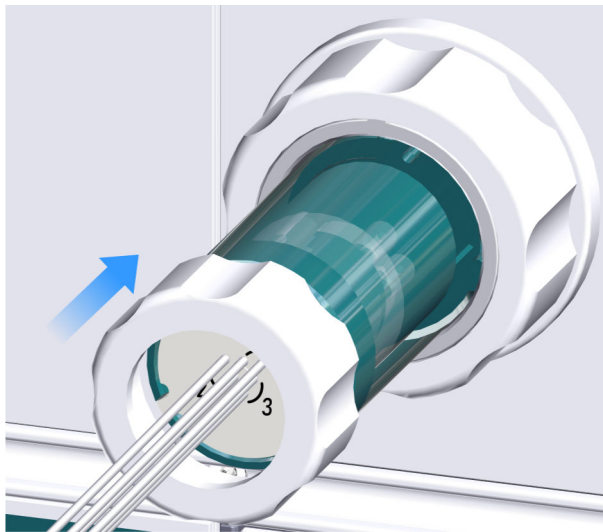


- Insert the connecting piece into the rotor housing so that position 1 is at the top. The 3 pins of the connecting piece fit into the recesses on the rotor housing.



4 Attaching the coupling nut

- Thread the capillaries on the connecting piece through the coupling nut.
- Tighten the coupling nut onto the thread of the rotor housing by hand.



The coupling nut secures the connecting piece.

The capillary connection can be created ([see "Connecting functional units", chapter 5.15, page 262](#)).

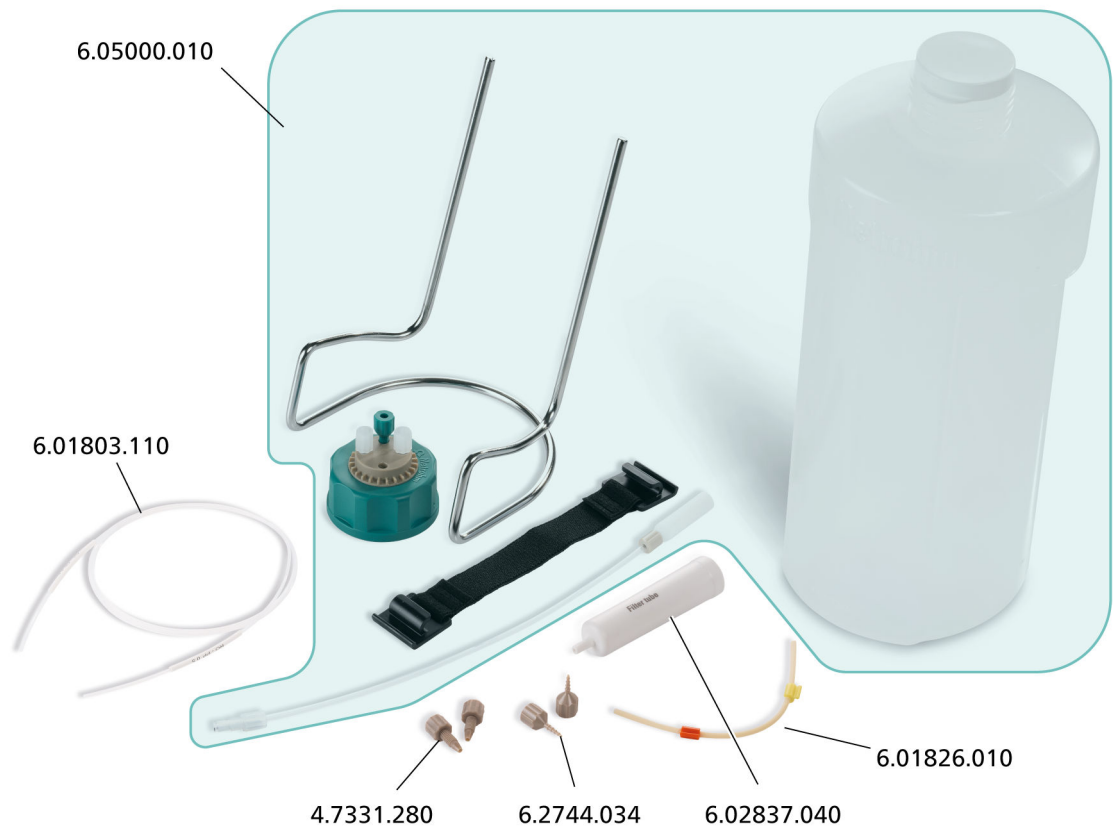


Figure 148 OMNIS IC equipment: PP Reg. – Parts

Table 54 Parts of the OMNIS IC equipment: PP Reg. (6.05332.040)

Article number	Product name	Number
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.01826.010	Pump tubing, ID 0.5 mm, orange - yellow	1
6.02837.030	Filter tube	1
6.2744.034	Coupling olive/UNF 10/32, 2x	1
4.7331.280	Pressure screw, short	2
6.01803.110	PTFE capillary RO - PP, 900/0.5 mm	1

Connecting the regeneration solution (with peristaltic pump)

⚠ WARNING

Risk of injury due to hazardous substances

If bottles fall over or fall off the reagent organizer during reagent replacement, then leaking hazardous substances can cause poisoning or chemical burns.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Use bottle caps.
- Place the bottles to be filled on the laboratory table.

⚠ WARNING

Risk of injury from falling bottles

If bottles fall from the reagent organizer during reagent replacement, they may cause injuries to the feet.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Place the bottles to be filled on the laboratory table.

Prerequisite:

- The aspiration filter is pre-rinsed (*see "Setting up the eluent", chapter 5.14.1, page 248*).

Required accessories:

- OMNIS IC equipment: PP Req. kit (6.05332.040)

 Use the CO2 Absorber (Tube) for alkaline eluents. Use the filter tube for all other eluents and reagents.

1 Equipping the peristaltic pump

- Insert the pump tubing into the peristaltic pump and equip both

ends with a coupling olive/UNF 10/32 (*see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200*).

2 Connecting the aspiration tubing

- There is a UNF connector on the bottle cap. Screw the M6 FEP tubing with filter onto the inside of the bottle cap opposite the UNF connector.
- Tighten the bottle cap on the bottle.

3 Connecting the PTFE capillary RO-PP

- Connect one end of the PTFE capillary RO - PP to the peristaltic pump inlet. Guide the other capillary end from below through the feed-through for capillaries and tubings on the left of the reagent organizer.
- A UNF threaded stopper is fastened to the UNF connector opposite the M6 FEP tubing with filter. Unscrew the UNF threaded stopper.
- Fasten the PTFE capillary RO-PP to the UNF connector on the bottle cap.

4 Connecting the CO₂ Absorber (Tube) or the filter tube

- Insert the CO₂ Absorber (Tube) or the filter tube into the Luer connector.

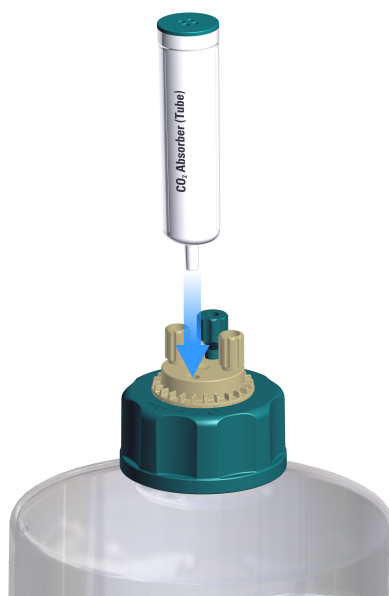


Figure 149 Mounting the CO₂ Absorber (Tube)

Then place the bottle on the reagent organizer (*see "Setting up a bottle", page 253*).

5 Connecting the MSM

- Connect the capillary of the MSM labeled with *regeneration solution* to the peristaltic pump outlet.

Regeneration with OMNIS Dosing Drive Unit

The equipment kit contains the following parts:

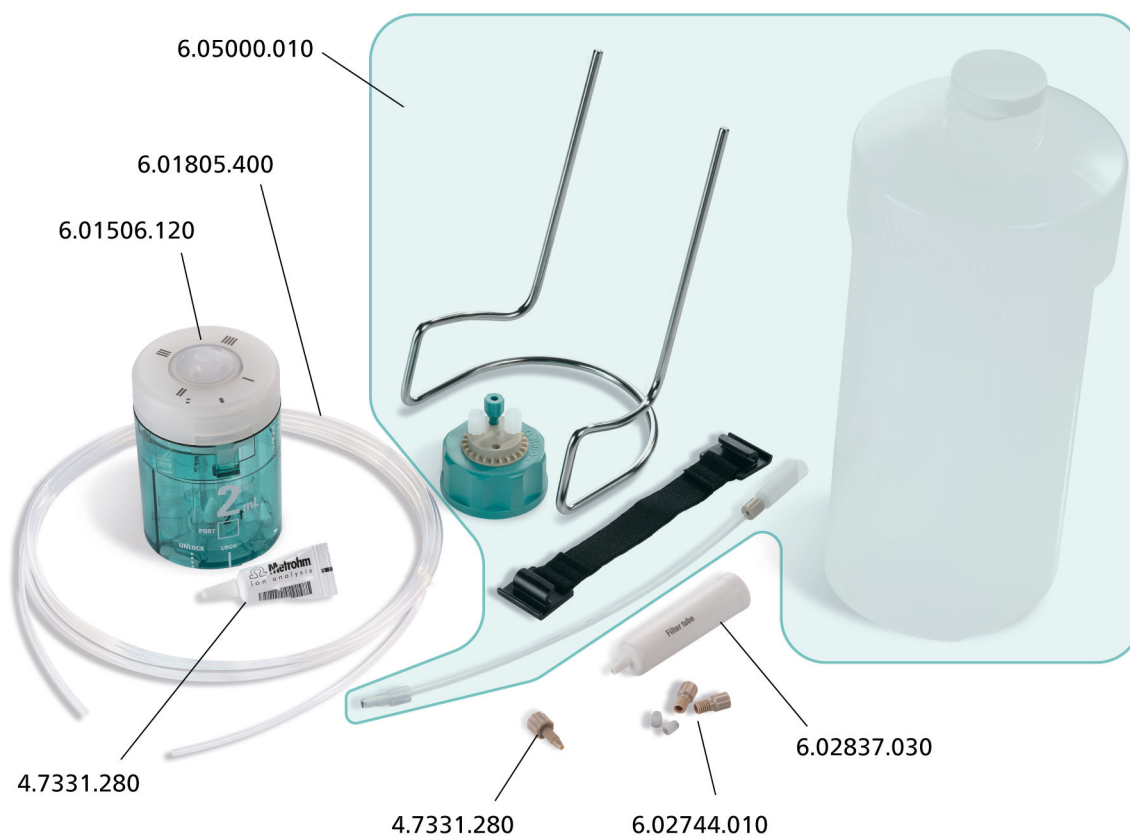


Figure 150 OMNIS IC equipment: DD Reg. – Parts

Table 55 Parts of the OMNIS IC equipment: DD Reg. (6.05332.050)

Article number	Product name	Number
6.01506.120	Cylinder unit OMNIS 2 mL, UNF 10/32	1
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.02837.030	CO2 Absorber (Tube)	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	1
4.7331.280	Pressure screw, short	1
6.2803.010	Grease (2 g)	1

Connecting the regeneration solution (with OMNIS Dosing Drive Unit)

WARNING

Risk of injury due to hazardous substances

If bottles fall over or fall off the reagent organizer during reagent replacement, then leaking hazardous substances can cause poisoning or chemical burns.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Use bottle caps.
- Place the bottles to be filled on the laboratory table.

WARNING

Risk of injury from falling bottles

If bottles fall from the reagent organizer during reagent replacement, they may cause injuries to the feet.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Place the bottles to be filled on the laboratory table.

Prerequisite:

- The aspiration filter is pre-rinsed (*see "Setting up the eluent", chapter 5.14.1, page 248*).

Required accessories:

- OMNIS IC equipment: DD Reg. (6.05332.050)
- Capillary cutter (6.2621.080)

-  Use the CO₂ Absorber (Tube) for alkaline eluents (6.02837.030). Use the filter tube for all other eluents and reagents.



 Cut the FEP tubing to the suitable length during installation.

1 Preparing the bottle with regeneration solution

- Screw the FEP tubing M6 with filter onto the inside of the bottle cap opposite an M6 connector.
- Tighten the bottle cap on the bottle.
- An M6 threaded stopper is attached to the M6 connector opposite the M6 FEP tubing with filter. Unscrew the M6 threaded stopper.
- Fasten one end of an FEP tubing to the M6 connector using a flangeless fitting.
- Guide the FEP tubing from above through the feed-through for capillaries and tubing on the left side of the reagent organizer to the cylinder unit OMNIS.

 If there is insufficient space in the OMNIS IC, the 0.75 mm ID / 100 cm PEEK capillary (6.01831.230) can also be used.

2 Connecting the regeneration solution to the OMNIS Dosing Drive Unit

- Connect the capillary of the MSM labeled *regeneration solution* to Port I of the cylinder unit OMNIS using a short pressure screw.
- An FEP tubing is connected to the bottle with the regeneration solution. Use a flangeless fitting to connect the free tubing end to Port II of the cylinder unit OMNIS.

3 Connecting the filter tube

- Insert the filter tube into the Luer connector.

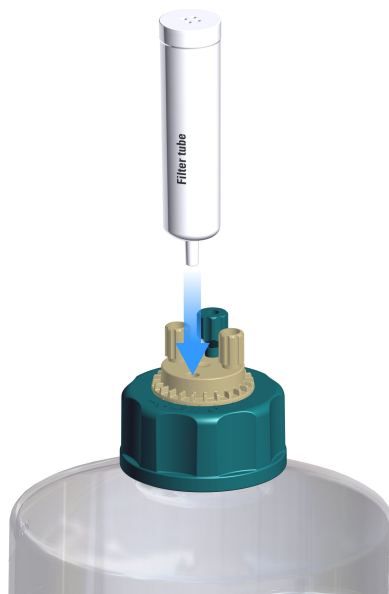


Figure 151 Mounting the filter tube

Then place the bottle on the reagent organizer ([see "Setting up a bottle", page 253](#)).

Regeneration and rinsing with OMNIS Dosing Drive Unit

The equipment kit contains the following parts:

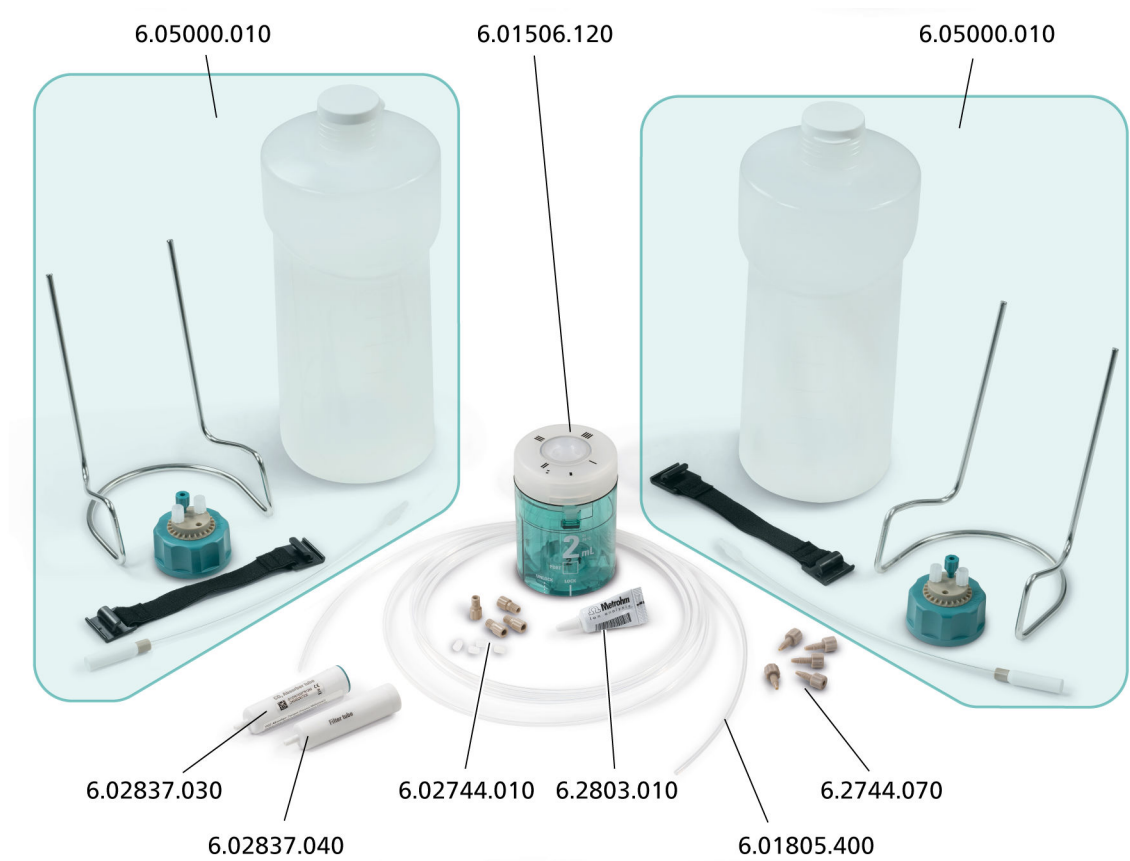


Figure 152 OMNIS IC equipment: DD Reg., Rinse – Parts

Table 56 Parts of the OMNIS IC equipment: DD Reg., Rinse
(6.05332.100)

Article number	Product name	Number
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	2
6.01506.120	Cylinder unit OMNIS 2 mL, UNF 10/32	1
6.2744.070	Pressure screw short, 5 pcs.	1
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.2803.010	Grease (2 g)	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	2
6.02837.030	CO2 Absorber (Tube)	1
6.02837.040	Filter tube	1



Connecting the regeneration solution and rinsing solution (with OMNIS Dosing Drive Unit)

WARNING

Risk of injury from falling bottles

If bottles fall from the reagent organizer during reagent replacement, they may cause injuries to the feet.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Place the bottles to be filled on the laboratory table.

Prerequisite:

- The aspiration filter is pre-rinsed (*see "Setting up the eluent", chapter 5.14.1, page 248*).

Required accessories:

- OMNIS IC equipment: DD Reg., Rinse kit (6.05332.100)
- Capillary cutter (6.2621.080)

 Cut the FEP tubing to the suitable length during installation.

1 Preparing the bottle with regeneration solution

- Screw the FEP tubing M6 with filter onto the inside of the bottle cap opposite an M6 connector.
- Tighten the bottle cap on the bottle.
- An M6 threaded stopper is attached to the M6 connector opposite the M6 FEP tubing with filter. Unscrew the M6 threaded stopper.
- Fasten one end of an FEP tubing to the M6 connector using a flangeless fitting.
- Guide the FEP tubing from above through the feed-through for capillaries and tubing on the left side of the reagent organizer to the cylinder unit OMNIS.

2 Preparing the ultrapure water bottle

- Follow the instructions from *Step 1 – Connect the bottle with regeneration solution* for the ultrapure water bottle as well.

3 Connecting the regeneration solution

- Connect the capillary of the MSM labeled *regeneration solution* to Port I of the cylinder unit OMNIS using a short pressure screw.
- An FEP tubing is connected to the bottle with the regeneration solution. Use a flangeless fitting to connect the free tubing end to Port II of the cylinder unit OMNIS.
-

4 Connecting the ultrapure water

Connect the capillary of the MSM labeled *rinsing solution* to Port III of the cylinder unit OMNIS using a short pressure screw.

An FEP tubing is connected to the ultrapure water bottle. Connect the free tubing end to Port IIII of the cylinder unit OMNIS with a short pressure screw.

5 Connecting the filter tube

- Insert one filter tube each into the Luer connector of the bottle with regeneration solution and the ultrapure water bottle.

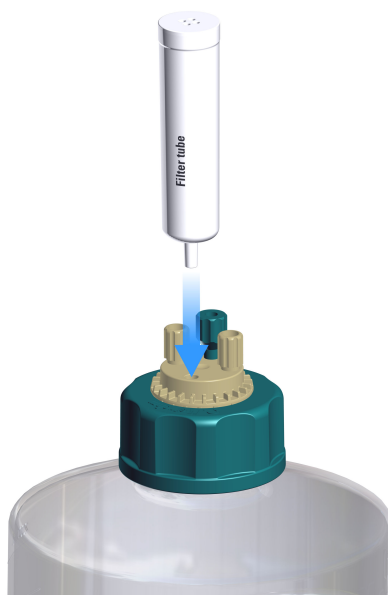


Figure 153 Mounting the filter tube

Then place the bottles on the reagent organizer (see "Setting up a bottle", page 253).

5.12 Setting up the OMNIS IC Autosampler Module



WARNING

Risk of injury due to hazardous substances

Risk of injury from spilled hazardous substances when loading the sample rack.

If hazardous substances are spilled when loading sample racks or OMNIS IC AS Tray, then poisoning or chemical burns may occur.

- Always seal the vials with a lid or septum.
- Do **not** load the OMNIS IC AS Tray with sample racks while the autosampler is in operation.
- Wear personal protective equipment (e.g., protective glasses, gloves).



WARNING

Risk of injury due to sample needle

Risk of injury from touching the moving sample needle.

- Never reach into the sample compartment while the sample changer is in operation.

NOTICE

Property damage due to unauthorized accessory parts

If unauthorized sample racks or vials are used, then damage to the instrument may occur.

- Use only Metrohm vials that are compatible with the instrument or vials that are expressly permitted.
- Use only Metrohm sample racks that are compatible with the instrument or sample racks that are expressly permitted.
- Use only sample racks that can be selected in the OMNIS Software.

NOTICE

Material damage due to incorrectly placed sample racks

If sample racks are not placed exactly in the designated positions, then damage to the instrument will occur.

- Place sample racks in the designated positions.

NOTICE

Damaged sample needle

If the OMNIS IC AS Tray is pulled out while the sample needle is in a vial or bottle, then the sample needle will be damaged.

- Before removing the OMNIS IC AS Tray, check that the **OMNIS IC AS Tray** status display is illuminated in green.

NOTICE

Damage to the cooling unit and the refrigerant piping

If the OMNIS IC Autosampler Module COOL is handled incorrectly, then there will be a risk of damage to the cooling unit or the refrigerant piping. This can increase the risk of a leak.

NOTICE

Increased risk of potential ignition due to faulty parts or incorrect maintenance

Maintenance and the replacement of instrument components must be carried out only by a technician authorized by the manufacturer.

-  There must be a distance of at least 15 cm between the wall and the OMNIS IC Autosampler Module COOL. This ensures smooth cooling and accurate temperature control.
-  The OMNIS IC Autosampler Module COOL must not be removed independently and must not be turned upside down at any time. Furthermore, it is essential to ensure that, when replacing instrument components, only modules specifically manufactured for the OMNIS IC Autosampler Module COOL are used.
-  For optimum cooling output, Metrohm recommends pre-cooling the OMNIS IC AS COOL Tray and the sample racks.

i As soon as the cooling function of the OMNIS IC Autosampler Module COOL is deactivated, an automatic shutdown mechanism will start. The temperature in the sample compartment is adjusted to the ambient temperature at this time. Depending on the temperature difference of the sample compartment and the ambient temperature, this procedure takes up to 3 hours. The fans and compressors remain in operation during the shutdown mechanism. The shutdown mechanism ensures that no condensation occurs in the sample compartment. If the cooling function is deactivated by pressing the on/off switch on the main module, then the shutdown mechanism will not be initiated and condensation may form in the sample compartment.

Loading the OMNIS IC AS Tray

Prerequisite:

- The status display, OMNIS IC AS Tray lights up in green (36-3).

Required accessories:

- Desired number of sample racks, filled with vials
- Desired number of bottles PP, 50 mL (6.02743.090)

- 1 If the sample needle is not in the park position, then move the sample needle to the park position. To do this, select **My Autosampler / Needle Drive ► Manual control ► Target position ► Park position** and start the procedure by clicking on , see [OMNIS help](#).

The sample needle moves to the park position.

- 2 **i** Before removing the OMNIS IC AS Tray, always check the status display, OMNIS IC AS Tray.
If the status display, OMNIS IC AS Tray, flashes green, then the OMNIS IC AS Tray must not be removed. If the status display lights up in green or does not light up, then the OMNIS IC AS Tray may be removed.

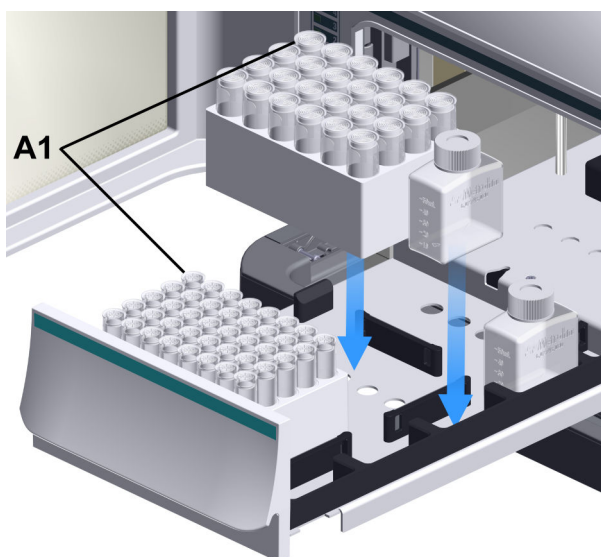


Pull out the OMNIS IC AS Tray.

If necessary, remove the OMNIS IC AS Tray from the autosampler and place it on the laboratory table.

- 3** The OMNIS IC AS Tray contains holders for the sample racks. Hold the sample racks so that position **A1** on the OMNIS IC AS Tray is aligned to the top left. Additional arrows on the OMNIS IC AS Tray and the sample racks help ensure correct alignment.

Insert the sample racks between 2 holders in the OMNIS IC AS Tray. Press down on both sides of the sample racks until they are resting flat on the OMNIS IC AS Tray.



- 4** Place the bottles in the positions on the right in the OMNIS IC AS Tray intended for this purpose.

- 5 If the OMNIS IC AS Tray has been removed from the autosampler, then reinsert the OMNIS IC AS Tray into the autosampler.

Push the OMNIS IC AS Tray into the autosampler as far as it will go.

The OMNIS IC AS Tray is full. The autosampler is ready for operation.

 Push the OMNIS IC AS Tray into the autosampler as far as it will go. This is the only way to ensure that the OMNIS Software detects the OMNIS IC AS Tray.

The needle drive is initialized when the OMNIS IC AS Tray is inserted.

In the case of a needle drive with a barcode reader, this initiates the scanning procedure. Without a barcode reader, a window in the OMNIS Software will appear to assign the sample racks to their positions.

5.13 Connecting the rinse station

Use the rinse station in the autosampler to rinse the sample needle and the OMNIS IC System.

The rinsing solution can be conveyed using one of the following functional units:

- OMNIS Dosing Drive Unit
- Peristaltic pump

If no rinse station is available in the OMNIS IC System, then a bottle with rinsing solution can be placed in the autosampler. The sample needle aspirates the rinsing solution directly from the bottle with the rinsing solution. Different rinse positions are used to prevent contamination by the sample needle.

An **overview of the rinse station** can be found in the chapter [OMNIS IC Autosampler Module – Overview](#).

 By default, the sample needle is connected to the OMNIS Dosing Drive Unit. This makes it possible to rinse the sample needle in reverse. If back-rinsing is not possible, then an alternative rinsing version can be installed using additional accessories.

 The drain tubing must be laid downwards to prevent siphoning ([see "Installing the drainage tubing system", chapter 5.3.4, page 119](#)).

Prerequisite:

- A bottle cap is fitted and connected to the bottle with rinsing solution ([see "Connecting a bottle for eluent and concentrate", page 250](#)).
- The rinse station is connected to the drainage tubing system.

- The matching cylinder unit OMNIS is mounted on the OMNIS Dosing Drive Unit (*see "Refitting the cylinder unit OMNIS", chapter 6.11, page 342*).
Metrohm recommends using a cylinder unit OMNIS (6.0150x.xx0) for dosing the rinsing solution.

5.14 Connecting the reagent organizer

5.14.1 Setting up the eluent

⚠ WARNING

Risk of injury due to hazardous substances

If bottles fall over or fall off the reagent organizer during reagent replacement, then leaking hazardous substances can cause poisoning or chemical burns.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Use bottle caps.
- Place the bottles to be filled on the laboratory table.

⚠ WARNING

Risk of injury from falling bottles

If bottles fall from the reagent organizer during reagent replacement, they may cause injuries to the feet.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Place the bottles to be filled on the laboratory table.

The eluent is drawn into the aspiration tubing via an aspiration filter. In order to avoid air bubbles after the installation of the aspiration filter, pre-rinse the aspiration filter with ultrapure water or eluent.

Pre-rinsing the aspiration filter

Required accessories:

- From the *OMNIS IC bottle PP 2 L accessory kit* (6.05000.010):
 - Aspiration tubing with aspiration filter (6.01834.010)
- Adapter Luer inner / M6 outer (6.02744.050)
- Syringe, Luer
- Vessel with ultrapure water or eluent

1

Always wear gloves when handling the aspiration filter.

Unscrew the aspiration filter from the aspiration tubing.

2

Screw the adapter to the aspiration filter.

3

Insert the syringe into the adapter.

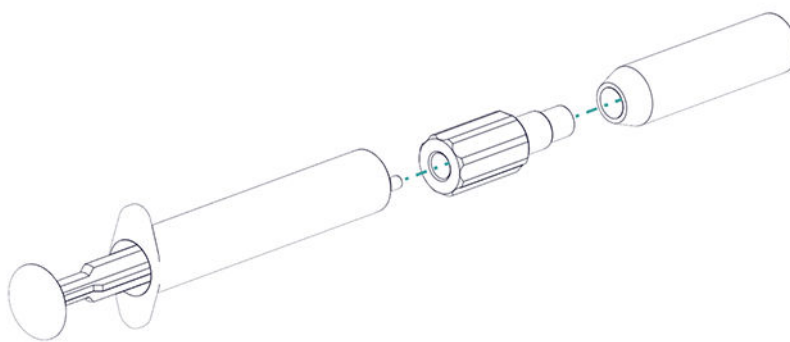


Figure 154 Connecting the syringe to the adapter and aspiration filter

4

Immerse the aspiration filter in a vessel with ultrapure water or eluent.

5

Fill the syringe completely with ultrapure water or eluent 3 times and then empty it again each time.

6

Screw the aspiration filter back onto the aspiration tubing.

The aspiration filter is rinsed.

5.14.2 Connecting the bottle cap

On the outside of the GL 45, 2x M6, UNF 10/32 bottle cap are to be found 2 M6 connectors, 1 UNF 10/32 connector, and 1 Luer connector. On the inside of the GL 45, 2x M6, UNF 10/32 bottle cap, are to be found 3 M6 connectors and 1 Luer connector.

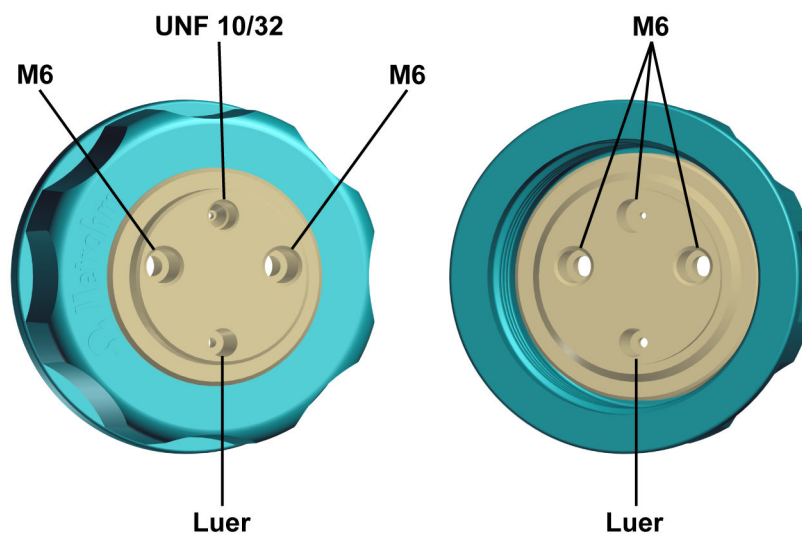


Figure 155 Bottle cap GL 45, 2x M6, UNF 10/32 – Connectors

Connecting a bottle for eluent and concentrate

 WARNING

Risk of injury due to hazardous substances

If bottles fall over or fall off the reagent organizer during reagent replacement, then leaking hazardous substances can cause poisoning or chemical burns.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Use bottle caps.
- Place the bottles to be filled on the laboratory table.



WARNING

Risk of injury from falling bottles

If bottles fall from the reagent organizer during reagent replacement, they may cause injuries to the feet.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Place the bottles to be filled on the laboratory table.

Prerequisite:

- The aspiration filter is pre-rinsed ([see "Setting up the eluent", chapter 5.14.1, page 248](#)).

Required accessories:

- From the *OMNIS IC bottle PP 2 L accessory kit* (6.05000.010):
 - Bottle cap GL 45, 2x M6, UNF 10/32 (6.01602.100)
 - FEP tubing M6 with filter, 0.27 m (6.01834.010)
- CO₂ Absorber (Tube) (6.02837.030) or filter tube (6.02837.040)
Use the CO₂ Absorber (Tube) for alkaline eluents. Use the filter tube for all other eluents and reagents.
- FEP tubing 1/8" RO – DEG, 1,200 mm (6.01805.500), equipped with a flangeless fitting (6.02744.010) at both ends ([see "Connecting the tubings", chapter 5.3.3, page 118](#))

1 Connecting the FEP tubing M6 with filter

- Screw the M6 FEP tubing with filter onto an M6 connector on the inside of the bottle cap.
- Tighten the bottle cap on the bottle.

2 Connecting the FEP tubing RO - DEG

- An M6 threaded stopper is attached to the M6 connector opposite the M6 FEP tubing with filter. Unscrew the M6 threaded stopper.
- Connect one end of the RO – DEG FEP tubing with the M6 connector opposite the M6 FEP tubing with filter.
- Guide the FEP tubing RO – DEG through the feed-through for capillaries and tubing on the reagent organizer.
- Screw the free end of the RO – DEG FEP tubing to the degasser inlet or to the desired functional unit.

3 Connecting the CO2 Absorber (Tube) / filter tube

- Insert the CO2 Absorber (Tube) or the filter tube into the Luer connector of the bottle cap.

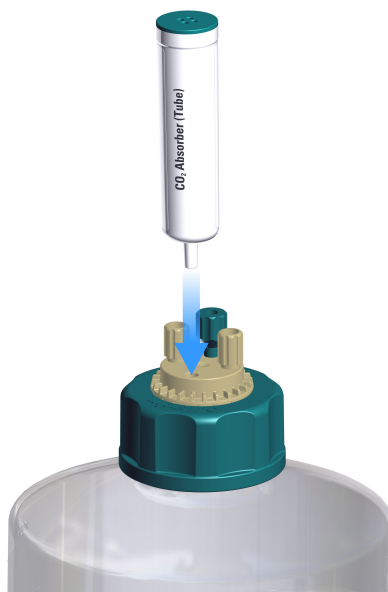


Figure 156 Mounting the CO2 Absorber (Tube)

Then place the bottle on the reagent organizer (see "Setting up a bottle", page 253).

5.14.3 Setting up a bottle

A bottle holder is required to set up the bottles on the reagent organizer. A bottle holder consists of a bottle holder, RO and a bottle fixation, RO.

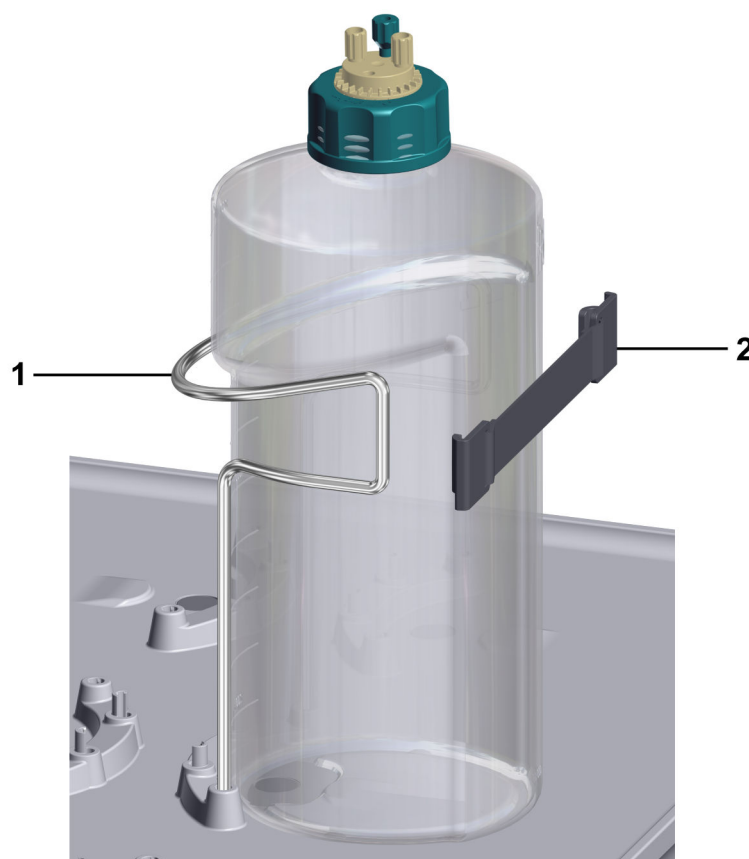


Figure 157 Bottle holder – Overview

1 Bottle holder, RO (6.02050.000)

2 Bottle fixation, RO (6.02050.010)

Setting up a bottle

WARNING

Risk of injury due to hazardous substances

If bottles fall over or fall off the reagent organizer during reagent replacement, then leaking hazardous substances can cause poisoning or chemical burns.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Use bottle caps.
- Place the bottles to be filled on the laboratory table.



WARNING

Risk of injury from falling bottles

If bottles fall from the reagent organizer during reagent replacement, they may cause injuries to the feet.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Place the bottles to be filled on the laboratory table.

NOTICE

Material damage caused by incorrect handling

If a bottle holder, RO or a bottle retainer is moved multiple times, then the mountings on the reagent organizer will become excessively worn.

- To equip additional bottle positions with bottle holders, RO or bottle retainers, order additional bottle holders, RO or bottle retainers.

Required accessories:

- Suitable bottle (*see "Functional description", chapter 3.4.2, page 38*)
- From the OMNIS IC bottle PP 2 L accessory kit (6.05000.010):
 - Bottle holder, RO (6.02050.000)
 - Bottle fixation, RO (6.02050.010)

Optional accessories:

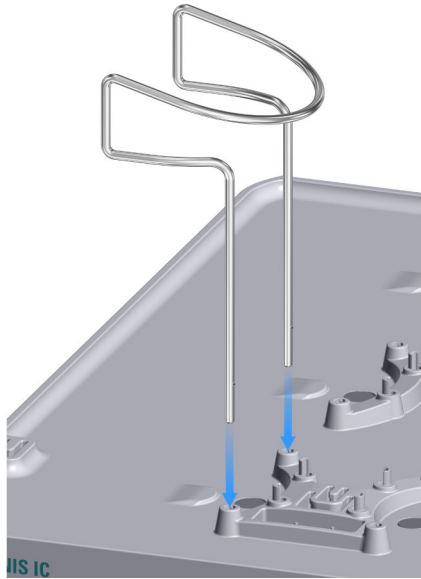
- Bottle holder RO, universal (6.02050.100)
- Bottle fixation RO, universal (6.02050.110)

1 Inserting a bottle holder

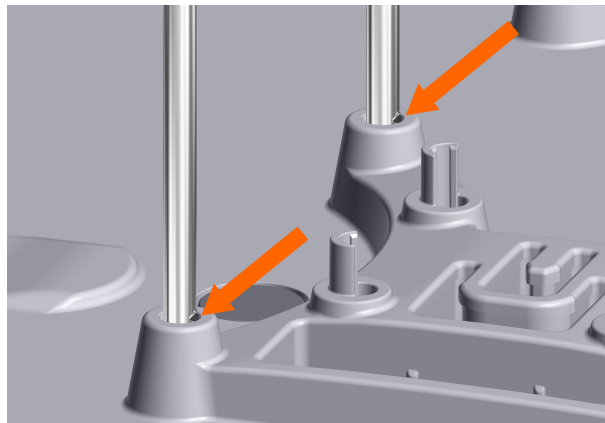


Metrohm recommends the bottle holder RO, universal, if the bottle PP, 2 L, GL 45 is not used.

- Insert the bottle holder into the desired position on the reagent organizer.
To do this, hold the bottle holder so that the bracket is facing outwards. Insert the bottle holder straight into the mounting from above.



- There are 2 positioning aids on the bottle holder. Insert the bottle holder into the mounting until the positioning aids are still half visible.



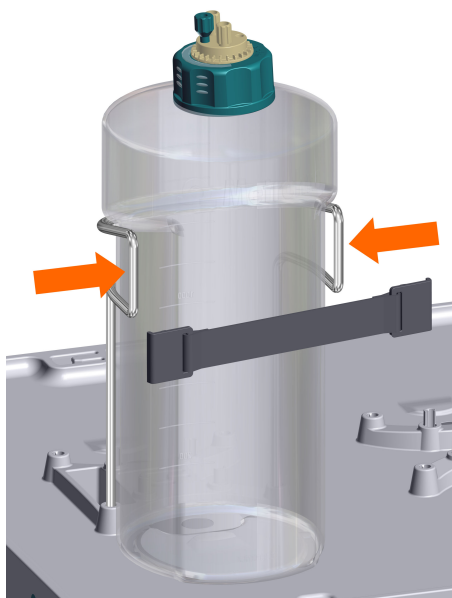
2 Positioning the bottle

- Place the bottle in the desired bottle position.
If the bottle PP, 2 L, GL 45 (6.01608.000) is used, then the bottle holder bracket covers the indentation on the bottle.

3 Fastening the bottle fixation, RO

-  The bottle fixation RO, universal is adjustable in size.
Metrohm recommends the bottle fixation RO, universal, if the bottle PP, 2 L, GL 45 is not used.

- There is a snap lock at both ends of the bottle fixation.
- Press one of the snap locks on the bracket until the lock clicks into place.
- Place the bottle fixation around the bottle.
- Press the snap lock on the other side of the bottle against the bracket until the lock clicks into place.



The bottle is secured.

Setting up a bottle with volume sensor

⚠ WARNING

Risk of injury due to hazardous substances

If bottles fall over or fall off the reagent organizer during reagent replacement, then leaking hazardous substances can cause poisoning or chemical burns.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Use bottle caps.
- Place the bottles to be filled on the laboratory table.

WARNING

Risk of injury from falling bottles

If bottles fall from the reagent organizer during reagent replacement, they may cause injuries to the feet.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Place the bottles to be filled on the laboratory table.

NOTICE

Material damage caused by incorrect handling

If a bottle holder, RO or a bottle retainer is moved multiple times, then the mountings on the reagent organizer will become excessively worn.

- To equip additional bottle positions with bottle holders, RO or bottle retainers, order additional bottle holders, RO or bottle retainers.

Prerequisite:

- A volume sensor is installed.
- A bottle holder, RO is installed.
- A bottle retainer is installed.
- A bottle cap is attached to the bottle (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).

Required accessories:

- Bottle PP, 2 L, GL 45 (6.01608.000), with attached bottle cap.

1



When using a volume sensor, a bottle retainer must be installed.

A regional Metrohm service representative installs the volume sensor and the bottle retainer.

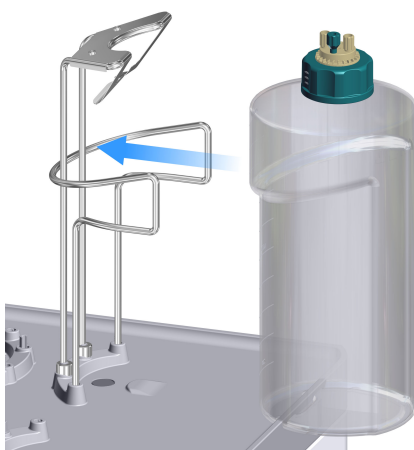


The volume sensor works only with the bottle PP, 2 L, GL 45.

There is a slight elevation on the bottom of the bottle. Hold the bottle so that the elevation faces the volume sensor.



- 2 Insert the bottle into the bottle retainer with a straight movement so that the upper part of the bottle fits into the recess on the bottle retainer.



The bottle is standing upright on the reagent organizer. The elevation on the bottom of the bottle is located above the volume sensor.



- 3** The FEP tubing M6 with filter inside the bottle must not lie on the keepout area of the volume sensor.

