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Introduction

xPIPETTE is an air-displacement pipette that incorporates major ergonomic improvements to minimize strain and help reduce the risk of repetitive stress injuries. Low spring forces and low force seals contribute to a lighter feel. A magnet is used to help balance and hold the piston in the zero position, which reduces static force on the operator's hand during the pipetting cycle.

Parts Checklist

After unpackaging, please verify that the following items were included and are undamaged:

- xPIPETTE
- Calibration Certificate

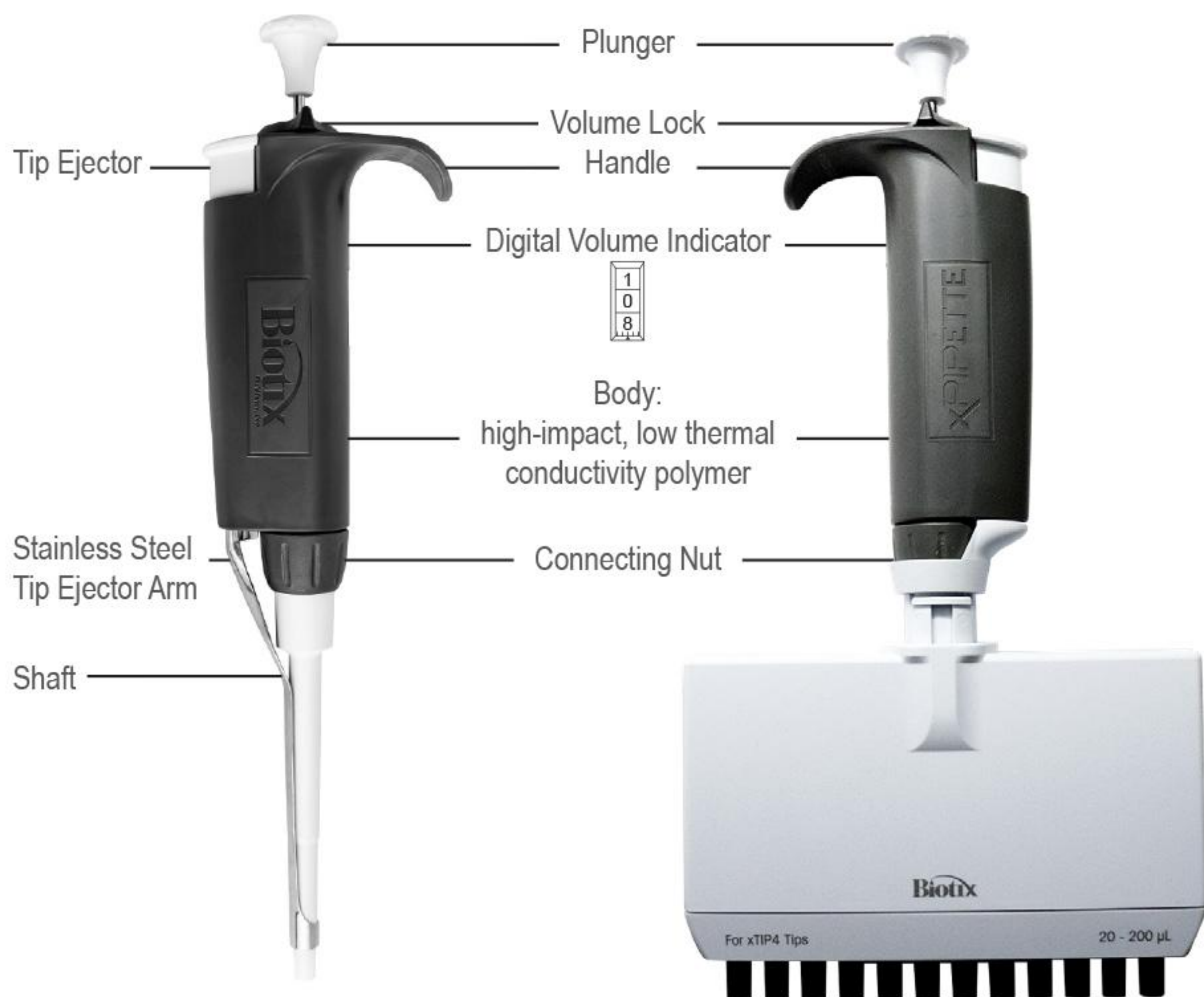
GLP Compliance

The unique pipette serial number is engraved on the body of the pipette underneath the handle. It provides a unique identification to help fulfill GLP requirements.

