

# SoftGrip™ Single Channel Pipettes User Manual



## **Welcome**

Thank you for choosing a SoftGrip™ pipette from the Hamilton Company.

Before using your new pipette, please review the important information in this manual on pipette features, basic operation, calibration, optimizing performance, maintenance, and troubleshooting.

For French, German, and Spanish translations of this manual, please visit [www.hamiltoncompany.com](http://www.hamiltoncompany.com). For sales and support in countries outside the U.S., please contact your local dealer.

For additional information in the U.S., call Hamilton Sales and Support at 1-888-525-2123 and visit our website at [www.hamiltoncompany.com](http://www.hamiltoncompany.com).

**[www.hamiltoncompany.com](http://www.hamiltoncompany.com)**  
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## **Pipette Warranty**

Hamilton Company unconditionally guarantees its products to be free of defects in materials and workmanship for one year from date of delivery. Any product that fails due to such defects will be repaired or replaced at our discretion without cost, provided the device is returned with an explanation. It is the responsibility of the purchaser to determine the suitability of application and material compatibility of the products based on the published specifications of the products. The specified accuracy and precision performance of Hamilton pipettes is guaranteed only when used with Hamilton Precision Pipette Tips.

SoftGrip pipettes are protected by U.S. Patent Number 5,983,733 with other patents pending.

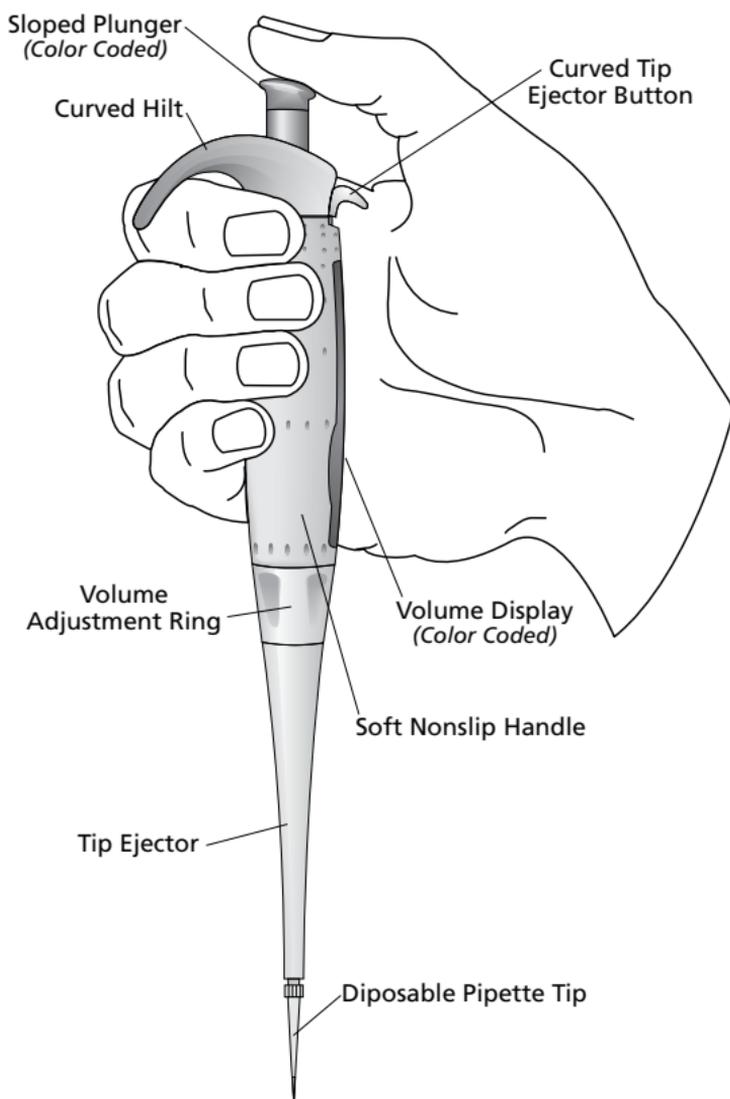
## Hamilton SoftGrip™ Pipettes

Hamilton Company is the leader in precision fluid measurement products. We extended our world-renowned syringe expertise to the SoftGrip Manual Pipettes specifically designed to deliver maximum accuracy and minimize hand injuries. The results set the standard for precision, comfort, and value.

