Solvent Pump

Product manual

8.1029.8003EN / v4 / 2025-12-12

Metrohm

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Technical Communication
Metrohm AG
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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 Product description

The Solvent Pump is a pump module.

With the integrated membrane pump, it is possible to aspirate the titrated solution and to add new solvent without having to open the titration cell.

1.2 Product versions

The product is available in the following versions:

Table 1 Product versions

Art. no.	Designation
2.1029.0010	Solvent Pump

The article number and serial number for identification of the product can be found on the type label:

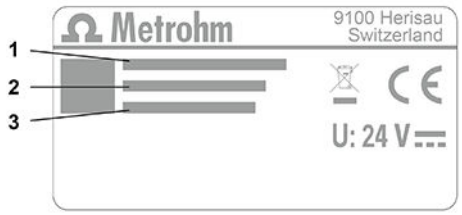


Figure 1 Type label (example)

1	**(01) = External article number**	**2**	**(21) = Serial number**
3	**(240) = Metrohm article number**		

1.3 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.

1.4 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]**.
  - Obtain the article number from the list *(see "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 Solvent Pump is mainly used together with an Eco KF Titrator for the volumetric Karl Fischer titration and is suitable only for indoor operation (lab environment with appropriate protective and working equipment).

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 Overview

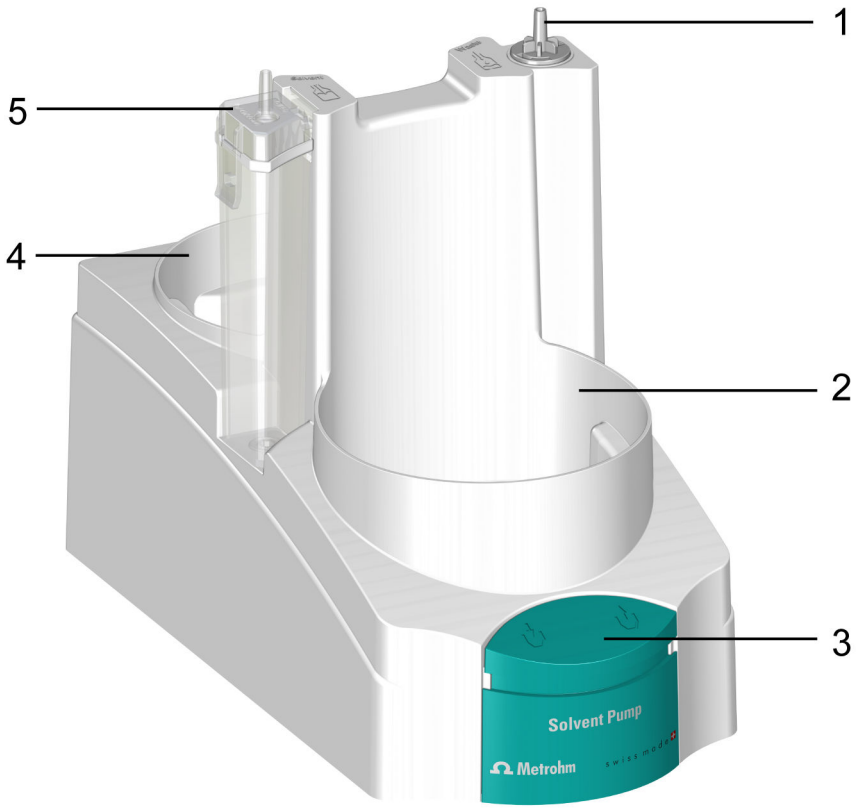


Figure 2 Solvent Pump – Front

1	**Tubing connector** Tubing connection between Solvent Pump and waste bottle (Waste)	**2**	**Bottle holder for reagent bottle (Solvent)**
3	**Controls**	**4**	**Bottle holder for waste bottle (Waste)**
5	**Adsorber cartridge** with tubing connector for the tubing connection between Solvent Pump and reagent bottle (Solvent)		

