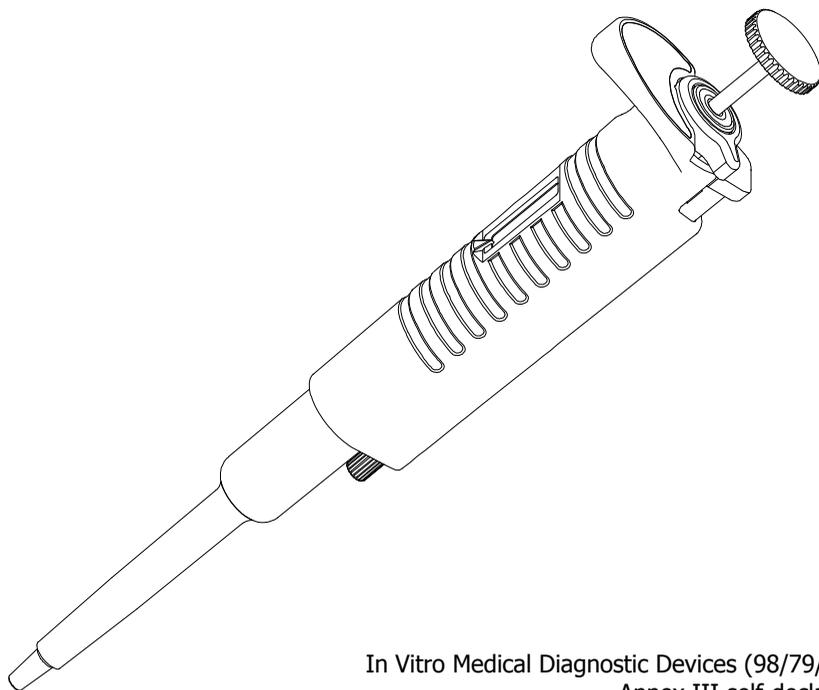


Autoclavable & UV Resistant

Nichipet EX Plus II

Digital micro pipette for liquid handling

User's Manual



In Vitro Medical Diagnostic Devices (98/79/EC)
Annex III self-declared
ISO 8655 STANDARD

CERTIFIED ISO9001



Thank you very much for purchasing Nichipet EX Plus II.
Please read this manual carefully before using this device.

Safety Precautions

- Please read this manual carefully and have sufficient understanding of the contents and instructions, especially concerning matters of safety, prior to use.
- The notes stated here is for the safety of the user, and for the correct usage of the product.
- Contents marked with  "Danger Level Symbols" are matters that require the user's utmost attention, not only for using Nichipet EX Plus II properly, but also to prevent users from injuries or death, harm to others, and/or property damage.
- After reading this manual, please keep it in a noticeable and accessible place for 'users of the device' to refer to at any time.

Danger Levels

 DANGER	Will lead to serious injuries or death.
 WARNING	May lead to severe injuries or death.
 CAUTION	May lead to light to moderate injuries, and/or cause property damage.
	User information

Caution on disposal of this product

When disposing the pipette body and tips (including adhering liquid), please comply with the laws and regulations of each country related to disposal, or local ordinance or regulation.

Autoclavable & UV resistant
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1. Product overview

