

MANUAL PIPETAS ULTRALITE
ULTRALITE PIPETTES MANUAL
MANUEL DES PIPETTES ULTRALITE

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MGD102_117, MGB101_111, MGG040_051

DIGIPETTE



UltraLite^{FX}

UltraLite^{VR}

UltraLite Mini

UltraLite M8

UltraLite M12

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.

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1. DESCRIPTION

These micropipettes feature an ergonomic and intuitive design for easy handling over long working days. Thanks to their advanced technology, they offer exceptional accuracy and repeatability in every aspiration and dispensing.

They are available in single channel versions with fixed volumes and in variable volume models, thus adapting to the different dosing requirements in the laboratory.

2. CHARACTERISTICS

■ High precision dosing

Design minimises air gap between plunger and liquid ensuring greater dispensing accuracy

■ Volume locking mechanism

Prevents unintentional volume adjustments during pipetting; ensuring stability and operational safety even during prolonged or repetitive use

■ Fast and accurate calibration

Allows direct and efficient calibration in the lab, without requiring repetitive adjustments or complex procedures

■ Integrated tip ejector

Incorporates an ejector system that applies just the right amount of force and improves the aesthetic appearance of the equipment.

■ Smooth drive of the dosing mechanism

It offers a very light pipetting experience, with forces of 5-3 N in the first stage and 14-10 N in the second stage.

■ Quick volume adjustment wheel

Allows fast volume setting through smooth plunger rotation

■ Housing made of polycarbonate

Tough, lightweight and durable material; protects against scratches and dirt

■ Ergonomic and lightweight design

Easy one-handed handling, ideal for prolonged use without fatigue

■ Cone compatible with universal tips

Supports most standard tips available on the international market

■ Autoclavable

Can be autoclaved at 121°C and 15 psi for 15-20 minutes.

3. RAW MATERIALS

Made of mechanically durable, autoclavable materials that withstand repeated sterilisation cycles without degrading, and free of hazardous or toxic substances, ensuring maximum safety and reliability in the laboratory.

4. MICROPIPETTE OPERATION

Variable volume

- Set the dispensing volume with the push button on the top of the micropipette. To decrease the volume, turn the push button clockwise; to increase the volume, turn it counterclockwise.
- Make sure that the selected volume clicks into place.
- Do not set a volume outside the specified range for the micropipette.

Note: Applying excessive force when turning the push button beyond its range may lock the mechanism and damage the micropipette.

Fixed volume

The fixed volume micropipette completely eliminates random error, as there is no possibility of accidental changes in volume, allowing the user to operate faster and more efficiently.

No presetting required: the volume is preset at the factory and the micropipette is ready for immediate use.

5. TIP EJECTION

The micropipette is equipped with an ejection button to prevent contamination. To discard the tip, direct the micropipette into an appropriate waste container and press the ejection button with your thumb.

6. PIPETTING TECHNIQUE

General Instructions

- Press and release the plunger in a smooth and controlled manner, especially when working with highly viscous solvents or reagents. Avoid sudden movements that may cause bubbling or splashing.
- Check that the tip is correctly attached to the tip cone before aspirating any liquid.
- Before starting the experiment, precondition the tip by filling and emptying it 2-3 times with the same reagent or solution to be pipetted, to improve precision and reproducibility.
- Keep the micropipette in an upright position during aspiration; the non-slip area should rest on the index finger.
- Make sure that the tips, the micropipette and the solution or reagent are at the same temperature to avoid variations in the aspirated volume.

Direct suction technique

- Press the plunger to the first stop and, holding the micropipette vertically, insert the tip into the liquid. Release the plunger slowly and in a controlled manner to aspirate the desired volume.
- Release the plunger slowly and steadily while the tip is submerged; the liquid will be sucked into the tip. To dispense the liquid, rest the tip against the inner wall of the receiver container at a steep angle.
- Slowly depress the plunger to the first stop to release the aspirated volume.
- To empty the tip completely, press the plunger to the second stop.
- When removing the tip, gently slide it along the inside wall of the container to remove any remaining liquid.

