eppendorf

Register your instrument!
www.eppendorf.com/myeppendorf

Varispenser® 2
Varispenser® 2x

Operating Manual

0040 000 143-02/032022

Table of contents

1 Operating instructions

1.1 Using this manual

- Read this operating manual completely before using the device for the first time. Observe the instructions for use of the accessories where applicable.
- This operating manual is part of the product. Please keep it in a place that is easily accessible.
- Enclose this operating manual when transferring the device to third parties.
- The current version of the operating manual for all available languages can be found on our webpage www.eppendorf.com/manuals.

1.2 Danger symbols and danger levels

1.2.1 Danger symbols

The safety instructions in this manual have the following danger symbols and danger levels:

 **Biohazard**	 **Toxic substances**
 **Hazard point**	 **Material damage**

1.2.2 Danger levels

DANGER	Will lead to severe injuries or death.
WARNING	May lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

1.3 Symbols used

Depiction	Meaning
1. 2.	Actions in the specified order
▸	Actions without a specified order
•	List
Text	Display or software texts
	Additional information

1.4 Other applicable documents

- Instructions for use for flexible discharge tube
- Instructions for use for drying tube
- SOP - Standard operating procedure for manual dispensing systems

2 Safety

2.1 Intended use

The models of the Varispenser 2 series and the models of the Varispenser 2x series are laboratory devices for dispensing aqueous solutions directly from a supply bottle. The dispensers may only be used within the specified technical and physical limits.

Applications in or on the human body (in vivo applications) are not permitted.

The device has been designed for general laboratory applications and conforms to the requirements of the relevant standards, e.g., DIN EN ISO 8655. The use of the device for particular applications (e.g., for trace analysis, in the food industry, etc.) must be checked meticulously by the user himself. Special permits for particular applications, e.g., for the production or administration of food, pharmaceutics or cosmetics, have not been granted.

2.2 Application limits

2.2.1 Physical properties of the liquid

Density	up to 2.2 g/cm^3
Vapor pressure	up to 500 mbar *
Kinematic viscosity	up to 500 mm^2/ s
Temperature	15 °C – 40 °C

* Above 300 mbar, aspirate the liquid slowly to avoid boiling of the liquid.

2.2.2 Unsuitable liquids

NOTICE! Material damage due to incorrect handling
Deposits that are hard to dissolve lead to irreparable damage to the piston, the valves, and the discharge tube.

▸ Only use approved liquids.

The dispenser is not suitable for the following solutions, substances, and liquids:

- Liquids with low ignition temperatures.
- Liquids which attack FEP, ETFE, PFA, PTFE, PVDF, PP, borosilicate glass or Al_2O_3 ceramics.
- Solutions containing hydrofluoric acid.
- Suspensions, as solid particles can clog or damage the device (e.g. activated carbon).
- Liquids which form insoluble deposits and decomposing solutions (e.g. Biuret reagent).
- Substances which react catalytically with platinum iridium (e.g. H_2O_2).
- Explosive liquids (e.g. carbon disulfide).
- Nitric acid > 60%
- Trifluoroacetic acid.
- Tetrahydrofuran.

2.2.3 Liquids with restricted use

The dispenser is suitable for the following liquids to a limited extent:

- Dispense flammable liquids in glass tubes only and do not wipe the dispenser when it is dry to avoid an electrostatic charge.
- Liquids which form soluble deposits can make the piston difficult to move.
- Use nitric acid (concentration 60 % maximum) with thread adapters made from ETFE only.

2.3 Suitable acids and bases

Chemical substance	Maximum concentration
Adipic acid	unlimited
Aluminum hydroxide	unlimited
Formic acid	98 % – 100 %
Ammonium hydroxide	20 %
Boric acid	10 %
Chloroacetic acid	unlimited
Chromic acid [1]	10 %
Chromic acid	50 %
Chromosulfuric acid	unlimited
Acetic acid	50 %
Ethylenediaminetetraacetic acid	unlimited
Potassium hydroxide [2]	50 %
Lactic acid	unlimited
Sodium hydroxide [2]	30 %
Oxalic acid	unlimited
Perchloric acid [1]	10 %
Phosphoric acid	85 %
Nitric acid [1]	60 %
Hydrochloric acid [2]	35 %
Hydrochloric acid [1, 2]	37 %
Salicylic acid	unlimited
Sulfuric acid [1]	98 %
Sulfuric acid	60 %
Tartaric acid	unlimited

[1] Use the thread adapter made from ETFE.

[2] Use the drying tube.

2.4 Suitable organic liquids

Chemical substance	Maximum concentration
Acetone	unlimited
Acetonitrile	unlimited
Acetylaldehyde	unlimited
Benzene	unlimited
Benzine	unlimited
n-Butanol	unlimited
n-Butyl acetate	unlimited
Dibutyl phthalate [1]	unlimited
Dichlorobenzene	unlimited
Dichloroethane	unlimited
Diethyl ether [1]	unlimited
Diethylene glycol	unlimited
Dimethylformamide [1]	unlimited
1,4-Dioxane [1]	unlimited
Acetic acid ethyl ester	unlimited
Ethanol	100 %
Formaldehyde	40 %
Glycol	unlimited
Heating oil (Diesel oil)	unlimited
n-Hexane [1]	unlimited
Isobutanol	unlimited
Isopropanol	unlimited
Methanol	unlimited
Methylisobutylketone	unlimited
Nitrobenzene [1]	unlimited
Propanol	unlimited
Octane [1]	unlimited
Phenol (water saturated)	unlimited
Pyridine [1]	unlimited
Turpentine oil [1]	unlimited
Toluol [1]	unlimited

Chemical substance	**Maximum concentration**
Trichloromethane (chloroform)	unlimited
Triethylene glycol	unlimited
Tripropylene glycol	unlimited
Xylol	unlimited
[1] Use the thread adapter made from ETFE.	

2.5 Suitable inorganic liquids

Chemical substance	**Maximum concentration**
Aluminum chloride solution	unlimited
Ammonium chloride solution	unlimited
Ammonium fluoride	unlimited
Barium chloride	unlimited
Iodine potassium iodide solution	unlimited
Calcium chloride	unlimited
Potassium chloride	unlimited
Potassium permanganate	unlimited
Copper sulfate	unlimited
Magnesium chloride	unlimited
Mercury chloride	unlimited
Silver nitrate	unlimited
Zinc chloride	10 %
Zinc sulfate	10 %

2.6 Suitable saline solutions, buffers, wetting agents, oils, and other solutions

Chemical substance	Maximum concentration
Acrylonitrile [1]	unlimited
Allyl alcohol	unlimited
Amino acids	unlimited
n-Amyl acetate	unlimited
Amyl alcohol	unlimited
Amyl chloride	unlimited
Aniline	unlimited
Benzaldehyde	unlimited
Benzyl alcohol	unlimited
Brij-35 or Brij	unlimited
Dibutyl phthalate	unlimited
Glycerol	unlimited
Urea	unlimited
m-Cresol	unlimited
Methyl propyl ketone	unlimited
Sodium acetate	unlimited
Sodium dichromate	unlimited
Sodium lauryl sulfate (SDS)	unlimited
Propylene glycol	unlimited
Propylene oxide	unlimited
Salicylaldehyde	unlimited
Silver acetate	unlimited
TRIS HCl	unlimited
Triton X-100	unlimited
Tween 20	unlimited
[1] Use the thread adapter made from ETFE.	

2.7 Suitable cleaning and decontamination agents

Chemical substance	Maximum concentration
Biocidal ZF	unlimited
Cidex	unlimited
Dismozon pur (peroxide-based)	4 %
DNA *AWAY*	unlimited
DNA-Erase	unlimited
Ethanol	70 %
Helipur (phenol-based)	6 %
Hexaquart S (QAV-based)	5 %
Hi-TOR Plus (DISCONTINUED)	unlimited
Isopropanol	70 %
Korsolex basic (aldehyde-base)	5 %
Meliseptol (alcohol-based)	unlimited
Sodium hypochlorite	4 %
RNase AWAY	unlimited
RNase-ExitusPlus	unlimited
Sterillium	unlimited

2.8 User profile

The device and accessories may only be operated by trained and skilled personnel.

Before using the device, read the operating manual and the instructions for use of the accessories carefully and familiarize yourself with the device's mode of operation.

2.9 Warnings for intended use

WARNING! Damage to health due to infectious liquids and pathogenic germs.

- When handling infectious liquids and pathogenic germs, observe the national regulations, the biosafety level of your laboratory, and the manufacturers' Safety Data Sheets and application notes.
- Wear your personal protective equipment.
- Consult the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, as amended) for comprehensive regulations on the handling of germs or biological material of risk group II or higher.

WARNING! Damage to health due to toxic, radioactive or aggressive chemicals.

- Wear your personal protective equipment.
- Observe the national regulations for handling these substances.
- Observe the manufacturers' Safety Data Sheets and application notes.

CAUTION! Contamination due to contact with biological and chemical reagents.
Contact with reagents may be harmful to eyes or skin.

- Wear your personal protective equipment.
- Make sure that no reagents are leaking from the device.
- Ensure that the piston can move freely before starting work.
- Do not point the opening of the discharge tube towards people.
- Remove the sealing cap from the discharge tube before pushing down the piston.
- Only initiate liquid dispensing if you are not endangering other people.
- Dispense liquid slowly and evenly to prevent splashing. Do not use force.
- Only disassemble the device when it is clean.

CAUTION! Contamination with reagents when removing the sealing cap.
The sealing cap may contain biological and chemical reagents. Contact with reagents may be harmful to eyes or skin.

- Wear your personal protective equipment when removing the sealing cap.

CAUTION! Personal injury due to incorrect transportation of the device.
If the assembled device is not transported correctly, reagents will be released. Contact with reagents may be harmful to eyes or skin.

- To transport the assembled device, hold the head gear of the device with one hand and support the bottom of the bottle with the other hand.
- Do not hold the device by the cylinder sleeve.

CAUTION! Poor safety due to incorrect accessories and spare parts.
The use of accessories and spare parts other than those recommended by Eppendorf may impair the safety, functioning and precision of the device. Eppendorf cannot be held liable or accept any liability for damage resulting from the use of accessories and spare parts other than those recommended or from improper use.

- Only use accessories and original spare parts recommended by Eppendorf.

NOTICE! Material damage due to improper use.

- Only use the product for its intended purpose as described in the operating manual.
- Ensure adequate material resistance when using chemical substances.
- If in doubt, contact the manufacturer of the product.

NOTICE! Damage to the device due to contamination inside the device.
If there are contaminations inside the dispenser, the dosing valve may be blocked and the valve ball may be stuck. When the piston is pushed down, high pressure develops in the dispenser. If the valve ball is not released, liquid is pushed past the sealing lip and enters the inside of the housing.

- If the piston is hard to move, clean the dispenser.

