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MICROLIT NERO

High Precision Micropipette

Variable and Fixed Volume

Operation Manual

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Product Description

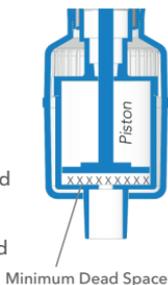
MICROLIT NERO micropipettes are designed with ergonomic and intuitive handling, ensuring high precision with its μ Air™ technology. Built by our in-house team of product design engineers, NERO Micropipettes are available in Single Channel Fixed and Variable Volume ranges.

Product Features

Microlit NERO offers sophisticated features and it is designed to optimize the accuracy and precision during operation.

μ Air™ Technology:

The design of Microlit NERO ensures minimum dead air space between the piston and the liquid in the tip, thereby, reducing air compression and ensuring high precision.



UniCal™ Technology (Patent Pending):



It is a unique calibration tool / mechanism which allows quick in-lab calibration in a single operation Without disengaging the digits from the plunger mechanism.

Easy Volume Adjustment:

The easy rotation mechanism of plunger drives the digital system to set the volume of the instrument comfortably.



Set the volume with perfection:



A soft click at every volume change ensures perfect volume setting and prevents any accidental volume change.

Universal Tipcone:

Our tip-cone is designed to be compatible with most internationally accepted tips, which enhances the compatibility of the instrument in the industry.



Easy tip ejection:

An in-built tip-ejector is designed to eject tips with optimal force.



Raw Materials

Microlit NERO is made of mechanically durable and autoclavable materials. It does not contain any hazardous material.

Micropipette Operation



Variable Volume:

1. Set the delivery volume using the push button on the top of the micropipette. To decrease the delivery volume, turn it clockwise. To increase the delivery volume, turn the push button counter-clockwise.

2. Make sure that the desired delivery volume clicks into place.

3. Do not set a volume that lies outside the micropipette's specified volume range.



Note: Using excessive force to turn the push button outside the range may jam the mechanism and eventually damage the micropipette.

Fixed Volume:

A fixed volume micropipette minimizes the random error as the chances of accidental volume change is nil. The fixed volume allows the user to work at a faster pace.



There is no need to set the volume and the user can directly operate the pipette as per the volume required.

Tip Ejection



The pipette has a tip ejector button which prevents contamination. In order to eject the tip, point the micropipette at a suitable waste receptacle and press the ejector button with your thumb.

Pipetting Technique

General Instructions

1. Press and release the plunger slowly, at all times, particularly when working with high viscosity reagents / solutions.

Make sure that the plunger does not snap.

2. Make sure the tip is firmly attached to the tip cone.

3. Before starting your experiment, fill and empty the tip 2-3 times with the reagent or solution that you will be pipetting.

4. Hold the micropipette in an upright position while aspirating.

The Grippy must rest on your index finger.



5. Make sure that the tips, the micropipette and the reagent/solution are at the same temperature.

Forward Technique:



1. To aspirate the liquid in the tip, press the plunger to the first stop and Immerse the pipette tip vertically in the liquid.

2. Slowly release the plunger while the tip is immersed. The liquid will be aspirated into the pipette tip.

3. To dispense the liquid, place the tip on the inner wall of the receiving vessel at a steep angle.

4. Slowly press the plunger to the first stop to dispense the liquid.

5. To empty the tip completely, press the plunger to the second stop.

6. Wipe the tip on the inner wall while taking the tip out of the vessel.



Reverse Technique:

1. To aspirate the liquid in the tip, press the plunger to the second stop and immerse the pipette tip vertically in the liquid.

2. Slowly release the plunger while the tip is immersed. The liquid will be aspirated into the pipette tip.

3. To dispense the liquid, place the tip on the inner wall of the tube at a steep angle.

4. Slowly press the plunger to the first stop.

5. Wipe the tip on the inner wall while taking the tip out of the vessel.

Note: Residual liquid remains in the tip. This does not belong to the dispense volume.

