

USER MANUAL
EDVOTEK®
Variable
Micropipettes



Designed for the Classroom
SINCE 1987



Sections

- 01 INTRODUCTION
- 02 CONTROL ELEMENTS
- 03 OPERATION
- 04 CHECKING THE VOLUME
- 05 CALIBRATION
- 06 RECOMMENDATIONS
- 07 CLEANING AND STERILIZATION
- 08 TROUBLESHOOTING

01 Introduction

The variable micropipettes are designed for general laboratory use. Micropipettes can be used for measurement and transfer of aqueous solution, acids, bases and enzyme assay applications. These variable volume pipettes cover the range from 0.1 μ L to 5 mL in 7 models.

The variable micropipettes operate utilizing the air cushion principle, i.e. the aspirated liquid has no contact with the shaft or plunger of the pipette. Liquid is aspirated into disposable tips put on the pipettes.

Micropipettes are equipped with a four-digit counter displaying the set volume, and the aspirated volume is set by means of the adjustment knob. The pipette design allows the user to lock the volume setting.

Please get acquainted with the figure and its description before reading the instruction manual.

02 Control Elements



NOTE: See photo on page 1 for proper ergonomic grip of the pipette. Always hold and use pipette in a vertical position.

The micropipette can be individually marked with a label on the finger rest. Remove the label window on the finger rest, add text to the label and re-insert the label and window.



Identify your pipette on the protected label.

The serial number is behind the protected label.

Label window

03 Operation

1. Fitting the Tip

Use the correct tip according to the volume range or the color code. Ensure that the tip is securely seated but do not use excessive force.



2. Volume Setting

- Confirm that your desired volume fits within the pipette's range. This should be listed at the top of the pipette shaft.
- Push the volume lock upward to disengage (UNLOCK).
- Select the desired volume by rotating the volume-setting wheel. Avoid twisting and abrupt rotating motions during this adjustment.
- Push the volume lock down to re-engage (LOCK).



NOTE: The volume lock tightens but does not lock volume-setting wheel.

3. Aspirate Sample

- Press pipetting button to the first stop.
- Hold the pipette vertically and immerse the tip 2-3 mm into the liquid.
- Let the pipetting button slide back slowly. In order for the liquid to reach its end position, leave the tip immersed for another 1-2 seconds.
- Touch the tip against the container wall.



4. Discharge the Sample

- Place the pipette tip against the wall of the vessel. Hold the pipette at an angle of 30-45° relative to the container wall.
- Press the pipetting button slowly to the first stop and hold it down. For serum and liquids of high viscosity or low surface tension, a slow and steady raising of the pipetting button will allow such solutions to fill the tip properly and improve accuracy.
- The blow-out stroke empties the tip completely: Press the pipetting button down to the second stop.
- While doing this, wipe the pipette tip against the wall of the container.
- Remove the pipette tip from the container wall and let the pipetting button slide back.



5. Ejecting the Tip

Hold the pipette shaft over a suitable disposal container and press the tip ejection key to the stop.



NOTE: Don't lay the instrument horizontal when the tip is filled. Liquid may enter and contaminate the instrument.

04 Checking the Volume

Depending on use, we recommend inspection of the instrument every 3-12 months. The cycle can, however, be adjusted to individual requirements.

The gravimetric testing of the pipette volume is performed according to the following steps and is in accordance with DIN EN ISO 8655.

1. Set Nominal Volume

Set volume to the maximum volume indicated on the instrument.

2. Condition the Pipette

Pipet up and down 5 times to condition the pipette. Discard and replace the tip.

3. Carry Out the Test

- a. Attach a new pipette tip and pre-rinse one time with test liquid.
- b. Aspirate liquid and pipette it into the weighing vessel.
- c. Weigh the pipetted quantity with an analytical balance. (Please follow the operating manual instructions from the balance manufacturer.)
- d. Calculate the volume, taking the temperature into account.
- e. Repeat the measurement at least 10 times for statistical analysis.

We recommend using diH₂O at room temperature for calibration measurements. With these conditions, 1.0 mL of H₂O should equal ~1.0 g.