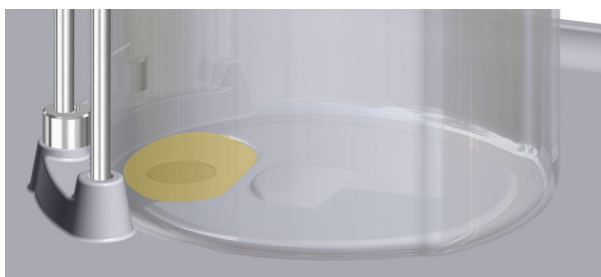


Figure 158 Keepout area of the volume sensor (colored orange)

If necessary, move the M6 FEP tubing with filter away from the keepout area. To do this, rotate the PEEK part of the bottle cap until the M6 FEP tubing with filter is correctly positioned.

5.14.4 Connecting the container

On the outside of the S 40, 2x M6, UNF 10/32 bottle cap are to be found 2 M6 connectors, 1 UNF 10/32 connector, and 1 Luer connector. On the inside of the S 40, 2x M6, UNF 10/32 bottle cap, are to be found 3 M6 connectors and 1 Luer connector.

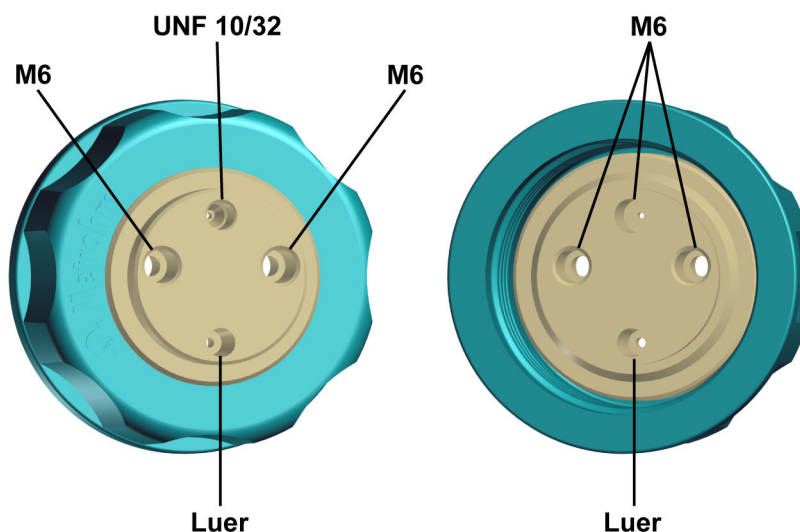


Figure 159 Bottle cap S 40, 2x M6, UNF 10/32 – Connectors

Connecting the container

Prerequisite:

- The container is placed in the volume sensor holder (*see "Setting up the waste canister", chapter 5.3.4.2, page 122*).
- The aspiration filter is pre-rinsed (*see "Setting up the eluent", chapter 5.14.1, page 248*).

Required accessories:

- From the *OMNIS IC equipment: LC 10 L container kit* (6.05332.000):
 - Bottle cap S 40, 2x M6, UNF 10/32 (6.01602.110)
- FEP aspiration tubing for canister (6.1819.110)
- CO2 Absorber (Tube) (6.02837.030) or filter tube (6.02837.040)
Use the CO2 Absorber (Tube) for alkaline eluents. Use the filter tube for all other eluents and reagents.
- Additional accessories for connecting a *capillary*:
 - PTFE capillary 0.5 mm ID / 3 m (6.1803.030)
 - M6 thread / UNF 10/32 adapter (6.2744.080)
 - Pressure screw short, 2 pcs. (6.2744.070)
- Additional accessories for connecting an *FEP tubing*:
 - FEP tubing M6, $\frac{1}{8}$ " x 1.59 mm, 3 m (6.01805.400), equipped with a flangeless fitting (6.02744.010) at both ends ([see "Connecting the tubings", chapter 5.3.3, page 118](#))

1 Connecting the aspiration tubing

- Screw the aspiration tubing with an M6 adapter onto an M6 connector on the inside of the bottle cap.

- Depending on the application, connect a PTFE capillary (step 2) or an FEP tubing (step 3).

2 Connecting the container (PTFE capillary)

- An M6 threaded stopper is attached to the M6 connector opposite the aspiration tubing. Unscrew the M6 threaded stopper.
- Place the M6 / UNF 10/32 adapter thread on one end of the PTFE capillary.
- Connect the PTFE capillary with the M6 connector opposite the aspiration tubing.
- Connect the free end of the PTFE capillary to the desired functional unit using a pressure screw.

3 Connecting the container (FEP tubing)

- An M6 threaded stopper is attached to the M6 connector opposite the aspiration tubing. Unscrew the M6 threaded stopper.
- Connect one end of the FEP tubing with the M6 connector opposite the aspiration tubing.
- Connect the free end of the FEP tubing to the desired functional unit.

4 Connecting the CO₂ Absorber (Tube) / filter tube

- Insert the CO₂ Absorber (Tube) or the filter tube into the Luer connector.

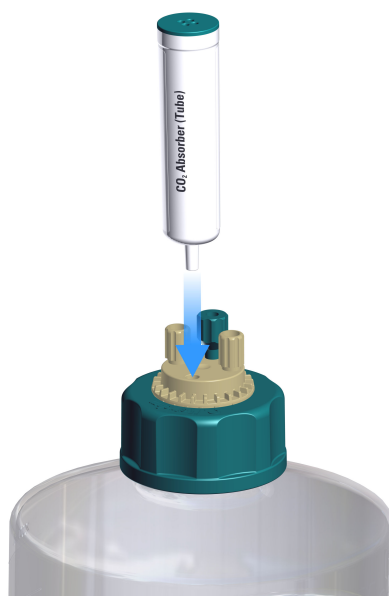


Figure 160 Mounting the CO₂ Absorber (Tube)



5.15 Connecting functional units

The flow path consists of the eluent path and the sample path. The eluent path is already installed at the time of delivery. The following figure shows, for example, the installed eluent path of an OMNIS IC System with sequential suppression:

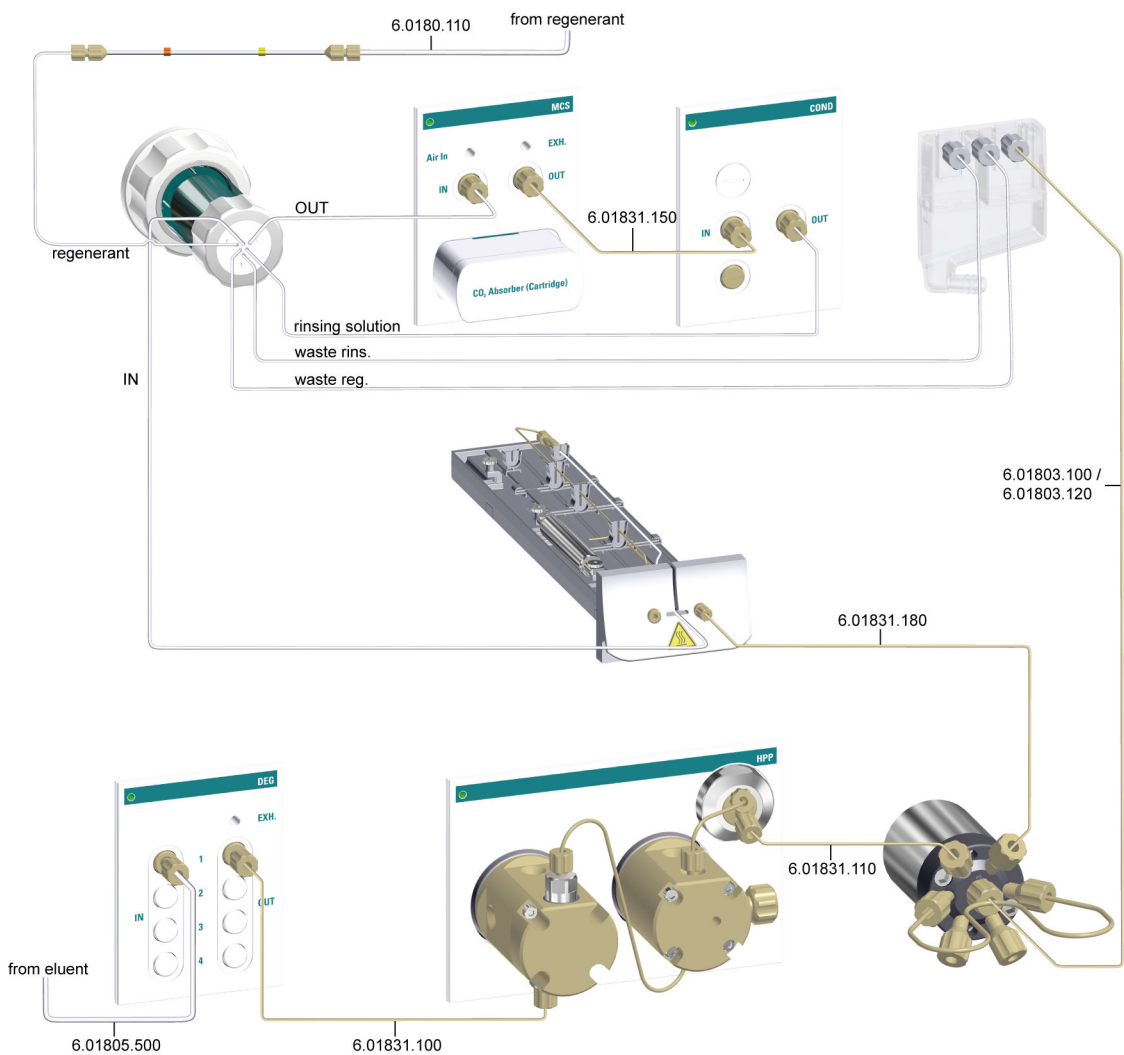


Figure 161 Eluent path for sequential suppression – Example with injector 7/3

Table 57 Installed capillaries for sequential suppression

Article number	Product name	Connection
6.01803.110	PTFE capillary RO - PP, 900/0.5 mm	Regeneration solution - Peristaltic pump inlet



Article number	Product name	Connection
6.01805.500	FEP tubing 1/8" RO - DEG, 1,200 mm	Eluent - Degasser inlet 1
6.01831.100	PEEK capillary DEG - HPP, 240/0.75 mm	Degasser outlet 1 - Inlet for high-pressure pump
6.01831.110	PEEK capillary HPP - INJ, 160/0.5 mm	Outlet, high-pressure pump - Injector port 5
6.01803.110	PEEK capillary INJ - MFM, 450/0.5 mm	Injector port 7 - MFM inlet 4*
6.01831.180	PEEK capillary INJ - COL, 280/0.18 mm	Injector port 4 - Column thermostat inlet 1
6.01831.150	PEEK capillary MCS - COND, 120/0.18 mm	MCS outlet - Detector inlet

**only when using an injector 7/3*

i The flow path depends on the application to be performed and the available functional units. The following procedure shows a possible tubing setup of an OMNIS IC System with sequential suppression and direct injection.

i The guard column, the separation column, and, if needed, the suppressor rotor must be installed in any case during start-up.

i The required bottles (the eluent bottle and the bottle for the regeneration solution by default) must be installed in any case during start-up.

Creating the eluent path

Prerequisite:

- All functional units of the OMNIS IC System are mounted and equipped.
- All functional units are switched off.
- There is no pressure in the system.
- The eluent bottle is equipped with a bottle cap ([see "Connecting the bottle cap", chapter 5.14.2, page 249](#)).
- The bottle with regeneration solution is equipped with a bottle cap and connected to the peristaltic pump or to the OMNIS Dosing Drive Unit ([see "Connecting the regeneration solution", chapter 5.11.2, page 232](#)).
- The bottles are empty or standing on the laboratory table.

Required accessories:

- Depending on the OMNIS IC System used, use the matching accessory kit:
 - Accessory kit: OMNIS IC S Module (6.05000.020)
 - Accessory kit: OMNIS IC M Module (6.05000.030)
 - Accessory kit: OMNIS IC L Module (6.05000.040)
- Wrench (6.2739.000) for pressure screws

1 Connecting the eluent degasser

 Seal unused channels of the degasser with stoppers. Otherwise, the channels will become contaminated and the aspirated air may influence the measurement result.

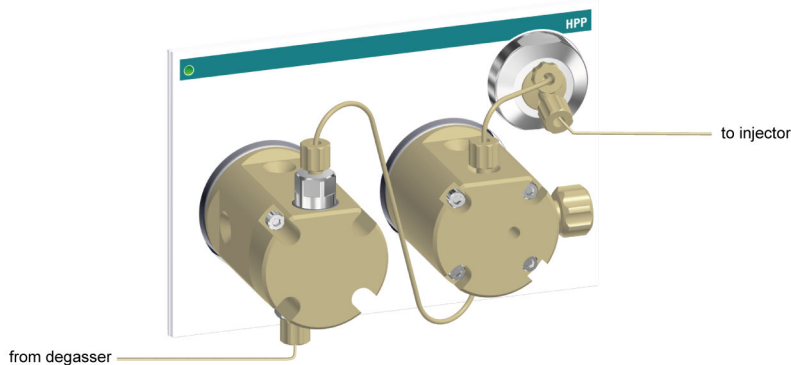
An FEP tubing with a flangeless fitting is installed at degasser inlet 1.

- Connect the free end of this FEP tubing to the bottle cap of the eluent bottle (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).

The capillary connection from degasser outlet 1 to the inlet of the high-pressure pump is installed at the time of delivery.

2 Connecting the high-pressure pump

The capillary connections from the outlet of the high-pressure pump to the pressure sensor and from the pressure sensor to the injector port 5 are installed at the time of delivery.



3 Connecting the column thermostat or column holder

i At the time of delivery, a coupling 2 x UNF (6.2744.040) is installed instead of the guard column and the separation column. Connect the guard column and the separation column only during start-up of the OMNIS IC (see *"Putting the OMNIS IC System into operation", chapter 6.4, page 332*).

Usually, either a column thermostat **or** a column holder is used.

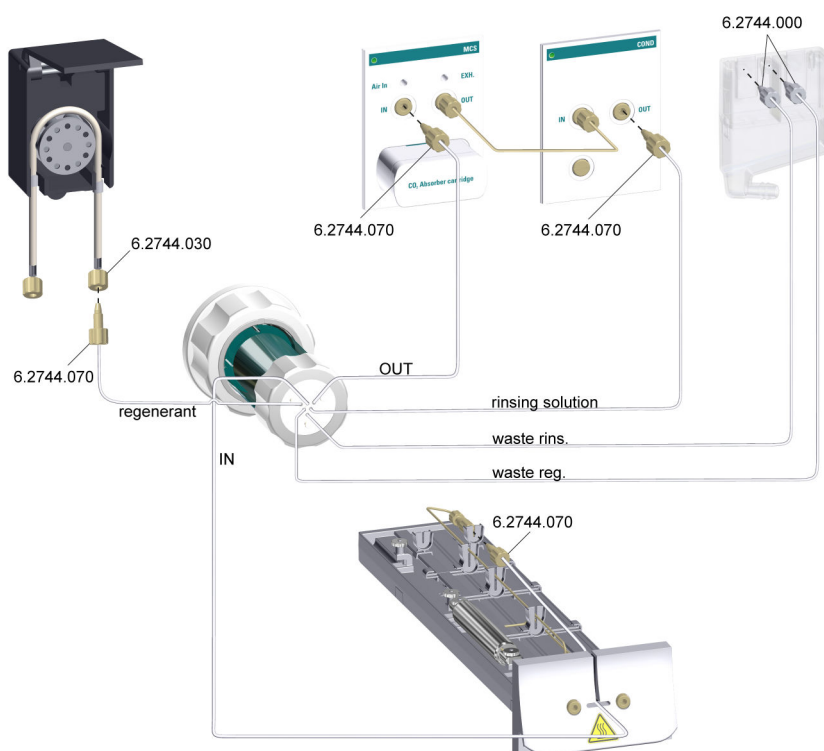
- *Column thermostat*
The capillary connection from injector port 4 to the column thermostat inlet is installed.
At the time of delivery, a coupling 2 x UNF (6.2744.040) is installed on the column tray at the column inlet capillary. The other end of the coupling 2 x UNF is connected to the *in* MSM capillary.
- *Column holder*
The column inlet capillary is already pre-installed on injector port 4.
At the time of delivery, a coupling 2 x UNF (6.2744.040) is installed on the column inlet capillary. The other end of the coupling 2 x UNF is connected to the *in* MSM capillary.

4 Connecting the Metrohm Suppressor Module (MSM) (with sequential suppression)

i Execute this step only if an OMNIS IC System with sequential suppression is used.
Sequential suppression includes the chemical suppression of the eluent by the MSM and CO_2 suppression by the MCS.

The following flow diagram shows the default tubing setup of the MSM:

Each suppressor chamber has a permanently mounted inlet capillary and an outlet capillary. The capillaries are labeled and already installed at the time of delivery.



- The capillary labeled *IN* is fastened to the outlet of the coupling 2 x UNF in the column thermostat or to the column holder.
 - If a column thermostat is used, then the capillary leads through the column thermostat outlet.
- The capillary labeled *OUT* is fastened to the MCS inlet.
- The capillary labeled *regeneration solution* is fastened to the peristaltic pump outlet or to Port II of the cylinder unit OMNIS.
- The capillary labeled *waste reg.* is fastened to inlet 2 of the waste collector.
- The capillary labeled *waste rins.* is fastened to inlet 1 of the waste collector.
- The capillary labeled *rinsing solution* is fastened to the detector outlet.

5 Connecting the bottle with regeneration solution

- Connect the regeneration solution to the peristaltic pump or to the cylinder unit OMNIS ([see "Connecting the regeneration solution", chapter 5.11.2, page 232](#)).

6 Connecting the Metrohm Suppressor Module (MSM) (for chemical suppression and STREAM)

 Execute this step only if an OMNIS IC System with chemical suppression is used.
Chemical suppression includes the suppression of the eluent by the MSM. No CO₂ suppression takes place in the system by the MCS.

- The capillary labeled *OUT* is fastened to the detector inlet.
- The remaining capillaries of the MSM are installed as described in *Step 4 – Connecting the Metrohm Suppressor Module (MSM) (for sequential suppression)*.

7 Connecting the Metrohm Suppressor Module (MSM) (for systems without STREAM)

 Execute this step only if an OMNIS IC System without STREAM is used.

In systems without STREAM, an OMNIS Dosing Drive Unit or a peristaltic pump conveys the rinsing solution to the MSM.

- The detector outlet capillary is connected to the waste collector.
- A peristaltic pump or an OMNIS Dosing Drive Unit conveys the rinsing solution.
The capillary labeled *rinsing solution* is fastened to the peristaltic pump outlet or to Port III of the OMNIS Dosing Drive Unit ([see "Regeneration and rinsing with OMNIS Dosing Drive Unit", page 239](#)).
- The remaining capillaries of the MSM are installed as described in *Step 4 – Connecting the Metrohm Suppressor Module (MSM) (for sequential suppression)*.

8 Connecting the MCS (only for systems with sequential suppression)

 If the MCS is not used, then seal the inlet and outlet of the MCS with stoppers. Otherwise the channel will become contaminated and aspirated air may influence the measurement result.

The capillary connection from the MCS outlet to the detector inlet is installed at the time of delivery.

9 Connecting the deaeration port (only for injector 7/3)

NOTICE

Damage to the cylinder

The sample channel remains sealed as long as the injector 7/3 is in the **Drain position**. If sample is conveyed manually with the OMNIS Dosing Drive Unit while the injector 7/3 is in the **Drain position**, then backing up will take place and the cylinder may become damaged.

- Do not operate the OMNIS Dosing Drive Unit manually while the injector 7/3 is in the **Drain position**.

The capillary connection from the deaeration port to the inlet 4 of the waste collector is installed at the time of delivery.

If necessary, this capillary connection can be installed at the waste collector on the reagent organizer.

Creating a sample path – Direct injection (with OMNIS Dosing Drive Unit)

The equipment kit contains the following parts:

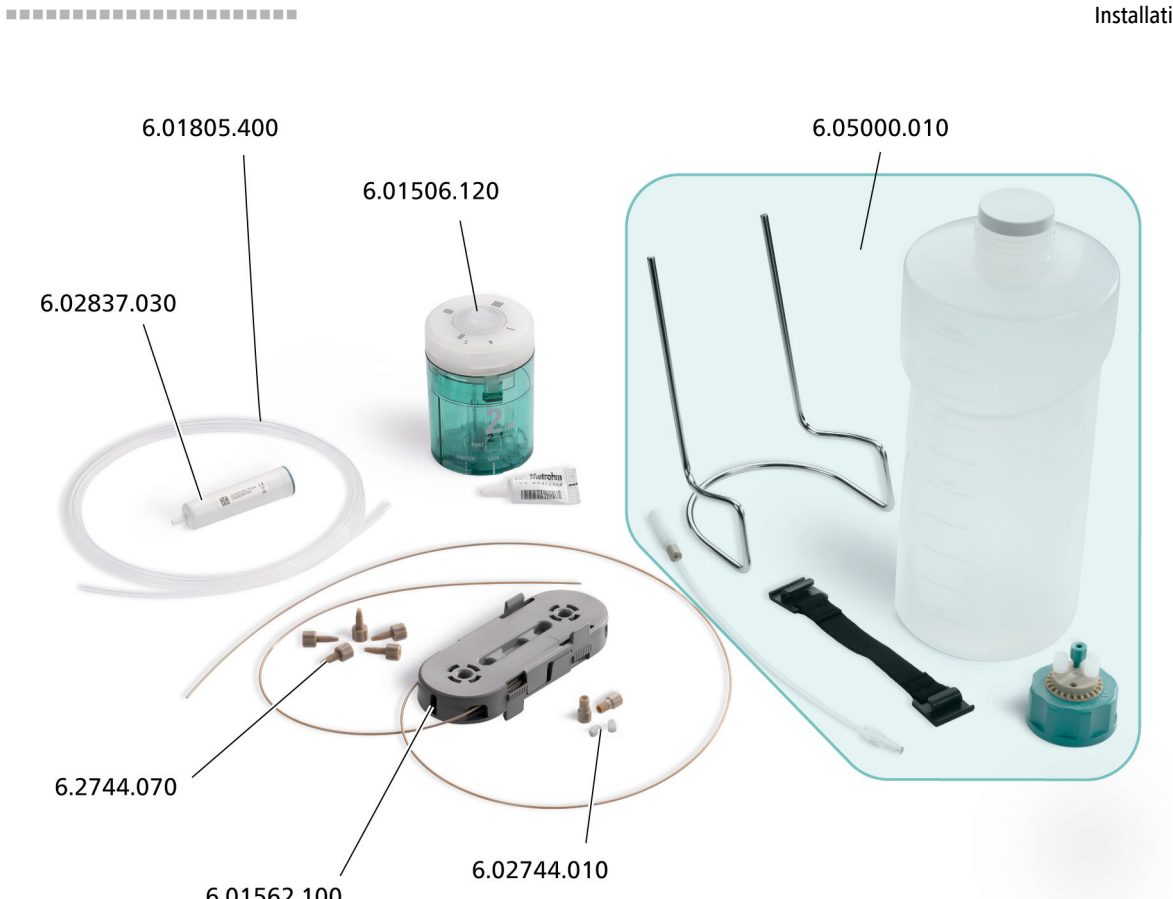


Figure 162 OMNIS IC equipment: D-INJ, DD – Parts

Table 58 Parts of the OMNIS IC equipment: D-INJ, DD (6.05331.010)

Article number	Product name	Number
6.02837.030	CO2 Absorber (Tube)	1
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.01506.120	Cylinder unit OMNIS 2 mL, UNF 10/32	1
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	1
6.01562.100	Transfer capillary 2 mL, PEEK	1
6.2744.070	Pressure screw short, 5 pcs.	1

Creating a sample path – Direct injection (with OMNIS Dosing Drive Unit)

The following illustration shows the sample path of the direct injection with the OMNIS Dosing Drive Unit. A sample preparation technique can also be installed if required.

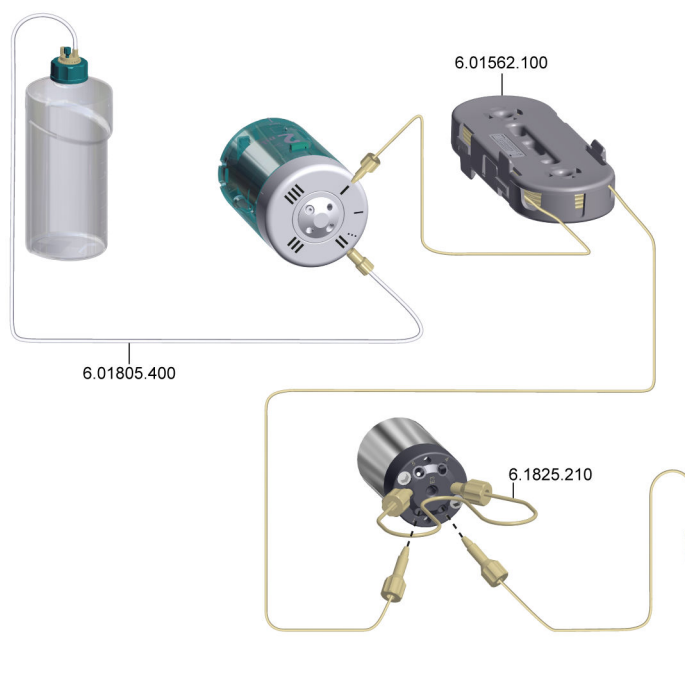


Figure 163 Direct injection with OMNIS Dosing Drive Unit – Flow diagram

Prerequisite:

- All functional units of the OMNIS IC System used are mounted.
- All functional units are switched off.
- There is no pressure in the system.
- An OMNIS Dosing Drive Unit is available in the OMNIS IC System.
- An OMNIS MISP Unit is present in the OMNIS IC system.
- The eluent path is created ([see "Creating the eluent path", page 263](#)).
- A bottle with ultrapure water is equipped with a bottle cap ([see "Connecting the bottle cap", chapter 5.14.2, page 249](#)).

Required accessories:

- OMNIS IC equipment: D-INJ, DD kit (6.05331.010)
- Wrench (6.2739.000) for pressure screws
- Capillary cutter (6.2621.080)

- i** Depending on the OMNIS IC System, the lengths required for capillary connections and tubing connections differ. Cut the PEEK capillaries and FEP tubing to the suitable length with the capillary cutter during installation.

1 Installing the cylinder unit OMNIS 2 mL

- Install the cylinder unit OMNIS on the dosing drive (*see "Equipping the OMNIS Dosing Drive Unit", chapter 5.5, page 198*).

2 Connecting the bottle with ultrapure water

An FEP tubing is connected to the bottle with ultrapure water.

- Use a flangeless fitting to tighten the loose end of the FEP tubing to Port II of the cylinder unit OMNIS.

3 Connecting the MISP unit

- i** This procedure describes only the basic installation of the MISP unit. In order to carry out sample preparation techniques, additional accessories must be connected in the MISP unit. To do this, observe the description of the respective sample preparation technique.

- Insert the transfer capillary 2 mL into the MISP tray (*see "Installing optional accessory parts", page 205*).
- Use a short pressure screw to screw one end of the transfer capillary 2 mL to Port I of the cylinder unit OMNIS.
- Use a pressure screw to connect the other end of the transfer capillary 2 mL to injector port 1.

4 Connecting the sample needle

- The sample needle capillary is already tightened to the sample needle at the time of delivery. Guide the sample needle capillary through the capillary guide of the autosampler (*see "Guide system", chapter 5.3, page 109*) to the OMNIS IC.

5 Connecting the injector

- i** Use only pressure screws (6.2744.01x) for capillary connections at the injector.



- Use a pressure screw to screw the sample needle capillary to injector port 2.
- A 20 µL sample loop is installed on injector ports 3 and 6 by default. If required, the sample loop can be replaced ([see "Equipping the OMNIS Actuator Unit", chapter 5.7, page 203](#)).

The sample path for direct injection is installed.

Creating a sample path – direct injection (with peristaltic pump)

The equipment kit contains the following parts:

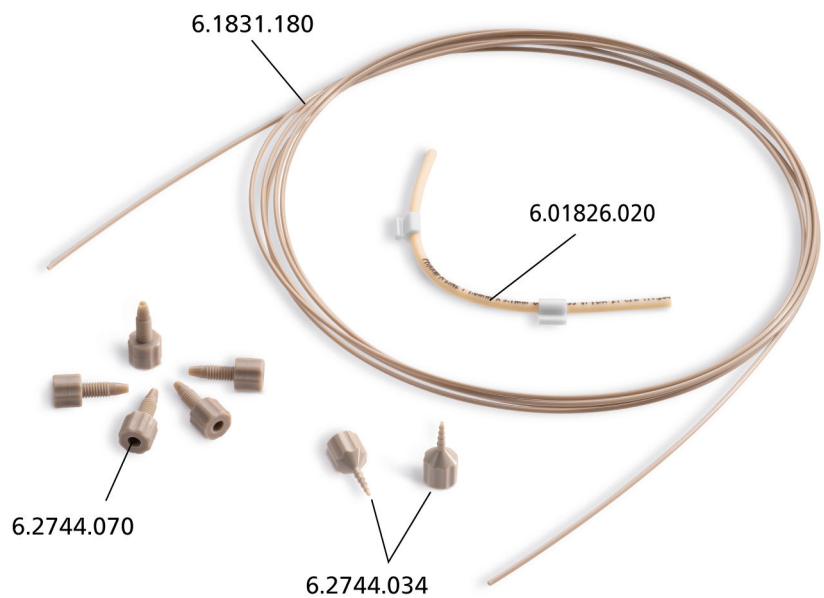


Figure 164 OMNIS IC equipment: D-INJ, PP – Parts

Table 59 Parts of the OMNIS IC equipment: D-INJ, PP (6.05331.020)

Article number	Product name	Number
6.1831.180	PEEK capillary, 0.5 mm ID / 3 m	1
6.01826.020	Pump tubing, ID 1.0 mm, white - white	1
6.2744.034	Coupling olive/UNF 10/32, 2x	1
6.2744.070	Pressure screw short, 5 pcs.	1

Creating a sample path – direct injection (with peristaltic pump)

The following illustration shows the sample path of the direct injection with the peristaltic pump. A sample preparation technique can also be installed if required.



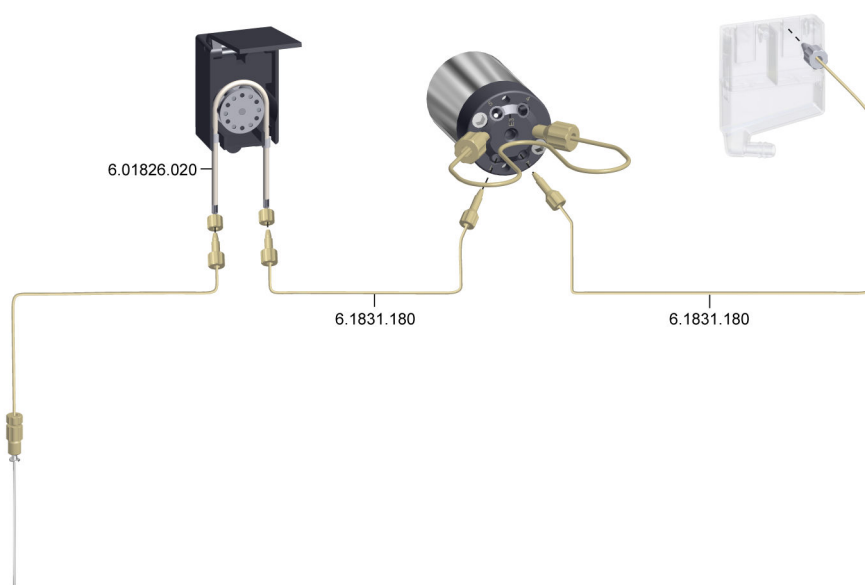


Figure 165 Direct injection with peristaltic pump – Flow diagram

Prerequisite:

- All functional units of the OMNIS IC System used are mounted.
- All functional units are switched off.
- There is no pressure in the system.
- The eluent path is created ([see "Creating the eluent path", page 263](#)).
- The OMNIS IC System has a free peristaltic pump channel.

Required accessories:

- OMNIS IC equipment: D-INJ, PP kit (6.05331.020)
- Wrench (6.2739.000) for pressure screws
- Capillary cutter (6.2621.080)

i Depending on the OMNIS IC System, the lengths required for capillary connections and tubing connections differ. Cut the PEEK capillaries and FEP tubing to the suitable length with the capillary cutter during installation.

1 Inserting the pump tubing

- Insert the pump tubing at both ends with one coupling olive/UNF 10/32 each and insert it into the peristaltic pump ([see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200](#)).

2 Connecting a peristaltic pump

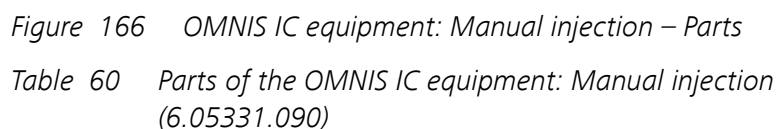
- The sample needle capillary is already tightened to the sample needle at the time of delivery. Guide the sample needle capillary through the capillary guide of the autosampler to the OMNIS IC (*see "Guide system", chapter 5.3, page 109*).
- Use a short pressure screw to screw the sample needle capillary at the coupling olive/UNF 10/32 at the peristaltic pump inlet.
- Use a short pressure screw to tighten one end of a capillary 0.5 mm at the coupling olive/UNF 10/32 on the peristaltic pump outlet.
- Use a pressure screw to connect the other capillary end to injector port 1.

3 Connecting the injector

- Use only pressure screws (6.2744.01x) for capillary connections at the injector.
- Use a pressure screw to tighten one end of a capillary 0.5 mm to injector port 2.
- Use a PVDF pressure screw to tighten the other capillary end to the waste collector.
- A 20 µL sample loop is pre-installed on injector ports 3 and 6 by default. If required, the sample loop can be replaced ([see "Equipping the OMNIS Actuator Unit", chapter 5.7, page 203](#)).

Creating a sample path – Direct injection (with manual injection)

The equipment kit contains the following parts:



Article number	Product name	Number
6.2744.120	Luer F pressure screw adapter	1
6.1831.060	PEEK capillary 0.5 mm ID / 1 m	1
6.02816.000	Syringe 20 mL with Luer connector	1
4.7331.280	Pressure screw, short	1

The following illustration shows the sample path of the manual direct injection.

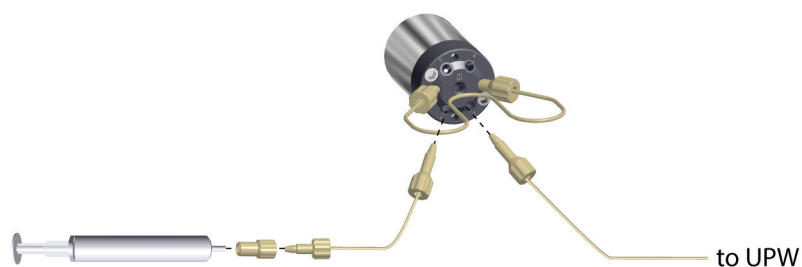


Figure 167 Manual direct injection – Flow diagram

Prerequisite:

- All functional units of the OMNIS IC System used are mounted.
- All functional units are switched off.
- There is no pressure in the system.
- The eluent path is created (*see "Creating the eluent path", page 263*).

Required accessories:

- OMNIS IC equipment: Manual injection kit (6.05331.090)
- Bottle PP 50 mL (6.02743.030), filled with ultrapure water

1 Connecting the syringe

 Use only pressure screws (6.2744.01x) for capillary connections at the injector.

- Connect the syringe to the Luer pressure screw adapter.
- Use a short pressure screw to connect a capillary end 0.5 mm to the Luer pressure screw adapter.
- Use a pressure screw to connect the other capillary end 0.5 mm to injector port 1. Cut the capillary to a suitable length with the capillary cutter.

2 Connecting the ultrapure water bottle

- Guide one end of a capillary 0.5 mm into the bottle PP 50 mL with ultrapure water.
- Use a pressure screw to connect the other capillary end to injector port 2. Cut the capillary 0.5 mm to a suitable length with the capillary cutter.

3 Injecting the sample

- Replace the ultrapure water bottle with a sample vessel.
- Aspirate the sample with the syringe.

5.16 Accessories

The OMNIS IC System can be extended to include the following accessories:

- Piston seal wash
 - with OMNIS Dosing Drive Unit, [see page 277](#)
 - with peristaltic pump [see page 278](#)
- Eluent production [see page 285](#)
- Dose-in gradient [see page 291](#)
- Low-pressure gradient [see page 294](#)
- Post-column reaction (PCR-UV/VIS)
 - with OMNIS Dosing Drive Unit, [see page 299](#)
 - with peristaltic pump [see page 304](#)
- AutoSwitch [see page 307](#)
- Drip collector, Unit, [see page 314](#)
- Pulsation absorber [see page 315](#)
- Fall prevention fixture, base plate
[see page 318](#)
- Mobile device holder [see page 321](#)

5.16.1 Piston seal wash

There are various options for installing the piston seal wash. The installation selected depends on the application area and the accessories available. Metrohm recommends using the piston seal wash with an OMNIS Dosing Drive Unit.

Piston seal wash with OMNIS Dosing Drive Unit (recommended)

The dosing drive with attached cylinder unit OMNIS is connected to the piston seal wash. Ultrapure water is used for rinsing. Rinsing is integrated into the method as a command and takes place after each sample injection. To use the piston seal wash correctly with the OMNIS Dosing Drive Unit, observe the sequence of the functional units:

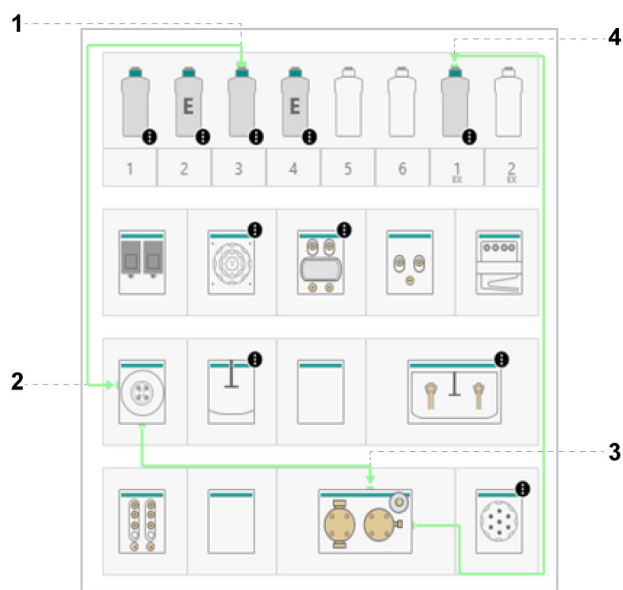


Figure 168 Piston seal wash with OMNIS Dosing Drive Unit

1. Bottle with ultrapure water
2. Cylinder unit OMNIS Port II
3. Cylinder unit OMNIS Port III – Piston seal wash
4. Waste collector

An OMNIS Dosing Drive Unit is required for this type of piston seal wash (see ["Mounting the piston seal wash \(with OMNIS Dosing Drive Unit\)"](#), page 281).

Piston seal wash with peristaltic pump

A peristaltic pump is connected to the piston seal wash. Ultrapure water is used for rinsing. To use the piston seal wash correctly with the peristaltic pump, observe the sequence of the functional units:

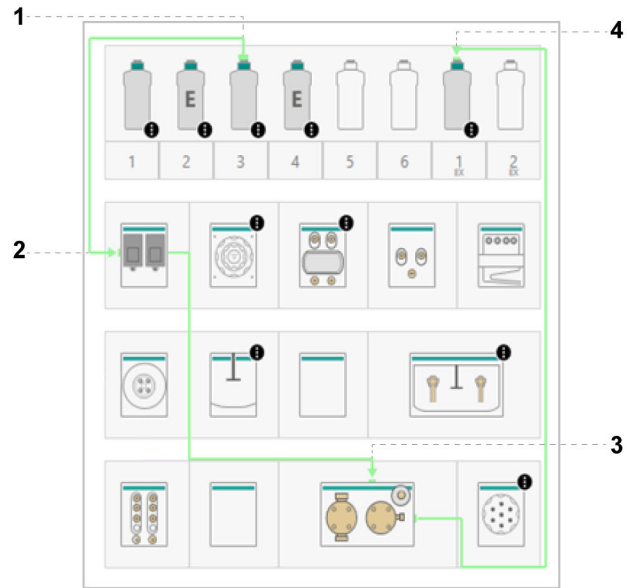


Figure 169 Piston seal wash with peristaltic pump

1. Bottle with ultrapure water
2. Peristaltic pump
3. Piston seal wash
4. Waste collector

An additional peristaltic pump is required for this type of piston seal wash (see *"Mounting the piston seal wash (with peristaltic pump)"*, page 284).

Piston seal wash – Overview

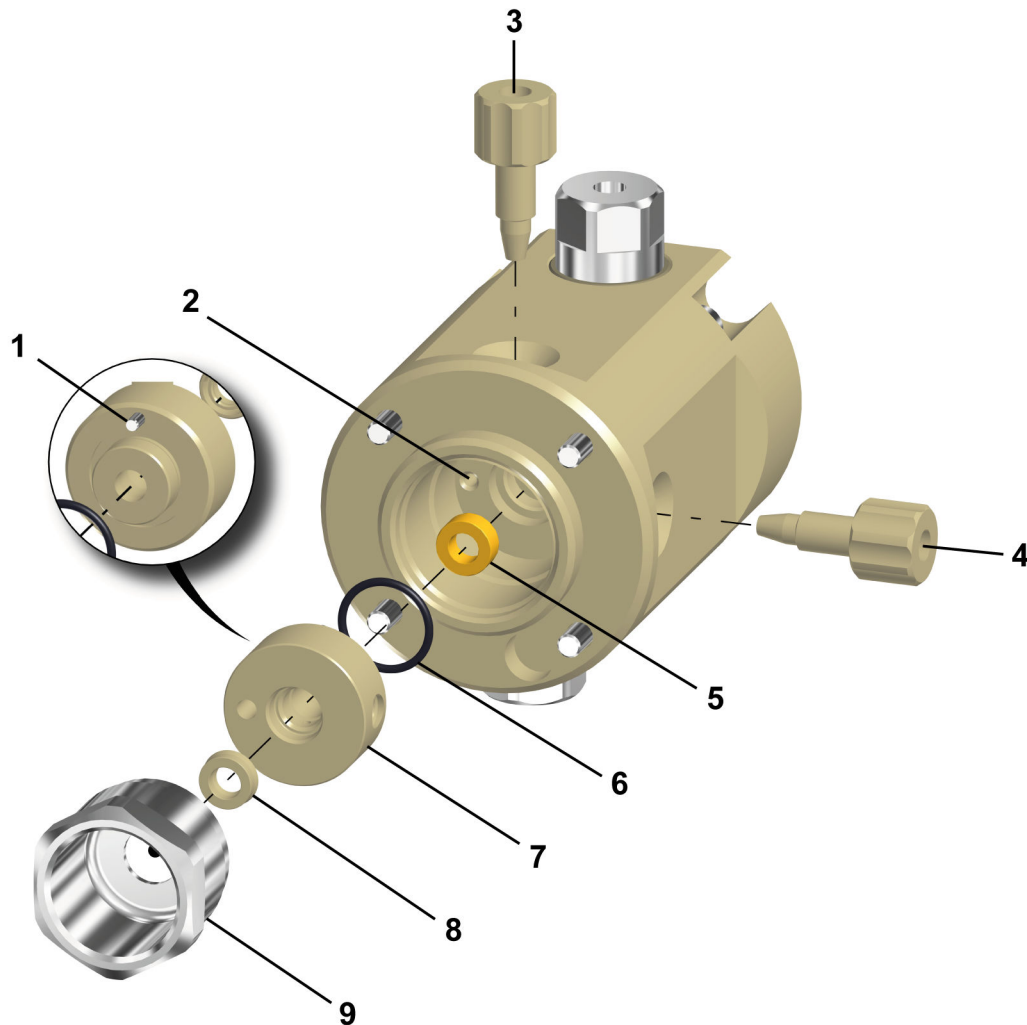


Figure 170 Pump head main with piston seal wash – Rear

- | | |
|---|---|
| <p>1 Positioning pin
Ensures correct positioning of the insert for piston seal wash in the pump head.</p> <hr/> <p>3 Piston seal wash outlet</p> <hr/> <p>5 Piston seal
Seals the pump piston.</p> <hr/> <p>7 Insert for piston seal wash
Replaces the support insert (200-2).</p> <hr/> <p>9 Coupling nut
Fastens the insert for piston seal wash or support insert in the pump head.</p> | <p>2 Positioning aid
Ensures correct positioning of the insert for piston seal wash in the pump head.</p> <hr/> <p>4 Piston seal wash inlet</p> <hr/> <p>6 O-ring
Seals the insert for piston seal wash.</p> <hr/> <p>8 Piston wash seal
Seals the insert for piston seal wash.</p> |
|---|---|

Piston seal wash with OMNIS Dosing Drive Unit

The equipment kit contains the following parts:

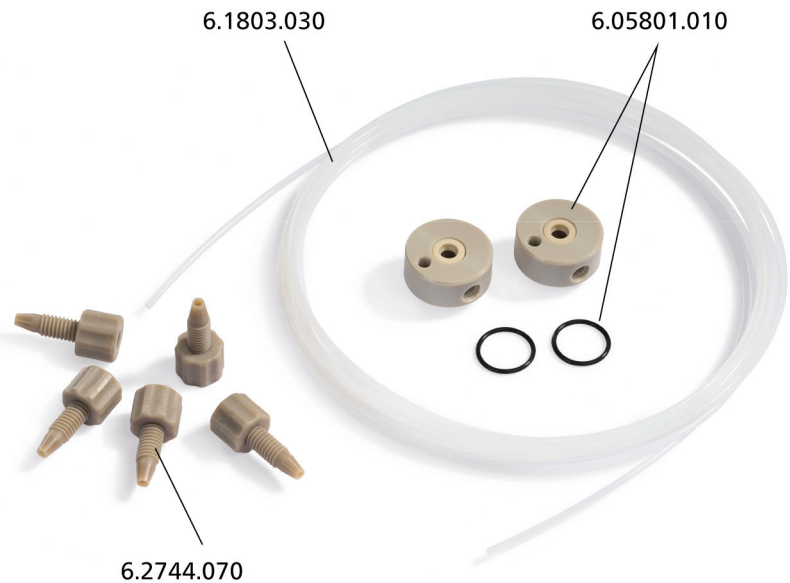


Figure 171 OMNIS IC equipment: HPP piston rinsing, DD – Parts

Table 61 Parts of the OMNIS IC equipment: HPP piston rinsing, DD (6.05332.020)

Article number	Product name	Number
6.1803.030	PTFE capillary, 0.5 mm ID / 3 m	1
6.05801.010	Piston wash kit	1
6.2744.070	Pressure screw short, 5 pcs.	1

Mounting the piston seal wash (with OMNIS Dosing Drive Unit)

Prerequisite:

- A free port is available on a cylinder unit OMNIS in the OMNIS IC System.
- The pump head main and the pump head auxiliary are dismantled ([see "Dismantling a pump head", chapter 7.3.1, page 365](#)).
- A new piston wash seal has been inserted ([see "Replacing the piston wash seal", chapter 7.3.6, page 374](#)).

