



**FOUR E'S**  
SCIENTIFIC

Operating Manual  
操作说明书  
Bedienungsanleitung  
Manual de uso  
取扱説明書



CE

ISO 9001:2008  
13485:2003

# Adjustable Volume Pipette

English (EN)

## Operating Manual

Product Description	2
Operation	4
Pipetting	5
Performance test and Calibration	6
Maintenance	8
Troubleshooting	9
Warranty	10

# Product description

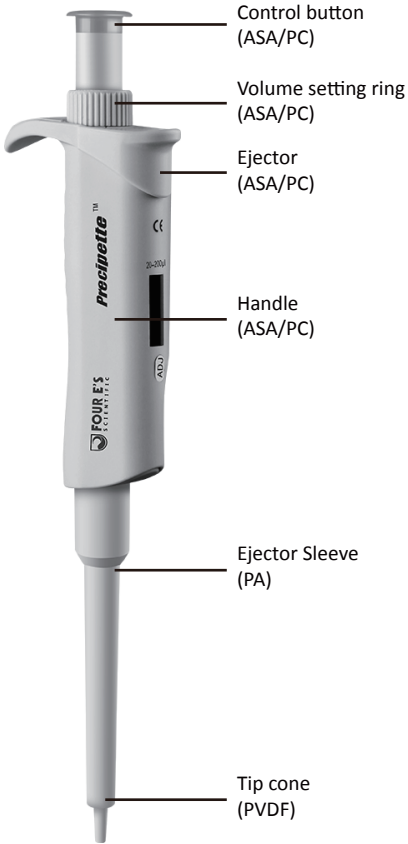
## *Features*

- Ergonomic design of low plunger pressure avoids repetitive strain injuries.
- 9 volumes cover a range of 0.1ul to 10mL.
- Large 4-position volume display and high display accuracy up to 0.002ul.
- Durable high-tech synthetic material provides excellent resistance to high temperature, corrosion and weather.
- Reasonable structure and exquisite technology make flexible assembling and disassembling.
- Tip ejector makes easy and quick tip change.
- High-elastic tip cone provides good seal and easy removal of tips.
- Easy to calibrate and maintain with tools supplied.
- Different volume range is identified by different color top.
- Calibrated in accordance with ISO8655 and each pipette supplied with individual test certificate.
- The lower section can be autoclaved.

## *Delivery package*

- Pipette
- Operating manual
- Calibration tool
- Grease
- Tip
- Certificate

# Material



# Operation

## Setting the volume

- Turn the volume setting ring shown as below to set the volume.



- The height of the control button changes as the volume is adjusted. The higher the button is, the bigger the volume is.
- The side viewing window displays the set volume.
- The numbers on the volume display are to be read from the top to the bottom. The decimal places are below the hyphen.
- DO NOT turn the volume setting ring excessively to set the volume outside of range which would jam the mechanism and damage the pipette.

## 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's 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 heating of the pipette tip.
- Press the ejector firmly downwards to eject the tips.



# Pipetting

## Notes

- To ensure maximum precision and accuracy, we recommend initially wetting each new tip by aspirating and dispensing the liquid one to three times. Only then should pipetting begin.
- To aspirate liquid, vertically immerse the pipette tips approx. 4mm into the liquid and maintain the immersion depth to ensure no air is aspirated. Wipe the tips slowly against the tube 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 dispensing button and wipe the tip on the tube inner wall.

## Forward pipetting

- Press down the dispensing button to the first stop
- Vertically immerse the pipette tip(s) approx. 4mm into the liquid.
- Allow the dispensing button to slide back slowly. Maintain the immersion depth to ensure no air is aspirated.
- For large volumes: wait approx. 3 seconds before removing the pipette tip from the liquid.
- Press the dispensing button slowly until the first stop and wait until the flow of liquid stops.
- To empty the tip, press the dispensing button until the second stop.
- Allow the dispensing button slide back slowly outside of the tube.
- To eject the tips, press the ejector.



First stop



Starting point



Second point

## ***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 dispensing button to the second stop
- Vertically immerse the pipette tip(s) approx. 4mm into the liquid.
- Allow the dispensing button to slide back slowly. Maintain the immersion depth to ensure no air is aspirated.
- Press the dispensing button slowly until the first stop and wait until the flow of liquid stops.
- The remaining liquid together with tips should be discarded.

## **Performance Test and Calibration**

### ***Performance Test***

Performance test should be performed in a draught-free room at 15-30°C (constant to  $\pm 0.5^\circ\text{C}$ ) and the relative humidity is above 50%. Keep the pipette, tips and test water in the test room for at least 2 hours to reach balance of the test conditions. Please perform the tests with the distilled water or deionized water (grade 3) and the analytical balance (accuracy up to 0.01mg).

