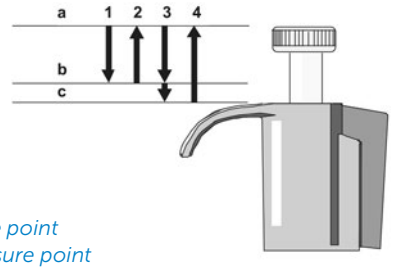
Correct pipetting for accurate results

Inaccuracies in the pipetted volumes will immediately affect the accuracy of measurement results.
Errors in pipetted volumes are frequently attributable to a badly adjusted pipette. This error may occur after long use, overwinding, or mechanical stress. Regular Quality Assurance with standard solutions facilitates its early detection.
Another possible cause is incorrect handling of the pipette. This is usually indicated by wide differences in the values obtained from double determinations.

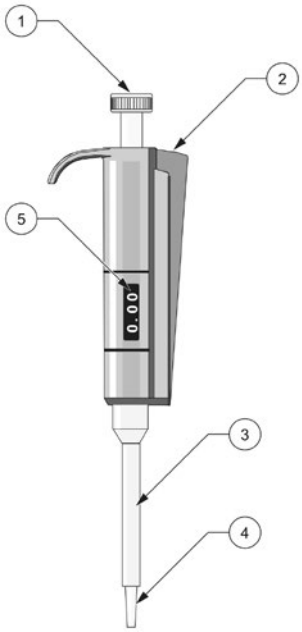


Push button
a: Rest position
b: First pressure point
c: Second pressure point

Standard pipetting technique

With mechanical piston pipettes:

1. Press the push button to the first pressure point.
2. Dip the pipette tip under the surface of the liquid (2–3 mm) and slowly release the push button. Take the tip out of the liquid and touch it against the inside wall of the vessel to remove excess liquid.
3. Place the tip against the inside wall of the vessel and press lightly and evenly on the push button until the first pressure point is reached. Hold the pipette in this position. After about one second, press the push button until the second pressure point is reached. This completely empties the tip.
4. Allow the push button to return to its rest position.



Variable Piston Pipette
1: Push button
2: Ejector button
3: Tip ejector
4: Cone
5: Volume scale

Tips for maximum accuracy

- Make sure that the **correct volume** was selected and that the volume scale clicked into place properly. The volume shown in the display must be completely visible.
- For every new sample use a new pipette tip.
- Make sure to use the **original tips** destined for the pipette.
- Use **light pressure** to fit a new tip to the cone, turning the tip slightly as you do so.
- Make sure that there are no foreign bodies between the tip and the cone.
- Make yourself familiar with the pipette. If you are not sure of the **two pressure points**, test it on air before inserting the tip into the sample.
- Insert the pipette tip into the sample no deeper than the pointed part of the tip.
- Wet the tips with the liquid by repeatedly filling and emptying them.

- Hold the pipette **almost vertical** (no more than 10° from the vertical) while liquid is being drawn into the tip.
- Move the piston up or down **slowly and evenly** (all the more when pipetting highly viscous liquids).
- Do not allow the push button to spring back into its original position. Never allow liquid to come into contact with the cone!
- Move the piston down just once when pipetting the sample.
- The temperature of the pipette and the tip should match that of the liquid.

Maintenance

Pipettes should be stored dry and clean in a vertical position, ideally in a suitable pipette holder.

Check the pipette daily for dust and external soiling before starting work or after finishing work. Pay special attention to the tip cone. Clean the pipette with 70% alcohol. Do not use any other solvents to clean the pipette.

If the pipette is used each day, maintenance should be carried out at least twice each year. This generally consists of disassembly, cleaning, and greasing. Refer to the user manual for the detailed steps. Maintenance can be carried out either in your laboratory or at the Hach service center.

NOTE: After re-assembling the pipette it is highly recommended to check the calibration.

Table 1: Checking the calibration with an analytical balance

Pipette	Volume setting	Permissible weight range [mg]
200 µL	200 µL	198.7 - 201.3
500 µL	500 µL	497.0 - 503.0
0.2 - 1.0 mL	0.30 mL	298 - 302
1.0 - 5.0 mL	2.00 mL	1,990 - 2,010

Checking the calibration

Each pipette is calibrated in the factory with distilled water. No recalibration is needed for routine use. However, the calibration should, be checked twice per year minimum to comply with Analytical Quality Assurance/GLP requirements and whenever the pipette was disassembled for cleaning.

Weight method

An appropriately sensitive analytical balance, a small beaker and distilled water are needed to carry out the calibration check. Pipette distilled water into previously weighed beaker at least five times. Determine each weight in mg to the first decimal place and compare this with the weight shown in Table 1. If the weight is not within this range, recalibrate the pipette. Make sure to comply with the temperature given in the user manual of the pipette.

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HACH COMPANY World Headquarters: Loveland, Colorado USA
United States: 800-227-4224 tel 970-669-2932 fax orders@hach.com
Outside United States: 970-669-3050 tel 970-461-3939 fax int@hach.com
hach.com

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