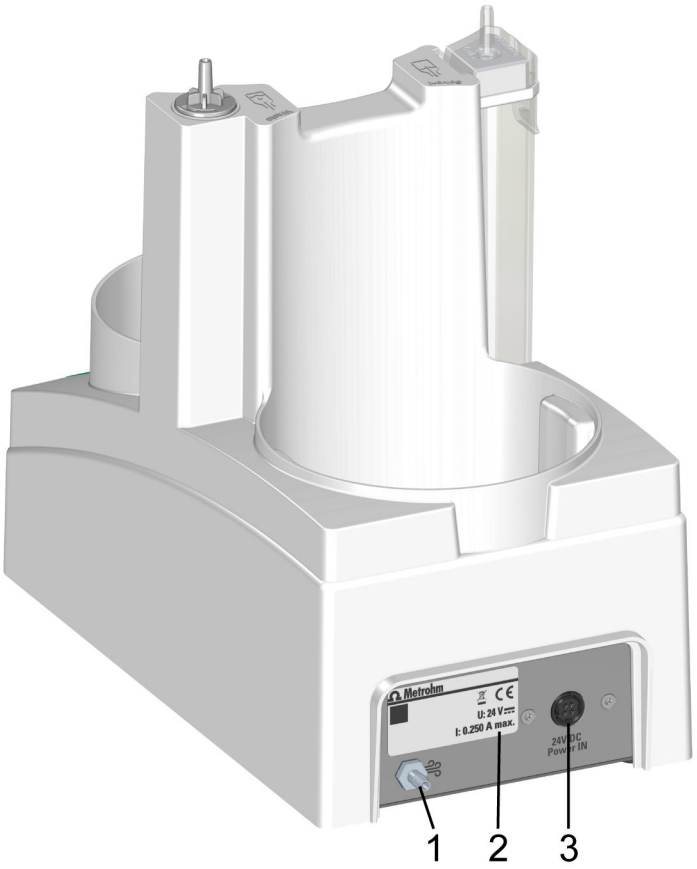


Figure 3 Solvent Pump – Back

1	**Air vent** Nozzle for exhaust air	**2**	**Type label**
3	**Power IN** Connecting the power supply unit		