Reverse Aspiration Technique

- Press the plunger to the second stop and, holding the micropipette vertically, insert the tip into the liquid.
- Release the plunger slowly and steadily while the tip is submerged; the liquid will be sucked into the tip.
- To dispense the liquid, rest the tip against the inner wall of the container at a steep angle.
- Slowly depress the plunger to the first stop to release most of the volume.
- When removing the tip from the liquid, gently slide it along the inner wall of the container to remove any remaining sample.

Note: It is normal for residual liquid to remain in the tip; this volume is not part of the dispensed amount.

Repetitive technique

The repetitive technique allows rapid dispensing of identical volumes in succession, optimising productivity in multi-sample procedures.

- Press the plunger to the second stop and, holding the micropipette vertically, dip the tip into the liquid.
- Release the plunger slowly and in a controlled manner; the volume will be automatically aspirated at the tip.
- To dispense, rest the tip against the inner wall of the container at a steep angle.
- Press the plunger to the first stop to release the aspirated volume. When the plunger is released, it will automatically return to its initial position, ready for the next aspiration.
- It is normal for residual liquid to remain in the tip; this volume is not part of the dispensed volume.
- Repeat steps 2 to 4 as many times as necessary to complete the procedure.

Pipetting of heterogeneous samples

Suppose deproteinisation is to be determined in a blood glucose sample.

- Use the forward aspiration technique to fill the tip with the blood sample. Carefully wipe the outside of the tip with a clean, dry tissue paper, avoiding cross-contamination and ensuring accuracy in the dispensed volume.
- Dip the tip into the reagent or solution and press the plunger to the first stop. Make sure that the tip is well below the surface of the liquid.
- Slowly release the plunger to return it to its initial position. This will allow the tip to fill with solution. Keep the tip in the liquid during this process.
- Press to the first stop and slowly release. Repeat this procedure several times until the inner wall of the tip is clean and free of debris from the original sample.
- Finally, press the plunger all the way down (second stop) to empty the tip completely.
- Once the operation is complete, eject the tip by pressing the eject button. Dispose of the used tip in a suitable container to avoid any contamination.

7. CALIBRATION

The technology of this micropipette allows the user to calibrate the pipette without disassembling any components, disconnecting the digit or having to align the calibration markers with the setting table in the operating manual.

The calibration tool is easy to use and allows the user to perform a quick calibration in the laboratory. If the volume dispensed by the micropipette (measured with an analytical balance) is not within the permissible limits set by ISO 8655 (as stated in the micropipette specifications), the pipette can be calibrated using the calibration tool provided in the box, following the procedure below:

- Take at least 5 measurements of the nominal volume of the micropipette and calculate the weighted average volume, as indicated by an analytical balance.
- Hook the calibration tool onto the plunger and calibration nut, and adjust the digits until the weighted average volume is displayed.
- Once the volume weighted average is displayed on the digital system, remove the calibration tool and store it safely. The micropipette is now recalibrated.
- Adjust the volume back to the nominal volume of the micropipette by turning the plunger.
- Perform some pipetting operations to verify the resulting volume. If the readings on the balance are still outside the permissible limits, repeat the calibration procedure.

8. TECHNICAL SPECIFICATIONS

UltraLite^{FX}

Code	Volume	Inaccuracy		Imprecision	
		± %	± μL	± %	± μL
MGD102	5 μL	2.0	0.10	1.0	0.05
MGD103	10 μL	1.0	0.10	0.5	0.05
MGD104	20 μL	0.8	0.16	0.4	0.08
MGD105	50 μL	0.8	0.40	0.4	0.20
MGD106	100 μL	0.6	0.60	0.2	0.20
MGD107	200 μL	0.6	1.20	0.2	0.40
MGD108	500 μL	0.6	3.00	0.2	1.00
MGD109	1000 μL	0.6	6.00	0.2	2.00
MGD110	2000 μL	0.6	12.0	0.2	4.00