3 Product description

3.1 Delivery package

3.1.1 Varispenser 2 – 2 mL – 10 mL

Quantity	Description
1	Varispenser 2
1	Operating manual
5	Thread adapter (25 mm, 28 mm, 32 mm, 38 mm, 40 mm)
1	Telescopic aspirating tube (125 mm – 240 mm)
1	Universal wrench
1	Certificate

3.1.2 Varispenser 2 – 25 mL – 100 mL

Quantity	Description
1	Varispenser 2
1	Operating manual
3	Thread adapter (32 mm, 38 mm, 40 mm)
1	Telescopic aspirating tube (170 mm – 330 mm)
1	Universal wrench
1	Certificate

3.1.3 Varispenser 2x – 2 mL – 10 mL

Quantity	Description
1	Varispenser 2x
1	Operating manual
5	Thread adapter (25 mm, 28 mm, 32 mm, 38 mm, 40 mm)
1	Telescopic aspirating tube (125 mm – 240 mm)
1	Universal wrench
1	Recirculation tube
1	Certificate

3.1.4 Varispenser 2x – 25 mL – 100 mL

Quantity	Description
1	Varispenser 2x
1	Operating manual
3	Thread adapter (32 mm, 38 mm, 40 mm)
1	Telescopic aspirating tube (170 mm – 330 mm)
1	Universal wrench
1	Recirculation tube
1	Certificate

3.2 Product overview
3.2.1 Varispenser 2

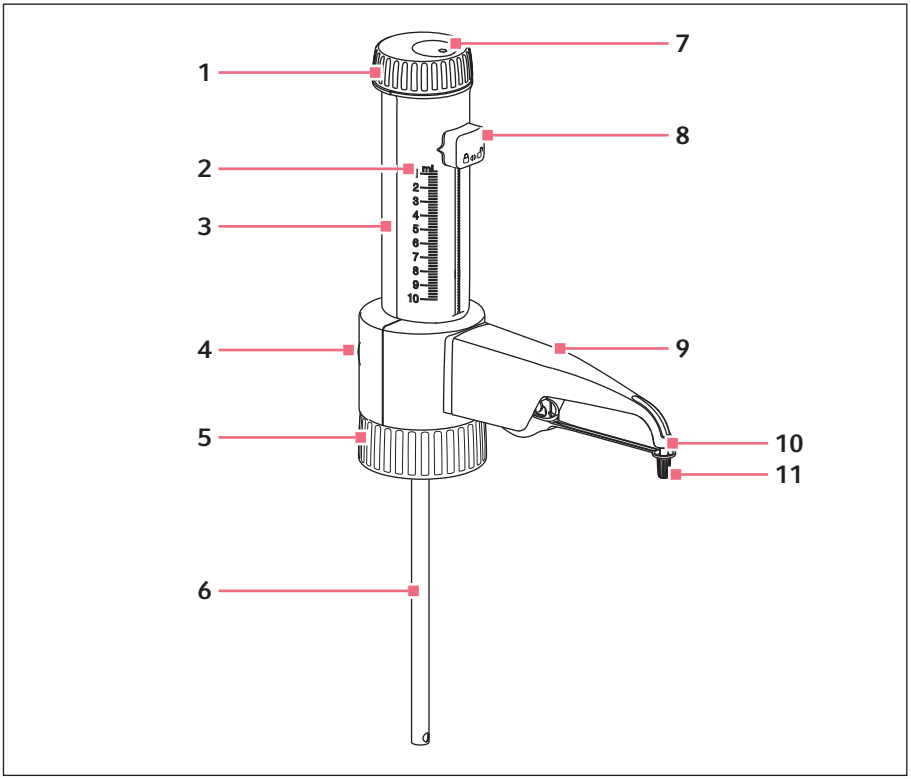


Fig. 3-1: Varispenser 2

1 **Piston bearing**

2 **Volume scale**
Maximum volume corresponds to the nominal volume

3 **Piston pump**
Housing, cylinder guard, cylinder und piston

4 **Ventilation screw**
Connecting the optional accessories (not included in the delivery package)

5 **Threaded connection**

6 **Telescopic aspirating tube**

7 **Adjustment cover**

8 **Volume selection slider**

9 **Canula arm**

10 **Discharge tube**

11 **Sealing cap**

3.2.2 Varispenser 2x

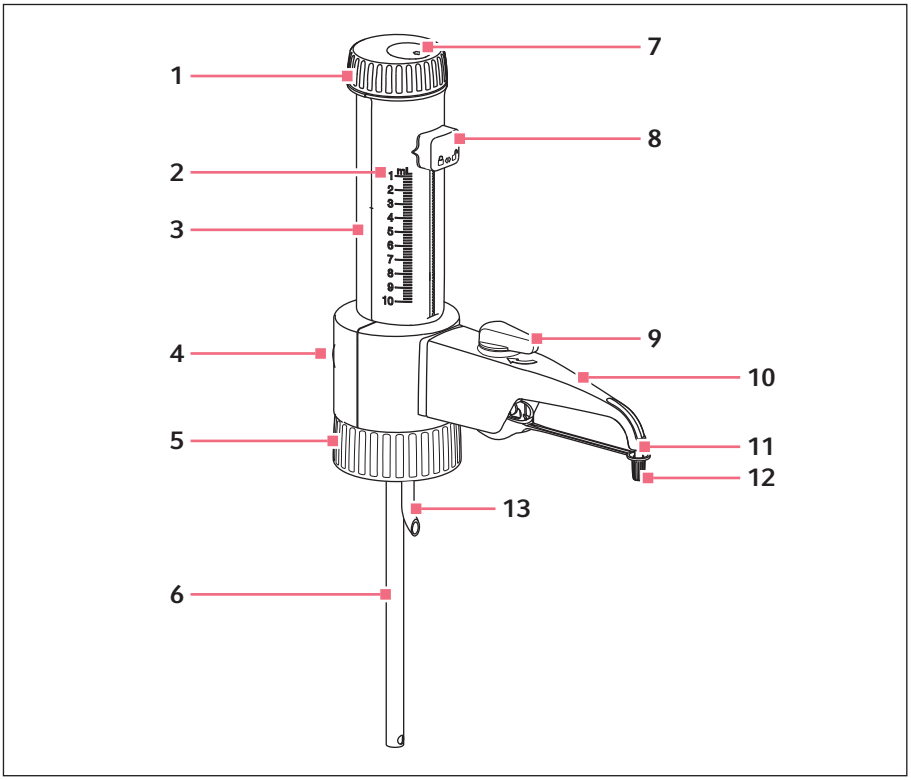


Fig. 3-2: Varispenser 2x

1 Piston bearing

2 Volume scale
Maximum volume corresponds to the nominal volume

3 Piston pump
Housing, cylinder guard, cylinder und piston

4 Ventilation screw
Connecting the optional accessories (not included in the delivery package)

5 Threaded connection

6 Telescopic aspirating tube

7 Adjustment cover

8 Volume selection slider

9 Dosing valve
Including valve toggle

10 Canula arm

11 Discharge tube

12 Sealing cap

13 Recirculation tube

3.2.3 Telescopic aspirating tube

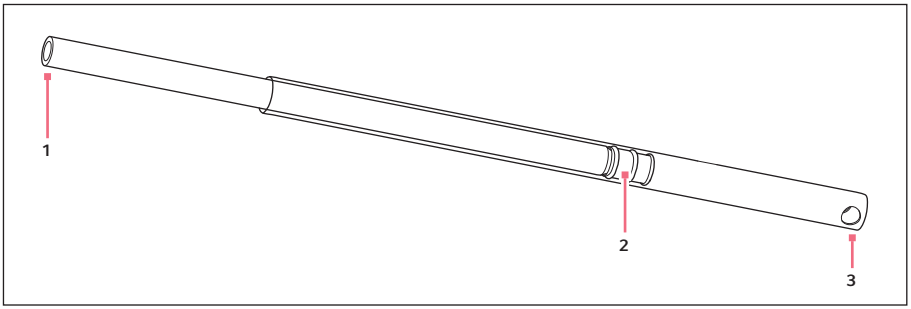


Fig. 3-3: Telescopic aspirating tube

1 Connection opening
Inner tube - connection side for filling valve

2 Seal

3 Aspiration opening
Outer tube

3.2.4 Recirculation tube – Varispenser 2x

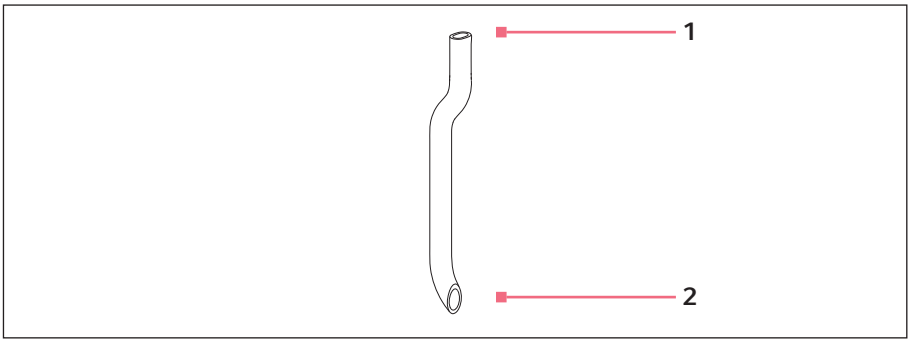


Fig. 3-4: Recirculation tube

1 Connection opening

2 Discharge opening

3.2.5 Thread adapter

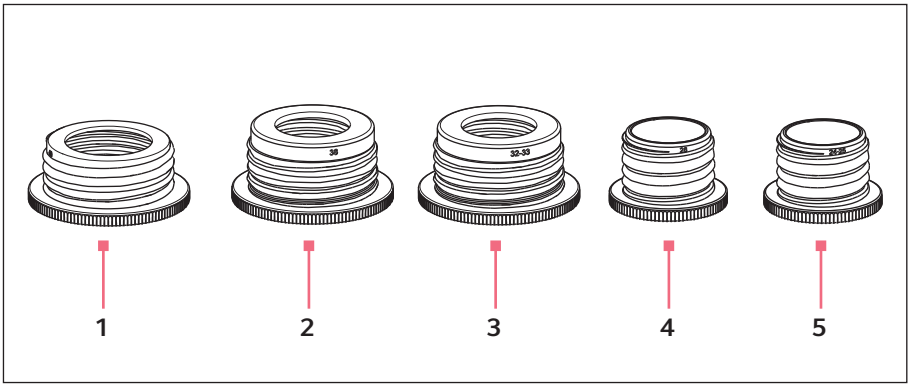


Fig. 3-5: Thread adapter

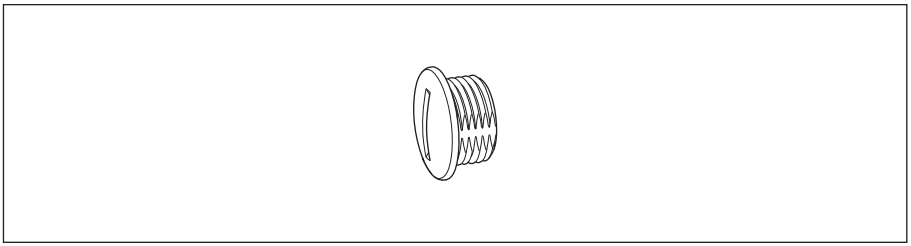
1 Reducing from 45 mm to 40 mm
2 Reducing from 45 mm to 38 mm
3 Reducing from 45 mm to 32 mm
4 Reducing from 32 mm to 28 mm
5 Reducing from 32 mm to 25 mm

3.2.6 Ventilation screw

The ventilation screw can be replaced by the optional accessories.

