

MANUAL DISPENSADORES DE BOTELLA DIGIPETTE ACCUDOSE
MANUAL BOTTLE DISPENSERS DIGIPETTE ACCUDOSE
MANUEL DISPENSATEUR DE BOUTEILLES DIGIPETTE ACCUDOSE

REF. - CODE - RÉF.
Digipette AccuDose **Electro** MGM043-MGM051

DIGIPETTE



Este manual es parte inseparable del aparato por lo que debe estar disponible a todos los usuarios del equipo. Le recomendamos leer atentamente el presente manual y seguir rigurosamente los procedimientos de uso para obtener las máximas prestaciones y una mayor duración del mismo.

This manual should be available for all users of these equipments. To get the best results and a higher duration of this equipment it is advisable to read carefully this manual and follow the processes of use.

Ce manuel est une partie indissociable de l'appareil et doit être mis à la disposition de tous les utilisateurs de l'équipement. Nous vous recommandons de lire attentivement ce manuel et de suivre scrupuleusement les procédures d'utilisation afin d'obtenir des performances maximales et une plus longue durée de vie de l'appareil.

LANGUAGE INDEX

Spanish	1-15
English	16-29
French	30-43

INDEX

1. SAFETY INSTRUCTIONS AND WARNINGS	17
2. GENERAL DESCRIPTION	17
2.1. Technical specifications	17
3. OVERVIEW	18
3.1. Detailed product description	18
3.2. Symbols	19
3.3. Navigation bar	19
4. INITIAL PREPARATION	19
4.1. Initialisation	19
4.2. Configuration	20
5. PIPETTING OPERATIONS AND MODES	20
5.1. Pipetting mode	20
5.2. Manual mode	21
5.3. Aspiration mode	22
5.4. Multiple mode	22
5.5. Other pipetting operations	23
5.6. Selection of pipetting modes	24
6. MEMORY FUNCTION	24
7. ASSEMBLY AND CALIBRATION	25
7.1. Assembly	25
7.2. Calibration	25
8. MAINTENANCE	26
8.1. Pre-rinse	26
8.2. Suction and dispensing of liquids	26
8.3. Dense and viscous liquids	27
8.4. Recommendations and warnings	27
9. CLEANING AND STERILISATION	28
10. TROUBLESHOOTING	28

1. SAFETY INSTRUCTIONS AND WARNINGS

This manual does not cover all possible hazards associated with the use of the instrument.

It is the sole responsibility of the user to consult and establish proper safety and health practices and determine the applicability of applicable regulations before using this instrument.

Please read the following instructions carefully:

- Read and understand this Instruction Manual completely before using the instrument.
- Follow the general and safety instructions for risk prevention, e.g. always wear protective clothing and protective equipment for eyes and hands.
- Carefully follow the specifications given by the reagent manufacturers.
- Observe the exclusions of use indicated. In case of doubt, contact the manufacturer or supplier.
- Always use the instrument in such a way that it does not endanger the user or third parties.
- Use only original accessories and spare parts.
- Do not attempt to make technical modifications.
- Do not disassemble the instrument further than described in this Instruction Manual.
- Always check the instrument for visible damage before use.
- If you detect any signs of possible malfunction, discontinue use immediately.
- Refer to the “Troubleshooting” section of this Instruction Manual and, if necessary, contact the manufacturer.
- ATTENTION
 - Use the product within the limits of chemical corrosion resistance.
 - Do not handle highly flammable fluids
 - The temperature of the fluid, pipette and tip must be the same.
 - Do not use force to disassemble the product
 - The temperature range for use is 15-40°C and the relative humidity should be 80% or less.

2. GENERAL DESCRIPTION

2.1. Technical specifications

Code	Volume	Increments (μ l)	Volume (μ l)	Inaccuracy		Imprecision	
				\pm %	\pm μ l	\pm %	\pm μ l
MGM043	0.2-10 μ l	0.05	10	1.0	0.1	0.40	0.04
MGM044	0.5-20 μ l	0.1	20	1.0	0.2	0.30	0.06
MGM045	2-100 μ l	0.5	100	0.6	0.6	0.15	0.15
MGM046	5-200 μ l	0.5	200	0.75	1.5	0.20	0.40
MGM047	10-300 μ l	1.0	300	0.4	1.2	0.15	0.45
MGM048	10-500 μ l	2.0	500	0.4	2.0	0.16	0.80
MGM049	50-1000 μ l	1.0	1000	0.4	4.0	0.15	1.50
MGM050	0.1-5 ml	10	5000	0.6	30.0	0.20	10.0
MGM051	1-10 ml	100	10000	0.6	60.0	0.16	16.0

3. OVERVIEW

3.1. Detailed product description

A. Pipetting key / Confirmation key:

Used for aspiration and dispensing in the main pipetting mode. This key also functions as a confirmation key (Enter) when required.

