Cylinder unit OMNIS

6.03001.XX0 / 6.01503.XX0

Manual

8.0108.8010EN / v5 / 2025-04-21

Metrohm

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Technical Communication
Metrohm AG
CH-9100 Herisau

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 Cylinder unit OMNIS – Product description

The cylinder unit OMNIS is a versatile piston buret and is suitable for precise dosing, titrations, pipetting processes, sample transfers, etc.

1.2 Cylinder unit OMNIS – Product versions

The product is available in the following versions:

Table 1 Product versions

Article number	Designation	Version feature
6.03001.120	Cylinder unit OMNIS 2 mL	Volume 2 mL
6.03001.150	Cylinder unit OMNIS 5 mL	Volume 5 mL
6.03001.210	Cylinder unit OMNIS 10 mL	Volume 10 mL
6.03001.220	Cylinder unit OMNIS 20 mL	Volume 20 mL
6.03001.250	Cylinder unit OMNIS 50 mL	Volume 50 mL
6.01503.120	Cylinder unit OMNIS 2 mL without accessories	Volume 2 mL, without accessories
6.01503.150	Cylinder unit OMNIS 5 mL without accessories	Volume 5 mL, without accessories
6.01503.210	Cylinder unit OMNIS 10 mL without accessories	Volume 10 mL, without accessories
6.01503.220	Cylinder unit OMNIS 20 mL without accessories	Volume 20 mL, without accessories
6.01503.250	Cylinder unit OMNIS 50 mL without accessories	Volume 50 mL, without accessories

An antidiffusion tip (6.1543.200) is available as an accessory. The antidiffusion valve prevents the sample from diffusing into the immersed tip.

A dosing tip (6.1543.060) can be used as an alternative to the antidiffusion tip.

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
	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 Further information

Additional information on the product 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 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: see *(see table 1, page 1)*
- In the result list, click on the desired product.

Detailed information regarding the product is displayed.

2 Displaying 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 Cylinder unit OMNIS – Intended use

The cylinder unit OMNIS provides the liquid volume required for the analysis and can be equipped with different volumes. A distributor with 4 ports enables the filling and emptying of the cylinder.

The four inputs and outputs (ports) are designed for flexible use (presuming the presence of a suitable control instrument).

The cylinder unit OMNIS can be used with the following dosing drives:

- OMNIS Titrator
- OMNIS Titration Module
- OMNIS Dosing Module

The cylinder units OMNIS 2 mL to 20 mL are used for dosing as well as titrating. The cylinder unit OMNIS 50 mL is particularly suitable for the rapid addition of larger quantities of solvents or auxiliary reagents as well as for other liquid handling tasks.

Thanks to the transparent housing of the cylinder unit OMNIS, the movements of the piston and the centering tube are visible inside. This means that even complex liquid handling applications are easy to monitor. The unobstructed view into the cylinder also ensures that solutions can be monitored with respect to the absence of bubbles and the leak-tightness of the cylinder element.

Information on the cylinder unit OMNIS and the reagent can be stored in the integrated data chip and read out by a suitable control instrument.

2.2 Responsibility of the operator

The operator must ensure that basic regulations on occupational safety and accident prevention in chemical laboratories are observed. The operator has the following responsibilities:

- 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 staff on basic occupational safety and accident prevention regulations.
- Provide personal protective equipment (e.g. protective glasses, gloves).
- Provide suitable tools and equipment to carry out the work safely.

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

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

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.
- Only use the product with the covers fitted. 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.

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.
- 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.

- Remove and dispose of escaping liquids in accordance with regulations.
- If you suspect that liquid has penetrated the instrument, disconnect the instrument from the energy supply. Then have the instrument checked by a regional Metrohm service representative.

2.4.5 Danger during transport of the product

Chemical or biological substances may be spilled during the transport of the product. Parts of the product may fall down or may be damaged. There is a risk of injury from chemical or biological substances and pieces of broken glass. To ensure safe transport, observe the following:

- Remove loose parts (e.g. sample racks, sample vessels, bottles) before transport.
- Remove liquids.
- Lift and transport the product with both hands on the base plate.
- Lift and transport heavy products only according to instructions.

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 2 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 Dosing drive – Overview

Figure 1 Dosing drive with mounted cylinder unit OMNIS or cylinder unit OMNIS special

1 **Cylinder unit OMNIS / cylinder unit OMNIS special**	**2** **Dosing drive** Not in scope of delivery

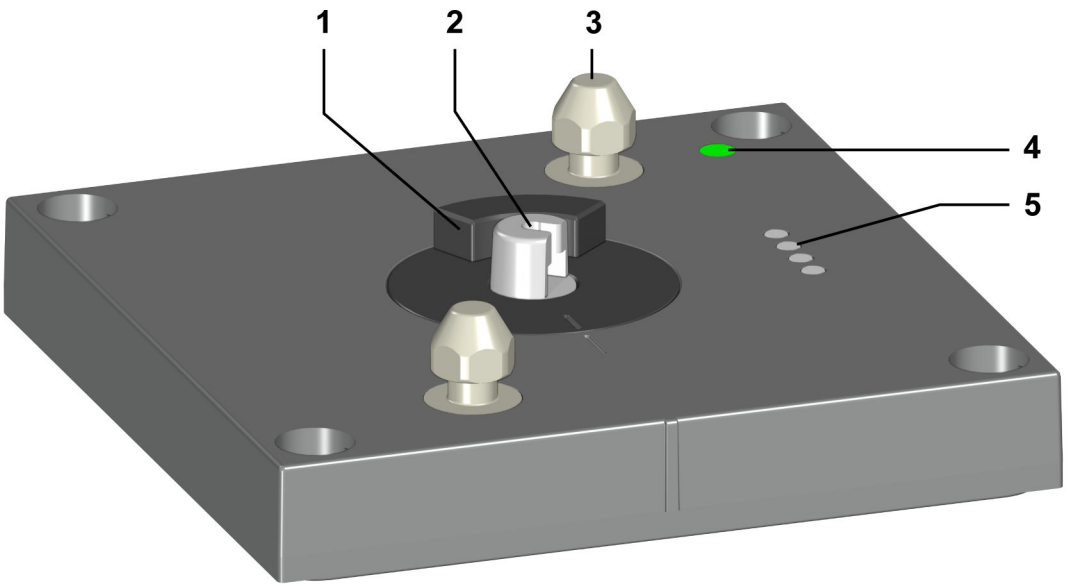


Figure 2 Dosing drive – Overview

1	**Valve coupling**	**2**	**Push rod** For moving the piston
3	**Twistlocks** For the lock release mechanism of the cylinder unit OMNIS / cylinder unit OMNIS special	**4**	**Status display** LED. Multi-colored
5	**Contact pins** For communicating with the cylinder unit OMNIS / cylinder unit OMNIS special		

3.1.1 Dosing drive – Function

The dosing drive with mounted cylinder unit OMNIS / cylinder unit OMNIS special can be used to accurately dose liquid volumes under software control.

