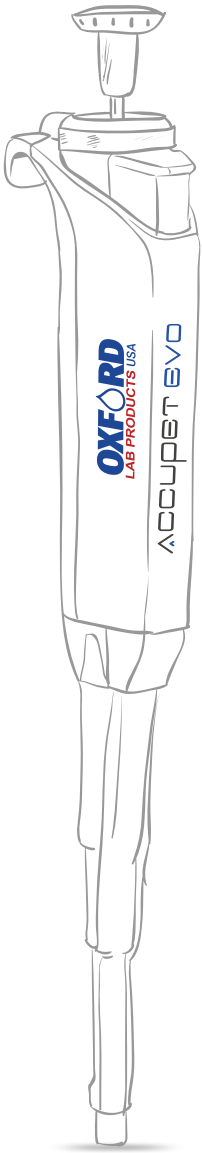
Experience

EFFORTLESS PIPETTING



ACCUPET EVO

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1. INTRODUCTION

This manual will guide you on how to take care of your pipette and benefit the most from its advanced features as follows:

- Magnet assisted piston for precise results
- Innovative spring and seal design for one of the lowest plunge force requirements
- Corrosion resistant tip ejector with unique shock absorbing mechanism
- Volume lock setting
- Fully autoclavable
- Ergonomic design
- Easy in-house calibration
- Highly durable universal tip cone

1.1 OPERATING INSTRUCTIONS FOR USING THIS MANUAL

- Complete reading this manual before using the device for the first time.
- This manual is part of the product. Please keep it in an easily accessible place.
- Enclose this manual when transferring the EVO pipette to third parties.

1.2 DANGER SYMBOLS

The safety instructions in this manual have the following danger symbols and danger levels:

⚠ Hazard point	Material damage

2. INTENDED USE

The EVO pipette is designed and manufactured for dispensing liquids in a measured way and to be used in combination with same brand tips. Thereby, it fulfils the relevant demands of the directive 98/79/EC of the European Parliament. This pipette is intended exclusively for indoor usage, and for operation by trained and skilled personnel.

3. PACKAGE INCLUSION

Description	*Quantity*
• EVO Pipette	1
• Certificate of conformity including calibration certificate	1
• Warranty card	1
• Product manual	1
• Shelf-mounting stand	1
• Calibration tool	1
• Silicone grease	1
• Sample pack of tips	1

4. PRODUCT DESCRIPTION

The EVO pipette works on air-displacement with the help of a magnet assisted piston for aspirating and dispensing measured volumes of liquid. The pipette has to be used with disposable tips. Since the pipette tips are ejected with the help of an ejector.

SINGLE CHANNEL VARIABLE VOLUME

MULTICHANNEL VARIABLE VOLUME

4.1 VARIABLE VOLUME PIPETTE RANGE

CAT No.	Color Code	Volume Range [µl]	Incre-ments [µl]	Test Volume [µl]	Inac-curacy (±) %	Impreci-sion (±) %
EVO:AE-2.5		0.1-2.5 µl	0.002	0.25	12	6
				1.25	2.5	1.5
				2.5	2.5	0.7
EVO:AE-10		0.5-10 µl	0.02	1	2.5	1.5
				5	1.5	0.8
				10	1	0.4
EVO:AE-20		2-20 µl	0.02	2	3	1.5
				10	1.2	0.6
				20	0.9	0.3
EVO:AE-50		5-50 µl	0.1	5	2	2
				25	0.8	0.4
				50	0.6	0.3
EVO:AE-100		10-100 µl	0.1	10	3	1
				50	1	0.3
				100	0.8	0.2
EVO:AE-200		20-200 µl	0.2	20	2.5	0.7
				100	0.7	0.3
				200	0.6	0.2
EVO:AE-1000		100-1000 µl	1	100	3	0.6
				500	1	0.2
				1000	0.6	0.2
EVO:AE-5000		500-5000 µl	10	500	2.4	0.6
				2500	1.2	0.25
				5000	0.6	0.2
EVO:AE-10000		1000-10000 µl	20	1000	3	0.6
				5000	0.8	0.2
				10000	0.6	0.15