1.1 Features

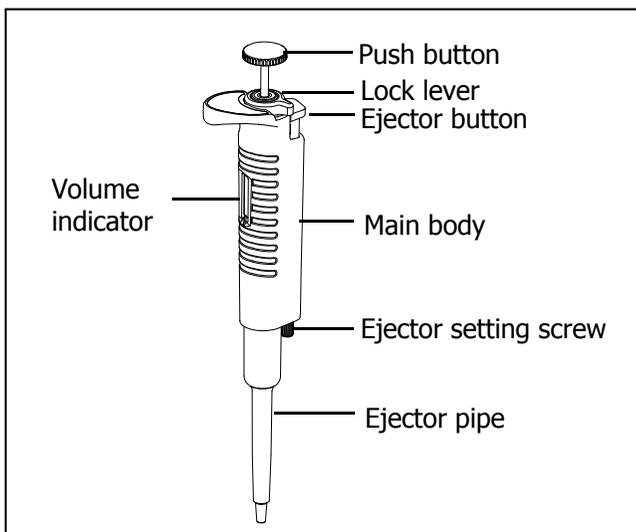
- Nichipet EX Plus II is fully autoclavable at the condition of 121°C for 20 minutes.
- An O-ring made of perfluoro rubber is used in the airtight compartment, which gives this device excellent thermal and chemical resistance, and organic solvent compatibility.
- Nichipet EX Plus II is made of UV resistant materials, thus it can be used in a clean bench environment.
- When Nichipet EX Plus II is exposed to UV light for a considerable length of time, it may become discolored, but its performance will not be affected.
- The newly designed curvature and roundness in shape is ergonomic, and mitigates the user's fatigue and stress levels from long periods of use.
- Easy to read digital indicator.
- The sample volume can easily be set by simply rotating the push button.
- Setting the sample volume can easily be locked on with the one-touch lock mechanism.
- A wide range of sampling volume can be covered by eight models, from 0.1μL to 10,000μL.
- Patented body construction shields the hand temperature permeating through the body and inner workings of the device, which increases the accuracy of the volume measurements.
- Since highly durable PTFE (Fluoroplastic) is used in the product, long lasting accuracy and precision is maintained.
- A thin nozzle tip can be easily inserted, and can reach the bottom of universal test tubes (110mm in depth) for aspiration and dispensing of liquid. (2μL – 1000μL)
- The tip can be removed without direct contact, by simply pressing the tip ejector.

1.2 Standard accessories (Included)

Accessories	QTY
Tip (2μL/10μL/20μL/100μL/200μL/1000μL)	3
Tip (5000μL/10000μL)	1
Nozzle filter (1000μL/5000μL/10000μL)	3
Nozzle filter remover(1000μL/5000μL/10000μL)	1
Adjustment tool	1
User's Manual	1

When unboxing the package, check that all of the items above are included for the respective model.

1.3 Main illustration



2. Information on Safety

2.1 Intended Use

Nichipet EX Plus II, used in conjunction with pipette tips recommended by Nichiryō, are designed and constructed for low-contamination transfer of liquids, especially for samples from the human body and for reagents within the scope of an in-vitro diagnostic application in order to allow the in-vitro diagnostic medical device to be used as intended.

Therefore, Nichipet EX Plus II is subjected to the accessories of in-vitro diagnostic medical devices under Directive 98/79/EC. The accessories is treated as in vitro diagnostic medical devices in their own right under Directive 98/79/EC.

Nichipet EX Plus II are intended for operation by qualified staff.

2.2 Warnings for intended use

DANGER

- ✓ When handling radioactive substances or infectious substances, always check and confirm the information first, and follow guidelines on their safety procedures.
- ✓ When using harmful liquids to the human body, be very careful in the handling of the substances.
- ✓ Never touch or come into direct contact with the used chips.
- ✓ Never touch filters directly that are contaminated by harmful or toxic substances.
- ✓ When liquids that are harmful to the human body adheres and/or contamination occurs, use appropriate measures to clean and decontaminate the device before continuing its use.
- ✓ This product is not intended for use on living organisms.
- ✓ Do not eject the tip with liquid inside of it.
- ✓ Do not eject the tip towards anybody.
- ✓ Do not expel or dispense any liquids towards anybody.
- ✓ Depending on the splashed liquid, there is danger of causing injuries to the human body.