Calibration certificates are also included for further traceability.



Description



Specifications

These manufacturer’s specifications should be used as guidelines when establishing your own performance specification.

Single Channel Pipettes				
	BIOTIX		ISO 8655	
Volume*	Systematic Error	Random Error	Systematic Error	Random Error
2 µL with xTIP4 20 µL tips (ES81949-2)				
0.2	± 0.024	≤ 0.012	± 0.08	≤ 0.04
1	± 0.027	≤ 0.013	± 0.08	≤ 0.04
2	± 0.03	≤ 0.014	± 0.08	≤ 0.04
10 µL with xTIP4 20 µL tips (ES81949-10)				
1	± 0.025	≤ 0.012	± 0.12	≤ 0.08
5	± 0.075	≤ 0.03	± 0.12	≤ 0.08
10	± 0.1	≤ 0.04	± 0.12	≤ 0.05
20 µL with xTIP4 20 µL tips (ES81949-20)				
2	± 0.15	≤ 0.04	± 0.20	≤ 0.10
10	± 0.15	≤ 0.05	± 0.20	≤ 0.10
20	± 0.2	≤ 0.06	± 0.20	≤ 0.10
100 µL with xTIP4 200 µL tips (ES81949-100)				
10	± 0.35	≤ 0.10	± 0.80	≤ 0.30
50	± 0.4	≤ 0.12	± 0.80	≤ 0.30
100	± 0.8	≤ 0.15	± 0.80	≤ 0.30
200 µL with xTIP4 200 µL tips (ES81949-200)				
20	± 0.5	≤ 0.20	± 1.60	≤ 0.60
100	± 0.8	≤ 0.25	± 1.60	≤ 0.60
200	± 1.6	≤ 0.30	± 1.60	≤ 0.60
1000µL with xTIP4 1000 µL tips (ES81949-1M)				
100	± 3	≤ 0.6	± 8.0	≤ 3.0
500	± 4	≤ 1	± 8.0	≤ 3.0
1000	± 8	≤ 1.5	± 8.0	≤ 3.0

Multi-Channel Pipettes				
	BIOTIX		ISO 8655	
Volume*	Systematic Error	Random Error	Systematic Error	Random Error
10 µL with xTIP4 20 µL tips				
1	± 0.040	≤ 0.05	± 0.08	≤ 0.10
5	± 0.075	≤ 0.075	± 0.15	≤ 0.15
10	± 0.100	≤ 0.05	± 0.20	≤ 0.10
20 µL with xTIP4 20 µL tips				
1	± 0.15	≤ 0.08	± 0.30	≤ 0.16
5	± 0.15	≤ 0.15	± 0.30	≤ 0.30
10	± 0.20	≤ 0.10	± 0.40	≤ 0.20
200 µL with xTIP4 200 µL tips				
2	± 0.50	≤ 0.24	± 1.00	≤ 0.48
10	± 0.80	≤ 0.25	± 1.60	≤ 0.50
20	± 1.60	≤ 0.60	± 3.20	≤ 1.20

*Specifications are subject to change without notice

* All volumes are in microliters

Setting the Volume

Instructions

1. Turn the volume lock counter-clockwise to the position shown at left below so the volume setting mechanism is unlocked and free to turn.



2. With the mechanism unlocked, orient the pipette so you are looking at the digital volume indicator, then rotate the plunger button to change volume – counter-clockwise to increase, clockwise to decrease volume. The volume indicator is read from the top down and is color-coded in relation to where the decimal point should go.