The dosing drive is permanently installed in the housing of the instrument. The dosing drive is controlled via the OMNIS Software and is responsible for the accurate dosing of the solution.

If the cylinder unit OMNIS / cylinder unit OMNIS special *(1-**1**)* is placed on top of the dosing drive *(1-**2**)*, then the dosing drive will assume responsibility for the following functions:

- **Raising and lowering the piston:**
  Solution is aspirated as soon as the piston is lowered. The cylinder fills up.
  Solution is dosed as soon as the piston is raised. The cylinder empties.

- **Rotate the cylinder element:**
  The rotation of the cylinder element controls which of the 4 ports the solution flows through.
  The valve disk with an opening is located in the middle of the cylinder base.
  The distributor disk with 4 openings corresponding to the 4 ports of the distributor is located at the bottom in the cylinder top piece.
  The dosing drive rotates the cylinder by 90° stages so that the opening of the valve disk fits with an opening on the distributor disk. This results in a passage for the solution to the corresponding port of the distributor.

3.1.2 Dosing drive – Dosing accuracy

The dosing drive is equipped with a resolution of 102,400 steps per stroke.

If the cylinder is entirely filled, then these 102,400 steps will allow the following typical whole-number volumes to be precisely aspirated and dosed.

Cylinder volume	Examples for volumes that can be dosed with microliter precision	Theoretically smallest volume step
2 mL	5 µL, 10 µL, 15 µL, …	19.53125 nL
5 mL	25 µL, 50 µL, 75 µL, …	48.828125 nL
10 mL	25 µL, 50 µL, 75 µL, …	97.65625 nL
20 mL	25 µL, 50 µL, 75 µL, …	195.3125 nL
50 mL	125 µL, 250 µL, 375 µL, …	488.28125 nL

If a volume is dosed or aspirated that is not a multiple of the theoretically smallest volume step, then it will be rounded to the previous volume step.

The maximum deviation from the required volume thus equals the smallest volume step.

Limit values

The cylinder unit OMNIS and the dosing drive fulfill the *systematic error* and the *random error* according to DIN EN ISO 8655-3 Piston-operated volumetric apparatus – Part 3: Piston burette.

Metrohm guarantees compliance with the following limit values (at the time of shipment):

Cylinder volume	Maximum permissible systematic measurement deviation		Maximum permissible random measurement deviation	
2 mL	± 0.5%	± 10 µL	± 0.1%	± 2 µL
5 mL	± 0.3%	± 15 µL	± 0.1%	± 5 µL

Cylinder volume	Maximum permissible systematic measurement deviation		Maximum permissible random measurement deviation	
10 mL	± 0.2%	± 20 µL	± 0.07%	± 7 µL
20 mL	± 0.2%	± 40 µL	± 0.07%	± 14 µL
50 mL	± 0.2%	± 100 µL	± 0.05%	± 25 µL

The regional Metrohm representatives offer the possibility of on-site inspections and certifications of cylinder units OMNIS and dosing drives with respect to accuracy.

3.2 Cylinder unit OMNIS – Overview

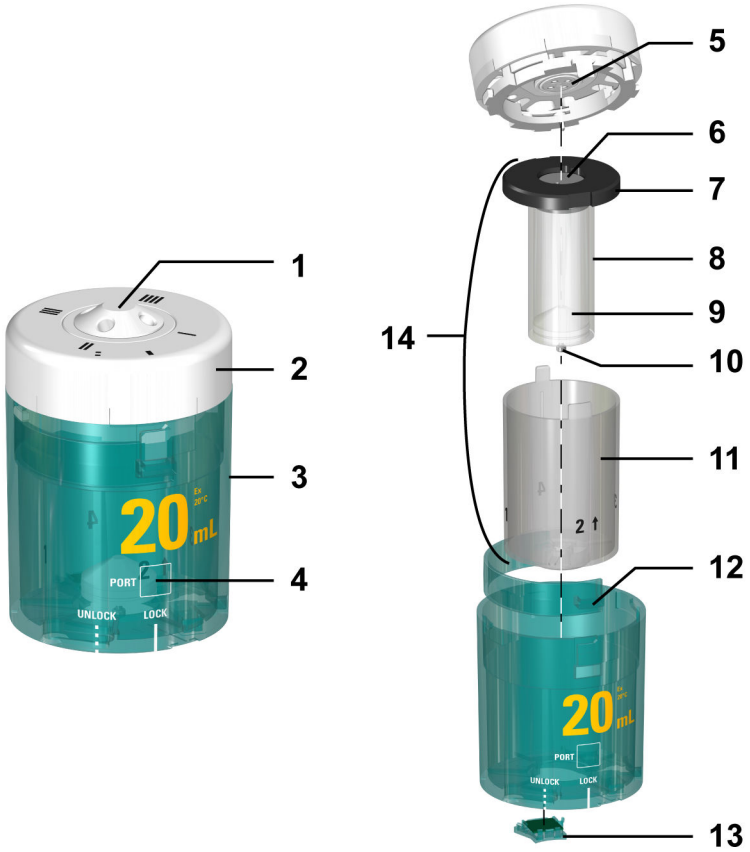


Figure 3 Cylinder unit OMNIS – Overview

1	**Distributor with 4 ports**	**2**	**Cylinder top piece**
3	**Housing**	**4**	**Port display**
5	**Distributor disk**	**6**	**Valve disk**
7	**Cylinder base**	**8**	**Cylinder**