- Attach the tip to the pipette properly.
- Wet the tip by aspirating and dispensing the set volume 5 times.
- Wet the new tip in the same way after replacing the new tip.
- Vertically immerse the pipette tip(s) approx. 4mm into the liquid.
- Allow the dispensing button to slide back slowly. Maintain the immersion 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. Hold down the dispensing button and wipe the tip on the container inner wall.

- 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 ( $Z=1.0033$ ,  $22^{\circ}\text{C}$  and  $101.3\text{ Kpa}$ ).

### **Calibration**

- Remove the “ADJ” sticker.
- Stick the calibration tool into the hole where the “ADJ” sticker is located. Please make sure the cut is downwards for effective calibration
- Turn the volume setting ring to adjust the volume. To increase the volume by anticlockwise rotating and decrease the volume by clockwise rotating.
- Anticlockwise rotate the volume setting ring to increase the displayed volume if it’s smaller than the actual volume, while clockwise rotate the volume setting ring to decrease the displayed volume if it’s larger than the actual volume until the displayed volume is same with the actual volume.
- Attach the “ADJ” sticker after calibration
- Perform the tests per the mentioned above to verify the calibration.

**Note:** Each pipette will be calibrated at our facility before shipment. Recalibrate is to eliminate the errors caused in the long-term use.





## **Maintenance**

Aggressive substances may damage the pipette, pipette tip and accessories. Faulty dispensing results are sometimes due to lack of maintenance.

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

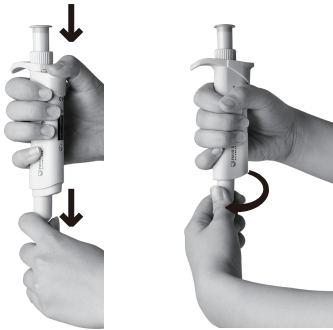
## ***Cleaning***

The 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. Unsuitable cleaning agents can damage the device.

- Moisten a cloth with a cleaning agent / Alcohol.
- Remove external contamination.
- Moisten a new cloth with water.
- Wipe down the housing.

## ***Maintenance***

- Push the ejector button to take down the ejector sleeve
- Clockwise rotate the piston cylinder to take down the whole piston cylinder.
- Moisten a cloth with alcohol.
- Wipe the piston cylinder, piston pin, spring, fixed seat, O-ring and ejector sleeve.
- After cleaning, paint moderate amount of silicone grease onto the piston pin, fixed seat, O-ring. Excessive silicone grease would cause the blocked movement of the piston.
- After cleaning, paint moderate amount of silicone grease onto the piston pin, fixed seat, O-ring. Excessive silicone grease would cause the blocked movement of the piston.
- After re-assembly, push the control button several times to make sure the silicone grease is uniform. (The liquid is without any liquid).



## Troubleshooting

Problem	Cause	Solution
Residual liquid and / or liquid is dripping from the tip and / or the dispensed volume is too small.	<ul style="list-style-type: none"> <li>• Unsuitable tip.</li> <li>• The tip is not wet uniformly.</li> <li>• Incorrect tip attachment.</li> <li>• Foreign particles between the tip and the piston cylinder.</li> <li>• Insufficient grease on the piston and O-ring; O-ring positioned incorrectly or the O-ring is damaged.</li> <li>• Misoperation; The calibration is changed or the pipette is damaged.</li> </ul>	<ul style="list-style-type: none"> <li>• Use original tip.</li> <li>• Attach new tip.</li> <li>• Attach the tip firmly.</li> <li>• Clean the piston cylinder and attach new tip.</li> <li>• Clean and grease the O-ring and piston. Reinstall or replace the O-ring.</li> <li>• Recalibrate and repair the pipette.</li> </ul>
The dispensing button jams and does not move smoothly.	<ul style="list-style-type: none"> <li>• The piston is dirty</li> <li>• The seal is dirty</li> <li>• Seal defective</li> <li>• The pipette is blocked</li> </ul>	Clean the piston cylinder and ejector sleeve.
The pipette is blocked	Insufficient silicone grease on O-ring	Clean and lubricate the O-ring and piston.
The ejector sleeve is blocked.	Contaminated piston cylinder and ejector sleeve.	Clean the piston cylinder and the ejector sleeve.

## **Warranty**

The pipette is covered by warranty for one year against defects in materials and workmanship. If your pipette failed to function, please contact your local representative.

Any warranty will, however, be deemed as void if fault is found to have been caused by maltreatment, misuse, unauthorized maintenance of service or negligence of regular maintenance and service, accidental damage, incorrect storage or use of the products for operations outside their specifications, contrary to the instructions given in this manual or with other than the manufacturer's original tips.

Each pipette is calibrated and tested before shipping and it's ready for use.