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Eppendorf Reference[®] 2

Operating manual

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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		Hazard point
	Toxic substances		Material damage

1.2.2 Danger levels

DANGER	<i>Will</i> lead to severe injuries or death.
WARNING	<i>May</i> 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.	Actions in the specified order
2.	
▶	Actions without a specified order
•	List
	Direction of movement
<i>Text</i>	Display or software texts
	Additional information

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1.4 Other applicable documents

- Chemical resistance Reference 2
- AdjustmentReference 2
- SOP - Standard operating procedure for manual dispensing systems

2 Safety

2.1 Intended use

The pipette "Eppendorf Reference 2" is a product for general laboratory use intended for transferring liquids in the specified volume range in combination with matching tips. In-vivo applications (in or on the human body) are not allowed. Only users trained according to the manual are allowed to use the pipette "Eppendorf Reference 2". All users must read the operating manual carefully and familiarize themselves with the device's mode of operation.

2.2 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.
- ▶ For comprehensive regulations about handling germs or biological material of risk group II or higher, please refer to the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, in the currently valid version).



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 manufacturer's Safety Data Sheets and application notes.



CAUTION! Danger to people due to grossly negligent use.

- ▶ Never point the opening of the device towards yourself or others.
- ▶ Only initiate liquid dispensing if it is safe to do so.
- ▶ For all dispensing tasks, make sure that you are not endangering yourself or anyone else.



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! Damage to device due to missing pipette tips.

- ▶ Use the pipette with fitted pipette tips only.



NOTICE! Incorrect dispensing volume with special liquids and due to temperature differences.

Solutions with physical data very different to that of water or temperature differences between the pipette, pipette tip and liquid may result in incorrect dispensing volumes.

- ▶ Avoid temperature differences between the pipette, pipette tip and liquid.



NOTICE! Damage to device due to penetration of liquid.

- ▶ Only immerse the pipette tip in the liquid.
 - ▶ Do not put the pipette down when the pipette tip is filled.
 - ▶ The pipette itself may not come into contact with the liquid.
-

3 Product description

3.1 Features

The Reference 2 pipette is a piston-stroke pipette for aspirating and dispensing liquids. The pipette operates according to the air cushion principle. A suitable pipette tip must be fitted prior to use. The dispensing, volume setting ring and ejector are controlled with the control button. Depending on the model, volumes between 0.1 µL and 10 mL can be dispensed.

3.1.1 Pipette models

Different variants are available:

- Single-channel pipettes with fixed volume (fix)
- Single-channel pipettes with variable volume setting
- Multi-channel pipettes with 8 or 12 channels and variable volume setting

3.2 Delivery package

Quantity	Description
1	Reference 2
1	Operating manual
1	Certificate
1	Adjustment seal for user adjustment
2	Adjustment seal for factory adjustment
1	Pin (for removing the adjustment seal)
1	Grease for pipettes

3.2.1 Accessories – single-channel pipettes

Quantity	Description
1	Locking ring ($\leq 1000 \mu\text{L}$)
1	Filter sleeve ($\geq 2 \text{ mL}$)
10	Filter cartridges ($\geq 2 \text{ mL}$)
1	Pipette wrench ($\geq 2 \text{ mL}$)
1	Reusable box with pipette tips ($\leq 1000 \mu\text{L}$)
1	Bag with pipette tips ($\geq 2 \text{ mL}$)

3.2.2 Accessories – multi-channel pipettes

Quantity	Description
1	O-ring tool (100 µL und 300 µL)