9	**Piston**
10	**Piston stopper**
11	**Centering tube**
12	**Spring clip with unlocking button**
13	**Data chip**
14	**Cylinder element OMNIS** Cylinder, cylinder base with valve disk, piston with piston stopper, and centering tube

3.2.1 Cylinder unit OMNIS – Overview of ports

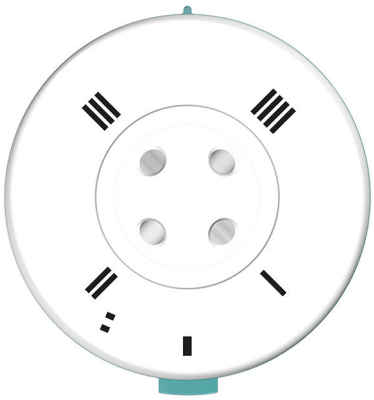


Figure 4 Cylinder unit OMNIS – Overview of ports

The following table shows the standard use of the 4 ports. The use of the ports can be changed in the OMNIS Software.

Symbol	Port	Use	Connector
I	1	Dose	Dosing tubing (M6)
II	2	Filling the cylinder	Filling tubing (M6)
III	3	optional	Filling tubing (M6) cleaning solution
IIII	4	optional	Waste tubing (M6)

3.2.2 Cylinder unit OMNIS – Resistance to chemicals

Conventional reagents and media can be dosed with the cylinder unit OMNIS. The materials of the single parts that come into contact with the liquid being dosed have been selected for maximum resistance to chemicals and functionality.

However, not all types of aggressive or high-concentration reagents can be conveyed without difficulty. It is the user's own responsibility to determine the resistance of the various single parts to specific, aggressive media.

Observe the following notes to ensure the functional capability of the cylinder unit OMNIS:

- When using strong inorganic alkalis or concentrated solutions that could crystallize, adhere to the specifications concerning the housing *(see "Cylinder unit OMNIS – Housing resistance to chemicals", chapter 3.2.2.1, page 14)*.
- The temperature of the media must not exceed 50 °C.
- Clean and inspect the cylinder unit OMNIS at regular intervals to avoid problems with aggressive media. *(see "Performing maintenance on the cylinder unit OMNIS", chapter 6.1, page 22)*

Replace the cylinder unit OMNIS at regular intervals.

3.2.2.1 Cylinder unit OMNIS – Housing resistance to chemicals

In contrast to the other components of the cylinder unit OMNIS, the housing has only limited resistance to chemicals.

Good resistance	▪ Aqueous solutions ▪ Diluted acids ▪ Alcohols ▪ Hydrocarbons
Limited resistance	▪ Concentrated organic acids ▪ Diluted aqueous alkalis (cold cracking) ▪ acetone ▪ Isopropanol ▪ Tetrahydrofuran ▪ Hot water (> 50 °C)
Non-resistant	▪ Concentrated inorganic acids and bases ▪ Chlorinated solvents ▪ Bromine (Br_2) ▪ Phenol ▪ Water vapor (> 100 °C)

See also

Cylinder unit OMNIS – Overview (chapter 3.2, page 12)

4 Delivery and transport

4.1 Delivery

Inspect the delivery immediately upon receipt:

- Check the delivery against the delivery note to ensure completeness.
- Check the product for damage.
- If the delivery is incomplete or damaged, contact your regional Metrohm representative.

4.2 Packaging

The product and accessories are supplied in protective special packaging. Keep this packaging to ensure safe transportation of the product. If a transport locking device is present, keep this as well for future reuse.

5 Operation of the cylinder unit OMNIS

Notes on handling

If no continuous sample throughput is ensured, then fill the cylinder with solution and move to the exchange position (port 2).

The cylinder unit OMNIS does not automatically move into the exchange position. In order to automatically move to exchange position after each titration/dosing, insert the **FILL** and **VALVE POS** commands into the method.

NOTICE

Piston wear due to solutions and solids

Solutions of solids (e.g., salts or hydroxides) increase the wear of the piston, which may lead to leakage.

- Fill the cylinder with solution and move to the exchange position after each titration/dosing.

Metrohm recommends rinsing the cylinder unit OMNIS with cleaning solution according to best practice and storing it filled in the exchange position before shorter downtimes (e.g., overnight).

For storage of the cylinder unit OMNIS over an extended time period: *(see "Storing the cylinder unit OMNIS", chapter 6.3, page 26)*

Usage of dosing tubing with antidiffusion tip

When using an antidiffusion tip, the maximum dosing rate is 150 mL/min.

The dosing rate can be saved on the memory chip of the cylinder unit OMNIS: Enter the dosing rate in the OMNIS Software in **Properties** ▶ **Specific data**.

Usage of dosing tubing with a different tubing tip

When using different tubing tips, do not immerse the dosing tubing in the sample solution.

There is a danger of back diffusion of the sample solution from the vessel into the tubing due to open tubing ends.

The cylinder unit OMNIS and its parts cannot be autoclaved. The sterility of a germ-free solution cannot be guaranteed.

5.1 Attaching the cylinder unit OMNIS

Default settings for ports 1 and 2

Port 1 is defined as dosing port and port 2 as fill port in the data chip default settings of the cylinder unit OMNIS. The following instructions describe the default setting.

If the ports should be used differently from the default setting, adjust the ports in the OMNIS Software in **Properties** ▶ **Specific data**.

Preparing for attachment

1 Open the **Manual control** in the OMNIS Software.

2 Start the **Exchange position** function.

Attaching the cylinder unit OMNIS

These instructions describe the default installation as defined in the OMNIS Software.

Prerequisite:

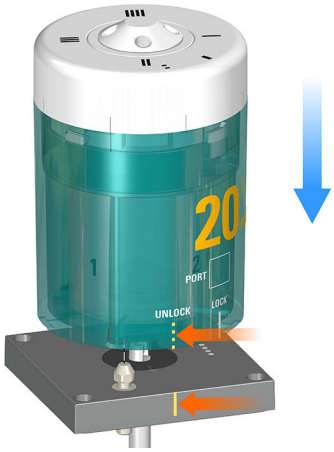
- Dosing drive: Valve coupling and push rod are in the exchange position (port 2 is set).
- Cylinder unit OMNIS: The piston stopper is flush with the base of the housing. The centering tube is in the correct position: Port 2 is visible in the port display *(3-**4**)*.

