



# **Single Channel Pipettor**

Instruction Manual



**CORNING**  
The Most Trusted Tools of Science

---

## Contents

---

1. Basic Design .....	3
2. Accuracy and Reproducibility .....	5
3. Operation .....	7
4. Pipetting Techniques and Special Conditions .....	9
5. Calibration .....	11
6. Troubleshooting Table .....	15
7. Cleaning/Sterilization .....	17
8. Maintenance .....	19
9. Ordering Information .....	25
10. Corning Limited Warranty .....	29

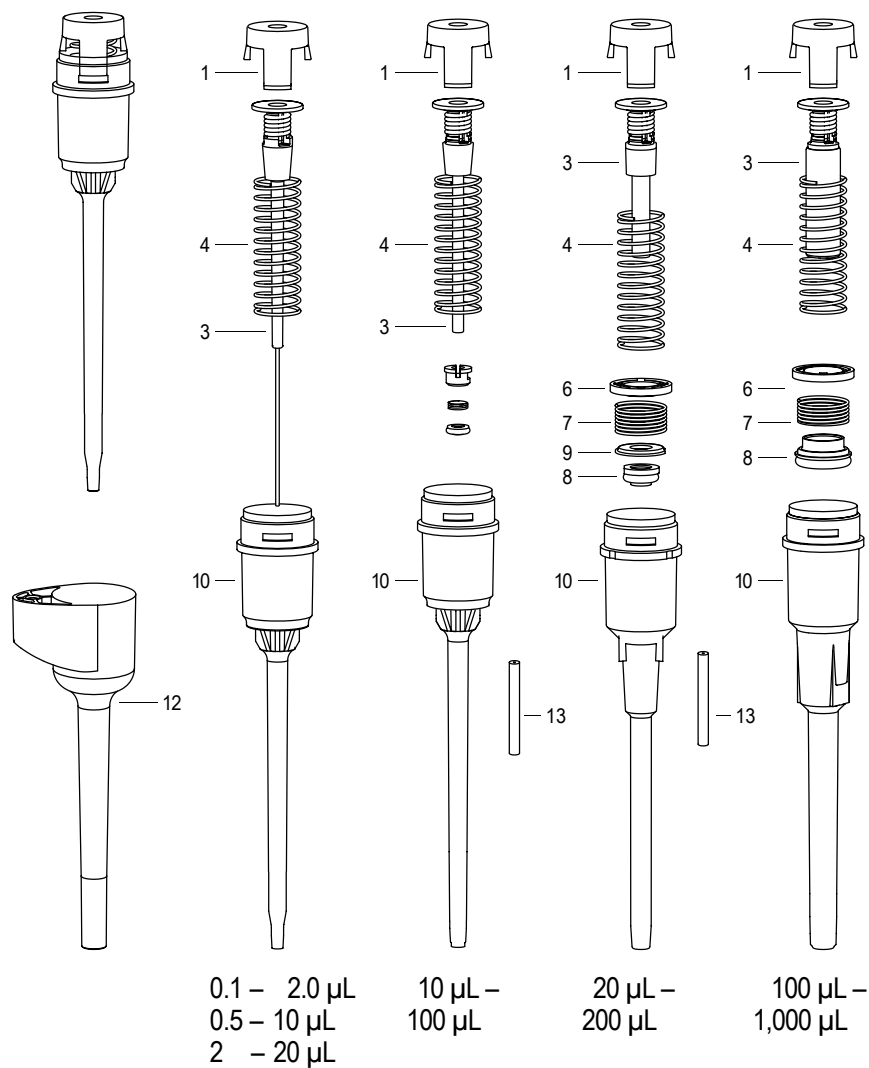


Figure 1. Corning Single Channel Pipettor Components

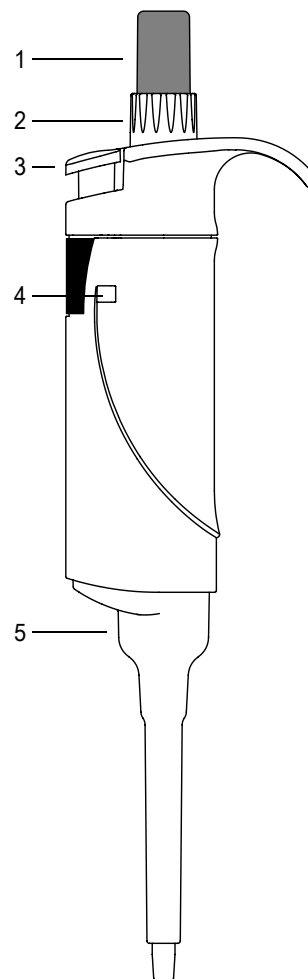


Figure 2. Basic Design

## 1. Basic Design

The Corning Pipettor is a precision air-displacement pipettor with continuously adjustable volume setting.

The functions of the operating controls are as follows:

### 1. Control Button

Used to control aspirating and dispensing.

### 2. Volume Adjustment Ring

Used to set pipetting volume.

### 3. Ejector Button

Used for pipette tip ejection.

### 4. Calibration Port

Accepts calibration tool for recalibration, cleaning and maintenance. (see Sec. 5 and 7).

### 5. Ejection Sleeve

Ejects pipette tip from tip holder. Can be removed when pipetting into narrow tubes.

## 2. Accuracy and Reproducibility

### 2.1 Technical data

Pipettor	Color of button	Increment (μL)	Vol. (μL)	Accuracy	Precision
0.1 – 2.0 μL	aqua	0.002	0.2	± 12.0 %	≤ 6.0 %
			1.0	± 2.5 %	≤ 1.5 %
			2.5	± 1.4 %	≤ 0.7 %
0.5 – 10 μL	orange	0.01	0.5	± 5.0 %	≤ 2.8 %
			1	± 2.5 %	≤ 1.8 %
			10	± 1.0 %	≤ 0.4 %
2 – 20 μL	blue	0.02	2	± 5.0 %	≤ 1.5 %
			20	± 1.0 %	≤ 0.3 %
10 – 100 μL	yellow	0.1	10	± 3.0 %	≤ 1.0 %
			100	± 0.8 %	≤ 0.2 %
20 – 200 μL	red	0.2	20	± 2.5 %	≤ 0.7 %
			200	± 0.6 %	≤ 0.2 %
