



2024 Pipettes Buyers Guide

Simplifying Progress

SARTORIUS

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Author: Dr. Emilia Varhimo | Read Time:
10 minutes | Last Updated: June 2024

So, you want to explore pipettes? From Techniques to Trade-Ins: The Guide to Choosing the Right Pipette for Your Application.

Laboratory work is pertinent to an exceptionally broad scope of principles and professions. But for all the different research fields, there is a unifying factor – most rely on pipettes to safely and accurately transfer liquid samples and conduct repeatable experiments. Most – if not all – basic laboratory guides feature sections about pipettes and pipetting techniques. Indeed, pipetting is one of the most common tasks performed in lab settings and one of the most important. It is important to remember that pipetting is not a one-size-fits-all process. Everything from liquids to workflow can directly influence the pipettes, accessories and pipetting techniques that should be used. Because pipetting occurs so frequently in lab settings, it stands to reason a user would want to ensure proper equipment and techniques are always used.

But what constitutes proper equipment and technique?

There are several factors to consider regarding pipettes and pipetting but making these choices does not have to be a daunting task. Sartorius offers an all-inclusive buyers guide for selecting pipettes and pipetting accessories and a robust library of resources, so there is never a missed step when it comes to technique, maintenance, etc.



Decisions, Decisions, Decisions: Choosing the Perfect Pipette

Deciding your laboratory requires pipettes is the easy part. The breakdown of needs and variables will ultimately determine which pipette and accessory choices will make the most sense.

Quick Tip: A good rule of thumb is to remember the highest accuracy levels are achieved by choosing the smallest volume pipettes capable of handling your volumes. Pipettes are most accurate at nominal volume.

Before you purchase your next pipette, consider the following:

- 1 For which applications will the pipettes commonly be used?
- 2 What type of work is involved (Quality Control, pharmaceutical safety, life sciences)?
- 3 What is the typical workflow?
- 4 What are the sample materials?



Consider These Top Ten Features When Choosing Your Next Pipette:

- 1** **🌐 Ergonomics and Handling Comfort** - The action of pipetting can cause repetitive strain injuries (RSI), which can not only cause pain and discomfort but can also impact the precision and accuracy of results. Consider things like tip ejection force and grip design when choosing a unit. Also, check the weight of the pipette. Lightweight is essential in long pipetting sessions to prevent muscle strain.
- 2** **Air vs. Positive Displacement** - There are two types of piston-operated pipettes: air displacement and positive displacement. Most lab pipetting is done using air displacement pipettes, which have air columns between the piston and the liquid. With positive displacement pipettes, the piston is in direct contact with the liquid. These are typically used for demanding samples such as radioactive liquids.
- 3** **Accuracy, Precision Requirements** - Accuracy means delivered volume = set volume; precision expresses proximity of multiple pipetting results. These are two of the most critical aspects when choosing a pipette.
- 4** **Single vs. Multichannel Pipette** - Does your lab work involve pipetting to and from tubes and vessels of various sizes, with no degree of uniformity? Do you engage in large-volume pipetting (1.2 – 10 mL)? For cases such as these, single-channel pipettes are the optimal choice. When working with 96 or 384-well plates, in situations when sample numbers are large, multichannel pipettes are a better option.
- 5** **Fixed vs. Variable Volume** - Variable volume pipettes are the industry standard, as it makes sense to use equipment that can be adjusted to various needs and measurements. There are, however, times when fixed volume pipettes have advantages, particularly when working with consistent volumes like in clinical testing or patient samples. Fixed volume pipettes remove a source of error, as there is no chance of selecting an improper volume.
- 6** **Autoclaving** - Check whether the pipette is fully autoclavable – meaning it can be autoclaved as is, or whether it requires disassembly as some parts, like electronics, might not tolerate autoclaving. Autoclaving is the most efficient way to decontaminate a pipette.
- 7** **Volume Lock** - Make sure the pipette has a proper volume lock to avoid accidental volume changes.
- 8** **Visible Display** - An easy-to-read volume display makes for efficient and reliable working conditions. Check that the volume is displayed in numbers, down to the last decimal.
- 9** **Light Operation** - Avoid unnecessary strain by making sure the pipette plunger is light to press at both maximum and minimum volumes. Also remember to check for light tip ejection as it is the most force demanding action during pipetting.
- 10** **Easy Maintenance** - Check that the pipette is easy to disassemble without tools and has only a few parts to clean.