3.3 Product overview

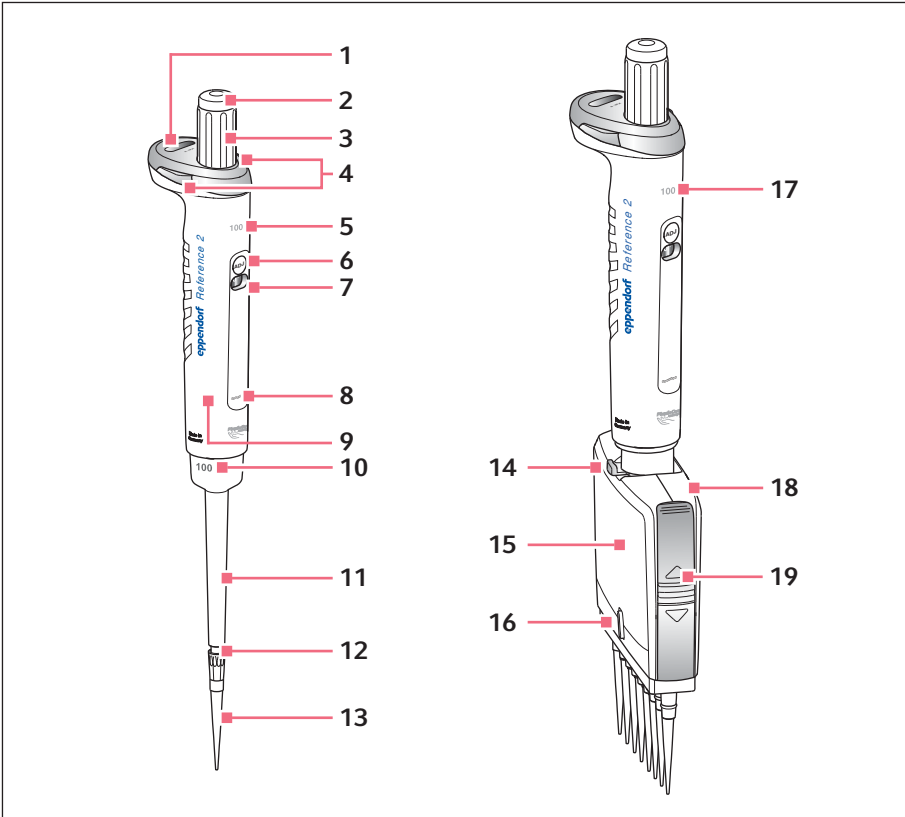


Fig. 3-1: Single-channel pipette and multi-channel pipette

- | | | | |
|----|---|----|--|
| 1 | Volume display | 11 | Ejector sleeve |
| 2 | Color code | 12 | Tip cone |
| 3 | Control button | 13 | Pipette tip |
| 4 | Volume catch | 14 | Lever |
| 5 | Single-channel upper part with nominal volume | 15 | Multi-channel lower part |
| 6 | User adjustment | 16 | Spring suspension (On/Off) switch |
| 7 | Display for temporary adjustment | 17 | Multi-channel upper part with nominal volume |
| 8 | Serial number | 18 | Housing lid |
| 9 | RFID chip | 19 | Latch |
| 10 | Single-channel lower part with nominal volume | | |

3.4 Materials



NOTICE! Aggressive substances may damage components, consumables and accessories.

- ▶ Check the chemical resistance before using organic solvents or aggressive chemicals.
- ▶ Only use liquids whose vapors do not attack the materials used.

The components of the pipette which can be accessed by the user are made of the following materials:

Assembly	Material
External surfaces of the upper part	<ul style="list-style-type: none"> • Improved polypropylene (PP) • Polycarbonate (PC) • Polyetherimide (PEI) • Stainless steel
Viewing window	<ul style="list-style-type: none"> • Polycarbonate (PC)
Exterior and interior of lower parts	<ul style="list-style-type: none"> • Improved polypropylene (PP) • Polyvinylidene fluoride (PVDF) • Polyetherimide (PEI) • Polyphenylene sulfide (PPS) • Polyetheretherketone (PEEK) • Polytetrafluoroethylene (PTFE) • Ethylene propylene diene rubber (EPDM) • Silicone • Steel (stainless steel and spring steel)

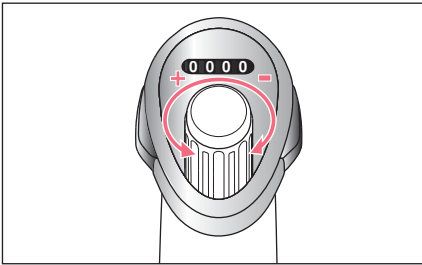


You can find information on the resistance to chemicals on our website www.eppendorf.com/manuals.

4 Operation

4.1 Setting the volume

- i** Set the volume from a high to a low value. If necessary, exceed the desired volume and then go back.

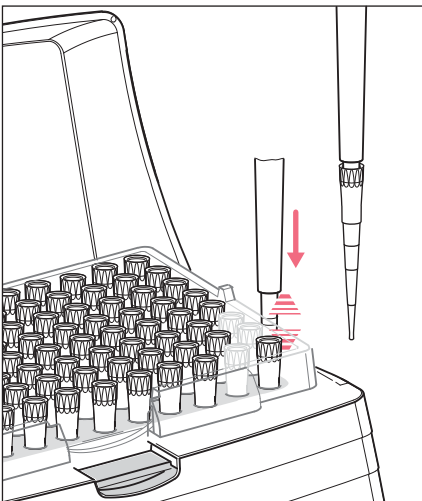


1. Keep the volume catch pressed.
2. Turn the control button.

4.2 Attaching the pipette tips

The pipette tip can be attached by hand or mounted directly from a tip holder (tray) with the pipette.

- i** The pipette tips are single-use items.
- i** The control button and the trays are color-coded. The color marks the pipette size and the volume of the pipette tip (epT.I.P.S.).



1. Insert the tip cone into the pipette tip using light force.

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4.3 Optimum immersion depths

Volume	Immersion depth
0.1 µL – 1 µL	1 mm
1 µL – 100 µL	2 mm – 3 mm
100 µL – 1000 µL	2 mm – 4 mm
1 mL – 10 mL	3 mm – 5 mm

4.4 Forward pipetting**4.4.1 Aspirating liquid**

Prerequisites

- The pipette tip has been attached.



To ensure maximum precision and accuracy, we recommend initially wetting each new tip by aspirating and dispensing the liquid one to three times.

1. Press down the control button to the first stop.
2. Immerse the pipette tip vertically in the liquid.
3. Maintain the immersion depth and let the control button slide back slowly. Liquid is aspirated into the pipette tip.
4. Wait until the liquid has been aspirated.
5. Remove the pipette tip from the liquid.