Optional accessories:

- Flexible discharge tube
- Drying tube



3.2.7 Tools

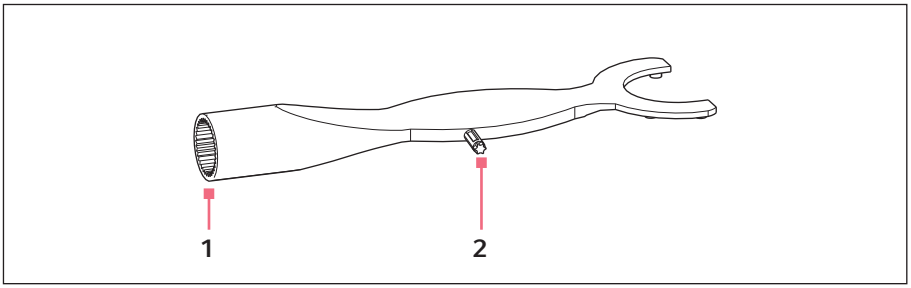


Fig. 3-6: Universal wrench

1 Mounting wrench
Mounting side for valves

2 Adjustment wrench

3.3 Features

When handling aggressive liquids, the dispenser offers the greatest possible protection for users and the laboratory environment. The user has to judge for himself whether the Varispenser is suitable for the intended application. The user has to judge the chemical compatibility of the reagents used himself.

The Varispenser is autoclavable.

Varispenser 2

The Varispenser 2 is a bottle top dispenser for dispensing liquids with milliliter accuracy.

- Dispensing - Dispense liquid from a bottle into a destination vessel.
- Adjustment option - Set the dispenser to liquids with a density other than water.

Varispenser 2x

The Varispenser 2x is a bottle top dispenser for dispensing liquids with milliliter accuracy without wasting liquid.

- Dispensing - Dispense liquid from a bottle into a destination vessel.
- Recirculation - Recirculate liquid from the bottle back into the bottle, e.g., to remove air bubbles from the cylinder.
- Adjustment option - Set the dispenser to liquids with a density other than water.

3.4 Materials

NOTICE! Aggressive substances may damage the Varispenser 2 and accessories.

- Check the chemical resistance before using organic solvents or aggressive chemicals.

Assembly	Material
Filling valve	Perfluoroalkoxy (PFA), Al_2O_3 ceramics, boroslilicate glass
Discharge tube	Fluorinated ethylene propylene (FEP)
Discharge valve	Perfluoroalkoxy (PFA), platinum-iridium (Pt-Ir), Al_2O_3 ceramics, boroslilicate glass
Piston bearing	Polypropylene (PP)
Sealing lip of the piston	Perfluoroalkoxy (PFA)
Recirculation tube	Fluorinated ethylene propylene (FEP)
Telescopic aspirating tube	Fluorinated ethylene propylene (FEP), polytetrafluorethylene (PTFE)
Valve ball (filling valve)	Boroslilicate glass
Sealing cap	Polypropylene (PP)
Volume selection switch	Polypropylene (PP)
Cylinder	Boroslilicate glass

When operated correctly, the dispensed liquid comes into contact with the following chemically resistant materials: borosilicate glass, Al_2O_3 ceramics, ETFE, FEP, PFA, PTFE, platinum iridium, PP.

4 Installation

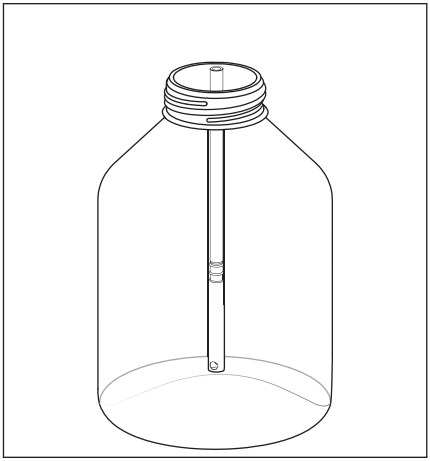
4.1 Setting and inserting the telescopic aspirating tube

4.1.1 Adjusting the telescopic aspiration tube to the height of the bottle

Prerequisites

- The bottle is larger than the collapsed telescopic aspirating tube.

Use an empty bottle to adjust the telescopic aspiration tube.



1. Hold the telescopic aspiration tube next to the bottle.
2. Extend the telescopic aspiration tube. The telescopic aspiration tube is supposed to reach from the bottle opening to just above the base of the bottle.

4.1.2 Shortening the telescopic aspiration tube for smaller bottles

Prerequisites

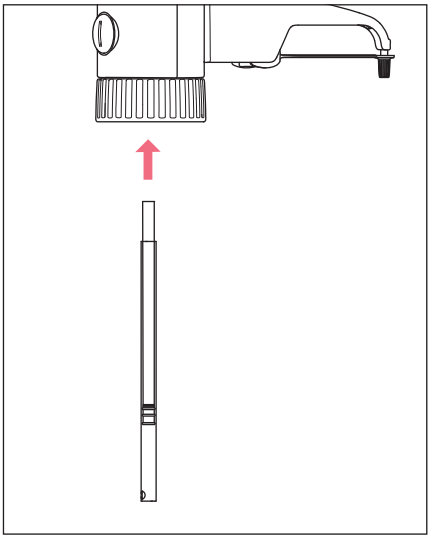
- The bottle is smaller than the collapsed telescopic aspirating tube.

1. Extend the telescopic aspiration tube completely.
2. Shorten the inner tube at the connection side.
3. Shorten the outer tube opposite the aspiration openings.
4. Assemble the telescopic aspirating tube.

4.1.3 Inserting the telescopic aspirating tube

Prerequisites

- The telescopic aspiration tube is adjusted to the height of the bottle.

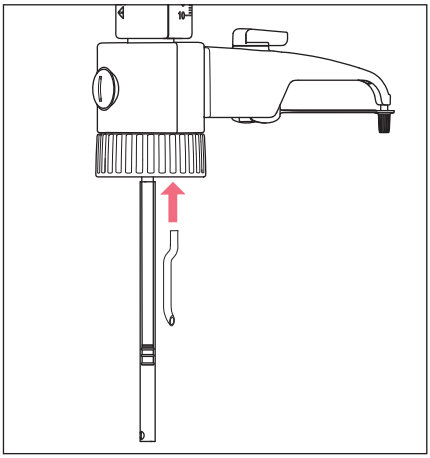


1. Push the telescopic aspirating tube straight onto the filling valve until it reaches the stop.

4.2 Installing the recirculation tube – Varispenser 2x

Prerequisites

- The telescopic aspirating tube is inserted.



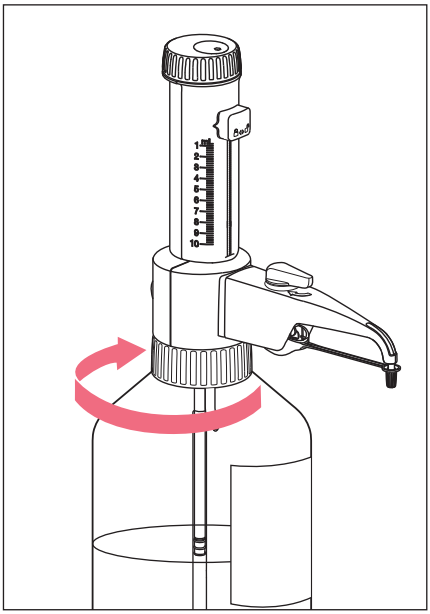
1. Insert the recirculation tube next to the telescopic aspirating tube.
2. Rotate the opening of the recirculation tube outward.

5 Operation

5.1 Screwing the dispenser onto the bottle

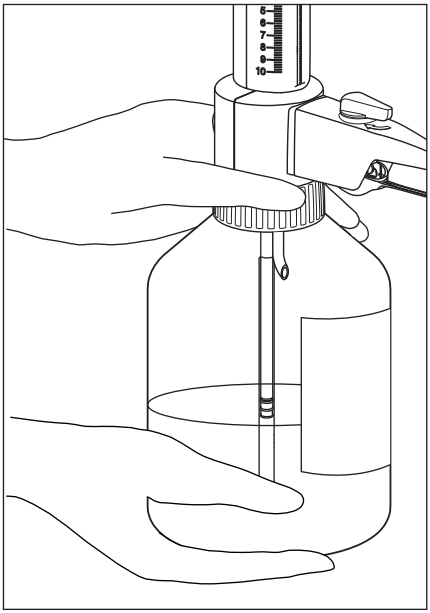
Prerequisites

- Varispenser 2x – The recirculation tube is installed.
- The telescopic aspirating tube is installed.
- The length of the telescopic aspirating tube has been adjusted to the size of the bottle.



1. Put the dispenser straight onto the bottle thread and tighten it.
2. Align the discharge tube to the label on the bottle.

5.2 Carrying the dispenser and the bottle



1. Grasp the dispenser by the thread connection.
2. Hold the bottle at its base.
3. Carry the dispenser and the bottle upright.

5.3 Screwing on the thread adapter

The thread connection of the dispenser is designed for bottle threads of 45 mm. For other bottle threads a thread adapter can be used. The diameter of the thread adapter is imprinted on the adapter. If the bottle thread is smaller than 32 mm, a second adapter must be used.

5.3.1 Determining the diameter of the flask neck

Prerequisites

- A suitable thread adapter is available.

Some thread adapters are included in the delivery package.Other diameters can be ordered.

1. Measure the inner diameter of the bottle top or the outer diameter of the flask neck.
2. Choose the suitable thread adapter.

5.3.2 Screwing on the thread adapter

Prerequisites

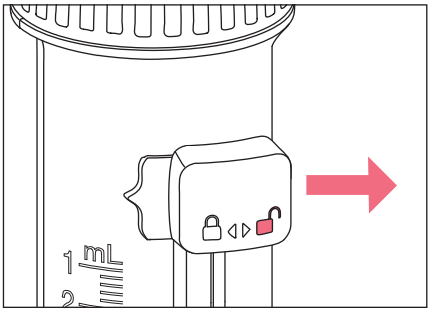
- A suitable thread adapter is available.

If you need a thread adapter with a higher resistance to chemicals, use a PTFE/ETFE adapter.

1. Screw the thread adapter onto the flask neck.
   The dispenser can be screwed onto the bottle.

5.4 Operating the volume selection slider

5.4.1 Unlocking the volume selection slider

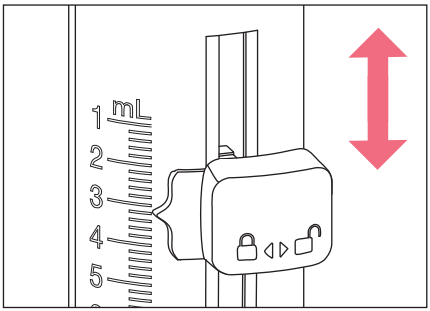


1. Slide the volume selection slider to the right.
   The volume selection slider is unlocked.
   The volume selection slider can be moved.
   The volume can be set.

5.4.2 Setting the volume

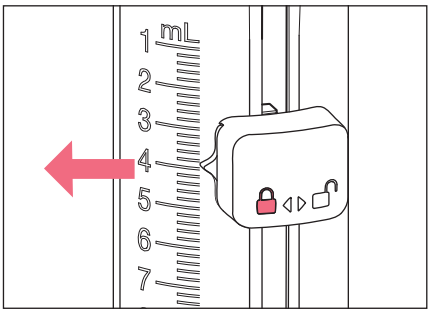
Prerequisites

- The volume selection slider is unlocked.