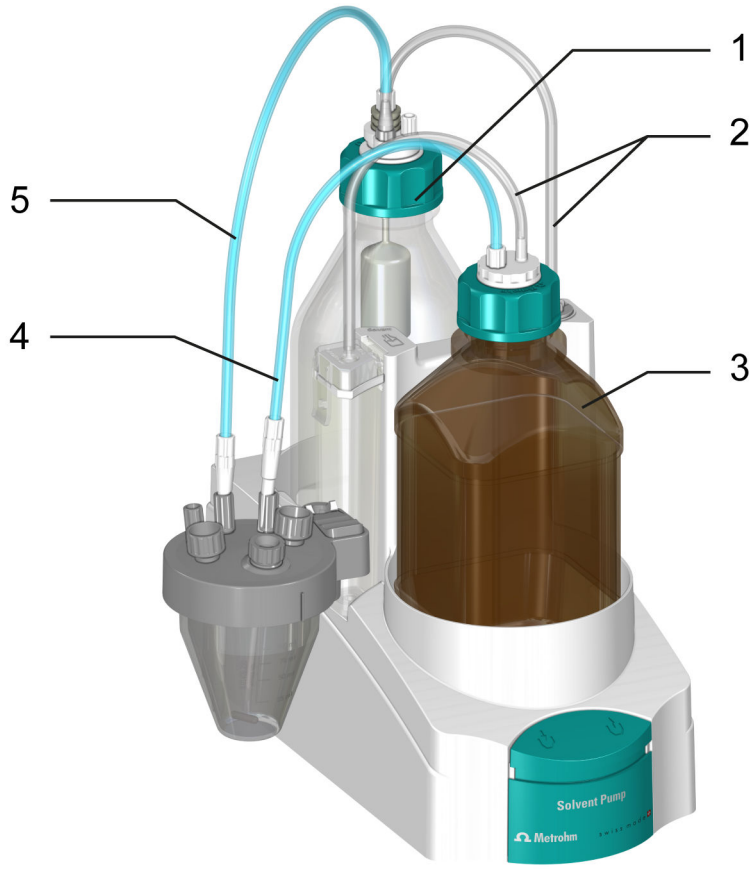


Figure 4 Solvent Pump – Accessories

1	**Waste bottle (Waste)**	**2**	**PVC tubing connection**
3	**Reagent bottle (Solvent)**	**4**	**PTFE tubing connection with dosing tip** Dosing tip 6.1543.110
5	**PTFE tubing connection with aspiration tip** Aspiration tip 6.1543.120	**6**	**PTFE tubing connection**

3.1.1 Function

The Solvent Pump contains one membrane pump.

With the integrated membrane pump, new reagent (Solvent) can be added without the titration cell having to be opened and the waste (e.g. the titrated solution) can be aspirated from the titration cell.

To achieve this, air only is pumped through the pump and a positive or negative pressure is created.

Due to the positive pressure in the reagent bottle, the liquid flows through the tubing and into the titration cell.

Due to the negative pressure in the waste bottle, the liquid is aspirated out of the titration cell.

The Siphon Breaker on the reagent bottle prevents liquid from seeping into the titration cell after the pumping procedure.

3.2 Adsorber cartridge – Overview

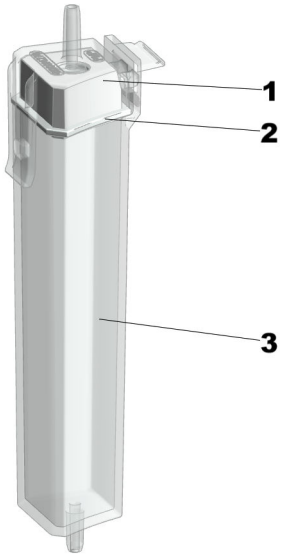


Figure 5 Adsorber cartridge (6.01807.000)

1	**Cartridge lid** With tubing olive for the PVC tubing leading to the reagent bottle	**2**	**Seal** Integrated in the cartridge lid
3	**Cartridge housing** With connection nipple for Solvent Pump		

3.2.1 Adsorption cartridge – Function

When pumping solvent out of the reagent bottle, the following air stream is led through the adsorber cartridge where it is dried.

For this, the adsorber cartridge must be filled with molecular sieve which has to be replaced regularly. The adsorber cartridge must be connected to the reagent bottle with a PVC tubing, see *(see "Mounting the bottles", chapter 5.5, page 18)*.

Make sure
- that the lid of the adsorber cartridge is tightly sealed.
- that the cotton loosely covers the whole base of the adsorber housing.