Required accessories:

- Wrench (6.2739.000)
- 2 FEP tubings (6.1805.100)

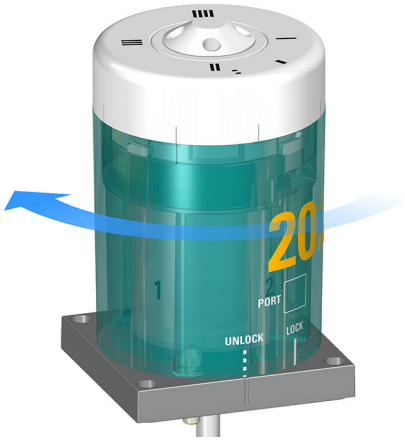
- Antidiffusion tip (6.1543.200)

1 Attaching the cylinder unit OMNIS



- Rotate the cylinder unit OMNIS until the marking with the label **UNLOCK** is in line with the marking on the dosing drive.
- Set the cylinder unit OMNIS down onto the two twistlocks straight from above.

2 Locking the cylinder unit OMNIS



- Rotate the cylinder unit OMNIS to the left until it stops.
- Use the marking with the label **LOCK** as guidance.

3 Mounting the tubing

- Tighten an FEP tubing (6.1805.100) into port 1.
  This FEP tubing is used as dosing tubing. Tighten the other end of the antidiffusion tip (6.1543.200).

- Tighten the other FEP tubing (6.1805.100) into port 2.
  This FEP tubing is used as filling tubing. Tighten the other end to the OMNIS Liquid Adapter.
- Optionally connect additional tubings to ports 3 and 4, e.g., for the automatic rinsing procedure with cleaning solution.
- Tighten the tubing with the wrench (6.2739.000).

See also

Cylinder unit OMNIS – Overview (chapter 3.2, page 12)

5.2 Removing the cylinder unit OMNIS

Preparing the removal

1 Open the **Manual control** in the OMNIS Software.

2 Start the **Empty** function.

3 Start the **Exchange position** function.

Removing the cylinder unit OMNIS

Prerequisite:

- Dosing drive: Valve coupling and push rod are in the exchange position (port 2 is set).
- Cylinder unit OMNIS: The piston stopper is flush with the base of the housing. The centering tube is in the correct position.

CAUTION

Health hazards due to contact with chemicals

Chemicals in the cylinder unit OMNIS / cylinder unit OMNIS special may cause chemical burns.

- Empty and rinse the cylinder before removing the cylinder unit OMNIS / cylinder unit OMNIS special.
- Wear protective equipment, especially gloves.

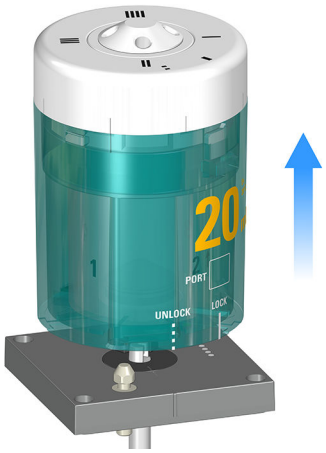
1 **Removing the tubing**

- Unscrew the dosing tubing.
- Unscrew the filling tubing.
- If other tubings are connected, then remove them as well.

2 Unlocking the cylinder unit OMNIS

- Rotate the cylinder unit OMNIS to the right as far as the **UNLOCK** position.

3 Raising the cylinder unit OMNIS



- Raise the cylinder unit OMNIS straight upwards.

See also

Cylinder unit OMNIS – Overview (chapter 3.2, page 12)

5.3 Refitting the cylinder unit OMNIS

The cylinder units OMNIS are available in various versions *(see "Cylinder unit OMNIS – Product versions", chapter 1.2, page 1)*.

For fitting the instrument with a different cylinder unit:

- Order the cylinder unit OMNIS with the required volume. *(see "Cylinder unit OMNIS – Product versions", chapter 1.2, page 1)*
- Remove the current cylinder unit OMNIS. *(see "Removing the cylinder unit OMNIS", chapter 5.2, page 19)*
- Attach the new cylinder unit OMNIS. *(see "Attaching the cylinder unit OMNIS", chapter 5.1, page 17)*

6 Maintenance

6.1 Performing maintenance on the cylinder unit OMNIS

NOTICE

Damage due to aggressive chemicals

Chemicals may escape through leaks. Aggressive chemicals damage the data chip and the dosing drive.

- Regularly check the cylinder unit OMNIS / cylinder unit OMNIS special for leaking liquid (under the piston, on the base of either the centering tube or the cylinder unit OMNIS / cylinder unit OMNIS special).
- Check the cylinder and the piston for wear at regular intervals. *(see "Checking and replacing the cylinder unit OMNIS", chapter 6.6, page 32)*
- Replace a defective cylinder unit OMNIS / cylinder unit OMNIS special immediately. Do not continue using it.

Depending on the application, cylinders and pistons are subject to different mechanical strain. A cylinder unit OMNIS, for example, that is often used for alkaline, high-concentration or crystallized reagents will be subject to higher wear. This results in shorter maintenance intervals. The cylinder unit OMNIS must furthermore be replaced more often.

After prolonged decommissioning, the function of the cylinder unit OMNIS may be impaired; do not use manual control commands to return it to operation. Metrohm recommends regular maintenance of the cylinder unit OMNIS as a precautionary measure.