1. Slide the volume selection slider to the desired volume.
   The volume has been set.
   The volume selection slider can be locked.

5.4.3 Locking the volume selection slider

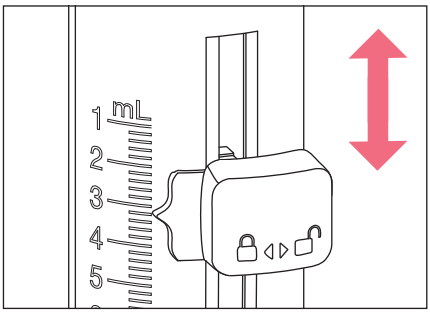


1. Slide the volume selector switch to the left.
   The volume selection slider is locked.
   The volume selection slider cannot be moved.
   The liquid can be dispensed.

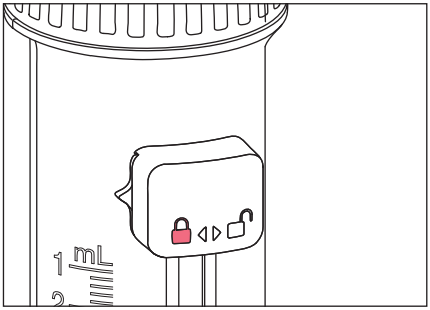
5.5 Locking the piston

Prerequisites

- The volume selection slider is unlocked.



1. Slide the volume selection slider as far upwards as it will go.



2. Slide the volume selection slider to the left.
   The volume selection slider is in the basic position and it is locked.
   No liquid can be dispensed.

5.6 Dispensing liquid – Varispenser 2

NOTICE! Damage to the device due to contamination inside the device.
If there are contaminations inside the dispenser, the dosing valve may be blocked and the valve ball may be stuck. When the piston is pushed down, high pressure develops in the dispenser. If the valve ball is not released, liquid is pushed past the sealing lip and enters the inside of the housing.

- If the piston is hard to move, clean the dispenser.

CAUTION! Contamination with reagents when removing the sealing cap.
The sealing cap may contain biological and chemical reagents. Contact with reagents may be harmful to eyes or skin.

- Wear your personal protective equipment when removing the sealing cap.

5.6.1 Rinsing the dispenser prior to initial setup

Prerequisites
- A bottle of demineralized water is available.

1. Screw the dispenser onto a bottle containing demineralized water.
2. Place a collection vessel below the discharge tube.
3. Remove the sealing cap carefully.
4. Pump several times to flush the dispenser.
5. Empty the dispenser.
6. Remove the dispenser and pump it through dry with air several times.

5.6.2 Venting the dispenser

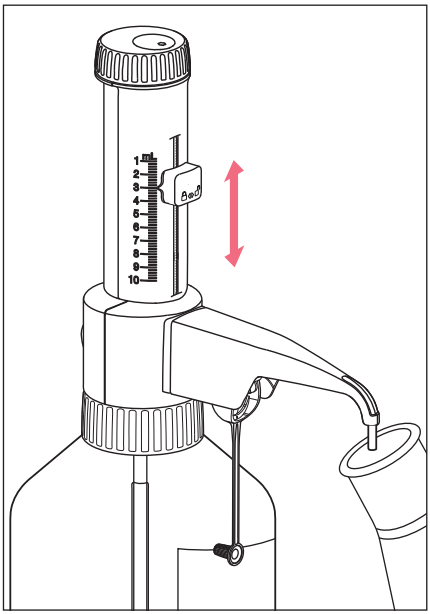
Prerequisites
- The dispenser is clean.
- The dispenser has been screwed onto the storage bottle.
- The maximum volume is set.
- A collection vessel is available.

1. Remove the sealing cap carefully.
2. Hold a collection vessel below the discharge tube.
3. Pull up the piston by approx. 30 mm.
4. Dispense the liquid.
5. Repeat the procedure until the liquid in the cylinder is free from air bubbles.
6. Discard the liquid.
   The dispenser has been vented.
   The liquid can be dispensed accurately.

5.6.3 Dispensing liquid

Prerequisites

- The dispenser has been vented.
- A destination vessel is available.

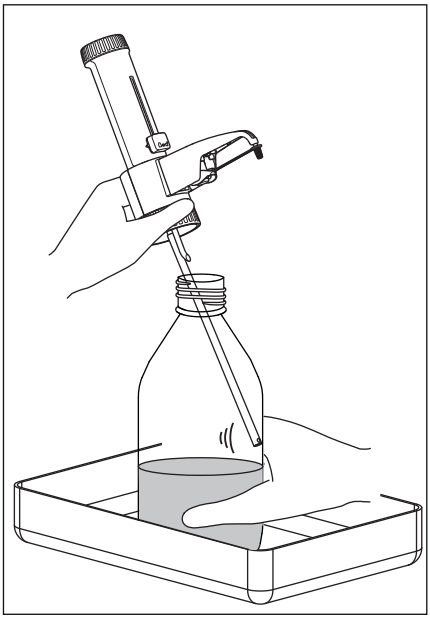


1. Set the required volume.
2. Remove the sealing cap carefully.
3. Hold a destination vessel under the discharge tube.
4. Slowly and evenly pull the piston up until the stop.
5. Slowly and evenly push the piston down. The set amount of liquid is dispensed.

5.6.4 Emptying the dispenser

Prerequisites

- The piston is in the lower position.



1. Attach the sealing cap.
2. Place the dispenser and the bottle in a collecting vessel.
3. Remove the dispenser.
4. Pull the dispenser out of the bottle until the telescopic aspirating tube is no longer immersed in the liquid.
5. Tap the telescopic aspirating tube against the inside of the bottle.
   The residual liquid flows out of the telescopic aspirating tube.
   The dispenser is empty.

5.6.5 Rinsing the dispenser

Prerequisites

- The dispenser is empty.
- A bottle with a neutral cleaning solution is available.
- A bottle of demineralized water is available.

1. Screw the dispenser onto the bottle containing the neutral cleaning solution.
2. Place a collection vessel below the discharge tube.
3. Remove the sealing cap carefully.
4. Pump several times to flush the dispenser.
5. Empty the dispenser.
6. Screw the dispenser onto a bottle containing demineralized water.
7. Pump several times to flush the dispenser.
8. Empty the dispenser.
9. Remove the dispenser and pump it through dry with air several times.

5.7 Dispensing liquid – Varispenser 2x

NOTICE! Damage to the device due to contamination inside the device.
If there are contaminations inside the dispenser, the dosing valve may be blocked and the valve ball may be stuck. When the piston is pushed down, high pressure develops in the dispenser. If the valve ball is not released, liquid is pushed past the sealing lip and enters the inside of the housing.

- If the piston is hard to move, clean the dispenser.

CAUTION! Contamination with reagents when removing the sealing cap.
The sealing cap may contain biological and chemical reagents. Contact with reagents may be harmful to eyes or skin.

- Wear your personal protective equipment when removing the sealing cap.

5.7.1 Rinsing the dispenser prior to initial setup

Prerequisites

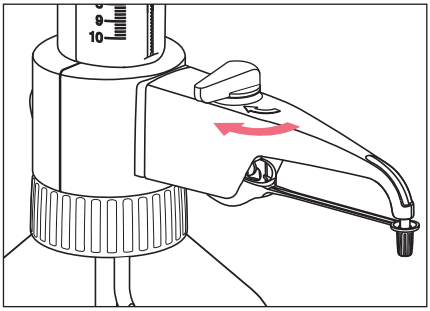
- The valve toggle is set to dispensing.
- A bottle of demineralized water is available.

1. Screw the dispenser onto a bottle containing demineralized water.
2. Place a collection vessel below the discharge tube.
3. Remove the sealing cap carefully.
4. Pump several times to flush the dispenser.
5. Set the valve toggle to recirculation.
6. Pump several times to flush the recirculation valve.
7. Empty the dispenser.
8. Remove the dispenser and pump it through dry with air several times.

5.7.2 Venting the dispenser

Prerequisites

- The dispenser is clean.
- The dispenser has been screwed onto the storage bottle.
- The maximum volume is set.
- A collection vessel is available.

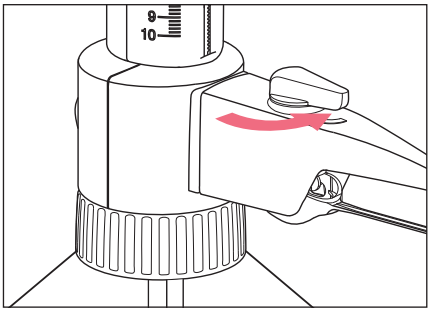


1. Remove the sealing cap carefully.
2. Set the valve toggle to recirculation.
3. Pull up the piston by approx. 30 mm.
4. Dispense liquid into the bottle.
5. Repeat the procedure until the liquid in the cylinder is free from air bubbles.
6. Set the valve toggle to dispensing.
7. Fill the discharge tube with liquid.
8. Set the valve toggle to recirculation.
9. Dispense the remaining liquid into the bottle.
10. Set the valve toggle to dispensing.
    The dispenser has been vented.
    Liquid can be dispensed.

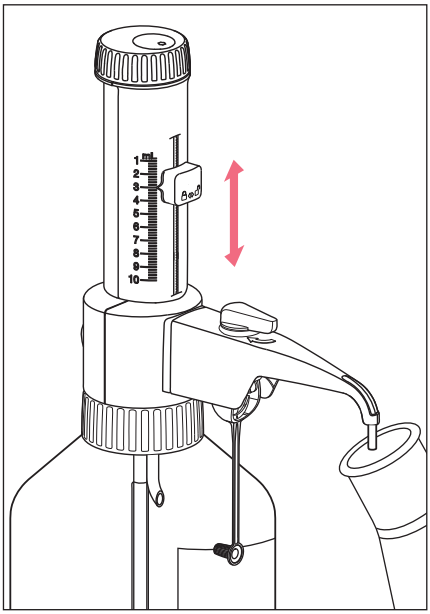
5.7.3 Dispensing liquid

Prerequisites

- The dispenser has been vented.
- A destination vessel is available.



1. Set the valve toggle to dispensing.
2. Remove the sealing cap carefully.
3. Set the required dispensing volume.

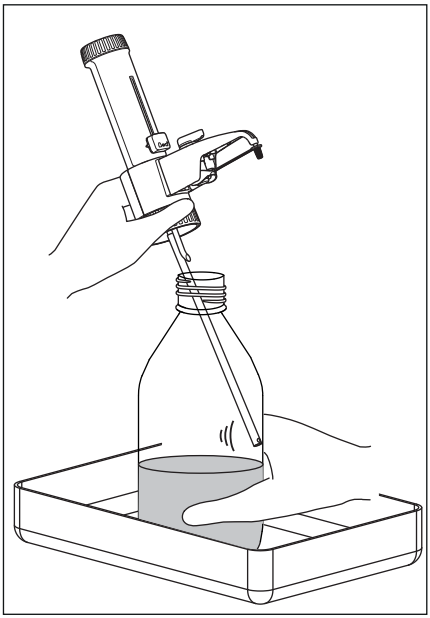


4. Hold a collection vessel below the discharge tube.
5. Slowly and evenly pull the piston up until the stop.
6. Slowly and evenly push the piston down until the stop.
   The set amount of liquid is dispensed.