SoftGrip pipettes feature a soft, nonslip handle for a relaxed grip; lighter plunger action for more comfort; and a separate tip ejector to reduce hand motion. The curved hilt supports the pipette for finer control while pipetting. Hardened, stainless steel pistons are precision ground and polished to ensure accurate performance, and provide exceptional piston and seal life.

SoftGrip pipettes operate on the air displacement principle and use disposable tips. Every pipette is calibrated at the factory with standards traceable to N.I.S.T. and shipped with a Certificate of Calibration documenting the pipette's accuracy and precision.

A complete range of fully autoclavable, high-performance single and multi-channel pipettes are available. Two styles of single channel, air-displacement SoftGrip pipettes are offered: fixed volume and adjustable volume.



## Volume Setting

### Hamilton SoftGrip Fixed Volume Pipettes

Fixed volume air displacement pipettes are ready to use. No adjustment or setup is required.

### Hamilton SoftGrip Adjustable Volume Pipettes

The isolated volume adjustment ring prevents accidental volume changes. To set the volume, hold the pipette vertical with the volume display in front of you and turn the volume adjustment ring to the desired volume. Set the desired volume to within the pipette's volume range as given below.

For the greatest attainable accuracy, always turn the adjustment ring down to the desired volume. If you are starting at a setting lower than the one desired, turn the adjustment ring past that volume and then turn back to the desired volume.

When setting volumes, start your settings from the top digit on the volume setting display. Full units are expressed in black digits. Incremental units, the values to right of the decimal point, are expressed in red digits and appear below the full units. The graduated scale identifies the least significant digit.

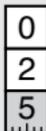
#### Notes:

For the 2  $\mu\text{L}$ , 10  $\mu\text{L}$ , 25  $\mu\text{L}$ , and 1 mL pipettes, the red digits on the scale represent values to the right of the decimal point.

For the 100 and 300  $\mu\text{L}$  pipettes, only the last digit, obtained from the graduated scale, represents a value to the right of the decimal point.

For the best accuracy and precision, use your pipette only within the recommended volume range of 10-100% of the specific pipette's total volume range.

## Recommended Volume Ranges

Pipette Volume	2 $\mu\text{L}$	10 $\mu\text{L}$	25 $\mu\text{L}$	100 $\mu\text{L}$	300 $\mu\text{L}$	1 mL
Pipette Color	Aqua	Purple	Forest Green	Violet	Brick Red	Sky Blue
Recommended Volume Range	0.2-2 $\mu\text{L}$	1-10 $\mu\text{L}$	2.5-25 $\mu\text{L}$	10-100 $\mu\text{L}$	30-300 $\mu\text{L}$	0.1-1 mL
100% Volume Setting	2.000 $\mu\text{L}$	10.00 $\mu\text{L}$	25.00 $\mu\text{L}$	100.0 $\mu\text{L}$	300.0 $\mu\text{L}$	1.000 mL
Reading at 100% Volume						
10% Volume Setting	0.200 $\mu\text{L}$	1.00 $\mu\text{L}$	2.50 $\mu\text{L}$	10.0 $\mu\text{L}$	30.0 $\mu\text{L}$	0.100 mL
Reading at 10% Setting						
Smallest Increment of the Scale	0.002 $\mu\text{L}$	0.02 $\mu\text{L}$	0.02 $\mu\text{L}$	0.2 $\mu\text{L}$	0.2 $\mu\text{L}$	0.002 mL

## Pipette Operation

1. Press a disposable tip firmly onto the pipette's lower body assembly.
2. Depress the plunger button to the first stop. Hold the pipette vertically and immerse the tip 2 to 4 mm into the sample below the meniscus.
3. Slowly release the plunger button to aspirate sample.
4. Withdraw the tip from the sample, touching-off on the side of the container.
5. To dispense, place the tip against the inside wall of the receiving vessel and depress the plunger button to the first stop. Pause and then depress the plunger button to the second or blowout stop. Hold the plunger button down, sliding the tip out along the inside of the receiving vessel.
6. Release the plunger button. With the disposable tip directed into a safe receptacle, depress the tip ejector to dispose of the tip.