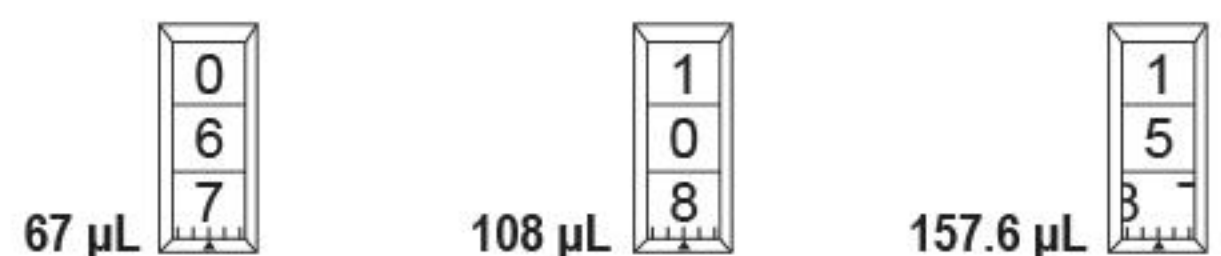
2 μL	10 μL	20 μL	100 μL	200 μL	300 μL	1000 μL
1	0	1	0	1	2	0
2	7	2	7	2	2	7
5	5	5	5	5	5	5
1.25 μL	7.5 μL	12.5 μL	75 μL	125 μL	225 μL	0.75 mL

2-20 μL : Black - μL . Red - tenths, hundredths of μL .

100 -300 μL : All digits black - whole μL .

1000 μL : Red - mL. Black - tenths, hundreds of mL.

3. To eliminate errors due to mechanical backlash: when setting the desired volume, first turn the knob $\frac{1}{3}$ turn above the desired volume. Then turn the knob slowly clockwise until the desired volume is displayed.



4. Turn the volume lock clockwise (see diagram above) to prevent any accidental changes to the volume setting. Example volumes are shown on the next page (note the intermediate setting at the right).

Volume ranges and increments for single-channel pipettes are shown below:

Pipette Size (μ L)	Adjustable Range (μ L)	Recommended Volume Range (μ L)	Increment (μ L)
2	0 - 2	0.1 - 2	0.002
10	0 - 10	0.5 - 10	0.02
20	0 - 20	2 - 20	0.02
100	0 - 100	10 - 100	0.2
200	0- 200	20 - 200	0.2
1000	0 - 1000	100 - 1000	2.0

Pipetting

Tip Selection

To ensure top performance of your xPIPETTE, we recommend that you use Biotix xTIP4 pipette tips. Together, the pipette-tip combination creates an ergonomic system to reduce insertion and ejection forces. The xPIPETTE is also fully compatible with Rainin® LTS™ tips.

Tip Mounting

Single-Channel Pipette: To mount a tip, press the pipette shaft nozzle into the end of the tip with light force.

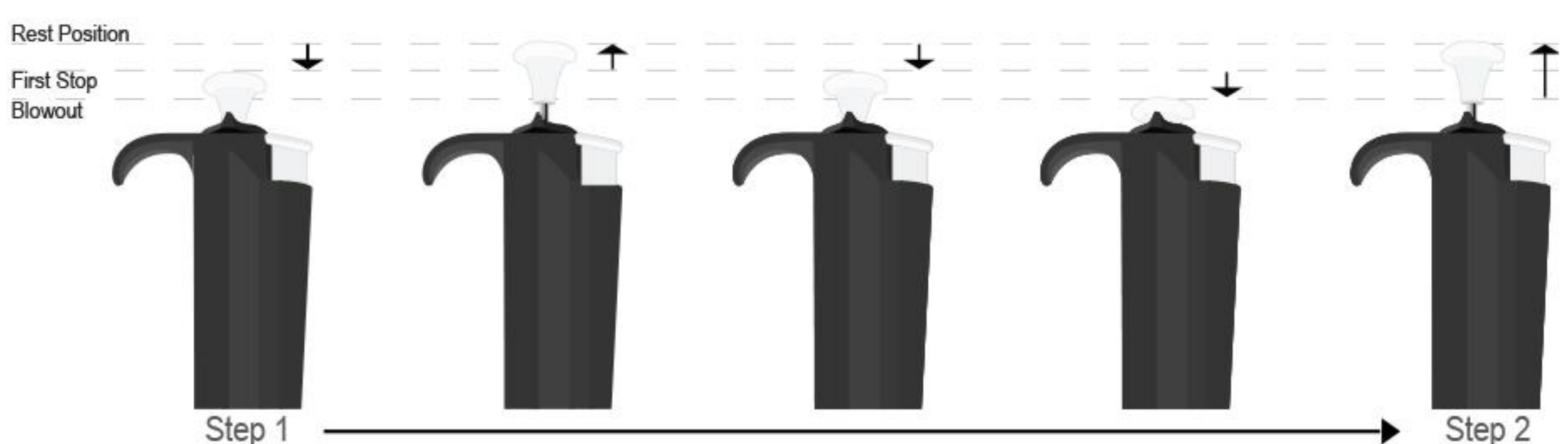
Operation

Before pipetting valuable samples, we recommend that you practice aspirating and dispensing water before pipetting with actual samples.