5.7.4 Emptying the dispenser

Prerequisites

- The piston is in the lower position.
- The valve toggle is set to dispensing.



1. Attach the sealing cap.
2. Place the dispenser and the bottle in a collecting vessel.
3. Remove the dispenser.
4. Pull the dispenser out of the bottle until the telescopic aspirating tube is no longer immersed in the liquid.
5. Tap the telescopic aspirating tube against the inside of the bottle.
   The residual liquid flows out of the telescopic aspirating tube.
   The dispenser is empty.

5.7.5 Rinsing the dispenser

Prerequisites

- The dispenser is empty.
- The valve toggle is set to dispensing.
- A bottle with a neutral cleaning solution is available.
- A bottle of demineralized water is available.

1. Screw the dispenser onto the bottle containing the neutral cleaning solution.
2. Place a collection vessel below the discharge tube.
3. Remove the sealing cap carefully.
4. Pump several times to flush the dispenser.
5. Set the valve toggle to recirculation.
6. Pump several times to flush the recirculation valve.
7. Empty the dispenser.
8. Screw the dispenser onto a bottle containing demineralized water.
9. Pump several times to flush the dispenser.
10. Pump several times to flush the recirculation valve.
11. Empty the dispenser.
12. Remove the dispenser and pump it through dry with air several times.

5.8 Cleaning the dispenser

CAUTION! Personal injury due to contact with reagents.
The feeding mechanism, valves, telescopic aspirating tube and discharge tube are filled with reagents. Reagents enter the bottle with the cleaning solution. Contact with reagents may be harmful to eyes or skin.

- ▸ Wear your personal protective equipment.
- ▸ Discard the cleaning solution after cleaning.

The dispenser must be cleaned:

- If the piston is hard to move.
- Regularly for liquids which form soluble deposits.
- When the reagent is changed.
- Prior to autoclaving.
- Prior to storage.
- Prior to service and repair work.
- Prior to disassembly.
- Prior to valve replacement.
- Regularly when liquid accumulates in the sealing cap.

Prerequisites

- The dispenser is empty and flushed.
- A bottle of demineralized water is available.
- A bottle with a cleaning solution is available.
- A soft cleaning brush is available.

1. Pull off the telescopic aspirating tube and clean it with the cleaning brush.
2. Unscrew the piston mount and carefully pull out the piston.
3. Use the cleaning brush and water to clean the piston and cylinder.
4. Insert the piston into the cylinder.
5. Tighten the piston bearing.
6. Flush the dispenser with the cleaning solution.
7. Flush the dispenser with demineralized water.
8. Empty the dispenser.

5.9 Rinsing the dispenser after using strong acids or bases

When strong acids or bases have been dispensed, the residual liquid in the dispenser must first be neutralized.

- A bottle with neutralization liquid is available.
- A collection vessel is available.
- A bottle of demineralized water is available.

1. Screw the dispenser onto the bottle with neutralization liquid.
2. Remove the sealing cap.
3. Hold a collection vessel below the discharge tube.
4. Flush the dispenser several times.
5. Pump several times to flush the recirculation valve.
6. Remove the dispenser.
7. Screw the dispenser onto the bottle containing demineralized water.
8. Flush the dispenser several times.
9. Remove the dispenser.
10. Pump dry air through the dispenser several times.

6 Troubleshooting

6.1 Dispenser and piston

Problem	Cause	Solution
The piston is difficult to move.	• The sealing cap is on the discharge tube.	▸ Remove the sealing cap carefully.
	• Crystals have formed.	1. Abort dispensing. 2. Clean the dispenser. 3. If the problem persists, contact the authorized service.
	• The piston seal is damaged.	▸ If the problem persists, contact the authorized service.
The canula arm cannot be mounted.	• The discharge valve has not been screwed far enough into the valve block.	▸ Use the universal wrench to tighten the discharge valve.

6.2 Dispensing and liquid

Problem	Cause	Solution
The aspirated liquid contains air bubbles.	• The dispenser was not vented sufficiently.	▸ Vent the dispenser.
	• The telescopic aspirating tube has not been mounted correctly.	▸ Slide the telescopic aspirating tube firmly onto the filling valve.
	• The telescopic aspirating tube is damaged.	▸ Shorten the telescopic aspirating tube or replace it.
	• The filling valve is loose.	▸ Use the universal wrench to tighten the filling valve. ▸ If the problem persists, replace the filling valve with a new valve.
	• The filling valve is damaged.	▸ If the problem persists, replace the filling valve with a new valve.
	• The telescopic aspirating tube is not immersed in the liquid.	▸ Lengthen the telescopic aspirating tube until it is immersed in the liquid .
	• The bottle is empty.	▸ Fill the bottle.

Problem	Cause	Solution
The dispenser does not aspirate any liquid.	• The telescopic aspirating tube has not been mounted correctly.	▸ Slide the telescopic aspirating tube firmly onto the filling valve.
	• The filling valve is clogged.	1. Clean the dispenser. 2. If the problem persists, replace the filling valve.
The dispensed volume is too low.	• The telescopic aspirating tube has not been mounted correctly.	▸ Slide the telescopic aspirating tube firmly onto the filling valve.
	• The telescopic aspirating tube is damaged.	▸ Shorten the telescopic aspirating tube or replace it.
	• The dispenser is adjusted incorrectly.	▸ Adjust the dispenser. ▸ If the problem persists, send the dispenser to the authorized service.
	• The filling valve is loose.	▸ Use the universal wrench to tighten the filling valve. ▸ If the problem persists, replace the filling valve with a new valve.
	• The filling valve is damaged.	▸ If the problem persists, replace the filling valve with a new valve.
No liquid can be dispensed.	• The discharge valve is sticky.	▸ Disassemble the discharge valve. ▸ Clean the discharge valve. ▸ Release the jammed valve ball. ▸ If the problem persists, replace the discharge valve with a new valve.
Liquid escapes at the threaded connection.	• The recirculation tube is missing.	▸ Insert the recirculation tube.
	• A slightly volatile liquid was dispensed without the sealing washer.	▸ Insert the sealing washer.
	• Liquids that are sensitive to moisture and/or CO_2 were dispensed.	▸ Insert the sealing washer. ▸ Use the drying tube.

Problem	Cause	Solution
Liquid escapes at the canula connection.	• The port of the discharge valve is leaking.	▸ Use the universal wrench to tighten the discharge valve. ▸ If the problem persists, replace the discharge valve with a new valve.
Liquid escapes between the cylinder and the housing cases.	• Cylinder or cylinder gasket is leaking.	▸ If the problem persists, send the dispenser to the authorized service.

7 Maintenance

7.1 Decontamination before shipment

If you are shipping the device to the authorized Technical Service for repairs or to your authorized dealer for disposal please note the following:

WARNING! Risk to health from contaminated device.

1. Observe the information contained in the decontamination certificate. It is available as a PDF document on our webpage (https://www.eppendorf.com/decontamination).
2. Decontaminate all parts to be shipped.
3. Include the fully completed decontamination certificate in the shipment.

7.2 Autoclaving the dispenser

NOTICE! Material damage from hot metal surfaces.
The plastic parts of the dispenser can melt if they get into contact with hot metal surfaces.

- ▶ Place the dispenser on a cloth during autoclaving.

Prerequisites

- The dispenser has been cleaned.
- Varispenser 2x – The valve toggle is set to dispensing.
- The dispensing piston is pressed down.
- Autoclave at 121 °C and 2 bar positive pressure.

1. Remove the sealing cap carefully.
2. Remove the telescopic aspirating tube.
3. Check the filling valve for proper seating.
4. Turn over the dispenser.
   The filling valve faces upwards.
5. Slightly tap the valve block.
   Any jammed valve balls are released.
   The steam of the autoclave can pass through the valve without any obstruction.
6. Place the dispenser and the telescopic aspirating tube in the autoclave on a cloth.
7. Autoclave for 20 minutes.
8. Let the dispenser cool down for 2 hours after autoclaving.
9. Check all parts for distortion or leaks.

7.3 Flushing a dispenser before long-term storage

Prerequisites

- A bottle of demineralized water is available.
- A bottle with a mixture of glycerol (1 %) in ethanol (reagent-grade, not denatured) is available.
- A collection vessel is available.

1. Screw the dispenser onto the bottle containing demineralized water.
2. Set the volume selection slider to maximum volume.
3. Remove the sealing cap carefully.
4. Flush the dispenser several times.
5. Remove the dispenser.
6. Screw the dispenser onto the bottle containing the glycerol-ethanol mixture.
7. Flush the dispenser several times.
8. Remove the dispenser.
9. Tap the telescopic aspirating tube against the inside of the bottle.
   The residual liquid flows out of the telescopic aspirating tube.
   The dispenser is empty.

7.4 Replacing valves or canula arm

CAUTION! Personal injury due to contact with reagents.
The feeding mechanism, valves, telescopic aspirating tube and discharge tube are filled with reagents.
Contact with reagents may be harmful to eyes or skin.

- Only disassemble the device if it is clean and has been decontaminated.

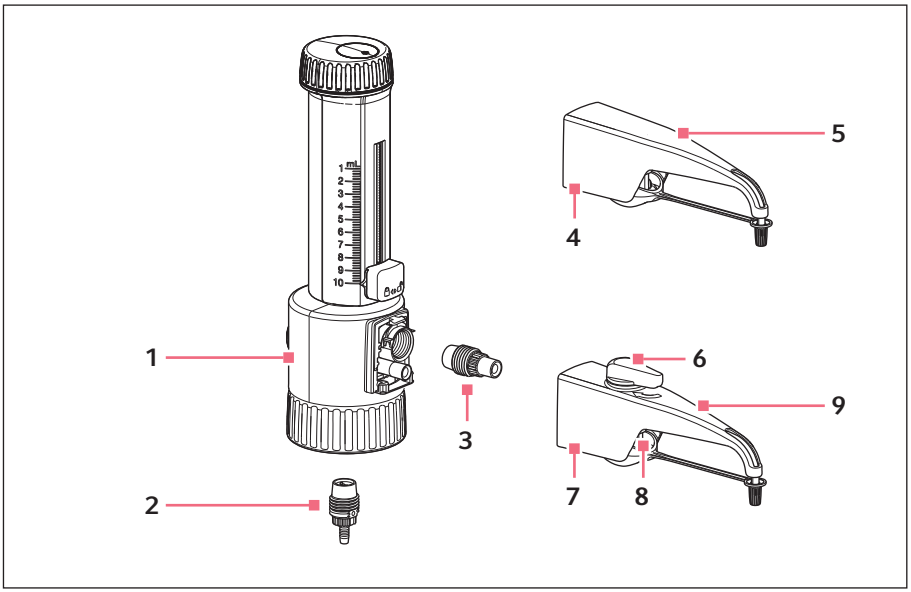


Fig. 7-1: Valve block with valves

1 **Valve block**
With filling valve und discharge valve

2 **Filling valve**

3 **Discharge valve**

4 **Housing**

5 **Canula arm**
Varispenser 2

6 **Valve toggle**

7 **Housing**

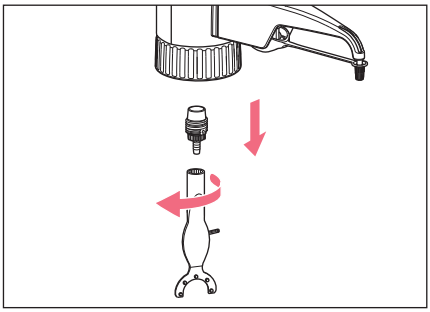
8 **Dosing valve**

9 **Canula arm**
Varispenser 2x

7.4.1 Removing the filling valve

Prerequisites

- The dispenser is clean.
- The telescopic aspirating tube has been removed.
- Varispenser 2x – The recirculation tube has been removed.
- The universal wrench is available.