100 – 1,000 μL	green	1	100	± 3.0 %	≤ 0.6 %
			1,000	± 0.6 %	≤ 0.2 %

Technical specifications subject to change.

### 2.2 Test conditions

Liquid: distilled water  
 Reference temperature: 20 to 25°C, constant to ±0.5°C in accordance with DIN 12650

No. of measurements: 15 (using Costar® brand pipette tips)

This data is best achieved if you observe the notes on operation in Sec. 3 and the recommendations in Sec. 4.

---

## 3. Operation

---

### 3.1 Volume setting

See Sec. 2.1 for increment information.

The volume is adjusted continuously by turning the volume adjustment ring (See Fig. 2[2]). The digits of the volume display should be read from top to bottom.

For improved accuracy, we recommend turning the adjustment ring past the desired volume and then back again when changing the volume from a lower to a higher setting.

### 3.2 Attaching tip

Securely attach a Costar® brand disposable pipette tip.

### 3.3 Filling

- 3.3.1 Depress the control button to the first stop (See Fig. 2[1]).
- 3.3.2 Hold the Pipettor in a vertical position and immerse the tip in the liquid.
- 3.3.3 Slowly release the control button.
- 3.3.4 Pause for one to two seconds and then remove the tip from the liquid.

### 3.4 Dispensing

- 3.4.1 Place the tip in the receiving container.
- 3.4.2 Slowly press the control button to the first stop and hold it in that position for one or two seconds. For blowout, press the control button to the next stop. This will clear any remaining liquid from the disposable tip.

- 3.4.3 Hold the control button at this stop and remove the pipette tip from the container, sliding the tip along the inside wall of the container to remove any liquid that may be on the outside of the tip.