Maintenance work	Maintenance interval
Check the housing for contaminations and clean it if necessary. *(see "Cleaning the cylinder unit OMNIS", chapter 6.2, page 24)*	Daily

Maintenance work	Maintenance interval
Check the cylinder inside and outside for crystallization and clean it if necessary.*(see "Cleaning the cylinder unit OMNIS", chapter 6.2, page 24)* Remove the cylinder unit OMNIS from the dosing drive, check the instrument for crystallization and clean it if necessary.*(see "Cleaning the cylinder unit OMNIS", chapter 6.2, page 24)* Rinse the cylinder with suitable cleaning solution.*(see "Cleaning the cylinder unit OMNIS", chapter 6.2, page 24)* Fill the cylinder with cleaning solution when no titration is running (e.g., overnight). Rinse the cylinder unit OMNIS with cleaning solution automatically (at least six cleaning cycles) according to "Best practice." Leave the cylinder unit OMNIS in the cleaning solution and in exchange position overnight.	Daily when using corrosive or crystallizing reagents
Check electrical contacts for contaminations and clean them if necessary. *(see "Cleaning the cylinder unit OMNIS", chapter 6.2, page 24)* Clean the cylinder top piece and the valve disk. Grease the centering tube and the valve disk. *(see "Cylinder unit OMNIS – Greasing the components", chapter 6.5, page 30)* Check the cylinder and piston. *(see "Checking and replacing the cylinder unit OMNIS", chapter 6.6, page 32)*	Weekly if using: ▪ Concentrated solutions that tend to crystallize ▪ EDTA solutions, ultrapure solvents, and ultrapure water ▪ Organic solvents ▪ Alkaline (e.g. KOH or isopropyl alcohol), corrosive or high-concentration reagents Every 3 months if using unproblematic reagents.
Check the antidiffusion valve and dosing tubing and clean them if necessary.	Regularly
Clean the centering tube and the valve disk. Grease the centering tube and the valve disk. *(see "Cylinder unit OMNIS – Greasing the components", chapter 6.5, page 30)*	Regularly
Recommended maintenance and calibration certification by a regional Metrohm service representative.	Annually

Metrohm recommends a rinse with water for aqueous solutions.

6.2 Cleaning the cylinder unit OMNIS

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.

The cylinder unit OMNIS requires appropriate care. Excess contamination of the cylinder unit OMNIS results in functional disruptions and a reduction in the service life.

Prerequisite:

- The cylinder unit OMNIS has been removed from the dosing drive. *(see "Removing the cylinder unit OMNIS", chapter 5.2, page 19)*

Required accessories:

- Lint-free cloth
- Dishwashing detergent

1 Cleaning the housing

- Clean the housing with lukewarm water and dishwashing detergent.

The housing is **not** dishwasher proof.

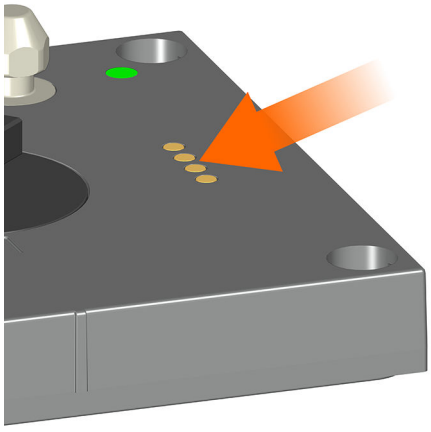
2 Cleaning the electrical contacts of the cylinder unit OMNIS

- If the electrical contacts are only lightly contaminated, then clean the electrical contacts with a cloth moistened with water.
- If the electrical contacts are heavily contaminated:
  - Add dishwashing detergent or ethanol to the moist cloth and clean the electrical contacts.
  - Or clean the electrical contacts in an ultrasonic bath with a little dishwashing detergent or ethanol.

To clean in an ultrasonic bath, first disassemble the cylinder unit OMNIS.

- Do not exceed 50 °C when drying. Use compressed air if necessary.

3 Cleaning the electrical contacts of the dosing drive



- If the electrical contacts are only lightly contaminated, then clean the electrical contacts with a cloth moistened with water.

- If the electrical contacts are heavily contaminated, then add dish-washing detergent or ethanol to the moist cloth and clean the electrical contacts.

6.3 Storing the cylinder unit OMNIS

If the cylinder unit OMNIS has not been used for a prolonged time period, then rinse and fill the cylinder with deionized water to prevent the valve disk and distributor disk from sticking together. When using the following titrands, it is recommended that the solutions listed in the table be used for cleaning and short-term titration downtimes (e.g., overnight).

Titrants	Cleaning solution
Aqueous alkali solutions	Deionized water
Titrant 5	Methanol
$AgNO_3$ solutions	0.1 mol/L HNO_3
Nonaqueous alkaline solutions	Deionized water
$KMnO_4$ solutions	$(NH_4)_2Fe(SO_4)_2$ (1)
EDTA solutions	Ethanol

(1) 44 g $(NH_4)_2Fe(SO_4)_2 \times 6\ H_2O$, 12 mL H_2SO_4 in 1 L H_2O

When using water-sensitive reagents, rinse the cylinder with solvent and then store it empty.

Automatic cleaning

1 Connect the cleaning solution to the cylinder unit OMNIS.

2 Execute the "Best practice" operating procedure. This empties the cylinder unit OMNIS and executes 6 cleaning cycles with the cleaning solution. Afterwards it is ensured that the cylinder unit OMNIS is in the exchange position and filled with cleaning solution.

3 If the cylinder unit OMNIS is to be stored empty,

- then remove the filling tubing from the bottle with rinsing liquid and
- start the **Empty** function.

4 Start the **Exchange position** function.

5 Store the cylinder unit OMNIS at ambient temperature and protect it from direct sunlight.

Rinse the cylinder unit OMNIS automatically

To automatically rinse the cylinder unit OMNIS, download the "Best practice" operating procedure for automatically rinsing the cylinder unit OMNIS as a template or create it yourself.

6.4 Disassembling the cylinder unit OMNIS

Prerequisite:

- The cylinder is empty.
- The cylinder unit OMNIS has been removed from the dosing drive. *(see "Removing the cylinder unit OMNIS", chapter 5.2, page 19)*

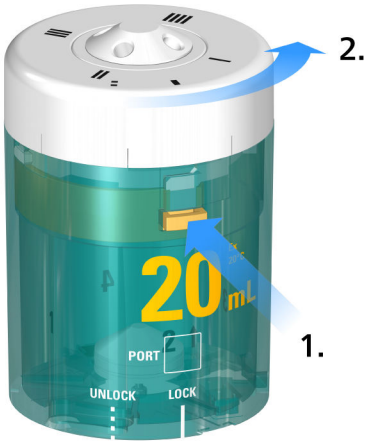
1 Loosening the cylinder top piece

NOTICE

Damage due to improper handling

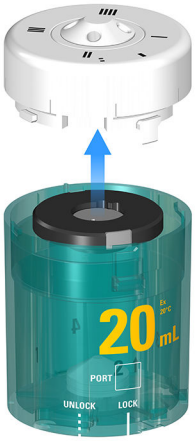
Improper handling leads to damage to the cylinder unit OMNIS / cylinder unit OMNIS special or to the piston.