Required accessories:

- OMNIS IC equipment: HPP piston rinsing, DD kit (6.05332.020)
- Multitool HPP (6.02621.010) ([see figure 202, page 365](#))
- Wrench (6.2739.000) for pressure screws

- Bottle with ultrapure water incl. bottle cap and aspiration tubing with aspiration filter
- FEP tubing M6, $\frac{1}{8}$ " x 1.59 mm, 3 m (6.01805.400)
- Flangeless fitting M6, $\frac{1}{8}$ ", 2 pcs. (6.02744.010)

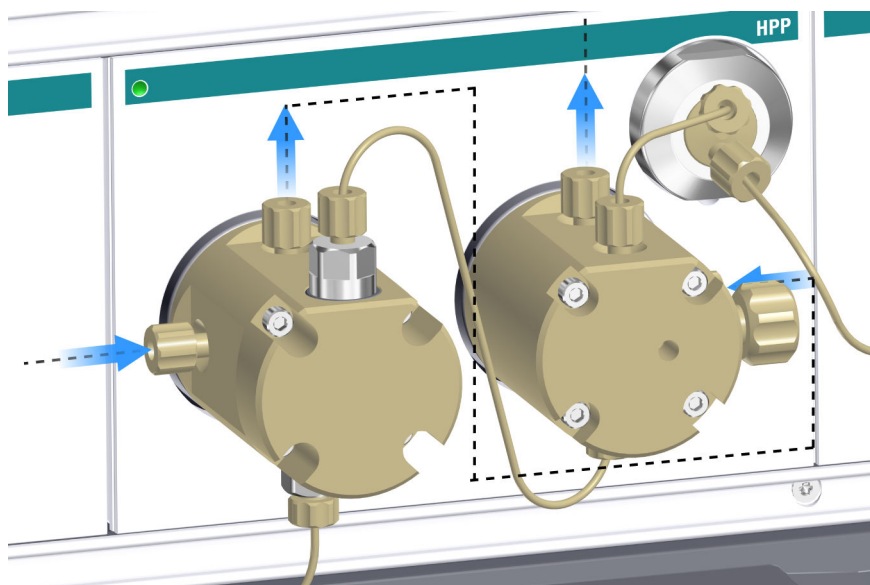
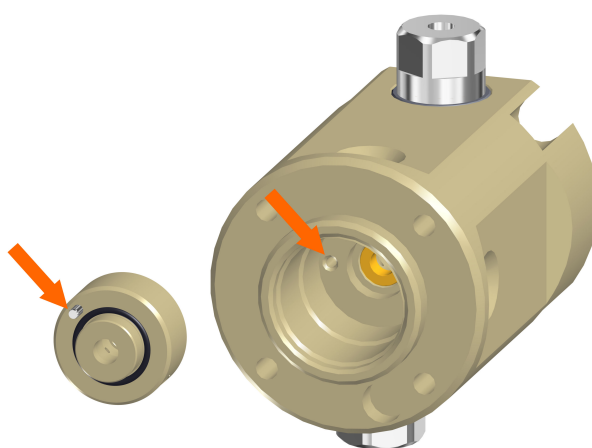


Figure 172 Flow path of the piston seal wash

1 Mounting the insert for piston seal wash

Perform steps 1 to 3 on both the pump head main and the pump head auxiliary.

- Place the O-ring (170-6) on the insert for piston seal wash.
- A positioning pin is located on the insert for piston seal wash (170-1). Align this positioning pin on the positioning aid (170-2) inside the pump head. Insert the insert for piston seal wash into the pump head.



- If the insert for piston seal wash is not correctly positioned in the pump head, then rotate the insert for piston seal wash until the positioning pin engages. To do this, use the multitool with the attachment for inserting seals screwed on (202-5).

2 Inserting the coupling nut

- Insert the coupling nut into the multitool (202-2).
- Attach the coupling nut to the pump head using the multitool and tighten it by turning it clockwise $\frac{1}{4}$ rotation.

The coupling nut fastens the insert for piston seal wash.

3 Mounting the pump head

- Mount the pump head (see *"Mounting the pump head", chapter 7.3.7, page 376*).

4 Setting up the bottle with ultrapure water

- Pre-rinse the aspiration filter (see *"Setting up the eluent", chapter 5.14.1, page 248*).
- Attach the aspiration tubing and the bottle cap, incl. FEP tubing, to the bottle with ultrapure water (see *"Connecting the bottle cap", chapter 5.14.2, page 249*).
- Connect the other end of the FEP tubing to Port II of the cylinder unit OMNIS using a flangeless fitting.

5 Establishing capillary connections

To ensure that there is no air in the rinsing solution flow path, always select the connection opening located further down on the pump head as the inlet for the piston seal wash. Use the capillary cutter to cut the 0.5 mm capillary to the desired length during installation.

- Use a short pressure screw to screw one capillary end at the inlet of the piston seal wash of the pump head main.
Use a short pressure screw to screw the other end of this capillary to Port III of the cylinder unit OMNIS.
- Tighten one end of another capillary to the outlet of the piston seal wash of the pump head main using a short pressure screw.
- Tighten the other end of this capillary to the inlet of the piston seal wash of the pump head auxiliary using a short pressure screw.
- Tighten the end of another capillary to the outlet of the piston seal wash of the pump head auxiliary using a short pressure screw.
- Tighten the other end of this capillary to the waste collector.

Piston seal wash with peristaltic pump

The equipment kit contains the following parts:

Mounting the piston seal wash (with peristaltic pump)

Prerequisite:

- The OMNIS IC System has a free peristaltic pump channel.
- The pump head main and the pump head auxiliary are dismantled (*see "Dismantling a pump head", chapter 7.3.1, page 365*).
- A new piston wash seal has been inserted (*see "Replacing the piston wash seal", chapter 7.3.6, page 374*).

Required accessories:

- OMNIS IC equipment: HPP piston rinsing, DD kit (6.05332.020)
- Pump tubing, ID 0.5 mm, orange - yellow (6.01826.010)
- Coupling olive/UNF 10/32, 2 pcs. (6.2744.034)
- Multitool HPP (6.02621.010) (*see figure 202, page 365*)
- Wrench (6.2739.000) for pressure screws
- Bottle with ultrapure water incl. bottle cap and aspiration tubing with aspiration filter

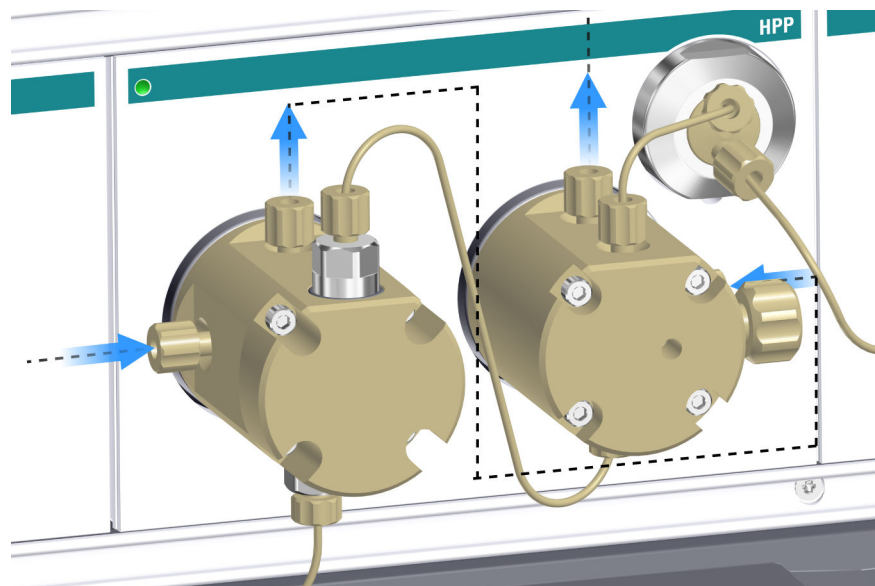


Figure 173 Flow path of the piston seal wash

1 Equipping the peristaltic pump

- Insert the pump tubing into the peristaltic pump (see *"Equipping the OMNIS Peristaltic Pump Unit"*, chapter 5.6, page 200).

2 Connecting the bottle with ultrapure water

- Pre-rinse the aspiration filter (*see "Setting up the eluent", chapter 5.14.1, page 248*).
- Attach the aspiration tubing and the bottle cap, incl. the 0.5 mm capillary, to the bottle with ultrapure water (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).
- Use a short pressure screw to connect the other capillary end 0.5 mm at the peristaltic pump inlet.

3 Equipping the pump heads with piston seal wash

- Perform steps 1 to 3 of the *Mounting piston seal wash (with OMNIS Dosing Drive Unit)* procedure (*see "Mounting the piston seal wash (with OMNIS Dosing Drive Unit)", page 281*).

4 Establishing capillary connections

To ensure that there is no air in the rinsing solution flow path, always select the connection opening located further down on the pump head as the inlet for the piston seal wash. Use the capillary cutter to cut the 0.5 mm-diameter PTFE capillary to the desired length during installation.

- Use a short pressure screw to screw one capillary end at the inlet of the piston seal wash of the pump head main.
Use a short pressure screw to screw the other end of this capillary at the peristaltic pump outlet.
- Tighten one end of another capillary to the outlet of the piston seal wash of the pump head main using a short pressure screw.
Tighten the other end of this capillary to the inlet of the piston seal wash of the pump head auxiliary using a short pressure screw.
- Tighten the end of another capillary to the outlet of the piston seal wash of the pump head auxiliary using a short pressure screw.
- Tighten the other end of this capillary to the waste collector.

5.16.2 Installing eluent production

For eluent production with the OMNIS IC equipment: EPOD (Eluent Production on demand), software-controlled and, as required, the eluent for the OMNIS IC System can be produced from a concentrate and ultrapure water.

The exact composition of the eluent is thereby dosed by the cylinder unit OMNIS using various ports.

The manufacturing process for eluents is improved with the eluent production for the OMNIS IC. During eluent production with the OMNIS IC, the components are already being continuously stirred during dosing. If eluent is to be produced, then one portion of eluent is prepared in each of a cylinder unit OMNIS and then fed to the eluent bottle.

The required volume of ultrapure water is divided into 3 parts and the required volume of eluent concentrate into 2 parts. First, a portion of ultrapure water is aspirated into the cylinder unit OMNIS and then a portion of eluent concentrate. This is continued until the cylinder unit OMNIS is filled and then transferred to the eluent bottle.

As another function, the eluent production for the OMNIS IC can be added to a rinsing solution without additional system modification. The rinsing solution rinses the system after the analysis or after a sample series and thereby increases the service life of the individual components.

The fill level of the individual eluent components is monitored by sensors. This ensures that there is no empty run and that no air is aspirated.

By default, a cylinder unit OMNIS 50 mL is used for eluent production.

As a rule, no magnetic stirrer is required for eluent production. Optionally, both anions and cation eluents can be mixed with a magnetic stirrer. It accelerates the equilibrium setting through improved diffusion and leads to an even faster homogenization of the solution.

The ultrapure water can be aspirated either from an ultrapure water container 10 L or from an ELGA PURELAB ultrapure water purification system.

 The ultrapure water is pumped with a high flow rate. The aspiration filter must therefore be unscrewed when using the FEP tubing with ultrapure water. This is the only way to ensure optimum pumping of ultrapure water and that no air bubbles form. The aspiration filter (Filter Porous PE 27 µm) is included in the accessories for the bottle cap S 40, 2x M6, UNF 10/32 (6.01602.110).

Overview

The equipment kit contains the following parts:

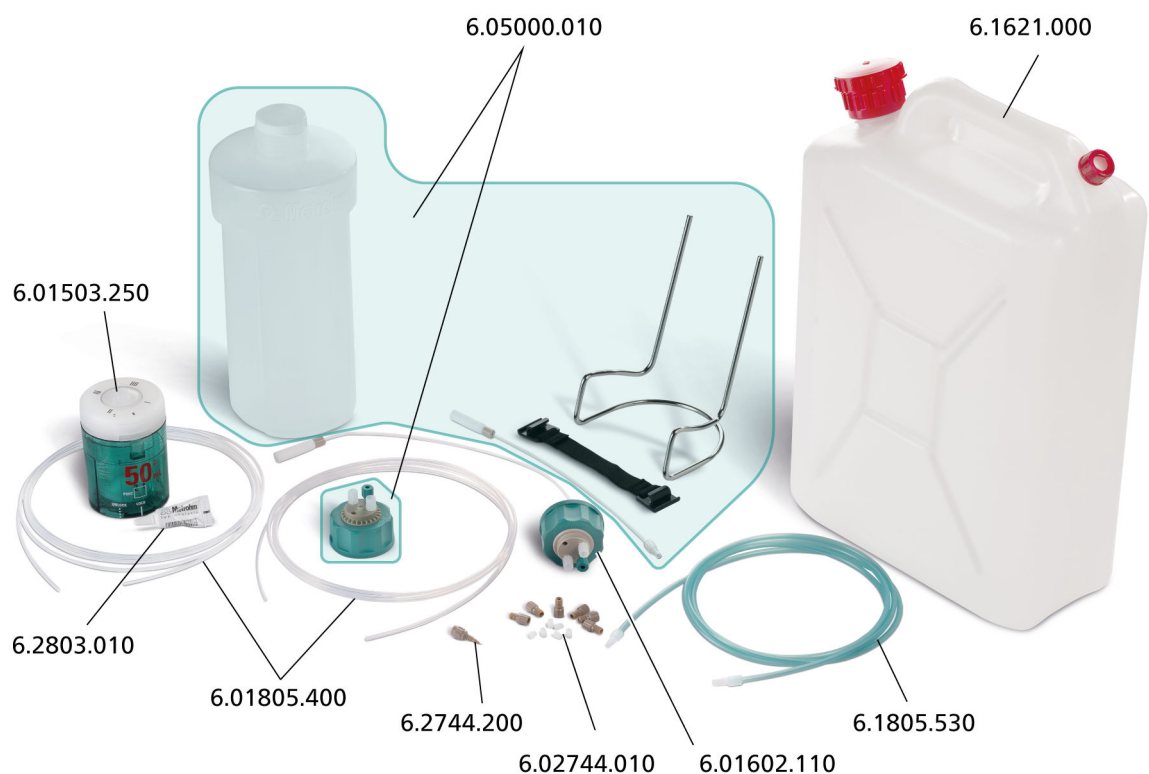


Figure 174 OMNIS IC equipment: EPOD – Parts

Table 62 Parts of the OMNIS IC equipment: EPOD (6.05332.080)

Article number	Product name	Number
6.01503.250	Cylinder unit OMNIS 50 mL	1
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.1621.000	Container, 10 L	1
6.1805.530	FEP tubing connection	1
6.01602.110	Bottle cap S 40, 2x M6, UNF 10/32	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	3
6.2744.200	Adapter UNF 10/32 outer / M6 inner	1
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	2
6.2803.010	Grease (2 g)	1

Installing eluent production for OMNIS IC

Prerequisites:

- The bottle holders for the eluent bottle and the eluent concentrate are mounted. If necessary, multiple bottle holders can also be mounted (*see "Setting up a bottle", chapter 5.14.3, page 252*).
- The OMNIS IC system contains a free OMNIS Dosing Drive Unit.

Required accessories:

- Kit OMNIS IC equipment: EPOD (6.05332.080)

Optional accessories:

- Magnetic stirrer, ROLC kit (6.05801.090)
- If volume monitoring is used:
 - Bottle retainer, ROLC (6.02050.200, installed by a regional Metrohm service representative)

 Metrohm recommends dosing the new eluent from above. The eluent should not be on one level or under the OMNIS IC.

1

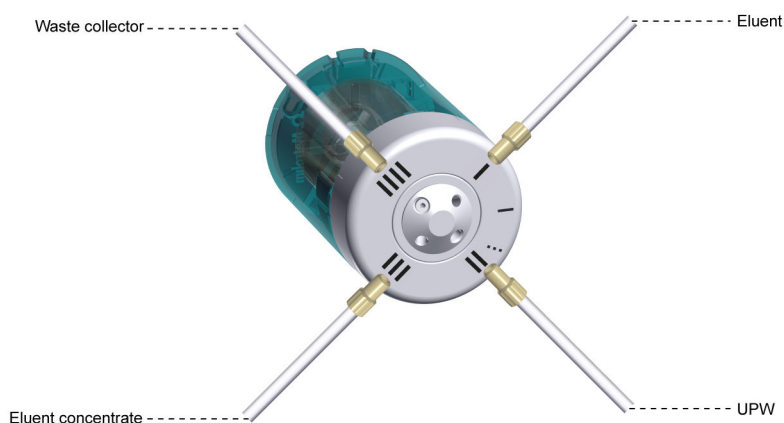


Figure 175 Port connectors – Eluent production

2 Connecting Port I

Port I of the cylinder unit OMNIS is connected to the eluent bottle.

- Attach the aspiration tubing and the bottle cap, incl. FEP tubing, to the eluent bottle (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).
- Use the FEP tubing for dosing inside the eluent bottle. Cut a piece with the exact length of 4 cm off the FEP tubing. The tubing end must not touch the eluent.

- Use a flangeless fitting to screw the cut-off piece to the bottle cap from the inside.
- Set up a connection to Port I on the external side through the remaining FEP tubing. This transfers the prepared eluent. The eluent bottles are placed at positions 3 and 4 of the reagent organizer. The solution in the eluent bottles are stirred in the process.

3 Connecting Port II

Port II of the cylinder unit OMNIS is connected to the ultrapure water container.

- Screw the M6 outer / M8 inner thread adapter into the M8 opening of the ultrapure water container.
- Attach the aspiration tubing and the bottle cap incl. FEP tubing to the ultrapure water container (*see "Connecting the container", chapter 5.14.4, page 259*).
- Use a flangeless fitting to screw the free end of the FEP tubing to Port II of the cylinder unit OMNIS.
- Insert the CO₂ Absorber (Tube) into the Luer connector of the bottle cap.

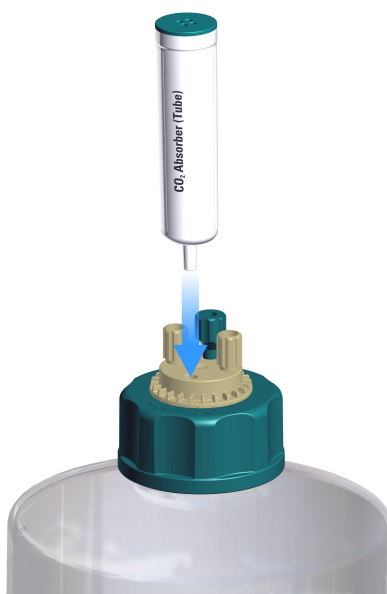


Figure 176 Mounting the CO₂ Absorber (Tube)

4 Connect Port III

Port III of the cylinder unit OMNIS is connected to the eluent concentrate.

- Attach the aspiration tubing and the bottle cap incl. FEP tubing to the eluent concentrate (*see "Connecting a bottle for eluent and concentrate", page 250*).
- Use a flangeless fitting to screw the free end of the FEP tubing to Port III of the cylinder unit OMNIS. The bottles of the eluent concentrates are placed at positions 1 and 2 of the reagent organizer.

5 Connecting Port III

Port III of the cylinder unit OMNIS is connected to the waste canister via the OMNIS Multi Flow Monitor Unit. Alternatively, the waste canister on top of the reagent organizer can be used.

 The waste canister and the Multi Flow Monitor must not be dosed at more than a maximum of 100 mL/min.

- Use a flangeless fitting to screw one end of an FEP tubing to Port III of the cylinder unit OMNIS.
- Use a flangeless fitting and an adapter UNF 10/32 outer / M6 inner to screw the other end of the FEP tubing at the waste canister (*see "Connecting the container", chapter 5.14.4, page 259*).

As an option, an additional eluent can be installed with the same procedure.

 The minimum eluent volume is 300 mL. This value must not be changed because otherwise the monitoring will not work correctly. The maximum volume is 500–2000 mL. The top-up portions go up to the maximum volume – 50 mL.

Supplementing the ultrapure water container and bottle cap with volume monitoring (optional)

If the OMNIS IC is run without supervision for prolonged periods of time, then Metrohm recommends monitoring the ultrapure water container with a level sensor.

Required accessories:

- *OMNIS IC equipment: LC container 10 L kit* (6.05332.000)
 - Container, 10 L (6.1621.000)
 - Volume sensor holder, container 10 L (6.02009.000)
 - Sensor cable St/St, 3 m (6.02104.100)
 - Bottle cap S 40, 2x M6, UNF 10/32 (6.01602.110)
 - Container 10 L, fastening (6.02050.210)
 - FEP tubing / M6 / 2 m (6.1805.530)

1 Setting up the container

Set up the container in the volume sensor holder (*see "Setting up the container with volume monitoring", page 126*).

2 Connecting the sensor cable

- Connect the sensor cable to the OMNIS Reagent Organizer Liquid Control (*see "Setting up the waste canister", chapter 5.3.4.2, page 122*)

5.16.3 Installing the Dose-in gradient

A Dose-in gradient (6.05332.090) extends an isocratic IC system with simple means by one gradient system. A gradient is created by mixing different eluents at a mixing ratio that varies over the analysis duration.

A cylinder unit OMNIS doses a concentrated or diluted eluent into the main eluent stream at a defined ratio. This changes the total concentration of the mobile phase. The result is an optimum separation of all ions with an acceptable analysis duration.

Depending on the application, a trap column is used for cleaning and mixing the eluent flow. Even reagents of the highest quality level, e.g., "Ultrapur" or "Puriss", can still contain minimal anion contaminations. These are reliably held back by the trap column.

A Dose-in gradient can be installed in any existing OMNIS IC System. The Dose-in gradient can also be included in the system setup from the start.

Another function of the Dose-in gradient allows you to add a rinsing solution without additional system modification. The rinsing solution rinses the system after the analysis or after a sample series and thereby increases the service life of the individual components.

Overview

The equipment kit contains the following parts:

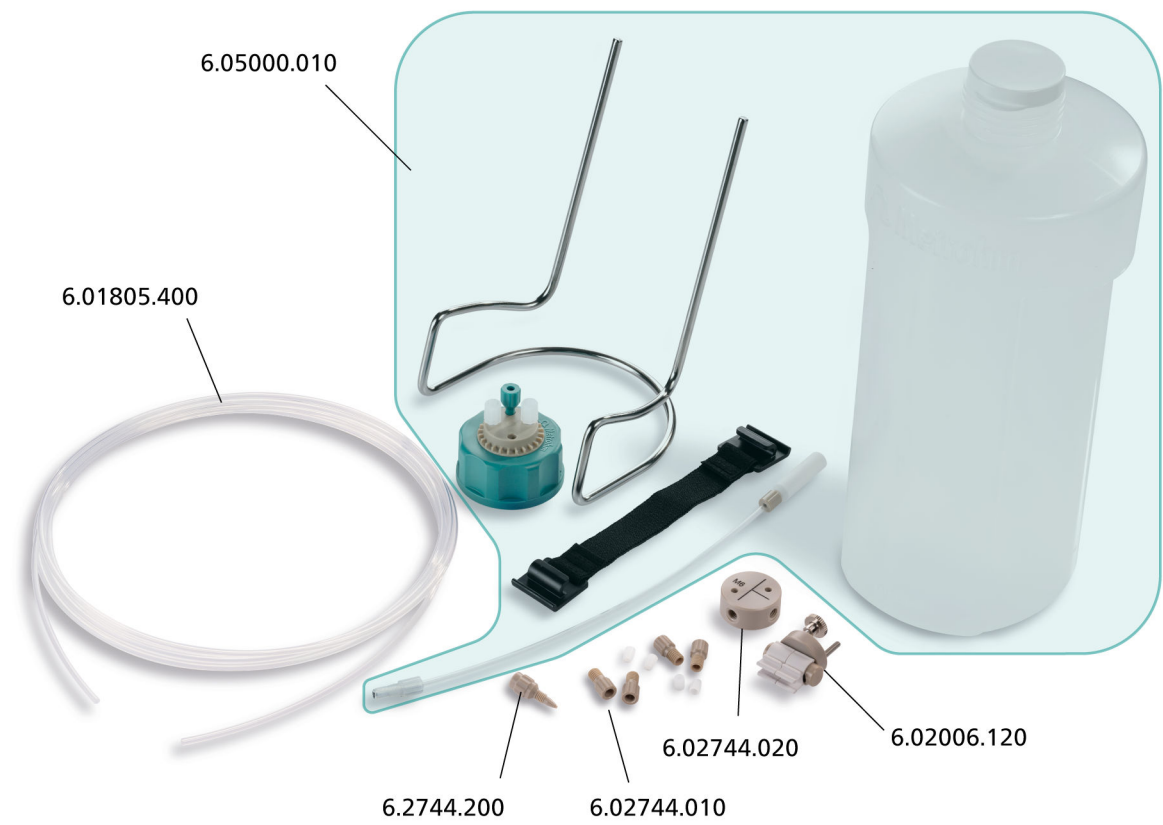


Figure 177 OMNIS IC equipment: Dose-in gradient – Parts

Table 63 Parts of the OMNIS IC equipment: Dose-in gradient (6.05332.090)

Article number	Product name	Number
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.02006.120	Holder, fixation bar	1
6.02744.020	T connector, M6	1
6.02744.010	Flange tubing Screw connector M6, 1/8", 2 pcs.	2
6.2744.200	Adapter UNF 10/32 outer / M6 inner	1

Installing the Dose-in gradient

Prerequisite:

- The eluent path and the sample path are installed as desired ([see "Connecting functional units", chapter 5.15, page 262](#)).
- A free OMNIS Dosing Drive Unit is available in the OMNIS IC System.

Required accessories:



- OMNIS IC equipment: Dose-in gradient kit (6.05332.090)
- Cylinder unit OMNIS, UNF 10/32 (6.01506.xx0)

i During installation, use the capillary cutter to cut the FEP tubing to size to fit the OMNIS IC System.

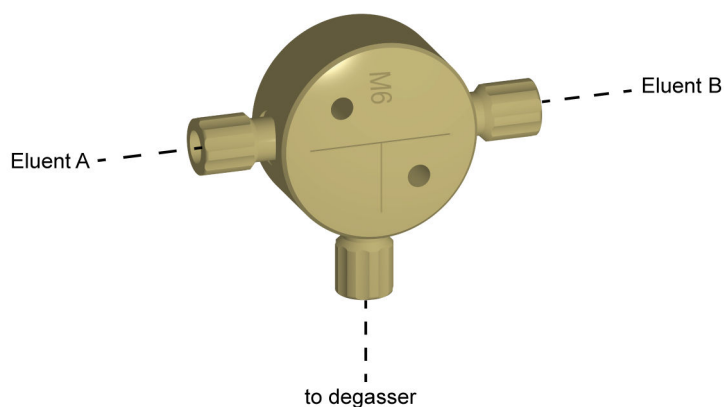
i Depending on the application, a trap column is also used. The trap column is installed between the high-pressure pump and the injector.

1 Connecting the additional eluent bottle

- Attach the aspiration tubing and the bottle cap, incl. FEP tubing, to the eluent bottle (*see "Connecting a bottle for eluent and concentrate", page 250*).
- Use a flangeless fitting to screw the free end of the FEP tubing to Port II of the cylinder unit OMNIS.

2 Connecting the T connector

- Detach the eluent tubing at the degasser inlet. Use a flangeless fitting to connect the detached end to a side port of the T connector.
- Use a flangeless fitting to screw one end of an FEP tubing to Port I of the cylinder unit OMNIS.
- Use a flangeless fitting to screw the other end of the FEP tubing to the other side port of the T connector.
- Use a flangeless fitting to screw one end of another FEP tubing to the lower port of the T connector.
- Use a flangeless fitting to screw the other end of the FEP tubing to the degasser inlet.



genized in the high-pressure mixer. The high-pressure pump then pumps the mixed gradient into the injector.

Eluent path

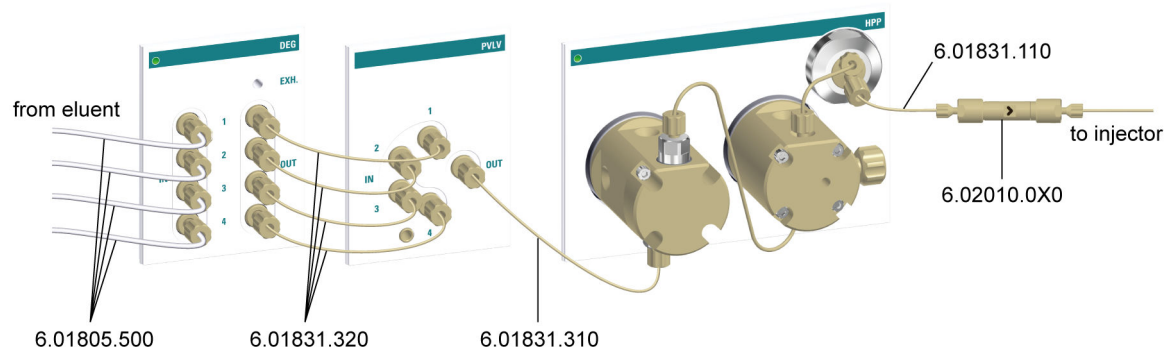


Figure 178 Low-pressure gradient – Flow diagram

Installing the low-pressure gradient

Prerequisite:

- The eluent path and the sample path are installed as desired ([see "Connecting functional units", chapter 5.15, page 262](#)).
- An OMNIS Proportioning Valve Unit is available in the OMNIS IC System.
- The OMNIS Degasser Unit is equipped with 4 chambers.

Required accessories:

- 4 x PEEK capillary DEG – PVLV, 140/0.75 mm (6.01831.320)
- PEEK capillary PVLV – HPP, 140/0.75 mm (6.01831.310)
- PEEK capillary HPP – INJ, 160/0.5 mm (6.01831.110)
- Pressure screw short, 5 pcs. (6.2744.070)
- 3 x accessory kit: OMNIS IC bottle PP 2 L (6.05000.010)
- 3 x FEP tubing 1/8" RO – DEG, 1,200 mm (6.01805.500)
- 3 x flangeless fitting M6, 1/8", 2 pcs. (6.02744.010)
- High-pressure mixer, X0/X.0 mm (6.02010.0X0)
- Clip fixation bar, 2 x OD 1/16" (6.02027.030)

- Capillary cutter (6.2621.080)

1 Connecting the bottles for gradients

- Equip all bottles with an aspiration tubing and a bottle cap incl. FEP tubing RO – DEG (see *"Connecting a bottle for eluent and concentrate"*, page 250).
- Use a flangeless fitting to screw each of the other tubing ends to degasser inlets 1–4.

2 Connecting the proportioning valve

 The pressure at the proportioning valve inlet must not exceed 1 bar.

- Use a short pressure screw to screw one PEEK capillary *DEG* – *PVLV* each to degasser outlets 1–4.
- Use a short pressure screw to screw the other capillary ends to each of the corresponding 1–4 proportioning valve inlets.
- Use a short pressure screw to screw the PEEK capillary *PVLV* – *HPD* to the proportioning valve outlet.
- Use a short pressure screw to screw the other capillary end to the inlet of the high-pressure pump.

3 Connecting the high-pressure mixer

 During installation, observe the flow direction of the high-pressure mixer.

- Loosen the PEEK capillary at the pressure sensor outlet.
- Use a short pressure screw to screw the PEEK capillary *HPP – INJ* to the pressure sensor outlet.
- Use a short pressure screw to screw the other capillary end to the high-pressure mixer inlet.
- Use a short pressure screw to screw the released PEEK capillary to the high-pressure mixer outlet. The high-pressure mixer is now connected to the injector.
- Use the clips (6.02027.030) to fasten the high-pressure mixer to the fixation bar.

5.16.5 Installing the Post-Column Reaction UV/VIS (PCR-UV/VIS)

The OMNIS IC equipment: PCR (6.05332.070 or 6.05332.110) extends the OMNIS IC System to include post-column reaction UV/VIS "PCR-UV/VIS".

The PCR UV/VIS detection is used to detect analytes photometrically by a chemical reaction after chromatographic separation. In the PCR cartridge, the eluent is mixed with a reagent downstream of the separation column, thus specifically converting the analyte. The mixture of eluent and reagent as well as converted analytes is then transported to the UV/VIS detector. In this application, ions that are otherwise difficult to detect become visually measurable. Depending on the analyte, the detection is carried out at different wavelengths with or without reference wavelength (exact parameters must be taken from the respective Application Work).

There are 2 installation versions for the application:

- **with cylinder unit OMNIS** ([see page 299](#))

An OMNIS Dosing Drive Unit is required for the application. The OMNIS Dosing Drive Unit conveys the PCR reagent. The sample (in eluent) and the PCR reagent flow together in the PCR cartridge after passing through the column via the T connector. The OMNIS Dosing Drive Unit also enables automatic rinsing of the flow path.

- **with peristaltic pump** ([see page 304](#))

The functional principle for the post-column reaction with a peristaltic pump is analogous to the post-column reaction with cylinder unit OMNIS. A peristaltic pump delivers the PCR reagent to the T connector and to the PCR cartridge. This means that no additional cylinder unit OMNIS is required.

Installation with cylinder unit OMNIS

The equipment kit contains the following parts:

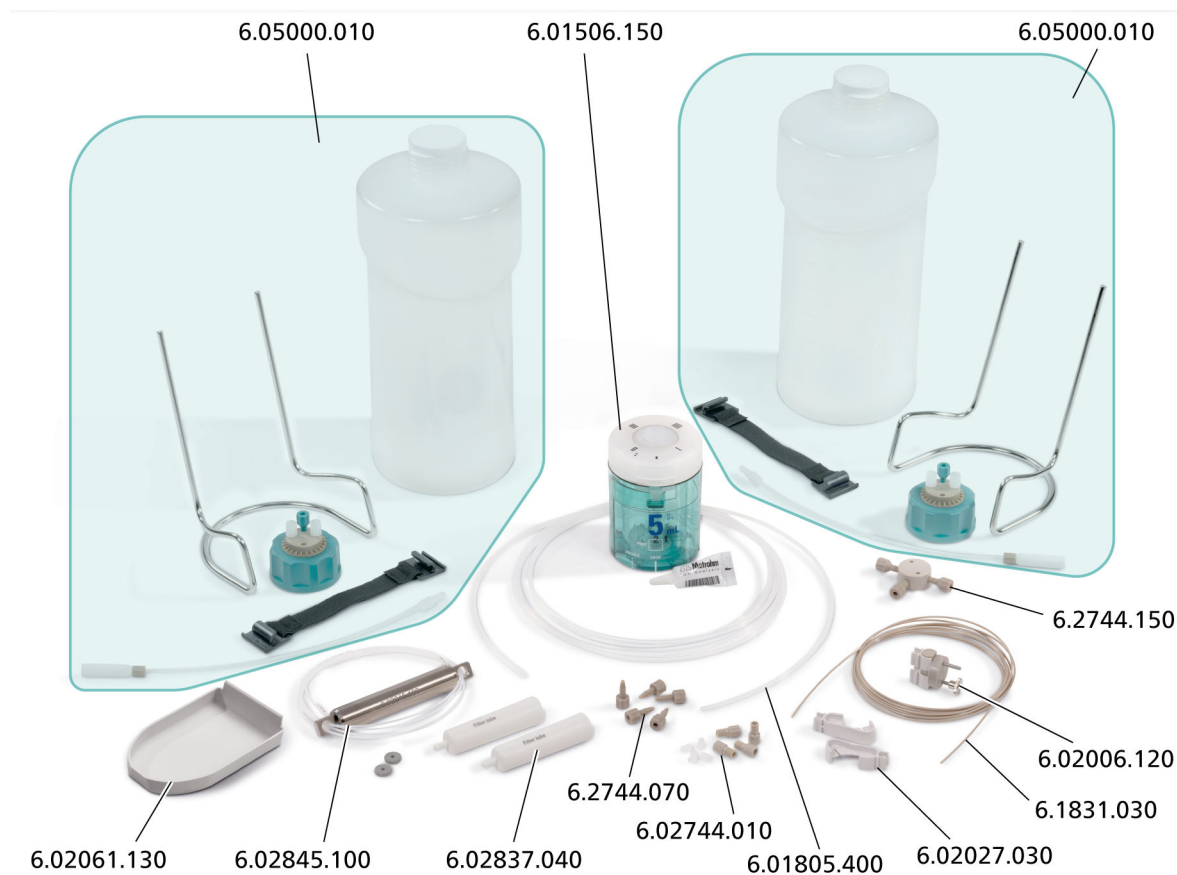


Figure 179 OMNIS IC equipment: PCR, DD – Parts

Table 64 Parts of the OMNIS IC equipment: PCR, DD (6.05332.070)

Article number	Product name	Number
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	2
6.01506.150	Cylinder unit OMNIS 5 mL, UNF 10/32	1
6.2744.150	T connector UNF 10/32	1
6.02006.120	Holder, fixation bar	1
6.1831.030	PEEK capillary 0.75 mm ID / 3 m	1
6.02027.030	Clip fixation bar, 2 x OD 1/16"	2
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	1
6.02744.010	Flangeless fitting M6, 1/8", 2 pcs.	2
6.2744.070	Pressure screw short, 5 pcs.	1
6.02837.040	Filter tube	2
6.02845.100	PCR cartridge, PTFE, ID 0.5 mm	1
6.02061.130	Drip collector, Unit	1

Sample path (with cylinder unit OMNIS)

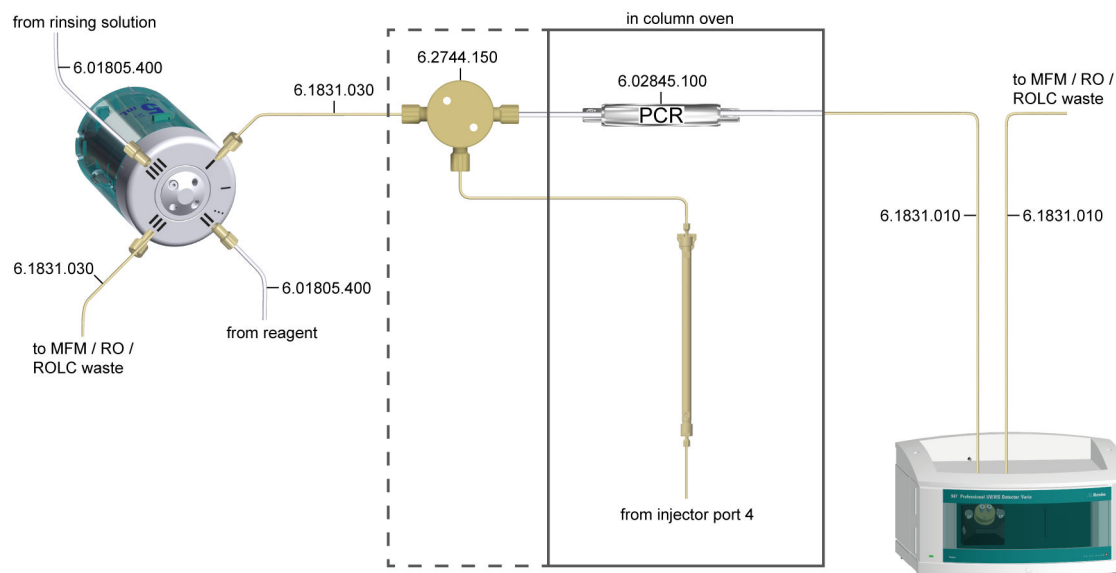


Figure 180 Post-column reaction (PCR) – Standard flow diagram

The PCR cartridge can also be placed outside the column thermostat.

Installing the Post-Column Reaction UV/VIS (with cylinder unit OMNIS)

Prerequisite:

- A free OMNIS Column Thermostat Unit (2.1056.05x0) is available in the OMNIS IC System.
- A free OMNIS Dosing Drive Unit is available in the OMNIS IC System (2.1056.0310).
- The eluent path and the sample path are installed as desired ([see "Connecting functional units", chapter 5.15, page 262](#)).

Required accessories:

- Kit OMNIS IC equipment: PCR, DD (6.05332.070)
- PEEK capillary 0.25 mm ID, 3 m (6.1831.010)

 The FEP tubings and PEEK capillaries must be cut to size to fit the OMNIS IC System using the capillary cutter during installation.

1 Connecting the cylinder unit OMNIS 5 mL with T connector

- Attach the cylinder unit OMNIS 5 mL to the OMNIS Dosing Drive Unit (*see "Equipping the OMNIS Dosing Drive Unit", chapter 5.5, page 198*).
- Screw one end of the PEEK capillary 0.75 mm to Port I of the cylinder unit OMNIS 5 mL. Connect the other capillary end to an outlet of the T connector.

2 Connecting the bottle with PCR reagent

- Place the aspiration tubing and the bottle cap incl. FEP tubing on the bottle (*see "Connecting a bottle for eluent and concentrate", page 250*).
- Use a flangeless fitting to screw the free end of the FEP tubing to Port II of the cylinder unit OMNIS.

3 Connecting the waste collector

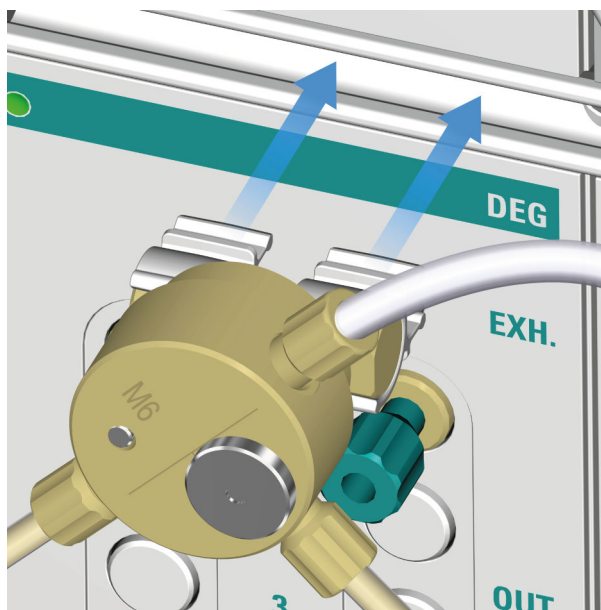
- Screw one end of a PEEK capillary 0.75 mm to Port III of the cylinder unit OMNIS.
- Screw the other capillary end to the waste collector (MFM or RO/ROLC).