If necessary, wipe the pipette tip against the tube inner wall.

4.4.2 Dispensing liquid

1. Place the pipette tip on the tube inner wall at a steep angle.
2. Press down the control button to the first stop.
The liquid is dispensed.
3. Wait until the flow of liquid stops.
4. Press down the control button to the second stop.
The pipette tip is completely emptied.
5. Hold down the control button and wipe the pipette tip on the tube inner wall.

4.4.3 Ejecting the pipette tip

- ▶ Push the operating lever all the way down.
The pipette tip is ejected.

4.5 Reverse pipetting

An additional volume (blow out) is aspirated when performing reverse pipetting. This can improve dispensing results for viscous or foaming liquids. Volume limits may occur when using filter tips.

4.5.1 Aspirating liquid

1. Press down the control button to the second stop.
2. Immerse the pipette tip vertically in the liquid.
3. Maintain the immersion depth and let the control button slide back slowly.
Liquid is aspirated into the pipette tip.
4. Wait approx. 3 seconds.
5. Remove the pipette tip from the liquid.



If necessary, wipe the pipette tip against the tube inner wall.

4.5.2 Dispensing liquid

1. Place the pipette tip on the tube inner wall at a steep angle.
2. Slowly press down the control button to the first stop.
The liquid is dispensed.
3. Wait until the flow of liquid stops.
4. Hold down the control button and wipe the pipette tip on the tube inner wall.
Residual liquid remains in the pipette tip.
During dispensing, the additional volume (blow out) does not belong to the dispensing volume.

4.5.3 Ejecting the pipette tip

1. Press down the control button to the second stop.
The residual liquid is dispensed.
The residual liquid can be discarded.
2. Press the control button down all the way.
The pipette tip is ejected.

4.6 Storing the pipette

The pipette can be stored in a pipette carousel, a wall mount or in horizontal position.

5 Troubleshooting

5.1 Control button

Problem	Cause	Solution
Control button jams.	The lower part is contaminated.	Clean and grease the lower part.
	The seal is defective.	Replace seal.
	The protection filter is blocked.	Replace the protection filter (2 mL – 10 mL).

5.2 Dispensing

Problem	Cause	Solution
Liquid drips.	Pipette tip is loose.	<ul style="list-style-type: none"> ▶ Firmly attach the pipette tip. ▶ Deactivate the spring-loaded action. ▶ Use the epT.I.P.S. pipette tip.
	The seal is defective.	Replace seal.
	O-ring defective.	Replace o-ring.
	Dispensed liquid has a high vapor pressure.	Pre-wet the pipette tip several times.
	The tip cone is damaged.	<ul style="list-style-type: none"> ▶ Replace the lower part (single-channel pipette). ▶ Replace the channel (multi-channel pipette).
Incorrect dispensing volume.	Dispensed liquid has a high vapor pressure or a different density.	Adjust the pipette for the liquid used.

5.3 Pipette tip

Problem	Cause	Solution
Pipette tip is loose.	The pipette tip is not compatible.	<ul style="list-style-type: none"> ▶ Use epT.I.P.S. pipette tips. ▶ Use a suitable size.
	Higher attachment forces are required.	<ul style="list-style-type: none"> ▶ Firmly attach the pipette tip. ▶ Deactivate the spring-loaded action.

5.4 Tip cone

Problem	Cause	Solution
No spring-loaded action of the tip cone.	The spring-loaded action is blocked.	<ul style="list-style-type: none"> ▶ Remove the locking ring (single-channel). ▶ Remove the locking clip (multi-channel).
	Spring loading is switched off (multi-channel).	Switch on spring loading.

6 Maintenance

6.1 Service options

Eppendorf recommends having your device checked and maintained by trained specialist personnel at regular intervals.

Eppendorf offers you tailor-made service solutions for the preventive maintenance, qualification and calibration of your device. For information, offers and contact options, please visit www.eppendorf.com/epservices.

6.2 Disassembling the single-channel pipette $\leq 1000 \mu\text{L}$

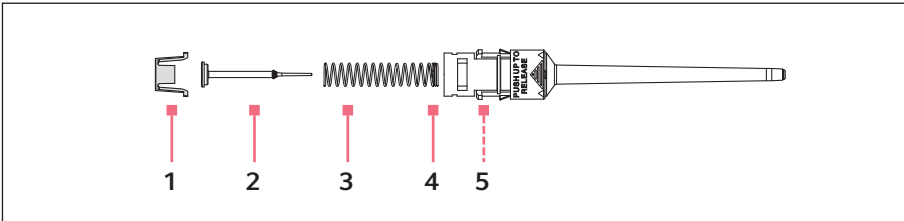
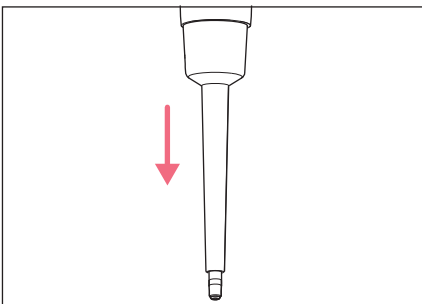