## Pre-Rinsing Tips

Pre-rinsing pipette tips is recommended for all pipetting operations. To pre-rinse, aspirate and dispense the sample one to three cycles. On the last rinse, press the plunger past the blowout stop to clear the tip of any sample. Make sure there are no micro-droplets in the tip before aspirating the first sample. If micro-droplets remain in the tip, replace the tip and pre-rinse again.

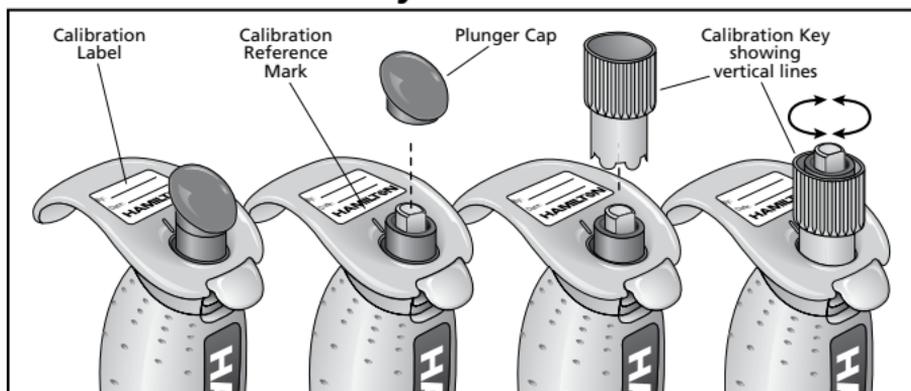
## Pipette Calibration

Hamilton SoftGrip pipettes can be gravimetrically calibrated by the user. Each pipette comes with its own calibration key so that the pipette can be adjusted to accommodate specific fluid viscosities and environmental factors such as temperature, humidity, altitude, etc.

Use a 5- or 6-place balance depending on the volume being measured. A 5-place balance should be accurate to within  $\pm 0.01$  mg and a 6-place balance should be accurate to within a  $\pm 0.001$  mg. All items used to perform the calibration must be allowed to equilibrate to room temperature (20-25 °C, constant to  $\pm 0.5$  °C).

Each time you recalibrate the pipette, initial and date a new calibration label and replace the current label. Also, in accordance with your organization's instrument operation practices and standards, we recommend following good laboratory practices by calibrating your pipette on a regular basis, i.e., three month intervals, using the following procedure, or a known standard method, such as DIN 12650. Depending on the frequency of use and the liquids measured, other time intervals may be more appropriate.

## Calibration Label and Key



## To Calibrate

1. Attach a disposable tip and pre-rinse the tip.
2. Set the desired or the lowest volume at which the pipette will be used.
3. Make 10 measurements of distilled water per tip, recording the weights.  
Adjust for environmental factors, e.g., temperature, humidity, and altitude.
4. Calculate the mean and standard deviation.
5. If necessary, adjust the volume. However, adjust the volume only after confirming the error is not due to other causes. Refer to the sections on Optimizing Performance and Troubleshooting.
  - a. Remove the calibration label and locate the calibration reference mark.
  - b. Remove the plunger cap by pulling the plunger button off the pipette.
  - c. Inset the calibration key, turning the calibration key clockwise to increase volume and counter-clockwise to decrease volume. Each vertical line on the calibration key is approximately 0.2% of the pipette volume.
  - d. Remove the calibration key and replace the plunger cap. Repeat the gravimetric procedure until results are satisfactory.
6. Initial and date a new calibration label, placing the label on the pipette hilt.