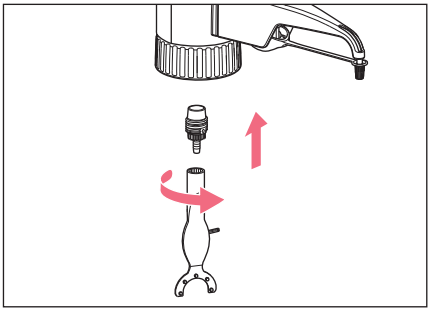


1. Attach the universal wrench to the top of the filling valve.
2. Unscrew the filling valve in a counterclockwise direction.

7.4.2 Mounting the filling valve

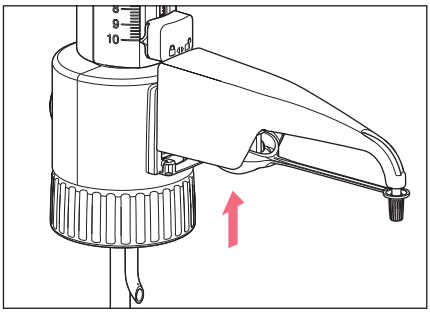
Prerequisites

- The defective filling valve has been removed.
- A new filling valve is available.
- The universal wrench is available.

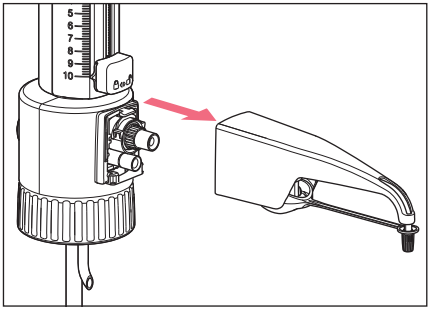


1. Screw a new filling valve into the valve block by hand.
2. Attach the universal wrench.
3. Tighten the filling valve in a clockwise direction.

7.4.3 Disassembling the canula arm – Varispenser 2

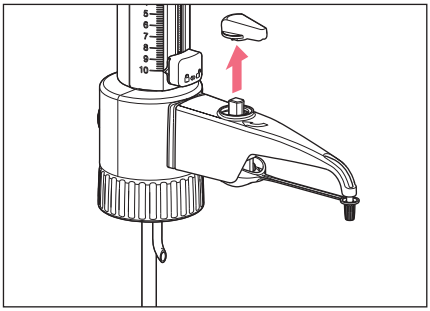


1. Push up the housing of the canula arm on the valve block.

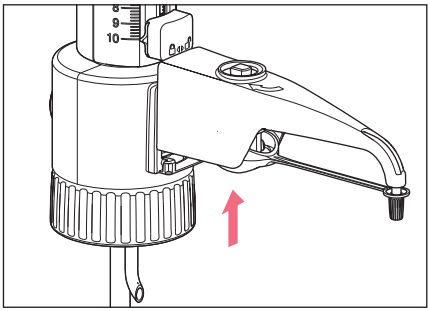


2. Remove the canula arm in a forward motion.

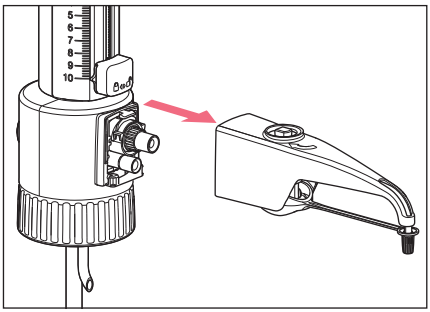
7.4.4 Disassembling the canula arm – Varispenser 2x



1. Pull off the valve toggle.



2. Push up the housing of the canula arm on the valve block.

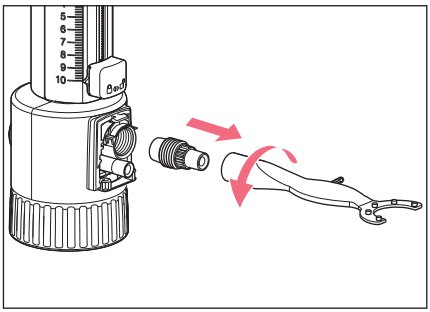


3. Remove the canula arm in a forward motion.

7.4.5 Disassembling the discharge valve

Prerequisites

- The canula arm has bee disassembled.

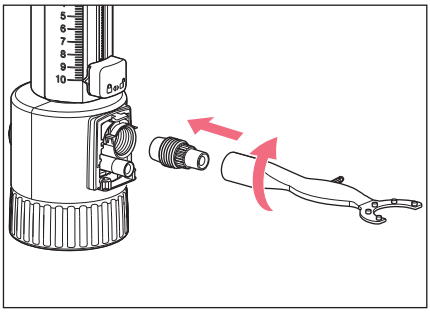


1. Attach the universal wrench to the top of the discharge valve.
2. Unscrew the discharge valve in a counterclockwise direction.

7.4.6 Mounting the discharge valve

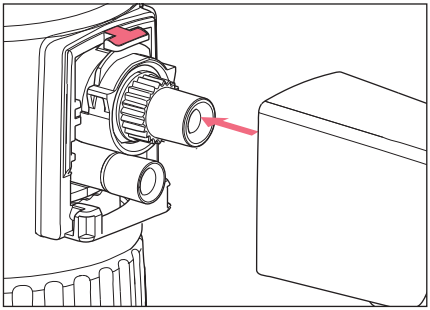
Prerequisites

- The defective discharge valve has been removed.
- A new discharge valve is available.
- The universal wrench is available.



1. Screw a new discharge valve into the valve block by hand.
2. Attach the universal wrench.
3. Tighten the discharge valve in a clockwise direction.

7.4.7 Mounting the canula arm – Varispenser 2

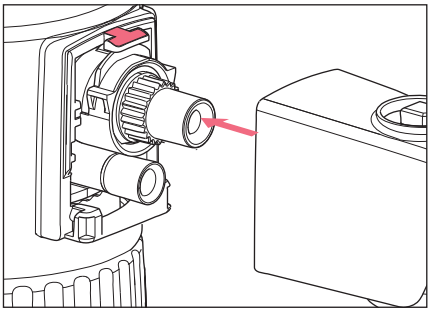


1. Insert the dosing valve into the discharge valve on the valve block.
2. Slide the housing over the lug on the valve block.
3. Push the housing down.
   The housing engages in the lower lugs.

7.4.8 Mounting the canula arm – Varispenser 2x

Prerequisites

- The valve toggle has been taken off.



1. Push the dosing valve slightly downward in the housing.
2. Slide the dosing valve into the valve block.
   The housing of the canula arm must be above the lug.
3. Push the housing down.
   The housing engages.
4. Attach the valve toggle to the top of the dosing valve.

7.5 Adjusting the dispenser

The dispenser has been adjusted to the physical properties of demineralized water at the factory.

The dispenser can be readjusted:

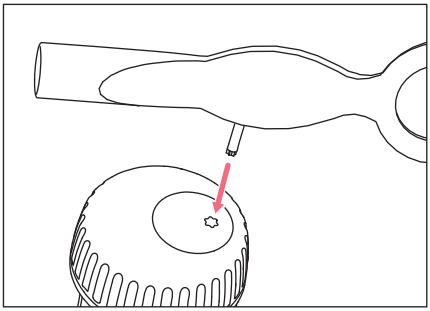
- If the physical properties of the liquid are different to those of water.
- If the error of measurement of the dispensed volume is outside of the tolerance range.

The gravimetric test and the conversion of the measured values for the volume are described in the document *"Standard operating procedure for manual dispensing systems"*. The document is available on the webpage www.eppendorf.com/manuals www.eppendorf-support.com.
Perform another gravimetric check after adjusting the dispenser.

7.5.1 Remove the adjustment cover.

Prerequisites

- The universal wrench is available.



1. Insert the adjustment wrench of the universal wrench into the adjustment cover.
2. Turn the adjustment wrench and break off the adjustment cover.
   The adjustment cover can be disposed of.

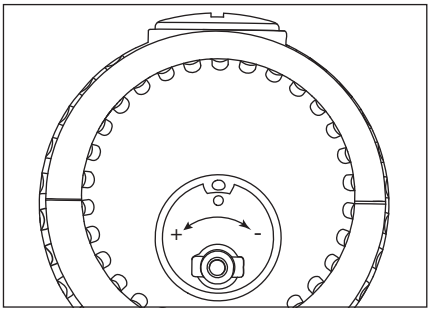
7.5.2 Adjustment range

Nominal volume	Maximum ±	per revolution
2 mL	12 µL	~ 16 µL
5 mL	30 µL	~ 40µL
10 mL	60 µL	~ 80 µL
25 mL	150 µL	~ 130 µL
50 mL	300 µL	~ 265 µL
100 mL	600 µL	~ 400 µL

7.5.3 Changing the adjustment

Prerequisites

- The gravimetrically determined measured values are available.



▸ Insert the adjustment wrench into the adjustment opening.
Turning in the plus direction increases the dispensing volume.
Turning in the minus direction decreases the dispensing volume.

7.5.4 Checking the dispensing volume

Prerequisites

- The document "*Standard operating procedure for manual dispensing systems*" is available.

▸ Perform a gravimetric check of the dispensed volume.

8 Technical data

8.1 Errors of measurement

8.1.1 Varispenser 2

Model	Testing volume	Error of measurement			
		Systematic		Random	
		± %	± µL	± %	± µL
0.2 mL – 2 mL	0.2 mL	5	10	1	2
	1 mL	1	10	0.2	2
	2 mL	0.5	10	0.1	2
0.5 mL – 5 mL	0.5 mL	5	25	1	5
	2.5 mL	1	25	0.2	5
	5 mL	0.5	25	0.1	5
1 mL – 10 mL	1 mL	5	50	1	10
	5 mL	1	50	0.2	10
	10 mL	0.5	50	0.1	10
2.5 mL – 25 mL	2.5 mL	5	125	1	25
	12.5 mL	1	125	0.2	25
	25 mL	0.5	125	0.1	25
5 mL – 50mL	5 mL	5	250	1	50
	25 mL	1	250	0.2	50
	50 mL	0.5	250	0.1	50
10 mL – 100 mL	10 mL	5	500	1	100
	50 mL	1	500	0.2	100
	100 mL	0.5	500	0.1	100

8.1.2 Varispenser 2x

Model	Testing volume	Error of measurement			
		Systematic		Random	
		± %	± µL	± %	± µL
0.2 mL – 2 mL	0.2 mL	5	10	1	2
	1 mL	1	10	0.2	2
	2 mL	0.5	10	0.1	2
0.5 mL – 5 mL	0.5 mL	5	25	1	5
	2.5 mL	1	25	0.2	5
	5 mL	0.5	25	0.1	5
1 mL – 10 mL	1 mL	5	50	1	10
	5 mL	1	50	0.2	10
	10 mL	0.5	50	0.1	10
2,5 mL – 25 mL	2.5 mL	5	125	1	25
	12.5 mL	1	125	0.2	25
	25 mL	0.5	125	0.1	25
5 mL – 50 mL	5 mL	5	250	1	50
	25 mL	1	250	0.2	50
	50 mL	0.5	250	0.1	50
10 mL – 100 mL	10 mL	5	500	1	100
	50 mL	1	500	0.2	100
	100 mL	0.5	500	0.1	100

8.1.3 Test conditions

Test conditions and test analysis in accordance with ISO 8655-6.