1. Set the desired volume as described on page 6.
2. Attach a new tip. Press the shaft into the tip to make a good seal.
3. Press the plunger button to the FIRST STOP, and hold it in this position. The magnetic assist will help you sense and hold this position.
4. Holding the pipette vertically, place the tip into the sample to the proper depth and relax your thumb pressure on the plunger. The light piston spring will move the piston upward, aspirating your sample. Do not let go of the plunger button suddenly, or the piston may snap up quickly, resulting in an inaccurate measurement.
5. Pause briefly to ensure that the full volume of the sample is drawn into the tip.
6. Withdraw the tip from the sample. If any liquid remains on the outside of the tip, wipe it carefully with a lint-free tissue, taking care not to touch the tip orifice.

Dispensing:

1. Touch the tip end against the sidewall of the receiving vessel and press the plunger slowly, past the first stop, to blowout (bottom of stroke). Wait: 1-2 seconds for 2–300 μL volumes, 2-3 seconds for 1000 μL (longer for viscous solutions).
2. Still holding the plunger, withdraw the tip, sliding it along the wall of the vessel. Release the plunger.
3. Press the tip ejector button to discard the tip. Use a new tip for each sample to prevent carry-over. Repeat for the next pipetting cycle.



Good Pipetting Guidelines

xPIPETTE incorporates features to deliver pipetting consistency. You should also maintain:

- 1. Consistent pickup and dispense rhythm.
- 2. Consistent speed and smoothness when pipetting.
- 3. Consistent pressure on the plunger button at the first stop.
- 4. Consistent immersion depth.

Volume Range (μ L)	Immersion Depth (mm)	Wait Time (sec)
0.1-10	1-2	1
10-200	2-3	1
200-1000	3-6	2-3

- 5. Pipette vertically, or within 20° of vertical.
- 6. Don't invert or lay the pipette flat with liquid in the tip.

Pre-Rinsing Recommended

Some solutions may leave a film on the inside tip wall. This film remains relatively constant in successive pipetting with the same tip, so excellent precision can be obtained by refilling the tip and using the refilled volume as the sample. Successive samples from this same tip will exhibit good reproducibility.

Temperature Considerations

Warm or cold liquids can be measured with good precision by using a consistent pipetting rhythm. This will help minimize any differences in heating or cooling effects within the pipette. Use a new pipette tip each time for optimal accuracy and precision when measuring samples with temperatures greatly different from ambient, and do not pre-rinse. As with any air-displacement pipette, you will get the best results if there is no delay between aspirating the sample and dispensing it.