The pipette can be recalibrated for liquids with a density other than water. Follow the calibration procedure above with the pipette set at the required volume. Use the liquid to be sampled. With this type of calibration adjustment, the pipette is calibrated only for the liquid used and the volume tested. The pipette should be labeled as such, and should not be used for other sampling applications unless it is recalibrated.

## Performance Specifications

<b>Fixed Volume Pipettes</b>				<b>At 100% of Pipette Volume</b>	
<b>Part No.</b>	<b>Volume Range</b>	<b>Color Coding</b>	<b>Accuracy within ± %</b>	<b>Precision within + %</b>	
1708-03	5 µL	Steel Blue	1.40	0.75	
1708-05	10 µL	Purple	0.80	0.40	
1708-07	25 µL	Forest Green	0.80	0.30	
1708-09	50 µL	Sandstone	0.60	0.30	
1708-11	100 µL	Violet	0.50	0.20	
1708-13	200 µL	Mustard	0.40	0.18	
1708-15	250 µL	Burnt Orange	0.40	0.18	
1708-17	300 µL	Brick Red	0.40	0.18	
1708-19	500 µL	Olive Green	0.40	0.18	
1708-21	1 mL	Sky Blue	0.30	0.12	

<b>Adjustable Volume Pipettes</b>			<b>At 10% of Pipette Volume</b>		<b>At 100% of Pipette Volume</b>	
<b>Part No.</b>	<b>Volume Range</b>	<b>Color Coding</b>	<b>Accuracy within ± %</b>	<b>Precision within + %</b>	<b>Accuracy within ± %</b>	<b>Precision within + %</b>
1708-30	0.2-2 µL	Aqua	8.00	4.00	1.20	0.60
1708-32	1-10 µL	Purple	2.50	1.20	0.80	0.40
1708-34	2.5-25 µL	Forest Green	4.50	1.50	0.80	0.20
1708-36	10-100 µL	Violet	1.80	0.70	0.60	0.15
1708-38	30-300 µL	Brick Red	1.20	0.40	0.40	0.15
1708-40	0.100-1 mL	Sky Blue	1.60	0.50	0.30	0.12

## Optimizing Performance

Topic	Action
Consistent Technique	Pipette with a consistent rhythm, pressure, and speed
Tip Selection	Use Hamilton pipette tips for guaranteed accuracy. For information, visit <a href="http://www.hamiltoncompany.com">www.hamiltoncompany.com</a>
Tip Size and Fit	Use proper size tip, firmly placed on pipette shaft
Pre-Rinse Tips	Pre-rinse pipette tips for improved precision
Sample Aspiration	Keep the disposable tip immersed in fluid during aspiration. Do not let the plunger snap back to starting position.
Immersion Depth	Maintain an immersion depth of 2 to 4 mm
Immersion Angle	Maintain an angle of <math><20^{\circ}</math> from vertical
Viscous Samples	Aspirate slowly. If bubbles are observed, resample. Volume errors may still occur. Refer to the Calibration section.
Acid Samples	Pipetting strong acids and corrosive solutions is not recommended. These liquids may damage the piston and seal. To protect the pipette, use filter barrier pipette tips and inspect piston frequently. For more information, visit <a href="http://www.hamiltoncompany.com">www.hamiltoncompany.com</a>
High Vapor Pressure Samples	Pipetting solutions with high vapor pressure is not recommended. These liquids may damage the piston and seal.
Sample Temperature	Fluids at a temperature other than that for which the pipette and pipette tips have been calibrated may result in volume measurement errors.
Storage	Store upright in stand. Do not lay the pipette on its side with fluid in the tip. Fluid reaching the piston causes contamination and possible corrosion.
Cleaning Piston	Wipe piston with alcohol and a soft, lint-free cloth. Dry and lightly lubricate the piston (Lubricant, Part No. 5763-01).
Seal Replacement	Replace the TEFLON® PTFE seals every 3-6 months depending on use and the samples aspirated
Performance Checks	Check the accuracy and precision of your pipette every 3-6 months depending on use and the samples aspirated