8.2 Ambient conditions

Ambience	Only for use indoors.
Ambient temperature	15 °C – 40 °C
Relative humidity	10 % – 90 %, non-condensing.
Atmospheric pressure	700 hPa – 1060 hPa

9 Transport, storage and disposal

9.1 Transport

NOTICE! Damage due to incorrect packing.
Eppendorf SE is not liable for any damage caused by improper packing.

- Only store and transport the device in its original packing.

Tab. 9-1: Transport conditions

	Air temperature	Relative humidity	Atmospheric pressure
General transport	-20 °C – 50 °C	10 % – 90 %, non-condensing.	300 hPa – 1060 hPa
Air freight	-20 °C – 50 °C	10 % – 90 %, non-condensing.	300 hPa – 1060 hPa

9.2 Storage

Tab. 9-2: Storage conditions

	Air temperature	Relative humidity	Atmospheric pressure
Storage	-20 °C – 50 °C	10 % – 90 %, non-condensing.	300 hPa – 1060 hPa

9.3 Disposal

Observe the relevant legal regulations for disposing of the product.

10 Ordering Information

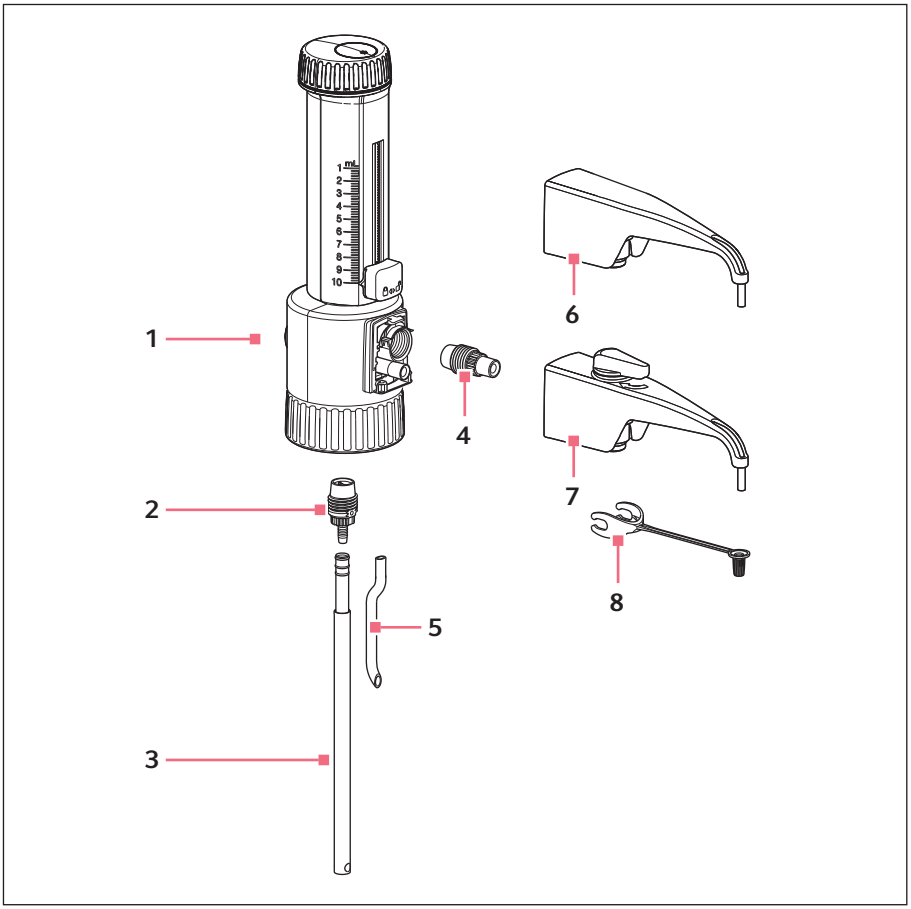
10.1 Varispenser 2

Order no. (International)	Order no. (North America)	Description
		Varispenser 2 Bottle top dispenser for bottle thread 45 mm, telescopic aspirating tube, universal wrench, 5 adapters (25 mm, 28 mm, 32 mm, 38 mm, 40 mm)
4966 000.010	4966000010	0.2 mL – 2 mL
4966 000.029	4966000029	0.5 mL – 5 mL
4966 000.037	4966000037	1 mL – 10 mL
		Varispenser 2 Bottle top dispenser for bottle thread 45 mm, telescopic aspirating tube, universal wrench, 3 adapters (32 mm, 38 mm, 40 mm)
4966 000.045	4966000045	2.5 mL – 25 mL
4966 000.053	4966000053	5 mL – 50 mL
4966 000.061	4966000061	10 mL – 100 mL

10.2 Varispenser 2x

Order no. (International)	Order no. (North America)	Description
		Varispenser 2x Bottle top dispenser with return valve, and valve switch for bottle thread 45 mm, telescopic aspirating tube, universal wrench, 5 adapters (25 mm, 28 mm, 32 mm, 38 mm, 40 mm)
4967 000.014	4967000014	0.2 mL – 2 mL
4967 000.022	4967000022	0.5 mL – 5 mL
4967 000.030	4967000030	1 mL – 10 mL
		Varispenser 2x Bottle top dispenser with return valve, and valve switch for bottle thread 45 mm, telescopic aspirating tube, universal wrench, 3 adapters (32 mm, 38 mm, 40 mm)
4967 000.049	4967000049	2.5 mL – 25 mL
4967 000.057	4967000057	5 mL – 50 mL
4967 000.065	4967000065	10 mL – 100 mL

10.3 Accessories



1 **Ventilation screw**

2 **Filling valve**

3 **Telescopic aspirating tube**

4 **Discharge valve**

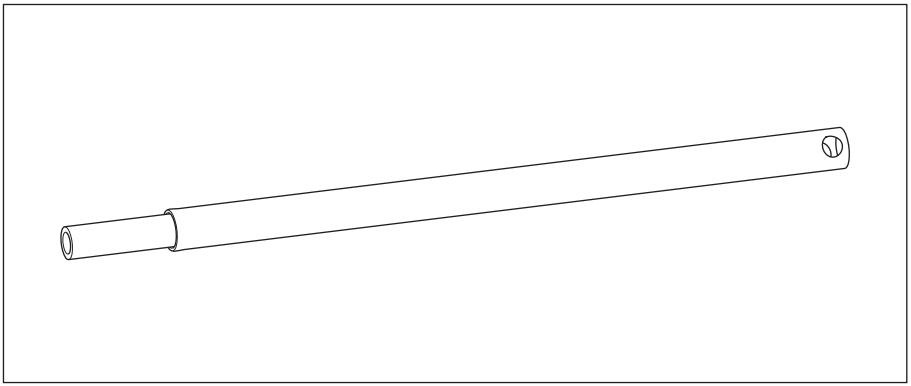
5 **Recirculation tube**
Varispenser 2x

6 **Canula arm**
With discharge tube for Varispenser 2

7 **Canula arm**
With discharge tube and valve toggle for Varispenser 2x

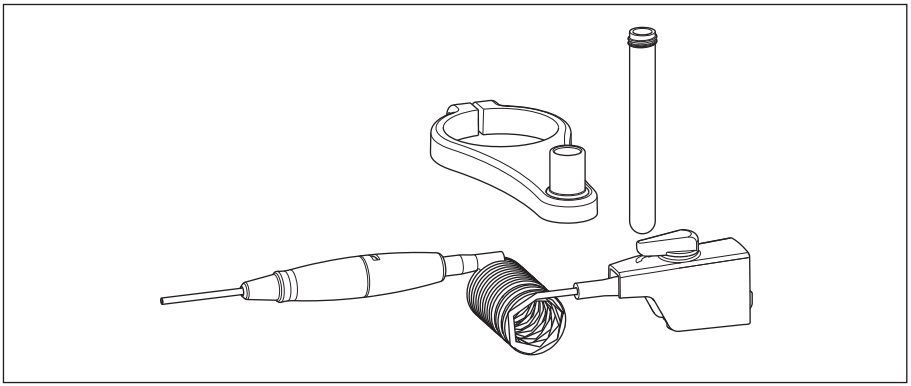
8 **Sealing cap**

10.3.1 Telescopic aspirating tube



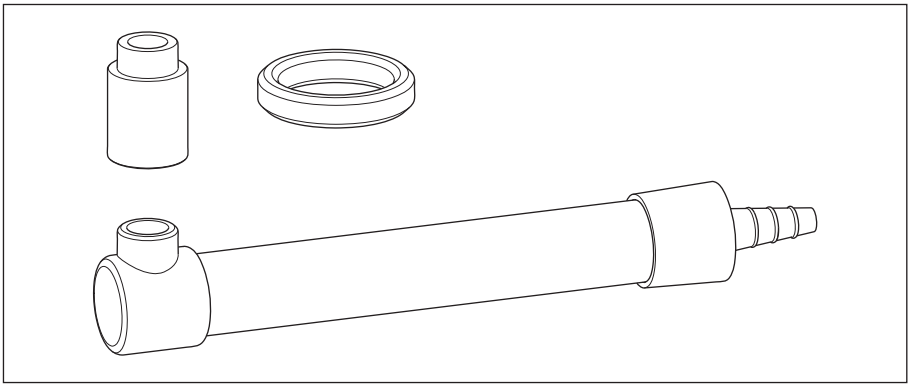
Order no. (International)	Order no. (North America)	Description
		Telescopic aspirating tube
		70 mm – 140 mm
4966 503.004	4966503004	for 2 mL, 5 mL, 10 mL
		Telescopic aspirating tube
		125 mm – 240 mm
4966 504.000	4966504000	for 2 mL, 5 mL, 10 mL
		Telescopic aspirating tube
		195 mm – 350 mm
4966 505.007	4966505007	for 2 mL, 5 mL, 10 mL
		Telescopic aspirating tube
		250 mm – 480 mm
4966 506.003	4966506003	for 2 mL, 5 mL, 10 mL
4966 508.006	4966508006	for 25 mL, 50 mL, 100 mL
		Telescopic aspirating tube
		170 mm – 330 mm
4966 507.000	4966507000	for 25 mL, 50 mL, 100 mL

10.3.2 Flexible discharge tube with recirculation valve



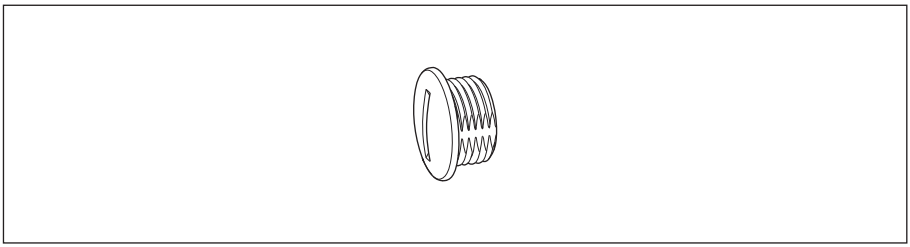
Order no. (International)	Order no. (North America)	Description
		Discharge tube spiraled
4966 501.001	4966501001	for 2 mL, 5 mL, 10 mL
4966 502.008	4966502008	for 25 mL, 50 mL, 100 mL