B. Volume adjustment wheel:

Used to adjust the liquid volume in the automatic or manual pipetting interface. It is used to change the volume in manual mode (no aspiration), and the aspirated liquid determines the direction of aspiration or dispensing. It is also used to move the cursor in preset program mode.

C. Tip ejection key:

It is used for easy and effortless tip ejection.

D. Function key/Program key/Pipetting mode change key:

Allows you to switch freely between the different pipetting modes.

E. Speed key:

Used to change the aspiration/dispensing speed during operation. There are three dispensing speed modes: low, medium and high.

F. Handle:

The good grip ensures firm control and stable pipetting for reliable results.

G. Identification window:

Allows you to mark or identify your pipette with personalised descriptions.

H. Pipette shaft:

It contains the piston assembly and facilitates a guided and smooth tip ejection.

I. Cone for tips:

304 grade stainless steel tip cone, designed to fit all standard tips.

J. Finger support:

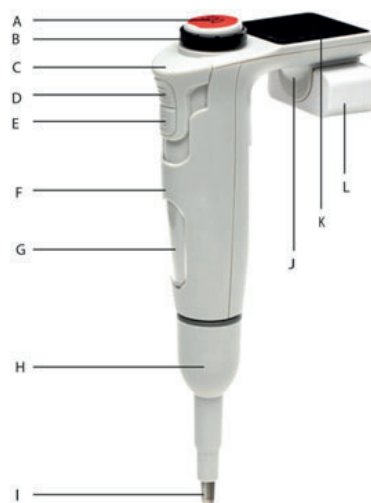
It allows hand support and is useful for both right and left-handed users, providing comfortable pipetting.

K. LCD display:






1-inch LCD display, made of tempered glass, with an intuitive graphical user interface.

L. External lithium battery:

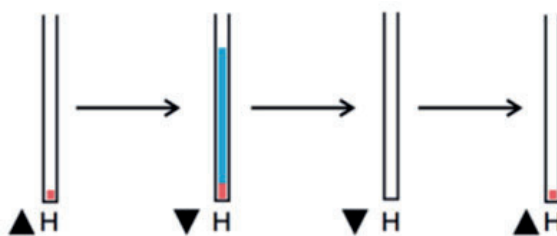
Rechargeable and removable 4.2 V 'knock-down' lithium battery ensures continuous use with a reliable power supply.



3.2. Symbols

Symbol	Description
	CAUTION – This symbol indicates a potential hazard and alerts you to proceed with caution.
	Fully charged battery.
	Low battery.
	Suction indicator.
	Dispensing indicator.

3.3. Navigation bar



The piston is ready for suction.

State in which liquid is aspirated

Full dispensation

The piston returns to zero and sucks in again.

4. INITIAL PREPARATION

4.1. Initialisation

The electronic micropipette has a partially charged battery. However, it is recommended to fully charge it for at least one hour before the first use (Fig. 1):

- To connect the battery, align it and slide it towards the rear of the pipette (Fig. 2).
- Then, to charge the battery, connect the charger to the USB port on the back (Fig. 3).
- To switch on the pipette, use the ON/OFF button located on the back of the pipette (Fig. 4).



Fig. 1



Fig. 2



Fig. 3



Fig. 4

4.2. Configuration

4.2.1. Voltage requirements

The required input voltage is 100-240V- 50/60 Hz. The charger is supplied with a power adapter with an output of 5V and 1A.

4.2.2. Basic operating instructions

- When the button is activated, the LCD will display the message 'PRESS PIP'.
- Press the pipetting key and you will be automatically redirected to the default pipetting mode/automatic mode.
- The display will also show the volume capacity of the pipette and the battery status.
- Now select the mode of operation required to carry out the experiment.

5. PIPETTING OPERATIONS AND MODES

There are four main pipetting modes: pipetting mode, manual mode, aspiration mode and multi/stepper mode.

5.1. Pipetting mode

This is the default mode when the pipette is switched on.