4 Connecting the rinsing solution

- Attach the aspiration tubing and the bottle cap, incl. FEP tubing, to the bottle with rinsing solution (*see "Connecting a bottle for eluent and concentrate", page 250*).
- Screw the bottle with rinsing solution with a FEP tubing and a flangeless fitting to Port III of the cylinder unit OMNIS.

5 Installing the T connector

- Loosen the knurled screw on the holder, fixation bar.
- Place the T connector on the positioning screws on the holder, fixation bar and fasten it with the knurled screw.
- Fasten the two clips to the holder, fixation bar.
- Insert the T connector with the clips on the fixation bar in the OMNIS IC System.



i Depending on the application, the T connector can also be placed inside the column thermostat.

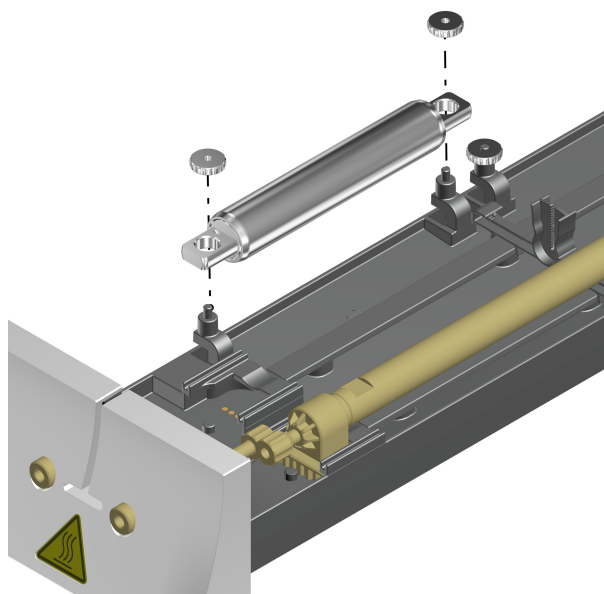
6 Connecting the T connector and the PCR cartridge

i The PCR cartridge can also be placed outside the column thermostat. To do this, attach the PCR cartridge with clips to the fixation bar.

i Cut the inlet capillary and the outlet capillary of the PCR cartridge to the desired length using the capillary cutter.

The sample and the PCR reagent are mixed in the T connector.

- Use a PEEK capillary and a short pressure screw to connect an outlet of the T connector to the column outlet. The inner diameter and the length of the PEEK capillary are dependent on the application to be performed.
- Connect the inlet capillary of the PCR cartridge to another outlet of the T connector. The PCR cartridge contains a special spiralized PTFE capillary 0.5 mm. The PCR cartridge is fastened in the column thermostat exactly the same way as a preheating cartridge (*see "Fixing the jamming in the preheating cartridge", page 430*).

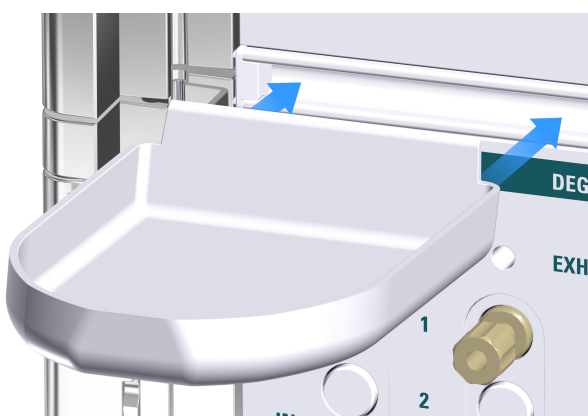


- Connect the outlet capillary of the PCR cartridge from the inside to the outlet of the column thermostat.
- Connect one end of a PEEK capillary 0.25 mm to the opposite column thermostat inlet. Guide the other capillary end to the UV/VIS detector.

The PCR cartridge is connected to the UV/VIS detector.

7 Fastening the drip collector, Unit

- Mount the drip collector, Unit, below the dosing drive for the PCR reagent on the fixation bar (*see "Installing the optional drip collector, Unit", page 314*).



8 Connecting the detector outlet

- Cut off a piece of PEEK capillary 0.25 mm at least 1 m long. Screw one end of the PEEK capillary 0.25 mm to the outlet of the UV/VIS detector.
- Connect the other capillary end to the waste collector (MFM or RO/ROLC).

The eluent path for the post-column reaction is installed.

Installation with peristaltic pump

The equipment kit contains the following parts:

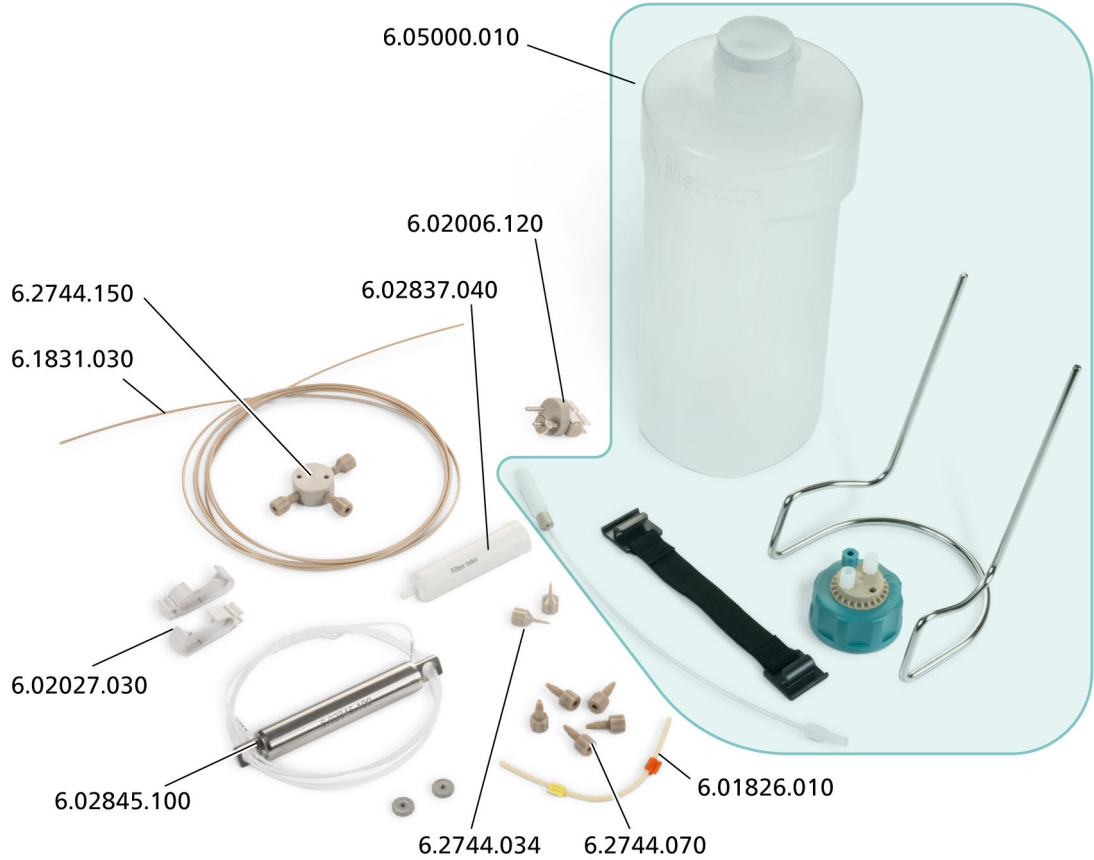


Figure 181 OMNIS IC equipment: PCR, PP – Parts

Table 65 Parts of the OMNIS IC equipment: PCR, PP (6.05332.110)

Article number	Product name	Number
6.1831.030	PEEK capillary 0.75 mm ID / 3 m	1
6.2744.150	T connector UNF 10/32	1
6.02837.040	Filter tube	1
6.02006.120	Holder, fixation bar	1

Article number	Product name	Number
6.05000.010	Accessory kit: OMNIS IC bottle PP 2 L	1
6.01826.010	Pump tubing, ID 0.5 mm, orange - yellow	1
6.2744.070	Pressure screw short, 5 pcs.	1
6.2744.034	Coupling olive/UNF 10/32, 2 pcs.	1
6.02845.100	PCR cartridge, PTFE, ID 0.5 mm	1
6.02027.030	Clip fixation bar, 2 x OD 1/16"	2

Sample path (with peristaltic pump)

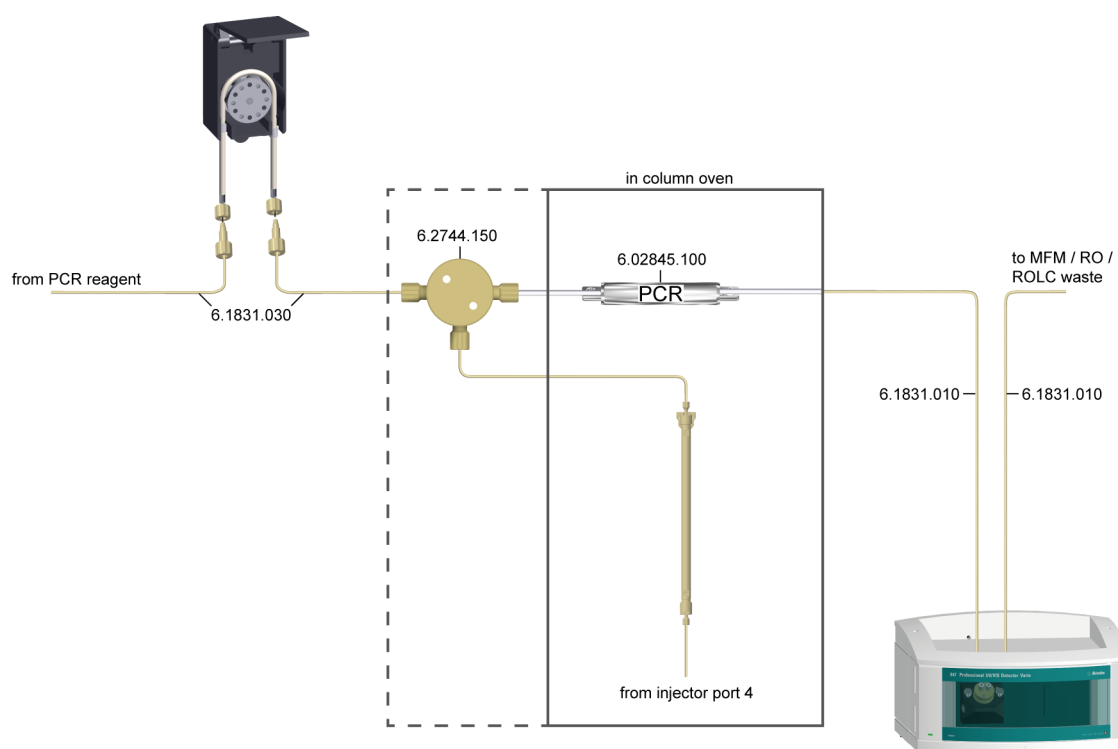


Figure 182 Post-column reaction (PCR) – Flow diagram with peristaltic pump

The PCR cartridge can also be placed outside the column thermostat.

Installing Post-Column Reaction UV/VIS (with peristaltic pump)

Prerequisite:

- A free OMNIS Column Thermostat Unit (2.1056.05x0) is available in the OMNIS IC System.
- The OMNIS IC System has a free peristaltic pump channel.
- The eluent path and the sample path are installed as desired (*see "Connecting functional units", chapter 5.15, page 262*).

Required accessories:

- Kit OMNIS IC equipment: PCR, PP (6.05332.110)
- PEEK capillary 0.25 mm ID, 3 m (6.1831.010)

 The PEEK capillaries must be cut to size to fit the OMNIS IC System using the capillary cutter during installation.

1 Inserting the pump tubing

- Insert the pump tubing at both ends with one coupling olive/UNF 10/32 each and insert it into the peristaltic pump (*see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200*).

2 Connecting the bottle with PCR reagent

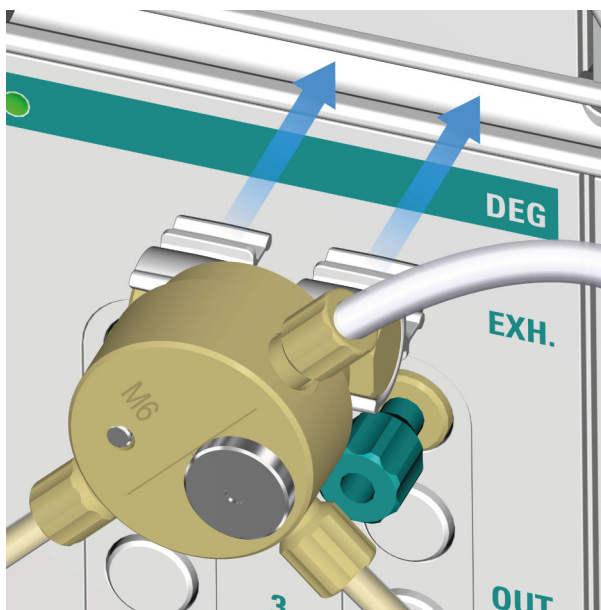
- Attach the aspiration tubing and the bottle cap incl. PEEK capillary 0.75 mm onto the bottle (*see "Connecting a bottle for eluent and concentrate", page 250*).
- Cut the PEEK capillary 0.75 mm to the suitable length. Use a short pressure screw to screw the other capillary end to the peristaltic pump inlet.

 Optionally, an additional bottle with rinsing solution can be installed:

1. Connect the rinsing solution and the PCR reagent to Port 1 and Port 2 of a switching valve 3/2, UNF kit.
2. Connect the central port of the switching valve 3/2, UNF Kit, to the peristaltic pump inlet.

3 Installing the T connector

- Loosen the knurled screw on the holder, fixation bar.
- Place the T connector on the positioning screws on the holder, fixation bar and fasten it with the knurled screw.
- Fasten the two clips to the holder, fixation bar.
- Insert the T connector with the clips on the fixation bar in the OMNIS IC System.



i Depending on the application, the T connector can also be placed inside the column thermostat.

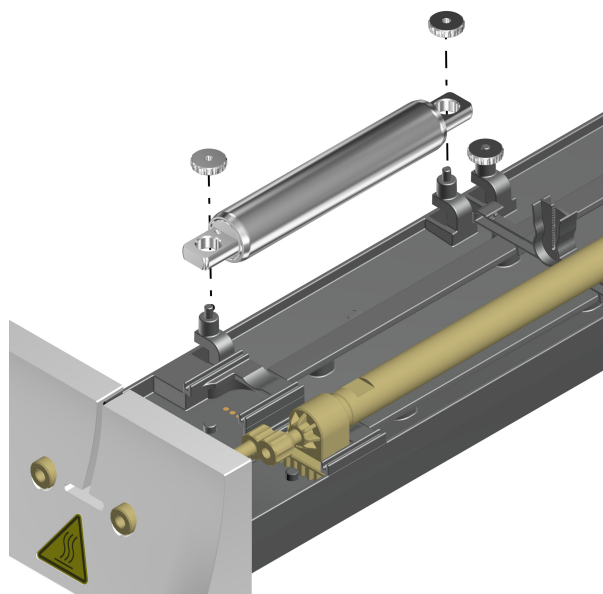
4 Connecting the T connector and the PCR cartridge

i The PCR cartridge can also be placed outside the column thermostat. To do this, attach the PCR cartridge with clips to the fixation bar.

i Cut the inlet capillary and the outlet capillary of the PCR cartridge to the desired length using the capillary cutter.

The sample and the PCR reagent are mixed in the T connector.

- Use a PEEK capillary and a short pressure screw to connect an outlet of the T connector to the column outlet. The inner diameter and the length of the PEEK capillary are dependent on the application to be performed.
- Screw a cut piece of the PEEK capillary 0.75 mm to another outlet of the T connector. Use a short pressure screw to screw the other capillary end at the peristaltic pump outlet.
- Connect the inlet capillary of the PCR cartridge to the remaining outlet of the T connector. The PCR cartridge contains a special spiralized PTFE capillary 0.5 mm. The PCR cartridge is fastened in the column thermostat exactly the same way as a preheating cartridge (see *"Fixing the jamming in the preheating cartridge"*, page 430).



- Connect the outlet capillary of the PCR cartridge from the inside to the outlet of the column thermostat.
- Connect one end of a PEEK capillary 0.25 mm to the opposite column thermostat inlet. Guide the other capillary end to the UV/VIS detector.
The PCR cartridge is thus connected to the UV/VIS detector.

5 Connecting the detector outlet

- Cut off a piece of PEEK capillary 0.25 mm at least 1 m long. Screw one end of the PEEK capillary 0.25 mm to the outlet of the UV/VIS detector.
- Connect the other capillary end to the waste collector (MFM or RO/ROLC).

The eluent path for the post-column reaction is installed.

5.16.6 Installing the AutoSwitch

Many samples require the analysis of 2 different IC applications, e.g., as anions and cations. The OMNIS IC M (1-channel system) can be easily upgraded. This enables automated serial execution of 2 different analyses, e.g., anion analyses and cation analyses. The automatic switching between the first and second type of analysis is possible with an additional injector and 2 switching valves 3/2.

A special setup has been provided for the purpose of offering an option for performing 2 different analyses such as anions and cations with a 1-channel system as well.

The OMNIS term for this setup is "AutoSwitch". The work sequence enables series measurement of the first type of analysis, followed by an



automatic eluent change. The column and the suppression are changed at the same time. After automatic rinsing and equilibration, performance of a series of the second type of analysis is started. The system switches between the two types of analysis once per **Pending execution**. When using the Metrohm method templates, it is not possible to switch back and forth between the two methods, as is the case with a classic 2-channel system.

i Metrohm provides method templates for ion chromatography. The method templates can be found on the [Metrohm Knowledge Base](#).

Overview

The equipment kit contains the following parts:



Figure 183 OMNIS IC equipment: AutoSwitch – Parts

Table 66 Parts of the OMNIS IC equip.: AutoSwitch (6.05332.130)

Article number	Product name	Number
6.02845.000	Preheating cartridge, ID 0.18 mm	1
6.01805.400	FEP tubing M6, 1/8" x 1.59 mm, 3 m	2
6.2744.070	Pressure screw short, 5 pcs.	1



[illegible]

Sample path

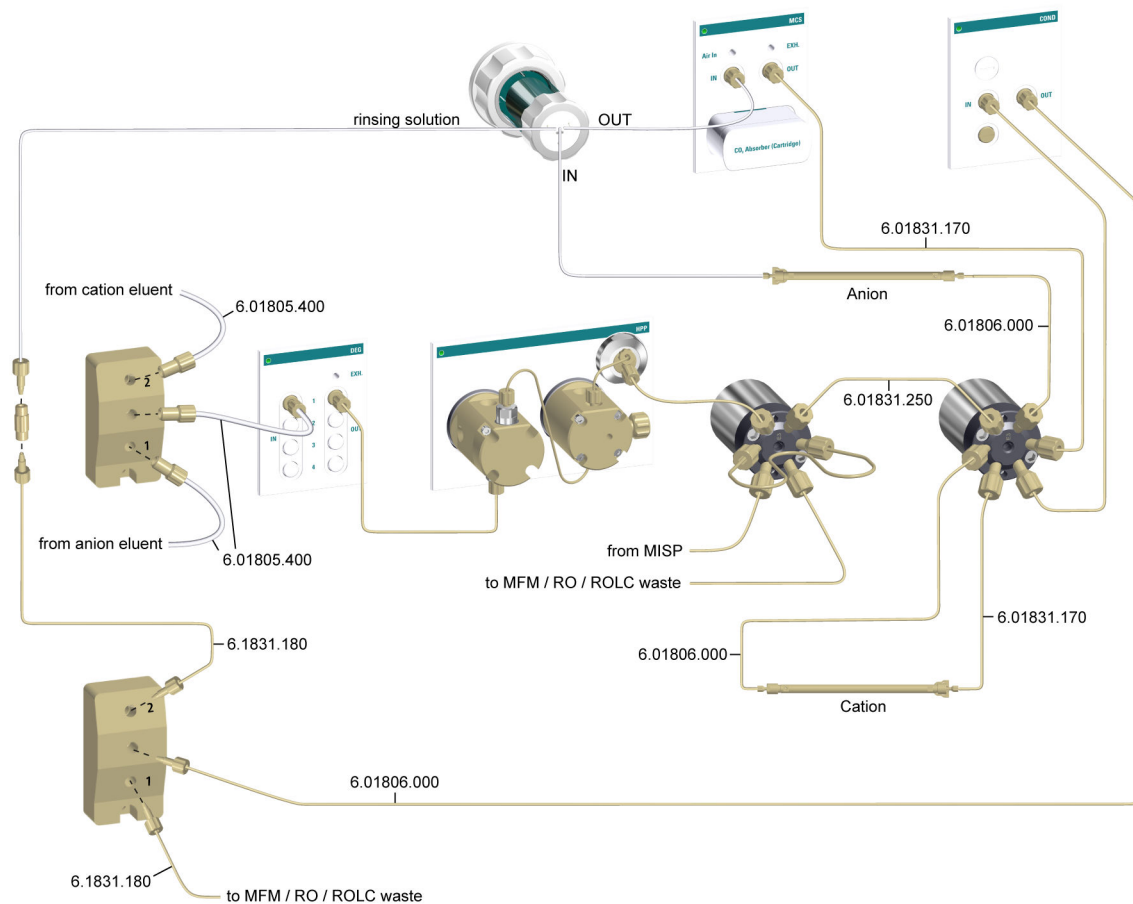


Figure 184 AutoSwitch – Exemplary flow diagram (serial anion analysis and cation analysis)

Table 67 AutoSwitch – Installation

Product name	Article number	Capillary length
PEEK capillary, 0.5 mm ID	6.1831.180	cut to size for OMNIS IC System
PEEK capillary, 0.18 mm ID	6.01806.000	cut to size for OMNIS IC System
PEEK capillary INJ - COL, 540/0.18 mm	6.01831.170	54 cm
PEEK capillary INJ – INJ 250/0.18 mm	6.01831.250	25 cm

Product name	Article number	Capillary length
2 x FEP tubing M6, 1/8" x 1.59 mm, 3 m	6.01805.400	cut to size for OMNIS IC System

- i** Every 1-channel method with conductivity detection can be upgraded to AutoSwitch. An additional injector and 2 switching valves 2/3 are required for the AutoSwitch setup of the OMNIS IC M and the autosampler.

Installing the AutoSwitch

Prerequisite:

- A switching valve 3/2, UNF kit (6.05801.110) is available in the OMNIS IC system.
- A switching valve 3/2, M6 kit (6.05801.120) is available in the OMNIS IC System.
- An OMNIS Actuator Unit (2.1056.0410) with mounted injector 7/3 kit (6.05801.180) is available in the OMNIS IC System.
- The eluent path and the sample path are installed as in a 1-channel system ([see "Connecting functional units", chapter 5.15, page 262](#)).
- The OMNIS IC M is equipped with an additional 7/3 injector. For this, the high-pressure pump is moved one unit to the left. In addition, 2 switching valves 3/2 are used.

- i** This step must be carried out by a regional Metrohm service representative.

Required accessories:

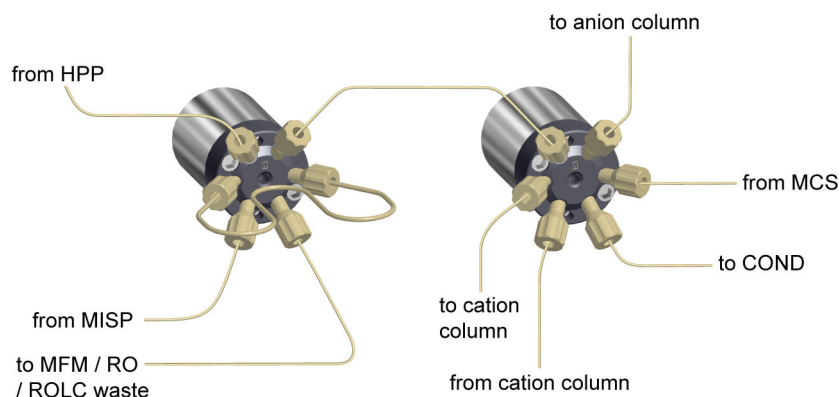
- OMNIS IC equip.: AutoSwitch (6.05332.130)

1 Connecting the switching valve 3/2, M6

The eluents are connected to the switching valve 3/2, M6. The first eluent (*anion eluent* master method) flows to Port 1. The second eluent (*cation eluent* master method) flows to Port 2. An FEP tubing M6 runs from the central port of the switching valve 3/2, M6 to the degasser.

2 Connecting the injectors

The capillaries are connected in accordance with the following figure. The injector on the left is used to inject the sample into the eluent path with the corresponding sample injection technique. The injector on the right is used to select whether a sample is analyzed for anions (**Fill** position) or for cations (**Inject** position).



i All PEEK capillaries between the injector and the conductivity detector must have an inner diameter of 0.18 mm.

3 Connecting the switching valve 3/2, UNF

The column of the first analysis channel (*anions* master method) is placed at position 1 (on the right) in the column thermostat. The column of the second analysis channel (*cations* master method) is placed at position 2 (on the left).

For the switching valve 3/2, UNF, the flow of the non-suppressed channel is directed into the waste. The flow of the suppressed channel is used to rinse the suppressor (STREAM).

i Metrohm recommends that you always use the same positions when using the OMNIS IC method.

i Cation eluent must not come into contact with the suppressor. Therefore, a second switching valve 3/2, UNF, is used downstream of the conductivity detector. It guides cation eluents into the waste and anion eluents into the capillary of the MSM rinsing solution.

- Connect a PEEK capillary 0.18 mm from the detector outlet to the central port of the switching valve 3/2, UNF. Cut the capillary to the suitable length.
- Guide a PEEK capillary 0.5 mm from Port 1 of the switching valve 3/2, UNF to the waste collector.
- Use a coupling to connect another PEEK capillary 0.5 mm from Port 2 of the switching valve 3/2, UNF to the *rinsing solution* capillary of the suppressor.

AutoSwitch with additional peristaltic pump channel

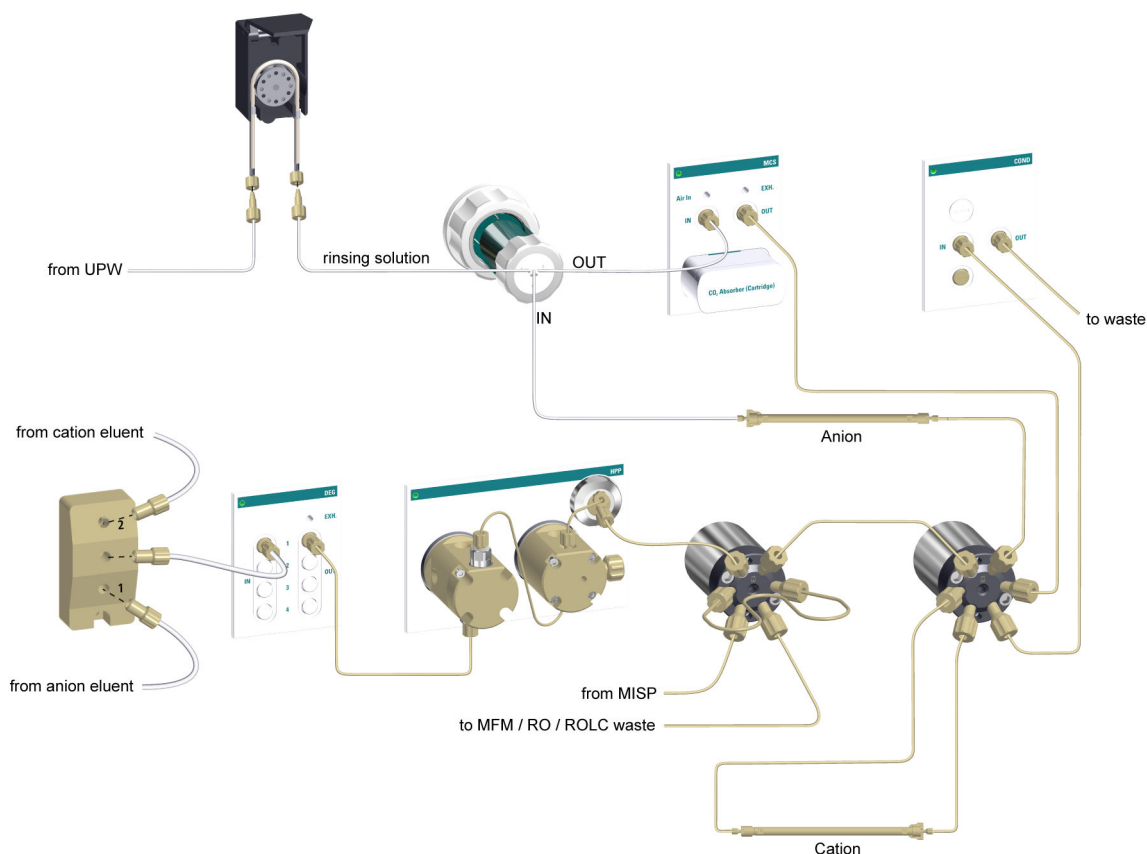


Figure 185 AutoSwitch – Exemplary flow diagram (anion analysis and cation analysis with peristaltic pump and STREAM)

Setup with additional peristaltic pump channel (optional)

Prerequisite:

- OMNIS IC M Module (2.1051.0020)
- OMNIS IC Autosampler Module (2.1054.0010)
- Peristaltic pump channel kit (6.05801.000)
- OMNIS Actuator Unit (1.1056.0410)
- Injector 7/3 kit (6.05801.180)
- MSM Rotor A (6.2832.000)

- A switching valve 3/2, M6, is available in the autosampler.
- The OMNIS IC M is equipped with an additional 7/3 injector. For this, the high-pressure pump is moved one unit to the left.

 This step must be carried out by a regional Metrohm service representative.

 Instead of rinsing the suppressor with STREAM, the already existing ultrapure water is used for this setup. The additional peristaltic pump channel kit is used for this purpose.

Required accessories:

- PEEK capillary COND - MFM/WC, 400/0.18 mm (6.01831.190)

1 Connecting the switching valve 3/2, M6, and injectors

Execute Steps 1 and 2 of the procedure *Installing the AutoSwitch*.

2 Using the peristaltic pump channel kit

The rinsing solution is used for rinsing the suppressor. For this purpose, the peristaltic pump must be connected to the rinsing solution and the suppressor. The rinsing solution is conveyed through the suppressor by the movement of the pump tubing. The capillary labeled *waste rins.* is connected to the waste collector.

3 Connector from the detector to the waste canister

The conductivity detector is connected to the waste collector with the PEEK capillary COND - MFM/WC, 400/0.18 mm (6.01831.190).

5.16.7 Drip collector

The drip collector, Unit (6.02061.130) is installed below a functional unit and protects components below it from dripping liquids (e.g., from the cylinder unit OMNIS). The drip collector is an accessory part and not included in the scope of delivery.

Metrohm recommends the use of the drop collector for the following applications:

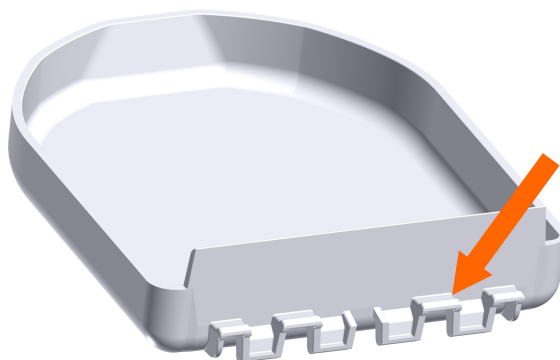
- Post-column reaction

Installing the optional drip collector, Unit

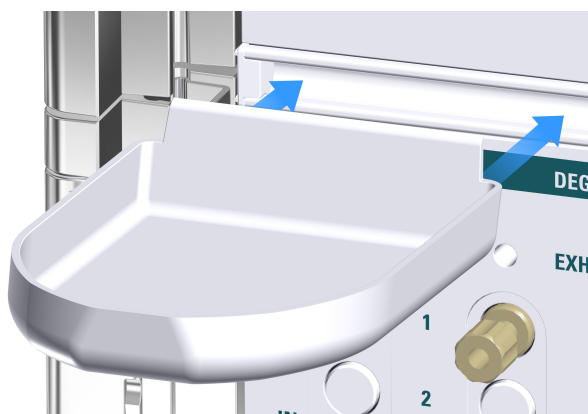
Required accessories:

- Drip collector, Unit (6.02061.130)

The drip collector has clips on the rear. These clips are used to attach the drip collector to the fixation bar below the desired functional unit.



- 1 Position the drip collector straight from the front on the fixation bar below the desired functional unit. While doing so, align the clips on the rear with the fixation bar.



- 2 Press the back panel of the drip collector, first on one side and then on the other, into the fixation bar until the clips snap in.

The drip collector is installed.

5.16.8 Installing the pulsation absorber

For non-suppressed analyses (such as a standard cation determination), Metrohm recommends installing a pulsation absorber between the high-pressure pump and the injector. The pulsation absorber dampens disruptive pulsations from the high-pressure pump. This ensures low limits of detection and a stable baseline.

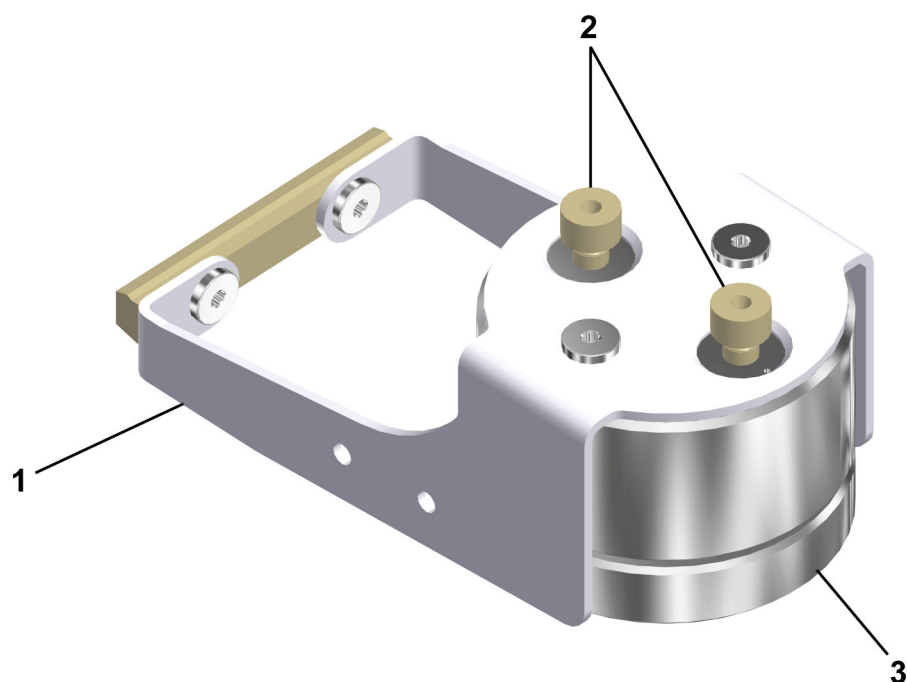


Figure 186 Pulsation absorber with holder – Overview

1 Holder

Fastens the pulsation absorber to the fixation bar.

2 Connectors

Both connections can be used as either an inlet or an outlet.

3 Pulsation absorber

Installing the pulsation absorber

Required accessories:

- Pulsation absorber with holder (6.02010.000)
 - PEEK capillary PA – INJ, 180/0.5 mm (6.01831.160)
- Wrench (6.2739.000) for pressure screws

1 Mounting the pulsation absorber with holder

- Align the pulsation absorber so that the connectors are facing upwards.
- Snap the holder of the pulsation absorber into place in the fixation bar between the high-pressure pump and the injector.

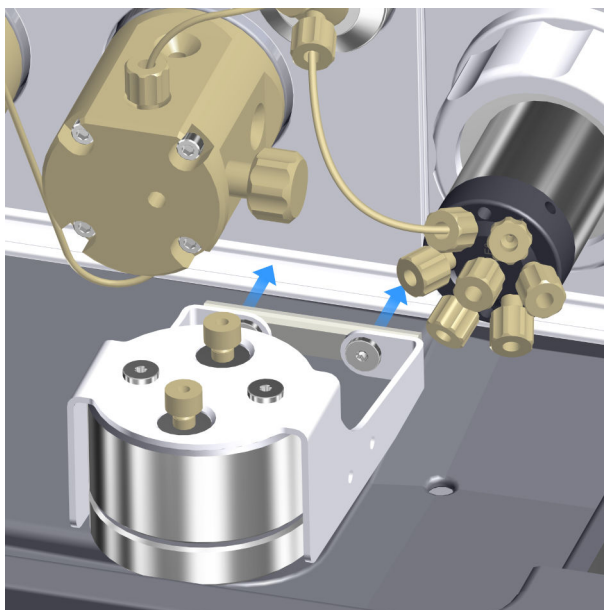


Figure 187 Mounting the pulsation absorber with holder

2 Connecting the pulsation absorber

- Remove the capillary (6.01831.110) labeled *HPP – PA/INJ* from the injector. Connect the removed capillary end to the pulsation absorber.

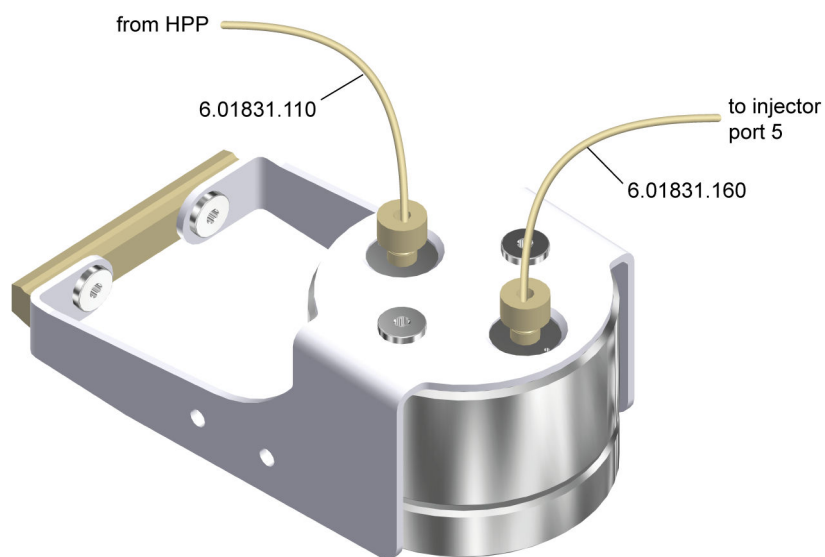


Figure 188 Connecting the pulsation absorber

- Use a pressure screw to connect the capillary labeled *PA – INJ* to the remaining connector. Connect the free capillary end to injector port 5.



- Use the wrench for pressure screws to tighten all capillary connections created in this step.

The pulsation absorber is installed.

5.16.9 Mounting the fall prevention fixture

When using an OMNIS IC System in a location subject to shocks (e.g., on a ship or in an aircraft, or in earthquake-prone areas), it can be bolted securely to the work surface using the fall prevention fixture, base plate.

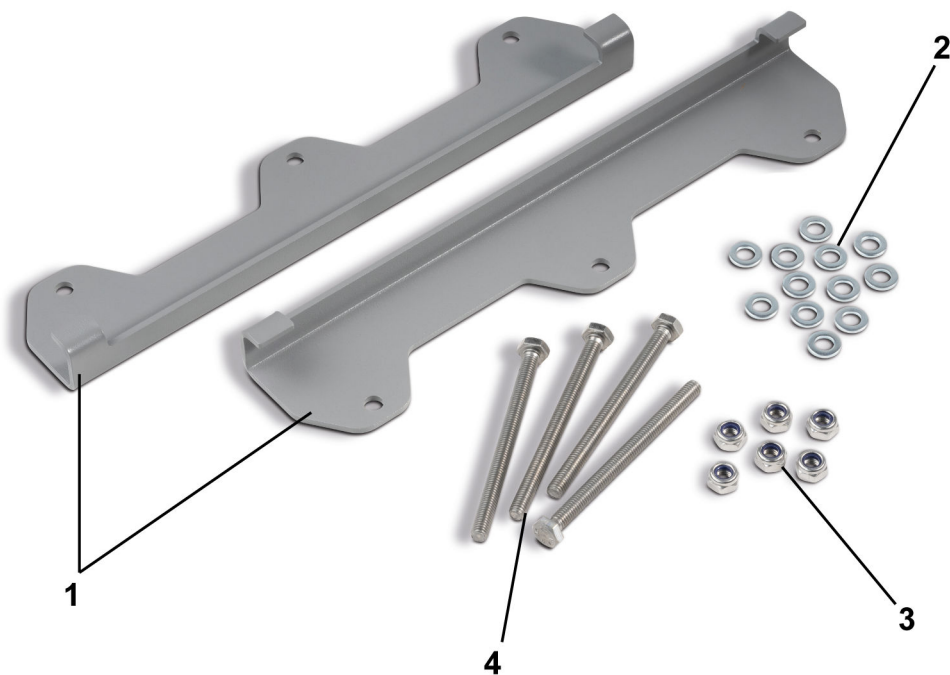


Figure 189 Fall prevention fixture, base plate – Parts

1	Fall prevention fixture, base plate This is mounted on the base plate of the OMNIS IC System.	2	Stainless steel washer, M6
3	Stainless steel hexagon nut, M6	4	Stainless steel hexagon bolt, M6 For tightening the fall prevention fixture, base plate on the work surface.

Mounting the fall prevention fixture, base plate

Prerequisite:



- The OMNIS IC System is installed on the desired work surface.

Required accessories:

- Fall prevention fixture, base plate (6.02603.000)
- M6 tapping tool

1 Mounting the fall prevention fixture

- Gently tilt the OMNIS IC System to one side.
- Hook the fall prevention fixture into the openings provided for this purpose on the underside of the base plate.

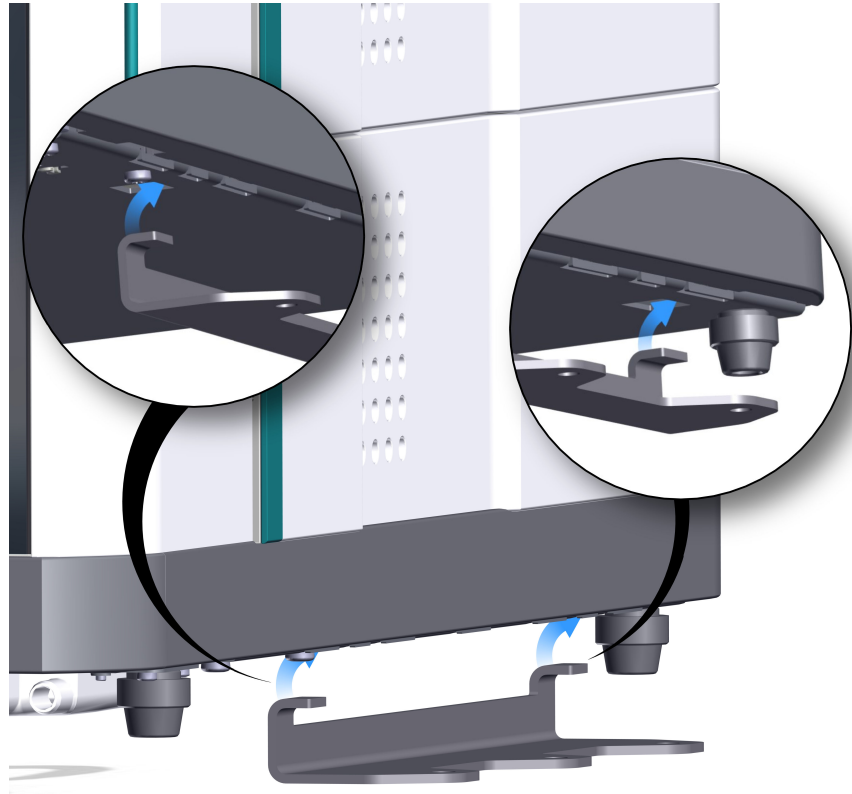


Figure 190 Mounting the fall prevention fixture, base plate

- Mark the positions for the bores.
- Slide the OMNIS IC System to one side so that the marked areas are exposed.
- Use the M6 tapping tool to drill holes in the work surface at the marked points.
- Return the OMNIS IC System to its original position.

2 Tightening the fall prevention fixture

Each of the two fall prevention fixtures is fastened with 3 screws.

- Position a hexagon nut and a washer underneath the work surface at each bore.
- Use a hexagon bolt and a washer to fix the fall prevention fixture in place at each bore.

