

How to use serological pipets and pipet controllers

1 Start with the basics

Accuracy and precision

- Accuracy: how close a dispensed volume is to its specified value
- Precision: measure of repeatability

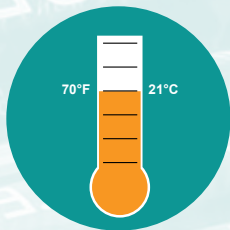


Serological pipets are usually calibrated with deionized water 'to deliver' (TD, Ex) with an accuracy of $\pm 2\%$ at 20 °C; this cannot be improved on, even with perfect liquid handling practices. It is important to realize that, since the **calibration/reference temperature is 20 °C, any deviation from this temperature will require correction** to maintain accuracy and precision.

2 Following best practices

Temperature

Allow time for the liquid to equilibrate to the environmental temperature before pipetting. Ideally, the **pipet, pipet controller and liquid should be equilibrated to the same temperature**. Prewetting of the pipet by aspirating and dispensing the liquid two or three times helps to equilibrate the environment inside the pipet, to reduce the extent of any error.



Liquid density

Serological pipets are calibrated using deionized water. If liquids of differing densities are pipetted, it may be necessary to **aspirate more or less liquid to compensate for differences in density**. The volume dispensed can be check-weighed using a laboratory balance to ensure accuracy.



Non-aqueous liquids

Volatile liquids evaporate rapidly. Aspirating and dispensing as **swiftly** as possible, as well as prewetting, is beneficial. **Slow** speeds are essential for **viscous liquids**, to allow sufficient time to ensure complete aspiration and dispensing of the required volume.



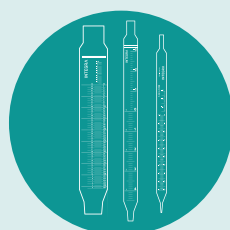
Altitude

Different geographic altitudes have different air pressures. This can impact the results if the pipet is used at a location with a significantly different altitude from the calibration site. Aspirate a small, defined volume of water and weigh it on a balance to check for any deviation, then **adjust the volume dispensed as necessary**.



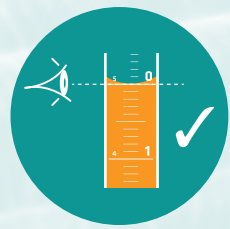
The correct pipet volume

Choose the **smallest pipet possible** to minimize dead air volume. For example, use a 10 ml (or even 5 ml with extended volume) pipet to dispense 8 ml of liquid.



Reading the liquid meniscus

The pipet must be held in an upright position at eye level, so that the graduation ring appears as a line, reading the volume with the **lowest point of the meniscus touching the upper edge of the graduation mark**. The meniscus will appear darker and be easier to read in front of a light background.



3 Pipet controller tips

Recommendations for using a pipet controller

For 1 and 2 ml pipets:

- Preset the pipetting **speed to minimum**; to avoid overfilling.
- Depending on the pipet controller, turn around the silicon holder in the sterile module (nose piece) to ensure that the pipet is held securely.



For 5-100 ml pipets:

- Preset the pipetting **speed to maximum**, or choose the speed that works best for your pipetting volume and sample.
- When working with 25-100 ml pipets, choose ones with an **anti-drip design**, to reduce the risk of spills.

Note: With INTEGRA PIPETBOYS, the speed of aspiration and dispense can be controlled by applying pressure to the pipet controller buttons. In addition, the maximum speed can be preset using the thumb wheel or speed slider.

For all serological pipets:

- Unpack the pipet from the upper end to keep it sterile as long as possible, then attach it to the pipet controller.
- Immerse the tip into the liquid and prewet by aspirating and dispensing the full volume of the pipet two or three times.
- Aspirate slightly more than the desired liquid volume then, if possible, wipe the outside of the pipet to remove any remaining liquid.
- Holding the pipet at eye level, dispense to waste until the bottom of the meniscus reaches the correct graduation.
- Dispense all remaining liquid into the target vessel while touching the tip on the vessel wall, then blow-out a small volume of air to ensure complete liquid delivery.

Note: INTEGRA PIPETBOYS allow drop-by-drop dispensing, for a highly controlled liquid dispense and low shear forces when working with sensitive cells or viscous liquids.

Performing repeat dispenses with a pipet controller

Depending on the application, it is often useful to aspirate one large volume, then dispense multiple smaller aliquots. Traditional pipet controllers require aspiration of the desired total volume, followed by visually controlled dispensing of the required aliquots. Alternatively, you can use a pipet controller with a repeat dispense mode. INTEGRA's PIPETBOY GENIUS allows users to dispense multiple aliquots of the same user-defined volume at the press of a button, without the need for visual inspection.

Pipet controller maintenance to avoid contamination

- Regularly clean pipet controllers with a cloth moistened with soapy water or 70 % ethanol, and replace the pipet mount and filter rubber in the sterile module if they are damaged.
- The sterile module can usually be autoclaved.
- The hydrophobic filter prevents excess liquid entering the device, and should be replaced every three months or if it has been contaminated by overfilling the pipet.



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