## Cleaning

Wipe the outer surface of the pipette daily with a mild soap and water. In case of accidental contamination of the pipette shaft, immediately remove the ejector sleeve and lower body assembly (refer to Pipette Parts Diagrams). Rinse the ejector sleeve and lower body assembly with a mild soap and water followed by distilled water. Dry all components completely. Lightly lubricate the piston (Lubricant, Part No. 5763-01). Hold the plunger button down to engage the piston into the seal. After reattaching the lower body assembly, attach the injector sleeve over the lower body C-ring.

## Troubleshooting

Problem	Possible Cause	Recommended Remedy
Inaccurate Results	Pipette tip not attached correctly	Check for tip fit and check for proper tip size, replacing tip as needed
	Aspiration stroke too rapid (viscous fluids)	Aspirate slowly by controlling rate of plunger release
	Calibration required	Calibrate the pipette
	Seal leak (dripping fluid)	Replace the seal
Imprecise Results	Inconsistent sampling method	See section on Optimizing Performance
	Seal leak	Replace the seal

## Autoclaving

The entire pipette is autoclavable at 121 °C for 15 minutes at 15 psi (103.5 kPa or 1.02 atm) pressure without the need for any disassembly. However, make sure to loosen the lower body assembly by:

1. Sliding the ejector sleeve off the pipette to access the lower body assembly (refer to Pipette Parts Diagrams).
2. Loosen the lower body assembly near the adjustment ring. Do not completely remove the assembly (refer to Pipette Parts Diagrams).
3. Slide the ejector sleeve back over the assembly but do not reconnect it. It should be loose enough that it slides off if the pipette is turned tip-side down.

Once autoclaved, retighten the lower body assembly. Although autoclaving should not affect pipette accuracy, practice good laboratory procedures by checking your pipette and recalibrate as needed.

