FOUR E'S SCIENTIFIC

Fully Autoclavable Adjustable Volume Pipette

Contents

Please read the operating instructions in full before
starting up and follow the safety instructions.
The appearance and specifications are subject to change without notice.

1.Product Introduction

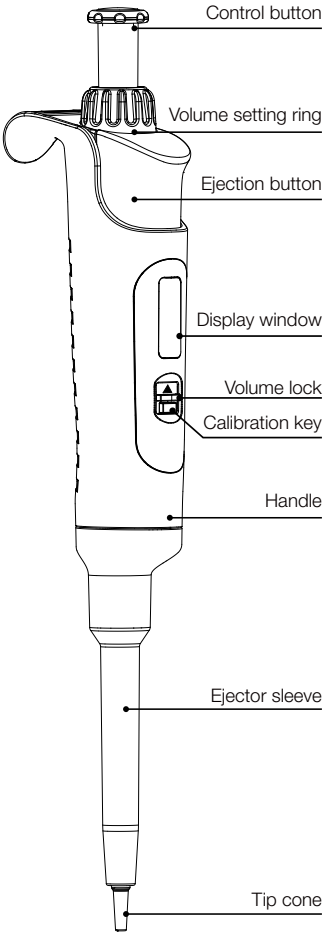
1.1 Product features

- Wide volume range of 0.1µl to 10ml
- Ergonomic design allows comfortable grip and fatigue-free pipetting
- 4-digit volume display offers high display accuracy of up to 0.002µl
- Color-coded control button allows for easy identification of different volume ranges
- The centrally positioned view window ensures effortless volume reading and adjustment, providing convenience for both left- and right-handed users.
- Constructed with premium materials, the pipettes are fully autoclavable without disassembly, UV sterilizable, and highly resistant to chemical corrosion
- A one-key volume lock significantly minimizes accidental misoperation and ensures precision and reliability when transferring small volumes of liquid
- Each pipette is calibrated in accordance with ISO8655 and shipped with individual test certificates
- Easy calibration without using any accessory tools
- Broadly compatible with various pipette tips on the market
- Easy to dismantle and maintain

1.2 Box contents

Item	Qty
Fully Autoclavable Adjustable Volume Pipette	1
User manual	1
Grease	1
Tip cone	1

1.3 Product structure



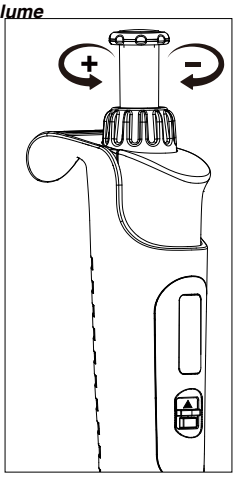
1.4 Specifications

Model	***Volume range***	***Increment***	***Test volume***
PPT0101	0.1-2.5μL	0.002μL	0.25μL
			1.25μL
			2.5μL
PPT0102	0.5-10μL	0.01μL	1μL
			5μL
			10μL
PPT0103	2-20μL	0.02μL	2μL
			10μL
			20μL
PPT0104	5-50μL	0.05μL	5μL
			25μL
			50μL
PPT0105	10-100μL	0.1μL	10μL
			50μL
			100μL
PPT0106	20-200μL	0.2μL	20μL
			100μL
			200μL
PPT0107	100-1000μL	1μL	100μL
			500μL
			1000μL
PPT0108	500-5000μL	5μL	500μL
			2500μL
			5000μL
PPT0109	1-10 mL	10μL	1mL
			5mL
			10mL