This is the automatic mode, i.e. the pipette will automatically aspirate and dispense the initially set volume (Fig. 1). To use this mode, follow the instructions below:

- Turn the volume adjustment knob to set the desired volume (Fig.2).
- The suction indicator shall be displayed (Fig.3).
- Press the pipetting key to aspirate the liquid (Fig. 4).
- Once the liquid has been aspirated, the display will show the dispensing indicator (Fig. 5).
- Press the pipetting key again to dispense the liquid. It is also possible to dispense less than the aspirated volume. Adjust to the required volume using the volume adjustment wheel. This will activate the stepper mode (Fig. 6).

The corresponding steps are now calculated, and the liquid can be dispensed by pressing the pipetting key.

- Upon completion, the blowout mode shall be activated to dispense the residual tip volume (Fig.7).



Fig. 1



Fig. 2

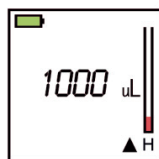


Fig. 3



Fig. 4

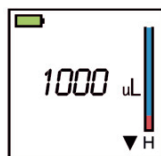


Fig. 5



Fig. 6



Fig. 7

Pipetting mode can also be used for mixing liquids.

- To use this function, after adjusting the volume, press the pipetting key to aspirate the liquid.
- Press and hold the pipetting key so that the pipette automatically aspirates and dispenses the liquid 5 times, thus completing the mixing.
- Once finished, the blowout mode will be activated to dispense the residual tip volume.

5.2. Manual mode

Manual mode is equivalent to non-electronic pipettes. To use this mode, follow the instructions below:

- Press the function key once (Fig. 1).
- Adjust the volume using the volume adjustment wheel (Fig. 2).
- Press and hold the pipetting key for 2-3 seconds when the aspiration bar indicator is lit. This will aspirate the set volume into the tip (Fig. 3).
- To dispense the liquid, press the pipetting key again when the dispensing indicator is lit (Fig. 4).
- The manual mode can also be used for small titrations. Press and hold the pipetting key to aspirate the desired volume.

Select the dispensing speed with the speed key in 'low' mode (Fig. 5) and briefly press the pipetting key to perform the titration.

- An unknown volume of liquid in a vial or tube can be measured using the manual mode. To do this, briefly press the pipetting key repeatedly, approximately once per second. The display will show the total volume aspirated (Fig. 6).



Fig. 1

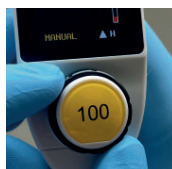


Fig. 2

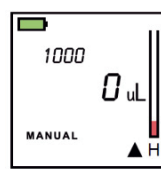


Fig. 3

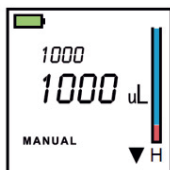


Fig. 4

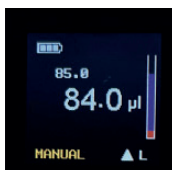


Fig. 5



Fig. 6

5.3. Aspiration mode

This mode is mainly used to aspirate highly volatile liquids, as in other modes the liquid could drip due to the high vapour pressure.

It is a multi-aspiration mode that can be used for equal or unequal aspirations, in combination with stepper mode and pipetting mode.

It can also be used to mix two types of liquids. To use this mode, follow the instructions below:

- Press the function key twice (Fig.1).
- Adjust the volume using the volume adjustment wheel (Fig. 2).
- Press and hold the pipetting key until the aspirating rod indicator is lit to aspirate the liquid (Fig. 3).
- Remove the tip of the liquid and aspirate some air. In case of mixing, aspirate the other liquid again (Fig. 4).

Note: The suction indicator will be on in this mode.

■ To dispense the liquid, press the function key once to return to pipetting mode.

■ The dispensing indicator will now be lit; press the pipetting key again to dispense the liquid (Fig. 5).

When finished, the blowout mode will be activated to dispense the residual tip volume.



Fig. 1

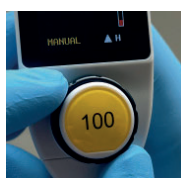


Fig. 2



Fig. 3



Fig. 5

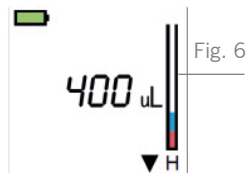


Fig. 6

5.4. Multiple mode

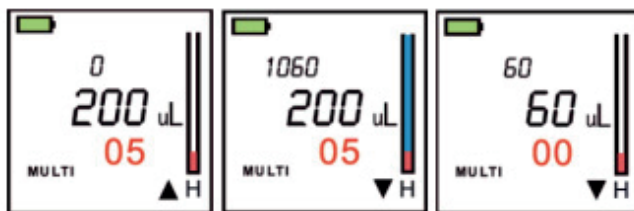
This is a multiple dispensing mode and can also be used for stepper mode. This mode allows reverse or repetitive pipetting. It can be used for equal or unequal dispensing in combination with aspiration and pipetting modes.

