

• **Volume setting**

(variable controllers)

- 1** Unlock the volume dial by pushing the lock lever downwards.
- 2** Choose the desired volume by turning the colored cap.
- 3** Re-lock by pushing the lock lever upwards.

Do not to turn the controller while it is locked!

• **Fixed volume controller**

If you frequently pipette certain volumes, we recommend that you order additional fixed volume controllers to your specifications as this offers the safest and most convenient volume setting of all. Please list the desired volume(s) as well as the colour coding of the pipette when ordering.

• **General operation**

- 1** Press the plunger down to the first stop.
Place the tip in the liquid, release the plunger slowly to aspirate and hold the tips in the liquid for 1 second.
- 2**
- 3** Place the tip where the sample is supposed to be delivered and push the plunger slowly to the second stop to blow out the liquid.

• **Tip Ejection**

Capp ecopipette™: Press the ejection pad.

CappAero™ Universal: Push the plunger to the third stop.

CappAero™ Multi and CappAero™ Comfort: Pressing the lever on the side of the handle.

• **Before use (once a day)**

Place the variable volume controller knob in the pipette, set it at top volume and press the plunger totally down, 3 to 5 times. This will ensure that the oil spreads through the whole piston, enabling a smoother pipetting work.

• **External cleaning**

Normal cleaning agents such as water with mild detergents, antiseptic agents or 60-70% ethanol. Pull and twist the ejector at the same time to release it from the pipette.

• **Autoclaving**

Simply take off the volume controller and put the pipette in the autoclave. It must not exceed 121°C and a period of 20 minutes.

• **Warranty or Service**

The pipette is guaranteed for a period of three years from the date of delivery against defects in materials and workmanship of this product. The warranty covers the costs of defective materials and labour. Standard tare are ware or misuse are not covered by warranty.

In case your pipette needs a regular service check, please return the pipette to one of our authorized service providers. Ensure that the pipette is decontaminated before returning it for repair. Non-decontaminated pipettes will not be serviced.

• **Tips to improve the pipetting technique and results**

- 1** Use a proper pipette tip of high quality (low retention), and make sure it fits the pipette.
- 2** Work at room temperature, enabling liquid and pipette to equilibrate to ambient temperature.
- 3** Check the tip before dispensing the sample, wipe it only if there is liquid on the outside of the tip and avoid touching the tip's orifice.
- 4** Pre-wet the pipette tip by aspirating and expelling the liquid 3 times before aspirating a sample for delivery.
- 5** Use consistent plunger pressure and speed for each sample.
- 6** Immerse the tip between 2 to 5 mm deep during sample aspiration.
- 7** Pause for a moment with the tip still in the liquid after aspirating.
- 8** Pull the pipette straight out, being careful not to touch the sides of the container.
- 9** Do not incline the pipette more than 15° when dispensing.
- 10** After dispensing, wipe off the tip onto the container to deliver the remaining sample if necessary.
- 11** Minimize handling of the pipette and tip to avoid transferring of body heat.

• **Serial Number**

Your pipette has been engraved with a serial number (two letters and four digits) placed on the side of the handle near the top. Please refer to this serial number with all inquiries relating to this pipette.

• **Spare Parts**

handle



cap for volume controller



variable volume controller



bottom part



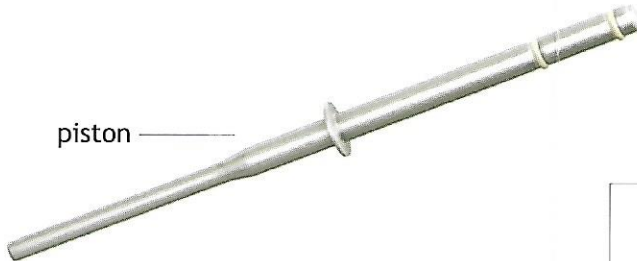
sealing o-ring



metal seal holder



piston



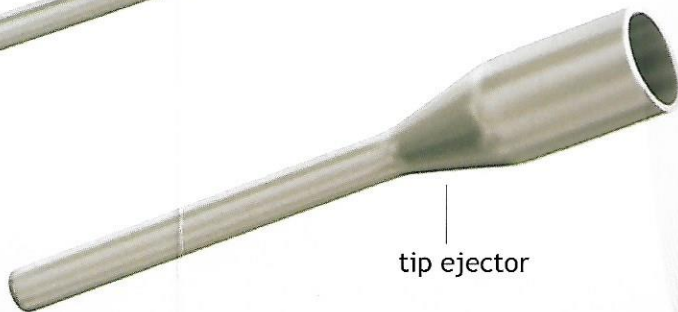
tip base with o-ring



o-ring for the tip base



tip ejector



• Recalibration

Surveys made by pipette service companies show that only about 5% of the total cases related to pipette service would actually require the pipette being adjusted. Therefore, before recalibrating the pipette, we recommend to observe the 5 elements of pipetting:

- 1 Pipette** - May change performance over time depending upon various factors, such as the frequency of use, the level of regular care, and aggressive liquids. Recommended: Use only high quality pipettes such as Capp, and apply service checks at regular intervals.
- 2 Pipette tips** - A low quality or badly fitting tip can destroy the otherwise high accuracy & precision of a high quality pipette. Recommended: Use high quality tips only, and preferably low retention tips, such as ExpellPlus™.
- 3 Environmental conditions** - Differences between pipette temperature, ambient temperature, liquid temperature and changes of relative humidity and air pressure may impose changes to the delivered volume. Recommended: Use Z factor ($\mu\text{l}/\text{mg}$) for converting measured mass of distilled water to volume.
- 4 Liquid being dispensed** - Liquids with physical properties other than distilled water, with which the pipette originally has been verified, may give changes in the delivered volume. Recommended: Calibrate the pipette to the specific liquid.
- 5 Pipette user** - Users differ in terms of pipetting technique and experience, and are therefore not likely to obtain the identical results. Recommended: Establish good pipetting techniques, such as according to the guidelines of ISO 8655-6.

Calibration is performed using distilled water and temperature must not vary $\pm 0.5^\circ\text{C}$ (between 15°C and 30°C) according to the guidelines given in ISO 8655. For high accuracy pipetting, we recommend using Expell™ and ExpellPlus™ pipette tips to ensure that the full volume of the aliquot is transferred to the weighing container.

1. Pipette 10 aliquots and determine the exact volume of each by accurate weighing.
2. Determine average and standard deviation and calculate accuracy and precision.

For the multi channel pipettes, each channel has to be checked individually, following the recommendations of ISO8655. If the results are outside the acceptable limits make sure that the pipette is serviced properly before you perform the adjustment procedure.

• Adjustment volume controller

Pass the Allen key through one of the holes located in the extremities of the volume controllers' holder. Make sure that it is completely fixed, and place it on the table. Remove the volume controller from the pipette, unlock it and gently take off the colored cap.

S1

• Variable volume controller

- 1** Place the volume controller on top of the 3 mm Allen key and make sure that the [S2] bottom screw is fixed on the Allen key during the remaining procedure.
- 2** Using the 2 mm Allen key, loosen the top screw [S1] slightly (no more than half a turn) to unfasten the volume dial - the turning wheel must also be completely fixed during this procedure.
- 3** Turn the volume dial to the average volume determined by weighing.
- 4** Hold the turning wheel in a fixed position and re-tighten the top screw of the volume controller.
- 5** Put the cap back on the volume controller, set the controller at nominal volume and check the accuracy and precision again.



S2

• Fixed Volume Controller

- 1** Remove the coloured cap from the volume controller.
- 2** Use the 1,5 mm Allen key supplied with the pipette. Turn the top screw [S3] to adjust the volume. Turn clockwise to increase volume, counter-clockwise to reduce volume. One full turn equals:

0.2 - 2ul: approx. 0.05ul	20 - 200ul: 6.3ul
0.5 - 10ul: 0.4ul	30 - 300ul: 6.3ul
5 - 50ul: 2.5ul	100 - 1000ul: approx. 30ul
10 - 100ul: 3.0ul	1 - 5ml: approx. 150ul
- 3** Put the cap back on the volume controller.
- 4** Set the controller in the pipette and check the accuracy and precision again.



S3

Troubleshooting

Problem	Possible reason	Proposed action
Pipette leaks, Uneven liquid level in tips on multi channel pipette	Pipette tip base and tip are not compatible	Change to suitable tip (e.g. Expell™ or ExpellPlus™)
	Insufficient tip quality	Change to suitable tip (e.g. Expell™ or ExpellPlus™)
	Tip rack bends when mounting tips on a multi channel pipette	Change to more solid tip rack
	Tip is not firmly attached	Press on tip more firmly (avoid hammering pipette into tip)
Inaccuracy, imprecision	Pipette is not properly calibrated	Recalibrate
	Sealing ring on the inside of the tip collides with the O-rings on the tip base	Change to tip without internal sealing ring
	Top screw on volume controller (marked S1 in the calibration guide) is loose	Tighten the screw, recalibrate
	O-ring(s) on tip base are worn or damaged	Change o-ring (s)
	Piston seal (inside O-ring) is damaged	Dismount tip base (please follow the instructions listed for lubrication) and replace o-ring
	Tip base is loose	Tighten the tip base
Liquid remaining in tip after blow-out	Tip used is hydrophilic	Change to a hydrophobic tip (e.g. Expell™ or ExpellPlus™)
Uneven movement of piston	Piston seal (inside o-ring) is damaged	Dismount tip base (please follow the instructions listed for lubrication) and replace o-ring
	Oil on piston is unevenly distributed	Set the pipette at maximum volume and operate the plunger fully up and down 3-5 times
	Piston needs lubrication	Lubricate piston
	Deposit on piston	Clean the piston and re-lubricate