4.2 FIXED VOLUME PIPETTE RANGE

CAT No.	Color Code	Volume Range [µl]	Test Volume [µl]	Inac-curacy (±) %	Impreci-sion (±) %
EVO:AE-205-F		2.5 µl	2.5	2	1.6
EVO:AE-5-F		5 µl	5	1.3	1.2
EVO:AE-10-F		10 µl	10	1.2	0.6
EVO:AE-20-F		20 µl	20	1	0.3
EVO:AE-25-F		25 µl	25	1	0.3
EVO:AE-50-F		50 µl	50	0.7	0.3
EVO:AE-100-F		100 µl	100	0.6	0.2
EVO:AE-200-F		200 µl	200	0.6	0.2

CAT No.	Color Code	Volume Range [µl]	Test Volume [µl]	Inac-curacy (±) %	Impreci-sion (±) %
EVO:AE-250-F		250 µl	250	0.6	0.3
EVO:AE-500-F		500 µl	500	0.6	0.2
EVO:AE-1000-F		1000 µl	1000	0.6	0.2
EVO:AE-2000-F		2000 µl	2000	0.3	0.15
EVO:AE-5000-F		5000 µl	5000	0.3	0.15
EVO:AE-10000-F		10000 µl	10000	0.6	0.2

4.3 MULTI-CHANNEL PIPETTE RANGE

8 Channels & 12 Channels

CAT No.	Color Code	Volume Range [µl]	Incre-ments [µl]	Test Volume [µl]	Inac-curacy (±) %	Impreci-sion (±) %
EVO:AE8-10 EVO:AE12-10		0.5-10 µl	0.02	1	8	5
				5	4	2
				10	2	1
EVO:AE8-20 EVO:AE12-20		2-20 µl	0.02	2	7	3
				10	3	2
				20	2	1.6
EVO:AE8-50 EVO:AE12-50		5-50 µl	0.1	5	3	2
				25	1.5	1
				50	1	0.7
EVO:AE8-100 EVO:AE12-100		10-100 µl	0.1	10	3	2
				50	1	0.8
				100	0.8	0.3
EVO:AE8-200 EVO:AE12-200		20-200 µl	0.2	20	5	1.4
				100	1	0.4
				200	0.7	0.25
EVO:AE8-300 EVO:AE12-300		30-300 µl	0.2	30	3	1
				150	1	0.5
				300	0.6	0.3

4.4 DIGITAL DISPLAY FOR VOLUME SETTING

In this pipette, delivery volume is evidently indicated in the large digital display behind the handle.

In variable volume pipette, the last wheel of the display has a scale that assists to set precise delivery volume.

In some of the variable volume pipettes the last one or two display font will have black horizontal line to indicate the value after the decimal.

4.5 VOLUME INDICATOR DISPLAY EXAMPLE

AE-2.5

2.25 µl

AE-10

10 µl

AE-20

18.3 µl

AE-100

100 µl

AE-1000

1 ml

AE-5000

4.85 ml

AE-10000

9.30 ml

AE8-300

300 µl

4.6 MATERIALS

NOTICE! Aggressive substances may damage components, consumables and accessories.

- Check the chemical resistance before using organic solvents or aggressive chemicals.
- Only use liquids whose vapors do not attack the materials used.

5 PIPETTE OPERATION

5.1 PIPETTING GUIDELINES

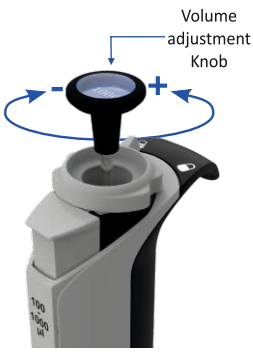
- While using the pipette make sure that operating plunger is handled slowly and smoothly.
- Ensure that the tip is firmly attached on the tip cone. Please check for foreign particles and remove if any, around the tip cone.
- Make sure that the temperature of tip, pipette and liquid are at equilibrium.
- While holding the pipette, its main handle should be resting on your index finger.
- While aspirating, hold the pipette in upright position and keep the tips at a constant depth below the surface of the liquid.
- Pre-rinse the tips before aspirating the liquid by filling and emptying the tip 5 times. This is important especially for liquids, which have a viscosity and density different from water.
- For the volatile solvents you should saturate the air-cushion of your pipette by aspirating and dispensing the solvent repeatedly before aspirating the sample.
- When pipetting liquids with temperature different to the ambient temperature, pre-rinse tips tip several times before use.