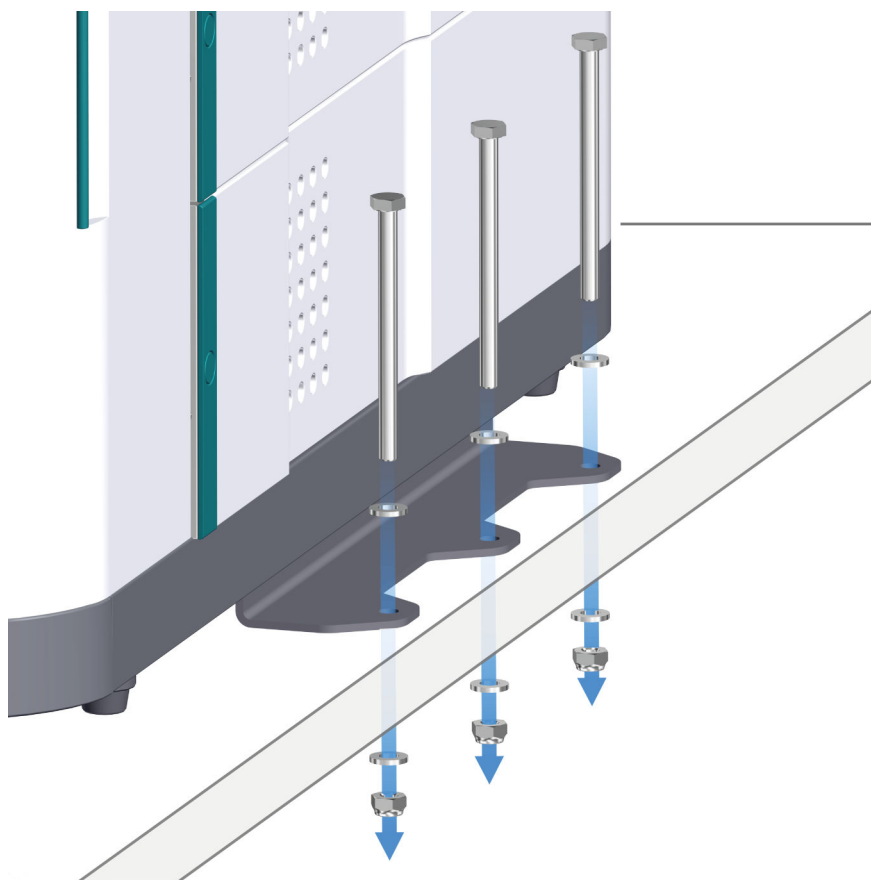


Figure 191 Tightening the fall prevention fixture, base plate

The OMNIS IC System is fixed in place on the work surface.

5.16.10 Mounting the mobile device holder

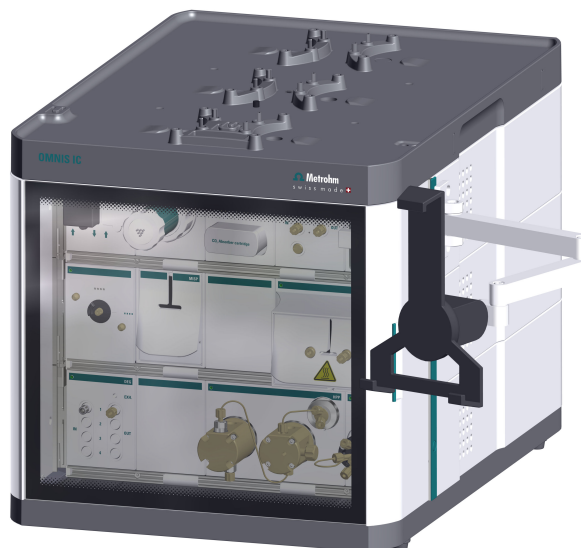


Figure 192 Mobile device holder – Installation

The mobile device holder kit (6.05801.330) extends the OMNIS IC to include an individually adjustable holder for mobile devices such as smartphones or tablets.

The alignment of the mobile device holder can be adjusted by tightening or loosening the screws on the robotic arm. Screws are also present on the instrument holder to adjust the instrument holder to the size of the mobile device.

A regional Metrohm service representative mounts the mobile device holder on the side panel of the OMNIS IC.

5.17 Connecting Metrohm instruments

Various instruments from other Metrohm product families can be integrated into an OMNIS IC System. The installation is described in the manual of the respective instrument.

The instruments are controlled via the OMNIS Software. The OMNIS Software recognizes the instruments automatically.

Connector via USB:

- [945 Professional Detector Vario – Amperometry](#)
- [858 Professional Sample Processor](#)
- [919 IC Autosampler plus](#)

Connector via MDL (Metrohm Device Link):

- [947 Professional UV/VIS Detector Vario](#)

5.18 Controlling third-party devices

Various third-party devices can be connected to an existing OMNIS IC System. Third-party instruments are connected to the remote connector on the OMNIS Extension Module Main via a remote cable. Depending on the remote connector used on the third-party device, the wire assignment differs (note the manufacturer's specifications) differs.



Figure 193 Remote cable – Connectors

1	White Cable shield
3	Orange-white Remote in 1
5	Red +3.3 V
7	Green-white Remote out 2
2	Black 0 V
4	Orange Remote in 2
6	Green Remote out 1

Connecting third-party devices

Prerequisite:

- The third-party device is installed (*see manual of the respective instrument*).
- The cable connections in the OMNIS IC System are created (*see "Installing cable connections", chapter 5.19, page 323*).
- The OMNIS IC and the third-party device are switched off.

Required accessories:

- Remote cable, St/open, 2 m (6.02102.100)
- 1** Plug the matching end of the remote cable into the I/O connector **(21-1)** on the OMNIS Extension Module Main.
 - 2** Connect the cables (*see figure 193, page 322*) at the other end of the remote cable to the remote connector on the third-party device in accordance with manufacturer specifications.

The third-party device is connected to the OMNIS IC System.

See also

OMNIS IC – Connectors and interfaces (chapter 3.1.4, page 27)

5.19 Installing cable connections

The main module, the extension modules, and the autosampler are connected to one another as a cascade via the inputs and outputs (*see "Energy supply and Internet supply – Concept", chapter 3.1.5, page 30*).

Installing cable connections

Prerequisite:

- All functional units are connected (*see "Connecting functional units", chapter 5.15, page 262*).

Required accessories:

- 2 x power cord, C13/C14, 1 m (6.02122.130)
- Power cord, C13/C14, 0.35 m (6.02122.120)
- 3 x network cable, 1 m (6.02107.000)
- Network cable, 0.3 m (6.02107.040)
- If an OMNIS Reagent Organizer Liquid Control is used:
 - Cable MDL St/Bu 0.5 m (6.02102.010)
- Additionally when using an OMNIS IC Autosampler Module COOL:
 - Power cord, C13/C14, 0.35 m (6.02122.120)
 - Network cable, 0.3 m (6.02107.040)

 The number of cables required depends on the size of the OMNIS IC System. The following procedure shows an example of a possible cabling setup of an OMNIS IC M System including the OMNIS IC Autosampler Module.

1 Installing the power cord



CAUTION

Connection interrupted by pressure on cable connections

If pressure is exerted on the cable connections on the rear of the instrument, then this can lead to interruptions in the energy supply or the network supply.

- Check whether there is sufficient space between the connected cables on the rear of the instrument and the wall.
- Plug the matching end of a long power cord into the female power socket (21-8) on the main module. Plug the other end of the power cord into the male power socket (23-1) of the autosampler.
- Plug the suitable end of another long power cord into the female power socket (23-4) of the autosampler. Plug the other end of the power cord into the male power socket (22-4) of the lowest extension module.
- Plug the suitable end of the short power cord into the female power socket (22-6) of the lowest extension module. Plug the other end of the power cord into the male power socket (22-4) of the extension module located above.

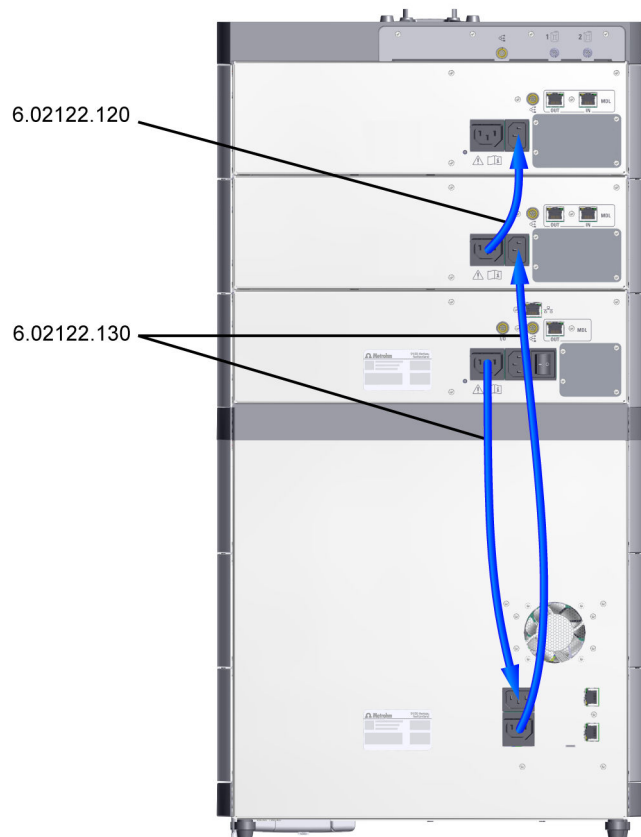


Figure 194 Power cord – OMNIS IC System with OMNIS IC Autosampler Module

- If an OMNIS IC Autosampler Module COOL is used, then an additional short power cord must be installed.

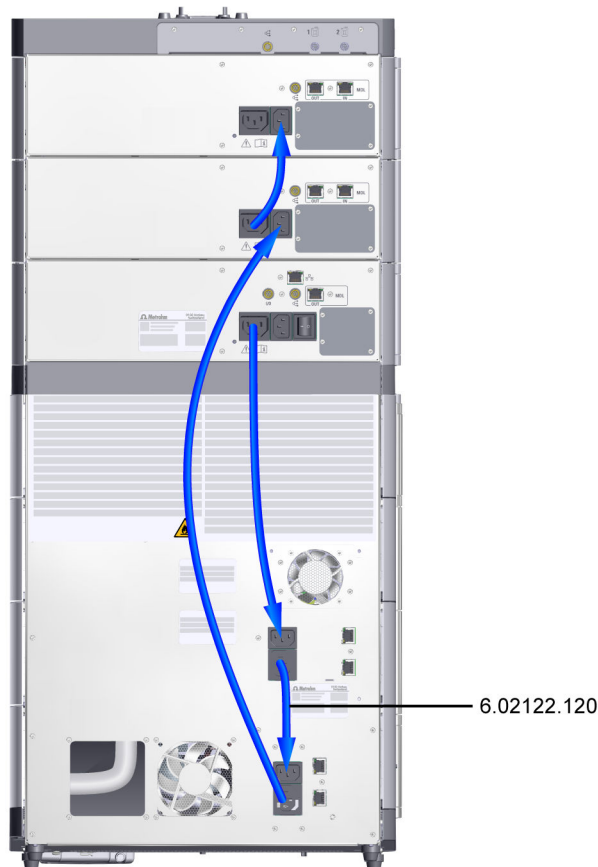


Figure 195 Power cord – OMNIS IC System with OMNIS IC Autosampler Module COOL

2 Installing the network cable

- Plug the matching end of a long network cable into the LAN connection socket (21-3) on the main module. Connect the other end of the network cable to the LAN supply.
- Plug the matching end of another long network cable into the MDL connection socket (21-4) labeled *OUT* on the main module. Plug the other end of the network cable into the MDL connection socket (23-2) labeled *IN* on the autosampler.
- Plug the matching end of another long network cable into the MDL connection socket (23-3) labeled *OUT* on the autosampler. Plug the other end of the network cable into the MDL connection socket (22-3) labeled *IN* on the lowest extension module.
- Plug the matching end of the short network cable into the MDL connection socket (22-2) of the lowest extension module labeled *OUT*. Plug the other end of the network cable into the MDL connection socket (22-3) of the extension module above labeled *IN*.

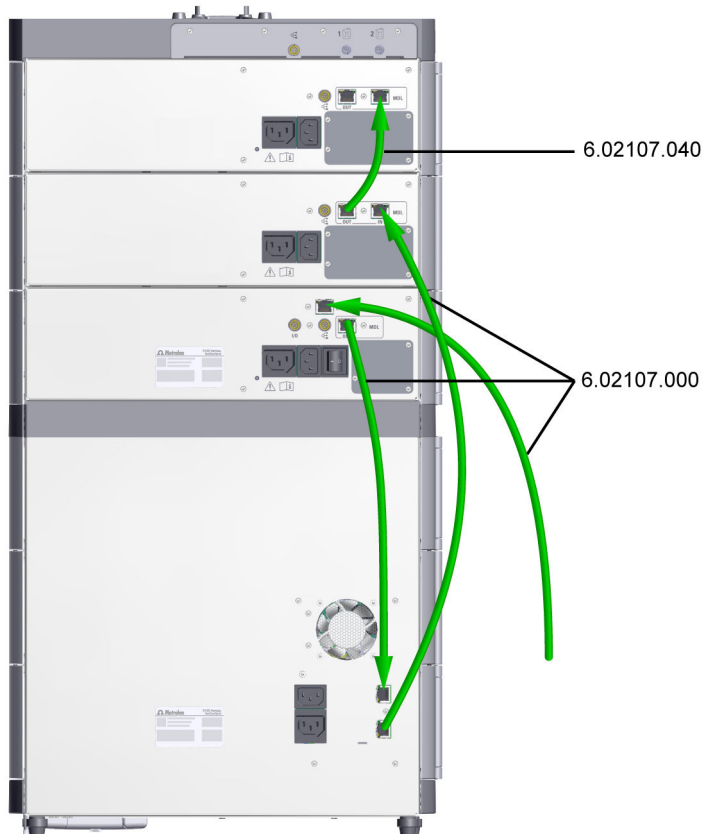


Figure 196 Network cable – OMNIS IC System with OMNIS IC Autosampler Module

- If an OMNIS IC Autosampler Module COOL is used, then an additional short network cable must be installed.

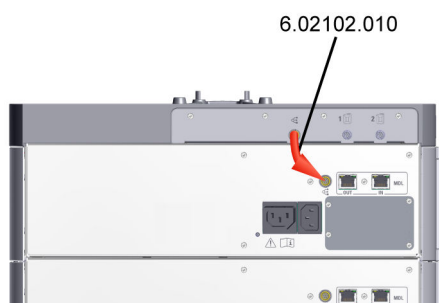


Figure 198 Connecting the OMNIS Reagent Organizer Liquid Control

See also

[OMNIS IC – Connectors and interfaces \(chapter 3.1.4, page 27\)](#)

5.20 Plugging in the power cord



WARNING

Health hazards from electrical potential.

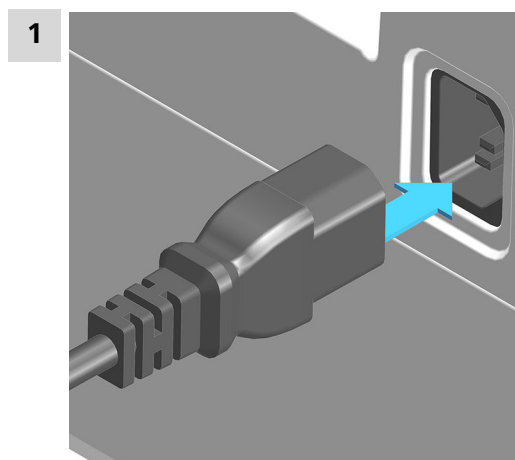
Severe injuries with possibly fatal consequences.

- Operate the product only if it is in perfect condition. The housing must also be intact.
- Only use the product with the covers fitted.
- Protect live components (e.g. power supply unit, power cord, connection sockets) against moisture.
- Always have maintenance work and repairs on electrical components carried out by a regional Metrohm service representative.

Required accessories:

- Power cord:
 - Length: max. 2 m
 - Number of conductors: 3, with protective ground
 - Conductor cross-section: 3x min. 1.0 mm² / 18 AWG
- Instrument plug:
 - IEC 60320, type C13, 10 A

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



- Plug the power cord into the product's power socket. Use only permitted power cords.
- Connect the power cord to the energy supply.

6 Operation and control

6.1 Initial start-up by Metrohm

As a basic rule, the initial start-up of the system is carried out by the regional Metrohm service representative.

6.2 Water quality in ion chromatography

Ion chromatography work mainly involves aqueous media. This means that water quality is a critical factor for good chromatography. If the water quality is insufficient, then the results are also insufficient. Water with inadequate quality can damage instruments and separation columns.

The ultrapure water used must be particle-free and meet the requirements for ultrapure water Type I in accordance with [ASTM D1193-24](#):

- Resistivity: $>18 \text{ M}\Omega \cdot \text{cm}$ (25 °C)
- TOC: $<10 \text{ ppb}$

Modern ultrapure water systems for laboratory use ensure this level of water quality.

6.3 Switching the OMNIS IC on and off



WARNING

Risk of injury caused by capillaries slipping out

Capillaries that slip out of the pressure screws can cause injuries to the eyes.

- Wear protective glasses.

Switching the OMNIS IC System on and off

1 Switching on the OMNIS IC System

There is a toggle switch on the rear of the main module ([see "Overview", chapter 3.3.1, page 33](#)).

Flip the toggle switch to the **On** position.

The status display begins to light up in yellow. The OMNIS IC System is ready for operation as soon as the status display lights up green.



2 Switching off the OMNIS IC System

There is a toggle switch on the rear of the main module (see "Overview", chapter 3.3.1, page 33).

Flip the toggle switch to the **Off** position.

The status display goes out and the OMNIS main instrument is switched off.

6.4 Putting the OMNIS IC System into operation

Before the guard column and the separation column are installed, the OMNIS IC System must be completely rinsed with eluent.

Equilibrating the OMNIS IC System

Prerequisite:

- All functional units are connected except for the columns (*see "Connecting functional units", chapter 5.15, page 262*).
- The power cord and network cable are connected to the OMNIS IC System (*see "Energy supply and Internet supply – Concept", chapter 3.1.5, page 30*).

Required accessories:

- Coupling 2 x UNF 10/32 (6.2744.040)

1 Replacing columns with coupling 2 x UNF 10/32

- Connect the columns only after start-up. Connect a 2 x UNF 10/32 coupling instead of the columns for start-up.

2 Preparing the instrument

- Check whether the aspiration tubing is immersed in the eluent and that there is enough eluent in the eluent bottle.
- Check whether the detector outlet capillary is connected to the waste collector.
- Switch on the OMNIS IC System with the toggle switch on the main module.

The OMNIS Software recognizes the connected OMNIS IC System.

3 Deaerating the high-pressure pump

 If no injector 7/3 is used, then manually purge the high-pressure pump (see *"Purging the OMNIS High-Pressure Pump Unit", chapter 6.8, page 339*).

- Start the **OMNIS Software**.
- Under **Equipment ► Work systems**, double-click on **nonS_Autopurge** or **SeS_Autopurge** to select the desired method.
- Change to the **Live data** tab.
- Start the desired method **nonS_Autopurge** or **SeS_Autopurge** by clicking on .
- After 2 minutes, stop the purging with .

4 Starting equilibration

- Under **Equipment ► Work systems**, select the desired method by double-clicking on **nonS_Equilibration** or **SeS_Equilibration**.
- Change to the **Live data** tab.
- Start the desired method **nonS_Equilibration** or **SeS_Equilibration** by clicking on .

5 Rinsing the OMNIS IC System without columns

- Rinse the OMNIS IC System (without columns) with eluent for 10 minutes. Use the recommended flow rate for the separation column used.
- After 10 minutes, stop the rinsing process with . Wait until the pressure in the high-pressure pump has released.

6 Installing columns

- Wait until the pressure in the high-pressure pump has released.
- New columns must be rinsed before insertion:
 - Rinse the guard column (see *"Rinsing the guard column", chapter 6.5, page 334*).
 - Rinse the separation column (see *"Rinsing the separation column", chapter 6.6, page 336*).

- Install the guard column and separation column:
 - in the column thermostat (*see "Equipping the OMNIS Column Thermostat Unit", chapter 5.9, page 218*)
- or
- in the column holder (*see "Equipping the OMNIS Column Holder Unit", chapter 5.10, page 223*)

7 Equilibrating the OMNIS IC System

- Equilibrate the OMNIS IC system afterwards (*see "Equilibrating the OMNIS IC System", chapter 6.7, page 338*).

6.5 Rinsing the guard column

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

Rinsing the guard column

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.
- Additionally for system start-up:
 - The OMNIS IC System is equilibrated (*see "Putting the OMNIS IC System into operation", chapter 6.4, page 332*).

Required accessories:

- Guard column
The *Metrohm column program* (available from a regional Metrohm service representative), the *product information on the separation column* or personal advice from a regional Metrohm service representative provide information on which guard column is suitable for the separation column used.
- Rinsing solution in accordance with column leaflet
- Wrench (6.2739.000) for pressure screws

 New columns must be rinsed before they are inserted into the OMNIS IC System (observe manufacturer specification).

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

i New guard columns and separation columns are delivered in storage eluent. Before inserting the guard column, check whether the storage eluent can be mixed with the eluent used for the measurement (observe the column leaflet).

1 Removing the coupling

- Remove the 2 x UNF 10/32 coupling installed between the column inlet capillary and the column outlet capillary for start-up.

2 Preparing the guard column

- Remove the stoppers from the guard column. If a Guard column is used, then also remove the sealing cap.

3 Connecting the guard column

i If a flow direction is marked on the column, then insert the column according to this flow direction.

- Loosen the capillary at the column thermostat inlet.
 - If a column holder is used, then detach the capillary from the 2 x UNF 10/32 coupling.
- If an S-Guard column is used, then use a short pressure screw to fasten the corresponding connection capillary to the outlet of the guard column.
- Fasten the loosened capillary to the inlet of the guard column.

4 Rinsing the guard column

- Place a beaker under the outlet of the guard column.
- Check whether the injector is in the **Inject position**.
- The values for flow rate and pressure are defined in the column leaflet. Start the high-pressure pump with the corresponding values. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, start the high-pressure pump by clicking on , [see OMNIS help](#).
- Rinse the guard column with eluent for 3 minutes.



- Stop the high-pressure pump by clicking on .

The guard column is rinsed. The next step is to rinse the separation column (*see "Rinsing the separation column", chapter 6.6, page 336*).

6.6 Rinsing the separation column

A test chromatogram accompanies every column. The standard chromatogram is available in the [Certificate Finder](#). The column leaflet can be found online at <http://www.metrohm.com> with the corresponding column. You can find information on special IC applications in the corresponding "**Application Notes**", which are available on the Internet under www.metrohm.com in the Applications area or free of charge upon request from your regional Metrohm service representative.

Rinsing the separation column

Prerequisite:

- The guard column is rinsed (*see "Rinsing the guard column", chapter 6.5, page 334*).
- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.
- Additionally for system start-up:
 - The OMNIS IC System is equilibrated (*see "Putting the OMNIS IC System into operation", chapter 6.4, page 332*).
 - The 2 x UNF 10/32 coupling installed between the column inlet capillary and the column outlet capillary for start-up is removed.

Required accessories:

- Separation column
The *Metrohm column program* (available from a regional Metrohm service representative), the *product information on the separation column* or personal advice from a regional Metrohm service representative provide information on which guard column is suitable for the separation column used.
- Rinsing solution in accordance with column leaflet
- Wrench (6.2739.000) for pressure screws

 New columns must be rinsed before they are inserted into the OMNIS IC System (observe manufacturer specification).

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

 New guard columns and separation columns are delivered in storage eluent. Before inserting the guard column, check whether the storage eluent can be mixed with the eluent used for the measurement (observe the column leaflet).

1 Preparing the separation column

- Remove the stoppers from the separation column.

2 Connecting the separation column to the high-pressure pump

- If a Guard column is used, then screw the Guard column directly onto the inlet of the separation column.
- If an S-Guard column is used, then connect the S-Guard column to the separation column using the corresponding connection capillary. To accomplish this, install the connection capillary with pressure screws to the outlet of the S-Guard column and to the inlet of the separation column.
- Loosen the capillary at the column thermostat inlet.
 - If a column holder is used, then detach the capillary from the 2 x UNF 10/32 coupling.
- Fasten the loosened capillary to the inlet of the guard column.

3 Rinsing the separation column

- Place a beaker under the outlet of the separation column.
- Check whether the injector is in the **Inject position**.
- If the column used has a chip, then the settings for **Flow rate** and **Pressure** are automatically transferred to the OMNIS Software.

If the column used does not have a chip, then the values for flow rate and pressure are defined in the column leaflet. Start the high-pressure pump with the corresponding values. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**.

- Click on  to start the high-pressure pump, *see OMNIS help*.
- Rinse the separation column with eluent for 5 minutes.
- Stop the high-pressure pump by clicking on .

- If a column holder is used, then insert the column into the OMNIS Column Holder Unit (*see "Equipping the OMNIS Column Holder Unit", chapter 5.10, page 223*).
 - If a column thermostat is used, then detach the capillary from the inlet of the guard column. Tighten the loosened capillary on the column thermostat inlet.
- Insert the columns into the OMNIS Column Thermostat Unit (*see "Equipping the OMNIS Column Thermostat Unit", chapter 5.9, page 218*).

6.7 Equilibrating the OMNIS IC System

In the following cases, the OMNIS IC System must be equilibrated with eluent until a stable baseline has been reached:

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

 The equilibrating time can be considerably prolonged if the composition of the eluent is modified.

Equilibrating the OMNIS IC System

Prerequisite:

- If a new guard column is used, then that guard column is rinsed ([see "Rinsing the guard column", chapter 6.5, page 334](#)).
- If a new separation column is used, then that separation column is rinsed ([see "Rinsing the separation column", chapter 6.6, page 336](#)).
- The columns are installed in the column thermostat or in the column holder.

 As an alternative, Metrohm provides method templates for automatic equilibration of the IC system. The method templates can be found on the [Metrohm Knowledge Base](#).

1 Preparing the instrument

- Check whether the column is inserted in accordance with the flow direction marked on the column.
- Check whether the aspiration tubing is immersed in the eluent and that there is enough eluent in the eluent bottle.

2 Preparing the ONMIS Software

- Under **Equipment** ► **Work systems**, select the desired method by double-clicking on **nonS_Equilibration** or **SeS_Equilibration**.
- Change to the **Live data** tab.
- Start the desired method **nonS_Equilibration** or **SeS_Equilibration** by clicking on .

3 Equilibrating the OMNIS IC System

- 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, then tighten the corresponding pressure screw further, or loosen the pressure screw, check the capillary end and shorten it using the capillary cutter if necessary and retighten the pressure screw.
- Equilibrate the OMNIS IC system for 30 minutes.
If the recommended method **nonS_Equilibration** or **SeS_Equilibration** is used, then the Metrohm Suppressor Module (MSM) is automatically switched to the next chamber every 10 minutes. If another method is used, then it must be ensured that all 3 chambers of the MSM have been rinsed after equilibration.
- After 30 minutes, stop the rinsing process with .

The OMNIS IC System is ready for operation.

6.8 Purging the OMNIS High-Pressure Pump Unit

 This step is necessary only if no injector 7/3 is installed in the OMNIS IC System. The injector 7/3 has an automatic purging function. This eliminates the need for manual purging of the high-pressure pump.

Purging the high-pressure pump manually

Prerequisite:

- The eluent bottle is connected to the OMNIS IC System.

Required accessories:

- Syringe 10 mL with Luer connector (6.2816.020)

- 1 Insert the syringe into the Luer connector of the pump head auxiliary.
- 2 Open the purge knob on the pump head auxiliary (approx. $\frac{1}{2}$ turn).

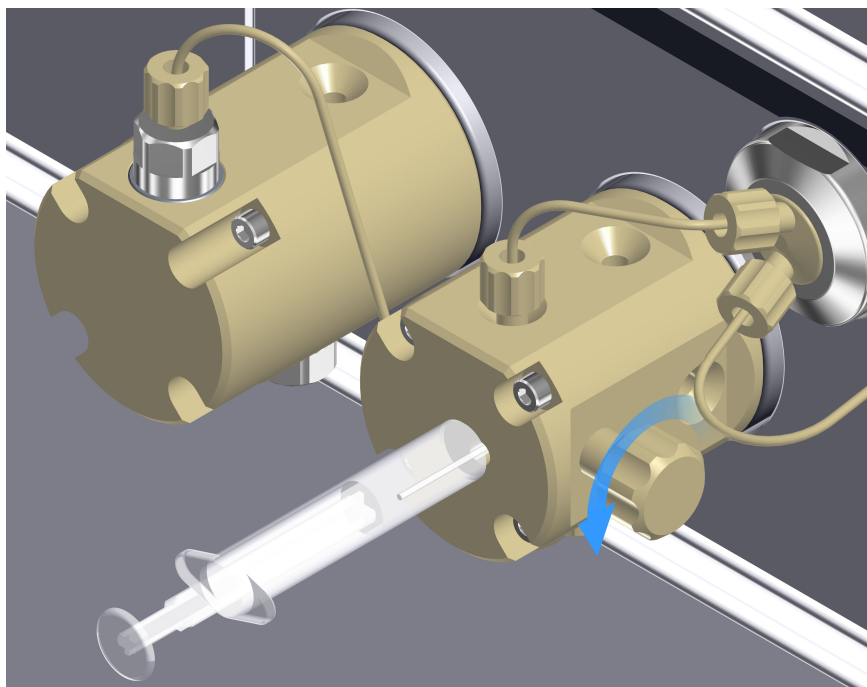


Figure 199 Purging the high-pressure pump manually

- 3 Start the high-pressure pump with a flow of 5 to 10 mL/min. To do this, in the overview of the instrument, open **High-Pressure Pump ▶ Manual control**, define **Flow rate**, start the high-pressure pump by clicking on , see [OMNIS help](#).
- 4 Use the syringe to aspirate eluent until there are no more air bubbles in the eluent aspiration tubing.
- 5 Stop the high-pressure pump by clicking on .
- 6 Close the purge knob.
- 7 Remove the syringe from the Luer connector.

6.9 Setting the cell constant

If the conductivity detector is operated at a temperature above 40 °C, then this may result in the cell constant having to be changed.

Setting the cell constant

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.

Required accessories:

- Ultrapure water
- Conductivity standard 100 µS/cm, 5 x 30 mL (6.2324.110)

- 1 Fill a suitable vessel with ultrapure water.
- 2 Release the inlet capillary of the high-pressure pump at the upstream unit. Place the released capillary end in the vessel with ultrapure water.
- 3 Connect the outlet capillary of the high-pressure pump to the detector inlet.
- 4 Rinse the OMNIS IC System with a flow of 1 mL/min for 5 minutes.
- 5 Remove the capillary from the ultrapure water. Instead, place the capillary in the conductivity standard.
- 6 Start the **Cell Constant_Determination and Writing in Detector** method. The method can be found on the [Metrohm Knowledge Base](#).

The cell constant is determined. If necessary, the cell constant can be adjusted in the settings, [see OMNIS help](#).

6.10 Operating the cylinder unit OMNIS

The operation of the cylinder unit OMNIS is described in the *Manual for the cylinder unit OMNIS UNF*.

6.11 Refitting the cylinder unit OMNIS

The cylinder units are available in various versions. The versions are distinguished according to their volumes and their connectors. Execute the following steps to attach another cylinder unit OMNIS to the OMNIS Dosing Drive Unit:

1. Remove the current cylinder unit (*see "Removing the cylinder unit OMNIS", page 342*).
2. Attach the desired cylinder unit (*see "Equipping the OMNIS Dosing Drive Unit", chapter 5.5, page 198*).

Removing the cylinder unit OMNIS

Prerequisite:

- All liquid-conveying pumps are switched off.
- The pressure in the system has been released.

Required accessories:

- desired cylinder unit OMNIS (6.0150x.xx0)

1 Preparing for storage

Prepare the cylinder unit OMNIS for storage:

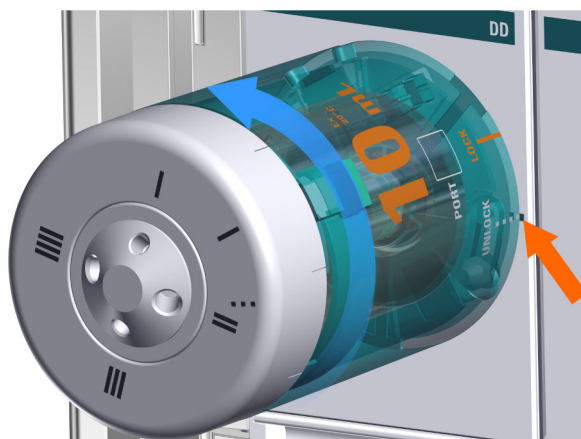
- Empty the cylinder unit OMNIS.
- Click on  to move the piston to the **Init.** position.

2 Removing the tubings

- Unscrew all tubings from the ports of the cylinder unit OMNIS.

3 Unlocking the cylinder unit OMNIS

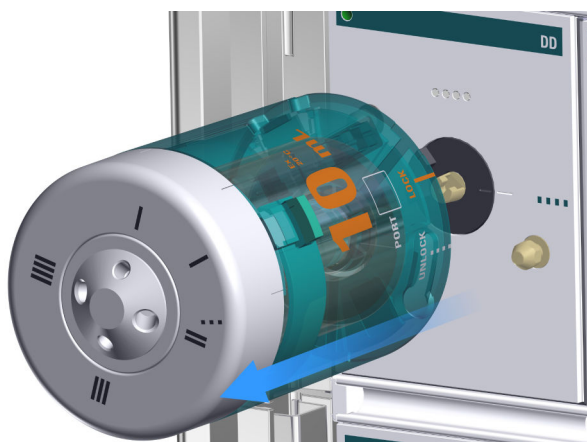
- Rotate the cylinder unit OMNIS counterclockwise as far as the **UNLOCK** position.



The positioning aid on the dosing drive and the marking of the **UNLOCK** position on the cylinder unit OMNIS line up with one another.

4 Removing the cylinder unit OMNIS

- Remove the cylinder unit OMNIS straight to the front.



The cylinder unit OMNIS is completely removed. Attach the desired cylinder unit OMNIS (*see "Equipping the OMNIS Dosing Drive Unit", chapter 5.5, page 198*).

6.12 Refitting the OMNIS MISP Unit

NOTICE

Material damage due to stress

Material damage due to physical stress on open trays.

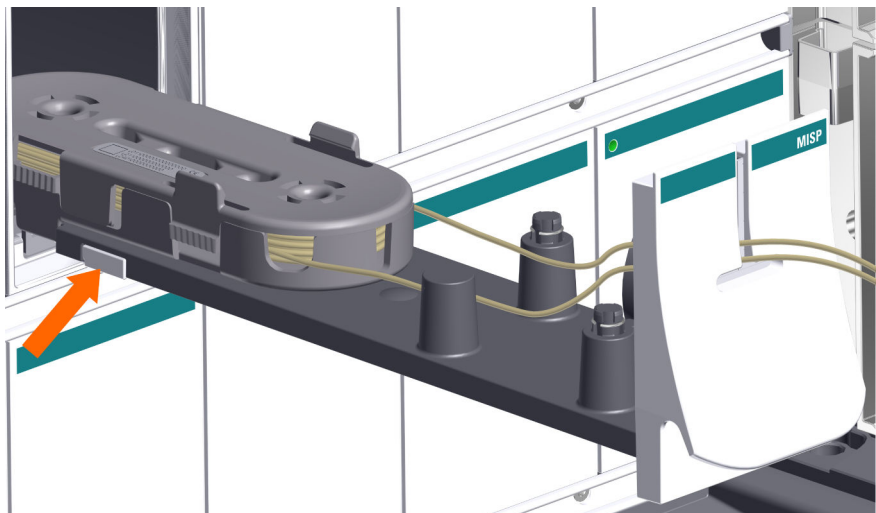
- Do not exert any pressure on open pull-out compartments and trays.

Remove the accessory parts from the MISP tray to then use other accessory parts or to service accessory parts. To do this, follow the following steps.

Removing optional accessories

1 Remove the MISP tray from the MISP unit

- Disconnect the capillary connections from the accessory parts being used.
- Pull the MISP tray out of the MISP unit until it reaches the end stop.
- Press and hold the lock release mechanism on the left side of the tray. At the same time, pull the MISP tray straight out of the MISP unit.



2 Removing the T connector

- Loosen the knurled screw on the T connector.
- Pull the T connector straight upwards away from the MISP base plate.

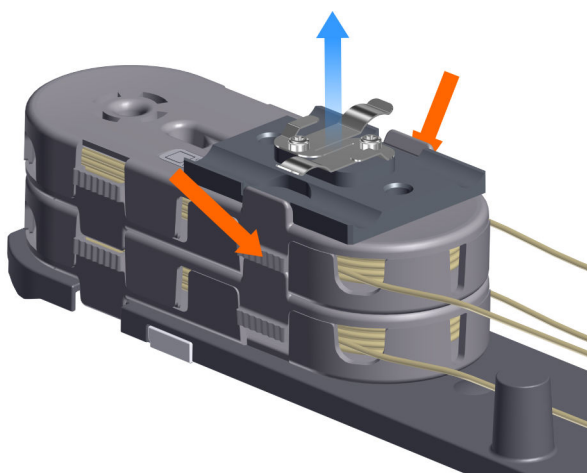
- To remove trap columns or pieces of transfer tubing as well, remove the MISP base plate. This gives you better access to the trap columns and pieces of transfer tubing. To do this, pull the MISP base plate straight upwards out of the MISP tray.
- If 2 T connectors are mounted, then a regional Metrohm service representative will perform the refitting.

3 Removing the ultrafiltration cell

- Pull the ultrafiltration cell straight upwards out of the MISP tray.

4 Removing trap columns

- Pull the trap columns sideways out of the recess in the MISP holder, trap column.
- Remove the MISP holder, trap column from a transfer capillary or the MISP tray.
 - *From a transfer capillary:*
Press and hold the ribbed surface of the front latches on both sides of the transfer capillary. At the same time, pull the MISP holder, trap column straight upwards away from the transfer capillary.

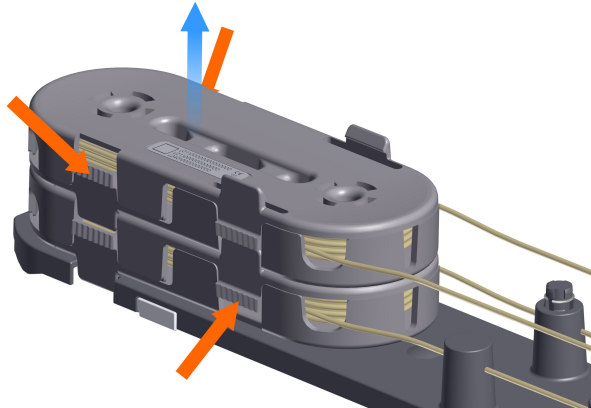


- *From the MISP tray:*
Pull the MISP holder, trap column straight upwards away from the MISP tray.

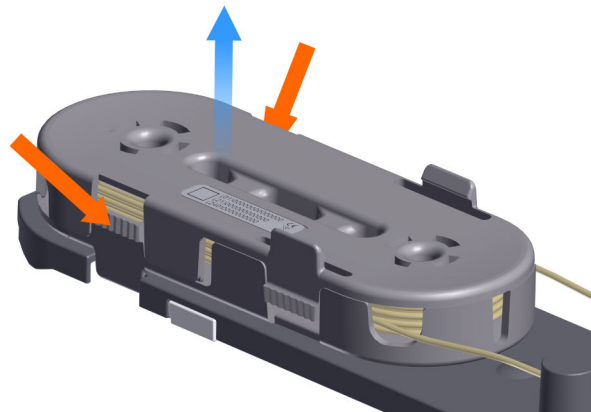
5 Removing transfer capillaries

-  Transfer tubing is removed in the same way as transfer capillaries.

- If several transfer capillaries are installed on top of each other, then remove the top transfer capillary first. To do this, press and hold the ribbed surface of the rear latches on both sides of the top transfer capillary. At the same time, press and hold the ribbed surface of the front latches on both sides of the lower transfer capillary. Pull the top transfer capillary straight upwards away from the lower transfer capillary.



- Press and hold the ribbed surface of the rear latches on both sides of the lower transfer capillary. At the same time, pull the transfer capillary straight upwards away from the MISP tray.



The accessory parts are removed. Then install the required accessory parts (*see "Equipping the OMNIS MISP Unit", chapter 5.8, page 205*).

6.13 OMNIS Column Thermostat Unit – Changing columns



CAUTION

Danger of burning due to hot column tray

Danger of burning due to hot parts. The column thermostat can be heated to 80 °C. The inside of the column tray is very hot during and immediately after operation.

- Do not open the column tray during operation. If the thermostat function has been started, then it remains active even when the column tray is open.
- After operation, do not open the column tray until it has cooled down to ambient temperature.
- Wear protective gloves if it is absolutely necessary to open the hot column tray.

NOTICE

Material damage due to stress

Material damage due to physical stress on open trays.

- Do not exert any pressure on open pull-out compartments and trays.

NOTICE

Leak due to condensation

If the column thermostat is cooled to below 15 °C, then condensation may form when the column tray is opened. The condensation on the open column tray is not drained and can cause leaks.

- Control the temperature of the column thermostat to 25 °C before opening.

Changing the columns

Prerequisite:

- The column thermostat is switched off.
- The column thermostat has cooled down.
- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.

Required accessories:

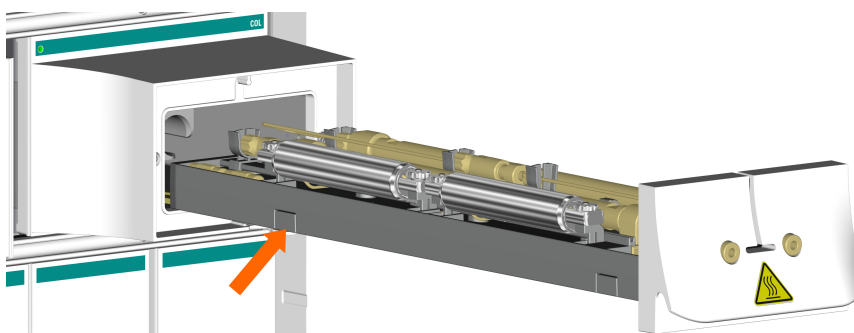
- Guard column
The *Metrohm column program* (available from a regional Metrohm service representative), the *product information on the separation column* or personal advice from a regional Metrohm service representative provide information on which guard column is suitable for the separation column used.
- Separation column

 New guard columns and separation columns are delivered in storage eluent. Before inserting the guard column, check whether the storage eluent can be mixed with the eluent used for the measurement (observe the column leaflet).

 New columns must be rinsed before they are inserted into the OMNIS IC System (observe manufacturer specification).

1 Pulling out the column tray

- Pull the column tray out of the column thermostat as far as it will go. If necessary, disconnect the capillary connection on the outside of the column thermostat inlet.
- If necessary, remove the column tray straight out of the column thermostat by pressing the column tray release.

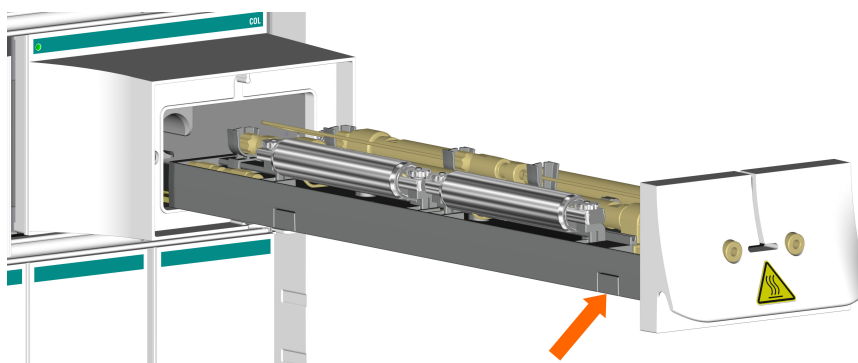


2 Loosening the capillary connections

- Loosen the capillary at the inlet of the guard column.
- Loosen the capillary at the outlet of the separation column.

3 Removing the columns from the column tray

- Press the IC Column release to remove the separation column together with the guard column from the column tray.



4 Replacing the guard column

i If a flow direction is marked on the column, then insert the column according to this flow direction.

- Rinse the new guard column (*see "Rinsing the guard column", chapter 6.5, page 334*).
- Remove the used guard column from the separation column.
- If the separation column is also being replaced, then have the new guard column ready and continue with *Step 5 – Replace the separation column*.
- If the separation column is not going to be replaced, then connect the new guard column to the separation column. Proceed directly to *Step 6 – Insert columns and column tray*.

