



fixed volume

adjustable volume

multi-channel

single-channel



# DiamondAdvance

ultralight high-performance pipettors



## TABLE OF CONTENTS

1. Introduction	2
- Package contents	2
- Pipettor selection guide	3
2. Diamond Advance Pipettor Diagram	4
3. Operating Instructions	5
- Setting the volume	5
- Changing the volume	5
- Loading and ejecting pipette tips	6
- Good pipetting guidelines	6
4. Pipetting Techniques	7
- Forward pipetting	7
- Reverse pipetting	7
5. Maintenance and Cleaning	8
- Disassembly of the tip ejector	8
- Cleaning of internal components	9
- Reassembly of the tip ejector	10
- Disassembly and cleaning of multichannel pipettors	11
- Spare parts diagrams	12
6. Calibration and Adjustment	19
- Procedure to check calibration	19
- Calibration equations	20
- Performance specification tables	21
- Calibration adjustment	23
7. Autoclaving	24
8. Troubleshooting Guide	24
9. Warranty	25

**Globe Scientific Inc.**  
**610 Winters Avenue, Paramus, NJ 07652 USA**  
**Phone: 201-599-1400 Fax: 201-599-1406**  
**[www.globescientific.com](http://www.globescientific.com)**

## INTRODUCTION

The Diamond Advance is a high precision, fully autoclavable air displacement pipettor. The Advance is made from chemically resistant materials that provide consistent performance and a long service life. The Advance is simple to operate, light-weight and comfortable for use by both right and left handed users. Each pipettor is color coded for quick volume identification. The Advance pipettor uses disposable plastic pipette tips.

### Package contents

Your Diamond Advance package includes:

1. Diamond Advance pipettor
2. Sample pack of pipette tips
3. Shelf mounting stand
4. Recalibration tool
5. Silicone grease
6. User guide
7. Calibration report with Certificate of Conformity



Shown above: optional pipettor carousel stand - Item #3348

## Pipettor selection guide

ADJUSTABLE VOLUME			
Item No.	Volume Range (µl)	Increments (µl)	Color Code
3341-1	0.1 - 2.5	0.002	Red
3341-10	0.5 - 10	0.02	Red
3341-20	2 - 20	0.02	Red
3341-50	5 - 50	0.1	Yellow
3341-100	10 - 100	0.1	Blue
3341-200	20 - 200	0.2	Lavender
3341-1000	100 - 1000	1	Orange
3341-5000	500 - 5000	10	Green
3341-10000	1000 - 10000	20	Green

FIXED VOLUME		
Item No.	Volume (µl)	Color Code
3342-2	2.5	Red
3342-5	5	Red
3342-10	10	Red
3342-20	20	Yellow
3342-25	25	Yellow
3342-50	50	Blue
3342-100	100	Lavender
3342-200	200	Lavender
3342-250	250	Orange
3342-500	500	Orange
3342-1000	1000	Green
3342-2000	2000	Green
3342-5000	5000	Green
3342-10000	10000	Green

8 - CHANNEL			
Item No.	Volume Range (µl)	Increments (µl)	Color Code
3344-10	0.5 - 10	0.02	Red
3344-20	2 - 20	0.02	Yellow
3344-50	5 - 50	0.1	Yellow
3344-100	10 - 100	0.1	Blue
3344-200	20 - 200	0.2	Lavender
3344-300	30 - 300	0.2	Orange

12 - CHANNEL			
Item No.	Volume Range (µl)	Increments (µl)	Color Code
3345-10	0.5 - 10	0.02	Red
3345-20	2 - 20	0.02	Yellow
3345-50	5 - 50	0.1	Yellow
3345-100	10 - 100	0.1	Blue
3345-200	20 - 200	0.2	Lavender
3345-300	30 - 300	0.2	Orange

# DIAMOND ADVANCE PIPETTOR DIAGRAM



\*For use on Adjustable Volume Pipettors

## OPERATING INSTRUCTIONS

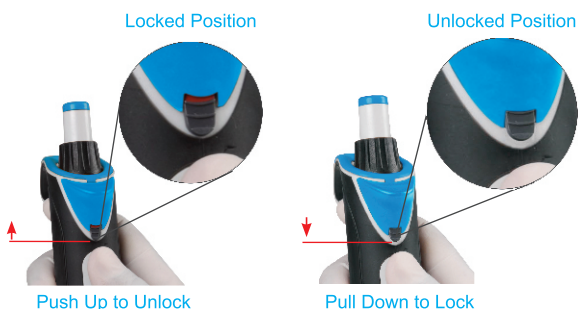
### Setting the volume



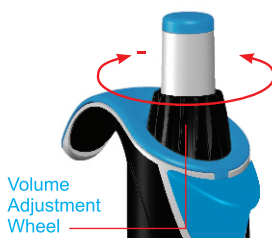
Delivery volume is clearly indicated in the volume display window. In adjustable volume pipettors, the last wheel of the counter has a scale to assist in setting precise delivery volume. Some adjustable volume pipettors are equipped with gray counter wheels that indicate the decimal value.