Systematic error (***Inaccuracy***)		***Random error*** (***Imprecision***)		***Color***
12.00%	±0.03 µL	6.00%	+0.015 µL	Brown
2.50%	±0.031 µL	1.50%	+0.019 µL	
1.40%	±0.035 µL	0.70%	+ 0.018 µL	
2.50%	±0.025 µL	1.80%	+0.018 µL	Orange
1.50%	±0.075 µL	0.80%	±0.04 µL	
1.00%	±0.1 µL	0.40%	±0.04 µL	
5.00%	±0.1 µL	1.50%	±0.03 µL	Purple
1.20%	±0.12 µL	0.60%	±0.06 µL	
1.0%	±0.2 µL	0.30%	+0.06 µL	
2.00%	+ 0.1 µL	2.00%	+0.1 µL	Green
0.90%	±0,225 µL	0.60%	+0.15 µL	
0.60%	+0.30 µL	0.30%	±0.15 µL	
3.00%	+0.3 µL	1.00%	+0.1 µL	Dark blue
1.0%	+0.5 µL	0.30%	+0.15 µL	
0.80%	+0.8 µL	0,20%	+0.2 µL	
2.50%	+0.5 µL	0.70%	+0.14 µL	Blue
1.00%	±1.0 µL	0.30%	+0.3 µL	
0.60%	±1.2 µL	0.20%	±0.4 µL	
3.00%	±3.0 µL	0.60%	±0.6 µL	Red
1.00%	±5.0 µL	0.20%	±1.0 µL	
0.60%	±6.0 µL	0.20%	±2.0 µL	
2.40%	±0.012 mL	0.60%	±0.003 mL	Yellow
1.20%	±0.03 mL	0.25%	±0.006 mL	
0.60%	±0.03 mL	0.15%	±0.008 mL	
3.00%	±0.03 mL	0.60%	±0.006 mL	Grey
0.80%	±0.04 mL	0.20%	+0.01 mL	
0.60%	+0.06 mL	0.15%	+0.015 mL	

2.Operation Instructions

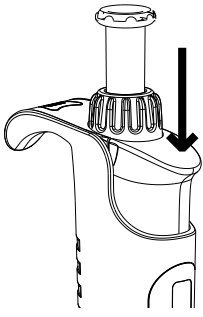
2.1 Setting volume



- As shown above, turn the volume setting ring to set the volume. Ensure the pipette operates within 10%-100% of its specified volume range. Avoid using a high-volume pipette to handle small liquid volumes.
- The height of the control button changes as the volume is adjusted. The higher the button is, the bigger the volume.
- The display window displays the set volume.
- The numbers on the volume display are to be read from the top to the bottom. The decimal places start after the underscored digit.
- Do not turn the volume setting ring excessively to set the volume outside of range, which could jam the mechanism and damage the pipette.

2.2 Attaching and ejecting tips

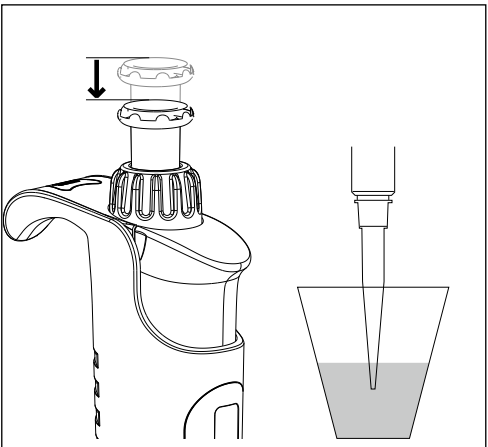
- The pipette can only be used after a pipette tip has been attached.
- Make sure the tip cone is clean before attaching the tip.
- Make sure it is a tight fit between the tip and the tip cone for accurate transferring of liquids.
- When attaching a tip by hand, it must be handled in a way that prevents both the contamination and hand-warming of the pipette tip.
- Press the ejector button firmly downwards to eject the tips.