- Do not use force to rotate the cylinder top piece. Instead, place the cylinder unit OMNIS / cylinder unit OMNIS special in water. *(see "Cylinder unit OMNIS – Clearing the jamming", chapter 7.3, page 42)*
- Follow the instructions for disassembling the cylinder unit OMNIS / cylinder unit OMNIS special.
- Do not disconnect the cylinder from the cylinder base.
- Do not remove the piston from the cylinder.



- Press the unlocking button and hold it down.
- Rotate the cylinder top piece to the right until it stops.

2 Removing the cylinder top piece

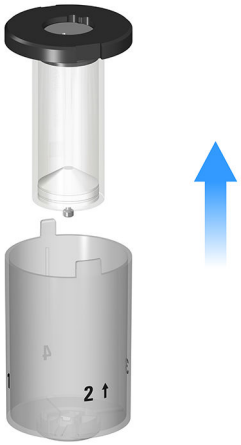


- Remove the cylinder top piece.

3 Removing the cylinder element

- Remove the cylinder element (centering tube incl. cylinder).

4 Removing the cylinder



- Hold the black cylinder base.
- Pull the cylinder together with the piston out of the centering tube.
- Turn the cylinder around and place the cylinder base on a flat surface.

Do not disconnect the cylinder from the cylinder base.
Do not remove the piston from the cylinder.

6.5 Cylinder unit OMNIS – Greasing the components

Cleaning the components

Prerequisite:

- The cylinder top piece and the cylinder element have been removed. *(see "Disassembling the cylinder unit OMNIS", chapter 6.4, page 27)*

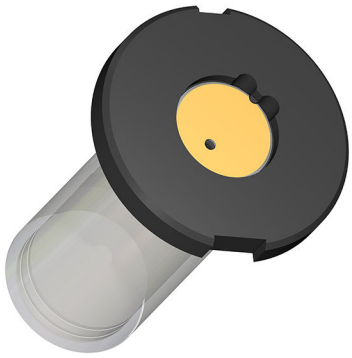
1 Cleaning the cylinder top piece

- Clean the cylinder top piece with water.

Do not remove the distributor disk from the cylinder top piece.

2 Cleaning the centering tube and cylinder

- Rinse the centering tube with water and wipe it with ethanol.
- Clean the contact surface of the valve disk with ethanol:



Do not disconnect the cylinder from the cylinder base.

3 Cleaning the housing

Rinse the housing with water and wipe it with ethanol.

Checking the components

1 *(see "Checking and replacing the cylinder unit OMNIS", chapter 6.6, page 32)*

Greasing the components

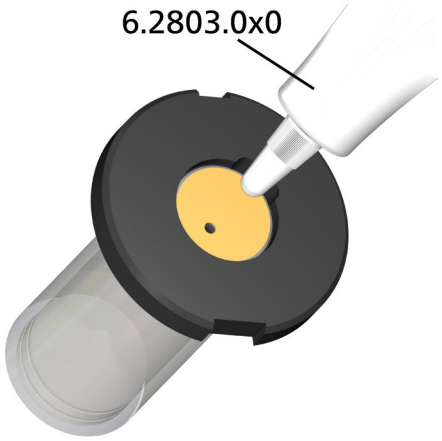
Required accessories:

- Grease (6.2803.010 or 6.2803.000)
- Lint-free cloth

1 Greasing the centering tube

- Grease the centering tube on the surface shown.

2 Greasing the valve disk



- Apply a very thin layer of grease to the surface shown on the valve disk.
- Wipe off excess grease with a cloth.

Make sure that no grease gets into the hole.

Assembling the cylinder unit OMNIS

1 *(see "Assembling the cylinder unit OMNIS", chapter 6.7, page 33)*

6.6 Checking and replacing the cylinder unit OMNIS

Prerequisite:

The cylinder unit OMNIS has been disassembled. *(see "Disassembling the cylinder unit OMNIS", chapter 6.4, page 27)*

1 Checking the cylinder

- Are rough areas or scratches visible on the cylinder?

2 Checking the piston

- Are scratches visible on the piston surface?
- Is any unevenness visible on the sealing lips of the piston?
- Are the cylinder and piston leakproof?

3 Replacing the cylinder unit OMNIS

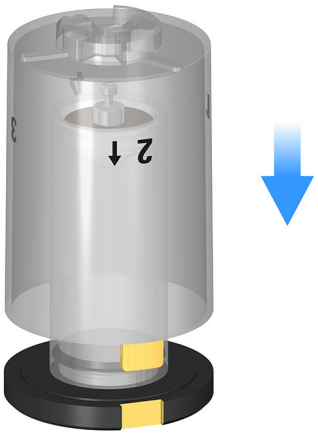
If any of these defects is visible, then replace the entire cylinder unit OMNIS.

6.7 Assembling the cylinder unit OMNIS

Assembling the cylinder unit OMNIS

1 Assembling the cylinder element

- Place the cylinder base with cylinder and piston on a flat surface.
- Place the centering tube over the cylinder and align it so that the protrusions of the centering tube fit into the recesses of the cylinder base:



- Attach the housing on the centering tube.
- Press the housing down evenly and straight (the piston stopper must fit through the small opening in the centering tube) as far as it will go:

- Remove the housing again.

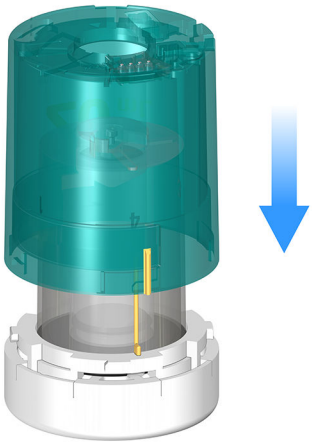
The centering tube now rests completely on the cylinder base and the piston is centered by the centering tube in the small opening.