### Changing the volume:

1. Push the volume lock up to the unlocked position.



2. Turn the volume adjustment wheel until the desired volume is aligned with the red arrow in the volume display window.
3. Pull the volume lock down to safeguard the volume setting.



**The volume lock is used to keep the volume adjustment wheel in position while aspirating or dispensing liquids. Any forced effort to rotate the volume adjustment wheel while in the locked position will either force it to the unlocked position or damage the locking mechanism.**

**Setting the volume beyond the specified volume range is not advisable. Using excessive force to turn the volume adjustment wheel outside the specified range may jam the mechanism and damage the pipettor.**

## Loading and ejecting pipette tips

Globe Scientific pipette tips are recommended for use on all Advance pipettors to ensure maximum precision and a perfect fit.

1. Check the tip cone to make sure it is clean.
2. Firmly press the pipette tip onto the tip cone to ensure an airtight seal.
3. To eject the pipette tip, press down firmly on the tip ejector button. Dispose of the used pipette tip in a suitable waste container.

## Good pipetting guidelines

- Check the tip cone to make sure it is clean.
- Make sure the pipette tip is firmly attached onto the tip cone.
- Make sure that the temperature of the pipette tip, pipettor and liquid are at equilibrium.
- Always press and release the operating button slowly and smoothly.
- Pre-rinse the pipette tip before aspirating the liquid by filling and emptying the pipette tip 5 times. This is important when dispensing liquids that have a viscosity and density different from water, and for volatile solvents.
- Do not pre-rinse the tip when pipetting liquids with temperatures different from the ambient temperature. Change pipette tip after each pipetting.
- When aspirating, hold the pipettor in an upright position and keep the pipette tip at a constant depth below the surface of the liquid.
- After pipetting acids or other corrosive liquids, remove the tip cone and rinse the piston, o-ring and seal with distilled water.
- Do not pipette liquids that have temperatures above 70°C or below 4°C.

Make sure that the liquid never enters the tip cone. To prevent this:

- Never lay the pipettor on its side when there is liquid in the pipette tip.
- Press and release the operating button slowly and smoothly.
- Never turn the pipettor upside down.

## PIPETTING TECHNIQUES

### Forward pipetting

1. Press the operating button to the first stop.
2. Dip the pipette tip under the surface of the liquid to a depth of about 1cm and slowly release the operating button. Withdraw the pipette tip from the liquid while touching it against the edge of the reservoir to remove excess liquid.
3. Dispense the liquid by gently pressing the operating button to the first stop. After a pause, continue to press the operating button all the way to the second stop. This action will empty the pipette tip.
4. Release the operating button to the ready position.



### Reverse pipetting

The reverse pipetting technique is suitable for dispensing liquids that have a high viscosity or a tendency to foam easily. This technique is also recommended for dispensing very small volumes.

1. Press the operating button all the way to the second stop.
2. Dip the pipette tip under the surface of the liquid to a depth of about 1cm and slowly release the operating button. Withdraw the pipette tip from the liquid while touching it against the edge of the reservoir to remove excess liquid.
3. Dispense the liquid by gently pressing the operating button to the first stop. Hold the operating button at the first stop. Some liquid will remain in the pipette tip and should not be dispensed.
4. The remaining liquid can be discarded with the pipette tip or dispensed back into the original solution.





## MAINTENANCE & CLEANING

When the Advance pipettor is not in use, please store in an upright position. Use the enclosed shelf mounting stand or the optional pipettor carousel for this purpose.

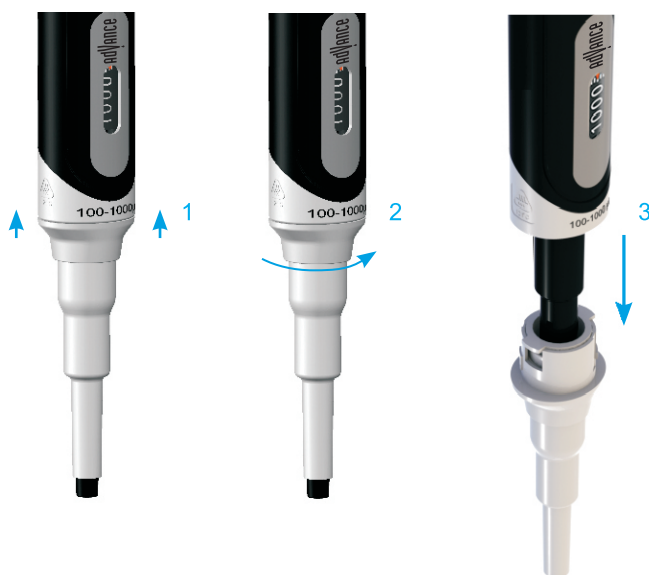
Check the pipettor at the beginning of each day for dust and dirt on the outside surfaces. Pay special attention to the tip cone. No other solvents except isopropanol should be used to clean the pipettor. If the pipettor is used daily, it should be inspected every three months.