3.3 Controls

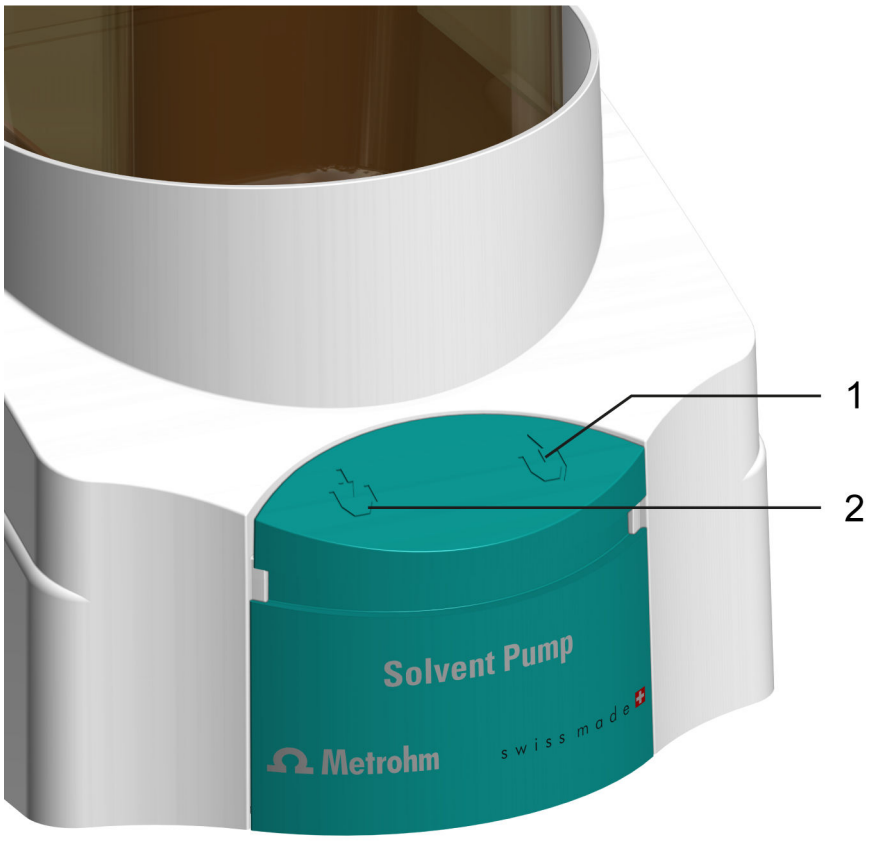


Figure 6 Solvent Pump – Controls

1 Aspirate key
Aspirate waste from the titration cell

2 Add key
Deliver liquid (Solvent) into the titration cell

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 Installation

5.1 Setup location

The product is only suitable 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.

5.2 Connecting 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.

Connecting the power cord

Required accessories:

- Power supply unit (6.2164.010)

Use only this power supply unit. Other products are not permitted.

- Power cord:
  - Length: max. 2 m
  - Number of conductors: 3, with protective ground
  - Conductor cross-section: 3 × min. 1.0 mm^2 / 18 AWG
  - Coupling: IEC 60320, type C13, 10 A
  - Power plug: 6.2122.XX0 (according to customer requirement), min. 10 A

1

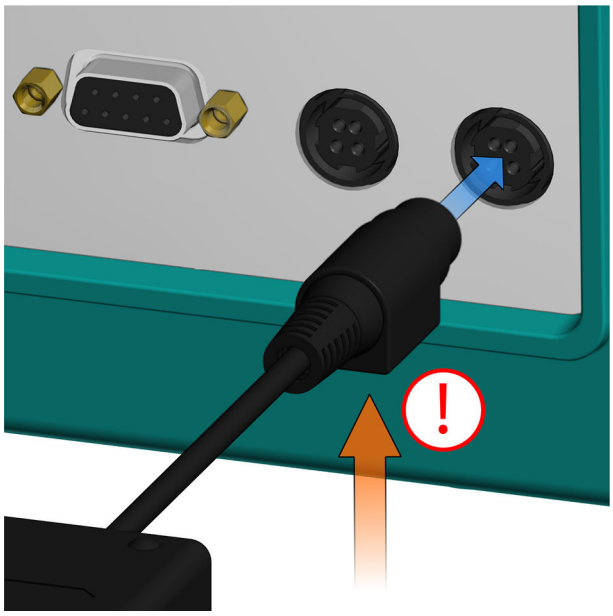


Figure 7 Rear of the instrument – Connecting the power cord

Connect the power supply unit to the **Power IN** connector.

Note the alignment (see figure).