Repetitive Technique:

The repetitive technique offers a rapid and simple procedure for repeated delivery of the same volume.

1. To aspirate the liquid, press the plunger to the second stop and immerse the pipette tip vertically in the liquid.

2. Slowly release the plunger while the tip is immersed. The liquid will be aspirated into the pipette tip.

3. To dispense the liquid, place the tip on the inner wall of the vessel at a steep angle.

4. Slowly press the plunger to the first stop. Hold the plunger at the first stop.

5. The residual liquid remains in the tip. This does not belong to the dispense volume.

6. Continue pipetting by repeating the steps 2 to 4.

Pipetting of Heterogeneous samples:

Let's assume that we have to determine the deproteinization in blood glucose.

1. Use the forward technique to fill the tip with blood. Wipe the tip carefully with a dry and clean tissue.

2. Immerse the tip into the reagent/solution and press the push button till the first stop. Make sure the tip is well below the surface.

3. Release the push button slowly to let it retract to the ready position. This will fill the tip. Keep the tip in the solution.

4. Press till the first stop and release slowly. Keep repeating this procedure until the interior wall of the tip is clear.

5. Finally, depress the push button all the way to completely empty the tip.

6. Once the operation is complete, make sure to eject the tip by pressing the tip ejector.

Discard the used tip in a bin to avoid any contamination.



Calibration

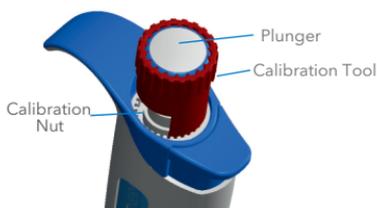
Microlit NERO features UniCal™ Technology, which allows the user to calibrate the pipette without disassembling any component of the pipette or digit disengagement or without matching the calibration markers with the adjustment chart in the operation manual.

The calibration tool is easy to use and enables the user for quick in-lab calibration.

If the dispensed volume of the micropipette (as read by an analytical balance) is not within permissible ISO 8655 limits (as given in *Micropipette Specifications*).

The pipette can be calibrated using the calibration tool provided in the box by following the procedure below:

1. Perform at least 5 measurements on the nominal volume of the pipette and calculate the average weighted volume as displayed by an analytical balance.
2. Engage the calibration tool with the plunger and the calibration nut and adjust the digits to display the average weighted volume.
3. Once the average weighted volume is displayed on the digital system, remove the calibration tool and store it safely. The pipette has now been recalibrated.



4. Adjust the volume back to the nominal volume of the pipette by rotating the plunger.

5. Perform a few pipetting operations to check the resulting volume. If the readings on the balance are still outside permissible limits, please perform the calibration procedure again.

Micropipette Specifications

Single Channel Variable Volume Micropipettes

The Single Channel Variable Volume

Micropipette is available in 9 unique volume ranges from 0.2 ul to 10 ml.

Model	Volume Range	Inc μ l	A		CV	
			$\pm\%$	$\pm\mu$ l	$\pm\%$	$\pm\mu$ l
NRO-2	0.2-2.0 μ l	0.01	2	0.04	1.2	0.024
NRO-10	0.5-10 μ l	0.05	1	0.1	0.5	0.05
NRO-20	2-20 μ l	0.1	0.8	0.16	0.4	0.08
NRO-50	5-50 μ l	0.2	0.8	0.4	0.4	0.2
NRO-100	10-100 μ l	0.5	0.6	0.6	0.2	0.2
NRO-200	20-200 μ l	1.0	0.6	1.2	0.2	0.4
NRO-1000	100-1000 μ l	5.0	0.6	6	0.2	2
NRO-5000	0.5-5 ml	20.0	0.6	30	0.2	10
NRO-10000	1-10 ml	50.0	0.6	60	0.2	20

Single Channel Fixed Volume Micropipettes

The Single Channel Fixed Volume Micropipette is available in 15 unique volume ranges from 1.0 ul to 10 ml.