- Press the function key three times to select multiple mode.
- Adjust the volume using the volume adjustment wheel. Depending on the volume setting, the steps will be defined automatically.
- Press the pipetting key to aspirate the liquid when the aspiration indicator is lit (Fig. 1).
- When the dispense indicator is lit, press the pipetting key to dispense the volume.
- Each time the pipetting key is pressed, one dispensing step is performed. The display



Fig. 1

shows the number of remaining dispensing steps.



- Then press the pipetting key again to perform a blowout.

5.5. Other pipetting operations

By combining different pipetting modes, the instrument can be used for various operations. These combinations make it possible to handle different types of liquids, such as viscous liquids, volatile liquids, acids, foaming liquids, heterogeneous solvents, among others.

Some common pipetting techniques are shown below:

- **Forward pipetting:** A technique for dispensing a measured amount of liquid by means of an air displacement pipette. This technique is mainly recommended for aqueous solutions, such as buffers, dilute acids or alkalis.
- **Pipetting heterogeneous samples:** Used for pipetting heterogeneous samples, such as blood or serum. Normally, pre-pipetting of the tip is not possible, and the entire sample must be dispensed for accurate analysis.
- **Reverse pipetting:** A technique for dispensing a measured amount of liquid by means of an air displacement pipette. This technique is mainly recommended for solutions with high viscosity or a tendency to foam, as it reduces the risk of splashing, foaming or bubbling. It is most accurate for dispensing small volumes of liquids containing proteins and biological solutions.
- **Manual pipetting:** Suitable for pipetting supernatants, measuring an unknown volume, performing titrations or loading gels. It is ideal for occasional or low volume pipetting.
- **Titration:** This is done by aspirating the total volume and then dispensing it manually dropwise until the desired reaction is reached.
- **Pipetting for gel loading:** This consists of loading acrylamide or agarose gels using standard pipette tips. The use of specialised tips for polyacrylamide gels accelerates the loading process and is used in a variety of applications.
- **Multi-stage aspiration technique:** Consists of aspiration of equal or unequal volumes of supernatants into a single pipette tip at the desired speed and volume. This function is useful for pooling supernatants containing proteins, peptides or viruses for further analysis.
- **Mixed Pipetting:** Allows a specific amount of liquid to be aspirated followed by a user-defined mixing step. It is ideal for increasing reproducibility and preventing repetitive strain injuries and minimises manual use of the piston during operation.
- **Sample dilution technique:** Allows samples to be added, diluted and mixed in a single pipetting operation. First the diluent is aspirated, followed by an air gap and then the sample.
- **Stepper technique or multiple dispensing mode:** The pipette divides an aspirated volume into multiple dispenses of a smaller volume. Repeated dispensing of a selected volume with equal or unequal steps is possible using this mode. Especially suitable for microplate applications.
- **Sequential dispensing:** Aspirate once and dispense multiple user-defined volumes in sequential order in a single operation.

■ **Repetitive pipetting:** This is a variation of reverse pipetting that consists of repeatedly pipetting the same volume of liquid.

Note: In case you wish to dispense a controlled volume or exit any of the pipetting modes after aspirating, you must press and hold the speed button. The blowout mode will then be activated, and you can dispense the residual liquid in one go by pressing the piston button.

5.6. Selection of pipetting modes

Pipetting techniques	Working modes			
	Pipetting mode	Manual mode	Aspiration mode	Multiple mode
Pipe forward	✓	✓		
Pipetting of heterogeneous samples	✓			✓
Reverse pipetting	✓			✓
Manual pipetting		✓		
Qualification		✓		
Pipetting for gel loading	✓			✓
Multi-stage suction technology			✓	
Mixed pipetting	✓	✓	✓	
Sample dilution technique	✓			✓
Stepper/Multiple Dispensing Technique				✓
Sequential dispensing	✓		✓	✓
Repetitive pipetting	✓			✓

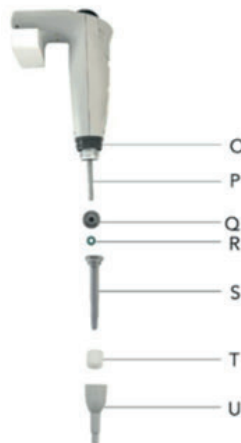
6. MEMORY FUNCTION

They have a built-in memory function that allows you to save executed programmes, which can be used later.