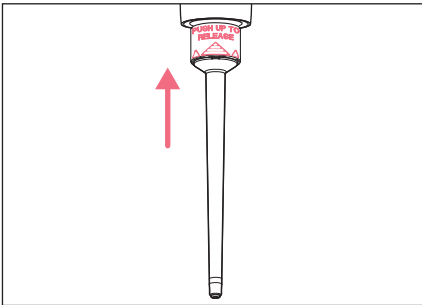
Fig. 6-1: Single-channel lower part $\leq 1000 \mu\text{L}$

- | | |
|-----------------|-----------------------|
| 1 Piston mount | 4 Double coil |
| 2 Piston | 5 Cylinder (internal) |
| 3 Piston spring | |

6.2.1 Removing the lower part



1. Press the control button completely down and hold.
2. Remove the ejector sleeve and release the control button.

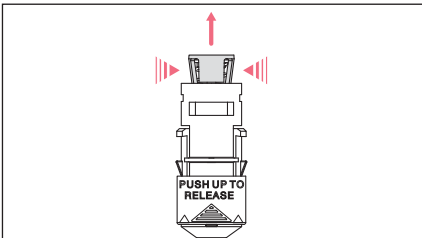


3. Push the "**PUSH UP TO RELEASE**" ring upward until the lower part is detached.
4. Take out the lower part.

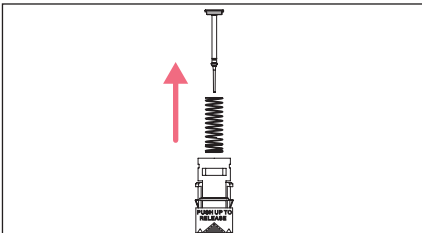
6.2.2 Disassembling the lower part

Prerequisites

- The ejector sleeve has been removed.
- The lower part has been removed from the upper part.



1. Slightly squeeze the stop pins at the piston mount.
2. Remove the piston mount.



3. Remove the piston spring and the piston.
4. Remove the piston from the piston spring (Not possible for pipettes with blue control button).

6.3 Disassembling the single-channel pipette ≥ 2 mL

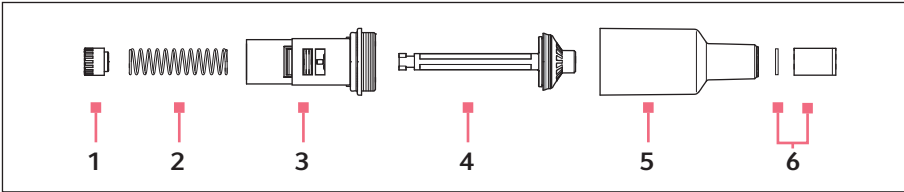
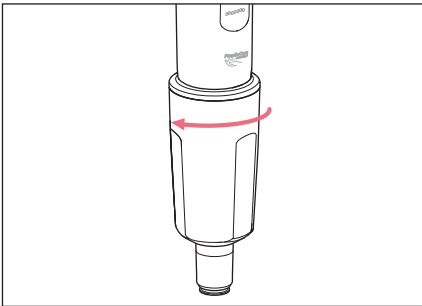


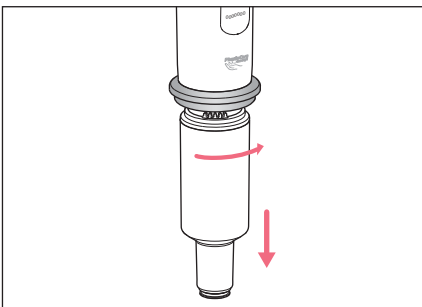
Fig. 6-2: Single-channel lower part ≥ 2 mL

- | | |
|-----------------|--|
| 1 Piston mount | 4 Piston |
| 2 Piston spring | 5 Cylinder with tip cone |
| 3 Piston guide | 6 Filter sleeve with protection filter |

6.3.1 Removing the lower part



1. Unscrew the ejector sleeve.

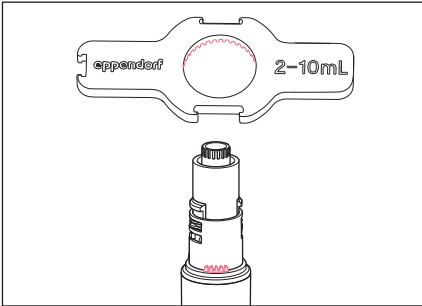


2. Hold the control button completely pressed down.
3. Turn the lower part toward the right approx. 30°. The lower part is released from the upper part.

6.3.2 Disassembling the lower part

Prerequisites

- The lower part has been removed.



1. Place the pipette wrench onto the lower part.
2. Hold the cylinder and unscrew it from the lower part.

6.4 Assembling the single-channel pipette $\leq 1000 \mu\text{L}$

1. Insert the piston spring.



If using piston springs with double coil, this must point down.

2. Carefully insert the piston into the cylinder from the top.
3. Compress the piston spring with piston and hold.
4. Squeeze the stop pins at the piston mount and attach them.
5. Press on the piston from above and check for free movement.
The piston must be able to move freely without resistance.
6. Insert the lower part into the upper part until it engages.
7. Fit the ejector sleeve.