Explore Pipette Categories

Mechanical Pipettes

Those in the market for manual pipettes that are accurate, ergonomic and easy to use should consider the Sartorius line of mechanical pipettes as a safe bet. Whether the choice is **Tacta**®, or **Proline**® Plus, Sartorius offers reliable mechanical pipettes, popular liquid-handling devices in research institutes, pharmaceutical laboratories, industrial labs and universities.



Need help?

[🌐 Learn How to Select a Mechanical Pipette.](#)

Explore Pipette Categories - Cont.

Electronic Pipettes

When the name of the game is precision – and you want to leave the variables of manual pipetting behind with the simple push of a button – it might be time to explore electronic pipettes. Sartorius Picus® 2 electronic pipettes are ideal for your daily liquid-handling lab requirements.

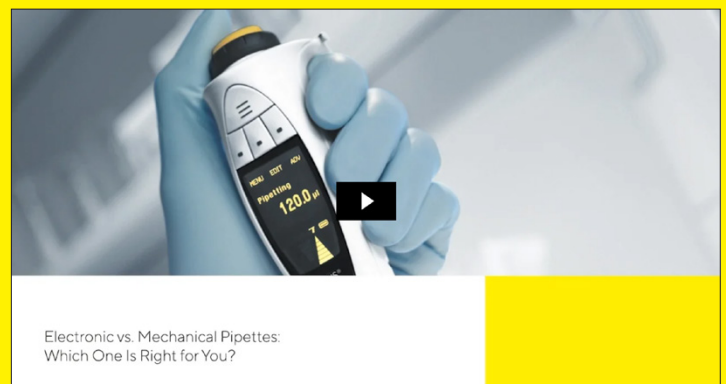
With fully electronic control, you can be sure of consistent, user-independent results. And with multiple settings, you can expedite your workflow, handling larger tasks faster than with mechanical pipettes.

By connecting Picus® 2 to your mobile device, you can use the Sartorius pipetting mobile app to seamlessly run sample preparation workflows and automatically adjust the pipette setting, taking your productivity to the next level.



Electronic vs. Mechanical Pipette


Discover how much faster an electronic multichannel pipette can fill a multiwell plate using multidispensing than a mechanical pipette [🌐 here](#).



Here Are the Top Three Benefits of Electronic Pipettes to Consider Before Buying Your Next Pipette:

1 Reliability – One of the biggest advantages of using electronic pipettes is the reduction of human variance. This is particularly beneficial for applications in laboratories today, where the pipetting of very small amounts of liquid might be required.

2 Expedited Workflow – Unlike their mechanical counterparts, electronic pipettes carry the advantage of numerous modes such as serial dispensing, diluting and titrating and much more. With user-defined protocols, users can simply change settings and get to work, reducing errors and significantly cutting task time.

3 Ergonomically Sound – Not only are our electronic pipettes designed with ergonomic comfort and safety in mind, but muscle strain is further reduced by introducing electronic tip-ejection. Time saved equals less repetitive strain load for the user, ensuring a more comfortable experience in the lab. Explore how  **ergonomically designed electronic pipettes improve results.**

Each of these user benefits are available with Sartorius' electronic pipettes. Picus® 2 takes pipetting to the next level with a sophisticated and ergonomic design, allowing users to work with minimal effort for maximum levels of accuracy and reliability. Utilize programmable protocols and safety features, ideal for users looking to optimize regulatory compliance. Features like password protection and calibration reminders are the gold standard for regulation conformity and workplace precision.

Exploring Pipetting Needs Through Applications

Understanding the specific needs of your application can help you select the right pipette and improve your results. There is a strong correlation between lab applications and the type of pipetting equipment to get the job done in the best possible way. Everything from sample medium to sterility requirements plays a role in the types of pipettes and accessories used. Knowing which pipettes and accessories most effectively mesh with various applications can keep pipetting tasks safe, accurate and repeatable - regardless of your field.