UltraLite^{VR}

Code	Volume	Increments (μL)	Inaccuracy		Imprecision	
			± %	± μL	± %	± μL
MGB101	0.2-2 μL	0.004	2.0	0.04	1.2	0.024
MGB102	0.5-10 μL	0.01	1.0	0.10	0.5	0.05
MGB103	2-20 μL	0.02	0.8	0.16	0.4	0.08
MGB104	5-50 μL	0.04	0.8	0.40	0.4	0.20
MGB105	10-100 μL	0.1	0.6	0.60	0.2	0.20
MGB106	20-200 μL	0.2	0.6	1.20	0.2	0.40
MGB107	100-1000 μL	1.0	0.6	6.00	0.2	2.00
MGB108	0.5-5 mL	4.0	0.6	30.0	0.2	10.0
MGB109	1-10 mL	10.0	0.6	60.0	0.2	20.0

UltraLite Mini

Code	Volume	Inaccuracy		Imprecision	
		± µL	± µL	± µL	± µL
MGD111	5 µL	2.5		1.5	
MGD112	10 µL	1.2		0.8	
MGD113	20 µL	1.0		0.5	
MGD114	25 µL	1.0		0.4	
MGD115	50 µL	1.0		0.4	
MGD116	100 µL	0.8		0.3	
MGD117	200 µL	0.8		0.3	

UltraLite M8

Code	Volume	Increments (µl)	Inaccuracy		Imprecision	
			± %	± µL	± %	± µL
MGG040	0.5-10 µL	0.01	1.6	0.16	1.0	0.01
MGG041	2-20 µL	0.02	0.8	0.16	0.40	0.08
MGG042	5-50 µL	0.04	0.8	0.40	0.40	0.20
MGG043	10-100 µL	0.20	0.8	0.80	0.30	0.30
MGG044	20-200 µL	0.20	0.8	1.60	0.30	0.60
MGG045	40-300 µL	0.40	0.8	2.40	0.30	0.90

UltraLite M12

Code	Volume	Increments (µl)	Inaccuracy		Imprecision	
			± %	± µL	± %	± µL
MGG046	0.5-10 µL	0.01	1.6	0.16	1.0	0.01
MGG047	2-20 µL	0.02	0.8	0.16	0.40	0.08
MGG048	5-50 µL	0.04	0.8	0.40	0.40	0.20
MGG049	10-100 µL	0.20	0.8	0.80	0.30	0.30
MGG050	20-200 µL	0.20	0.8	1.60	0.30	0.60
MGG051	40-300 µL	0.40	0.8	2.40	0.30	0.90

9. MAINTENANCE

- When the micropipette is not in use, be sure to store it in an upright position. We recommend the use of a stand for this purpose.
- The micropipette should be checked at the beginning of each day for dust and dirt on the outer surface. Special attention should be paid to the tip cone.
- No solvents other than 70% ethanol should be used to clean the micropipette.
- If the micropipette is used daily, it should be checked every three months. The maintenance procedure starts with disassembly.

10. DISMANTLING AND ASSEMBLY

DISASSEMBLY FOR FIXED AND VARIABLE VOLUME MICROPIPETTES (from 0.2 μL to 1000 μL)

- Rotate the tip ejector assembly counterclockwise to separate it from the upper housing.



- Rotate the piston assembly counterclockwise to separate it from the tip ejector housing.



- Remove the O-ring seat, turn the tip cone upside down and remove the O-ring.



- Clean the tip cone.
- Grease clean parts with a lubricant, preferably silicone grease

ASSEMBLY FOR FIXED AND VARIABLE VOLUME MICROPIPETTES (from 0.2 μ L to 1000 μ L)

- Place the O-ring on the tip cone and screw on the O-ring seat.



- Place the spring and O-ring seat over the piston and insert it into the tip cone.
- Screw the piston into the tip cone by turning it clockwise.



- Screw the tip ejector assembly clockwise onto the upper housing.

**DISASSEMBLY FOR FIXED AND VARIABLE VOLUME MICROPIPETTES (from 5 mL to 10 mL)**

- Rotate the tip ejector assembly counterclockwise to separate it from the upper housing.



- Turn the tip cone counterclockwise to separate it from the piston.



- Grease the cleaned parts with a lubricant, preferably silicone grease.