6.5 Assembling the single-channel pipette $\geq 2 \text{ mL}$

6.5.1 Assembling the lower part

1. Insert the piston into the piston guide.
2. Insert the piston spring into the piston guide.
3. Attach the piston mount and press the piston spring into the piston guide.
4. Turn the piston mount by 90° and let it engage.
5. Insert the lower part into the upper part until it engages.
6. Attach and tighten the ejector sleeve.

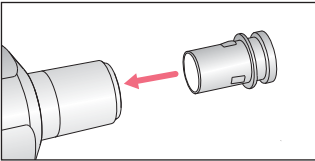
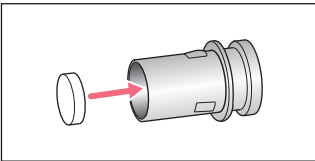
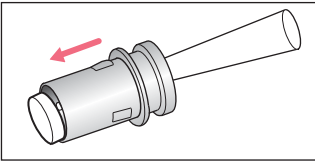
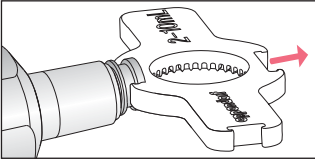
6.5.2 Checking the function

This inspection ensures that the pipette has been assembled correctly.

- ▶ Carry out a gravimetric test of the systematic and random errors.

6.6 Replacing the protection filter ≥ 2 mL

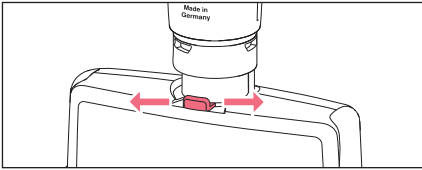
The protection filter in the tip cone must be replaced after every contact with liquids.



1. Place a pipette wrench with the appropriate opening onto the filter sleeve.
2. Pull out the filter sleeve.
3. Use a pipette tip to push out the filter.
4. Clean the filter sleeve.
5. Insert a new protection filter into the filter sleeve.
6. Insert the filter sleeve in the tip cone.

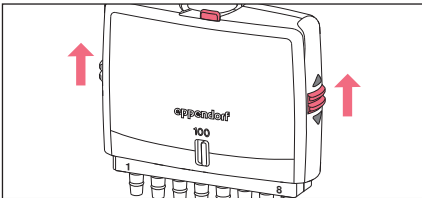
6.7 Disassembling the multi-channel pipette

6.7.1 Removing the lower part



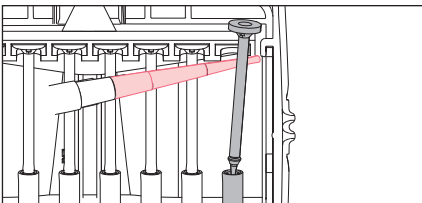
1. Set the volume to the nominal volume.
2. Turn the spring load switch to **On**.
3. Move the lever to one side and hold. The lower part is unlocked.
4. Remove the lower part.

6.7.2 Opening the lower part

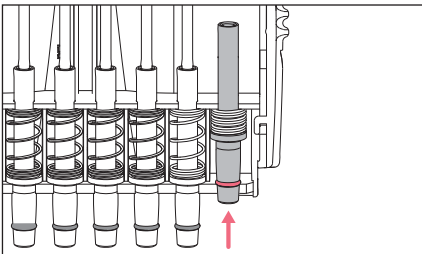


1. Hold the lower part with the lever pointing downward.
2. Push the side latch upward and remove the latch.
3. Remove the cover plate.

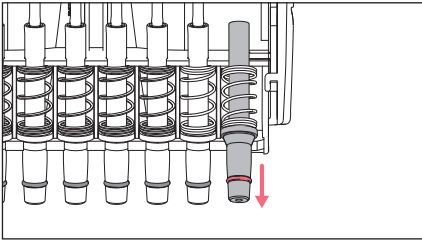
6.7.3 Removing the channel



1. Carefully release the piston from the upper rail and move upward to remove.



2. Slightly push the tip cone in and remove it from the lower rail.



3. Decompress the spring and pull the cylinder with spring out of the center rail.

6.7.3.1 Fitting the channel

1. Insert the spring with cylinder into the center rail.
2. Compress the spring with the cylinder and insert the cylinder into the lower rail.
3. Insert the piston into the cylinder.
4. Insert the piston into the upper rail.

6.7.4 Assembling the multi-channel lower part

1. Attach the cover plate.
2. Attach the side latches and slide down.
3. Insert the lower part into the upper part until it engages.

6.7.5 Checking the function

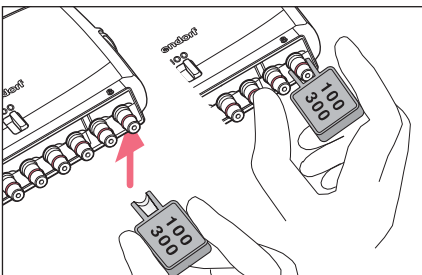
This inspection ensures that the pipette has been assembled correctly.

- ▶ Carry out a gravimetric test of the systematic and random errors.