Four Common Applications That Involve Pipetting Include:

- 1 Cell-based Assays** - Cells are typically sensitive and require careful handling in laboratory settings. To ensure optimal success in cell-based experiments, it is recommended that [🌐 electronic pipettes](#) be used with [🌐 filter tips](#), using good pipetting techniques that eliminate foaming and bubble formation during cell seeding.
- 2 Cell Culture Work** - A common hazard in cell culture work is contamination. The invasion of mold, bacteria and mycoplasma (to name a few) is detrimental to the sample and poses a risk to the entire laboratory. Additionally, cells should only be away from incubators for a minimal amount of time to preserve their integrity. These conditions call for multichannel pipettes (to expedite workflow) that are equipped with [🌐 filter tips](#) and fully autoclavable (to prevent contamination). Learn more about [🌐 the best practices for pipetting 3D cell culture hydrogels](#).
- 3 Microbiology** - When studying bacteria, viruses, algae and other micro-organisms, contamination prevention is paramount. Mixing populations or introducing unwanted strains should be avoided. Best practices dictate aseptic working methods using sterilized lab equipment. Fully autoclavable pipettes with pre-sterilized tips and pipette controllers — fitted with sterile filters — are the optimal choice to achieve this ideal working environment.
- 4 Chemicals** - In chemical industry labs, it can be tricky to continuously achieve reliable results due to the aggressive nature of chemicals. Pipettes engineered for reliability (such as Proline® Plus) and paired with chemical-resistant [🌐 pipette tips](#) can make the job much easier. Chemical-resistant bottle top dispensers can also reduce spillage risks. [🌐 Explore on-demand webinar on best practices for pipetting in chemical labs](#).

Working Smarter: Pipette Accessories and Consumables

Top Four Pipette Tips:

- 1 Standard Pipette Tips** – As indicated, standard tips are the most used in laboratories and are suitable for most applications.
- 2 Filtered Pipette Tips** – If the prevention of cross-contamination is a critical element of your workflow – or if handling dangerous liquids is common – filtered tips are recommended for maximum safety.
- 3 Extended Length Pipette Tips** – Extended length tips allow users to reach samples without putting the shaft of the pipette into the vessel from which the liquid is being retrieved.
- 4 Wide Bore Pipette Tips** – These tips are a great choice for handling samples with great care (i.e., cell or DNA-handling, or samples containing particulates).



Important Pipette Tip Selection Criteria

Additionally, when selecting pipette tips, the user must evaluate pipette tip compatibility with the pipette, the quality and purity of the tips, and how good the tip packaging is.

Pipette Compatibility

- ✓ The tip must be compatible with the pipette. The performance you are able to get depends on the system, not the tip or pipette alone.
- ✓ In most cases, the tips from the pipette manufacturer offer the best fit.

Tip Quality

- ✓ The tip must be in the correct size and shape.
- ✓ Any deviation, like bent tips, may cause inaccuracy and imprecision in the results.

Packaging

- ✓ In trays (or boxes), tips are ready to be packed, without the need for the user to touch the tips with hands.
- ✓ When packaged in bulk, the tips usually need to be picked by hand and refilled into a box.

Tip Purity

- ✓ The manufacturing process is critical to the tip purity.
- ✓ Tip purity is typically tested per production lot and a lot-specific certificate is written after confirming purity.

Tip Certification

- ✓ Proof of manufacturing or purity processes and quality.



Accessorize for Success: Choosing the Best for Your Workflow



Pipette Stands

It is recommended that pipettes be stored securely in an upright position to avoid contamination from work surfaces, etc. Whether using mechanical or electronic, single or multichannel, Sartorius has a selection of stands to suit your workspace needs. Enjoy space-saving, multi-unit storage with a carousel stand, or multitask and keep electronic units ready-to-use with charging stands. Regardless of need, there is a variety of choices to keep an orderly space and protect pipetting equipment.



Safe-Cone Filters

Our ultimate pipette protectors are made from polyethylene (PE) and designed to keep harmful substances (liquid vapors, contaminants, etc.) from reaching the internal components of your pipette when pipetting using standard pipette tips. This additional line of protection lessens the risk of pipette damage, prolongs the unit's lifetime and reduces maintenance intervals..

Ready for Action: Pipetting Techniques and Best Practices

You've found the perfect pipette for your workplace needs. You have accessorized your equipment with pipette tips, filters, stands and everything else you need to create a fully functional pipetting workspace.

What now?

Now is the time to make sure you are getting the most out of your pipette by going back to basics. By employing the [🌐 best practices when using pipettes and pipetting equipment](#), not only is the life of the equipment prolonged, but sample | experiment integrity is preserved through elimination of error.



I. Back to School: Get Top-of-the-Line Pipette Training

Regardless of experience level, enhancing work quality is a goal for most in the laboratory, and there are always training certifications to maintain. The **Sartorius Pipetting Academy** offers training modules and in-depth educational content for pipetting beginners as well as seasoned lab professionals. With a robust selection of theorybased content and hands-on sessions, pipette training is attainable for people of all preferred learning styles. Participants will learn:

- Essentials of pipetting
- Correct and safe pipetting techniques
- Maintenance and calibration procedures
- Best ergonomics for daily workflow
- Pipetting mastery for demanding applications

This ISO 9001 Certified training program provides high-quality training from certified instructors and guarantees participating lab personnel will the skills and knowledge necessary to meet quality requirements.