**NOTE:** We do not recommend using blowout in EIA and similar assays.

### **3.5 Tip ejection**

Place the tip over the proper waste receptacle and press the ejector button (See Fig. 2[3]).

## **4. Pipetting Techniques and Special Conditions**

### **4.1 Accuracy**

The key to repeated accuracy in pipetting is a consistent, smooth technique. Avoid sudden motions when aspirating or dispensing fluids, and maintain the same pace for all samples. It is also important to hold the Pipettor at the same angle — preferably tilted a few degrees from the vertical axis — when aspirating and dispensing fluids.

### **4.2 Pre-wetting**

Some liquids will show a tendency to cling to the inside and outside surfaces of the disposable tips. To insure that this surface tension does not cause variations in the volumes you aspirate and dispense, always pre-wet the disposable tip with the sample before use. Aspirate a full sample volume of liquid and then dispense it back into the original container. Pre-wetting is recommended in most operations for improved accuracy.

**NOTE:** When testing accuracy from 1 – 10  $\mu\text{L}$ , pre-wetting the tip is not recommended.

### **4.3 Corrosives**

Care should be exercised with acids and corrosive liquids. Clean and inspect the Pipettor as soon as possible after dispensing these liquids.

### **4.4 Extreme temperatures**

The Pipettor's precision volume control mechanism maintains accuracy for liquids over a wide range of temperatures. You may have to compensate for heat transfer when pipetting liquids of high temperatures. Draw a sample at the desired setting and measure it gravimetrically, and then adjust the volume setting accordingly.

### **4.5 Density and viscosity**

Volume-setting compensation may also be required for dense or highly viscous liquids. When aspirating these liquids, allow sufficient time for the liquids to reach volumetric equilibrium in the tip before withdrawing the tip

from the container. For maximum accuracy, calibration through gravimetric analysis is recommended for liquids that vary in surface tension, viscosity or density from water.

#### **4.6 Foaming**

If foaming occurs when aspirating, hold the Pipettor at a more vertical angle and slowly drain the liquid.

#### **4.7 Pipetting <10 $\mu\text{L}$**

For volumes <10  $\mu\text{L}$ , the values stated for accuracy and precision can only be achieved when the sample is dispensed into another liquid and weighed. The tip must not be pre-wetted:

- 4.7.1 Immerse tip with sample into the liquid. Press control button up and down several times to rinse contents from tip.
- 4.7.2 Perform blow-out and slide tip out along the inside of the vessel. Discard tip.

#### **4.8 Pipetting <1 $\mu\text{L}$**

When testing Pipettor accuracy on volumes <1  $\mu\text{L}$ , we recommend photometric testing. (For more information on photometric testing, contact Corning Technical Services or the Corning office nearest you.)

#### **4.9 Other limitations**

- The construction materials of the Pipettor are largely resistant to organic solvents. However, liquid should never be allowed to contact the pipetting instrument.
- Differences between the temperature of the pipette tip and the solution can result in inaccurate dispensing.
- Pipetting inaccuracy may also occur when pipetting liquids with a high vapor pressure.

#### **4.10 Serial number identification**

The serial number of the Pipettor can be viewed when the ejector button is depressed.

## **5. Calibration**

### **5.1 Factory calibration**

Your Pipettor was factory calibrated and gravimetrically tested prior to shipment. The calibration certificate included with the Pipettor shows the accuracy and reproducibility of your individual unit. Under normal use the Pipettor should never need recalibration.

Many of the factors that affect gravimetric analysis are subtle and require close attention if valid results are to be obtained. Factory calibration is performed under carefully controlled conditions as recommended by the National Committee for Clinical Laboratory Standards in the document: *Determining Performance of Volumetric Equipment*.

When attempting to recalibrate your Pipettor, the following factors must be considered:

- Correct and consistent pipetting technique.
- The density, surface tension, temperature and viscosity of the test liquid.
- Ambient temperature and relative humidity.
- The precision, accuracy, and standard deviation of the analytical balance.
- Evaporation of the test liquid during testing.
- Brand and style of disposable tip used.