5 Replacing the separation column

- Rinse the new separation column and connect it to the guard column (*see "Rinsing the separation column", chapter 6.6, page 336*).

6 Inserting the columns and the column tray

- Insert the columns and push the column tray into the column thermostat as far as it will go (*see "Equipping the OMNIS Column Thermostat Unit", chapter 5.9, page 218*).
- If the capillary on the outside of the column thermostat inlet has been disconnected, then restore the capillary connection (*see "Connecting functional units", chapter 5.15, page 262*).

The column thermostat is ready for operation.

6.14 OMNIS Column Holder Unit – Changing columns

Changing the columns

Prerequisite:

- The high-pressure pump is switched off.
- The pressure has been released.
- The peristaltic pump is switched off.
- The new guard column has been rinsed (*see "Rinsing the guard column", chapter 6.5, page 334*).
- The new separation column has been rinsed. (*see "Rinsing the separation column", chapter 6.6, page 336*).

Required accessories:

- Guard column
The *Metrohm column program* (available from a regional Metrohm service representative), the *product information on the separation column* or personal advice from a regional Metrohm service representative provide information on which guard column is suitable for the separation column used.
- Separation column

 New guard columns and separation columns are delivered in storage eluent. Before inserting the guard column, check whether the storage eluent can be mixed with the eluent used for the measurement (observe the column leaflet).

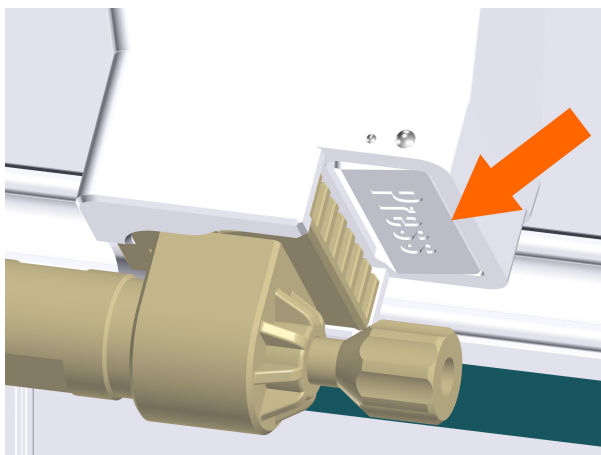
 New columns must be rinsed before they are inserted into the OMNIS IC System (observe manufacturer specification).

1 Loosening the capillary connections

- Loosen the capillary at the inlet of the guard column.
- Loosen the capillary at the outlet of the separation column.

2 Removing the columns

- Press the separation column release on the column holder.



- Remove the separation column together with the guard column from the column holder.

3 Inserting the columns

- Insert the required columns into the column holder and establish the capillary connection to the OMNIS IC System (*see "Equipping the OMNIS Column Holder Unit", chapter 5.10, page 223*).

The column holder is ready for operation.

6.15 Rinsing the OMNIS IC System

If the OMNIS IC System is not used for at least 1 week, then rinse the OMNIS IC System with a salt-free mixture of methanol and ultrapure water (1:4). Rinsing prevents eluent salts from crystallizing and causing damage.

Once the OMNIS IC System is put back into operation, rinse the OMNIS IC System once again.

Interrupting operation

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.

Required accessories:

- Bottle PP, 2L, GL 45 (6.01608.000), filled with a methanol/ultrapure water mixture in the ratio 1:4
- Bottle PP, 2 L, GL 45 (6.01608.000) filled with ultrapure water

- Switch the MSM during the rinsing process. To do this, in the overview of the instrument, open **MSM ► Manual control**, switch to the next suppressor unit with **Next channel**.
- Wait 10 minutes.
- Switch the MSM again.
- Wait 10 minutes.
- Switch off the high-pressure pump.

Each chamber of the MSM has been rinsed.

5 Rinsing the pump tubing of the peristaltic pumps

NOTICE

Damage to the pump tubing due to solvent

Damage to the pump tubing due to rinsing with solvents.

- Never allow pump tubing to come into contact with solvents.
- Rinse the pump tubing exclusively with ultrapure water.

 This step must be carried out for all pump tubing present in the OMNIS IC System.

- Ultrapure water is used as a rinsing solution for the pump tubing of the peristaltic pump.
Connect the peristaltic pump inlet to the bottle with ultrapure water (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).
- Check whether the press-on flap of the peristaltic pump is closed.
- Start the peristaltic pump at pump rate 10. To do this, in the overview of the instrument, open **Peristaltic pump ► Manual control**, define the **Pump rate**, and start the peristaltic pump by clicking on , *see OMNIS help*
- Wait 15 minutes. The pump tubing is rinsed.
- Switch off the peristaltic pump by clicking on  in manual control.
- To relieve the pump tubing, open the press-on flap of the peristaltic pump.

The rinsing process is finished.

Switch off the OMNIS IC System with the toggle switch on the main module.

Putting the OMNIS IC System back into operation

Prerequisite:

- The guard column and the separation column are **not** installed.
A coupling 2 x UNF 10/32 (6.2744.040) is installed instead of columns.
- All functional units are connected (*see "Connecting functional units", chapter 5.15, page 262*).

Required accessories:

- Bottle PP, 2L, GL 45 (6.01608.000), filled with eluent
- Bottle PP, 2L, GL 45 (6.01608.000), filled with regeneration solution

1 Switching on the OMNIS IC System

- Switch on the OMNIS IC System with the toggle switch on the main module.

2 Connecting the rinsing solution

- The eluent is used as a rinsing solution for the eluent path. Connect the degasser to the eluent bottle (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).

3 Connecting the regeneration solution

- Regeneration solution is required for the regeneration of the MSM.
- Connect the OMNIS Dosing Drive Unit or the peristaltic pump to the bottle with the regeneration solution (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).

4 Rinsing the OMNIS IC System

- Start the high-pressure pump with a flow rate of 1 mL/min and a maximum pressure of 2 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , *see OMNIS help*.
- Start the peristaltic pump at pump rate 10. To do this, in the overview of the instrument, open **Peristaltic Pump ► Manual control**, start the peristaltic pump by clicking on .
- Rinse the OMNIS IC system for 10 minutes.

5 Switching the MSM

- Switch the MSM during the rinsing process. To do this, in the overview of the instrument, open **MSM ► Manual control**, switch to the next suppressor unit with **Next channel**.
- Wait 10 minutes.
- Switch the MSM again.

- Wait 10 minutes.
- Switch off the high-pressure pump and the peristaltic pumps.

Each chamber of the MSM has been rinsed and regenerated.

6 Installing columns

- Wait until the pressure in the high-pressure pump has released.
- If new columns are used:
 - Rinse the guard column (*see "Rinsing the guard column", chapter 6.5, page 334*).
 - Rinse the separation column (*see "Rinsing the separation column", chapter 6.6, page 336*).
- Remove the coupling 2 x UNF 10/32 and install the guard column and separation column as required instead:
 - in the column thermostat (*see "Equipping the OMNIS Column Thermostat Unit", chapter 5.9, page 218*)
 - in the column holder (*see "Equipping the OMNIS Column Holder Unit", chapter 5.10, page 223*)
- Condition the OMNIS IC System (*see "Equilibrating the OMNIS IC System", chapter 6.7, page 338*)

The OMNIS IC System is ready for operation.

Maintenance interval	Functional unit / accessory part	Maintenance work
Every 4 months	OMNIS Peristaltic Pump Unit Pump tubing (6.01826.0x0)	Replace the pump tubing <i>(see "Performing maintenance on the OMNIS Peristaltic Pump Unit", chapter 7.4, page 378)</i> <i>Exception:</i> When using an OMNIS Multi Flow Monitor Unit, the flow rate of the pump tubing is monitored continuously. As long as the OMNIS Multi Flow Monitor Unit does not detect any changes in the flow rate, the pump tubing can be used beyond the recommended 4 months.
Every 6 months	Supply bottle Aspiration filter (6.2821.090)	Replace the aspiration filter on the FEP tubing in the supply bottle <i>(see "Setting up the eluent", chapter 5.14.1, page 248)</i>
Every 6 months	Supply bottle CO2 Absorber (Tube) (6.02837.030)	1. Remove used CO2 Absorber (Tube) from the bottle cap. 2. Insert the new CO2 Absorber (Tube) into the Luer connector of the bottle cap.
Annually	Supply bottle Filter tube (6.02837.040)	1. Remove the used filter tube from the bottle cap. 2. Insert the new filter tube into the Luer connector of the bottle cap.
Annually	OMNIS MCS Unit CO2 Absorber (Cartridge) (6.02837.110)	Replace the CO2 Absorber (Cartridge) <i>(see "Performing maintenance on the OMNIS MCS Unit", chapter 7.8, page 384)</i>
Annually	Cylinder unit OMNIS (6.0150x.xx0) Cylinder element glass x mL (6.1574.xx0)	Replace the cylinder element The information on the maintenance of the cylinder unit OMNIS is described in the <i>manual of the corresponding cylinder unit (8.0108.80x0)</i> .

Maintenance interval	Functional unit / accessory part	Maintenance work
If the pump piston is contaminated.	OMNIS High-Pressure Pump Unit Pump piston, ZrO2, 3.8 mm (6.02824.000)	Clean the pump piston (see "Cleaning or replacing the pump piston", chapter 7.3.2, page 367)
If the pump piston is heavily contaminated or scratched.	OMNIS High-Pressure Pump Unit Pump piston, ZrO2, 3.8 mm (6.02824.000)	Replace the pump piston (see "Cleaning or replacing the pump piston", chapter 7.3.2, page 367)
At least once a year or If the piston seal is damaged	OMNIS High-Pressure Pump Unit Piston seal, PE, orange, (6.02741.000)	Replace the piston seal (see "Replacing the piston seal", chapter 7.3.5, page 371)
At least once a year or If the piston wash seal is damaged	OMNIS High-Pressure Pump Unit Piston wash seal, PTFE, gray (6.02741.010)	Replace the piston wash seal (see "Replacing the piston wash seal", chapter 7.3.6, page 374)
If liquid has spilled onto the column tray.	OMNIS Column Thermostat Unit	Clean the column tray (see "Cleaning the OMNIS Column Thermostat Unit", chapter 7.10.5, page 394)
If liquid has spilled onto the base plate.	Base plate	Clean the base plate (see "Cleaning the base plate", chapter 7.10.1, page 388)
If liquid has spilled onto the reagent organizer.	Reagent organizer	Wipe up leaked liquid with a lint-free cloth. Clean the leak sensor (see "Cleaning the Reagent Organizer", chapter 7.10.2, page 389)
If the dilution vessel is contaminated. The contamination of the dilution vessel depends on the sample used.	OMNIS IC Autosampler Module Dilution vessel (6.02862.100)	Clean the dilution vessel (see "Cleaning the OMNIS IC Autosampler Module", chapter 7.10.3, page 390)

Maintenance interval	Functional unit / accessory part	Maintenance work
If the waste collector is contaminated.	OMNIS Multi Flow Monitor Unit Waste collector, 4x UNF 10/32 (6.02765.000)	Clean the waste collector (see <i>"Replacing the waste collector", chapter 7.7, page 382</i>)
If the waste collector is heavily contaminated or damaged.	OMNIS Multi Flow Monitor Unit Waste collector, 4x UNF 10/32 (6.02765.000)	Replace the waste collector (see <i>"Replacing the waste collector", chapter 7.7, page 382</i>)
If the drain tubing is damaged.	Reagent organizer Drain kit (6.05801.xx0)	Replace the drain tubing. (see <i>"Replacing the drain tubing", page 359</i>)

7.2 Performing maintenance on the Reagent Organizer

The following maintenance steps can be performed on the accessory parts of the reagent organizer as needed:

- Replacing the drain tubing (see *"Replacing the drain tubing", page 359*)
- Clean or replace the waste collector (see *"Cleaning or replacing the waste collector", page 361*)

Replacing the drain tubing

Prerequisite:

- All connections on the drain tubing are loosened.

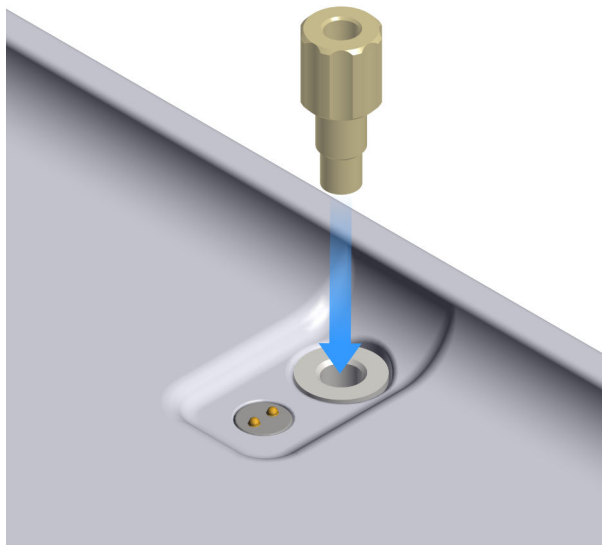
Required accessories:

- M6 thread / UNF 10/32 adapter (6.2744.080)
- desired drain kit (6.05801.xx0)
- Drain tubing fixation, 7-8 mm (6.01808.100)

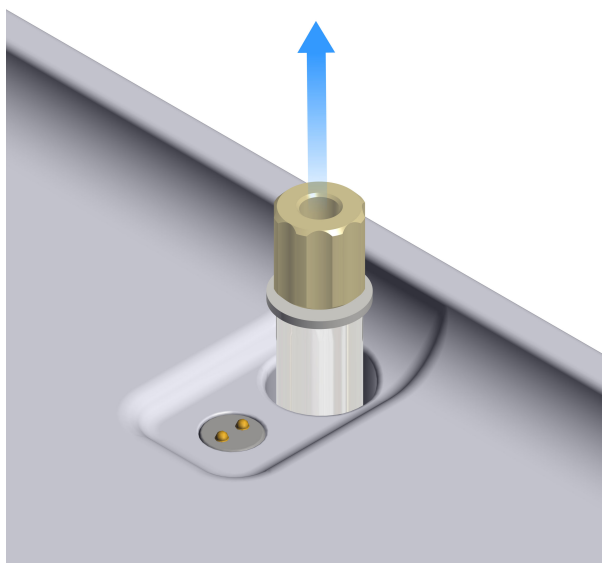
1 Removing the drain tubing

The drain tubing fixation has an M6 thread.

Screw the adapter into the thread of the drain tubing fixation.



- Remove the adapter, including the drain tubing fixation and the drain tubing, from the drain.



- Loosen the adapter from the drain tubing fixation.
- Remove the drain tubing fixation from the drain tubing.
- Pull the drain tubing downwards out of the opening for the drain.

2 Installing a new drain tubing

- Thread the drain tubing from below through the drain on the reagent organizer.
- Place the drain tubing fixation flat on the upper end of the drain tubing.

-

3 Installing the drainage tubing system

- ## Cleaning or replacing the waste collector

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.

- The waste collector detaches from the reagent organizer.

- Cleaning the waste collector (see "Cleaning the waste collector", chapter 7.10.7, page 400)

- Insert a new waste collector in the reagent organizer (*see "Installing the waste collector", chapter 5.3.4.1, page 119*).

7.3 Performing maintenance on the OMNIS High-Pressure Pump Unit

The following maintenance steps can be performed on the high-pressure pump:

- Dismantle the pump head (*see "Dismantling a pump head", chapter 7.3.1, page 365*)
- Clean or replace the pump piston (*see "Cleaning or replacing the pump piston", chapter 7.3.2, page 367*)
- Clean the check valve inlet and check valve outlet (*see "Cleaning the check valves", chapter 7.3.3, page 369*)
- Replace the check valve inlet and check valve outlet (*see "Replacing the check valves", chapter 7.3.4, page 369*)
- Replace the piston seal (*see "Replacing the piston seal", chapter 7.3.5, page 371*)
- Replace the piston wash seal (*see "Replacing the piston wash seal", chapter 7.3.6, page 374*)
- Mount the pump head (*see "Mounting the pump head", chapter 7.3.7, page 376*)

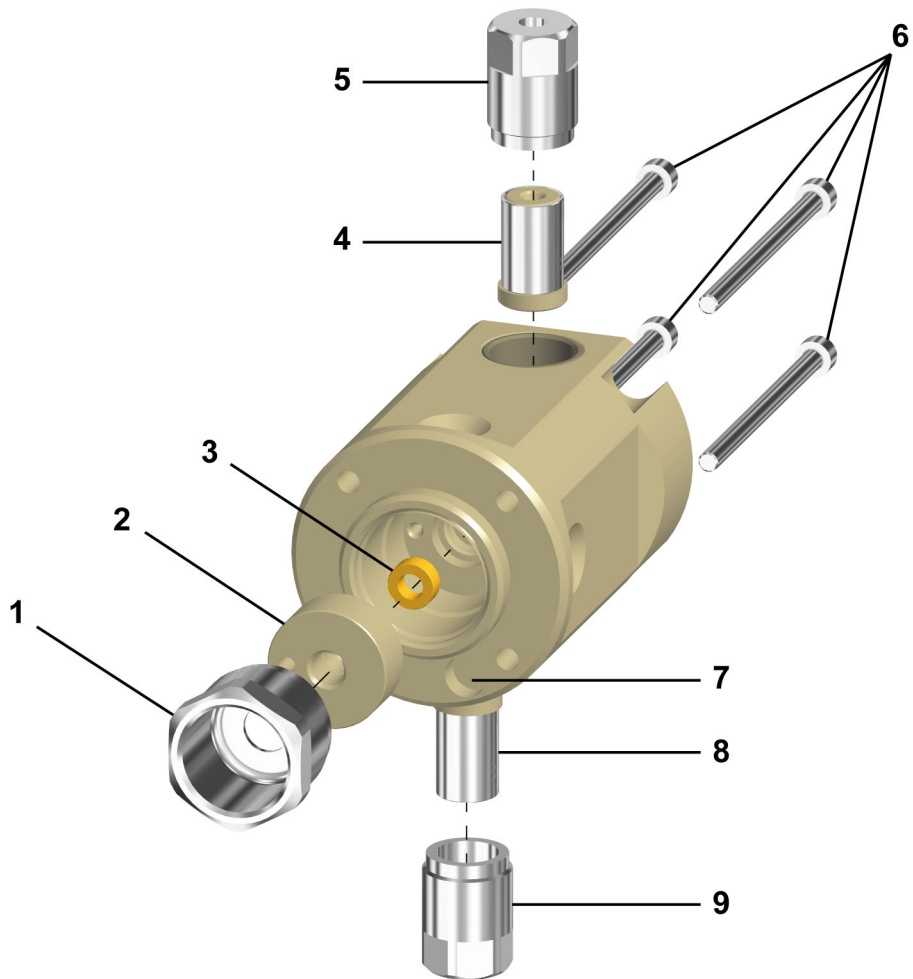


Figure 200 Pump head – Rear

1 Coupling nut

3 Piston seal

5 Check valve outlet

7 Positioning aid
for aligning the pump head with the pump
head mounting

9 Check valve inlet

2 Support insert

When using a piston seal wash, it is replaced
by an insert for piston seal wash.

4 Check valve outlet, PEEK

6 Fastening screws

8 Check valve inlet, PEEK

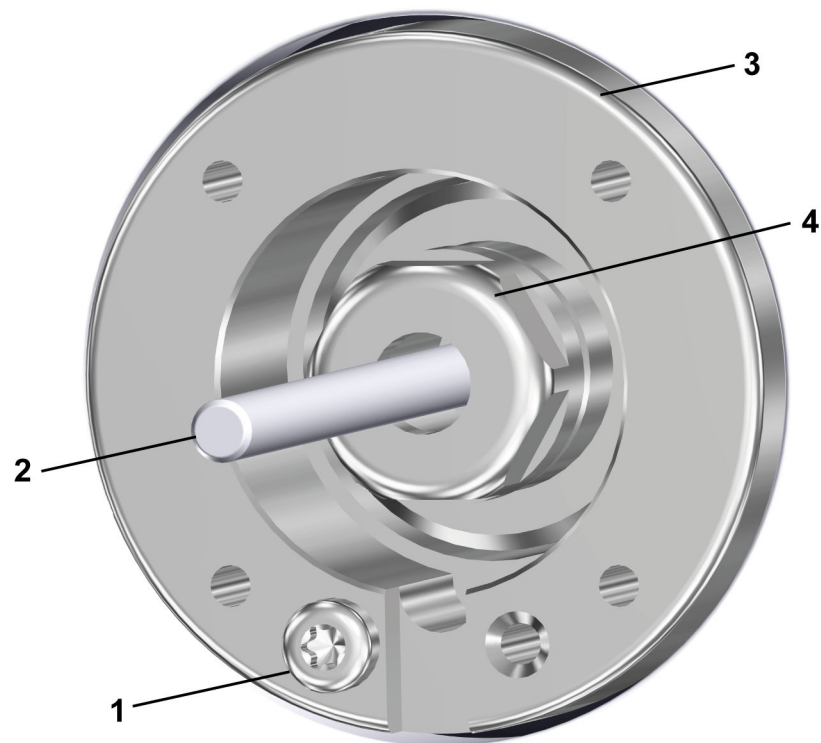


Figure 201 Pump head mounting – Front

1 Positioning screw

Ensures correct positioning of the pump head.

2 Pump piston

3 Pump head mounting

The pump heads are fastened to the pump head mounting.

4 Coupling nut

Fastens the pump piston in the pump head mounting.

i The multitool (6.02621.010) is required exclusively for maintenance of the high-pressure pump and is not included in the standard scope of delivery. The multitool is available from a regional Metrohm representative.



7.3.1 Dismantling a pump head

Prerequisite:

- Required accessories:**

- 365

- Multitool (6.02621.010) *(see figure 202, page 365)*

1 Retracting the pump piston

- In the overview of the instrument, open **High-Pressure Pump ► Manual control** and define 0.001 mL/min as **Flow rate**. Start the high-pressure pump by clicking on .
 - After 5 seconds, stop the high-pressure pump by clicking on .
- The pump head is now ready for dismantling.

2 Loosening the capillary connections

- Place the eluent bottle on the laboratory table so that the eluent does not leak when the capillary connections are loosened.
- Loosen the capillary connection at the outlet of the pump head main with the wrench for pressure screws.
- Loosen the capillary connection at the inlet of the pump head main at the outlet of the previous high-pressure pump unit, as the capillary connection at the inlet of the pump head is difficult to access.
- Loosen the capillary connection at the outlet of the pump head auxiliary with the wrench for pressure screws.
- Loosen the capillary connection at the inlet of the pump head auxiliary with the wrench for pressure screws.
- If a piston seal wash is installed, then loosen the capillary connections at the inlet and outlet of the piston seal wash with the wrench for pressure screws.

3 Removing the pump head

NOTICE

Material damage due to pump piston

The pump piston can cause damage to the piston seal when removing and inserting the pump head.

- Move the pump piston backward before removing and inserting the pump head. To do this, switch off the OMNIS High-Pressure Pump in the OMNIS Software and switch it back on again.
- The pump head is fastened with 4 fastening screws. Loosen and remove all 4 fastening screws with the hex key.
- Pull the pump head straight out of the pump head mounting.

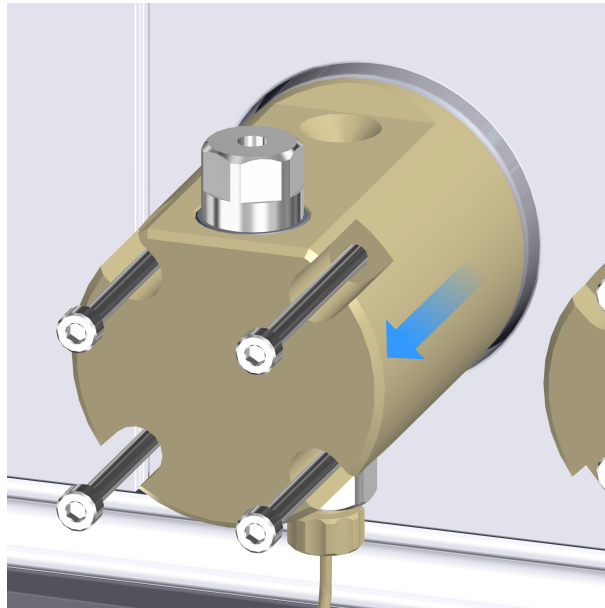


Figure 203 Removing the pump head

The pump head is dismantled.

i The positioning screw (201-1) on the pump head mounting must not be changed.

7.3.2 Cleaning or replacing the pump piston

Cleaning or replacing the pump piston

Prerequisite:

- The pump head is dismantled (see "Dismantling a pump head", chapter 7.3.1, page 365).

Required accessories:

- Multitool (6.02621.010) (see figure 202, page 365)
- Pump piston, ZrO₂, 3.8 mm (6.02824.000)

1 Removing the coupling nut

- Place the multitool over the pump piston.

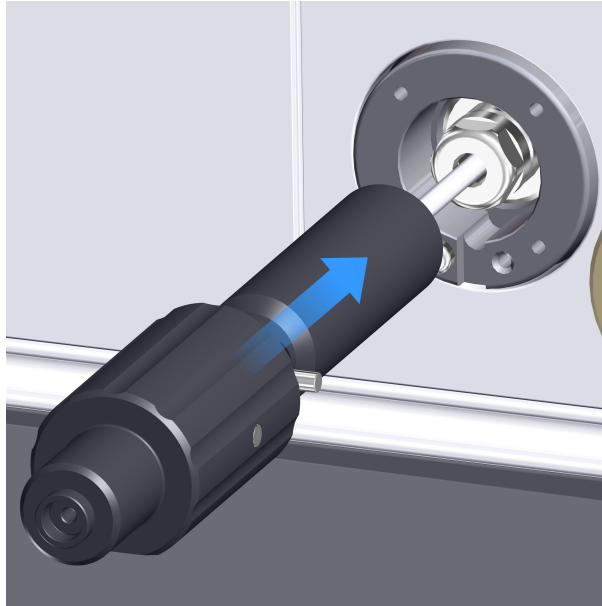


Figure 204 Removing the coupling nut

- Rotate the multitool counterclockwise to loosen the coupling nut.
- Pull the multitool straight out of the pump head mounting.

The coupling nut adheres in the multitool. This removes the coupling nut together with the multitool from the pump head mounting.

 The positioning screw (201-1) on the pump head mounting must not be changed.

2 Removing the pump piston

- Remove the pump piston from the piston holder by hand.
- Place the pump piston on a paper towel.

3 Cleaning the pump piston

 If the pump piston is slightly contaminated by abrasion or deposits, then clean the pump piston. If the pump piston is heavily contaminated or scratched, replace it.

- Rinse the pump piston with ultrapure water.
- Dry the pump piston with a lint-free cloth.

4 Inserting the pump piston

Insert the pump piston into the piston holder by hand.

5 Inserting the coupling nut

- Insert the coupling nut into the multitool.
- Place the multitool with the coupling nut over the pump piston as far as it will go.
- To tighten the coupling nut, rotate the multitool clockwise. Pull the multitool straight out of the pump head mounting.

7.3.3 Cleaning the check valves

Cleaning the check valve inlet and check valve outlet

Prerequisite:

- To clean the check valve inlet, remove the check valve inlet ([see "Replacing the check valves", chapter 7.3.4, page 369](#)).
- To clean the check valve outlet, remove the check valve outlet ([see "Replacing the check valves", chapter 7.3.4, page 369](#)).

Required accessories:

- Wash bottle / 250 mL (6.1614.000), filled with ultrapure water or acetone

- 1 First rinse the check valve with a wash bottle filled with ultrapure water or acetone in the direction of the eluent flow. The direction of eluent flow is marked on the check valve by an arrow.

The rinsing solution exits at the check valve outlet.

If no solution comes out of the check valve outlet, then the check valve is blocked.

- 2 Rinse the check valve with a wash bottle filled with ultrapure water or acetone against the direction of the eluent flow.

If the rinsing solution leaks at the check valve inlet, then the check valve is leaking. If this is the case, then replace the check valve ([see "Replacing the check valves", chapter 7.3.4, page 369](#)).

7.3.4 Replacing the check valves

Replacing the check valve inlet and check valve outlet

Prerequisite:

- The pump head main is dismantled ([see "Dismantling a pump head", chapter 7.3.1, page 365](#)).

Required accessories:

- Check valve inlet, PEEK (6.02824.010)
- Check valve outlet, PEEK (6.02824.020)
- Multitool (6.02621.010) (*see figure 202, page 365*)
- Wrench (6.2739.000) for pressure screws
- Torque wrench 2–10 Nm, 12 mm

 For the OMNIS High-Pressure Pump Unit, use only the above-mentioned check valves.

Check valves from older instrument generations must **NOT** be installed in the OMNIS High-Pressure Pump Unit.

- 1 Use the multitool to detach the check valve holder and remove it from the pump head.

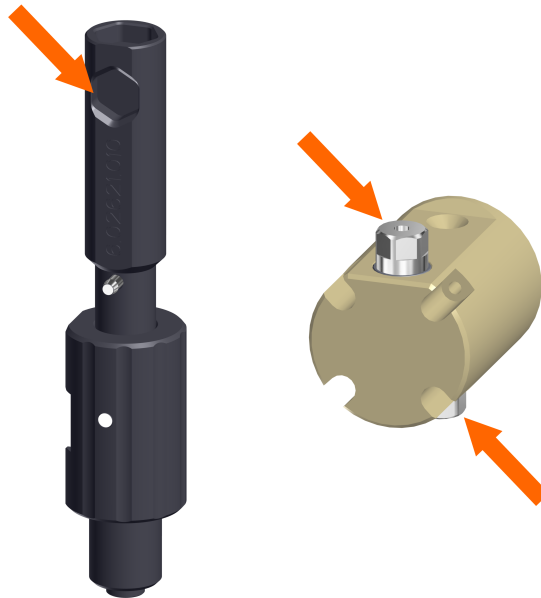


Figure 205 Removing the check valve holder

- 2 Remove the used check valve from the check valve holder.
- 3 The flow direction is marked with an arrow on the check valve. Insert the new valve into the check valve holder so that the arrow on the inserted valve points upward.

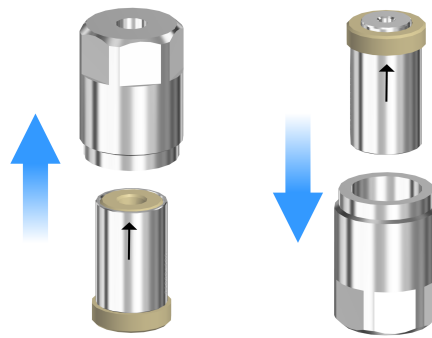


Figure 206 Inserting the check valves

4



No pressure screw may be installed on the check valve holder while tightening.

Insert the check valve holder with the valve into the pump head. Use a torque wrench (6 Nm) to tighten the check valve holder.

7.3.5 Replacing the piston seal

Replacing the piston seal

Prerequisite:

- The pump head is dismantled (*see "Dismantling a pump head", chapter 7.3.1, page 365*).

Required accessories:

- Multitool (6.02621.010) (*see figure 202, page 365*)
- Piston seal, PE, orange, (6.02741.000)



Do not replace the piston seal, PE, orange (6.02741.000) with the piston seal (orange) (6.2741.020).

1

Preparing the pump head

- Remove the coupling nut on the pump head with the multitool.



Figure 208 Preparing a piston seal

4 Inserting a new piston seal

- Insert the multitool with the piston seal inserted into the pump head as far as it will go.
- Push the handle of the multitool forwards to place the piston seal in the pump head.

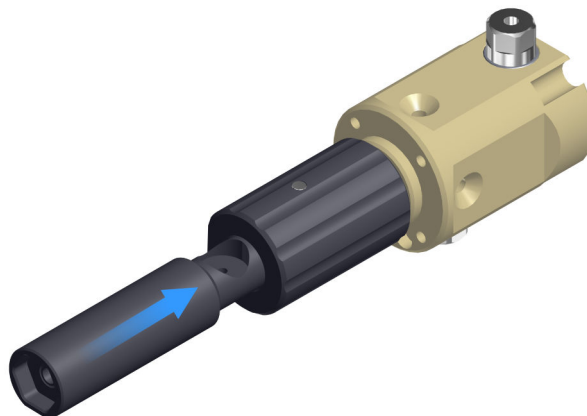


Figure 209 Inserting a piston seal

- Remove the multitool from the pump head.

5 Assembling the pump head

- Insert the support insert or the insert for piston seal wash into the pump head. (see "[Mounting the piston seal wash \(with OMNIS Dosing Drive Unit\)](#)", page 281).
- Tighten the selected insert with the coupling nut by hand. The coupling nut must not be fixed in place too tightly.

7.3.6 Replacing the piston wash seal

Replacing the optional piston wash seal

Prerequisite:

- The pump head is dismantled (*see "Dismantling a pump head", chapter 7.3.1, page 365*).

Required accessories:

- Multitool (6.02621.010) *(see figure 202, page 365)*
- Piston wash seal, PTFE, gray (6.02741.010)

1 Preparing the pump head

- Remove the coupling nut on the pump head with the multitool.

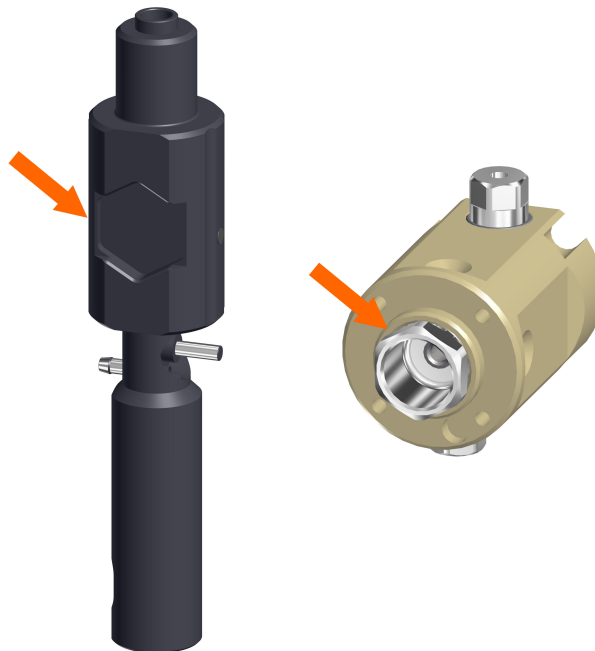


Figure 210 Removing the coupling nut

2 Removing an old piston wash seal

 The piston wash seal is a disposable product and is destroyed when removed. The piston wash seal cannot be removed and reinserted.

- Screw the attachment for removing seals into the opening for multitool attachments.

- If the insert for piston seal wash is not pulled out of the pump head, then screw the attachment for inserting seals into the bore in the insert for piston seal wash by hand and pull out the insert for piston seal wash.

3

- Place the piston wash seal on the attachment for inserting seals so that the spring in the seal is visible.



Figure 211 Preparing a piston wash seal

4

- Insert the piston seal wash until the piston seal audibly clicks into place.



- ## 5 Assembling the pump head

- ### 7.3.7 Mounting the pump head

Prerequisite:

- Required accessories:**

- ## 1 Inserting the pump head

Material damage due to pump piston

- Move the pump piston backward before removing and inserting the pump head. To do this, switch off the OMNIS High-Pressure Pump in the OMNIS Software and switch it back on again.

- 376 ■■■■■■

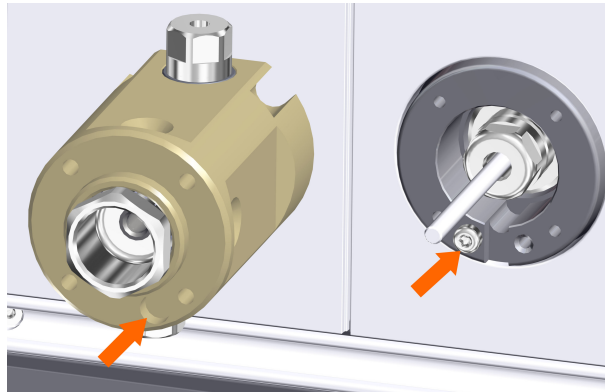


Figure 213 Aligning the pump head

- Push the pump head straight into the piston housing until it stops. The pump head encloses the pump piston.

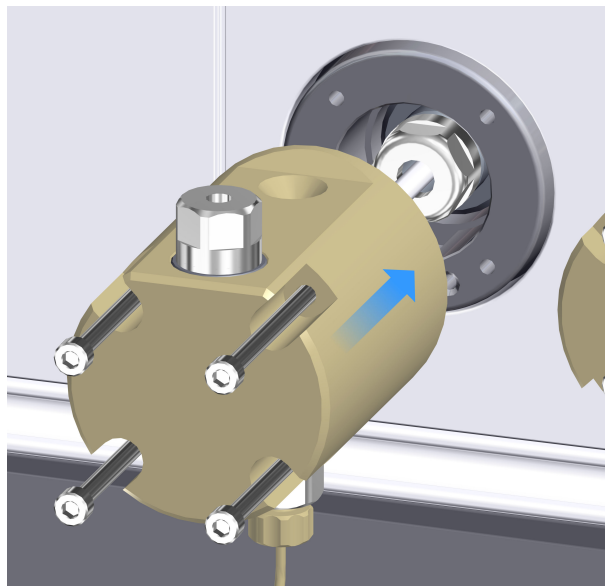


Figure 214 Mounting the pump head

2 Fastening the pump head

NOTICE

Material damage due to fastening screws

Excessive tightening of the fastening screws can cause damage to the pump head.

- Tighten the fastening screws using the long handle of the hex key.
- Use only the short handle of the hex key to loosen the fastening screws.

- The pump head is fastened with 4 fastening screws. Using the long handle of the hex key, gradually screw a fastening screw into each thread on the pump head. Tightening the screws gradually ensures that the pump head is screwed on evenly.

The pump head is mounted. The capillary connections can be established (see *"Connecting functional units", chapter 5.15, page 262*).

7.4 Performing maintenance on the OMNIS Peristaltic Pump Unit

Replacing the pump tubing

Prerequisite:

- The peristaltic pump is switched off.
- The capillary connections to the pump tubings have been loosened.
- The tubing olives on the pump tubing inlet and pump tubing outlet have been removed.

Required accessories:

- Pump tubing (6.01826.0x0) (*see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200*)

1 Removing the old pump tubing

- Open the press-on flap of the peristaltic pump.
- Pull the right end of the pump tubing down until the stopper disengages from the opening for the pump tubing.

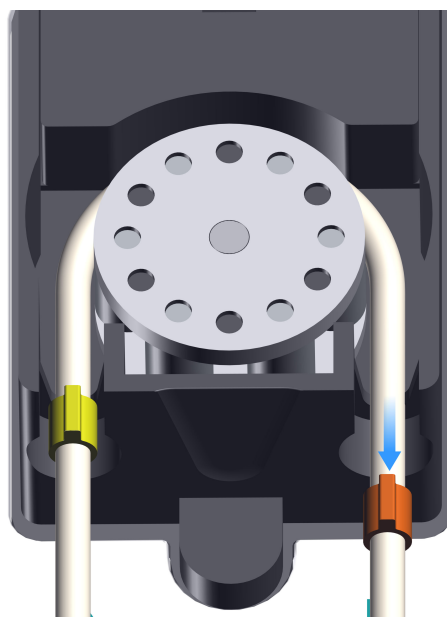


Figure 215 Removing pump tubing

- Remove the pump tubing from the roller head.
- The second stopper is still in the opening for the pump tubing. Pull the pump tubing down and unthread the stopper from the opening for the pump tubing.

The pump tubing can be removed from the peristaltic pump.

2 Mounting the new pump tubing

- Prepare and mount the new pump tubing (*see "Equipping the OMNIS Peristaltic Pump Unit", chapter 5.6, page 200*).

7.5 Service life of the filtration membrane

A common problem in filtration is that solid substances in the sample are deposited on the filtration membrane, causing it to become blocked over time. This effect is reduced with the following design measures.

- The ultrafiltration cell is placed horizontally in the system.
- The sample flows through the sample chamber of the ultrafiltration cell. The filtrate is aspirated on the filtration side. In this way, solid substances adhere less to the membrane.

Monitor the filtration process and replace the filtration membrane if needed.

A declining recovery rate in standard solution analyses is an indicator for an imminent blockage of a filtration membrane. Prepare standard solutions ideally with the sample matrix to be analyzed. Possible contaminations can also be seen in a blank measurement.

If a large number of samples is analyzed, we at Metrohm recommend measuring check standards regularly. In the case of samples with high particle loads, measure check standards after every 5th to 10th sample. Measure the sample check standards. No general prediction regarding the number of filtration processes can be made. Also, the change in the recovery rate may vary when a different number of samples is analyzed. The recovery rate depends on 2 factors: The number of samples that flow past the filtration membrane and the sample matrix. Depending on the sample matrix, the recovery rate can remain constant over a high number of samples and then suddenly drop steeply, while a slow and continuous decrease in the recovery rate can be observed with another sample matrix.

The time at which a filtration membrane needs to be replaced depends on the sample matrix and the specifications of the analysis method applied. Experience has shown that minuscule particles and suspended substances in the sample matrix will lead to blockage of the filtration membrane faster than coarser particles will. Coarser particles are more readily propelled past the membrane in the sample stream.

The table *Service life of the filtration membrane* contains samples that were filtered with the ultrafiltration cell and a filtration membrane of regular cellulose (6.2714.020) with a pore size of 0.2 µm and analyzed on a Metrohm ion chromatograph.

The listed results were obtained with inline ultrafiltration. The results are to be seen as examples, not guidelines. Deviating values for the service life can be found depending on the actual sample matrix.

The concentration of the following 7 anions was determined for each sample type: F^- , Cl^- , NO_2^- , Br^- , NO_3^- , HPO_4^{2-} , SO_4^{2-} .

Table 69 Service life of the filtration membrane

Sample designation	Number of samples per filter
Orange juice with fruit pulp	40
Surface water	500
Drinking water	1,000
Ground water	500
Waste water 1	1,000
Waste water 2	130
Waste water 3	40
Waste water 4	80
NaCl solution (1%)	5,000
Schöniger digestion solution	100
Acidic earth extracts	1,000
Aqueous earth extracts	200

7.6 Performing maintenance on the separation column

Separating efficiency of the separation column

The analytical quality that can be attained depends in a large part on the separating efficiency of the separation column being used. The separating efficiency of the selected separation column must be sufficient for the current analysis problems. If difficulties arise, then start by checking the quality of the separation column in each case by recording a standard chromatogram. The standard chromatogram is available in the [Certificate Finder](#).

The Metrohm column program (available from a regional Metrohm service representative), the [product information on the separation column](#) or personal advice from a regional Metrohm service representative provide information on which guard column is suitable for the separation column used. You can find information on special IC applications in the corresponding "**Application Notes**", which are available on the Internet under www.metrohm.com in the Applications area or free of charge upon request from your regional Metrohm service representative.

Protecting the separation column

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

- Apply microfiltration to both the sample and the eluent (filter 0.45 µm) and additionally aspirate the eluent via the aspiration filter (6.2821.090).
- Always use a guard column.

Storing the separation column

Always store unused separation columns in a sealed state and filled with storage eluent in accordance with the column manufacturer's specifications.

Regenerating the separation column

The separation column can be regenerated according to the column manufacturer's specifications if the separation properties of the column have deteriorated. The [separation column product information](#) supplied with each column provides information on regenerating the separation columns available from Metrohm.

 Regeneration can lead to irreversible damage to the separation column. Metrohm therefore recommends that regeneration be carried out only as a last resort to save a separation column.

7.7 Replacing the waste collector

The waste collector can be replaced if it is defective or heavily contaminated.

Replacing the waste collector

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.
- The capillary connections on the waste collector are loosened.

Required accessories:

- Waste collector, 4x UNF 10/32 (6.02765.000)

1 Dismantling the waste collector

- The MFM sensor bar is magnetic. To remove the MFM sensor bar, pull the MFM sensor bar away from the holder on the Multi Flow Monitor.
- Loosen the drain tubing from the waste collector.
- Push the waste collector straight up.

The waste collector comes loose from the holder.

2 Inserting the waste collector

Hold the waste collector straight and insert it into the holder on the Multi Flow Monitor from above. The pressure screws must point forwards.



Fasten the MFM sensor bar to the holder on the Multi Flow Monitor. The magnets are polarized so that the MFM sensor bar is always correctly fastened to the holder on the Multi Flow Monitor.

383

2

-



Figure 219 Inserting a CO2 Absorber (Cartridge)

- There is a marking on the CO2 Absorber (Cartridge). The CO2 Absorber (Cartridge) will be at the stop as soon as the marking is no longer visible.