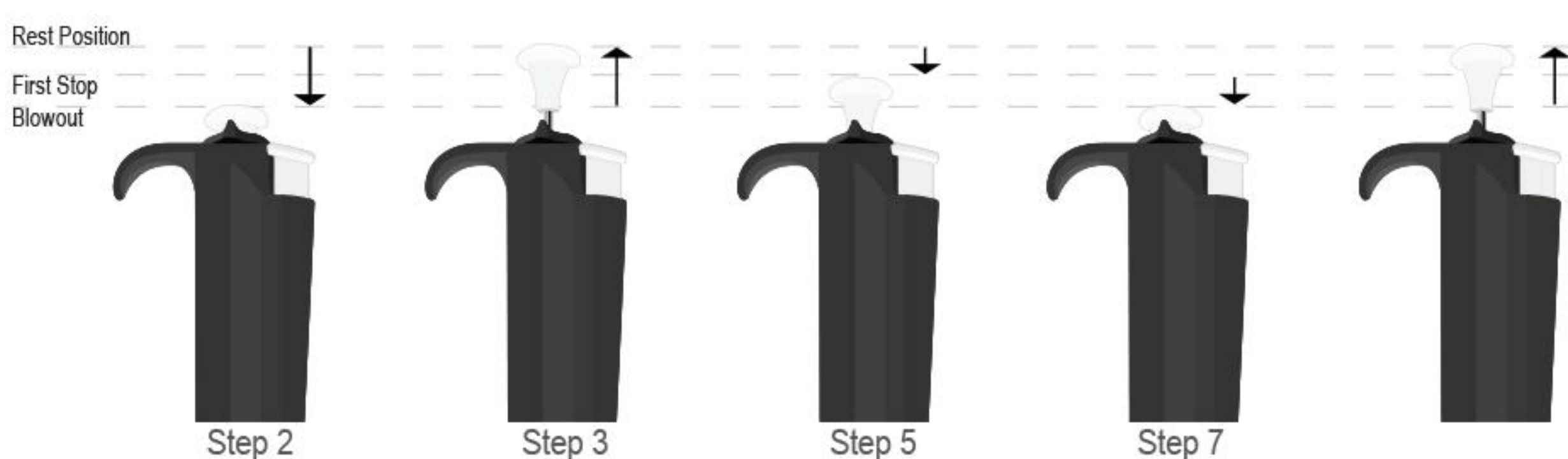
Pipetting Liquids of Varying Density

xPIPETTE adjustable pipettes allow you to compensate for solutions with densities that are different than water, by setting the volume slightly higher or lower. The compensation amount must be determined empirically. For example, if pipetting 10 μ L of CsCl solution, you determine that the volume delivered is actually 8.5 μ L. Change the volume setting to 11.8 μ L and repeat the measurements. If the volumes delivered are still not close enough to 10 μ L, make another slight volume adjustment until the measurements are as desired.

Reverse Pipetting

Another technique for reducing error due to film retention, especially useful for more viscous liquids, is reverse pipetting. The operating sequence is reversed:

1. Mount a disposable tip on the pipette shaft nozzle.
2. Press the plunger button fully to the **SECOND STOP**.
3. Immerse the tip in liquid and allow the button to return slowly to the resting position. Wait a moment for the liquid column in the tip to reach equilibrium.
4. Wipe any excess liquid from the outside of the tip without touching the orifice.
5. To dispense, rest the end of the tip against the vessel wall and press the plunger to the first stop. Hold this position for a few seconds, or long enough for the liquid column to reach equilibrium again.
6. Remove the tip from the receiving vessel without blowing out the remaining liquid.
7. Return excess sample in the tip to the original sample container, if desired. Discard the used tip.



Troubleshooting

Troubleshooting and Repairs

WARNING	When removing the shaft from the pipette body, make sure the spring, seal, and o-ring do not fall off the piston, especially on the smaller models.
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Symptom	Possible Cause	Action
Pipette is leaking	Loose shaft	Tighten the connecting nut by hand.
	Split or cracked shaft	Replace shaft. Check to see if the piston is bent. If bent, send the instrument for service (pg. 12).
	Worn seal and/or o-ring	Examine seal and/or o-ring. Replace them as necessary.
Pipette does not aspirate properly	Contamination inside instrument	Clean with distilled water or isopropyl alcohol. Dry with lint-free tissue and reassemble.
	Corrosion and/or staining	Do not use instrument. Return instrument to supplier.
Pipette is inaccurate	Improper repair or assembly	See page 12.
	Loose connecting nut	Tighten the connecting nut.
Pipette is not precise	Loose connecting nut	Tighten the connecting nut.
	Incorrect operator technique	Operator training.
	Damaged piston	Return pipette to supplier.
	Damaged shaft	Replace the shaft.
	Worn o-ring or seal	Replace both parts.
Tips Fall Off	Low-quality tips	Use xTIP4 from Biotix.
	Damaged shaft	Replace shaft.
	Damaged tip ejector causing misalignment	Replace tip ejector.

Sample Splash (liquid inside the mechanism)

- 1. Remove the tip ejector arm. Instructions on how to remove the ejector are on page 13.
- 2. On pipettes up to 1000 µL, unscrew the connecting nut (D) and remove the shaft (E).
- 3. Inspect the seal assembly and piston for contamination. The piston should be shiny and free of corrosion. Clean with distilled water or isopropyl alcohol. Dry with a lint-free tissue and reassemble after inspecting the interior of the shaft for any contamination.
- 4. If piston corrosion or staining is evident, do not use the instrument.