2 Connect the power cord to the power supply unit.

3 Connect the cable to the energy supply.

The instrument can now be switched on and off:

5.3 Solvent Pump – Filling the adsorber cartridge

Filling and closing the adsorber cartridge

Required accessories:

- Molecular sieve (6.2811.000 / 6.2811.010)
- Cotton for adsorber tube (6.02801.000)

1 Filling the cartridge housing

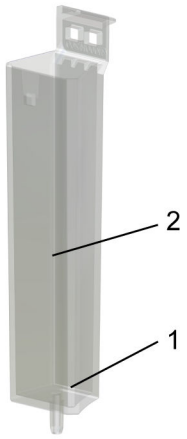


Figure 8 Filling the adsorber cartridge

- 1) Place a base-covering cotton plug loosely into the housing at the bottom.
  Do not pack the wad of cotton too tightly as sufficient gas flow must be possible.
- 2) Fill the housing with molecular sieve to approx. 1 cm under the housing edge.

2 **Closing the cartridge housing with cartridge lid**

Figure 9 Closing the adsorber cartridge

- Make sure that the sealing surface between the housing and the lid is clean and dry, and that there is no residual filling material whatsoever present.
- Hook the cartridge lid including the seal into the housing side and close it by clicking it into place.

Hint:

Write the date on the adsorber housing when you fill the molecular sieve. With this, you always know when it was last filled or replaced.

5.4 Removing and mounting the adsorber cartridge

Removing the adsorber cartridge from the Solvent Pump

1

- Remove the PVC tubing from the tubing olive.
- Press the integrated cartridge of the Solvent Pump down. At the same time, carefully pull it outwards until you hear it click out of the Solvent Pump.
- Lift the cartridge out of the seal of the Solvent Pump and remove it.

Mounting the adsorber cartridge on the Solvent Pump

Prerequisite:

- The adsorber cartridge is filled with molecular sieve and sealed tightly, see *(see "Solvent Pump – Replacing the adsorber material", chapter 7.2, page 25)*.

1
- Place the cartridge into the seal of the Solvent Pump and press it down. At the same time, tilt it inwards until you hear it click into the Solvent Pump.
- Mount the PVC tubing of the reagent bottle on the tubing olive.

The reagents used for Karl Fischer titration must be kept as dry as possible, even if they are conveyed from supply bottles that have been open for a long time. The connected adsorber cartridge prevents humidity from entering the reagent bottle.

5.5 Mounting the bottles

Setting up the waste bottle (Waste)

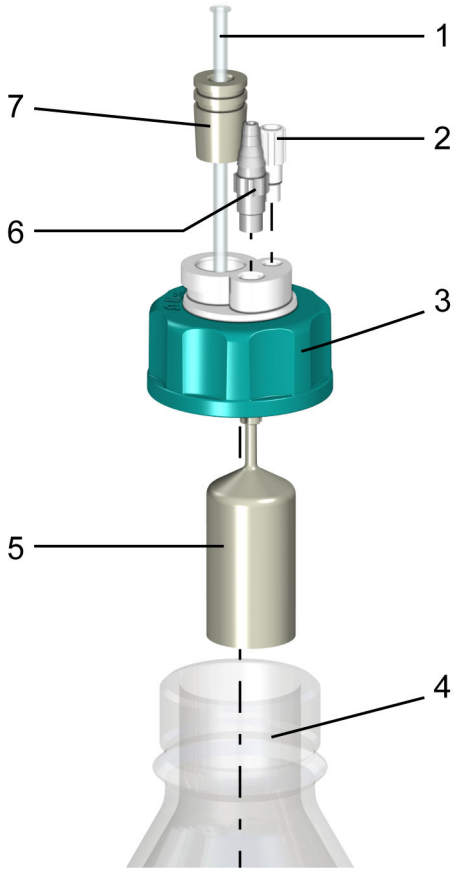


Figure 10 Waste bottle – Overview

1	**Short PTFE cannula** (6.1819.050)	**2**	**M6 threaded stopper** (6.1446.040)

3	**Bottle cap for GL 45**	**4**	**Clear glass bottle**
5	**Overflow protection**	**6**	**Tubing olive** (6.1808.050)
7	**Ground-joint stopper SGJ 14/M8**		

1 Place the threaded stopper in the M6 connector (smallest opening) of the bottle cap and screw it tight.

2 Introduce the overflow protection from below into the M8 connector (second-smallest opening) of the bottle cap and fasten it.