- After pipetting acids or other corrosive liquids that emit vapors, 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.
- Make sure that liquids never enter the tip-cone. In order to prevent this:
  - Avoid laying the pipette horizontally when the tip is filled with a sample. This could cause liquid to enter & contaminate the sample during the next pipetting cycle.
  - When there is liquid in the tip, press and release the volume adjustment knob slowly and smoothly.
  - Never turn the pipette upside down.
- Always store the pipette without a tip on the shelf mounting stand included or a pipette carousel stand.
- Highly recommended to calibrate the pipette once in every 3-6 months (depending on the sensitivity of usage) for better performance. The calibration must be carried by gravimetric method in accordance of DIN ISO 8655-6.

5.2 SETTING THE VOLUME

- To set the volume turn the volume lock lever to the “unlock” position so that the volume can be adjusted as per the requirement within the permitted volume range.
  Refer to the following images:

- To decrease the delivery volume, turn it clockwise and to increase, turn it counter clockwise.
- Do make sure that the desired delivery volume is set in-line with the pointer.
- Turn the volume lock to “lock” the volume setting, preventing any accidental change in the volume during pipetting.
  For this pipette the delivery volume of liquid is set using the digital display. A pointer is used to set exact or intermediate volumes using the scale on the last wheel of digital display (refer point # 4.6)



⚠ Locking mechanism ensures that volume adjustment knob remains in its set position while aspirating or dispensing liquids. Any forced efforts to rotate the volume adjustment knob while counter mechanism is in lock position will damage the locking mechanism.

⚠ Setting the volume beyond the specified volume range is not advisable. Using excessive force to turn the volume changing knob outside the specified range, may jam the mechanism and eventually damage the pipette.

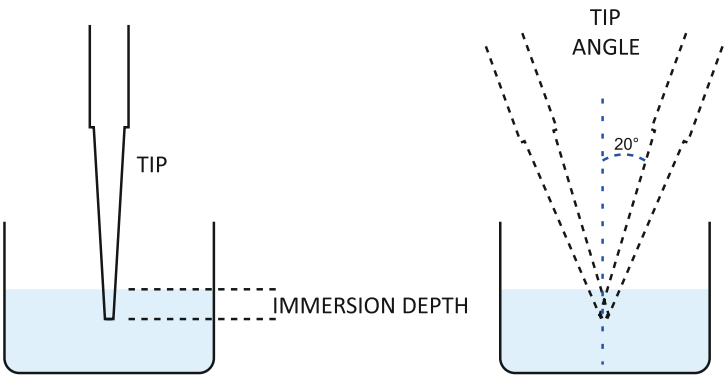
5.3 LOADING TIPS

Using the correct pipette tip according to the pipette volume range is recommended. It is necessary to check that the tip cone is clean before fitting a tip. Press the tip on the cone of the pipette firmly to ensure an air tight seal. Always ensure that the tip is correctly sealed to avoid any leakage while pipetting.

5.4 OPTIMUM IMMERSION DEPTHS

Volume	*Immersion depth*
0.1 µl - 1 µl	1 mm
1 µl - 100 µl	2 - 3 mm
100 µl - 1000 µl	2 - 4 mm
1ml - 10ml	3 - 5 mm

Tip immersion depth is critical and should not be exceeded, If exceeded the volume measured may be inaccurate and possibly out of specification. The tip angle is also important; the pipette should always be used in a position within 20° angle of vertical. See figure below.