 **WARNING**

- ✓ Please protect yourself in accordance with the general procedure of danger prevention, such as wearing protective clothing, protective glasses and gloves.
-

 **CAUTION**

- ✓ Do not use the pipette for any other purpose, use only for pipetting and liquid dispensing.
 - ✓ Do not modify the pipette, modification can lead to accidents.
 - ✓ Do not stab the tip into the human body, or eject the tip towards anyone. The tip is very sharp and extremely dangerous.
 - ✓ The filter replacement tool tip is very sharp and can be dangerous. Please handle it with caution.
 - ✓ Since the main body of the pipette becomes extremely hot right after autoclaving and drying. In this state, please do not touch it directly with your hands. It can lead to accidents and burn injury.
 - ✓ Do not use the pipette for any purpose other than pipetting and liquid dispensing, such as stirring liquid with this product. It can lead to loosening of the tip, the tip dropping off, liquid adhesion and contamination to the main unit of the device and accidents and/or injury.
 - ✓ During operation and maintenance, if any worn, missing or broken parts are detected, discontinue use immediately. Order and replace the part or parts, before use.
-

2.3 Material information

 **CAUTION**

- ✓ The use of highly reactive chemicals may damage the device. Please acknowledge the following materials that are used, and do not use liquids that will violate them.

Material of external parts

- Polypropylene (PP)
 - Polyetherimide (PEI)
 - modified- Polyphenyleneether (m-PPE)
 - Polyetheretherketone (PEEK)
 - PolyVinylidene DiFuloride (PVDF)
 - Prefluoro rubber (FFKM)
 - Stainless steel
 - Aluminum alloy
 - Alumina
-

3. Operation/Operating procedure



- ✓ **Users of the device are required to strictly observe the following in order for the pipette to keep its excellent accuracy, precision and original performance.**
 - ✓ Do not expose pipette to direct sunlight when using it, or for 2 hours prior to use, otherwise the pipette may lose its accuracy. Avoid working with pipettes in a high temperature, low temperature, low humidity environment, or when the temperature difference between the environment including the main body of the device and the liquid is large, accuracy and precision may not be guaranteed.
 - ✓ This Pipette can be used in a stable environment between +4°C and +40°C, but the specifications may vary.
 - ✓ Just prior to use, avoid touching the tip or nozzle cylinder as much as possible. If they are warmed up, accuracy may not be obtained.
 - ✓ Original Nichiryo tips are recommended. Nichipet EX Plus II is calibrated with the original Nichiryo tip, if you use other tips, deviations in original factory settings may occur, and accuracy will not be guaranteed.
 - ✓ Depending on the frequency of use, the pipette should be cleaned and the airtight chamber should be maintained according to the manual.
-

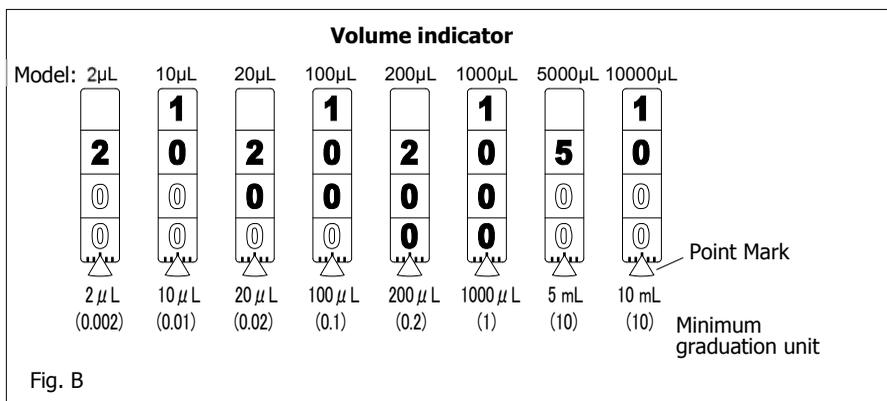
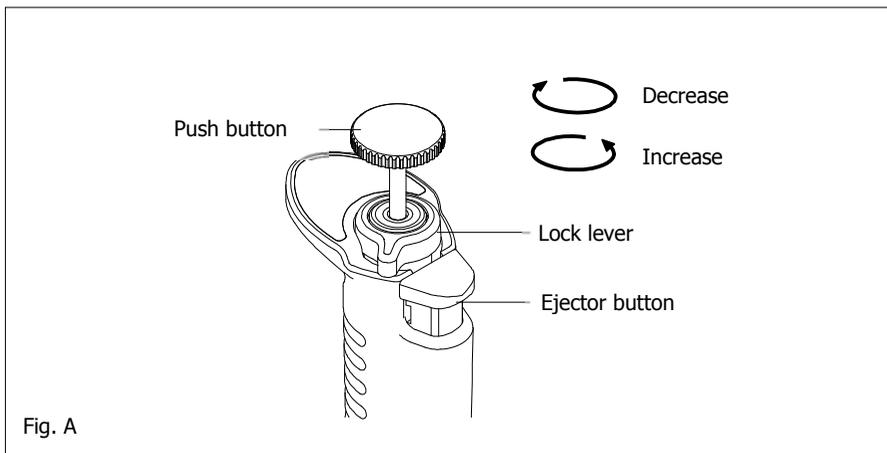
3.1 Volume setting