CALCULATION (FOR NOMINAL VOLUME)

- x_i = Weighing results
 n = Number of weighings
 V_0 = Nominal volume

Mean value:

$$\bar{x} = \frac{\sum x_i}{n}$$

Accuracy:

$$A \% = \frac{\bar{x}}{V_0} \cdot 100$$

04 Checking the Volume, continued

Compare the accuracy that you just calculated to the predicted accuracy in the table below. If it is within the suggested range, the pipette is accurate enough to use. If it is outside of the suggested range, proceed with Section 05 - Calibration.

| Cat. # | Volume (µL) | Increment (µL) | Volume step (µL) | Accuracy* ±% |
|--------|-------------|----------------|------------------|--------------|
| 589 | 0.5-10 | 0.01 | 10 / 5 / 1 | 1.2 |
| 589-1 | 2-20 | 0.02 | 20 /10/ 2 | 1 |
| 590 | 5-50 | 0.05 | 50/25/5 | 1 |
| 591 | 10-100 | 0.2 | 100/ 50 /10 | 0.8 |
| 591-1 | 20-200 | 0.1 | 200/ 100 /20 | 0.8 |
| 592-1 | 100-1000 | 1 | 1000 /500/100 | 0.8 |
| 593-1 | 500-5000 | 5 | 5000 /2500/500 | 0.8 |

* Maximal permissible systematic error

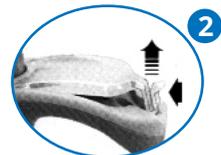
The accuracy and precision figures are obtained using EDVOTEK® tips, using a gravimetric method, performing at least 10 measurements of distilled water at the temperature of $20 \pm 1^\circ \text{C}$, according to EN ISO 8655 standard.

The pipette design enables the user to perform the recalibration process according to the rules presented in Section 05 - Calibration.

05 Calibration

The instrument is permanently adjusted for aqueous solutions. If the pipette operation is clearly inaccurate, or if the instrument must be adjusted for solutions of different densities and viscosities or specially-shaped pipette tips, adjustments can be made using the Easy Calibration Technique.

- Record the mean value (x) of your pipette from Section 04.
- Remove the label window and the label:
Push the hook forward, raise it slightly and then pull it back.
- Using a paperclip or a pipette tip, remove the protective film (this protective film can be discarded).
- Push the red adjustment slider completely back, raise the volume-setting wheel (decoupling) and release the adjustment slider. This will be a subtle raise in the wheel (very subtle "pop" up).



05 Calibration, continued

5. Set the adjustment value:
With the volume-setting wheel in the UNLOCK position, set to the mean value (determined in Section 04).
6. Push the adjustment slider completely back again, push the volume-setting wheel downwards and release the adjustment slider. Re-insert the label and the label window.



NOTE: *The change to the factory setting as indicated by the red adjustment slider are now visible in the label window.*

06 Recommendations

Observing the following recommendations will ensure maximum possible accuracy and precision of liquid sampling.

- Operate the pipette push button slowly and smoothly when liquid aspirating and dispensing.
- Place the tip just below the surface of the liquid while pipetting.
- While operating, the pipette should be held in a vertical position.
- The tip should be replaced with a new one each time a different kind of liquid is handled.
- The tip should also be changed if visible droplets of liquid remain inside it.
- Each new tip should be pre-rinsed with the pipetted liquid.
- Pipetted liquid must not enter the pipette shaft. To ensure this, operate the pipetting push button slowly and smoothly and do not lay the pipette down in a horizontal position if there is any liquid in the tip.
- Do not aspirate liquids of temperatures above 70° C.
- After pipetting acids and aggressive liquids, it is recommended to disassemble the pipette and rinse the pipette plunger, shaft, seal and other elements in distilled water.

07 Cleaning and Sterilization

Cleaning:

External surfaces of the pipetting push button, the ejector push button, the hand grip and the body can be cleaned with a tissue dipped in isopropyl alcohol.

Sterilization:

The pipette can be subjected to sterilization, as a whole, in the autoclave at a temperature of 121° C for 20 minutes. After performing the sterilization, the pipette should be dried and cooled down to room temperature.

It is Recommended:

- To sterilize the pipettes in an autoclave with initial vacuum and drying cycle.
- To test the pipette calibration every 10 sterilization cycles.

08 Troubleshooting

| PROBLEM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|--|--|--|
| Tip dripping (instrument leaks) The instrument does not aspirate or aspirates too little; the discharged volume is too low. | Unsuitable tip | Only use high-quality tips |
| | Tip not sealed tightly | Press tip on firmly |
| | Seal contaminated | Clean seal |
| | The seal or cone is damaged | Replace seal or shaft |
| | The piston is contaminated or damaged | Clean or replace piston |
| Aspiration is too slow. | Shaft is clogged | Clean shaft |
| | The filter in the 5 mL and 10 mL models is contaminated | Change the filter |
| Discharged volume is too large | Pipetting button pressed too far into the blow-out position before sample uptake | Operate properly |
| Piston is difficult to move | The piston is contaminated or needs oil | Clean and oil the piston |
| Actual volume pipetted does not match volume set on pipette | Pipette accuracy is out of range | Follow calibration instructions only if accuracy is outside of the acceptable range. |