Leaks, Inaccuracy, Abnormal Stroke

- 1. **Loose shaft.** Tighten connecting nut by hand.
- 2. **Split or cracked shaft.** Remove the tip ejector and inspect the shaft. Replace the shaft if necessary. If the shaft was dropped, remove it to see if the piston is bent. If so, send the instrument for service.
- 3. **Worn seal and/or o-ring.** Examine the seal and/or o-ring, replacing them as necessary. Pull off the old seal and o-ring, position the new seal and o-ring on the piston assembly as shown in the drawings on page 13, and reassemble the pipette.
Models up to 100µL only have an o-ring, while models 200µL or above incorporate a seal lip with an o-ring.

NOTE	It is not necessary to recalibrate pipette after changing seals.
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- 4. **Forming the seal.** xPIPETTE uses a small amount of specialized high-quality grease, applied to the o-ring to make the seal.

Service, Calibration and Repair

Mettler-Toledo is the preferred provider for the calibration and service of these pipettes. To contact your local service center please visit:
www.mt.com/service

Specifications

These manufacturer’s specifications should be used as guidelines when establishing your own performance application.

Maintenance

Autoclaving

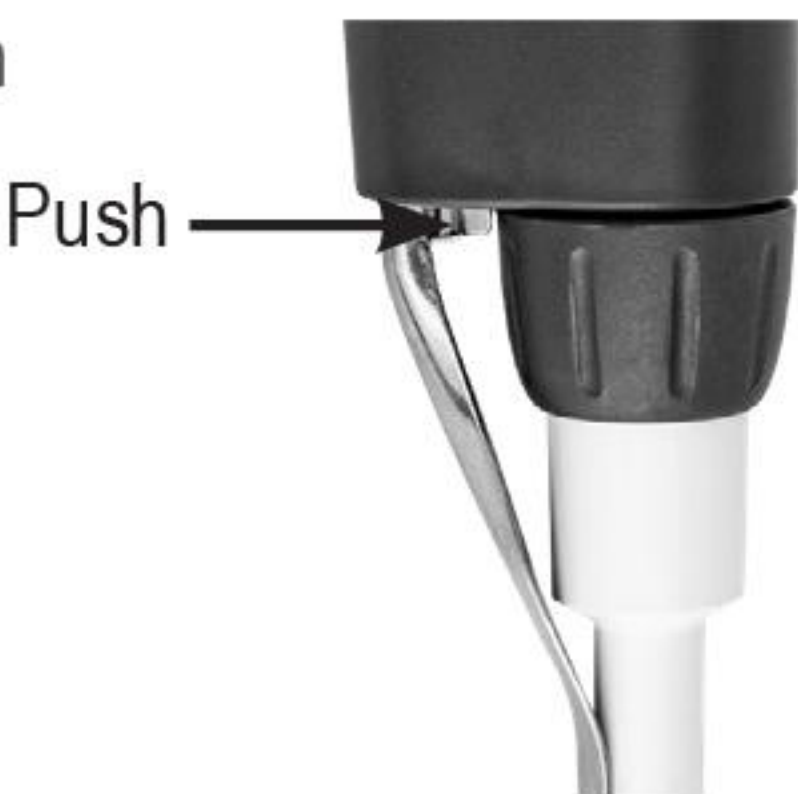
The shaft and tip ejector of the pipette can be autoclaved at the following settings: 121° C, 1 bar, 15-20 minutes.

Do not autoclave the complete pipette or any parts other than the shaft and the tip ejector.

The multi-channel pipettes are not autoclavable.

Tip Ejector Arm Removal

The tip ejector arm can be removed with minimum effort - do not use force. For all single-channel models push the ejector button and it will expose quick-release tabs below the handle. Press the tabs towards the shaft to remove the ejector.