- To access the memory section, press and hold the programming key.
- A selection screen will open.
- You can select any of the programmes according to the pipetting section and save it.
- To exit the memory, press the function key again.

7. ASSEMBLY AND CALIBRATION

- O. Upper part of the ejector
- P. Piston
- Q. Piston unit
- R. O-ring
- S. Shaft
- T. Shaft nut
- U. Lower part of ejector



- Unscrew the lower part of the ejector (U) and then unscrew the shaft nut (T) by turning it counterclockwise.
- Now remove the magnetic shaft (S) from the pipette. The O-ring (R) of the pipette is inside the shaft (S). Replace the O-ring only if necessary.
- This will expose the piston unit (Q) and piston (P). The lower part of the ejector (U), shaft nut (T), shaft (S), O-ring (R) and piston unit (Q) can be sterilised.

7.1. Assembly

To reassemble the piston assembly, follow the steps below:

- Place the O-ring (R) back on the magnetic shaft (S) and refit them.
- Thread the shaft nut (T), followed by the lower part of the ejector (U) onto the upper part of the ejector (O), one at a time.
- The assembly is now complete.

7.2. Calibration

All micropipettes are factory calibrated and adjusted to deliver the specified volume using distilled or deionised water, using the forward pipetting technique.

It should be noted that the use of other pipetting techniques may affect the calibration results.

The micropipettes are designed to allow readjustment in case of using other pipetting techniques or solutions/reagents with different temperatures and viscosities.

If the volume dispensed by the micropipette (measured with an analytical balance) is not within the permissible limits according to ISO 8655, the micropipette can be recalibrated by following the procedure below:

- Take 7 measurements of the nominal volume of the pipette and calculate the weighted average volume as displayed by an analytical balance.
- Turn the ignition key of the pipette to the ON position.
- Press and hold down the function/program key and the speed key simultaneously to enter the configuration interface.
- Go to the menu section and select Calibrate.
- Select four points to enter the calibration value.
- Preset the calibration value (average measured liquid value) and save the calibration to start the process.

Checkpoints	Description	Setting
P1	Lowest value	No adjustment required
P2	10% of the nominal value	At each point, 7 measurements must be taken with the analytical balance. The corresponding systematic error and random error must be calculated, and the calibration must be readjusted.
P3	50% of the nominal value	
P4	Maximum/nominal value	

- If the re-adjusted value is not within the permissible limit, perform the calibration again at the remaining control points.
- If the systematic error is positive, the calibration value must be adjusted upwards. If the error is negative, the calibration value must be adjusted slightly downwards. The adjusted figure corresponds to half of the systematic error.

8. MAINTENANCE

8.1. Pre-rinse

When pipetting viscous liquids or liquids with low surface tension, an internal film forms which may cause errors. To avoid this, it is recommended to aspirate and dispense a sample into the same container before the first pipetting. This improves accuracy, reduces evaporation and prevents cross-contamination. The pre-rinse should be repeated when changing the volume or tip.

8.2. Suction and dispensing of liquids

Place a tip on the pipette shaft. Press the tip firmly using a slight twisting motion. This will ensure a tight seal. Important: Never aspirate liquids without a tip attached to the pipette.

ASPIRATION

- Hold the pipette vertically and insert the tip into the sample liquid. The depth to which the tip is immersed in the liquid depends on the model.

Model	Depth (mm)
MGM043	≤ 1
MGM044-MGM049	2-4
MGM050	3-6

- Press the pipetting key to aspirate the sample. Wait one second and then remove the tip from the liquid.
- Avoid touching the tip mouth.

DISPENSATION

- Place the tip end against the inner wall of the vessel at an angle of 10 to 40 degrees. Press the pipetting key.
- Wait for one second. Remove the pipette by sliding the tip against the inner surface of the receiving vessel. Eject the tip by pressing the tip ejection key.
- Remember to change the tip each time a different type of liquid is to be pipetted.

8.3. Dense and viscous liquids

The accuracy of the pipette may vary with liquids of different density, viscosity or surface tension. In general, if the pipette is pipetted slowly and the tip is held for a few seconds after aspiration and expulsion, the error is minimal. In extreme cases, it is recommended to weigh the nominal aspirated volume and calculate a correction value:

- Set the pipette to the nominal volume and weigh the liquid, then calculate the deviation from the nominal value:

Correction value = $2 \times \text{nominal value} - m / \gamma$

where:

m = weight of the sample

γ = density of the liquid

- Check this operation again and correct if necessary. Note the corrected value for future pipetting of the same type of liquid.