10.3.3 Drying tube with sealing washer



Order no. (International)	Order no. (North America)	Description
4966 509.002	4966509002	**Drying tube** without filling, including sealing washer (PTFE)

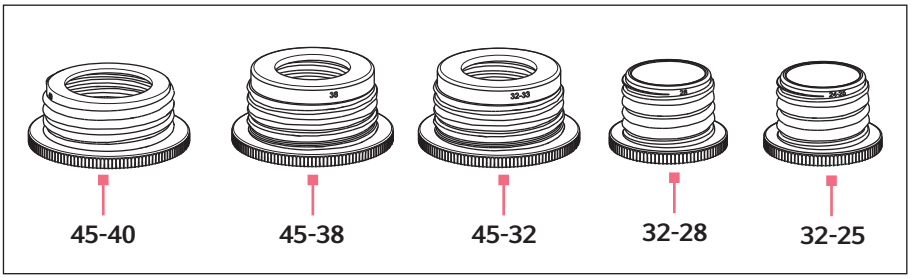
10.3.4 Ventilation screw



Order no. (International)	Order no. (North America)	Description
4966 601.006	4966601006	**Ventilation screw** PP
4966 511.007	4966511007	**Ventilation screw** for microfilters with Luer connector, PP, with PTFE sealing washer

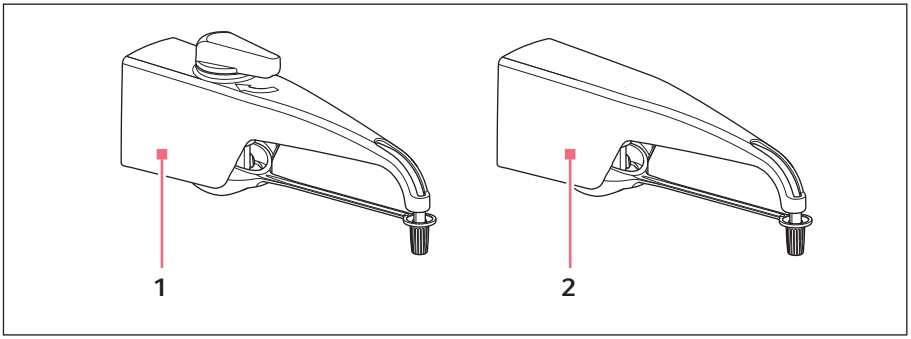
10.3.5 Thread adapter

- GL – round thread DIN 138 for glass threads. Number indicates the maximum outer diameter of the male thread.
- S – buttress thread. Thread type for glass bottles seals which is to prevent them becoming loose unintentionally due to vibrations.



Order no. (International)	Order no. (North America)	Description
		Bottle thread adapter PP
4960 800.040	4960800040	from GL 32 to GL 25,
4960 800.139	4960800139	from GL 32 to GL 27
4960 800.058	4960800058	from GL 32 to GL/S 28
4960 800.120	4960800120	from GL 45 to GL 32
4960 800.155	4960800155	from GL 45 to GL 38
4960 800.147	4960800147	from GL 45 to S 40
		Bottle thread adapter ETFE
4966 614.000	4966614000	from GL 32 to GL 25
4960 835.005	4960835005	from GL 32 to GL/S 28
4966 615.007	4966615007	from GL 45 to GL 32
4960 839.000	4960839000	from GL 45 to GL 38
		Bottle thread adapter PTFE
4960 834.009	4960834009	from GL 45 to S 40
		Thread adapter for 5 L-jerrycan, ETFE
4960 832.006	4960832006	from 45 mm to 17/8" thread

10.4 Spare parts
10.4.1 Canula arm

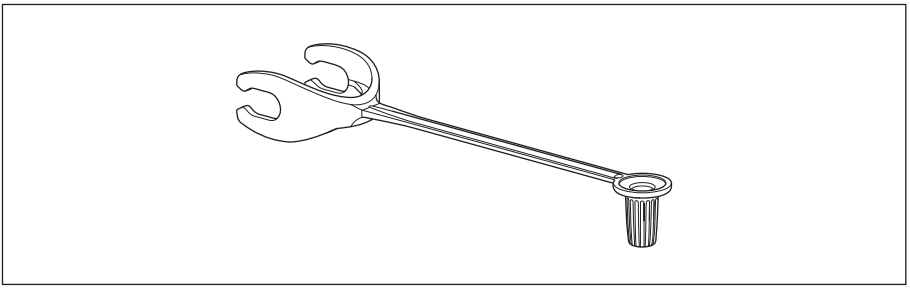


1 Varispenser 2x
Dosing valve, valve toggle, discharge tube und sealing cap

2 Varispenser 2
Discharge tube und sealing cap

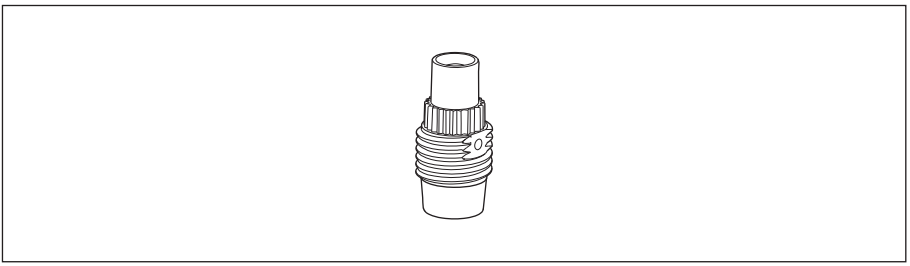
Order no. (International)	Order no. (North America)	Description
		Discharge tube Varispenser 2
4966 608.000	4966608000	for 2 mL, 5 mL, 10 mL
4966 609.007	4966609007	for 25 mL, 50 mL, 100 mL
		Discharge tube Varispenser 2x
4967 601.000	4967601000	for 2 mL, 5 mL, 10 mL
4967 602.006	4967602006	for 25 mL, 50 mL, 100 mL

10.4.2 Sealing cap



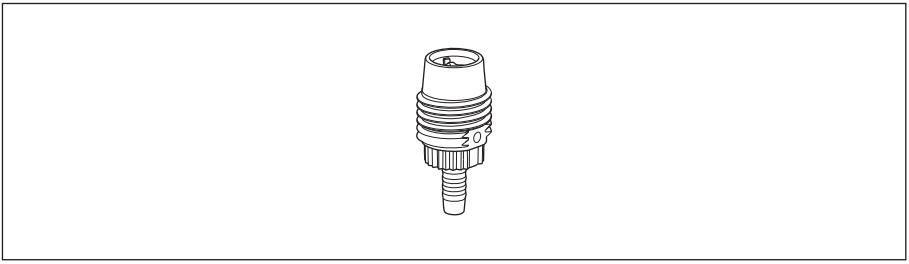
Order no. (International)	Order no. (North America)	Description
		Sealing cap PP, blue
4966 611.001	4966611001	for 2 mL, 5 mL, 10 mL
4966 612.008	4966612008	for 25 mL, 50 mL, 100 mL

10.4.3 Discharge valve



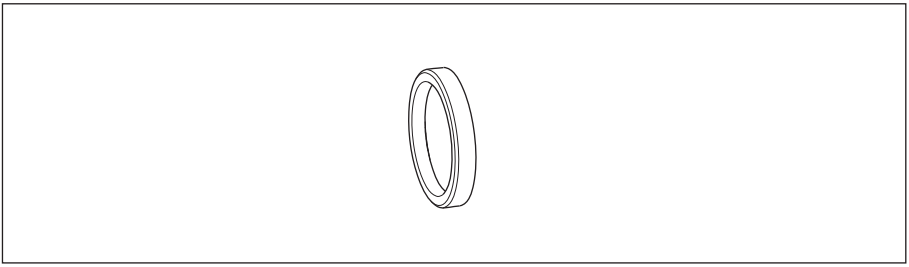
Order no. (International)	Order no. (North America)	Description
		Discharge valve
4966 604.005	4966604005	for 2 mL
4966 605.001	4966605001	for 5 mL, 10 mL
4966 606.008	4966606008	for 25 mL, 50 mL, 100 mL

10.4.4 Filling valve



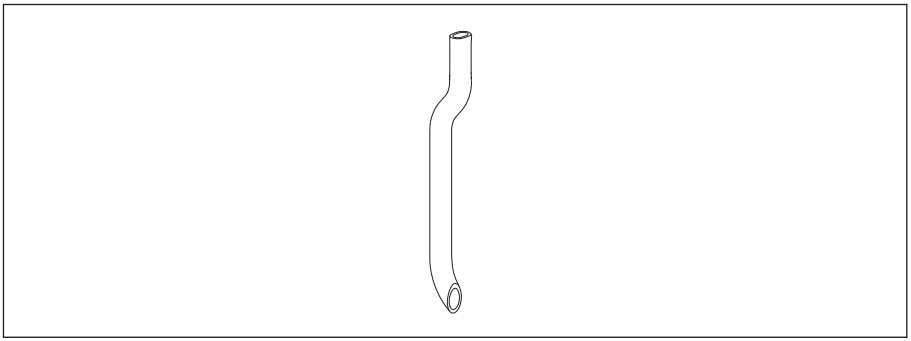
Order no. (International)	Order no. (North America)	Description
		Filling valve with valve ball
4966 602.002	4966602002	for 2 mL, 5 mL, 10 mL
4966 603.009	4966603009	for 25 mL, 50 mL, 100 mL

10.4.5 Sealing washer



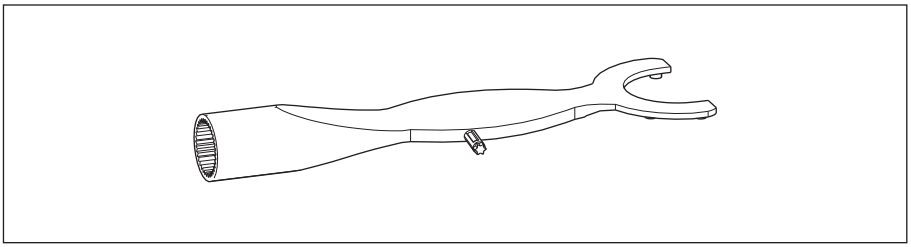
Order no. (International)	Order no. (North America)	Description
4966 613.004	4966613004	**Sealing washer** for valve block, PTFE

10.4.6 Recirculation tube



Order no. (International)	Order no. (North America)	Description
4966 610.005	4966610005	**Recirculation tube** FEP

10.4.7 Tools



Order no. (International)	Order no. (North America)	Description
4966 607.004	4966607004	**Universal wrench**

Evaluate Your Manual

Give us your feedback.
www.eppendorf.com/manualfeedback

Your local distributor: www.eppendorf.com/contact
Eppendorf SE · Barkhausenweg 1 · 22339 Hamburg · Germany
eppendorf@eppendorf.com · www.eppendorf.com