To properly service the pipettor, you must be able to disassemble and clean the parts. Please refer to the detailed illustrations on the next few pages for a better understanding of the components.

### Disassembly of the tip ejector



*Damage to the pipettor due to neglect or incorrect maintenance will void the warranty. Damage to, or loss of components will void the warranty. Please pay careful attention to all components during the disassembly and assembly process.*



1. To open, push the tip ejector collar upwards.
2. Rotate the tip ejector collar clockwise until you hear a click.
3. Carefully remove the tip ejector and collar.

## Cleaning of internal components

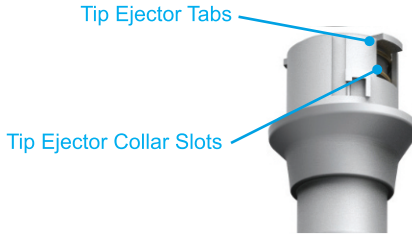


***Please pay careful attention to all components during the disassembly and assembly process.***

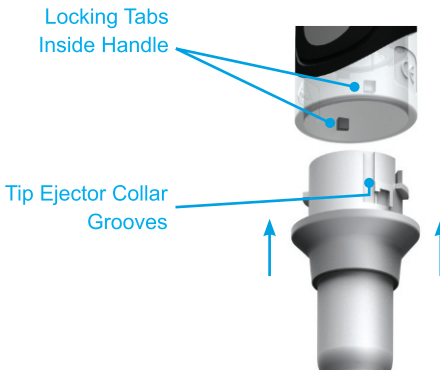
1. Please refer to the spare parts diagram that corresponds to your pipettor model (see pages 12 – 18).
2. Unscrew tip cone assembly from base of handle to access the piston and other internal components.
3. Grasp top and bottom of tip cone assembly and unscrew.
4. Carefully remove o-ring and seal(s) (if present) from inside of upper portion of tip cone assembly.
5. Using isopropanol and a lint free tissue, clean all internal components associated with your model pipettor. Allow to dry thoroughly.
6. Carefully reassemble internal components in reverse order.

## Reassembly of the tip ejector

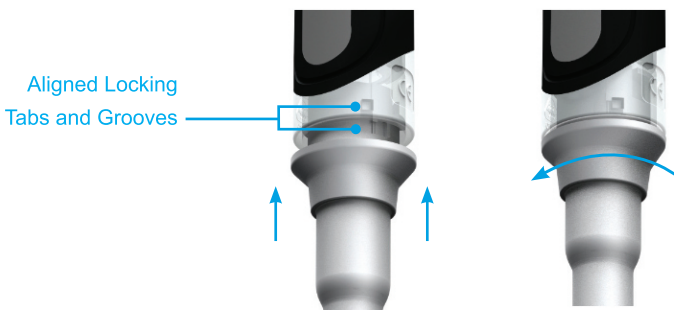
1. Align tabs on tip ejector with slots on tip ejector collar. Push collar all the way up and hold firmly against tabs.



2. Slide tip ejector and collar up over tip cone. Align locking tabs on inside of handle with grooves on tip ejector collar.



3. Push tip ejector collar upwards and twist counterclockwise to lock.

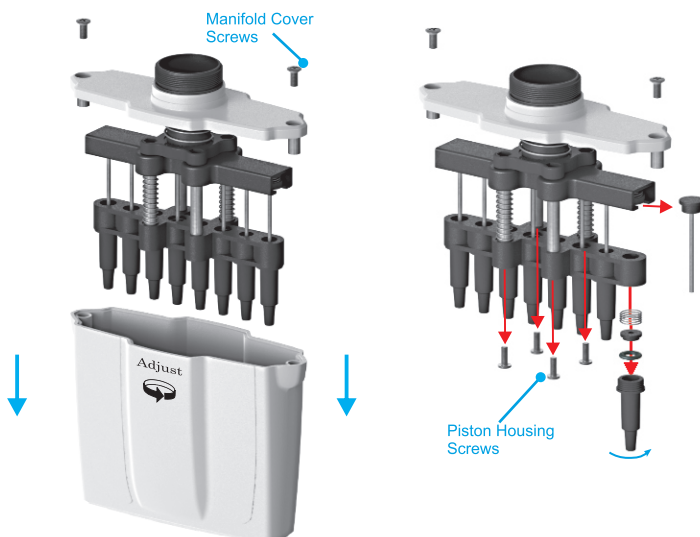


## Disassembly and cleaning of multichannel pipettors

For a comprehensive list of internal components, please refer to the spare parts diagram that corresponds to your pipettor model (see pages 17–18).