### **5.2 Recalibration**

For customers who feel it is necessary to recalibrate the Pipettor, the following information is offered:

**CAUTION:** Adjustment or calibration is technically a zero point shift. The volume setting of the Pipettor is changed by a defined amount over the entire measuring range. For example: If for a 10 – 100  $\mu\text{L}$  Pipettor there is a adjustment of 1  $\mu\text{L}$  at 100  $\mu\text{L}$ , which equals 1%, the adjustment at 10  $\mu\text{L}$  is also 1  $\mu\text{L}$ , which equals 10%.

- 5.2.1 Pipettor, tip and testing water must be equilibrated to the same temperature (20 to 25  $^{\circ}\text{C} \pm 0.5$   $^{\circ}\text{C}$ ).

- 5.2.2 Adjust the Pipettor to the desired nominal volume.
- 5.2.3 Attach a Costar® brand pipette tip. Pipette and weigh the desired volume eight times.

The mean value of these weighings is converted to  $\mu\text{L}$  using the following formula:

Volume = Mass/Density of liquid (at given temperature)

The resulting value is the actual volume the Pipettor is delivering (density of water at 20°C = 0.9982 mg/ $\mu\text{L}$ ).

- 5.2.4 To adjust to the volume displayed, insert “D”-end of the calibration tool horizontally into the upper half of the calibration port in the Pipettor handle (See Fig. 2[4]). Then rotate the wrench until it is vertical.
- 5.2.5 Adjust the piston stroke of the Pipettor by turning the volume adjustment ring (– or + direction). Counter setting remains unchanged.

One revolution corresponds to the following values:

0.1	–	2.0 $\mu\text{L}$	approx.	0.1 $\mu\text{L}$
0.5	–	10 $\mu\text{L}$	approx.	0.5 $\mu\text{L}$
2	–	20 $\mu\text{L}$	approx.	1 $\mu\text{L}$
10	–	100 $\mu\text{L}$	approx.	5 $\mu\text{L}$
20	–	200 $\mu\text{L}$	approx.	10 $\mu\text{L}$
100	–	1,000 $\mu\text{L}$	approx.	50 $\mu\text{L}$

- 5.2.6 Remove the wrench. Move the volume adjustment ring back and forth so that the counter and stroke system lock into each other again.
- 5.2.7 Repeat step 5.2.3. The measured values should lie within the tolerances stated in the technical data.
- If the nominal volume does not correspond with the result of the measurements, repeat steps 5.2.4 through 5.2.6.

As this adjustment affects the entire measuring range, the other volumes of the Pipettor stated in the technical data should also be checked.

### 5.3 Recalibration (liquid with density not equal to water)

It is possible to recalibrate the Pipettor to a specific volume of a liquid with a different density than water so that the value displayed corresponds with the pipetting value.

The Pipettor may no longer be accurate for all other volumes. This means that an adjustable-volume Pipettor becomes a fixed-volume Pipettor.

Proceed as described in steps 5.2.1 through 5.2.7.

**CAUTION:** A Pipettor set by this method provides a dispensing value corresponding with the display only for the liquid used and for the volume tested. Always label the recalibrated Pipettor as a fixed-volume Pipettor e.g. “solution x”.

The error for liquids with a high vapor pressure (e.g., organic solvents) cannot be compensated in this way. In such cases, we recommend the use of a positive-displacement pipettor.



## 6. Troubleshooting Table

Problem	Cause	Solution
Droplets remain on the inside of the pipette tip	Non-uniform wetting of the plastic	Attach new pipette tip.
	Tip with poor wetting properties used	Use Costar® brand pipette tip.
Pipette tip drips, pipetted volume incorrect	Tip is loose	Push tip on tightly.
	Tip doesn't fit properly	Use Costar® brand pipette tip.
	Pipette leaks because:	
	• Piston contaminated	Clean piston and lubricate lightly (see Sec. 7).
	• Piston damaged	Exchange piston and seal (see Sec. 8).
	• Seal damaged	Exchange piston and seal (see Sec. 8).
	• Lower assembly loose	Tighten lower assembly by hand.