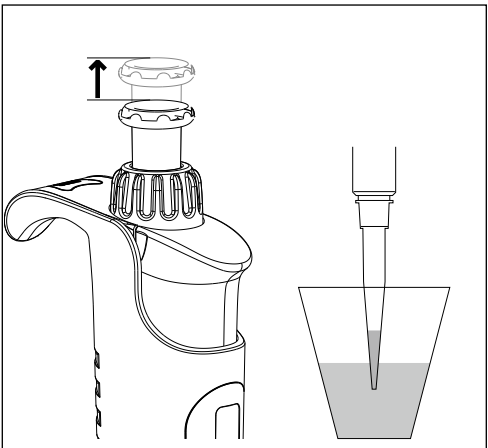
3.Pipetting

3.1Precautions for Use

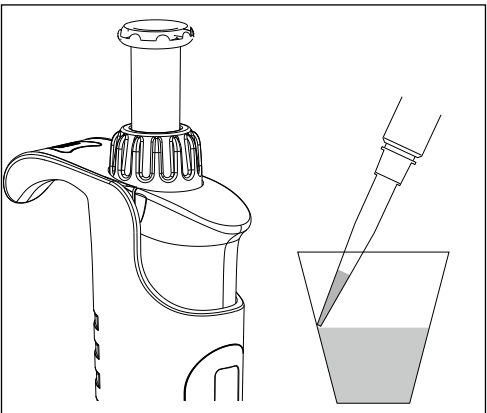
- To ensure maximum precision and accuracy, we recommend initially wetting each new tip by aspirating and dispensing the liquid three to five times.
- To aspirate liquid, immerse the pipette tip vertically in the liquid at a specific immersion depth (refer table below) and maintain the immersion depth to ensure no air is aspirated. Carefully wipe the pipette tip against the tube inner wall to ensure that no outer wetting remains on the tip.
- To dispense liquid, place the tip on the tube inner wall at an angle. Hold down the control button to dispense the liquid and wipe the tip on the tube inner wall.



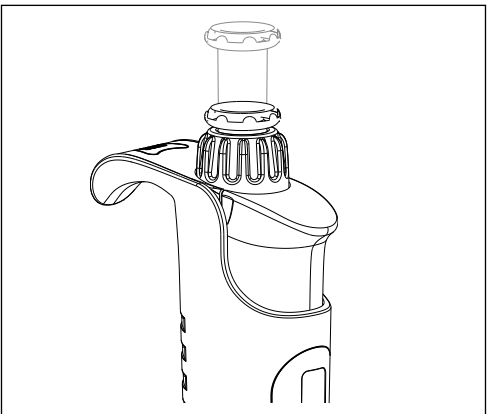
Press down the control button to the first stop.



Let the control button slide back slowly.



Place the pipette tip against the tube inner wall, at an angle of around 45°. Press the control button slowly to the first stop position and wait until the flow of liquid stops.



To empty the tip, press down the control button to the second stop. Hold down the control button and wipe the tip on the tube inner wall.

3.2 Forward Pipetting

- Press down the control button to the first stop.
- Vertically immerse the pipette tip into the liquid at a specific immersion depth (refer table below)

Sample volume	Immersion depth	Waiting time
≤1μL	1-2mm	1s
1-100μL	2-3mm	1s
100-1000μL	2-4mm	1s
1000-20000μL	3-6mm	3s

- Allow the control button to slide back slowly. Maintain the immersion depth to ensure no air is aspirated.
- Wait before removing the pipette tip from the liquid. The waiting time is based on how large volume is aspirated.
- To dispense the liquid, press down the control button slowly until the first stop.
- To empty the tip, press the control button until the second stop.

- Allow the control button to slide back to the starting point slowly.
- To eject the tip, press the ejector button.

3.3 Reverse pipetting

Reverse pipetting is used to dispense bubbling liquid, highly viscous liquid and can also be used for very small volume. Before pipetting, please wet the tip by aspirating and dispensing the liquid.

- Press down the control button to the second stop.
- Vertically immerse the pipette tip into the liquid at a specific immersion depth. (refer table above)
- Allow the control button to slide back slowly. Maintain the immersion depth to ensure no air is aspirated.
- To dispense the liquid, press the control button slowly until the first stop.
- The remaining liquid together with tips should be discarded.

4.Performance Test and Calibration

4.1 Performance Test

Performance testing should be conducted in a draft-free room with a temperature between 15-25°C (maintained within ±0.5°C) and humidity above 50%. Place the pipette, tips, and water used for test in the testing room for at least 2 hours to allow them to equilibrate to the ambient conditions. Use distilled or deionized water (Grade 3, ISO 3696) and an analytical balance with a precision of 0.01 mg.