1. Rotate the manifold counterclockwise, then slide down to detach.



2. Unscrew the two manifold cover screws and remove the manifold cover.
3. Unscrew the four piston housing screws to disassemble the piston housing.
4. Unscrew the tip cones and remove pistons, piston springs, seals and o-rings. Be sure to keep all parts in order for reassembly.
5. Clean the pistons, piston springs, seals and o-rings with isopropanol and a lint free tissue. Allow to dry thoroughly.
6. Check the tip cones for foreign particles and remove, if any.
7. Lubricate the cleaned parts with the silicone grease supplied with each pipettor.
8. Carefully reassemble components in reverse order.

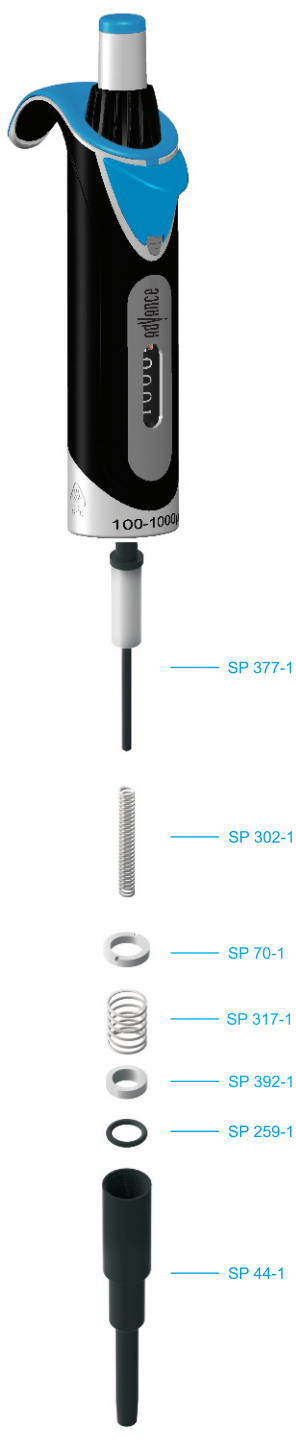
## Spare parts diagrams

Adjustable Volume 100 - 1000µl