Problem	Cause	Solution
Control button jams, moves erratically	Piston contaminated	Clean piston and lubricate lightly (see Sec. 7).
	Seal contaminated	Remove piston from lower assembly (see Sec. 8). Clean lower housing with warm water, rinse with distilled water and allow to dry. If necessary, exchange seal.
	Penetration of solvent vapors	Remove piston from lower assembly (see Sec. 8) and ventilate lower assembly.  Clean piston and lubricate lightly.
Pipette tip blocked, too little liquid is aspirated	Liquid has penetrated the Pipettor and dried.	Remove piston from lower assembly (see Sec. 8). Clean lower assembly with warm water, rinse with distilled water and allow to dry.
	For 10 – 100 µL and 20 – 200 µL Pipettors: The filling tube in the lower assembly is blocked.	Replace filling tube in lower assembly (see Sec. 8).

## 7. Cleaning/Sterilization

### 7.1 Cleaning

All parts of the Pipettor can be cleaned with soap solutions (then rinsed with distilled water and allow to dry at room temperature) or disinfected with 60% isopropanol.

All seals are maintenance-free. The pistons should be lubricated lightly before first use and after every cleaning.

The lower assembly of the Pipettor can be completely disassembled for cleaning and maintenance using the calibration tool provided.

### 7.2 Sterilization

The ejection sleeve (see Fig. 2[5]) and the lower assembly can be autoclaved at 121°C for 20 minutes.

Before autoclaving, depress the tip ejector button and pull off the ejection sleeve by hand. Unscrew the lower assembly by hand or with the calibration tool.

After autoclaving, the lower assembly should be allowed to dry at room temperature. Screw the Pipettor together by hand (do not use the calibration tool) only after it has completely cooled.

Storage of the Pipettor under UV light will not harm the unit.

**DO NOT AUTOCLAVE PIPETTOR HANDLE.**

---

## 8. Maintenance

---

To change pistons, seals and filling tubes, the Pipettor must first be disassembled. For Pipettor disassembly, follow steps in Fig. 3.

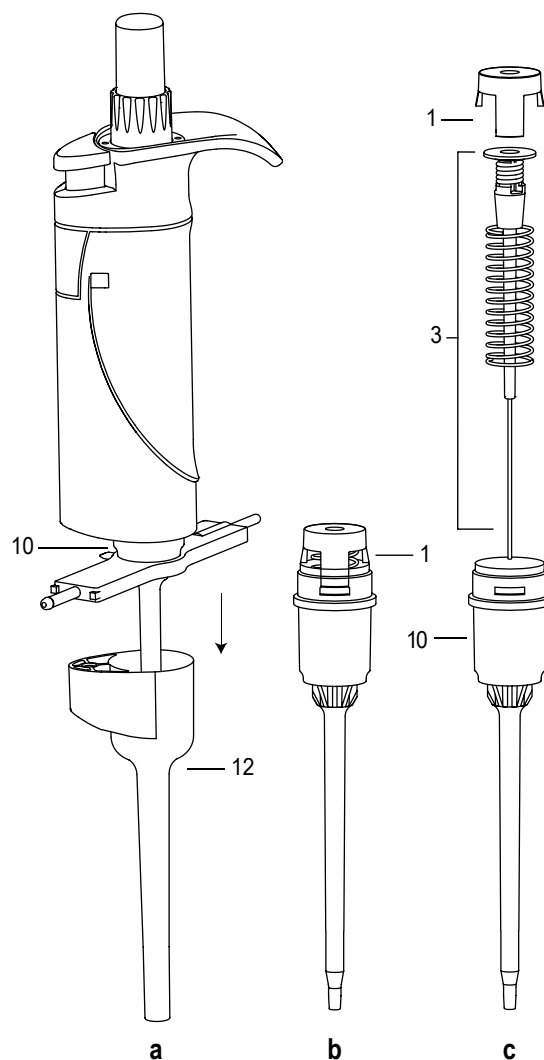
### ***8.1 Exchanging pistons and seals***

Figures 3 through 7 diagram how to disassemble the lower assembly of the different Pipettor models when replacing pistons and seals.