Model	Volume (μ l)	A		CV	
		$\pm\%$	$\pm\mu$ l	$\pm\%$	$\pm\mu$ l
NRO-F-1	1.0	5	0.05	5	0.05
NRO-F-2	2.0	4	0.08	2	0.04
NRO-F-5	5.0	2	0.1	1	0.05
NRO-F-10	10.0	1	0.1	0.5	0.05
NRO-F-20	20.0	0.8	0.16	0.4	0.08
NRO-F-25	25.0	0.8	0.2	0.4	0.1
NRO-F-50	50.0	0.8	0.4	0.4	0.2
NRO-F-100	100.0	0.6	0.6	0.2	0.2
NRO-F-200	200.0	0.6	1.2	0.2	0.4
NRO-F-250	250.0	0.6	1.5	0.2	0.5
NRO-F-500	500.0	0.6	3	0.2	1
NRO-F-1000	1000.0	0.6	6	0.2	2
NRO-F-2000	2000.0	0.6	12	0.2	4
NRO-F-5000	5000.0	0.6	30	0.2	10
NRO-F-10000	10000.0	0.4	40	0.2	20

Error Calculation

Inaccuracy (Systematic Error):

Inaccuracy is the difference between the dispensed volume and the selected volume of a pipette.
 $A = \bar{V} - V_0$

where,

A = Accuracy

\bar{V} = Mean Volume

V_0 = Nominal Volume

Inaccuracy can be expressed as a relative value:

$$A\% = 100\% \times A/V_0$$

Imprecision (random error):

Imprecision refers to the repeatability of the pipetting. It is expressed as the standard deviation (S) of coefficient of variation (CV).

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

where,

S = Standard Deviation

\bar{V} = Mean Volume

n = Number of measurement

Reproducibility or coefficient of variation (CV) can be expressed as:

$$CV = 100\% \times S / \bar{V}$$

Maintenance

When the micropipette is not in use, make sure that it is stored in an upright position. We recommend a stand for this purpose.

Short Term Service

The micropipette must be checked at the beginning of each day for dust and dirt on the outer surface. Particular attention must be paid to the Tip Cone.

No other solvents except 70% ethanol must be used to clean the micropipette.

Long Term Service

If micropipette is used daily, it must be checked every three months.

The servicing procedure starts with its disassembly.

Disassembly & Re-assembly of Micropipette

A1. Disassembly:

(For single channel variable volume and fixed volume 0.2 μ l to 1000 μ l)

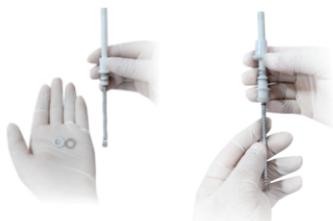
Step 1: Rotate the tip ejector assembly counter-clockwise to separate it from the upper housing.



Step 2: Rotate the piston assembly counter-clockwise to separate the piston from the tip ejector housing.



Step 3: Pull out the o-ring seat and turn the tip cone upside down and retrieve the o-ring.



Step 4: Clean the tip cone

Step 5: Grease the cleaned parts with a lubricant, preferably silicon grease.

A2. Reassembly:

(For single channel variable volume and fixed volume 5 ml and 10 ml)

Step 1: Place the o-ring in the tip cone and screw the o-ring seat.



Step 2: Place the spring and the o-ring seat on the piston and place it inside the tip cone.

Step 3: Screw the piston clockwise in the tip cone.



Step 4: Screw the tip ejector assembly in the clockwise direction to the upper housing.



B1. Disassembly:

(For single channel variable volume and fixed volume 5 ml and 10 ml)

Step 1: Rotate the tip ejector assembly counter-clockwise to separate it from the upper housing.



Step 2: Pull the lower ejector housing to separate it from the upper ejector housing.



Step 3: Rotate the tip cone in the counter-clockwise direction to separate it from the piston.

Step 4: Grease the cleaned parts with a lubricant, preferably Silicon grease.

B2. Reassembly:

(For single channel variable volume and fixed volume 5 ml and 10 ml)

Step 1: Screwback the tip cone to the piston assembly by rotating it in the clockwise direction.