- 1) Turn the lock lever to the unlocking direction to loosen it (Fig. A).
 - 2) Turn the push button to set the volume indicator to a desired liquid volume.
When setting the liquid volume, set the indicator's minimum graduation scale to the triangle point marker in the lower part of the volume indicator (Fig. B). Please refer to the volume indicator and the minimum graduation unit for each model to set the measurement volume accordingly. The volume indicator numbers are colored in black, or in red, to indicate the position of the decimal point. Black indicates the integer, red indicates the decimal. For models 2uL, 10uL, 20uL, 100uL, 200uL, 1000uL scale units are in (μL), for models 5000uL, 10000uL scale units are in (mL).
 - 3) To increase the volume setting, turn the push button till it passes the designated volume setting by at least half a rotation of the push button dial, and then dial back to set the designated volume.
 - 4) To decrease the volume setting, simply turn it to the designated volume directly.
 - 5) After setting the liquid volume, turn the lock lever to the locking position to lock it (Fig. A).
-



CAUTION

- ✓ Do not exceed the specified liquid volume limit, otherwise the pipette may be damaged or deteriorate in its quality.
-



3.2 Aspiration of liquid (Forward technique)

- 1) Attach a new tip to the nozzle end.



- ✓ It is recommended that tips are directly picked up from the rack. Do not twist the pipette when fixing tip on.
- ✓ Please be sure to mount the tip on the main nozzle securely. Failure to do so may cause the tip to drop off and liquid to splash.

CAUTION

- ✓ Do not perform pipetting with less liquid than the set volume. If the quantity of liquid is less than the set volume, it may cause the liquid to spray into the main body, and the pipette may be damaged or deteriorate in its quality.

- 2) Press down the push button fully to the first stop position "b". (Fig. C) – ①

- 3) Hold the pipette vertically and immerse the tip 2mm. to 3mm. below the surface of the liquid (Fig. D) - ①.
- 4) To aspirate the set volume of liquid into the tip, release the push button slowly and let the push button go back to the initial position naturally. It takes 1 second (up to 3 seconds for a volume of 5000 μ L, 10000 μ L) to aspirate the liquid. During this operation, stop to wait for the suction process of the liquid to be totally completed, making sure that the liquid is drawn up into the tip with certainty (Fig. D) -②.
- 5) Draw the tip of the pipette carefully vertically upward and away from the liquid surface, then touch the tip to the side of the tube to remove excess droplet adhering to the outside of the tip (Fig. D) - ③.