ASSEMBLY FOR FIXED AND VARIABLE VOLUME MICROPIPETTES (5 mL to 10 mL)

- Screw the tip cone back onto the piston assembly by turning it clockwise.



- Place the upper and lower ejector housing over the piston assembly and snap them back into place.



- Assemble the ejector housing with the upper housing by turning it clockwise.



DISASSEMBLY FOR MULTICHANNEL MICROPIPETTES

- Hold the micropipette and remove the lower part of the ejector. The tip cone area shall be exposed.



- Unscrew the nut from the tip cone bracket.



- Remove the tip cone assembly. The O-ring and piston will be exposed.



- Grease the tip cone and O-ring with a lubricant, preferably silicone grease.



ASSEMBLY FOR MULTICHANNEL MICROPIPETTES

- Push the plunger to the first stop, position and align the tip cone with the piston assembly. Push the tip cone assembly into the piston assembly.
- Screw the piston and tip cone assembly into the piston bracket.
- Insert the ejector button into the main assembly.

11. EQUIPMENT REQUIREMENTS AND TEST CONDITIONS

Use an analytical balance. The graduation value of the balance must be selected according to the test volume chosen for the micropipette.

The test liquid is distilled or deionised water, grade 3, according to ISO 3696

All tests shall be performed in a draught-free room at a constant temperature ($\pm 0,5^{\circ}\text{C}$) of the water, micropipette and air, within the range of 15°C to 30°C .

The relative humidity must be above 50 %. For volumes below $50\ \mu\text{l}$, the humidity of the air should be as high as possible to minimise evaporation. The use of special accessories, such as evaporation traps, is recommended.

Pipette volume	Scale accuracy
Less than $10\ \mu\text{l}$	0.001 mg
Less than $100\ \mu\text{l}$	0.01 mg
Greater than $100\ \mu\text{l}$	0.1 mg

12. PERFORMANCE OPTIMISATION

Activity	Action
Constant technique	Pipe with a constant rhythm, pressure and speed.
Tip size and fit	Use the right size of tip, firmly placed on the cone.
Pre-rinse of tips	Pre-rinse the tips to improve accuracy.
Sample aspiration	Keep the disposable tip immersed in the liquid during aspiration. Do not let the plunger return abruptly to its initial position.
Depth of immersion	Maintain an immersion depth of 2 to 4 mm.
Viscous samples	Aspirate slowly. If bubbles are observed, re-sample. Volume errors may occur.
Acid samples	Pipetting acidic or corrosive solutions is not recommended. These liquids can damage the piston and seal.
Samples with high vapour pressure	Pipetting liquids with high vapour pressure is not recommended. These liquids can damage the piston and seal.
Sample temperature	Using liquids at a temperature different from that for which the pipette has been calibrated may cause measurement errors.
Storage	Store in an upright position on a stand. Do not lay the pipette on its side with liquid in the tip. Liquid may reach the piston, causing contamination or corrosion.
Piston cleaning	Clean the piston with alcohol and a soft lint-free cloth. Dry and lightly lubricate the piston.
Performance checks	Check the precision and accuracy of the pipette every 3 to 6 months, depending on the use and type of sample aspirated.

13. AUTOCLAVE STERILISATION

Autoclave at 121° C (252° F) at 15 psi for a minimum of 20 minutes, if necessary. After the process, the micropipette must cool down to room temperature for at least two hours.

Before pipetting, make sure that the instrument is completely dry. It is recommended to perform this procedure after each autoclave cycle to maintain maximum precision and accuracy.

14. GOOD PRACTICES AND MISTAKES TO AVOID FOR PRECISE AND ACCURATE MICROPIPETTING

GOOD PRACTICE

Pre-Wet Tips

Pre-wetting micropipette tips with pipetting solutions can improve accuracy by ensuring complete transfer of the desired volume.

Calibrate your pipette regularly

Before starting any pipetting work, make sure that your pipette is correctly calibrated. Regular calibration ensures precision and accuracy in volume measurements.

Correct handling of pipettes

Hold pipettes vertically to avoid air bubbles and ensure accurate volume measurements. Use a smooth, controlled motion when aspirating and dispensing liquids.