6.8 Replacing the O-ring

The O-rings must be replaced in the case of wear or damage.

6.8.1 Removing the O-ring



1. Deactivate the spring load of the tip cones.
2. Attach the multi-channel tool to the tip cone with the opening.
3. Supporting the multi-channel tool with your thumb, push it firmly against the tip cone.
The O-ring is cut at one location.
4. Remove the multi-channel tool and the O-ring.

6.8.2 Mounting a new O-ring

1. Attach the new O-ring to the tip cone and press it into the groove with the finger.
2. Attach the pipette tip.
3. Check firm fit and leak tightness of the pipette tip.

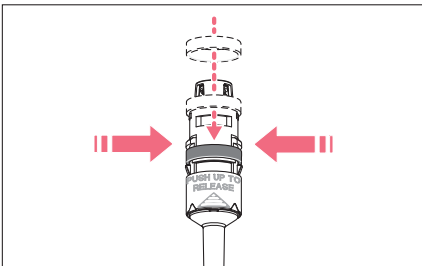
6.9 Deactivating the spring loading of the tip cone

The tip cone of the pipettes with a nominal volume of up to 1000 µL gives when the pipette tip is attached. This ensures optimum fit of the pipette tip and the attachment forces are kept low. If higher attachment forces are required, the spring load can be deactivated.

6.9.1 Deactivating the spring load – single-channel pipettes ≤ 1000 µL

Prerequisites

- The ejector sleeve has been removed.
- The lower part has been detached.



1. Lightly squeeze the clamps on the lower part and push the black locking ring onto the lower part from the top .
2. Insert the lower part and attach the ejector sleeve.

6.9.2 Deactivating the spring load – multi-channel pipettes

- ▶ Turn the switch spring load to **Off**.

6.10 Adjusting the pipette



The execution of changes to the user adjustment and factory adjustment is described on our website www.eppendorf.com/manuals.

6.11 Cleaning



NOTICE! Damage to device from unsuitable cleaning agents or sharp or pointed objects.

Use of unsuitable cleaning agents may damage the device.

- ▶ Do not use corrosive cleaning agents, strong solvents or abrasive polishes.
- ▶ Check the compatibility with the materials used.
- ▶ Please note the information on chemical resistance.
- ▶ Do **not** clean the device with acetone or organic solvents with a similar effect.
- ▶ Do **not** use sharp or pointed objects to clean the device.



NOTICE! Damage to device due to penetration of liquid.

- ▶ Only immerse the pipette tip in the liquid.
 - ▶ Do not put the pipette down when the pipette tip is filled.
 - ▶ The pipette itself may not come into contact with the liquid.
-

6.11.1 Cleaning and disinfecting the pipette

All single and multi-channel lower parts are wear parts. Clean them after contamination, use of aggressive chemicals and/or heavy stress. If the lower parts are worn or damaged, replace these parts.

1. Moisten a cloth with a cleaning agent and a decontamination agent.
2. Remove external contamination.
3. Moisten a new cloth with water.
4. Wipe down the housing.

6.11.2 Cleaning and disinfecting the lower part

Prerequisites

- Heavy contamination caused by ingress of liquid must be removed.
 - Lower part has been removed and disassembled.
1. Remove piston grease.
 2. Rinse the lower part with cleaning agent or decontamination agent or let it soak.
 - **i** Observe the contact time recommended by the manufacturer.
 3. Thoroughly rinse the lower part with demineralized water.
 4. Let it dry.
 5. Lubricate the piston or cylinder.
 - **i** See the instructions for use for "Grease for pipettes".
 6. Assemble the lower part.

6.11.3 Sterilizing the pipette with UV light

The pipette can be sterilized with UV light at 254 nm.

6.12 Autoclaving the pipette



NOTICE! Damage to device due to incorrect handling.

- ▶ Do not use any additional disinfectants, decontamination agents, or sodium hypochlorite during autoclaving or UV irradiation.

6.12.1 Autoclaving



Autoclave the filter sleeve and the protection filter separately.



The upper part and lower part can be autoclaved in assembled state. The lower part does not have to be disassembled.

Prerequisites

- The pipette has been cleaned.
- Any residual cleaning agent has been removed.
- The protection filter has been removed.

1. Autoclave the pipette at 121°C and 1 bar overpressure for 20 minutes.
2. Cool the pipette to ambient temperature and let it dry.



For maximum precision and accuracy, a gravimetric test is recommended after autoclaving.



The piston does **not** need to be greased following autoclaving.

6.13 Decontamination before shipment



CAUTION! Use of a contaminated device may result in personal injury and damage to the device.

- ▶ Clean and decontaminate the device in accordance with the cleaning instructions before shipping or storage.
-

Hazardous substances are:

- solutions presenting a hazard to health
 - potentially infectious agents
 - organic solvents and reagents
 - radioactive substances
 - proteins presenting a hazard to health
 - DNA
1. Please note the information in the document "Decontamination certificate for product returns".
It is available as a PDF document on our website
www.eppendorf.com/decontamination.
 2. Enter the serial number of the device in the decontamination certificate.
 3. Enclose the completed decontamination certificate for returned goods with the device.
 4. Send the device to Eppendorf SE or an authorized service center.

