### What are air-displacement pipettes?

**Three things to remember**

1. Recommended for aqueous samples and for general laboratory work
2. Always have a cushion of air (dead volume) between the pipette piston and the liquid sample
3. The piston is a permanent part of the pipette

![Air Displacement Pipette Diagram](image)

### What are positive-displacement pipettes?

**Three things to remember**

1. Recommended for problem samples (viscous, dense, volatile, radioactive, corrosive)
2. Direct contact of the piston with the sample (no air cushion)
3. Disposable piston (not a permanent part of the pipette)

![Positive Displacement Pipette Diagram](image)
**How do air-displacement pipettes work?**

When the push-button is pressed on an air-displacement pipette, the piston inside the instrument moves down to let air out. **Air is displaced by the piston.** The volume of air displaced is equivalent to the volume of liquid aspirated.

The schematic drawings (on the right) show how the piston determines the volume of air displaced and subsequently the volume of sample aspirated.

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**How do positive-displacement pipettes work?**

Positive-displacement pipettes work like a syringe. **There is no air cushion between the disposable piston and the sample.** With no elastic air cushion to expand or contract, the aspiration force remains constant, unaffected by the physical properties of the sample.

This allows the Microman operator to pipette very viscous or high density samples, such as mercury or toothpaste.
How do air-displacement pipettes work?

How do positive-displacement pipettes work?

**Prepare for aspiration**

The push-button is pressed prior to sample aspiration. The piston descends and expels a volume of air equal to the selected volume of liquid.

**Aspirate the sample**

As the push-button is released, a partial vacuum is created inside the tip. The ambient atmospheric pressure forces the desired volume of liquid through the orifice into the tip.

**Dispense the sample**

The push-button is pressed again. Air pressure increases inside the shaft and the tip. The compressed air pushes the liquid out of the tip.

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**Prepare for aspiration**

The push-button is pressed prior to sample aspiration. The piston descends down to the end of the capillary.

**Aspirate the sample**

The orifice is then immersed below the liquid surface. As the push-button is released, the piston moves up and the ambient pressure forces the desired volume of liquid through the orifice into the capillary.

**Dispense the sample**

The push-button is pressed again. The piston moves down and expels the liquid out of the capillary.