8.4. Recommendations and warnings

Following the guidelines below will ensure maximum precision and accuracy in liquid sampling:

- Use the models slowly and evenly
- The depth of immersion in the liquid must be the minimum necessary and must be kept constant during aspiration.
- The pipette must be kept in an upright position.
- For small volumes, it is recommended to dispense at medium or low speed.
- To ensure a correct fit of the tip and to avoid leakage, it is recommended to press the tip two or three times against the cone to ensure a tight seal.
- Replace the tip whenever the dispensing volume is changed or a different liquid is aspirated.
- Replace the tip if a drop remains in the extreme after the previous pipetting operation.
- Each new tip must be pre-rinsed with the liquid to be pipetted.
- Liquid must never enter the shaft. To avoid this:
 - Press and release the button slowly and evenly.
 - Never invert the pipette
 - Do not leave the pipette horizontal if there is liquid in the tip.
- Do not force the volume setting beyond the recommended limits.
- When pipetting liquids at temperatures different from ambient, it is recommended to pre-rinse the tip several times before use.
- Do not pipette liquids above 70°C.
- When pipetting acids or corrosive solutions that emit vapours, it is recommended to disassemble the shaft, rinse the piston and seal it with distilled water at the end of the operation.

9. CLEANING AND STERILISATION

CLEANING

The external surfaces of the pipetting button, ejector button, handle, shaft nut and adjustment knob can be cleaned with a cloth dampened with isopropyl alcohol.

Other parts removed when disassembling the pipette can be washed with distilled water or isopropyl alcohol.

STERILISATION

Only the piston unit can be autoclaved at 121°C for 20 minutes.

After sterilisation, the pipette should be dried and allowed to cool to room temperature. It is recommended to sterilise pipettes in an autoclave with initial vacuum and drying cycle. Before sterilisation, loosen the pipette shaft nut slightly. After the autoclaving process, these parts should be retightened firmly.

The accuracy of the results should not be affected if the use of the pipette and the autoclaving process are performed correctly.

10. TROUBLESHOOTING

Problem	Possible causes	Solution
Piston failure	Piston is installed too tight	Replace the piston
	Piston has insufficient lubrication	Grease the piston
	Solidification of the lubricating grease on the piston surface	Remove the oldest grease and add new grease.
	Foreign body or damage to the piston surface	Clean or replace the piston
	Contamination or particles between piston, O-ring and tip ejector sleeve	Clean and grease the O-ring and the tip ejector sleeve.
	O-ring is damaged	Replace the O-ring
Inaccurate pipetting volume or leakage	The tip is not installed correctly	Replace the tip
	The tips are not compatible	Clean the cone and replace the tip.
	Imperfections between tip and cone	Clean the cone and replace the tip.
	The tip is damaged	Replace with a new tip
	Fluid has been extracted too quickly	Adjust pipetting speed/replace and remove fluid slowly

Problem	Possible causes	Solution
Inaccurate pipetting volume or leakage	The tip withdrew from the surface of the liquid too fast	When drawing large volumes of viscous fluids, pause for a few seconds before removing the tip from the surface of the fluid.
	Foreign body or damage to the piston surface	Clean or replace the piston
	Contamination or particles between piston, O-ring and tip ejector sleeve	Clean and grease the O-ring and cone.
	Insufficient lubrication of O-ring and piston	Apply grease evenly
	O-ring is damaged	Replace the O-ring
	Incorrect operation	Follow the operating instructions
There is residue on the tip	The tip is incompatible	Use an appropriate tip
	The tip is not installed properly	Reinstall the tip
	The tip is highly absorbent	Replace with a lower absorption tip.
	Excessive liquid viscosity	Pre-wrench the tip and reduce the suction speed.
Noise during operation	Insufficient lubrication of the piston	Apply lubricating grease evenly to the piston.
	Foreign body in the piston	Clean the piston and grease it.
	O-ring loose	Make sure the O-ring is properly installed.
Suction is weak or does not draw fluid	The battery has reached the end of its useful life.	Replace the battery
	Battery is low	Charge the battery
Inaccurate dispensing of special fluids	Incorrect calibration	Recalibrate
	Do not dispense volatile fluids or those with a large density difference with water.	Pre-wash tips or recalibrate
Tip becomes detached or difficult to engage	Low quality tips	Use higher quality tips
	The tip is damaged	Replace with a new tip