5.5 FORWARD PIPETTING

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

5.6 REVERSE PIPETTING

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

1. Press the operating knob until the second stop.
2. Dip the tip under the surface of the liquid in the reservoir and slowly release the operating knob. This action will fill the tip. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Dispense the preset volume of liquid by gently pressing the operating knob to the first stop. Hold the operating knob at the first stop. Some liquid will remain in the tip and it should not be dispensed.
4. The remaining liquid should either be discarded with the tip or should be dispensed back into the reagent reservoir.

5.7 ASPIRATION OF SAMPLE

- Holding the pipette vertically; press the volume adjustment knob to its first stop. Place the tip into the sample at proper depth (refer point # 5.4) and relax your thumb pressure on the plunger. The light piston spring will move the piston upward, aspirating sample.
- Pause for about 1 second (longer for macro-volume pipettes) to ensure that the full volume of sample is drawn into the tip.
- Withdraw the tip from the sample. If any liquid remains on the outer surface of the tip, touch it off carefully onto a lint-free tissue, making sure not to touch the tip orifice.

5.8 DISPENSING SAMPLE

1. Place the pipette tip against the reservoir wall to avoid any bubbles or splashing of the sample out of the reservoir.
2. Press the plunger slowly past the first and second stroke for complete blow out of liquid sample. For viscous samples, it is recommended to wait a few seconds till the fluid passes out to the reservoir.
3. Pull the tip gently along the wall of the reservoir and release the plunger slowly.
4. Discard the tip to avoid any carry over of the sample or cross contamination. It is highly recommended to change the tip and then repeat the pipetting cycle.

5.9 EJECTION OF TIPS

The tip ejector needs to be pressed downwards firmly with the thumb to ensure proper tip ejection. Once the process is complete, make sure the tips are disposed of into a suitable waste container.

6 CALIBRATION AND ADJUSTMENT

All pipettes have been quality tested according to ISO8655-6. The quality control process according to ISO 8655-6 involves gravimetric testing of each pipette with double distilled water.

All pipettes are calibrated in ISO/IEC 17025 accredited laboratory. Each Pipette is calibrated, inspected and validated by qualified technicians according to defined quality system.

6.1 DEVISE REQUIREMENTS AND TEST CONDITIONS

An analytical balance must be used. The balance selection depends upon selected model of the pipette and sensitivity of balance reading.

Test liquid: Water, distilled or de-ionized, grade 3 water conforming ISO3696 Calibration should be carried out in a draft-free room at a constant (±0.5°C) temperature of water, pipette and air between 15°C to 30°C.

The relative humidity must be above 50% especially with volumes under 50 µl. The air humidity should be as high as possible to reduce the effect of evaporation loss.

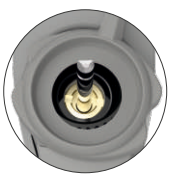
Special accessories for analytical balance, such as the evaporation trap are recommended for the calibration of volumes under 50 µl.

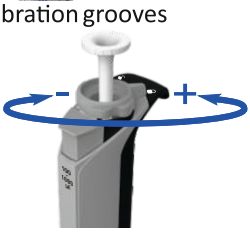
6.2 CALIBRATION ADJUSTMENT

1. Calibration adjustment is done with the calibration tool provided along with the pipette
2. Turn the volume adjustment knob to the “lock” position so the volume setting mechanism is locked and able to turn the calibration screw

3. Remove the volume adjustment knob by pulling it upwards

4. Place the calibration tool into the calibration grooves





5. Turn the calibration tool counter clockwise to increase the volume and clockwise to decrease the volume
6. After adjustment, check the calibration according to the instruction in point number 6.3
7. Once within permissible error range, remove the calibration tool from pipette and place volume adjustment knob in its original position

⚠ Depending upon use, we recommend checking of calibration every six months. However, this can be adjusted to individual requirements.

6.3 PROCEDURE TO CHECK CALIBRATION

The pipette is checked at maximum volume, at 50% of maximum volume and at minimum or 10% of maximum volume, whichever is higher.

- A new tip is first pre-wetted 3-5 times and a series of ten pipetting is done at each volume.
- Use of forward pipetting technique is recommended.