- Attach the tip to the pipette properly.
- Wet the tip by aspirating and dispensing the set volume 3 to 5 times.
- Vertically immerse the pipette tip into the liquid at a specific immersion depth. (refer table above)
- Allow the control button to slide back slowly. Maintain the immerse depth to ensure no air is aspirated.
- Dispense the liquid into the weighing container and place the tip on the container inner wall at an angle.
- Read the weight in mg.
- Repeat the same tests for 10 times and record each reading.
- Convert each weight reading to volume by multiplying the error correction Z (Z=1.0033, 22°C and 101.3 Kpa).

4.2 Calibration

(1) As shown below, press the button, then pull and hold the calibration key downward, with "CAL" shown above the key.

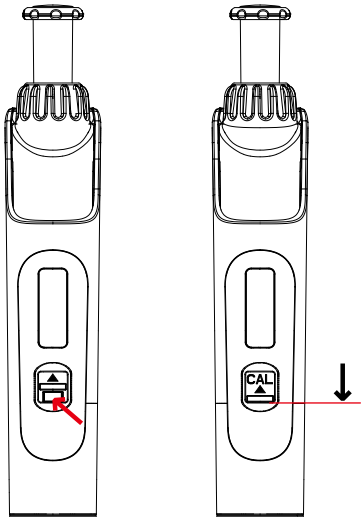
(2) Turn the volume setting ring to adjust the volume. To increase the volume, adjust in the counterclockwise direction and to decrease the volume adjust in clockwise direction.

(3) Rotate the volume setting ring counterclockwise to increase the displayed volume (if it is smaller than the actual volume) or rotate the volume setting ring clockwise to decrease the displayed volume (if it is larger than the actual volume) until the displayed volume is same with the actual volume.

(4) After calibration, release your thumb to let the calibration key return to the middle position.

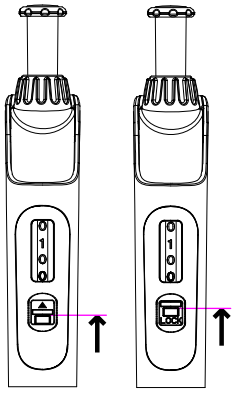
(5) Perform tests as mentioned above to verify the calibration.

Note: Each pipette is calibrated at our facility before shipment. Recalibration is to eliminate the errors caused after long-term use.



4.3 Volume Lock

Pull up the key to lock the set volume. Pull down the key to unlock the set volume.



5. Cleaning and Maintenance

Aggressive substances can damage the pipette, pipette tips and accessories. Inaccurate dispensing results may also occur due to insufficient maintenance.

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

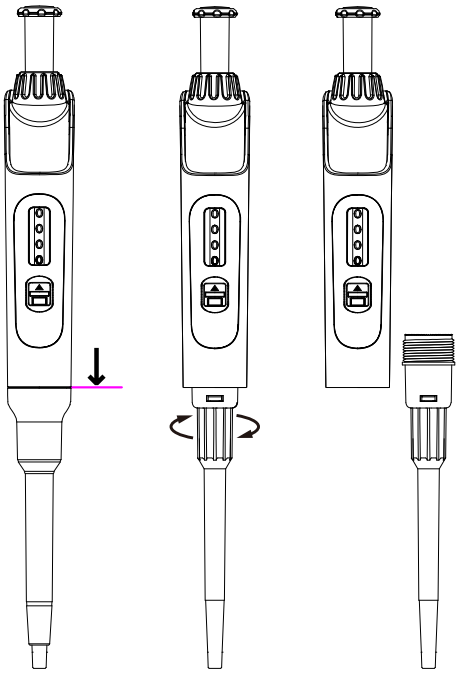
5.1 Cleaning

The lower parts may be subjected to wear and tear on long term use. Clean them after contamination or use of aggressive chemicals. If the lower parts are worn or damaged, replace these parts. Unsuitable cleaning agents can damage the device.