Fixed Volume 250µl

500µl

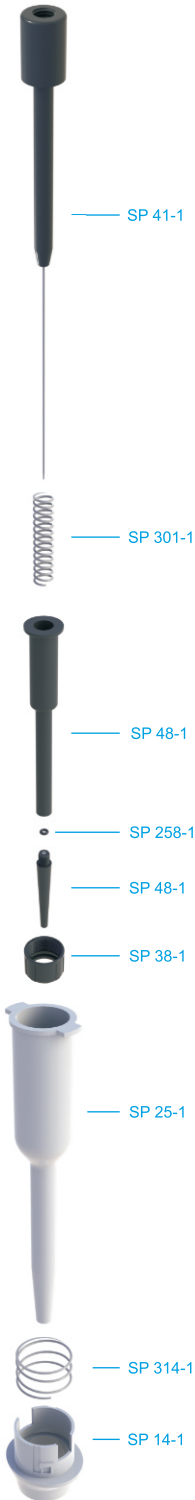
1000µl





Adjustable Volume 0.1 - 2.5 $\mu$ l  
Fixed Volume 0.5 $\mu$ l  
2.5 $\mu$ l

Adjustable Volume 0.5 - 10 $\mu$ l  
Fixed Volume 10 $\mu$ l



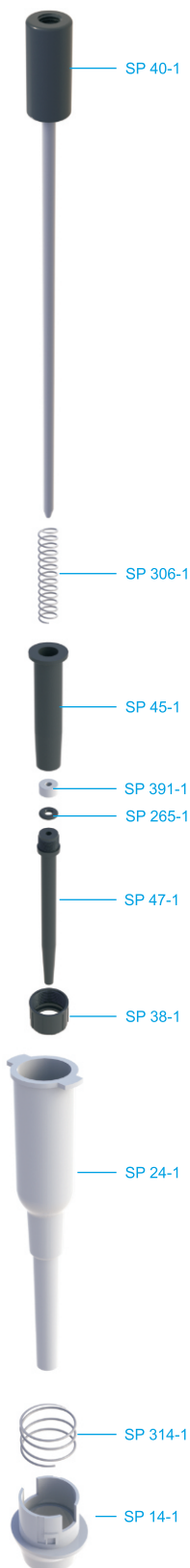
Adjustable Volume 2 - 20 $\mu$ l

Fixed Volume 20 $\mu$ l

Adjustable Volume 5 - 50 $\mu$ l

Fixed Volume 25 $\mu$ l

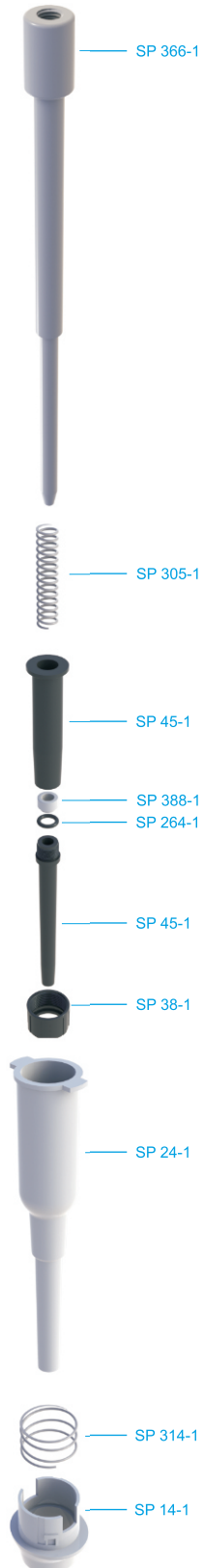
50 $\mu$ l





Adjustable Volume 10 - 100 $\mu$ l  
Fixed Volume 100 $\mu$ l

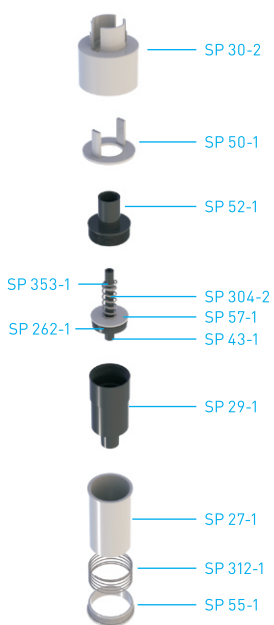
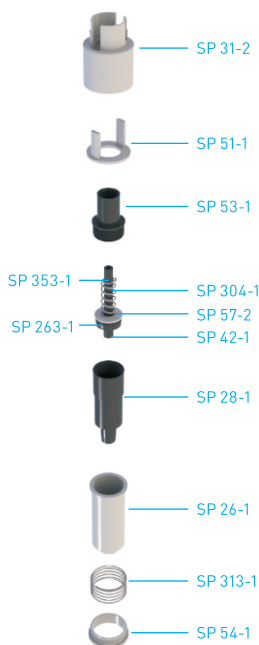
Adjustable Volume 20 - 200 $\mu$ l  
Fixed Volume 200 $\mu$ l





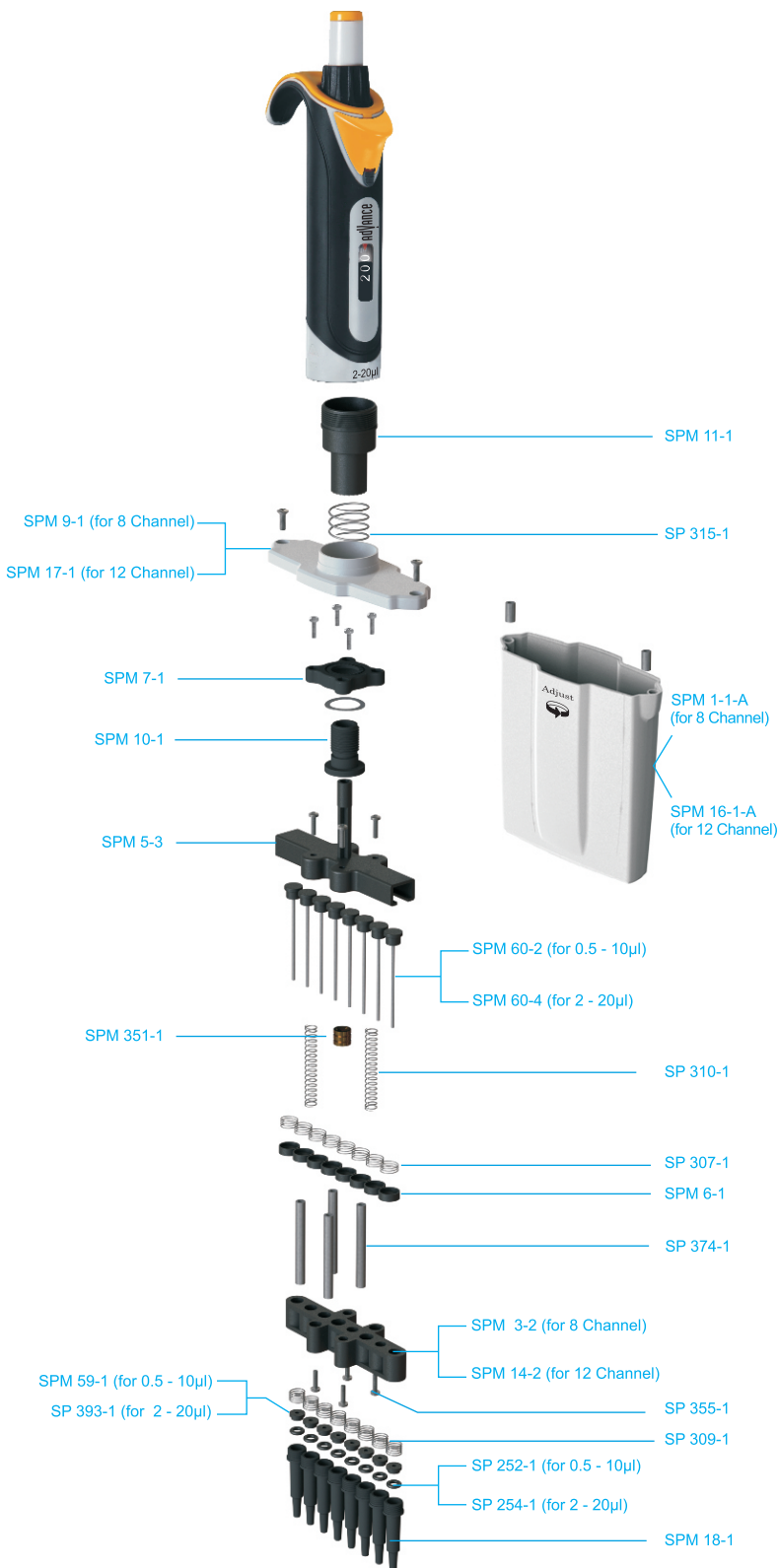
Adjustable Volume 500 - 5000µl  
 Fixed Volume 2000µl  
 5000µl