Step 2: Place the upper ejector housing and the lower ejector housing on the piston assembly and snap them back into place.



Step 3: Assemble the ejector housing to the upper housing by rotating in the clockwise direction.



Device Requirements and Test Conditions

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

Readable Volume Range

Pipette Graduation	Balance Graduation
under 10 μl	0.001 mg
under 100 μl	0.01 mg
Above 100 μl	0.1 mg

The test liquid water is distilled or deionized "grade 3" water, conforming to ISO 3696. All the tests are done in a draft-free room at a constant ($\pm 0.5^{\circ}\text{C}$) temperature of water pipette and air between 15°C to 30°C . The relative humidity must be above 50%. For volumes under 50 μl , the air humidity must be as high as possible to reduce the effect of evaporation. Special accessories, such as the evaporation trap, are recommended.

Performance Optimization

Activity	Action
Consistent Technique	Pipette with a consistent rhythm, pressure and speed.
Tip Size and Fit	Use proper size tip, firmly placed on Tip Cone.
Pre-rinse Tips	Pre-rinse pipette tips for improved precision.
Sample Aspiration	Keep the disposable tip immersed in fluid during aspiration. Do not let the plunger snap back to starting position.
Immersion Depth	Maintain an immersion depth of 2 to 4 mm.
Viscous Samples	Aspirate slowly. If bubbles are observed, resample. Volume errors may still occur. Refer to the Calibration section.
Acid Samples	Pipetting strong acids and corrosive solutions is not recommended. These liquids may damage the piston and seal.
High Vapor Pressure Samples	Pipetting solutions with high vapor pressure is not recommended. These liquids may damage the piston and seal.
Sample Temperature	Fluids at a temperature other than that for which the pipette and pipette tips have been calibrated may result in volume measurement errors.
Storage	Store upright in stand. Do not lay the pipette on its side with fluid in the tip. Fluid reaching the piston causes contamination and possible corrosion.
Cleaning Piston	Wipe piston with alcohol and a soft, lint-free cloth. Dry and lightly lubricate the piston.
Performance Checks	Check the accuracy and precision of your pipette every 3-6 months depending on use and the samples aspirated.

Autoclaving

- The micropipettes can be sterilized by autoclaving them at 121°C (252°F) at 15 psi for a minimum of 20 minutes.
- No special preparation is needed.
- You may use steam sterilization bags if needed. After autoclaving, the micropipette must be cooled to room temperature for at least two hours. Before pipetting, make sure that the instrument is dry.
- We recommend that you check the calibration after every autoclave cycle to achieve the best possible precision and accuracy.

Troubleshooting

The table below lists possible problems and their solutions.

Problem	Possible Reason	Proposed Action
Liquid is leaking from pipette tip.	Pipette tip does not fit properly onto the tip cone.	Use the appropriate tip for exact tip fitment.
	Liquid being pipetted is hot or cold. Liquid being pipetted is very dense or viscous.	Shorten the amount of time the liquid is in the tip, or the possible solution is to use the reverse mode of pipetting.
	Pipette sealing O ring is worn.	Replace the sealing O ring.
	Tip is not loaded to maintain the seal.	Press on tip more firmly. (Avoid using too much force and over inserting the tip)
	Foreign particles between tip and Tip Cone.	Clean the Tip Cone with a lint free cloth and attach new tips.
Amount of sample delivered is not accurate.	Pipette is not within calibration specifications.	Re-calibrate the pipette as per the operation Manual.
	Improper pipette technique.	Refer pipetting technique.

Package

The micropipettes are shipped in specially designed packages containing the following items.

The Micropipette



Calibration Tool



Tip Sample



Calibration Certificate



Shelf Hanger



Operation Manual



Caution

The micropipettes are designed to allow easy in-lab service. If you would prefer to have us or your local representative service your instrument, please make sure it has been decontaminated before you send it to us.

Please note that the postal authorities in your country may prohibit or restrict the shipment of contaminated material by mail.