### ***8.2 Exchanging the filling tube***

10 – 100  $\mu$ L and 20 – 200  $\mu$ L

- 8.2.1 Disassemble lower assembly of the Pipettor (Figs. 5 and 6).
- 8.2.2 Push out filling tube from below using wire punch and insert new tube from above.



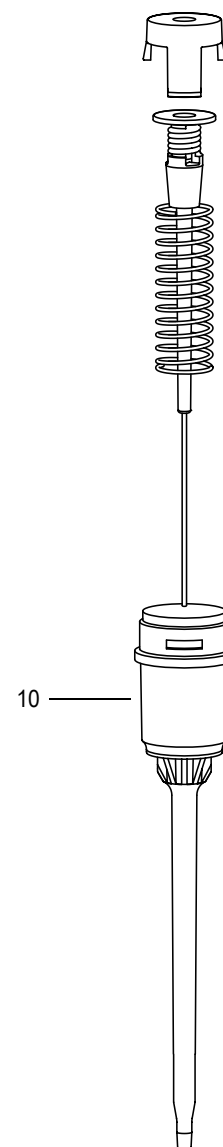
**Figure 3. Disassembly, Assembly and Piston Exchange for All Pipettor Models**

### **Exchanging the piston and spring (All models)**

- Depress tip ejector button and pull off ejection sleeve (12) by hand.  
Unscrew lower housing (10) by turning counterclockwise by hand (or use position A of wrench).
- Squeeze sides of piston mounting (1) and remove.  
**CAUTION:** The piston is under spring tension.
- Remove piston and spring (3), and exchange if damaged or worn.

### **Assembling the Pipettor**

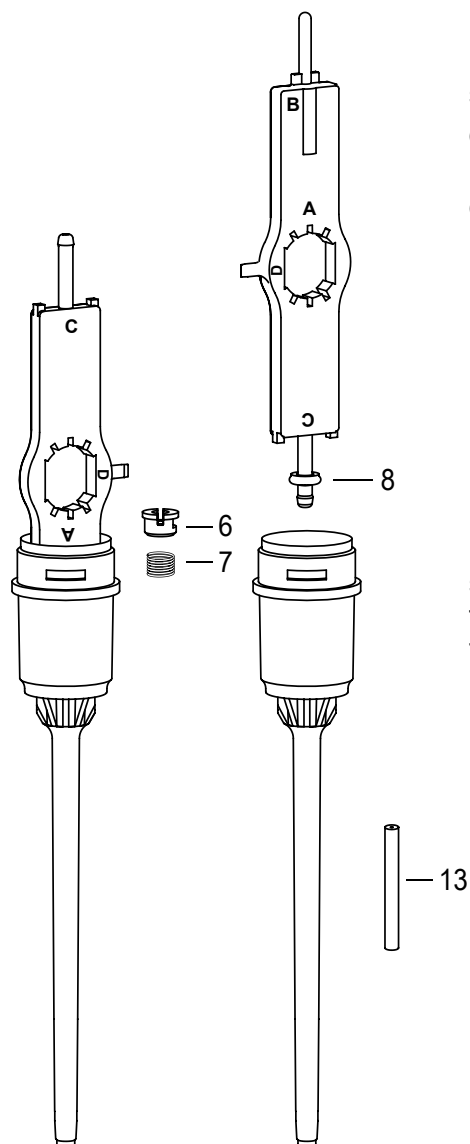
- Place piston with spring into lower assembly of Pipettor.
- Place piston mounting over piston, press together and insert into lower housing, making sure to engage the notches in the lower housing.
- Screw together lower and upper assemblies of Pipettor by hand. Do not use the wrench for this step.



**Figure 4. 1 – 2.0 µL, 0.5 – 10 µL and 2 – 20 µL**

### **Exchanging the seal (1 – 2.0 µL, 0.5 – 10 µL and 2 – 20 µL)**

Disassemble the Pipettor (See Fig. 3, steps a through c)  
The seal in the lower housing is exchanged by replacing the entire lower housing (10).