- Calculate the inaccuracy and imprecision for all three volumes as per EN ISO 8655-6 standards on the basis of the following calculation

6.3.1 CONVERSION OF WEIGHT READINGS TO VOLUME

Mean Volume $\bar{V} = \bar{X} \cdot Z$

Mean Weight $\bar{X} = \frac{\sum Xi}{n}$

Xi = Balance Reading
n = number of reading
Z = Conversion factor
[example Z=1.0040 µl/mg at 25°c and 1013 hPa]

6.3.2 CALCULATION FOR IN-ACCURACY (SYSTEMATIC ERROR)

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

$\bar{V}$ = Mean Value
Vo = Particular volume at which readings are taken

6.3.3 CALCULATION FOR IMPRECISION (RANDOM ERROR)

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

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

S = Standard Deviation
$\bar{V}$ = Mean Value
n = number of readings

Compare the results to the limits in the earlier tables (Page# 4, 5)

7 MAINTENANCE & SERVICING

When pipette is not in use, make sure that it is stored in an upright position. One must check the pipette at the beginning of each day for any settled dust and dirt on the outside surface. Attention should be paid to the tip cone. No other solvent except Iso-propanol should be used to clean the pipette. If the pipette is used daily, internal parts should be inspected once in every three months.

7.1 DISASSEMBLY

The servicing procedure starts with the disassembly of the pipette. Please refer to the spare parts lists for better understanding of the components.

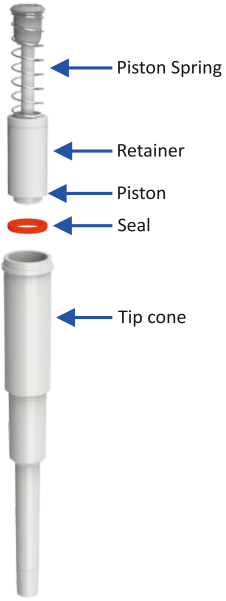
7.2 DISASSEMBLING THE LOWER PART

1. Press tip ejector pusher completely down and hold.
2. Pull down the tip ejector and release the tip ejector pusher.

7.2.1 DISASSEMBLING THE SINGLE-CHANNEL PIPETTE UP TO 1ml

1. Unscrew the coupler and remove tip cone.
2. Take out the lower part and pull out the piston and other parts from tip cone.

- Remember to keep all parts in order for reassembly.
- Clean the piston, the piston spring, seal and the o-ring with isopropanol and lint free tissue. Allow them to dry.
- Check the tip cone for foreign particles and remove, if any. Grease the cleaned parts with the approved lubricant provided with each pipette.



7.2.2 DISASSEMBLING THE SINGLE-CHANNEL PIPETTE: 5 - 10ml

1. As per the earlier process, remove the ejector by pulling it after pressing the tip ejector pusher completely down.
2. Unscrew the coupler to tip cone and pull out the piston and other parts from tip cone.

- Remember to keep all parts in order for reassembly.
- Clean the piston, the piston spring, seal and the o-ring with isopropanol and lint free tissue. Allow them to dry.
- Check the tip cone for foreign particles and remove, if any. Grease the cleaned parts with the approved lubricant provided with each pipette.

7.3 ASSEMBLING THE PIPETTE

7.3.1 ASSEMBLING THE SINGLE-CHANNEL PIPETTE UP TO 1ml

1. The seal wear on piston.
2. Carefully insert the piston into the tip cone.
3. Press on piston from above and check for free movement. The piston must be able to move freely without resistance.
4. The coupler wear to tip cone from bottom side and screw with body.
5. Fit the ejector collar.

7.3.2 ASSEMBLING THE SINGLE-CHANNEL PIPETTE: 5 - 10ml

1. The seal wear on piston.
2. Keep retainer on piston and spring. Press the spring to fit with piston.
3. Carefully insert the piston into the tip cone.
4. Press on piston from above and check for free movement. The piston must be able to move freely without resistance.
5. The coupler screw to tip cone and screw with body.
6. Fit the ejector collar.