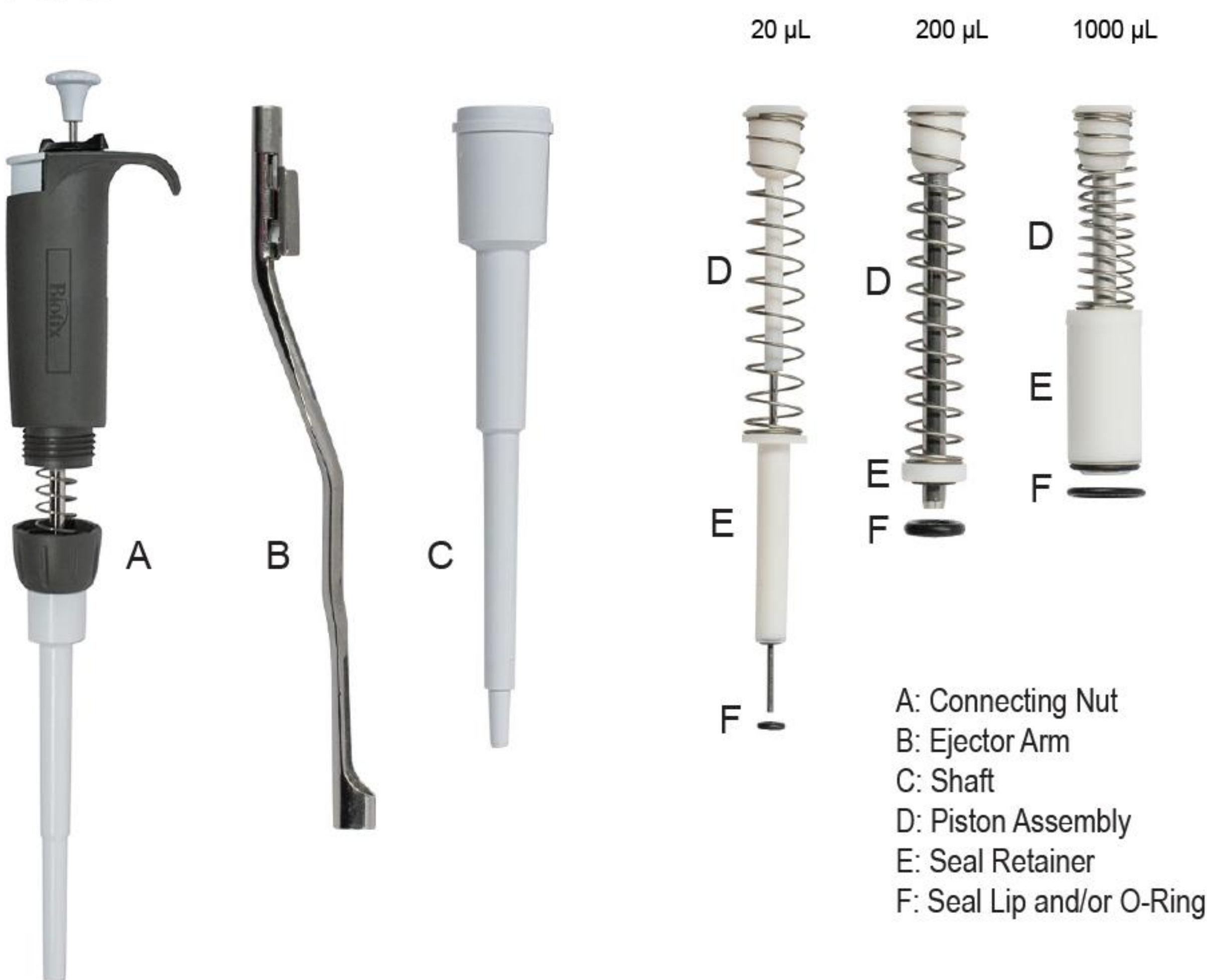
Storage

After use, store the pipette in a clean safe place. xPIPETTE is a precision instrument and should be treated with the level of care appropriate for laboratory instrumentation. Pipettes should be stored vertically using a hanger or stand when not in use. The Biotix carousel part number is located in the accessories section on page 14.

Acids and Corrosives

After pipetting concentrated acids or highly corrosive solutions, disassemble xPIPETTE. Inspect and clean the piston assembly, shaft, and seal with distilled water. Dry all components thoroughly and reassemble. Extensive contact with corrosive fumes may result in premature seal wear and damage to the piston. Exposure of internal components to corrosive fumes can be reduced by using tips with aerosol barrier filters.

Parts





Azer Scientific Inc.
701 Hemlock Road,
Morgantown, PA 19543
1-877-770-2937 | Info@AzerSci.com
www.azerscientific.com

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