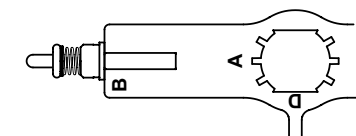
### Exchanging the seal (10 – 100 µL)

Disassemble the Pipettor (See Fig. 3, steps a through c).

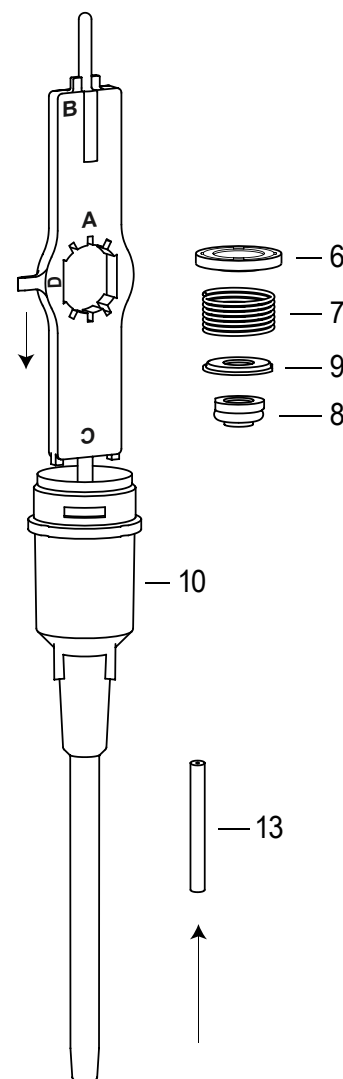
d. Remove screw (6) with "B"-end of calibration tool. Tap out spring (7).

e. Insert "C"-end of calibration tool. Pull out seal (8) together with O-ring.

### Inserting the new seal



Pull new seal off pin and place screw, spring and seal (with plastic part first), in that order, onto "B"-end of tool as shown above. Screw into lower housing (do not over-tighten).



### Exchanging the seal (20 – 200 µL)

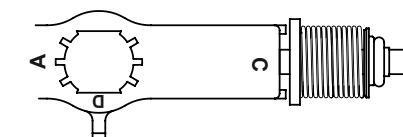
Disassemble the Pipettor.

(See Figure 3, steps a through c).

d. Remove screw (6) with "C"-end of calibration tool.

Tap spring (7), clamp (9) and seal (8) out of lower housing.

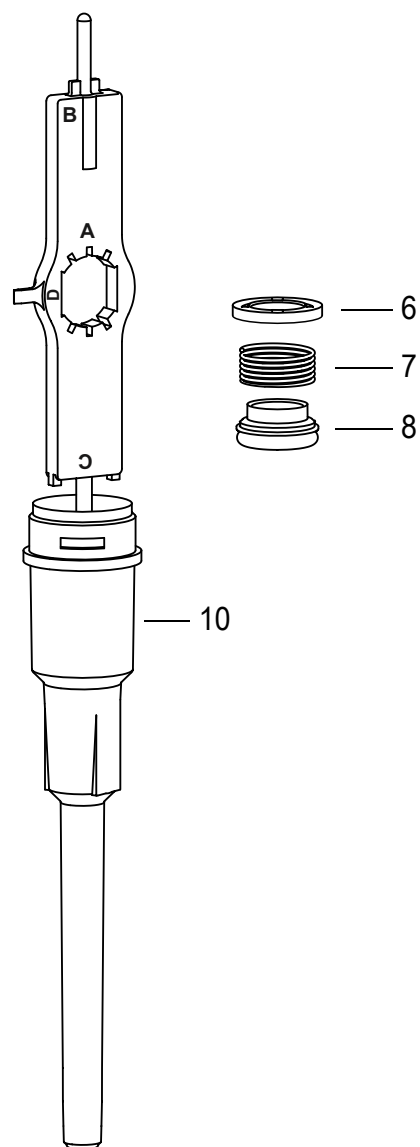
### Inserting the new seal



Push centering aid provided (tube) over "C"-end of calibration tool. Place screw, spring, clamp and new seal, in that order, onto "C"-end of tool as shown above. Screw into lower housing (do not over-tighten).