2 Placing the cylinder element on the cylinder top piece

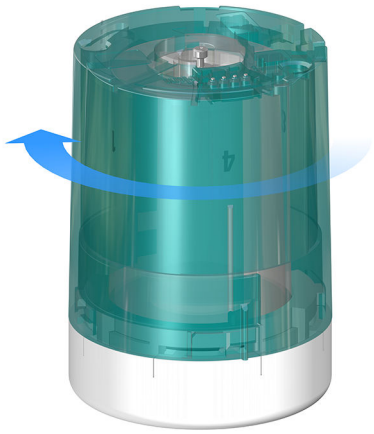
- Place the cylinder top piece on a flat surface with the ports facing downwards.

- Place the cylinder element on the cylinder top piece.
- Rotate the cylinder element in such a way that the markings on the centering tube and on the cylinder top piece are positioned one above the other.

3 Attaching the housing



- Attach the housing.
- The markings on the housing, centering tube and cylinder top piece must be positioned one above the other.



- Hold on to the cylinder top piece and rotate the housing to the left until the spring clip snaps in place.
- Make sure that the cylinder element does not rotate.

4 Checking the position of the piston

If necessary, check the position of the piston: *(see "", page 39)*

See also

Attaching the cylinder unit OMNIS (chapter 5.1, page 17)

Cylinder unit OMNIS – Adjusting the position of the piston (chapter 7.2, page 39)

7 Troubleshooting

Messages on malfunctions and errors are displayed in the control software or in the embedded software (e.g. on the display of an instrument) and contain the following information:

- Descriptions of causes of malfunctions (e.g. jammed drive)
- Descriptions of problems with the control (e.g. missing or invalid parameter)
- Information on how to solve the problem

System components with status display elements also indicate malfunctions and errors with a red flashing LED.

Troubleshooting on the product is often only possible with the control software or the embedded software (e.g. initializing, moving to a defined position).

7.1 Cylinder unit OMNIS – Malfunctions

Problem	Cause	Remedy
The entire cylinder unit OMNIS / cylinder unit OMNIS special rotates during dosing.	The friction points have not been greased.	Grease the centering tube and the valve disk. *(see "Cylinder unit OMNIS – Greasing the components", chapter 6.5, page 30)*
There is liquid under the piston, on the base of either the centering tube or the cylinder unit OMNIS / cylinder unit OMNIS special.	The piston is worn out or defective.	Replace the cylinder unit OMNIS.
	The cylinder does not seal.	Replace the cylinder unit OMNIS.
	The distributor disk does not seal.	Clean valve disk and distributor disk. *(see "Cylinder unit OMNIS – Greasing the components", chapter 6.5, page 30)*
The housing does not shut.	The spring clip is inserted incorrectly.	Remove the housing and insert the spring clip correctly.
The cylinder unit OMNIS / cylinder unit OMNIS special can be removed from the dos-	The friction points have not been greased.	Grease the centering tube and the valve disk. *(see "Cylinder unit OMNIS – Greasing the components", chapter 6.5, page 30)*

Problem	Cause	Remedy
ing drive only with difficulty.	The coupling is contaminated.	Remove the contaminations on the coupling between the cylinder unit OMNIS and the drive.
The cylinder unit OMNIS / cylinder unit OMNIS special cannot be removed from the dosing drive.	The cylinder unit OMNIS is not in the exchange position.	Start the **Exchange position** function.
The cylinder top piece can be removed from the cylinder unit OMNIS / cylinder unit OMNIS special only with difficulty.	The cylinder unit OMNIS is jammed because the valve disk and the distributor disk stick together.	▪ *(see "Cylinder unit OMNIS – Clearing the jamming", chapter 7.3, page 42)*
The cylinder unit OMNIS / cylinder unit OMNIS special is recognized either not at all or incorrectly.	The cylinder unit OMNIS was attached or assembled incorrectly.	▪ *(see "Removing the cylinder unit OMNIS", chapter 5.2, page 19)* ▪ *(see "Attaching the cylinder unit OMNIS", chapter 5.1, page 17)* ▪ Check the correct placement of the cylinder unit OMNIS. ▪ Switch the control instrument off and then back on again. ▪ If the problem persists, then contact your regional Metrohm representative.
	The data chip is mechanically damaged or impaired by chemicals.	▪ *(see "Cleaning the cylinder unit OMNIS", chapter 6.2, page 24)* ▪ If the problem persists, then contact your regional Metrohm representative.
Air bubbles are in the cylinder or in the dosing tubing.	Air intrusion through leaky connection.	▪ Check the ends of the tubing, in particular the end of the aspiration tubing. ▪ Tighten the tubing connections at the fill port with the wrench (6.2739.000). ▪ Check the correct placement of the OMNIS Liquid Adapter. ▪ Check the tubing connection of the bottle cap multi-use.

Problem	Cause	Remedy
	The reagent degasses excessively; the released air forms bubbles.	▪ Start the **Preparing** function to rinse the cylinder unit OMNIS and all tubing. ▪ Reduce the filling rate. ▪ Degas the reagent with ultrasound, nitrogen or in a vacuum.
	The piston is worn out.	▪ Replace the cylinder unit OMNIS.
	The **Preparing** function has not been executed or false parameters have been set.	▪ Execute the function **Preparing**. ▪ Check the length and diameter of the tubing and correct the settings in the control software if necessary. ▪ Check the fill port and correct the settings in the control software if necessary.
The cylinder unit OMNIS / cylinder unit OMNIS special doses an incorrect volume.	The cylinder unit OMNIS has been assembled incorrectly.	Check whether the nominal volume on the housing and the cylinder volume match one another. Use a housing with the corresponding volume if necessary.
The cylinder unit OMNIS / cylinder unit OMNIS special does not dose.	The tubing connections and/or valve openings are jammed.	▪ Check whether the dosing port is sealed off with a stopper. ▪ Check whether the dosing tip is blocked. Clean the dosing tip if necessary. ▪ Check whether the valve openings are blocked. Clean the valve openings if necessary.
	The cylinder unit OMNIS has been assembled incorrectly.	Check whether the dosing tubing is connected to the correct port and adjust if necessary.
	The push rod of the dosing drive does not reach the piston.	Remove the cylinder unit OMNIS and check the position of the piston. If the piston stopper is not flush with the underside of the housing, then correct the position of the piston using the piston tongs. *(see "Cylinder unit OMNIS – Adjusting the position of the piston", chapter 7.2, page 39)*