Adjustable Volume 1000 - 10000µl  
 Fixed Volume 10000µl



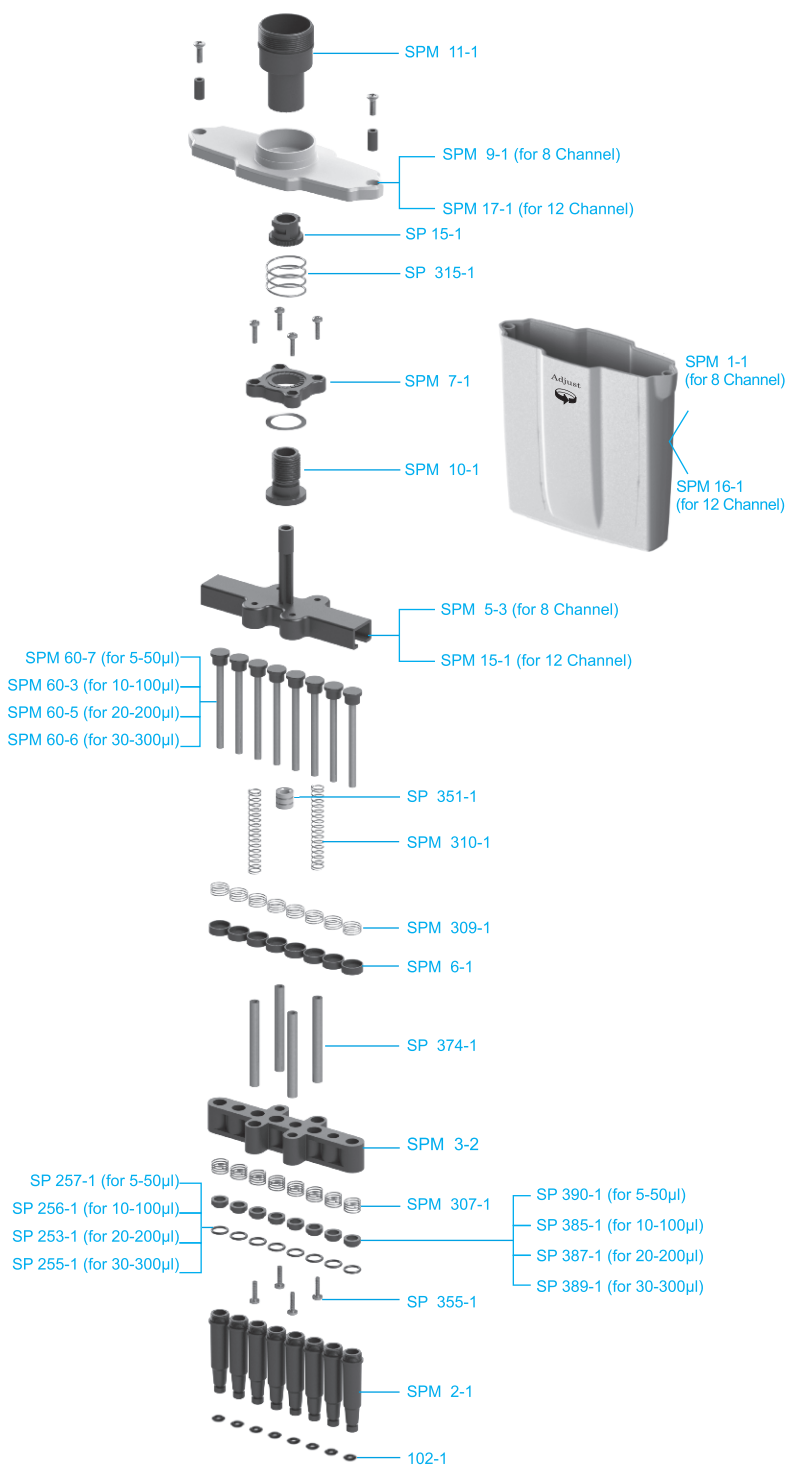
Multichannel Pipettor (8 & 12 Channel)