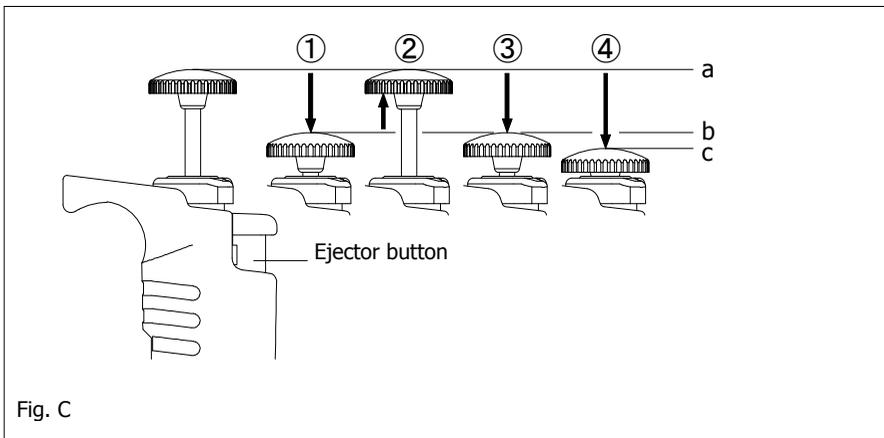


Fig. C

- ✓ Do not aspirate when the push button is at 'position ④' (Fig. C).
- ✓ We recommend using the forward technique as the operation method of this device for pipetting. Nichipet EX Plus II has been calibrated with the forward method, and precision may not be obtained when dispensing by any other means.
- ✓ Always change the tip when using different liquids to avoid cross-contamination.

⚠ CAUTION

- ✓ Please operate the push button slowly and gently. Sudden release of the push button, can lead to the aspiration of the liquid into the nozzle cylinder; not only precise accuracy will not be obtained, but also the quality of the device will be impaired. Due to the larger base volume measurements of models, 1000 μ L, 5000 μ L and 10000 μ L, there is a higher chance of the above to occur. To eliminate this possible situation that leads to inaccuracy, precision failure or contamination, filters (Sold separately.) are included in the package.
- ✓ We highly recommend that the 'Filter' is used and regularly replaced in due intervals. (Please order and replace the filters of the respective models when needed.)
- ✓ When using the pipette, be sure to always attach and use a tip. Failure to do so, will lead to liquid entering the inside of the device's nozzle cylinder and cause serious malfunctions
- ✓ Never turn the device sideways or upside down with liquid in the tip. Liquid can enter inside the device's nozzle cylinder, which can cause *contamination and breakdown.

*Cross-contamination with the entered liquid remaining inside the main body and/or nozzle cylinder of the device can also occur, when switching liquids thereafter.

3.3 Dispensing the liquid

- 1) Touch the end of the tip against the inside wall of the recipient tube at a slight angle.
- 2) Press the push button down slowly and smoothly to the first stop "position b".
Wait for a second, then press the push button down to the second stop "position c" to expel the last droplet of liquid from the tip (Fig. D) - 4 and 5.
- 3) Keep the push button compressed. Remove the last droplet by slightly touching and running the end of the tip up against the inner wall of the tube, then move the tip of the pipette vertically straight up and out of the tube.
- 4) Press the ejector button to detach the tip to dispose (Fig. D) – 6.



- ✓ We recommend the tip to be disposed of after each use.
Repeated use may lead to and result in; loss of accuracy, precision, and may lead to contamination/cross-contamination due to adhesion and deposits from prior use.