7.4 CHECKING THE FUNCTION

It is to ensure that the pipette has been assembled correctly.

- Carry out a gravimetric test for the systematic and random error.

7.5 DISASSEMBLING THE MULTI-CHANNEL PIPETTE

7.5.1 REMOVING THE LOWER ASSEMBLY

1. Press the tip ejector pusher completely and hold it while unscrewing the coupler from upper part of pipette.
2. Remove the lower assembly.

7.5.2 OPENING THE LOWER ASSEMBLY

1. Unscrew the two small screws from the back side and safely keep them. (Refer to image -1)
2. Press and push up from the side to open the front cover. (Refer to image -2)

image -1

image -2

7.5.3 REMOVING THE CHANNEL

1. Slightly push the spring and pull up the tip cone to remove it from the lower rail. (Refer to image -3)
2. Carefully release the piston from the upper rail and move upward to remove it. (Refer to image -4)

image -3

image -4

7.5.4 FITTING THE CHANNEL

1. Insert the spring with cylinder into the center rail.
2. Insert the piston into the cylinder and fit into upper rail.
3. Compress the spring with the cylinder and insert the cylinder into the lower rail.

7.5.5 ASSEMBLING THE LOWER ASSEMBLY

1. Attach the front cover and screw it.
2. Press the pusher completely and hold it while screwing the coupler nut to the body.