Adjustable Volume      0.5 - 10µl  
                                       2 - 20µl



### Multichannel Pipettor (8 & 12 Channel)

Adjustable Volume	5 - 50µl
	10 - 100µl
	20 - 200µl
	30 - 300µl



## CALIBRATION AND ADJUSTMENT

Advance pipettors have been quality tested according to ISO 8655/DIN 12650. The quality control involves gravimetric testing of each pipettor with distilled water (grade 3, ISO 3696) at 25°C (+/- 1°C).

All Advance pipettors have been calibrated in an ISO/IEC 17025 accredited laboratory. Each pipettor is calibrated, inspected and validated by qualified technicians prior to shipping.



*Pipettor recalibration should be performed by an accredited pipettor calibration facility. Improper calibration will result in inaccurate results and will void your warranty.*

### Procedure to check calibration

**Note: An analytical balance is required for the calibration procedure.**

Calibration should be performed in a draft-free room with a constant (+/-0.5°C) temperature of 15°C to 30°C. The relative humidity must be above 50%, especially with volumes under 50µl to reduce the effect of evaporation loss. The pipettor, pipette tips and testing water should be exposed to the room conditions for a minimum of 2 hours prior to calibration to reach equilibrium with the testing environment.

Use distilled or deionized water (grade 3, ISO 3696). Use an analytical balance. For volumes under 50µl, an evaporation trap is recommended for use on the analytical balance.

The test volumes are determined by pipettor size as indicated in the tables on the following pages.

- A new pipette tip is first pre-wetted 3-5 times and a series of ten pipetting repetition's performed at each test volume.
- The forward pipetting technique is recommended (see page 7).
- Calculate the inaccuracy and imprecision for all test volumes as per EN ISO 8655/DIN 12650 standards on the basis of the calculations listed on the next page.

## Calibration equations

### Conversion of weight values to volume

$$\text{Mean Value: } \bar{V} = \bar{X} \cdot Z$$

$$\text{Mean Value: } \bar{X} = \frac{\sum X_i}{n}$$

$X_i$  = Balance Reading

$n$  = Number of Readings

$Z$  = Conversion Factor

[example  $Z=1.0040 \mu\text{l/mg}$  at  $25^\circ\text{C}$  and  $1013 \text{ hPa}$ ]

### Calculation for inaccuracy (Systematic Error)

$$A\% = \frac{\bar{V} - V_0}{V_0} \cdot 100$$

$\bar{V}$  = Mean Value

$V_0$  = Particular volume at which readings are taken

### Calculation for imprecision (Random Error)

$$S = \sqrt{\frac{\sum_{i=1}^n (V_i - \bar{V})^2}{n - 1}}$$

$S$  = Standard Deviation

$\bar{V}$  = Mean Value

$n$  = number of readings

$$CV\% = \frac{100 \cdot S}{\bar{V}}$$

NOTE: Compare the results using the tables on the following pages.

## Performance specification tables

ADJUSTABLE VOLUME				
Item No.	Volume (µl)	Test Volume (µl)	Inaccuracy (±%)	Imprecision (±%)
3341-1	0.1 - 2.5	0.25	12	6
		1.25	3	3
		2.5	2.5	1.6
3341-10	0.5 - 10	1	2.5	1.8
		5	2	1
		10	1	0.6
3341-20	2 - 20	2	3	2
		10	1.5	1
		20	0.9	0.4
3341-50	5 - 50	5	2	2
		25	0.8	0.4
		50	0.6	0.3
3341-100	10 - 100	10	3	1
		50	1	0.5
		100	0.8	0.2
3341-200	20 - 200	20	2.5	0.7
		100	0.7	0.3
		200	0.6	0.2
3341-1000	100 - 1000	100	3	0.6
		500	1	0.4
		1000	0.6	0.2
3341-5000	500 - 5000	500	2.4	0.6
		2500	1.2	0.25
		5000	0.6	0.15
3341-10000	1000 - 10000	1000	3	0.6
		5000	0.8	0.3
		10000	0.6	0.2