II. Error Prevention through Proper Pipetting Technique

While pipetting is a common laboratory practice, there is always potential for error. In many instances, these errors are easy to prevent through proper equipment selection and the [🌐 basics of good pipetting practices](#). Common pipetting errors are summarized in this [🌐 poster](#) and include:

- Aspirating or dispensing liquids too quickly
- Contamination of samples and/or equipment (pipette-to-sample, sample-to-pipette or sample-to-sample contamination) – Read [🌐 How to Avoid Contamination In Pipetting](#), followed by [🌐 Top 10 Tips to Avoid Contamination In Pipetting](#)
- Improper maintenance and calibration
- Improper pipetting technique for sample medium (i.e. foaming fluids or viscous liquids)

By understanding samples | applications and finding the best pipetting techniques and equipment for the task at hand, the margin of human error can be greatly reduced as a factor for error in experiments and workflows. Check out the infographic, [🌐 Learn Six Easy Ways to Prevent Pipetting Errors](#).


On the Straight and Narrow: Pipette Maintenance and Compliance

With training in-hand, you are well on the way to a fulfilling working relationship with your carefully selected pipettes and pipetting equipment. There is nothing left but to enjoy years of safe, reliable, and accurate pipetting, right?

... almost. While Sartorius strives to produce high-quality pipettes and accessories, proper user maintenance is what keeps the equipment safe, clean, reliable, and compliant – all important assets for frequently used laboratory equipment.



I. Keep it Clean: Tips for Effective Pipette Cleaning


Pipettes are used to transfer a multitude of samples and media, including liquids that can be viscous, hazardous or potential contaminants. Thorough  **cleaning** is a must to keep equipment in working order and maintain sample integrity.


It is important to always follow manufacturer recommendations when it comes to cleaning pipettes and pipette equipment. A good tip to keep in mind when undertaking the following practices:

- Daily cleaning - For pipettes employed in day-to-day use, a daily cleaning is paramount before hanging up the safety goggles for the night. With Sartorius pipettes, it is recommended that tip cone filters be changed, if applicable, followed by a thorough outer body cleaning with 70% ethanol. During this procedure, it is useful to check cracks, defects or anything else that might prove detrimental to equipment function.
- Full cleaning – Follow manufacturer instructions for disassembling your pipette. It is very important to know the chemical compatibilities of your equipment before using cleaning and | or decontamination solutions (to include pure water, detergents, nuclease removal agent, radioactivity cleaning agent and sodium hypochlorite). After a thorough cleaning, you may wish to autoclave your instrument. Autoclaving is an efficient way to sterilize pipettes from biological contaminants like viruses and bacteria. Follow manufacturer instructions for autoclaving, and check which parts are autoclavable (some pipettes are fully autoclavable, but others are not). Always use correct settings.



II. Keep it Maintained: Pipette Maintenance Influences Equipment Performance

Service life cycle management is an important thing to consider when purchasing equipment. Whether the field is pharma, food and beverage, university, etc., good practices and preventative maintenance are crucial to increasing the longevity of equipment. And when the going gets tough, it also helps to know your lab equipment is backed by teams of exceptional repair and service professionals. To maintain the level of purity critical in many laboratory applications, adequate  **cleaning and decontamination of pipettes is necessary.**

Within the confines of your testing parameters are a variety of factors which, over time, could affect the performance of your pipettes and pipetting accessories. No matter where you are in the world, we are prepared to serve you – and your pipette – with service contracts and a full spectrum of repair/maintenance options to suit your needs. Let us work with you to develop optimal service solutions for your systems, instruments and pipetting equipment.  **With us on your support team**, you can be sure of the quality of results through the final step of your manufacturing and testing processes.