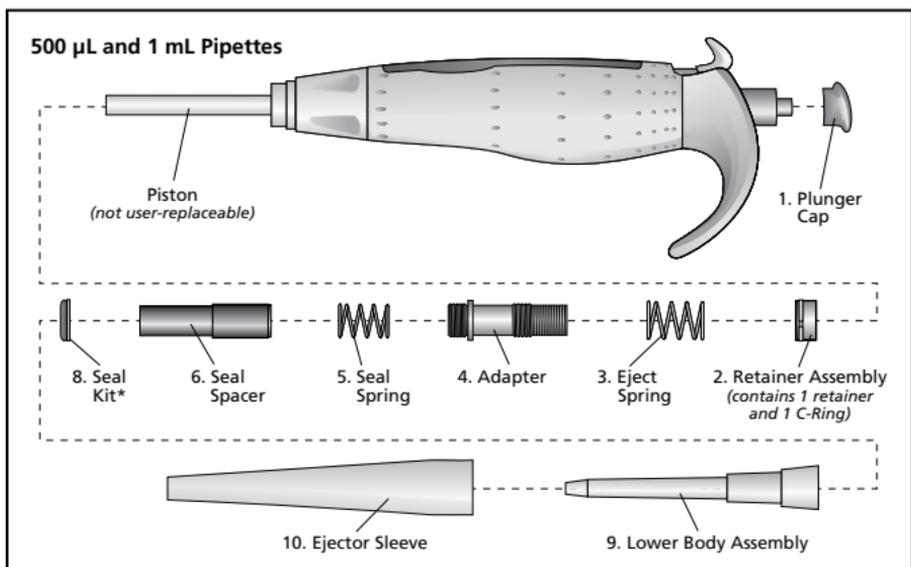
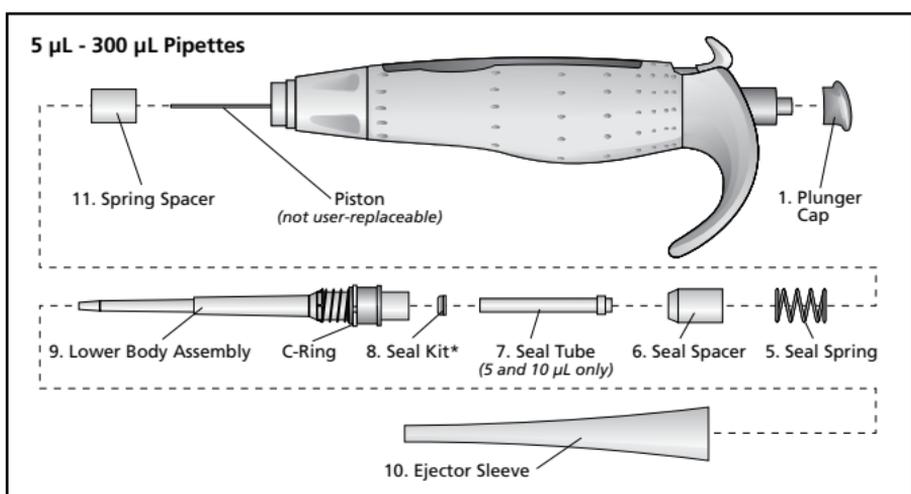
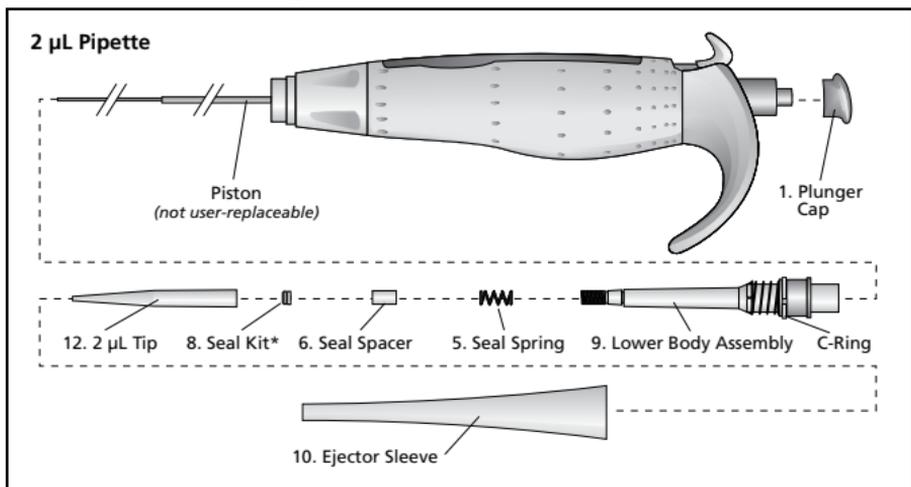
## Replacement Parts

Hamilton pipettes have been designed so simple repairs and part replacements can be performed by the user. The Replacement Parts Table lists all pipette replacement parts identified by Hamilton part numbers. There are three different assembly configurations for SoftGrip pipettes. Refer to the Pipette Parts Diagrams for the pipette that needs repair.

To replace parts, slide the ejector sleeve off the lower body assembly of the pipette. Unscrew the lower body assembly. All parts that are replaceable will now slide off the pipette shaft. Once the part is replaced, reassemble the pipette in the exact order as indicated in the diagram. Make sure that the seal flange is oriented towards the plunger with the O-ring below the flange towards the tip. Lightly lubricate the piston (Lubricant, Part No. 5763-01) using a soft, lint-free cloth. Hold the plunger button down to engage the piston into the seal. After reattaching the lower body assembly, attach the injector sleeve over the lower body C-ring. When replacing seals in the 2 µL, you need only to remove the tip section of the lower body assembly.

To assure that your instrument meets the original Hamilton Company standards and specifications, we strongly suggest that you follow Good Laboratory Practices by recalibrating your pipette after replacing any parts.