7 Technical data

7.1 Increments of the single-channel and multi-channel pipettes

Model	Increment
0.1 µL – 2.5 µL	0.002 µL
0.5 µL – 10 µL	0.01 µL
2 µL – 20 µL	0.02 µL
2 µL – 20 µL	0.02 µL
10 µL – 100 µL	0.1 µL
20 µL – 200 µL	0.2 µL
30 µL – 300 µL	0.2 µL
100 µL – 1000 µL	1 µL
0.25 mL – 2.5 mL	0.002 mL
0.5 mL – 5 mL	0.005 mL
1 mL – 10 mL	0.01 mL

7.2 Ambient conditions

	Temperature range	Relative humidity
Storage without transport package	-5 °C — 45 °C	10 % — 95 %
Operating conditions	5 °C — 40 °C	10 % — 95 %

8 Measurement deviations according to Eppendorf SE**8.1 Single-channel pipette with fixed volume**

Model	Test tip epT.I.P.S.	Error of measurement			
		systematic		random	
		± %	± µL	± %	± µL
1 µL dark gray	0.1 µL – 10 µL dark gray 34 mm	2.5	0.025	1.8	0.018
2 µL dark gray		2.0	0.04	1.2	0.024
5 µL medium gray	0.1 µL – 20 µL medium gray 40 mm	1.2	0.06	0.6	0.03
10 µL medium gray		1.0	0.1	0.5	0.05
20 µL light gray	0.5 µL – 20 µL L light blue 46 mm	0.8	0.16	0.3	0.06
10 µL yellow	2 µL – 200 µL yellow 53 mm	1.2	0.12	0.6	0.06
20 µL yellow		1.0	0.2	0.3	0.06
25 µL yellow		1.0	0.25	0.3	0.075
50 µL yellow		0.7	0.35	0.3	0.15
100 µL yellow		0.6	0.6	0.2	0.2
200 µL yellow		0.6	1.2	0.2	0.4
200 µL blue		50 µL – 1000 µL blue 71 mm	0.6	1.2	0.2
250 µL blue	0.6		1.5	0.2	0.5
500 µL blue	0.6		3.0	0.2	1.0
1000 µL blue	0.6		6.0	0.2	2.0

Model	Test tip epT.I.P.S.	Error of measurement			
		systematic		random	
		± %	± µL	± %	± µL
2.0 mL red	0.25 mL – 5 mL red	0.6	12	0.2	4
2.5 mL red	115 mm	0.6	15	0.2	5

8.2 Single-channel pipette with variable volume

Model	Test tip epT.I.P.S.	Testing volume	Error of measurement			
			systematic		random	
			± %	± µL	± %	± µL
0.1 µL – 2.5 µL dark gray	0.1 µL – 10 µL dark gray 34 mm	0.1 µL	48.0	0.048	12.0	0.012
		0.25 µL	12.0	0.03	6.0	0.015
		1.25 µL	2.5	0.031	1.5	0.019
		2.5 µL	1.4	0.035	0.7	0.018
0.5 µL – 10 µL medium gray	0.1 µL – 20 µL medium gray 40 mm	0.5 µL	8.0	0.04	5.0	0.025
		1 µL	2.5	0.025	1.8	0.018
		5 µL	1.5	0.075	0.8	0.04
		10 µL	1.0	0.10	0.4	0.04
2 µL – 20 µL light gray	0.5 µL – 20 µL L light gray 46 mm	2 µL	3.0	0.06	1.5	0.03
		10 µL	1.0	0.10	0.6	0.06
		20 µL	0.8	0.16	0.3	0.06
2 µL – 20 µL yellow	2 µL – 200 µL yellow 53 mm	2 µL	5.0	0.10	1.5	0.03
		10 µL	1.2	0.12	0.6	0.06
		20 µL	1.0	0.2	0.3	0.06
10 µL – 100 µL yellow	2 µL – 200 µL yellow 53 mm	10 µL	3.0	0.3	0.7	0.07
		50 µL	1.0	0.5	0.3	0.15
		100 µL	0.8	0.8	0.2	0.2
20 µL – 200 µL yellow	2 µL – 200 µL yellow 53 mm	20 µL	2.5	0.5	0.7	0.14
		100 µL	1.0	1.0	0.3	0.3
		200 µL	0.6	1.2	0.2	0.4

Model	Test tip epT.I.P.S.	Testing volume	Error of measurement			
			systematic		random	
			± %	± µL	± %	± µL
30 µL – 300 µL orange	20 µL – 300 µL orange 55 mm	30 µL	2.5	0.75	0.7	0.21
		150 µL	1.0	1.5	0.3	0.45
		300 µL	0.6	1.8	0.2	0.6
100 µL – 1000 µL blue	50 µL – 1000 µL blue 71 mm	100 µL	3.0	3.0	0.6	0.6
		500 µL	1.0	5.0	0.2	1.0
		1000 µL	0.6	6.0	0.2	2.0
0.25 mL – 2.5 mL red	0.25 mL – 2.5 mL red 115 mm	0.25 mL	4.8	12	1.2	3
		1.25 mL	0.8	10	0.2	2.5
		2.5 mL	0.6	15	0.2	5
0.5 mL – 5 mL violet	0.1 mL – 5 mL violet 120 mm	0.5 mL	2.4	12	0.6	3
		2.5 mL	1.2	30	0.25	6.25
		5.0 mL	0.6	30	0.15	7.5
1 mL – 10 mL turquoise	0.5 mL – 10 mL turquoise 165 mm	1.0 mL	3.0	30	0.6	6
		5.0 mL	0.8	40	0.2	10
		10.0 mL	0.6	60	0.15	15