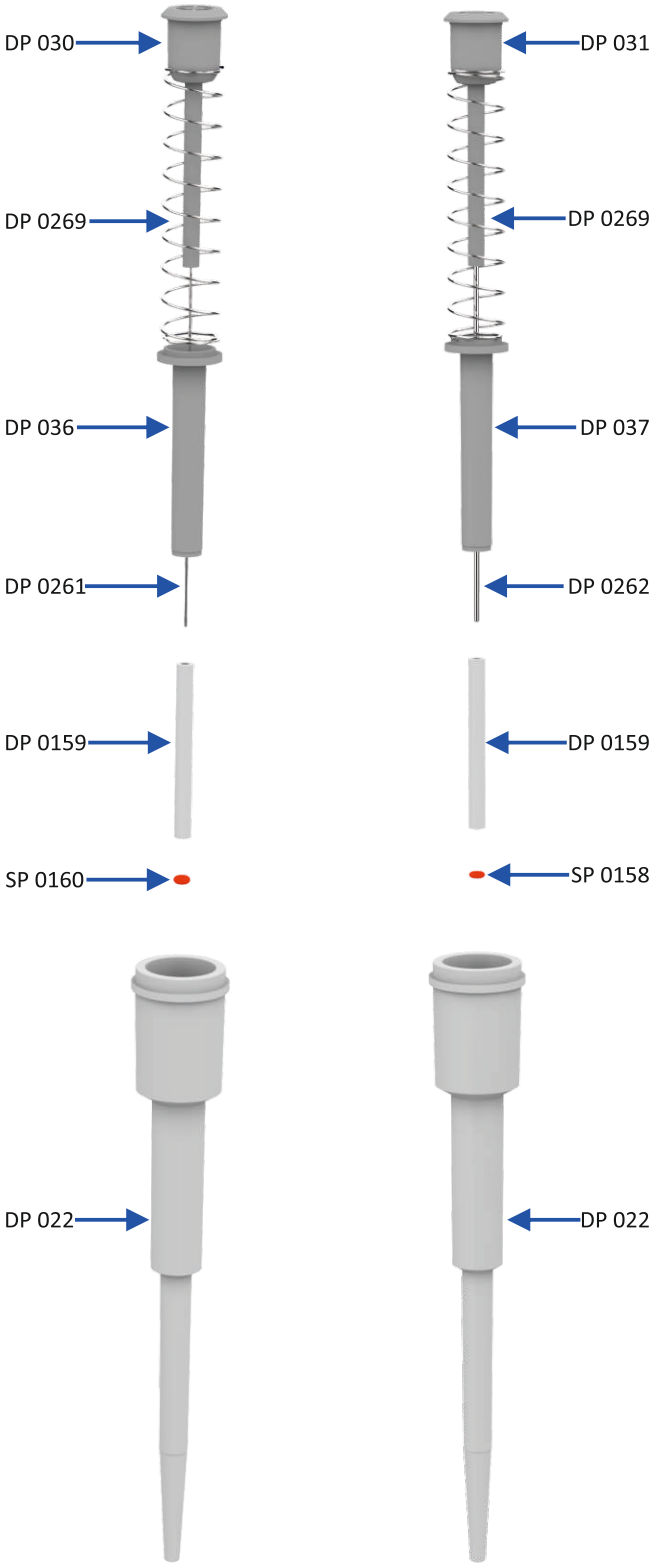
7.5.6 CHECKING THE FUNCTION

It is to ensure that the pipette has been assembled correctly.

- Carry out a gravimetric test for the systematic and random error.

7.6 LIST OF SPARE PARTS - SINGLE CHANNEL PIPETTE

Group 1		Group 2	
Variable volume	0.1-2.5µl	Variable volume	0.5-10µl
Fix volume	2.5µl	Fix volume	10µl



Group 3

Variable volume	2-20µl
Fix volume	20µl

Group 4

Variable volume	5-50µl
Fix volume	25µl 50µl

Group 5

Variable volume 10-100µl

Fix volume 100µl

Group 6

Variable volume 20-200µl

Fix volume 200µl

Group 7

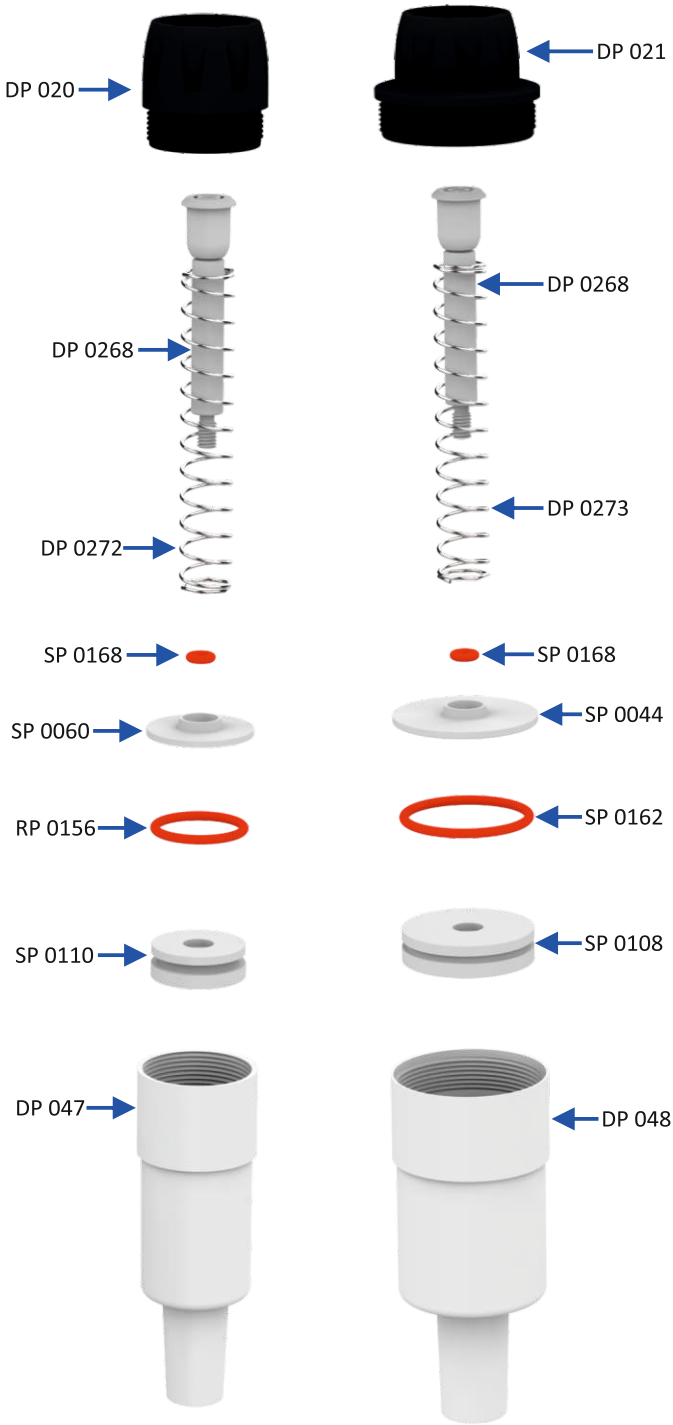
Variable volume	100 - 1000µl
Fix volume	250µl
	500µl
	1000µl