## Pipette Parts Diagrams



\*Includes 5 TEFLON® seals with O-rings, and 1 tube of lubricant.

## Replacement Parts Table

Item	Pipette Volume (μL)										
	2	5	10	25	50	100	200	250	300	500	1 mL
1.	4111-01	4111-02	4111-03	4111-04	4111-05	4111-06	4111-07	4111-08	4111-09	4111-10	4111-11
2.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4112-01	4112-01
3.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4113-01	4113-01
4.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4114-01	4114-01
5.	4115-03	4115-01	4115-01	4115-01	4115-01	4115-01	4115-01	4115-01	4115-01	4115-02	4115-02
6.	4116-09	4116-01	4116-01	4116-02	4116-03	4116-04	4116-05	4116-06	4116-06	4116-07	4116-08
7.	n/a	4117-01	4117-01	n/a							
8.	1708-79	1708-70	1708-70	1708-71	1708-72	1708-73	1708-74	1708-75	1708-76	1708-77	1708-78
9.	4118-01	4118-02	4118-02	4118-03	4118-04	4118-04	4118-05	4118-05	4118-05	4118-06	4118-06
10.	4119-01	4119-01	4119-01	4119-02	4119-02	4119-02	4119-02	4119-02	4119-02	4119-03	4119-03
11.	n/a	4120-01	4120-01	4120-01	4120-01	4120-01	4120-01	4120-01	4120-01	n/a	n/a
12.	4202-01	n/a									

## Pipette Recertification and Repairs

### Recertification

Hamilton Company offers a program to recertify the accuracy and precision of your Hamilton pipette. Testing is performed at a Hamilton facility under stringent conditions on state-of-the-art equipment. The calibration process is performed with an unbroken chain of calibrations traceable to N.I.S.T. Your pipette will be returned to you with a new Certificate of Performance. If a pipette must be repaired to bring it into conformance, you will be contacted with a cost estimate.

### Repairs

Hamilton Company offers a pipette repair program in addition to its general, 12-month warranty. You may return your Hamilton pipette for evaluation. A series of basic tests will be performed to evaluate the pipette's performance. If repairs are required to assure and confirm that your pipette is functioning to original Hamilton specifications, you will be contacted with a cost estimate and the additional repairs and recalibration will be performed upon your approval. Your pipette will be returned to you with a new Certificate of Performance.

For pipette recertification and repairs in the U.S.A., call 1-888-525-2123. For authorized service outside of the U.S.A., contact your local Hamilton Company office or representative using the contact information on the back cover.

## **Return of Goods**

Hamilton return and repair policy is written to protect our employees from potentially hazardous materials (e.g., infectious agents, radioactive materials, and carcinogenic chemicals) or any substance that may cause them partial or permanent disability during the inspection or repair process. When returning products, please ensure the items are decontaminated and marked accordingly. Furthermore, the customer assumes responsibility should the returned product be determined to be hazardous. All returns must be accompanied by a pre-approved Returned Goods Authorization Number (RGA#). Any return not received without a RGA# may be disposed. Contact Hamilton Customer Service at 1-888-525-2123 for an RGA#.

## **Hamilton Precision Pipette Tips**

Hamilton delivers performance, value, and choice with two high quality tip families, plus multiple formats and packaging options. The tip families are low retention/low binding tips for maximum sample recovery and standard tips for routine, high-throughput work. Formats include standard, non-filter, extended length, hydrophobic filter barrier, non-sterile, pre-sterilized, and macrovolume. Packaging options include bulk bags, hinged and lift-off racks, and stackable racks. Hamilton tips are made from chemically resistant, virgin polypropylene for excellent clarity and smooth surfaces. All Hamilton Pipette tips are certified to be free of RNase, DNase, and pyrogens. Hamilton pipette tips are universal-fit. For more information, visit [www.hamiltoncompany.com](http://www.hamiltoncompany.com)



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