Use the correct pipetting technique

Use your dominant hand to operate the pipette while holding it with the other hand. Gently and steadily depress the plunger until the first stop to aspirate the liquid, then slowly release it to dispense.

Keep the pipette upright during aspiration

Keep the pipette in an upright position while aspirating to ensure accurate volume measurements and prevent the formation of air bubbles.

Dispense liquid against the wall of the receiving vessel.

When dispensing liquid, touch the pipette tip against the inner wall of the receiving vessel to minimise liquid retention in the tip and ensure accurate volume delivery.

Clean your pipette every day before use.

Cleaning the pipette with 70% ethanol will help to generate accurate results and avoid pipetting errors.

Use new, high-quality tips

Use new, high-quality tips for every pipetting task to avoid contamination and ensure accuracy.

Inspect pipette tips

Always visually inspect pipette tips for defects or irregularities before use. Damaged tips can lead to inaccurate volume measurements.

Performs pipetting tasks in a sequential manner.

Performs pipetting tasks systematically and sequentially to minimise errors and ensure consistency.

Practice good pipetting etiquette

Label all tubes and plates clearly, record all pipetting steps accurately and maintain a clean and organised workspace to minimise errors and contamination.

ERRORS

Do not over-twist

Do not over-swirl or under-swirl beyond the pipette range. Avoid pipetting volumes outside the specified pipette range to maintain accuracy and prevent damage to the pipette.

Do not contaminate pipette tips.

Avoid touching pipette tips with bare hands or other surfaces to prevent contamination of samples and reagents.

Do not pipette directly from the reagent bottle.

Avoid pipetting directly from the reagent bottle to prevent contamination of the reagent and cross-contamination between samples.

Do not pull out the plunger with force

Avoid rapid pipetting movements that may create air bubbles and lead to inaccurate volume measurements.

Do not hold the pipette with the tip in a horizontal position.

Holding the pipette with the tip in a horizontal position is generally discouraged due to the risk of contamination, air bubble formation and the possibility of liquid retention, which may affect the precision and accuracy of pipetting.

Do not mix different types of liquids

Avoid mixing different types of liquids in the same pipette or tip to prevent contamination and ensure accurate volume measurements.

Do not ignore environmental conditions

Pay attention to environmental conditions, such as temperature and humidity, as they can affect pipetting precision and accuracy.

Don't ignore ergonomics

Make sure you maintain proper ergonomic posture and correct pipetting technique to prevent fatigue and repetitive strain injuries.

Do not reuse disposable tips

Disposable tips are designed for single use only. Reusing them can lead to cross-contamination between samples and compromise the integrity of the results.

Do not ignore safety precautions

Always wear appropriate personal protective equipment (PPE), such as gloves and goggles, when handling potentially hazardous substances.

15. TROUBLESHOOTING

The following table lists possible problems and their solutions.

Problem	Possible cause	Solution
Pipette tip does not fit tightly into the tip cone	The tip is not loaded correctly to maintain the seal.	Replace sealing O-ring.
Leakage of liquid from the pipette tip	The tip is not loaded correctly to maintain the seal.	Make sure that the tip is correctly positioned.
Liquid being pipetted is hot or cold	The temperature of the liquid affects the pipetting accuracy.	Reduce the time the liquid spends in the tip or use the reverse pipetting mode.
The liquid being pipetted is very dense or viscous	The density or viscosity of the liquid may affect aspiration.	Use a reverse pipetting mode if necessary.
Pipette sealing O-ring is worn out	The sealing O-ring has lost its effectiveness.	Replace the pipette sealing O-ring.
Foreign particles between pipette tip and cone	There may be residues that prevent proper sealing.	Clean the tip cone with a lint-free cloth and fit new tips.
Pipette is not within calibration specifications.	The pipette is not calibrated correctly.	Recalibrate the pipette according to the operating manual.
The amount of sample delivered is not accurate	The pipette is not calibrated or there is a technical error.	Check and correct pipetting technique.
Incorrect pipetting technique	Pipetting technique is inadequate, which affects accuracy.	Refer to the instructions for the correct pipetting technique.