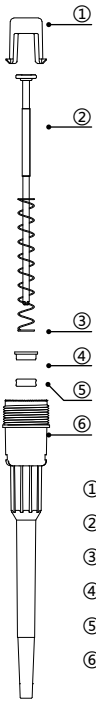
- Moisten a cloth with a cleaning agent / alcohol to remove the external contamination.
- Moisten a new cloth with water to wipe the housing.

5.2 Maintenance

- Pull ejection sleeve downwards to take it out.
- Then rotate the piston cylinder counterclockwise to remove it.



• The piston cylinder is composed of the following components:



① Piston mount
② Piston rod
③ Piston spring
④ Spring mount
⑤ O-ring
⑥ Piston cylinder

• Wipe the ejection sleeve, piston cylinder, O-ring, piston spring, spring mount, piston rod and piston mount. Apply a thin layer of silicone grease onto the O-ring.

Note:

Excessive silicone grease may hinder piston movement.

• After re-assembly, push the control button several times to make sure the silicone grease is evenly distributed.
(Ensure the pipette is empty during this operation.)

5.3 High-Temperature Sterilization

Precautions:

(1) Do not use any additional disinfectants, detergents, or sodium hypochlorite during high temperature sterilization or UV irradiation.

(2) Before high-temperature sterilization, remove the filter and autoclave the filter separately. (Only for PPT0107/PPT0108 /PPT0109)

(3) The pipette can be fully autoclaved and the lower part does not need to be disassembled.

(4) Before high-temperature sterilization, ensure the volume is set to the maximum range and it should be a valid numerical position (e.g., 10.25 or 10.26).

(5) If the pipette is frequently autoclaved, use the silicone oil provided with the package to lubricate the piston for smooth movement. After sterilization, if necessary, tighten the pipette handle and the lower part.

Operating Steps:

(1) Autoclave the pipette at 121°C and 1 bar for 20 minutes.

(2) Allow the pipette to cool down to the room temperature and then air-dry.

(3) For maximum precision and accuracy, calibrate the pipette after high temperature sterilization.

5.4 UV Disinfection

The pipette is resistant to standard-power UV disinfection lamps. Be advised that UV exposure may cause color fading or changes.

6. Troubleshooting

Problem	Cause	Solution
Residual liquid or liquid is dripping from the tip or the dispensed volume is too small.	• Incompatible tip. • The tip is not wet uniformity. • Tip incorrectly attached. • Foreign particles between the tip and the piston cylinder. • Insufficient grease on piston and O-ring; O-ring positioned incorrectly, or the O-ring is damaged. • Maloperation; The calibration is changed, or the pipette is damaged.	• Use compatible tip. • Attach new tip. • Attach the tip firmly. • Clean the piston cylinder and attach new tip. • Clean and grease the O-ring and piston. Reinstall or replace the O-ring. • Recalibrate and repair the pipette
The control button jams and does not move smoothly.	The piston is blocked by liquid.	Clean the piston cylinder.
The pipette is blocked, or the dispensed volume is too small.	Insufficient silicone grease on O-ring. Foreign particles on the piston pin and O-ring.	Clean and lubricate the O-ring and piston. Clean the end of piston cylinder.
The ejector sleeve is blocked or does not move smoothly.	• The spring jams. • Check if the ejector sleeve can be ejected.	• Grease the spring • Install the ejector sleeve in place

7. Warranty

We guarantee that our scientific instruments adhere to the most rigorous engineering and quality standards. This instrument is warranted to be free from defects in materials and workmanship under normal use and service, for a period of 12 months from the date of dispatch. The warranty is extended only to the original purchaser. For claims under the warranty, please contact your local supplier. After the warranty period expires, the manufacturer retains the right to invoice the cost price for the repair or maintenance of a faulty device, along with any associated service fees.

Scope of Warranty

The following conditions are not covered under the warranty.

- Faults or damage caused by negligence, improper installation, improper operation, or failure to use and maintain the device in accordance with the instructions in this operating manual.
- Issues caused by unauthorized disassembly or modification.

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