Figure 5. 10 – 100 µL

Figure 6. 20 – 200 µL



### Exchanging the seal (100 – 1,000 µL)

Disassemble the Pipettor  
(See Fig. 3, steps a through c).

d. Remove screw (6) with “C”-end  
of calibration tool.

Tap spring (7) and seal (8) out of  
lower housing. Exchange seal.

Mount spring onto new seal.  
Insert both these parts and the  
screw into lower housing  
and tighten.

**CAUTION:** After exchanging parts  
or completing other maintenance,  
always check that the Pipettor  
functions properly.

If a problem cannot be solved  
with the aid of the recommen-  
dations above, contact Corning  
Incorporated to arrange a return  
and repair of the Pipettor.

## 9. Ordering Information

### 9.1 Costar® brand pipette tips

Corning Single Channel Pipettors: 0.1 – 2 µL and 0.5 – 10 µL

Cat. No.	Description	Pkg.	Color	Sterile	Qty/ Pack	Qty/ Case
4894	Standard microvolume tip	Rack	Natural	Yes	96	960
4826	Standard microvolume tip	Rack	Natural	No	96	960
4840	Standard microvolume tip	Bulk	Natural	No	1000	10000
4807	Filtered microvolume tip	Rack	Natural	Yes	96	960

Corning Single Channel Pipettors: 2 – 20 µL, 10 – 100 µL and 20 – 200 µL

Cat. No.	Description	Pkg.	Color	Sterile	Qty/ Pack	Qty/ Case
4863	Standard 200 µL tip	Rack	Natural	No	96	960
4864	Standard 200 µL tip	Rack	Natural	Yes	96	960
4865	Standard 200 µL tip	Rack	Yellow	No	96	960
4860	Standard 200 µL tip	Rack	Yellow	Yes	96	960
4806	Std. 200 µL (Stack Rack)	Rack	Natural	No	480	960
4862	Standard 200 µL tip	Bulk	Natural	No	1000	1000
4866	Standard 200 µL tip	Bulk	Yellow	No	1000	1000
4844	Standard 200 µL tip	Bulk	Natural	No	1000	10000
4845	Standard 200 µL tip	Bulk	Yellow	No	1000	10000
4821	1 – 30 µL Filtered tip	Rack	Natural	Yes	96	960
4823	1 – 200 µL Filtered tip	Rack	Natural	Yes	96	960

Figure 7. 100 – 1,000 µL

Corning Single Channel Pipettors: 100 – 1000 µL use:

Cat. No.	Description	Pkg.	Color	Sterile	Qty/ Pack	Qty/ Case
4867	Standard 1,000 µL tip	Rack	Blue	No	100	1,000
9032	Standard 1,000 µL tip	Rack	Blue	Yes	100	1,000
4846	Standard 1,000 µL tip	Bulk	Blue	No	1000	10,000
4868	Standard 1,000 µL tip	Bulk	Blue	No	1000	1,000

Corning Pipettor performance specifications are guaranteed only with Costar® brand disposable pipette tips.

## 9.2 Corning® brand pipettors

Cat. No.	Volume Range
Single Channel	
4959	0.1 – 2.0 µL
4960	0.5 – 10 µL
4961	2 – 20 µL
4962	10 – 100 µL
4963	20 – 200 µL
4964	100 – 1000 µL

## 9.3 Components and Repair

For additional technical information, availability of component parts, or instructions for Pipettor return, please contact Technical Service:

US: 1-800-492-1110

Outside US: Contact your local Corning office.

---

## **10. Corning Limited Warranty**

---

Corning Incorporated warrants to user purchasers that for three years from the date of purchase it will replace or repair, at its option, this product if it proves defective in material or workmanship. CORNING DISCLAIMS ALL OTHER WARRANTIES WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE. Corning is not liable for any incidental or consequential damages.

This warranty does not apply to damage caused by misuse of the product.