Group 8

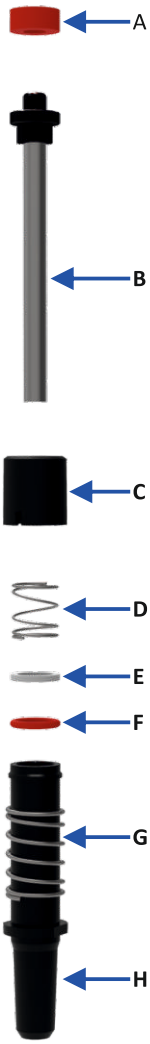
Variable volume	0.5-5ml
Fix volume	2ml
	5ml

Group 9

Variable volume	1-10ml
Fix volume	10ml



7.7 LIST OF SPARE PARTS - MULTICHANNEL PIPETTE



Part	Cat#					
	EVO:AE8-10 EVO:AE12-10 (0.5-10µl)	EVO:AE8-20 EVO:AE12-20 (2-20µl)	EVO:AE8-50 EVO:AE12-50 (5-50µl)	EVO:AE8-100 EVO:AE12-100 (10-100µl)	EVO:AE8-200 EVO:AE12-200 (20-200µl)	EVO:AE8-300 EVO:AE12-300 (30-300µl)
A	DPM 165	DPM 165	DPM 165	DPM 165	DPM 165	DPM 165
B	DPM 134	DPM 135	DPM 136	DPM 137	DPM 138	DPM 139
C	DPM 123	DPM 123	DPM 124	DPM 125	DPM 126	DPM 127
D	DPM 276	DPM 276	DPM 277	DPM 277	DPM 277	DPM 277
E	DPM 364	DPM 364	DPM 365	DPM 366	DPM 367	DPM 368
F	SPM 152	SPM 154	SPM 101	SPM 155	SPM 150	SPM 093
G	DPM 278	DPM 278	DPM 278	DPM 278	DPM 278	DPM 278
H	DPM 128	DPM 129	DPM 130	DPM 131	DPM 132	DPM 133

7.8 AUTOCLAVING

The EVO pipette is completely autoclavable at 1 bar pressure and 121°C temperature for 20 minutes exposure time.

AUTOCLAVING INSTRUCTIONS

- Keep digital counter in unlock position.
- Do not disassemble the pipette for autoclaving.
- After autoclaving, allow pipette to completely cool and dry for 4 hours.

If the pipette is autoclaved frequently, the piston and springs should be greased with supplied lubricant along with each pipette to maintain smooth movement.

8 TROUBLE SHOOTING GUIDE

Problem area	Possible Cause	Solution
Pipette is leaking	Worn o-ring or seal	Replace worn parts
	Foreign particles between tip and tip cone	Clean tip cone, attach new tip
	Foreign particles between piston and seal	Clean seal and piston
Pipette does not aspirate the solution	Worn o-ring or seal	Replace worn parts
	Tip cone is loose	Tighten tip cone
	Piston is damaged (Chemically or mechanically)	Return pipette to authorised distributor
	Damaged tip cone	Replace the tip cone
Pipette is inaccurate	Improper assembly	See “Maintenance” section
	Tip cone is loose	Tighten tip cone
	Tip incorrectly attached	Attach firmly
	Calibration altered	Recalibrate according to instructions
Inaccurate dispensing with certain liquids	Calibration not suitable for particular liquid	Recalibrate with the liquid in question

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