8.3 Multi-channel pipette

Model	Test tip epT.I.P.S.	Testing volume	Error of measurement			
			systematic		random	
			± %	± µL	± %	± µL
0.5 µL – 10 µL medium gray	0.1 µL – 20 µL medium gray 40 mm	0.5 µL	12.0	0.06	8.0	0.04
		1 µL	8.0	0.08	5.0	0.05
		5 µL	4.0	0.2	2.0	0.1
		10 µL	2.0	0.2	1.0	0.1
10 µL – 100 µL yellow	2 µL – 200 µL yellow 53 mm	10 µL	3.0	0.3	2.0	0.2
		50 µL	1.0	0.5	0.8	0.4
		100 µL	0.8	0.8	0.3	0.3
30 µL – 300 µL orange	20 µL – 300 µL orange 55 mm	30 µL	3.0	0.9	1.0	0.3
		150 µL	1.0	1.5	0.5	0.75
		300 µL	0.6	1.8	0.3	0.9

8.4 Test conditions

Test conditions and test analysis in accordance with : Tested using a standardized analytical balance with evaporation protection certified by the national metrological office.

i The three largest testing volumes per tip (10 %, 50 %, 100 % of the nominal volume) correspond to the specifications in accordance with , Part 2 or Part 5. The test is to be carried out with these three testing volumes for testing of the systematic and random error in compliance with the standard. The smallest adjustable volume serves to provide additional information.

- Number of determinations per volume: 10
- Water according to
- Inspection at 20 °C – 27 °C
Maximum temperature variation during measurement ± 0.5 °C
- Dispensing onto the tube inner wall

9 Ordering information

9.1 Single-channel pipettes with variable volume

Order no. (International)	Order no. (North America)	Description
		Eppendorf Reference 2 Single-channel, variable; serial number on upper and lower part
4924 000.010	4924000010	0.1 - 2.5 µL, dark gray
4924 000.029	4924000029	0.5 - 10 µL, medium gray
4924 000.037	4924000037	2 - 20 µL, light gray
4924 000.045	4924000045	2 - 20 µL, yellow
4924 000.053	4924000053	10 - 100 µL, yellow
4924 000.061	4924000061	20 - 200 µL, yellow
4924 000.070	4924000070	30 - 300 µL, orange
4924 000.088	4924000088	100 - 1000 µL, blue
4924 000.096	4924000096	0.25 - 2.5 mL, red
4924 000.100	4924000100	0.5 - 5 mL, violet
4924 000.118	4924000118	1 - 10 mL, turquoise

9.2 Single-channel pipettes with fixed volume (fix)

Order no. (International)	Order no. (North America)	Description
		Eppendorf Reference 2 Single-channel, fixed; serial number on upper and lower part
4925 000.014	4925000014	1 µL, dark gray
4925 000.022	4925000022	2 µL, dark gray
4925 000.030	4925000030	5 µL, medium gray
4925 000.049	4925000049	10 µL, medium gray
4925 000.057	4925000057	10 µL, yellow
4925 000.065	4925000065	20 µL, light gray
4925 000.073	4925000073	20 µL, yellow
4925 000.081	4925000081	25 µL, yellow
4925 000.090	4925000090	50 µL, yellow
4925 000.103	4925000103	100 µL, yellow
4925 000.111	4925000111	200 µL, yellow
4925 000.120	4925000120	200 µL, blue
4925 000.138	4925000138	250 µL, blue
4925 000.146	4925000146	500 µL, blue
4925 000.154	4925000154	1000 µL, blue

Order no. (International)	Order no. (North America)	Description
4925 000.162	4925000162	2 mL, red
4925 000.170	4925000170	2.5 mL, red

9.3 Multi-channel pipettes

Order no. (International)	Order no. (North America)	Description
		Eppendorf Reference 2 8-channel, variable; serial number on upper and lower part
4926 000.018	4926000018	0.5 – 10 µL, medium gray
4926 000.034	4926000034	10 – 100 µL, yellow
4926 000.050	4926000050	30 – 300 µL, orange
		Eppendorf Reference 2 12-channel, variable; serial number on upper and lower part
4926 000.026	4926000026	0.5 – 10 µL, medium gray
4926 000.042	4926000042	10 – 100 µL, yellow
4926 000.069	4926000069	30 – 300 µL, orange

9.4 Spare parts, accessories and pipette tips



More ordering information can be found on our webpage www.eppendorf.com.

36 **Ordering information**
Eppendorf Reference® 2
English (EN)



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Your local distributor: www.eppendorf.com/contact
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