Make sure that the overflow protection is connected to the M8 connector from which the PVC tubing leads to the tubing olive of the Solvent Pump.

3 Place the tubing olive in the M8 connector of the bottle cap from above and screw it tight.

4 Insert the ground-joint stopper into the remaining opening of the bottle cap.

5 Insert the short PTFE cannula into the ground-joint stopper from above and pull it through.

Make sure that the cannula is pulled through as far as it will go.

6 Place the bottle cap on the clear glass bottle (or on a different bottle with GL 45 thread) and screw it tight.

Setting up the reagent bottle (Solvent)

Only use the reagent bottle (Solvent) with Siphon Breaker!
Other bottle caps are not permitted.

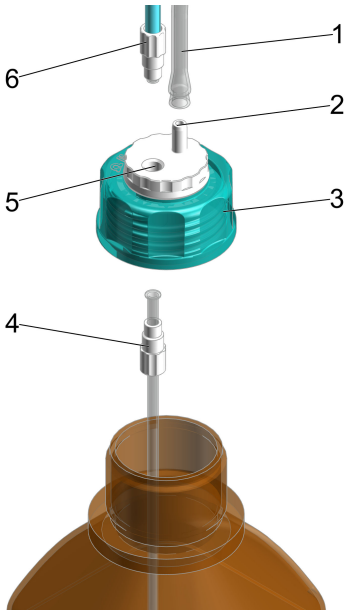


Figure 11 Equipping the Siphon Breaker for the reagent bottle (Solvent)

1	**PVC tubing** (6.01804.210)	**2**	**Tubing olive, integrated**
3	**Siphon Breaker** (6.01600.200)	**4**	**M8 aspiration tubing** (6.01805.130)
5	**M8 connector, integrated**	**6**	**M8 PTFE tubing** (6.1805.200)

1 Insert the M8 aspiration tubing with the screw nipple from below into the M8 connector of the Siphon Breaker and screw it tight.

Make sure that the M8 aspiration tubing is fastened from below to the Siphon Breaker and the M8 PTFE tubing for the KF titration cell is fixed in place from above.

2 Place the fully equipped Siphon Breaker on the reagent bottle (Solvent) and screw it tight.

3 Insert an M8 PTFE tubing into the M8 connector of the Siphon Breaker from above and screw it tight.

Mounting and connecting the bottles to the Solvent Pump

Make sure to limit the time the open reagent bottle (Solvent) and the KF titration cell are exposed to humidity.

The KF titration cell must be fully equipped and mounted on the Eco KF Titrator, except for the 2 M8 PTFE tubings from the aspiration tip and the dosing tip.

Prerequisite:

- The adsorption cartridge is filled with fresh molecular sieve, see *(see "Solvent Pump – Replacing the adsorber material", chapter 7.2, page 25)*.
- The Siphon Breaker for the reagent bottle is fully equipped and screwed tight on the reagent bottle (Solvent).
- The GL 45 bottle cap for the waste bottle is fully equipped and screwed tight on the waste bottle (Waste).

1. Place the fully equipped reagent bottle (Solvent) in the front bottle holder of the Solvent Pump.

2. Place the fully equipped waste bottle (Waste) in the back bottle holder of the Solvent Pump.

3. Plug a PVC tubing between the Siphon Breaker and the adsorption cartridge onto the **Solvent** tubing connector.

   Plug the other PVC tubing between the GL 45 bottle cap and the Solvent Pump onto the **Waste** tubing connector.

4. Mount the dosing tip and the aspiration tip to the titration cell.

6 Operation and control

6.1 Operation

The Solvent Pump can be operated via a power supply unit or via the Eco instruments.