4 Connecting the cylinder unit OMNIS

- Disconnect Port IIII from the waste collector.
- Connect the cylinder unit OMNIS according to the application to be performed (see *"Connecting functional units", chapter 5.15, page 262*).

7.10 Cleaning the product



WARNING

Electric shock from electrical potential

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

- Never remove functional units from the instrument.
- Never remove coverings from functional units.
- Only personnel who have Metrohm qualifications may perform service and repair work requiring the removal or opening of functional units.
- There are no parts inside the functional units which can be serviced or replaced by the user.



WARNING

Chemical hazardous substances

Contact with aggressive chemical substances may cause poisoning or chemical burns.

- Wear personal protective equipment (e.g. protective glasses, gloves).
- Use exhaust equipment when working with vaporizing hazardous substances.
- Clean contaminated surfaces.
- Only use detergents that do not cause any unwanted side reactions with the materials to be cleaned.
- Dispose of chemically contaminated materials (e.g. cleaning material) in accordance with regulations.

NOTICE

Instrument damage from aggressive chemical hazardous substances

Damage to the instrument or malfunction through contact with aggressive chemical substances.

- Clean up spilled liquids and solids immediately.
- Use protective grounding when working with highly flammable chemical substances and gases.
- If you suspect that chemical substances have penetrated the instrument, disconnect the instrument from the energy supply. Then notify the regional Metrohm Service representative.

 The ion chromatograph requires appropriate care. Excessive contamination leads to functional disruptions and a shorter service life.

Cleaning the surfaces of the product

Prerequisite:

- The product is disconnected from the energy supply.

- 1 Clean the surfaces with a damp cloth.

 Water or ethanol can be used as a cleaning agent. Do not use abrasive cleaning agents. Do not use solvents.

 The connectors at the rear of the product must only be cleaned with a dry cloth.

7.10.1 Cleaning the base plate

If liquids get into the drip collector, then clean the drip collector.

Cleaning the base plate

Required accessories:

- 2 lint-free cloths
- Ethanol

1 Cleaning the drip collector

- Pull the drip collector completely out of the rail.
- Rinse the drip collector under running water.

- Dry the drip collector using a lint-free cloth.

2 Cleaning the leak sensor

- Wipe up leaked liquid with a lint-free cloth.
- Wipe the leak sensor using a lint-free cloth and ethanol.

3 Inserting the drip collector

- Hook the drip collector into the rail.
- Push the drip collector in the rail towards the rear as far as it will go.

The base plate is ready for operation.

7.10.2 Cleaning the Reagent Organizer



WARNING

Risk of injury due to hazardous substances

If bottles fall over or fall off the reagent organizer during reagent replacement, then leaking hazardous substances can cause poisoning or chemical burns.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Use bottle caps.
- Place the bottles to be filled on the laboratory table.



WARNING

Risk of injury from falling bottles

If bottles fall from the reagent organizer during reagent replacement, they may cause injuries to the feet.

- Use a suitable climbing aid to remove bottles from the reagent organizer.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Secure bottles with bottle holders.
- Use plastic bottles.
- Place the bottles to be filled on the laboratory table.

If liquids have spilled onto the reagent organizer, or if necessary, clean the reagent organizer. If the OMNIS Reagent Organizer Liquid Control is contaminated or if necessary, clean the leak sensor as well.

Cleaning the reagent organizer

Prerequisite:

- All bottles have been removed from the reagent organizer.

Required accessories:

- Lint-free cloth, moistened with ethanol

1 Cleaning the reagent organizer

- If liquid has spilled onto the reagent organizer, then wipe it up with a lint-free cloth.
 - Wipe the surface of the reagent organizer with ethanol and a lint-free cloth.
- Do not apply excessive pressure during cleaning if volume sensors are installed in the OMNIS Reagent Organizer Liquid Control.

The reagent organizer is ready for operation.

2 Cleaning the leak sensor

With the OMNIS Reagent Organizer Liquid Control, the leak sensor must also be cleaned.

- If liquid has spilled onto the leak sensor, then wipe it up with a lint-free cloth.
- Wipe the leak sensor with ethanol and a lint-free cloth. Do not apply too much pressure while doing so.

The desired bottles can be placed on the reagent organizer. (see *"Connecting the reagent organizer", chapter 5.14, page 248*).

7.10.3 Cleaning the OMNIS IC Autosampler Module

Cleaning the drip collector

If there are liquids in the drip collector, then clean the drip collector (see *"Cleaning the base plate", chapter 7.10.1, page 388*).

Cleaning sample racks and OMNIS IC AS Tray

If a bottle or vial overflows, then wipe up spilled liquid with a cloth. Wipe the sample rack and, if necessary, the tray with a lint-free cloth and ethanol.

The dilution station is rinsed after each dilution to prevent carry-overs. No additional cleaning of the dilution station is necessary for aqueous samples. Clean the dilution station if the samples are heavily contaminated. Cleaning can be integrated into the method by defining an additional rinsing solution; see [OMNIS help](#). If automatic rinsing does not remove the contamination, then the dilution station can be cleaned manually. (see ["Cleaning the optional dilution station", page 391](#)).

Cleaning the optional dilution station

Prerequisite:

- The OMNIS IC Autosampler Module is switched off.
- No dilution solution is conveyed.

Required accessories:

- Wrench (6.2739.000) for pressure screws
- Lint-free cloth
- Cleaning agent
- Select the appropriate cleaning agent for the sample.

1 Preparing the dilution station

- If present, remove the dilution vessel lid.
- Remove the stirring bar from the dilution vessel.
- Loosen the capillary connection at the sample outlet with the wrench for pressure screws.
- The dilution vessel is attached with positioning pins on the stirrer. Remove the dilution vessel upwards from the stirrer.



- Cleaning is complete. The dilution station is ready for operation.

Cleaning the OMNIS Dosing Drive Unit

- The cylinder unit OMNIS is removed from the OMNIS Dosing Drive Unit (see "Refitting the cylinder unit OMNIS", chapter 6.11, page 342).

- 1 If the electrical contacts are only lightly contaminated, then clean the electrical contacts with a cloth moistened with water.

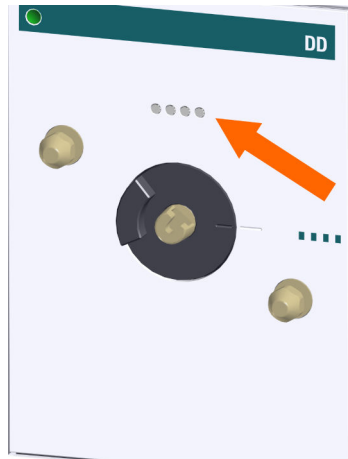


Figure 222 Cleaning the electrical contacts

-
- 2 If the electrical contacts are heavily contaminated, then add dish-washing detergent or ethanol to the moist cloth and clean the electrical contacts.

7.10.5 Cleaning the OMNIS Column Thermostat Unit

If there is a leak in the column thermostat, then clean the column tray.

The leak sensor consists of 2 wires in the base of the column tray. The leak sensor will detect a leak as soon as there is liquid on both wires.



CAUTION

Danger of burning due to hot column tray

Danger of burning due to hot parts. The column thermostat can be heated to 80 °C. The inside of the column tray is very hot during and immediately after operation.

- Do not open the column tray during operation. If the thermostat function has been started, then it remains active even when the column tray is open.
- After operation, do not open the column tray until it has cooled down to ambient temperature.
- Wear protective gloves if it is absolutely necessary to open the hot column tray.

NOTICE

Material damage due to stress

Material damage due to physical stress on open trays.

- Do not exert any pressure on open pull-out compartments and trays.

NOTICE

Leak due to condensation

If the column thermostat is cooled to below 15 °C, then condensation may form when the column tray is opened. The condensation on the open column tray is not drained and can cause leaks.

- Control the temperature of the column thermostat to 25 °C before opening.

Cleaning the column tray

Prerequisite:

- The column thermostat is switched off.
- The column thermostat has cooled down.
- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.

Required accessories:

- 2 lint-free cloths
- Ethanol
- 2 threaded stoppers (6.2744.060)

1 Removing the column tray from the column thermostat

- Loosen the capillary connection on the outside of the column thermostat inlet.
- Pull the column tray out of the column thermostat as far as it will go.
- Press and hold the column tray release on the left-hand side of the column tray. At the same time, pull the column tray straight out of the column thermostat.

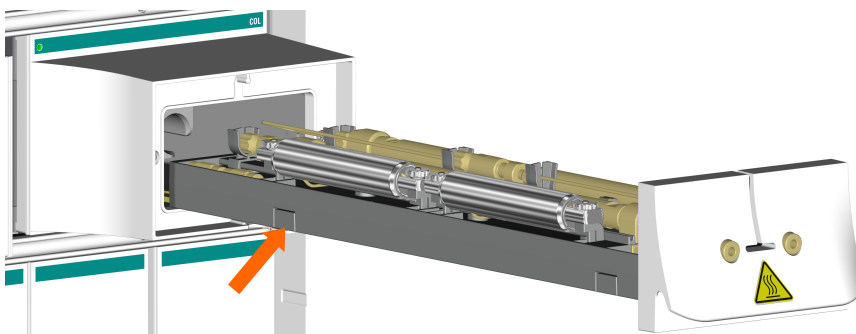


Figure 223 Releasing the column tray

2 Loosening the capillary connections

- Loosen the capillary at the inlet of the guard column.
- Loosen the capillary at the outlet of the separation column.
- Close the column inlet and the column outlet each with a threaded stopper to protect the column from drying out.

3 Removing the columns from the column tray

- Press the separation columns release on the left-hand side of the column tray.

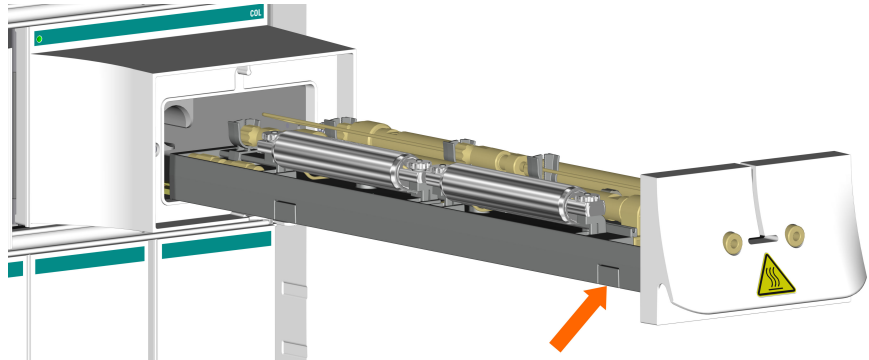


Figure 224 Releasing the columns

- Remove the separation column together with the guard column from the column holder.

4 Cleaning the leak sensor

- Wipe up spilled liquid using a lint-free cloth.
- Wipe the leak sensor using a lint-free cloth and ethanol.

 The contacts for the column contacting on the rear of the column tray must not become wet while cleaning.

 There must be no more liquid on the leak sensor after cleaning. Otherwise, the leak sensor will immediately detect a leak again after start-up.

 To ensure that the column contacts will function correctly, no liquid is permitted to be left behind on the chip contacts on the column holders after cleaning.

5 Inserting the columns and the column tray

- Insert the columns and column tray into the column thermostat (*see "Equipping the OMNIS Column Thermostat Unit", chapter 5.9, page 218*).

The column thermostat is ready for operation as soon as the color of the status display switches to green.

6 Cleaning the base plate

If liquid has dripped onto the base plate from the column thermostat overflow, then clean the base plate (*see "Cleaning the base plate", chapter 7.10.1, page 388*).

The base plate is ready for operation.

7.10.6 Cleaning the OMNIS MSM Unit

Clean the MSM in the following cases:

- Increased backpressure at the MSM's connection tubing.
- Jamming of the MSM. The MSM no longer switches.
- Blockage of MSM. Solutions are no longer pumped through the MSM.

Cleaning the MSM

Prerequisite:

- A bottle cap is fitted and connected to the bottle with ultrapure water (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).
- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.

Required accessories:

- Lint-free cloth, moistened with ethanol
- Bottle PP, 2 L, GL 45 (6.01608.000) filled with ultrapure water
- Wrench (6.2739.000) for pressure screws

1 Preparing the high-pressure pump

- Loosen the capillary connection at the inlet of the high-pressure pump.
- Connect the bottle with ultrapure water to the inlet of the high-pressure pump.
- Loosen the capillary connection at the pressure sensor outlet with the wrench for pressure screws.

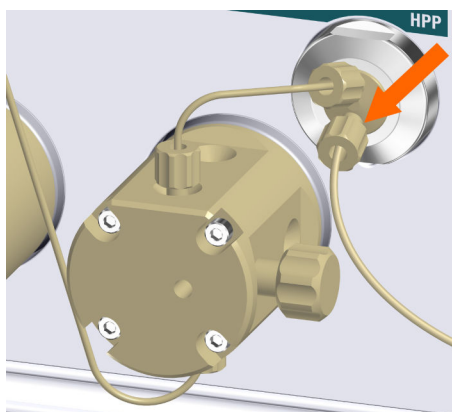


Figure 225 Loosening the capillary at the pressure sensor outlet

2 Removing the connecting piece

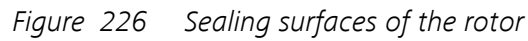
- Disconnect all capillary connections of the MSM from the OMNIS IC System.
- Loosen the coupling nut.
- Remove the connecting piece from the rotor housing.

3 Rinsing the capillaries

- 6 PTFE capillaries are connected to the connecting piece. Connect each PTFE capillary in turn to the pressure sensor outlet and pump ultrapure water through. To do this, start the high-pressure pump with a flow rate of 0.5 mL/min and a maximum pressure of 2 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , *see OMNIS help*.
- Check whether liquid comes out at the connecting piece. If one of the capillaries remains blocked, then insert a new connecting piece (*see "Installing the OMNIS MSM Unit", chapter 5.11.1, page 227*).

4 Cleaning the rotor

- Remove the MSM (*see "Replacing the rotor", page 440*).
- Clean the sealing surfaces on the front of the rotor with ethanol and a lint-free cloth.



- ## 5 Cleaning the connecting piece

- Figure 227 Sealing surfaces of the connecting piece

- ## 6 Connecting the MSM

- 399

7 Equilibrating the system

- Equilibrate the system (*see "Equilibrating the OMNIS IC System", page 332*).
- If the blockage persists, then rinse the rotor (*see "OMNIS MSM Unit – Troubleshooting", chapter 8.4, page 435*).
- If the blockage cannot be cleared, then replace the connecting piece and the rotor (*see "Replacing parts of the MSM", chapter 8.4.3, page 439*).

Cleaning the rotor housing

NOTICE

Dull rotor housing due to incorrect cleaning

The rotor housing may become scratched and dull if it is not cleaned properly. This can make viewing the rotor difficult or impossible.

- Do not use any scouring agents for cleaning the rotor housing.
- Do not use any solvents other than ethanol to clean the rotor housing.

If necessary, the outside of the rotor housing can be wiped with ethanol and a lint-free cloth.

7.10.7 Cleaning the waste collector

The waste collector can be cleaned if it becomes contaminated. The waste collector consists of 3 parts and can be taken apart:



2 —

3 —

Prerequisite:

- ### Required accessories:

- 401



-  Metrohm recommends using only soapy water or ethanol to clean the waste collector so as not to damage the material of the waste collector.

1 Taking apart the waste collector

- Lightly press in the clips on both sides of the waste collector.

The waste collector can be taken apart.

2 Cleaning the waste collector

- Clean the single parts of the waste collector with soapy water or ethanol.
- Dry the single parts of the waste collector with a lint-free cloth.

3 Putting together the waste collector

- Put the single parts of the waste collector back together. To do this, place the safety shield (228-2) on the lower part (228-3).
- Place the upper part (228-1) on the safety shield.

The clips on both sides of the waste collector snap into place.

4 Inserting the waste collector

- Insert the waste collector into the desired functional unit:
 - Multi Flow Monitor (*see "Replacing the waste collector", page 382*)
 - Reagent Organizer (*see "Installing the waste collector", chapter 5.3.4.1, page 119*)

7.10.8 Cleaning the drip collector, Unit

- Do not clean the drip collector while it is attached to the OMNIS IC. Remove the drip collector from the OMNIS IC before cleaning.

-  The drip collector is not dishwasher-safe.

Cleaning the optional drip collector, Unit

Required accessories:



- ## 1 Cleaning the drip collector

- ## 2 Inserting the drip collector

- 403

Problem	Cause	Remedy
		2. If this does not solve the problem, replace the affected column. <i>(see "OMNIS Column Thermostat Unit – Changing columns", chapter 6.13, page 347)</i> <i>(see "OMNIS Column Holder Unit – Changing columns", chapter 6.14, page 350)</i>
	A preheating cartridge in the column thermostat is blocked.	1. Cut the inlet capillary of the preheating cartridge once again. 2. If this does not remedy the malfunction, then replace the preheating cartridge (6.02845.000). <i>(see "OMNIS Column Thermostat Unit – Troubleshooting", chapter 8.3, page 429)</i>
	The conductivity detector is blocked.	Rinse the conductivity detector. If necessary, shorten pinched capillaries by a few millimeters. <i>(see "Rinsing the OMNIS Conductivity Detector Unit", chapter 8.5, page 443)</i>
	One of the MSM's connection capillaries is blocked.	Clean the MSM. <i>(see "Cleaning the OMNIS MSM Unit", chapter 7.10.6, page 397)</i>
	The injector is blocked.	Have the injector cleaned by a regional Metrohm service representative.
	The pulsation absorber is blocked.	Rinse the pulsation absorber. If necessary, shorten pinched capillaries by a few millimeters. <i>(see "Pulsation absorber – Releasing jamming", chapter 8.6, page 451)</i>
The pressure in the system drops significantly.	There is a leak in the OMNIS IC System.	Check all capillary connections and pressure screws and seal them if necessary. <i>(see "Connecting the capillaries", chapter 5.3.2, page 117)</i>

Problem	Cause	Remedy
	The eluent path is blocked.	Check the eluent path and eliminate the blockage.
	Contamination in the eluent.	Check the chemical quality and that of the water.
	The adsorption capacity of the CO ₂ Absorber (Cartridge) of the MCS is reduced.	Replace the CO ₂ Absorber (Cartridge) (6.02837.110). <i>(see "Performing maintenance on the OMNIS MCS Unit", chapter 7.8, page 384)</i>
	The vacuum pump of the MCS is defective.	Contact a regional Metrohm service representative.
The background conductivity is too high.	The incorrect eluent is being used.	Connect a suitable eluent.
	The MSM is either not connected or incorrectly connected.	Connect the MSM correctly. <i>(see "Connecting functional units", chapter 5.15, page 262)</i>
	No or insufficient flow of regeneration solution or rinsing solution in the MSM.	Check the flow of the regeneration solution and the rinsing solution.
	The MCS is either not connected or incorrectly connected.	Connect the MCS correctly. <i>(see "Connecting functional units", chapter 5.15, page 262)</i>
The retention times in the chromatogram have changed unexpectedly.	The eluent is incorrectly concentrated.	Prepare eluent with correct concentration.
	The eluent contains gas bubbles.	1. Check that the connections on the degasser are firmly connected. 2. Purge the high-pressure pump. <i>(see "Purging the OMNIS High-Pressure Pump Unit", chapter 6.8, page 339)</i>

Problem	Cause	Remedy
The phosphate sensitivity is reduced.	The capacity of the MSM rotor channels is reduced.	Regenerate or replace the suppressor rotor.
The peaks are asymmetrical.	The separating efficiency of the guard column is insufficient.	Replace the guard column: - in the column thermostat (<i>see "OMNIS Column Thermostat Unit – Changing columns", chapter 6.13, page 347</i>) - in the column holder (<i>see "OMNIS Column Holder Unit – Changing columns", chapter 6.14, page 350</i>)
	The separating efficiency of the separation column is insufficient.	1. Regenerate the separation column (<i>see "Performing maintenance on the separation column", chapter 7.6, page 381</i>). 2. Replace the separation column: - in the column thermostat (<i>see "OMNIS Column Thermostat Unit – Changing columns", chapter 6.13, page 347</i>) - in the column holder (<i>see "OMNIS Column Holder Unit – Changing columns", chapter 6.14, page 350</i>)
	The capacity of the MSM rotor channels is reduced.	Regenerate or replace the suppressor rotor.
The peak areas are smaller than expected.	The separating efficiency of the guard column is insufficient.	Replace the guard column: - in the column thermostat (<i>see "OMNIS Column Thermostat Unit – Changing columns", chapter 6.13, page 347</i>) - in the column holder (<i>see "OMNIS Column Holder Unit – Changing columns", chapter 6.14, page 350</i>)
	The separating efficiency of the separation column is insufficient.	Replace the separation column: in the column thermostat (<i>see "OMNIS Column Thermostat Unit – Changing columns", chapter 6.13, page 347</i>)

Problem	Cause	Remedy
	There is dead volume in the separation column head.	1. Check the column leaflet to see whether the separation column may be rinsed in the reverse flow direction. If the procedure is permitted, then install the separation column in the reverse flow direction and rinse into a beaker. 2. If this does not remedy the malfunction or if the separation column cannot be rinsed in the reverse flow direction, then replace the separation column. <i>(see "OMNIS Column Thermostat Unit – Changing columns", chapter 6.13, page 347)</i> <i>(see "OMNIS Column Holder Unit – Changing columns", chapter 6.14, page 350)</i>
The measured values are imprecise and show a large dispersion.	The sample loop is not installed correctly.	Check the installation of the sample loop. <i>(see "Equipping the OMNIS Actuator Unit", chapter 5.7, page 203)</i>
	The sample contains gas bubbles.	Degas the sample using the degasser.
	The rinsing volume of the sample is too small.	Extend the rinsing time, see OMNIS help .
	The injector is defective.	Contact a regional Metrohm service representative.
	The vacuum of the MCS is too low.	1. Check if the MCS is connected correctly. <i>(see "Connecting functional units", chapter 5.15, page 262)</i> 2. If this does not remedy the malfunction, then contact a regional Metrohm Service representative.
The measured values of the standard solutions are poorly reproducible.	The filtration membrane of the ultrafiltration cell is blocked.	Replace the filtration membrane (6.2714.0x0) of the ultrafiltration cell. <i>(see "Replacing the filtration membrane", chapter 5.8.2, page 216)</i>

Problem	Cause	Remedy
		2. If this does not remedy the malfunction, then contact a regional Metrohm Service representative.
The leak sensor is triggered by escaping liquid.	There is a leak in the Autosampler.	Check all the capillary connections in the autosampler and seal them if necessary.
	The drainage tubing system is blocked.	Remove the drainage tubing system and rinse forwards and backwards.
The OMNIS IC AS Tray is not recognized.	The OMNIS IC AS Tray is not fully inserted.	1. Push the OMNIS IC AS Tray completely backwards. 2. If this does not remedy the malfunction, then contact a regional Metrohm Service representative.

OMNIS IC Autosampler Module COOL

Problem	Cause	Remedy
The target temperature and tolerance could not be reached within one hour.	The OMNIS Autosampler COOL Tray and the sample racks are not pre-cooled.	For optimum cooling output, Metrohm recommends pre-cooling the OMNIS IC Autosampler COOL Tray and the sample racks.
	Defective cooling unit.	Contact a regional Metrohm service representative.
Target temperature outside of tolerance.	No standard use or the instrument is defective.	The warning signal is removed as soon as the tolerance has been reached and remains constant for 5 min. Contact a regional Metrohm service representative if the malfunction continues.
Target temperature is invalid.	Too great a change in the ambient temperature.	Warning signal is canceled when the target temperature and tolerance are adjusted so that they are within the limits.
Cooling output is no longer provided when the door is open.	Door is open for more than 3 min. The speed of the compressor is reduced by 35%.	Close the door again and keep it open for no longer than 3 min.

OMNIS Column Thermostat Unit / OMNIS Column Holder Unit

414 ■■■■■■

Problem	Cause	Remedy
	The memory chip is contaminated.	Clean the contact surface of the memory chip with ethanol.
	The memory chip is defective.	1. Save the column configuration in the OMNIS Software. 2. Contact a regional Metrohm service representative.

OMNIS Dosing Drive Unit

Problem	Cause	Remedy
The cylinder unit OMNIS is not recognized.	The electrical contacts of the OMNIS Dosing Drive Unit are contaminated.	Clean the electrical contacts of the OMNIS Dosing Drive Unit. <i>(see "Cleaning the OMNIS Dosing Drive Unit", chapter 7.10.4, page 393)</i>
	The electrical contacts of the cylinder unit OMNIS are contaminated.	Clean the electrical contacts of the cylinder unit OMNIS <i>(see manual for the cylinder unit OMNIS UNF)</i>.

OMNIS High-Pressure Pump Unit

Problem	Cause	Remedy
The high-pressure pump does not work.	A check valve is contaminated.	Clean the affected check valve. <i>(see "Cleaning the check valves", chapter 7.3.3, page 369)</i>
The high-pressure pump is leaking.	The pump head or pump head auxiliary has a leak.	▪ Dismantle the pump head and clean it using a lint-free cloth with ethanol. <i>(see "Dismantling a pump head", chapter 7.3.1, page 365)</i> ▪ Replace the piston seal (6.02741.000). <i>(see "Replacing the piston seal", chapter 7.3.5, page 371)</i> ▪ Replace the piston wash seal (6.02741.010). <i>(see "Replacing the piston wash seal", chapter 7.3.6, page 374)</i>

Problem	Cause	Remedy
	The pump tubing is defective, so that the peristaltic pump does not deliver enough solution.	Replace the pump tubing (6.01826.0x0). (see "Performing maintenance on the OMNIS Peristaltic Pump Unit", chapter 7.4, page 378)
The MSM does not switch.	The MSM is jammed.	1. Initialize the MSM with . 2. Clean the MSM. (see "Cleaning the OMNIS MSM Unit", chapter 7.10.6, page 397) 3. If this does not remedy the malfunction, then contact a regional Metrohm Service representative.
The rotor housing is contaminated.	The rotor housing is contaminated by leaked liquid.	Clean the rotor housing. (see "Cleaning the OMNIS MSM Unit", chapter 7.10.6, page 397)

OMNIS Peristaltic Pump Unit

Problem	Cause	Remedy
The peristaltic pump is pumping too little.	The pump tubing is defective.	Replace the pump tubing (6.01826.0x0). (see "Performing maintenance on the OMNIS Peristaltic Pump Unit", chapter 7.4, page 378)

OMNIS Reagent Organizer Liquid Control

Problem	Cause	Remedy
The volume sensor is not measuring.	The bottle does not have sufficient contact with the volume sensor.	Check whether the bottle is standing flat on the volume sensor. A bottle retainer must be used for volume sensor measurement. (see "Setting up a bottle with volume sensor", page 256)
	The aspiration tubing is jamming the volume sensor.	Rotate the PEEK part of the bottle cap until the aspiration tubing is no longer above the volume sensor.

Problem	Cause	Remedy
		- Place the stirring bar directly on the magnetic stirrer. Start the magnetic stirrer manually. - If the stirring bar moves, then put it back into the bottle. Place the bottle on the magnetic stirrer so that the stirring bar is captured by the magnet. - If the stirring bar does not move, then the magnetic stirrer is defective. Contact a regional Metrohm service representative.
The interior lighting of the OMNIS IC System does not activate when the door is opened.	The door sensor on the reagent organizer is jammed.	- Fix the jamming of the door sensor. - If the jamming cannot be fixed or there is no jamming, then contact your regional Metrohm service representative.
There are air bubbles in the reagent tube.	The aspiration filter was not rinsed correctly.	Rinse the aspiration filter. <i>(see "Setting up the eluent", chapter 5.14.1, page 248)</i>

Cylinder unit OMNIS

Problem	Cause	Remedy
The cylinder top piece can be removed from the cylinder unit OMNIS UNF only with difficulty.	The cylinder unit is not in the Init. position. The cylinder unit OMNIS is jammed because the valve disk and the distributor disk stick together.	Initialize the cylinder unit OMNIS with . Release the jamming of the cylinder unit OMNIS <i>(see manual for the cylinder unit OMNIS UNF)</i>.
Air bubbles are in the cylinder or in the dosing tubing.	Air is entering through a leaky connection.	- Check the ends of the tubing, in particular the tubing end of the aspiration tubing. - Tighten the tubing connections at the fill port with the wrench (6.2739.000) for pressure screws. - Check the tubing connection of the bottle cap.

Problem	Cause	Remedy
	The reagent degasses excessively; the released air forms bubbles.	- Initialize the cylinder unit OMNIS with , to rinse the cylinder unit OMNIS and all tubing. - Reduce the filling rate. - Degas the reagent using a degasser.
	The piston is worn out.	Replace cylinder unit OMNIS (6.0150x.xx0). <i>(see "Refitting the cylinder unit OMNIS", chapter 6.11, page 342)</i>
	The Init. function has not been executed or false parameters have been set.	- Execute the Init. function. - Check the length and diameter of the tubing and correct the settings in the OMNIS Software if necessary. - Check the fill port and correct the settings in the OMNIS Software if necessary.

Further measures for troubleshooting are described in the *manual for the cylinder unit OMNIS UNF*.

8.2 Autosampler – Troubleshooting

The following troubleshooting steps can be carried out on the autosampler:

- Replace the sample needle (*see "Replacing the sample needle", chapter 8.2.1, page 420*)
- Replacing the rinse station (*see "Replacing the rinse station", chapter 8.2.2, page 424*)
- Replacing the dilution vessel (*see "Replacing the dilution vessel", chapter 8.2.3, page 427*)

8.2.1 Replacing the sample needle

If the sample needle is bent or defective, replace it.

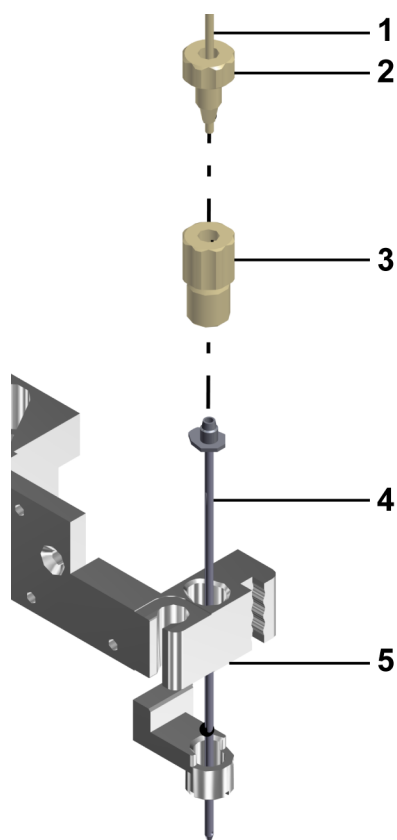


Figure 229 Sample needle – Overview

1 Sample needle capillary, PEEK, ID 0.5 mm

2 PEEK pressure screw, 14 mm
6.2744.350

Only use a pressure screw PEEK 14 mm to attach the sample needle capillary to the needle fixation connector.

3 Needle fixation connector
6.02744.000
connects the sample needle to the sample needle capillary

4 Sample needle, MF
6.02624.100

5 Needle holder

Replacing the sample needle



WARNING

Risk of injury due to sample needle

Risk of injury from touching the moving sample needle.

- Never reach into the sample compartment while the sample changer is in operation.



CAUTION

Risk of injury due to sample needle

Replacing the sample needle may result in puncture wounds to the hands.

- Do not touch the tip of the sample needle.



CAUTION

Risk of injury due to chemicals

Chemicals on the sample needle may cause chemical burns to the hands.

- Wear gloves.

Prerequisite:

- The status display, **OMNIS IC AS Tray** lights up in green.

Required accessories:

- Sample needle (6.02624.100)

1 Preparing the autosampler



 Before removing the OMNIS IC AS Tray, always check the status display, **OMNIS IC AS Tray**.

If the status display lights up in green or does not light up, then the OMNIS IC AS Tray may be removed. If the status display, **OMNIS IC AS Tray**, flashes green, then the OMNIS IC AS Tray must not be removed.

- Pull the OMNIS IC AS Tray out of the autosampler and remove it.

2 Preparing the sample needle

- Move the sample needle to the exchange position. To do this, select **My Autosampler / Needle Drive ► Manual control ► Target position ► Exchange position** and start the process by clicking on , *see OMNIS help*.

3 Dismantling a defective sample needle

- Loosen the pressure screw PEEK 14 mm.
- Remove the needle fixation connector from the sample needle.
- Remove the sample needle upwards from the needle holder.

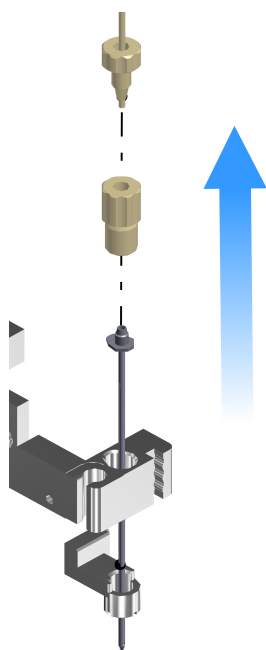


Figure 230 Removing the sample needle

4 Mounting a new sample needle

i **Only** use a PEEK 14 mm pressure screw (6.2744.350) to attach the sample needle capillary to the needle fixation connector.

A ferrule is attached to the sample needle. The ferrule is asymmetrical in shape. The opening for the sample needle in the needle holder has the same shape as the ferrule.

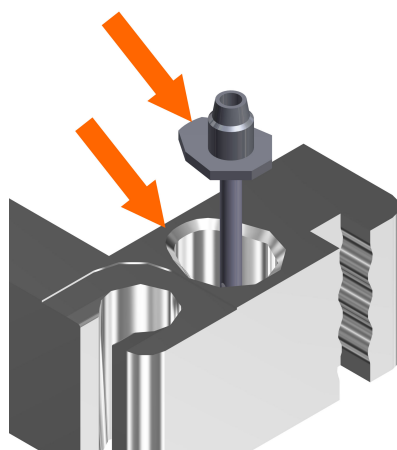


Figure 231 Aligning the sample needle

- Remove the protective rubber cap from the new sample needle.

- Insert the new sample needle into the needle holder. Align the sample needle so that the ferrule fits into the opening for the sample needle on the needle holder.
- Place the needle fixation connector on the sample needle.
- Connect the sample needle to the sample needle capillary with the 14 mm PEEK pressure screw. Tighten the pressure screw PEEK 14 mm.

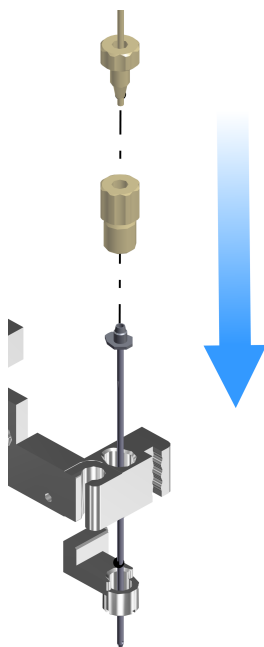


Figure 232 Mounting the sample needle

- Initialize the needle drive under **My Autosampler / Needle Drive** ► **Manual control** by clicking on .
- Insert the OMNIS IC AS Tray into the autosampler.

The autosampler is ready for operation.

8.2.2 Replacing the rinse station

If the rinse station is contaminated, then replace it.

Replacing the rinse station

Prerequisite:

- The autosampler is out of operation.
- No rinsing solution is conveyed.

Required accessories:

- Wrench (6.2739.000) for pressure screws

- Rinse station (6.02841.120)

1 Dismantling a contaminated rinse station

- Select a bottle position on the tray, as the sample needle is located in the rinse station by default.
- If the optional rinsing connector is used, then loosen the capillary connection with the wrench for pressure screws.
- Remove the drain tubing from the drain outlet.
- Unscrew the knurled screw by hand.
- The rinse station is attached with positioning pins. Pull the rinse station upwards away from the positioning pins.

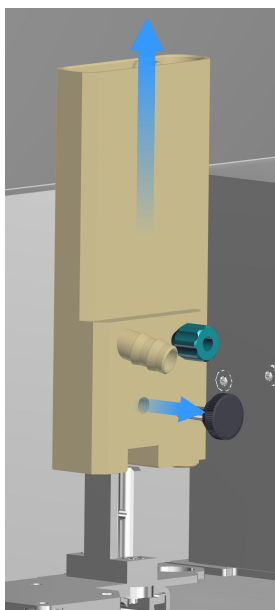


Figure 233 Dismantling a rinse station

2 Mounting a new rinse station

- Position the new rinse station in the autosampler so that the positioning pins are in the openings of the rinse station intended for this purpose.
- Tighten the knurled screw by hand.

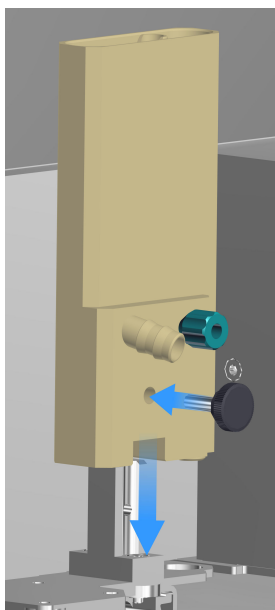


Figure 234 Mounting the rinse station

- *OMNIS IC Autosampler Module*
A T connector with the drain tubing is located in the drainage tubing system, at the height of the rinse station.
Connect the drain tubing to the drain outlet.

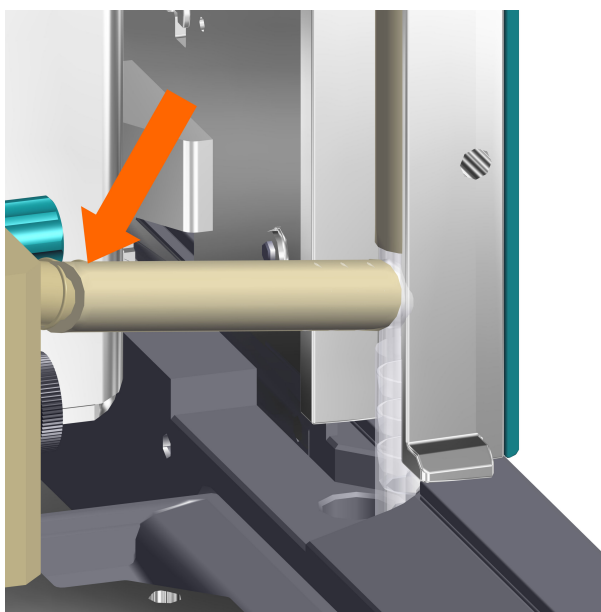


Figure 235 Connecting the drain tubing

- *OMNIS IC Autosampler Module COOL*
A T connector with the drain tubing is located in the drainage tubing system below the sample compartment. The drain tubing runs through the insulation to the rinse station.
Connect the drain tubing to the drain outlet.

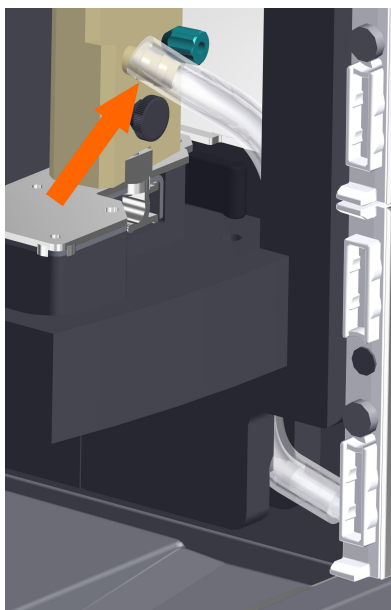


Figure 236 Connecting the drain tubing

- Check the position of the rinse station. To do this, select **My Autosampler / Needle Drive ► Manual control ► Target position ► Rinse position** and start the process by clicking on , *see OMNIS help*.
- Connecting the rinse station (*see "Connecting the rinse station", chapter 5.13, page 247*).

The rinse station is installed. The autosampler is ready for operation.

8.2.3 Replacing the dilution vessel

If the dilution vessel of the dilution station is contaminated and can no longer be cleaned (*see "Cleaning the OMNIS IC Autosampler Module", chapter 7.10.3, page 390*), then replace the dilution vessel.

Replacing the optional dilution vessel

Prerequisite:

- The OMNIS IC Autosampler Module is out of operation.
- No dilution solution is conveyed.

Required accessories:

- Wrench (6.2739.000) for pressure screws
- Dilution vessel (6.02762.100)

1 Dismantling a contaminated dilution vessel

- If present, remove the dilution vessel lid.
- Remove the stirring bar from the dilution vessel.

- Loosen the capillary connection at the sample outlet with the wrench for pressure screws.
- The dilution vessel is attached with positioning pins on the stirrer. Remove the dilution vessel upwards from the stirrer.

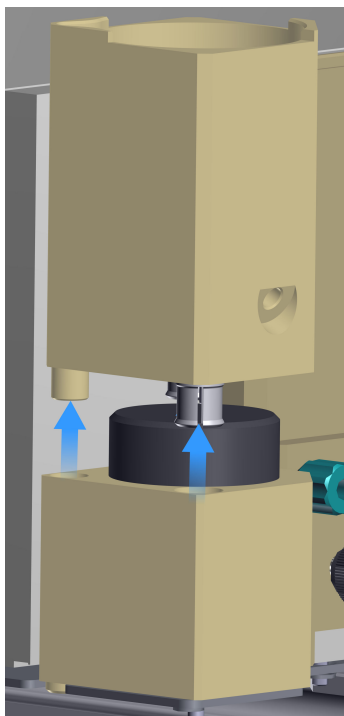


Figure 237 Dismantling a dilution vessel

2 Mounting a new dilution vessel

- Position the new dilution vessel on the stirrer so that the positioning pins are in the openings on the stirrer provided for this purpose.

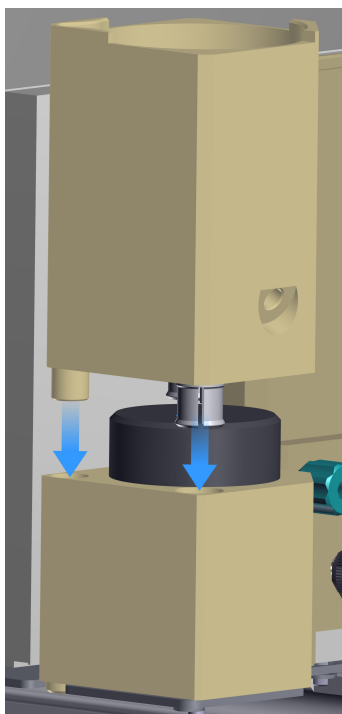


Figure 238 Mounting the dilution vessel

- Place the stirring bar in the dilution vessel.
- If present, place the dilution vessel lid on the dilution vessel.
- Connect the dilution station as desired.

The dilution station is mounted. The autosampler is ready for operation after initialization or the position check, respectively.

8.3 OMNIS Column Thermostat Unit – Troubleshooting

There are the following causes of blockages in the preheating cartridge:

- There are particles in the capillary.
- A pressure screw squeezes a capillary.



CAUTION

Danger of burning due to hot column tray

Danger of burning due to hot parts. The column thermostat can be heated to 80 °C. The inside of the column tray is very hot during and immediately after operation.

- Do not open the column tray during operation. If the thermostat function has been started, then it remains active even when the column tray is open.
- After operation, do not open the column tray until it has cooled down to ambient temperature.
- Wear protective gloves if it is absolutely necessary to open the hot column tray.

NOTICE

Material damage due to stress

Material damage due to physical stress on open trays.

- Do not exert any pressure on open pull-out compartments and trays.

NOTICE

Leak due to condensation

If the column thermostat is cooled to below 15 °C, then condensation may form when the column tray is opened. The condensation on the open column tray is not drained and can cause leaks.

- Control the temperature of the column thermostat to 25 °C before opening.

Fixing the jamming in the preheating cartridge

Prerequisite:

- The column thermostat is out of operation.
- The column thermostat has cooled down.
- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.

Required accessories:

- Capillary cutter (6.2621.080)
- If the preheating cartridge needs to be replaced:
 - Preheating cartridge (6.02845.000)
- Wrench (6.2739.000) for pressure screws

- Threaded stopper (6.2744.060)

1 Pulling out the column tray

- Pull the column tray out of the column thermostat as far as it will go.

2 Loosening the capillary connections

- Detach the inlet capillary of the preheating cartridge from the inside of the column thermostat inlet.