Pipette Cleaning for Different Applications

Cleaning Agents and Their Activities						
Cleaning Reagent	Radioactive Solutions	Acids and Alkalis	Organic Solvents	DNA/RNA	RNase/DNase	Proteins
Pure (type 3) water or distilled water		■				
Detergent	■					■
Radioactivity cleaning reagent	■		■			
Sodium hypochlorite				■		
Nucleic acid removal reagent				■		
Nuclease removal reagent					■	
DEPC (diethyl pyrocarbonate)					■	
UV (ultraviolet radiation)				■		

Decontamination Agents and Their Activities					
Decontamination Reagent	Bacteria Spores	Vegetative Bacteria	Virus Enveloped	Virus Non-Enveloped	Fungi
Ethanol / isopropanol		■	■		
Sodium hypochlorite	■	■	■	■	■
Hydrogen peroxide	■	■	■	■	■
Vapor hydrogen peroxide	■	■	■	■	■
UV (ultraviolet radiation)	(Poor)	■	■	■	■

Keep it Calibrated: Pipette Calibration for Compliance and Efficiency

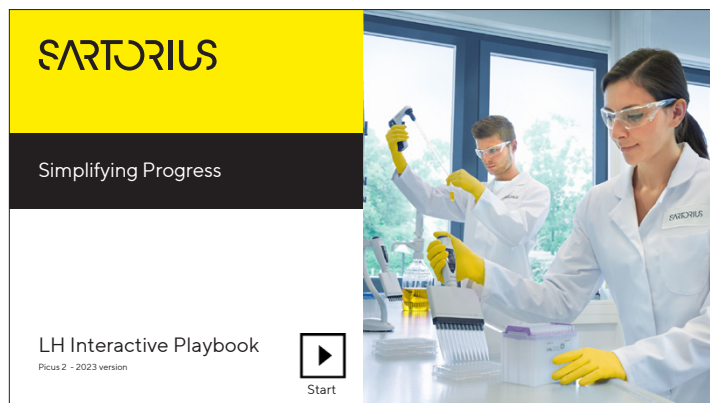
In addition to cleaning and performing routine maintenance on your pipettes, the accuracy and precision of these instruments should be checked at regular intervals (keeping in mind intervals can vary according to factors like frequency of use, pipetted materials, etc.).

With the Right Pipette Calibration Solutions, Your Laboratory Can Achieve:

- 1 Compliance – (Read [🌐 Are You GLP/GMP Compliant When it Comes to Pipetting?](#))
- 2 Decline in error frequency
- 3 Increased efficiency
- 4 Lower calibration costs

Whether you prefer to outsource calibration services to our team of professionals or tackle the task in-house, we have everything needed to get the job done – and done well!

[🌐 Explore How to Set Up Pipetting Quality Control Program for Your Lab](#)



Sartorius Instrument Service means less work for you and better performance for your devices. In addition to pipette repair, we offer pipette calibration services to keep your equipment accurate and industry compliant.

Speedcal mobile is a patented and unique pipette calibration system including up to 12 weighing systems for fast and precise calibration of multichannel pipettes (up to 12 channels). Speedcal mobile can also be used to calibrate single channel pipettes. With integrated semimicro balances (readability of 0.01 mg), it is possible to calibrate pipettes from 10 μ L up to 1,500 μ L. Speedcal mobile is available in 4, 8 and 12-channel versions (later upgrade possible).

We offer a portfolio of specialized micro and semimicro balances for fast and ergonomic pipette calibrations. The Cubis® MPS provides automated tasking and sleek precision to take human error out of the equation. For a complete calibration lab in one convenient spot, Cubis® MPS can be equipped with a climate tower and a temperature-controlled liquid reservoir. It has workflows integrated to guide the user through the pipette calibration routine (acc. to ISO8655), calculates weight values into volumes (incorporating environmental data as temperature and barometric pressure) and evaluates according to ISO 8655 tolerances.



Whether you are looking for top-of-the-line calibration software such as Pipetto or accompanying calibration hardware such as suction pumps, liquid reservoirs and climate control towers, Sartorius has the calibration tools to keep your pipetting equipment ready for action, regardless of application.

Now you're all set! We hope this one-stop guide puts you well on your way to pipette mastery, from equipment to technique to maintenance. We are confident our liquid-handling solutions will leave you wanting for nothing in your testing and manufacturing endeavors. Let us set you up for success in pharmaceutical discovery, bioengineering, quality control – whatever you might need.

Germany

Sartorius Lab Instruments
GmbH & Co. KG
Otto-Brenner-Strasse 20
37079 Goettingen
Phone +49 551 308 0

USA

Sartorius Corporation
565 Johnson Avenue
Bohemia, NY 11716
Phone +1 631 254 4249
Toll-free +1 800 635 2906

Finland & Baltics

Sartorius Liquid Handling Oy
Tulppatie 1
00880 Helsinki
Email: lhinfo.finland1@sartorius.com

 **For further information, visit**
[sartorius.com](https://www.sartorius.com)