6.2 Filling and emptying the KF titration cell

The reagent bottle, waste bottle and KF titration cell are fully mounted and connected with the corresponding tubings, see *(see "Mounting the bottles", chapter 5.5, page 18)*.

1 Filling the KF titration cell

Press the rocker switch on the left:

The Solvent Pump starts adding liquid from the reagent bottle into the KF titration cell until the key is released.

2 Emptying the KF titration cell

Press the rocker switch on the right:

The Solvent Pump starts aspirating liquid (Waste) from the KF titration cell into the waste bottle until the key is released.

7 Maintenance

Perform maintenance work on the product at regular intervals to prevent functional disruptions and to ensure a long service life.

- Metrohm recommends having the products maintained by the regional Metrohm service representative as part of an annual service. Shorter maintenance intervals may be necessary if you frequently work with caustic and corrosive chemicals.
- Only perform maintenance work that is described in this instruction. Contact your regional Metrohm service representative for further maintenance work and repairs. The regional Metrohm service representative offers every form of technical advice for maintenance and service of all Metrohm products.
- Only use spare parts that meet the technical requirements of the manufacturer. Original spare parts always meet these requirements.

7.1 Cleaning the product surface

Regularly clean the product to prevent malfunctions and to ensure a long service life.

- Remove spilled chemicals immediately.
- Protect plug connections against contamination.

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.

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.

Prerequisite:

- The product is switched off and disconnected from the energy supply.

Required accessories:

- Cleaning cloth (soft, lint-free)
- Water or ethanol

1. Clean the surface with a damp cloth. Remove persistent contamination with ethanol.
2. Wipe the surface with a dry cloth.
3. Clean the connectors with a dry cloth.

7.2 Solvent Pump – Replacing the adsorber material

Replacing the adsorber material of the adsorber cartridge

At average humidity, Metrohm recommends replacing the adsorber material approx. every 6 weeks.
An increase in drift indicates that the leak-tightness of the KF titration cell should be inspected and that the molecular sieve may need to be replaced.

1 Removing the lid

Figure 12 Removing the lid

- Unclip the cartridge lid *(5-**1**)* incl. seal *(5-**2**)* from the cartridge housing *(5-**3**)* and remove it.

2 Removing the adsorber material

Figure 13 Removing the adsorber cartridge

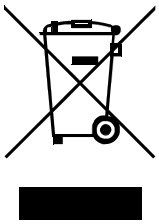
- Remove the entire content.
- This step is not necessary if the housing is empty.

The molecular sieve can be regenerated at 300 °C in the drying oven, see *https://www.metrohm.com/en/support-und-service/faq-kft/*.

3 Filling and closing the adsorber cartridge

(see "Filling and closing the adsorber cartridge", page 16)

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
Altitude / Pressure range	max. 2,000 m. above sea level / min. 780 mbar	
Overvoltage category	II	
Pollution degree	2	

9.2 Energy supply

External power supply unit

Inlet

Nominal voltage range	100–240 V AC	±10%
Frequency range	50–60 Hz	
Current	max. 1.5 A	

Outlet

Nominal voltage	24 V DC	
Current	max. 2.7 A	
Power output	65 W	

Instrument

Inlet

Nominal voltage	24 V DC	
Power consumption	max. 6 W	

9.3 Measurements and weight

Measurements

Width	150 mm
Height	249 mm
Depth	307 mm

Weight 2.1 kg

9.4 Housing

Materials

Cover	PP	20% filled with talc
Back panel	1.4301	Stainless steel
Base	1.4301	Stainless steel

IP degree of protection IP 21

9.5 Connectors specifications

Power IN

Socket	Round plug 4-pin

9.6 Liquid handling specifications

Pump

Type		Membrane
Number	1	

Flow rate	max. 5 s / 50 mL	depending on the fill level in the respective bottle
Aspirate	max. 15 s / 150 mL	depending on the fill level in the respective bottle