Problem	Cause	Remedy
The valve disk is jammed.	Utilization of corrosive or crystallizing reagents	▪ Remove the dosing tubing and take the cylinder unit OMNIS out of the titrator. Carefully remove the housing. ▪ Place the cylinder unit OMNIS in warm water for at least 30 minutes. ▪ Carefully loosen the distributor disk from the valve disk, placing the cylinder unit OMNIS once again in warm water in the event of problems. ▪ Rinse all parts with distilled water, taking care while doing so not to remove the piston or to disconnect the cylinder from the base plate. ▪ Dry the parts (e.g. with nitrogen). ▪ Grease the parts.*(see "Cylinder unit OMNIS – Greasing the components", chapter 6.5, page 30)* ▪ Assemble the cylinder unit OMNIS and attach it to the dosing drive. ▪ Initialize the dosing drive.

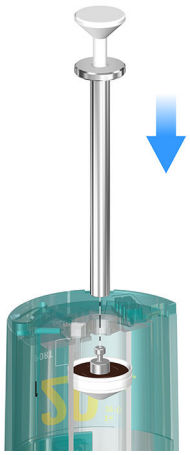
7.2 Cylinder unit OMNIS – Adjusting the position of the piston

If the piston stopper is not flush with the base of the housing, then the push rod of the dosing drive cannot reach the piston.

Required accessories:

- Piston tongs (6.1546.030)

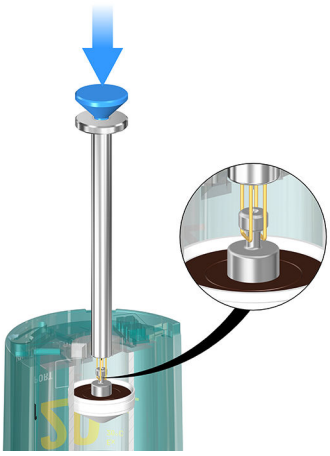
1 Inserting the piston tongs



- Insert the piston tongs into the opening of the cylinder.

The image shows the piston in a random position. However, the piston may be in a different position.

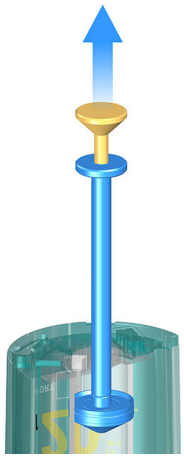
2 Grasping the piston



- Press the plunger of the piston tongs (blue) and hold it down.
- Position the piston tongs in such a way that the wire loops grasp the piston stopper (see zoomed in view).
- Release the plunger of the piston tongs.

The piston tongs clasp the piston.

3 Positioning the piston



- Make sure that the piston tongs rest flush against the piston.
- Hold on to the cylinder unit OMNIS.
- Hold on to the plunger (orange) of the piston tongs and carefully pull up the piston until it stops.

4 Removing the piston tongs

- Press the plunger of the piston tongs (blue) and hold it down.
- The wire loops spread apart (orange arrows) and the piston tongs can be removed.

5 Checking the position of the piston stopper

If the piston stopper protrudes beyond the housing (see zoomed in view), then perform the following steps:

- Place the cylinder unit OMNIS on a flat surface (e.g., laboratory table).
- Carefully push the cylinder unit OMNIS vertically downwards onto the support surface.

The piston stopper is positioned flush with the housing. The cylinder unit OMNIS can now be attached.

7.3 Cylinder unit OMNIS – Clearing the jamming

If it is difficult or impossible to rotate the cylinder top piece, the valve disk and the distributor disk stick to one another. The software displays an error message.

Clearing the jamming of the attached cylinder unit OMNIS

1. Remove the tubings.
2. Remove the liquid from all ports with a syringe.
3. Fill every port with deionized water or another suitable solvent with a syringe (with needle). Make sure that the needle reaches the valve disk (remains stuck in the port).
4. Allow the cylinder unit OMNIS to stand for 2 hours.
5. Initialize the dosing drive in the OMNIS Software or force the valve to switch using the **Filling volume…** function or the **Exchange position** function.

   Do not force the valve to switch multiple times.

6 If the cylinder unit OMNIS remains jammed, then repeat steps 2 to 5.

Clearing the jamming of the unattached cylinder unit OMNIS

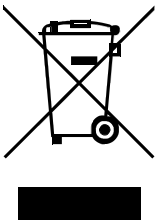
1 Place the jammed cylinder unit OMNIS with the cylinder top piece facing down in warm water for at least 30 minutes.

2 Remove the cylinder unit OMNIS from the water and dry it thoroughly.

3 If the cylinder unit OMNIS remains jammed, then repeat the steps.

If the error persists, then contact the regional Metrohm service representative or replace the entire cylinder unit OMNIS.

8 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.

9 Technical specifications

9.1 Ambient conditions

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

9.2 Cylinder unit OMNIS – Measurements and weight

Measurements

Diameter	68 mm
Height	100 mm

Weight

Type

2 mL	180 g
5 mL	190 g
10 mL	200 g
20 mL	210 g
50 mL	240 g

9.3 Cylinder unit OMNIS – Housing

Materials

Housing	PCT-G	Polycyclohexylenedimethylene terephthalate, glycol-modified
Centering tube	PCT-G	Polycyclohexylenedimethylene terephthalate, glycol-modified
Piston	PTFE	Polytetrafluoroethylene
Cylinder	Borosilicate 3.3	
Valve disk	Silicone carbide ceramic	
Distributor disk	Al_2O_3 ceramic	
Distributor	PCTFE	Polychlorotrifluorethylene

Degree of protection IP 40

9.4 Cylinder unit OMNIS – Connectors specifications

Electrical contacts 4 spring contacts

9.5 Cylinder unit OMNIS – Liquid handling specifications

Cylinder volume 2, 5, 10, 20, 50 mL

Tubings

Tubing nipple outer thread	M6	
Inner diameter	2 mm	
Material	PTFE	Polytetrafluoroethylene