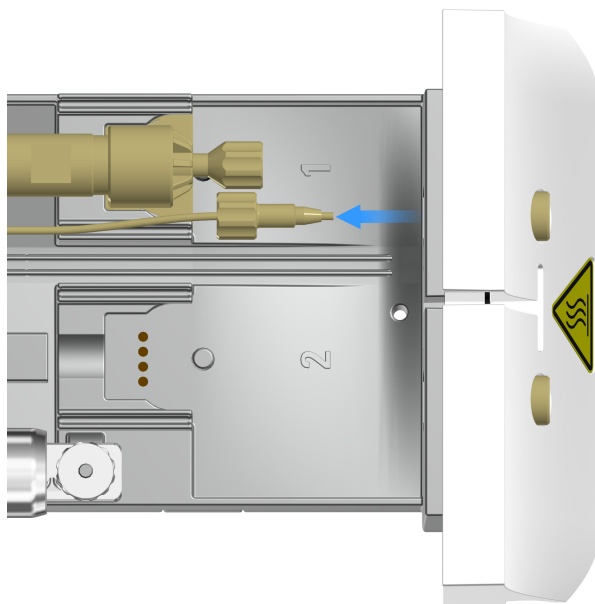


Figure 239 Disconnecting the inlet capillary

3 Cutting off the capillary end

- Use the capillary cutter to cut off 5 to 10 mm of the inlet capillary that has just been disconnected.
If a crushed capillary was the cause of the blockage, then the malfunction has been rectified.
If the malfunction is not rectified, then continue with *Step 4 – Rinse the preheating cartridge*.

4 Rinsing the preheating cartridge

- Loosen the capillary connection at the pressure sensor outlet with the wrench for pressure screws.

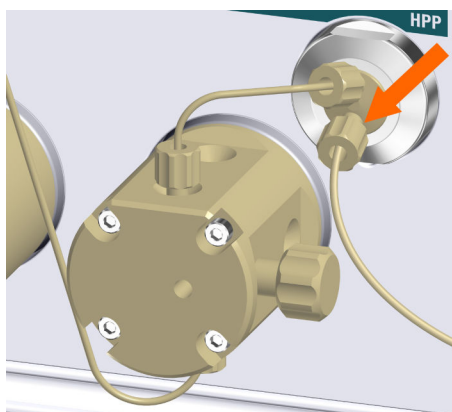


Figure 240 Loosening the capillary connection at the pressure sensor outlet

- Detach the outlet capillary of the preheating cartridge from the column inlet.
 - Close the column inlet with a threaded stopper to protect the column from drying out.
 - Connect the outlet capillary of the preheating cartridge to the pressure sensor. Tighten the connection with the wrench for pressure screws.
- Place a beaker under the inlet capillary of the preheating cartridge.
- Rinse the OMNIS IC System with a flow rate of 1 mL/min and a maximum pressure of 2 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , *see OMNIS help*.
- Rinsing in the opposite flow direction can rinse particles out of the preheating cartridge.

If the blockage has been cleared, then the malfunction has been rectified.

- Connect the outlet capillary of the preheating cartridge to the inlet of the guard column.
Connect the inlet capillary of the preheating cartridge to the inside of the column thermostat inlet.

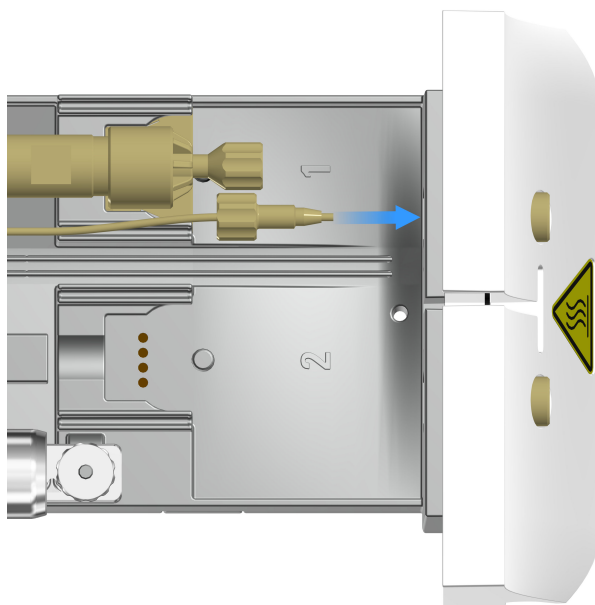


Figure 241 Connecting the inlet capillary

- Restore the capillary connection at the pressure sensor outlet and tighten with the wrench for pressure screws.
The OMNIS IC System is ready for operation.
- If the blockage has not been cleared, then stop the high-pressure pump by clicking on .
Continue with *Step 5 – Replace the preheating cartridge*.

5 Replacing the preheating cartridge

- Loosen the inlet capillary and the outlet capillary of the preheating cartridge.
- The preheating cartridge is fastened with 2 knurled nuts. Loosen both knurled nuts.
- Remove the preheating cartridge from the positioning pins.
- Place a new preheating cartridge on the positioning pins.
- Loosely screw both knurled nuts onto the positioning pins.

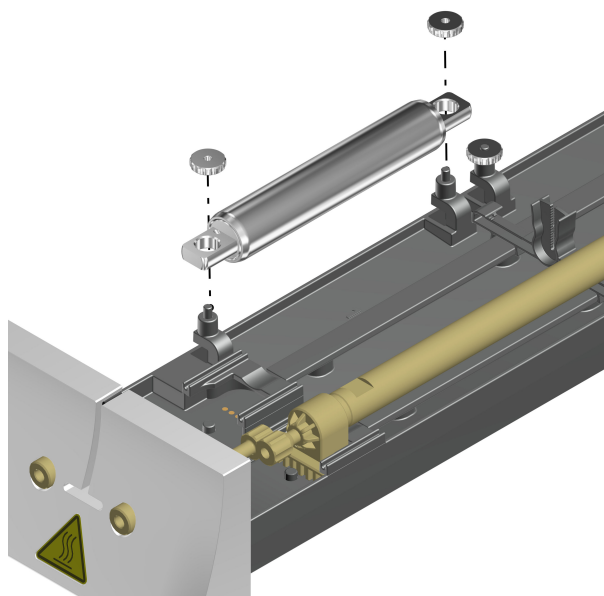


Figure 242 Mounting the preheating cartridge

- Connect the inlet capillary of the preheating cartridge to the inside of the corresponding column thermostat inlet.
- Connect the outlet capillary of the preheating cartridge to the inlet of the guard column.

 Capillaries that are too long can make it difficult to close the column tray. If the capillaries of the preheating cartridge are too long, then use a capillary cutter (6.2621.080) to shorten the capillaries to the desired length.

- If the column tray has been removed from the column thermostat, then insert the column tray into the column thermostat (*see "Equipping the column thermostat", page 219*).
- If the capillaries on the outside of the column thermostat inlet have been disconnected, then restore the capillary connection (*see "Connecting functional units", chapter 5.15, page 262*).

The preheating cartridge has been replaced. The column thermostat is ready for operation.

8.4 OMNIS MSM Unit – Troubleshooting

The following troubleshooting steps can be carried out on the OMNIS MSM Unit:

- Regenerate the anion suppressor rotor (*see "Regenerating the anion suppressor rotor", chapter 8.4.2, page 436*)
- Regenerate the cation suppressor rotor (*see "Regenerating the cation suppressor rotor", chapter 8.4.1, page 435*)
- Replace the rotor (*see "Replacing parts of the MSM", chapter 8.4.3, page 439*)
- Replace the connecting piece (*see "Replacing parts of the MSM", chapter 8.4.3, page 439*)
- Clean the MSM (*see "Cleaning the OMNIS MSM Unit", chapter 7.10.6, page 397*)

8.4.1 Regenerating the cation suppressor rotor

If certain contaminations contaminate the suppressor units over a prolonged period of time, then the standard regeneration solution will no longer remove the contaminations completely. As a result, the capacity of the suppressor units decreases continuously. This leads to either an increase in the baseline or asymmetrical peaks.

Regenerating the cation suppressor rotor

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.
- A bottle cap is fitted and connected to the bottles with regeneration solution and ultrapure water (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).

Required accessories:

- Wrench (6.2739.000) for pressure screws

1 Regenerating the suppressor units

-  If the contamination of the suppressor does not lead to increased backpressure, then the suppressor can be regenerated using the peristaltic pump.



 Observe the instructions for regeneration in the *leaflet for the rotor used*.

- Rinse a suppressor unit with eluent until the conductivity increases significantly. This can take up to 240 minutes under standard conditions.
The suppressor unit is completely depleted.
- In the OMNIS Software, switch to the next suppressor unit. To accomplish this, open **MSM ► Manual control** in the overview of the instrument, and switch to the next suppressor unit with **Next channel**; *see OMNIS help*.
- Rinse the system again until the conductivity increases significantly.
- Switch to the next suppressor unit with **Next channel**.
- Rinse the system again until the conductivity increases significantly.

All 3 suppressor units are completely depleted.

2 Supplying regeneration solution

- Start the peristaltic pump. To do this, in the overview of the instrument, open **Peristaltic Pump** ► **Manual control**, start the peristaltic pump by clicking on .

The peristaltic pump delivers regeneration solution once again.

3 Equilibrating the system

- Equilibrate the system (see "Equilibrating the OMNIS IC System", chapter 6.7, page 338).

8.4.2 Regenerating the anion suppressor rotor

If organic contaminations or certain heavy metals, e.g., iron, contaminate the suppressor units for prolonged periods, then the standard regeneration solution will no longer remove the contaminations completely. As a result, the capacity of the suppressor units decreases continuously. In mild cases, this leads to reduced phosphate sensitivity. In severe cases, this leads to a strong increase in the baseline. In this case, the anion suppressor rotor must be regenerated.

Table 70 Overview – Regeneration solutions

Cause	Regeneration solution
Contamination with heavy metals or elevated backpressure	1 mol/L H ₂ SO ₄ + 0.1 mol/L oxalic acid

Cause	Regeneration solution
Contamination with organic cationic complexation agents	0.1 mol/L H ₂ SO ₄ / 0.1 mol/L oxalic acid / acetone 5%
Heavy contamination with organic substances	0.2 mol/L H ₂ SO ₄ / acetone ≥ 20%
Contamination by certain environmental samples	1 mol/L H ₃ PO ₄

i If phosphoric acid was once used as the standard regeneration solution in a system, then regenerate the rotor with phosphoric acid. The phosphoric acid for regeneration has in these cases a higher concentration than the phosphoric acid used as a standard regeneration solution. Regeneration with sulfuric acid can lead to malfunctions in the baseline.

Regenerating the anion suppressor rotor

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.
- A bottle cap is fitted and connected to the bottles with regeneration solution and ultrapure water (*see "Connecting the bottle cap", chapter 5.14.2, page 249*).

Required accessories:

- Wrench (6.2739.000) for pressure screws

1 Disconnecting the MSM from the OMNIS IC

i Metrohm recommends using the high-pressure pump for regeneration.

If the contamination of the suppressor does not lead to increased backpressure, then the suppressor can be regenerated using the peristaltic pump.

i Observe the instructions for regeneration in the *leaflet for the rotor used*.

- Disconnect the capillaries of the MSM labeled *regeneration solution* and *rinsing solution* from the OMNIS IC.
- Loosen the capillary connection at the pressure sensor outlet.

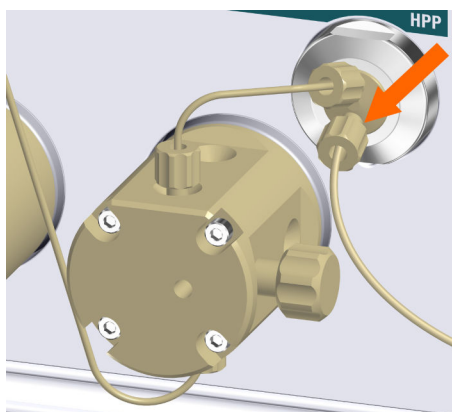


Figure 243 Loosening the capillary connection at the pressure sensor outlet

2 Regenerating the MSM

- Observe the instructions for regeneration in the leaflet for the rotor used.
- Connect the capillary labeled *regeneration solution* to the pressure sensor outlet.
- Loosen the capillary connection at the inlet of the high-pressure pump.
- Connect the bottle with regeneration solution to the inlet of the high-pressure pump.
- Start the high-pressure pump with a flow rate of 0.5 mL/min and a maximum pressure of 2 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, start the high-pressure pump by clicking on , see *OMNIS help*.
- If the pressure decreases during regeneration, then slowly increase the pump flow to a maximum of 2 mL/min. To do this, redefine the **Flow rate**.
- Switch to the next suppressor unit every 15 minutes until all 3 suppressor units have been regenerated. To do this, in the overview of the instrument, open **MSM ► Manual control**, switch to the next suppressor unit with **Next channel**.
- Stop the high-pressure pump. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, stop the high-pressure pump by clicking on .
- Loosen the capillary labeled *regenerant* from the pressure sensor outlet.

3 Rinsing the MSM

After regeneration, rinse the 3 suppressor units with degassed ultrapure water for 15 minutes each.

- Connect the capillary labeled *rinsing solution* to the pressure sensor outlet.
- Connect the bottle with ultrapure water to the degasser inlet.
- Start the high-pressure pump with a flow rate of 0.5 mL/min and a maximum pressure of 2 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, start the high-pressure pump by clicking on , see [OMNIS help](#).
- If the pressure decreases during rinsing, then slowly increase the pump flow to a maximum of 2 mL/min.
- Switch to the next suppressor unit every 15 minutes until all 3 suppressor units have been rinsed. To do this, in the overview of the instrument, open **MSM ► Manual control**, switch to the next suppressor unit with **Next channel**.
- Stop the high-pressure pump.
- Loosen the capillary labeled *rinsing solution* from the pressure sensor outlet.

4 Connecting the MSM to the OMNIS IC

- Connect the capillary labeled *regenerant* and *rinsing solution* to the OMNIS IC (see ["Connecting functional units", chapter 5.15, page 262](#)).
- Restore the capillary connection at the pressure sensor outlet.

The OMNIS MSM Unit is now ready for operation.

8.4.3 Replacing parts of the MSM

If necessary, the rotor and connecting piece, OMNIS MSM/SPM can be replaced on the MSM.

Parts of the MSM must be replaced under the following circumstances:

- Irremediable loss of suppressor capacity. The loss of suppressor capacity can be recognized by the following signs:
 - Sharp increase in the baseline
 - Reduced phosphate sensitivity
 - Asymmetrical peaks
- Irremediable blockage of the MSM. Solutions are no longer pumped through the MSM. Before replacing parts, try to clear the blockage by cleaning the MSM (see ["Cleaning the OMNIS MSM Unit", chapter 7.10.6, page 397](#)).

Replacing the rotor

Prerequisite:

- The high-pressure pump is switched off.
- The peristaltic pump is switched off.
- The capillary connections of the MSM to the OMNIS IC are disconnected.

Required accessories:

- Lint-free cloth, moistened with ethanol

1 Removing the connecting piece

- Unscrew the coupling nut from the rotor housing.
- Remove the connecting piece from the rotor housing.
- If the rotor gets stuck in the housing, then continue with *Step 2 – Remove rotor*.
- If the rotor can be removed together with the connecting piece, then detach the connecting piece from the rotor with a rotating movement.

The rotor is dismounted. Continue with *Step 3 – Check rotor for damage*.

2 Removing the rotor

- Insert a narrow object, e.g. a capillary, into the inspection window on the rotor housing.
- Move forward with the capillary in the inspection window. The capillary pushes the adapter sleeve or the rotor out of the rotor housing.

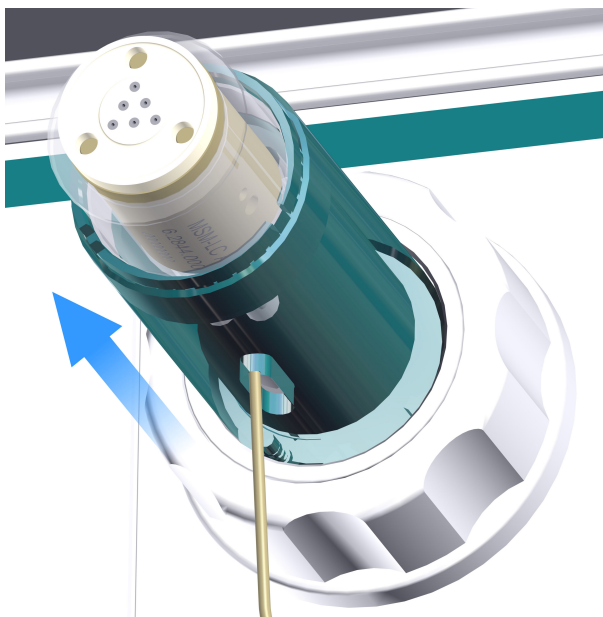


Figure 244 Removing the rotor

The rotor is dismantled.

3 Checking the rotor for damage

- Check whether the rotor is damaged. Damage includes scratches on the surface, for example.

4 Replacing a defective rotor

- Install the new rotor ([see "Installing the OMNIS MSM Unit", chapter 5.11.1, page 227](#)).

5 Putting the MSM into operation

- Reconnect all capillaries of the MSM to the system. ([see "Connecting functional units", chapter 5.15, page 262](#)).
- Start the high-pressure pump with a flow rate of 1 mL/min and a maximum pressure of 2 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , [see OMNIS help](#).
- Wait 5 minutes.
- In the OMNIS Software, switch to the next suppressor unit. To do this, in the overview of the instrument, open **MSM ► Manual control**, switch to the next suppressor unit with **Next channel**.
- Wait 5 minutes.
- Switch to the next suppressor unit with **Next channel**.
- Wait 5 minutes.

All 3 suppressor units of the MSM have been rinsed. The OMNIS MSM Unit is ready for operation.

6 Replacing the connecting piece

- If the MSM is still not functioning correctly after start-up, then replace the connecting piece as well (*see "Replacing the connecting piece, OMNIS MSM/SPM", page 442*).
- If the connecting piece has already been replaced and the MSM still does not function correctly after start-up, then notify the regional Metrohm service representative. Never open the housing of the OMNIS MSM Unit.

Replacing the connecting piece, OMNIS MSM/SPM

Prerequisite:

- The high-pressure pump is switched off.
- The peristaltic pump is switched off.
- The capillary connections of the MSM to the OMNIS IC are disconnected.

Required accessories:

- Connecting piece, OMNIS MSM/SPM (6.02842.020)
- Lint-free cloth, moistened with ethanol

1 Removing the connecting piece

- Unscrew the coupling nut from the rotor housing.
- Remove the connecting piece from the rotor housing.

2 Checking the connecting piece for damage

- Check whether the connecting piece is damaged. Damage includes scratches on the surface, defective capillaries or incorrectly fastened capillaries.

3 Replacing a defective connecting piece

- Install the new connecting piece (see "Installing the OMNIS MSM Unit", chapter 5.11.1, page 227).

4 Putting the MSM into operation

- Reconnect all capillaries of the MSM to the system. (*see "Connecting functional units", chapter 5.15, page 262*).

- Start the high-pressure pump with a flow rate of 1 mL/min and a maximum pressure of 2 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , *see OMNIS help*.
- Wait 5 minutes.
- In the OMNIS Software, switch to the next suppressor unit. To do this, in the overview of the instrument, open **MSM ► Manual control**, switch to the next suppressor unit with **Next channel**.
- Wait 5 minutes.
- Switch to the next suppressor unit with **Next channel**.
- Wait 5 minutes.

All 3 suppressor units of the MSM have been rinsed. The OMNIS MSM Unit is ready for operation.

5 Replacing the rotor

- If the MSM is still not functioning correctly after start-up, then replace the rotor as well (*see "Replacing the rotor", page 440*).
- If the rotor has already been replaced and the MSM still does not function correctly after start-up, then contact the regional Metrohm service representative. Never open the housing of the OMNIS MSM Unit.

8.5 Rinsing the OMNIS Conductivity Detector Unit

If the pressure in the system rises or if the MSM is leaking, then these are signs of a blockage in the conductivity detector.

The following causes of blockages in the conductivity detector exist:

- Particles are in the conductivity detector.
- A pressure screw squeezes a capillary.

Rinsing the detector inlet capillary

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.
- The peristaltic pump is switched off.

Required accessories:

- Wrench (6.2739.000) for pressure screws
- Capillary cutter (6.2621.080)

- If the detector inlet capillary needs to be replaced:
 - PEEK capillary COL - COND, 350/0.18 mm (6.01831.200)
 - or*
 - Peek capillary MCS - COND, 120/0.18 mm (6.01831.150)

1 Connecting the detector inlet capillary to the high-pressure pump

- Loosen the capillary connection at the pressure sensor outlet with the wrench for pressure screws.

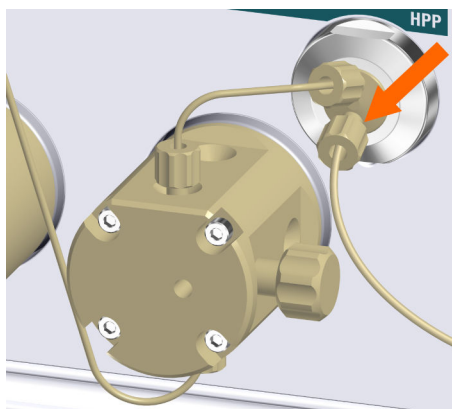


Figure 245 Loosening the capillary connection at the pressure sensor outlet

- Detach the detector inlet capillary from the detector inlet.
- Check whether the end of the detector inlet capillary that has just now been detached is squeezed. If necessary, cut 5 mm off the capillary end with the capillary cutter.
- Detach the other end of the detector inlet capillary from the connected functional unit.
- Check whether the capillary end that has just been detached is crushed. If necessary, cut 5 mm off the capillary end with the capillary cutter.
- Connect the end of the detector inlet capillary that has just been detached to the pressure sensor outlet and tighten with the wrench for pressure screws.
- Place the other end of the detector inlet capillary in a beaker so that the rinsing solution is collected.

The end of the detector inlet capillary that was previously connected to the detector inlet is now connected to the pressure sensor outlet. Particles can be rinsed out in the opposite flow direction by rotating the capillary 180°.

2 Starting the high-pressure pump

- Start the high-pressure pump with a flow rate of 1 mL/min and a maximum pressure of 5 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , *see OMNIS help*.

The detector inlet capillary is rinsed.

- If the pressure in the system increases, then the detector inlet capillary is blocked or squeezed. The high-pressure pump stops automatically as soon as the permitted maximum pressure is exceeded.

Replace the detector inlet capillary.

Continue with *Step 3 – Connecting the detector inlet* to make the OMNIS IC System operational.

- If liquid drips from the detector inlet capillary, then this capillary is free of blockages and squeezing.
Skip *Step 3 – Connecting the detector inlet*. Instead, rinse the detector outlet capillary (*see "Rinsing the detector outlet capillary", page 446*).

3 Connecting the detector inlet

- Connect one end of the new detector inlet capillary to the detector inlet.
- Connect the other end of the new detector inlet capillary to the upstream functional unit.
- Detach the defective detector inlet capillary from the pressure sensor outlet using the wrench for pressure screws.
- Restore the capillary connection at the pressure sensor outlet and tighten with the wrench for pressure screws.

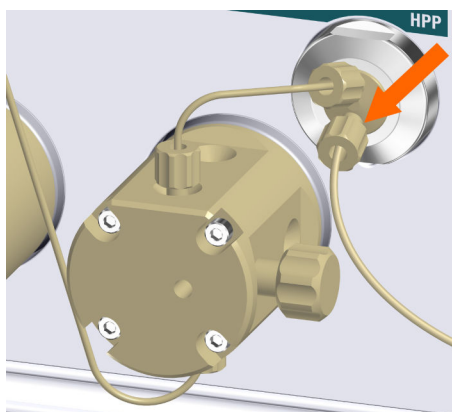


Figure 246 Restoring the capillary connection at the pressure sensor outlet

The OMNIS IC System is ready for operation.

Rinsing the detector outlet capillary

Prerequisite:

- The detector inlet capillary is rinsed (*see "Rinsing the detector inlet capillary", page 443*).
This does not clear the blockage.
- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.

Required accessories:

- Wrench (6.2739.000) for pressure screws
- If the detector outlet capillary is squeezed:
 - Capillary cutter (6.2621.080)
- If the detector outlet capillary needs to be replaced:
 - PEEK capillary COND MFM/WC, 400/0.18 mm (6.01831.190)

1 Connecting the detector outlet capillary to the high-pressure pump

 Execute this procedure only if a detector outlet capillary is present in the OMNIS IC System.

If you are working with STREAM, then detach the capillary labeled *rinsing solution* from the detector outlet and rinse it (see "*Cleaning the OMNIS MSM Unit*", chapter 7.10.6, page 397).

- Loosen the capillary connection at the pressure sensor outlet with the wrench for pressure screws.

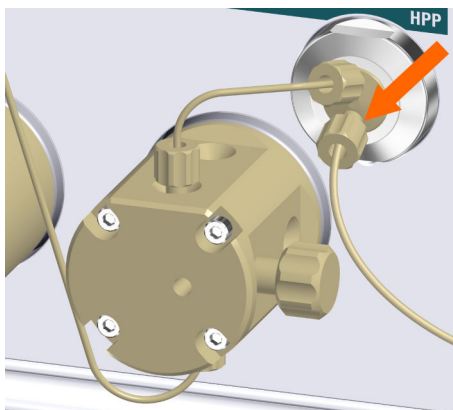


Figure 247 Loosening the capillary connection at the pressure sensor outlet

- Detach the detector outlet capillary from the detector outlet.
- Check whether the capillary end that has just been detached is crushed and, if necessary, cut 5 mm off the capillary end with the capillary cutter.
- Detach the other end of the detector outlet capillary from the connected functional unit.
- Check whether the capillary end that has just been detached is crushed. If necessary, cut 5 mm off the capillary end with the capillary cutter.
- Connect the end of the detector outlet capillary that has just been detached to the pressure sensor outlet.
- Place the other end of the detector outlet capillary in a beaker so that the rinsing solution is collected.

Particles can be rinsed out in the opposite flow direction by rotating the detector outlet capillary 180°.

2 Starting the high-pressure pump

- Start the high-pressure pump with a flow rate of 1 mL/min and a maximum pressure of 5 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , see [OMNIS help](#).

The detector outlet capillary is rinsed.

- If the pressure in the system increases, then the detector outlet capillary is blocked or squeezed. The high-pressure pump stops automatically as soon as the permitted maximum pressure is exceeded.
Replace the detector outlet capillary.
Execute *Step 4 - Connecting the detector* to make the OMNIS IC System ready for operation.

- If liquid drips from the detector outlet capillary, then this capillary is free of blockages and squeezing. The blockage is inside the conductivity detector.

Skip *Step 4 – Connecting the detector*. Rinse the conductivity detector instead (see *"Rinsing the conductivity detector"*, page 449).

3 Connecting the detector

- Connect one end of the detector inlet capillary to the detector inlet.
- Connect the other end of the detector inlet capillary to the upstream functional unit.
- Connect one end of the new detector outlet capillary to the detector outlet.
- Connect the other end of the detector outlet capillary to the downstream functional unit.
- Detach the defective detector outlet capillary from the pressure sensor outlet using the wrench for pressure screws.
- Restore the capillary connection at the pressure sensor outlet and tighten with the wrench for pressure screws.

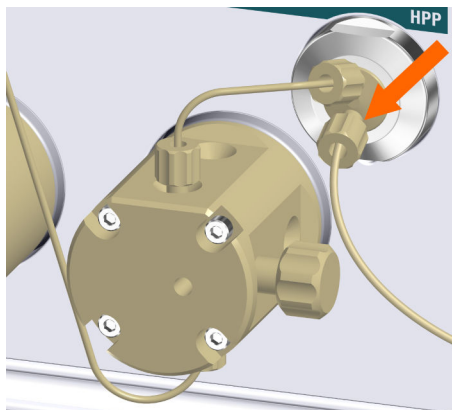


Figure 248 Restoring the capillary connection at the pressure sensor outlet

The OMNIS IC System is ready for operation.

Rinsing the conductivity detector



WARNING

Electric shock from electrical potential

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

- Never remove functional units from the instrument.
- Never remove coverings from functional units.
- Only personnel who have Metrohm qualifications may perform service and repair work requiring the removal or opening of functional units.
- There are no parts inside the functional units which can be serviced or replaced by the user.

Prerequisite:

- The detector inlet capillary is rinsed ([see "Rinsing the detector inlet capillary", page 443](#)).
- The detector outlet capillary is rinsed ([see "Rinsing the detector outlet capillary", page 446](#)).
- This does not clear the blockage.
- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.

Required accessories:

- PEEK capillary 0.5 mm ID, 3 m (6.1831.180)
- Capillary cutter (6.2621.080)
- Wrench (6.2739.000) for pressure screws

1 Adjusting capillary connections

- Detach the detector outlet capillary from the detector outlet and from the pressure sensor outlet.
- Tighten the PEEK capillary 0.5 mm to the detector outlet and the pressure sensor outlet. Cut the capillary to a suitable length with the capillary cutter.
- Place a beaker under the detector inlet so that any escaping liquid can be collected.

The PEEK capillary 0.5 mm now connects the pressure sensor outlet with the detector outlet.



2 Starting the high-pressure pump

- The detector is rinsed in the direction against the flow. Slowly increase the flow during the rinsing process to a maximum of 1 mL/min. The pressure must not exceed 1 MPa. Start the high-pressure pump for rinsing. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , *see OMNIS help*.
- If liquid drips from the detector inlet, then the blockage has been eliminated.
Execute *Step 3 - Connecting the detector* to make the OMNIS IC System ready for operation.
- If the pressure in the system rises above 1 MPa, then the blockage has **not** been eliminated. The high-pressure pump stops automatically as soon as the permitted maximum pressure is exceeded. Notify a regional Metrohm service representative. **Never** open the housing of the conductivity detector.
Do not perform *Step 3 – Connecting the detector*. Do **not** use the conductivity detector until the blockage has been cleared by a regional Metrohm service representative.

3 Connecting the detector

- Connect one end of the detector inlet capillary to the detector inlet.
- Connect the other end of the detector inlet capillary to the upstream functional unit.
- Connect one end of the detector outlet capillary to the detector outlet.
- Connect the other end of the detector outlet capillary to the downstream functional unit.
- Restore the capillary connection at the pressure sensor outlet and tighten with the wrench for pressure screws.



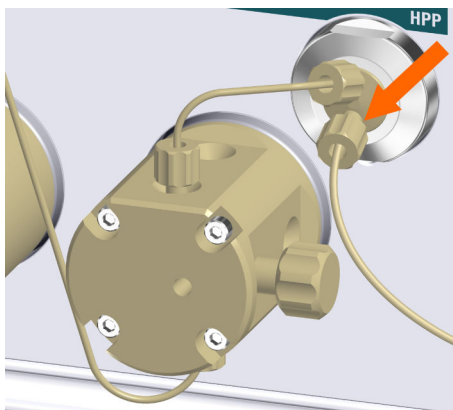


Figure 249 Restoring the capillary connection at the pressure sensor outlet

The OMNIS IC System is ready for operation.

8.6 Pulsation absorber – Releasing jamming

NOTICE

Membrane damaged by a sharp object

The internal membrane may become damaged if a sharp object is inserted into the pulsation absorber.

- Do not insert any sharp objects into the pulsation absorber to release the jamming.
- To release the jamming, rinse the pulsation absorber in the direction against the flow.

i The maximum pressure in a system with an OMNIS MCS Unit is 2 MPa.

If the system does not include an OMNIS MCS Unit, or if no liquid is being pumped through the OMNIS MCS Unit, then the maximum pressure in the system will be 5 MPa.

The following causes may lead to jamming in the pulsation absorber:

- There are particles inside the pulsation absorber.
- A pressure screw squeezes a capillary.

Rinsing the pulsation absorber

Prerequisite:

- The high-pressure pump is switched off.
- The pressure in the high-pressure pump has been released.

Required accessories:

- Wrench (6.2739.000) for pressure screws
- Capillary cutter (6.2621.080)
- If the inlet capillary needs to be replaced:
 - PEEK capillary HPP – PA/INJ, 160/0.5 mm (6.01831.110)
- If the outlet capillary needs to be replaced:
 - PEEK capillary PA – INJ, 180/0.5 mm (6.01831.160)

1 Rinsing the inlet capillary

- Use the wrench for pressure screws to detach the inlet capillary from the pulsation absorber.
- Check whether the capillary end that has just been detached is crushed. If necessary, cut 5 mm off the capillary end with the capillary cutter.
- Start the high-pressure pump with a flow rate of 1 mL/min and a maximum pressure of 5 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , *see OMNIS help*.

The inlet capillary is rinsed.

- If liquid drips from the inlet capillary, then this capillary is free of blockages and squeezing. Then carry out *Step 2 – Rinsing the outlet capillary*.
- If the pressure in the system rises, then the inlet capillary is blocked. The high-pressure pump stops automatically as soon as the permitted maximum pressure is exceeded. Replace the inlet capillary (*see "Installing the pulsation absorber", page 316*). The blockage has been rectified. Do not execute the remaining steps of the procedure.

2 Rinsing the outlet capillary

- Use the wrench for pressure screws to detach the inlet capillary from the pressure sensor outlet and set it aside.

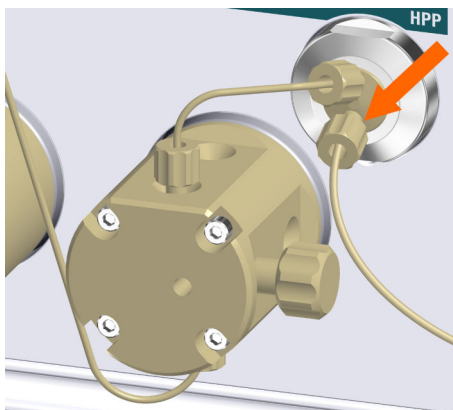


Figure 250 Loosening the capillary connection at the pressure sensor outlet

- Use the wrench for pressure screws to detach the outlet capillary from the pulsation absorber and the injector.
- Check whether the capillary ends are crushed. If necessary, cut 5 mm off the crushed capillary end with the capillary cutter.
- Connect the outlet capillary to the pressure sensor outlet.
- Start the high-pressure pump with a flow rate of 1 mL/min and a maximum pressure of 5 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control**, define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , see [OMNIS help](#).

The outlet capillary is rinsed.

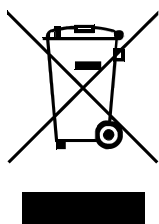
- If liquid drips from the outlet capillary, then this capillary is free of blockages. The blockage is inside the pulsation absorber. Then rinse the pulsation absorber [Step 3 – Rinsing the pulsation absorber](#).
- If the pressure in the system rises, then the outlet capillary is blocked. The high-pressure pump stops automatically as soon as the permitted maximum pressure is exceeded. Replace the outlet capillary (see ["Installing the pulsation absorber", page 316](#)). The blockage has been rectified. Do not execute the remaining steps of the procedure.

3 Rinsing the pulsation absorber

- Connect the capillary at the pressure sensor outlet to the pulsation absorber connector that was previously connected to the injector. The pulsation absorber is thus rinsed in the direction against the flow.

- Start the high-pressure pump with a flow rate of 1 mL/min and a maximum pressure of 5 MPa. To do this, in the overview of the instrument, open **High-Pressure Pump ► Manual control** define **Flow rate** and **Pressure**, and start the high-pressure pump by clicking on , *see OMNIS help*.
- The pulsation absorber is rinsed in the direction against the flow.
- If liquid drips from the free pulsation absorber connector, then the blockage has been eliminated. Use the wrench for pressure screws to detach the capillary at the pulsation absorber inlet. Connect the pulsation absorber (*see "Installing the pulsation absorber", page 316*).
- If the pressure in the system rises, then the blockage has **not** been eliminated. The high-pressure pump stops automatically as soon as the permitted maximum pressure is exceeded. Replace the pulsation absorber.

9 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.

10.1 Performance data

Type	Serial dual-piston pump
-------------	-------------------------

Pulsation $< 1\%$

Flow reproducibility < 0.1%

Flow accuracy < 0.1%

Flow range 0.001–10.0 mL/min

Flow increment 1 $\mu\text{L}/\text{min}$

Pressure range

Pump 0–42 MPa

Solvent compatibility	chemically inert and metal-free flow path
	resistant from pH 0–14

Other	Individual linear pump drive
	Automatic purging and pulsation control
	Automatic shutdown when pressure limit is exceeded
	Dynamic piston stroke, adapted to the operating conditions
	Optional piston seal wash

10.1.2 Column thermostat

Type	Peltier thermostat for two intelligent separation columns	
Temperature range	10–80 °C	no restriction due to ambient temperature
Temperature resolution	0.1 °C	
Temperature reproducibility	±0.2 °C	
Temperature stability	±0.05 °C	
Heating time	5 min	25–50 °C
Cooling time	14 min	50–25 °C
Column positions	max. 2	
Column length	max. 350 mm	
Leak sensor	present	

10.1.3 Conductivity detector

Type	Peltier thermostat with microprocessor-controlled digital signal processor (DSP technology)	
Conductivity range	0–35,000 µS/cm	Autoranging
Resolution	0.001 nS/cm	
Noise	< 0.1 nS/cm at 1 µS/cm	

Maximum pressure 10 MPa

Actuator type	Universal valve drive
----------------------	-----------------------

Valve types

Valve	Drill bore hole diameter	Rotor material	Stator material	Connection	Maximum pressure
7/3 injector	0.4 mm	Valcon E	PAEK / Carbon Fiber	UNF 10/32	34.5 MPa

[illegible]

P

[illegible][illegible][illegible][illegible][illegible]

P

[illegible][illegible][illegible][illegible][illegible]

Time to establish vacuum	< 10 s	
Degassing chambers	1–4	
10.1.8 Dosing drive		
Type	Stepper motor	
Resolution	250,000 steps per cylinder volume	
Dosing reproducibility during entire piston stroke	< 0.03%	
Dosing accuracy during entire piston stroke	< 0.06%	
Dosing times/filling times	10 s per cylinder volume	without filling again
Flow range	0.01–300 mL/min	
Compatible cylinder volume	2 mL 5 mL 10 mL 20 mL 50 ml	
10.1.9 Peristaltic pump		
Type	1-channel peristaltic pump or 2-channel peristaltic pump	
Flow range	0.1–10 mL/min	
Pump channels	1 or 2	independently adjustable

Value setting 1–100

Other Automatic pump tubing assembly

10.1.10 MISIP

Capacity 1 ultrafiltration cell or 1 MISIP base plate
and
2 pieces of transfer tubing or transfer capillaries and 1 MISIP holder, trap column

10.1.11 Multi Flow Monitor

Type Multi Flow Monitor with infrared diode and photo-transistor

Measuring range for flow monitoring 0.1–8.0 mL/min for aqueous reagents

Measuring channels 4

10.1.12 Reagent organizer (ROLIC)

Bottle positions 1–6

Capacity max. 6 x 2-L bottle

max. 2 x external 10 L containers

Volume monitoring

<i>Volume range</i>	250–2,150 mL	for 2-L bottle
	900–11,000 mL	for 10-L container
<i>Volume increment</i>	1 mL	for 2-L bottle
	1 mL	for 10-L container
<i>Accuracy</i>	± 1%	

<i>Reproducibility</i>	± 0.05%
Built-in magnetic stirrer	max. 2
Leak sensor	present
Other	Bottle positioning with a dedicated bottle holder Volume monitoring with contactless ultrasonic sensor technology

10.1.13 Autosampler

Sample capacity

Table 72 Sample capacity

Sample vessel	Number of sample vessels per sample rack	Sample capacity*
Vial 5 mL	40	160 vials
Vial 10 mL	24	96 vials
Bottle 50 mL	6	24 bottles
Bottle 200 mL	2	8 bottles
HPLC vial (1.5 mL, 0.7 mL, and 0.3 mL)	48	192 vials
96-well microtiter plate	-	384 wells
384-well microtiter plate	-	1,536 wells

*with maximum equipment of 4 sample racks or microtiter plates

In addition, a maximum of 6 50 mL bottles in the bottle positions of the OMNIS IC AS Tray

Injection modes	Full loop
	Partial loop
	Pick-up loop
Injection volume	0.5–20,000 µL

Reproducibility	< 1.0% RSD (pick-up-injection) 2 µL	
	< 0.5% RSD (partial loop) 1 µL	
	< 0.5% RSD (full loop) 20 µL	
Dilution	1 : 1–1 : 2,000	with standard configuration
Dilution accuracy	< 2%	(n=9, dilution factor 1,000)
Dilution reproducibility	< 0.5% RSD	for a dilution 1:100
Sample compartment temperature range	4–22 °C	
Vial detection	present	
Rack detection	present	

10.2 Physical specifications

10.2.1 OMNIS IC

10.2.1.1 Measurements and weight

Table 73 Dimensions

Instrument	Measurements (in mm)	Weight (in kg)
OMNIS IC S Module (incl. base plate)	310 x 400 x 560	18.7
OMNIS IC S Module (incl. OMNIS IC Autosampler Module)	633 x 400 x 560	36.8
OMNIS IC S Module (incl. OMNIS IC Autosampler Module COOL)	740 x 400 x 560	48.0
OMNIS IC M Module (incl. base plate)	417 x 400 x 560	26.1

*Maximum configuration, including 4 bottle holders

Parts in contact with the medium	PS, PTFE, PEEK
---	----------------

Nominal voltage range	100–240 VACV	±10%
------------------------------	--------------	------

Nominal frequency range	50–60 Hz	±3%
--------------------------------	----------	-----

Table 74 Power consumption

10.2.1.4 Connectors specifications

Socket

via power connection

IEC 60320, type C14, 10 A

Power cord

Length max. 2 m

Number of conductors	3	with protective conductor
----------------------	---	---------------------------

465

Nominal function range	+5 to +45 °C	at max. 80% relative humidity, non-condensing
Storage	+5 to +45 °C	at max. 80% relative humidity, non-condensing
Altitude	max. 4,000 m. above sea level	
Overvoltage category	II	
Pollution degree	2	
IP degree of protection	IP 20	

10.2.2.1 Measurements and weight

Functional unit	Measurements (in mm)	Weight (in kg)
OMNIS Actuator Unit	113 x 71 x 168	1.6
OMNIS Column Holder Unit	113 x 71 x 98	0.2
OMNIS Column Thermostat Unit	113 x 142 x 505	2.8
OMNIS Conductivity Detector Unit	113 x 71 x 416	1.5
OMNIS Degasser Unit	113 x 71 x 278	1.3
OMNIS Dosing Drive Unit	113 x 71 x 158	0.7
OMNIS High-Pressure Pump Unit	113 x 142 x 474	4.1
OMNIS MCS Unit	113 x 71 x 278	1.3
OMNIS MISP Unit	113 x 71 x 300	0.5
OMNIS Mult Flow Monitor Unit	113 x 71 x 87	0.2
OMNIS Peristaltic Pump Unit	113 x 71 x 143	0.6
Reagent Organizer	58 x 400 x 560	1.9
OMNIS Reagent Organizer Liquid Control	58 x 400 x 560	2.4

10.2.2.2 Energy supply

Table 76 Power consumption

Functional unit	Standard operation	Standby mode	Maximum
OMNIS Actuator Unit	18 W	1.1 W	36 W
OMNIS Column Holder Unit	< 0.1 W	< 0.1 W	< 0.1 W
OMNIS Column Thermo-stat Unit	12 W	2.2 W	48 W (heating) 56 W (cooling)
OMNIS Conductivity Detector Unit	5 W	3 W	23 W
OMNIS Degasser Unit	3.4 W	1.5 W	19 W
OMNIS Dosing Drive Unit	6.5 W	1.6 W	15 W
OMNIS High-Pressure Pump Unit	18 W	2 W	26 W
OMNIS MCS Unit	5 W	1.5 W	19 W
OMNIS MISP Unit	-	-	-
OMNIS Mult Flow Monitor Unit	< 0.7 W	< 0.7 W	1 W
OMNIS Peristaltic Pump Unit	6.4 W	1.6 W	26 W
Reagent Organizer	-	-	-
OMNIS Reagent Organizer Liquid Control	7.4 W	2.6 W	14 W

10.2.3 Autosampler

10.2.3.1 Measurements and weight

Table 77 Dimensions

Instrument	Measurements (in mm)	Weight (in kg)
OMNIS IC Autosampler Module	379 x 400 x 560	22.1
OMNIS IC Autosampler Module COOL	486 x 400 x 560	33.3

10.2.3.2 Energy supply

Nominal voltage range 100–240 VACV ±10%

Nominal frequency range 50–60 Hz ±3%

Table 78 Power consumption

Socket IEC 60320, type C14, 10 A

Socket IEC 60320, type C13, 10 A

OMNIS IC Autosampler Module	+5 to +45 °C	at max. 80% relative humidity, non-condensing
-----------------------------	--------------	---

OMNIS IC Autosampler Module COOL +5 to +35 °C at max. 80% relative humidity, non-condensing

Storage	+5 to +45 °C	at max. 80% relative humidity, non-condensing
----------------	--------------	---

Altitude max. 4,000 m. above sea level