FIXED VOLUME				
Item No.	Volume (µl)	Test Volume (µl)	Inaccuracy (±%)	Imprecision (±%)
3342-2	2.5	2.5	2	1.6
3342-5	5	5	1.3	1.2
3342-10	10	10	1.2	0.8
3342-20	20	20	1	0.5
3342-25	25	25	1	0.3
3342-50	50	50	0.7	0.3
3342-100	100	100	0.6	0.2
3342-200	200	200	0.6	0.2
3342-250	250	250	0.6	0.2
3342-500	500	500	0.6	0.2
3342-1000	1000	1000	0.6	0.2
3342-2000	2000	2000	0.3	0.15
3342-5000	5000	5000	0.3	0.15
3342-10000	10000	10000	0.6	0.2

<b>8 &amp; 12 CHANNELS</b>				
<b>Item No.</b>	<b>Volume (µl)</b>	<b>Test Volume (µl)</b>	<b>Inaccuracy (±%)</b>	<b>Imprecision (±%)</b>
3344-10 3345-10	05 - 10	1	8	5
		5	4	2
		10	2	1
3344-20 3345-20	2 - 20	2	7	3
		10	3	2
		20	2	1.6
3344-50 3345-50	5 - 50	5	3	2
		25	1.5	1
		50	1	0.7
3344-100 3345-100	10 - 100	10	3	2
		50	1	0.8
		100	0.8	0.3
3344-200 3345-200	20 - 200	20	5	1.4
		100	1	0.4
		200	0.7	0.25
3344-300 3345-300	30 - 300	30	3	1
		150	1	0.5
		300	0.6	0.3

## Calibration adjustment



*Pipettor recalibration should be performed by an accredited pipettor calibration facility. Improper calibration will result in inaccurate results and will void your warranty.*

Calibration adjustment is performed using the recalibration tool.

1. On the back of the handle (below the black grip), there is a small plastic circular guard covering the calibration adjustment nut. Remove the guard and place the recalibration tool into the nut.
2. Turn the tool clockwise to increase the volume or counter-clockwise to decrease the volume.
3. After adjustment, check the calibration according to the instructions listed previously (*Procedure to Check Calibration*).
4. Once the calibration is within the permissible error range, insert the plastic circular guard back into the handle to avoid accidental adjustments in calibration.



*Depending on use, we recommend checking the calibration every six months. However, this can be adjusted to individual requirements.*



## AUTOCLAVING

The Diamond Advance pipettor is fully autoclavable at 2 bar pressure, 121°C for 20 minutes.

- Autoclave the complete pipettor (do not disassemble).
- Keep the volume lock switch in the unlocked position.
- After autoclaving, allow the pipettor to completely cool and dry overnight.

If the pipettor is autoclaved frequently (10+ times), the piston, o-ring and seal(s) should be lubricated with the supplied silicone grease to maintain smooth operation.

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Solution
Pipettor is leaking	Worn o-ring or seal	Replace worn parts
	Foreign particles between the tip cone and pipette tip	Clean tip cone, attach new pipette tip
	Foreign particles between the piston and seal	Clean piston and seal
Pipettor doesn't aspirate	Worn o-ring or seal	Replace worn parts
	Tip cone is loose	Tighten the tip cone
	Piston is damaged (chemically or mechanically)	Replace piston
	Damaged tip cone	Replace the tip cone
Pipettor is inaccurate	Incorrect usage	See operating instructions
	Improper assembly	See "Maintenance & Cleaning" section
	Tip cone is loose	Tighten the tip cone
	Unsuitable pipette tip	Use OEM pipette tip
	Calibration altered	Recalibrate according to instructions
Inaccurate results with certain liquids	Current calibration may not be suitable for particular liquid	Recalibrate with the liquid in question

## WARRANTY

The Diamond Advance pipettor is covered by warranty for three years from the date of purchase from the factory, against defects in materials and workmanship.

The warranty is void if, in the opinion of Globe Scientific Inc., the product has been damaged by accident, misuse, chemical or physical corrosion, incorrect storage, loss of components and/or unauthorized or incorrect maintenance, service or modification by someone other than an authorized service provider.

Each pipettor is calibrated, inspected and validated by qualified technicians prior to shipping. Routine cleaning and recalibration are not covered under the terms of this warranty.

Warranty replacement instructions:

- Contact Globe Scientific Inc. or its authorized distributor immediately with the details of the defect, how the pipettor is being used and how this affects the performance.
- With preauthorization, return the pipettor to Globe Scientific Inc. for inspection. The cost of return (transportation, insurance, government taxes and miscellaneous fees) is to be paid by the customer.
- Globe Scientific Inc. will repair or replace the product at its discretion, under the conditions of this warranty.

**Globe Scientific Inc.**  
**610 Winters Avenue, Paramus, NJ 07652 USA**  
**Phone: 201-599-1400 – Fax: 201-599-1406**  
**[www.globescientific.com](http://www.globescientific.com)**