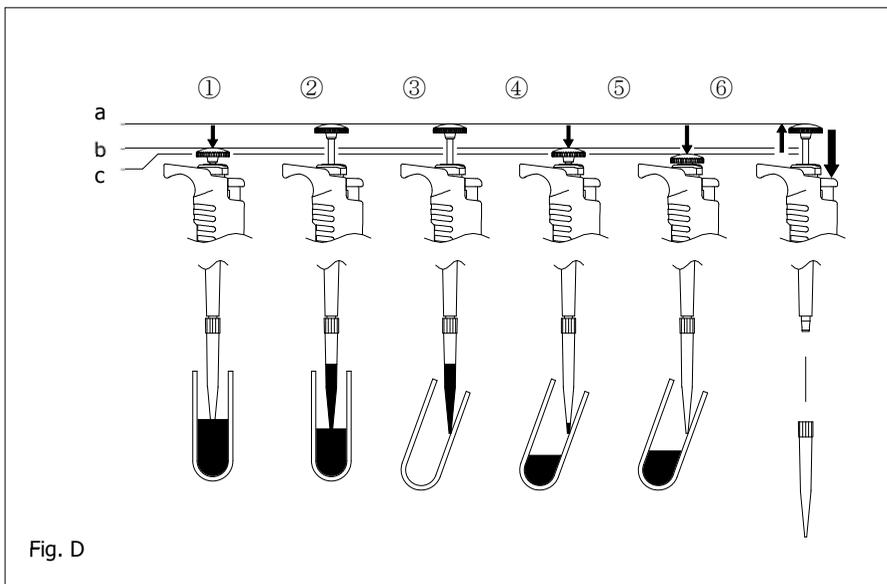


Fig. D

3.4 Recommendation for accurate pipetting (Technique)

In addition to the previously mentioned operations of pipetting, the following technique maximizes the performance of the pipette.

1) **Pre-Rinsing the tip**

Higher precision can be obtained by performing the pre-rinsing of the tip. When using a fresh pipette tip for the first time and before sampling, it is important to pre-rinse the tip at least two to three times with the target solution before pipetting. Repeat the aspiration and discharge to the position of the 1st stop consecutively for two to three times (Fig. E) – b.

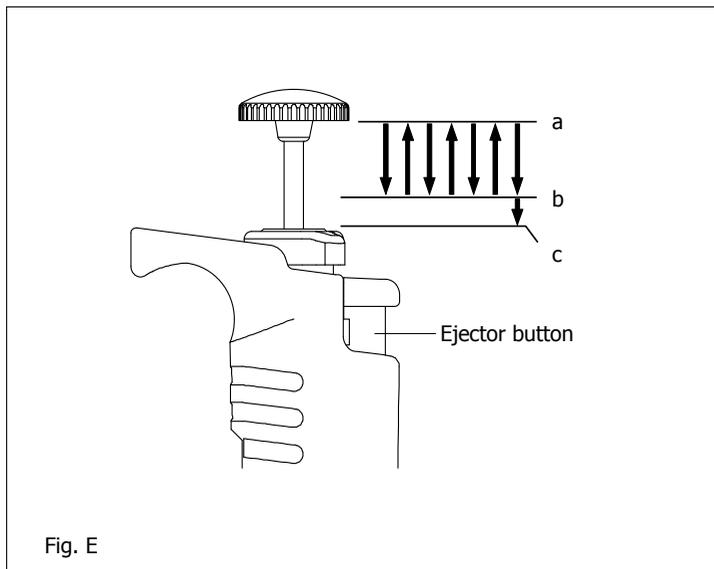
When strict precision is required, this method is recommended for all kinds of liquid handling. Pre-rinsing is a fast and easy way to increase the accuracy.

2) **Handling of High Density Solutions / Viscous Solutions**

After aspirating the liquid into the tip, wait for 2 to 3 seconds before removing the tip slowly from the surface of the liquid. When dispensing, wait 2 to 3 seconds at the first stop position before pushing into the second stop position (Fig. E) – c.

3) **Small volume dispensing**

Especially for volumes less than 50 μ L, please operate the pipette slowly and smoothly. Also, please pay close attention to the effect of evaporation loss, due to temperature and humidity.



4. Maintenance

4.1 Cleaning

When Nichipet EX Plus II's exterior is soiled, please use 70% ethanol on a clean soft cloth to wipe it off.

Also, if any symptom that is described in the "7. Troubleshooting" section occurs, disassemble and inspect the device (each part), and then check and follow the procedures in the 'Troubleshooting Table' to identify and isolate, correct and/or fix the situation or problem.

CAUTION

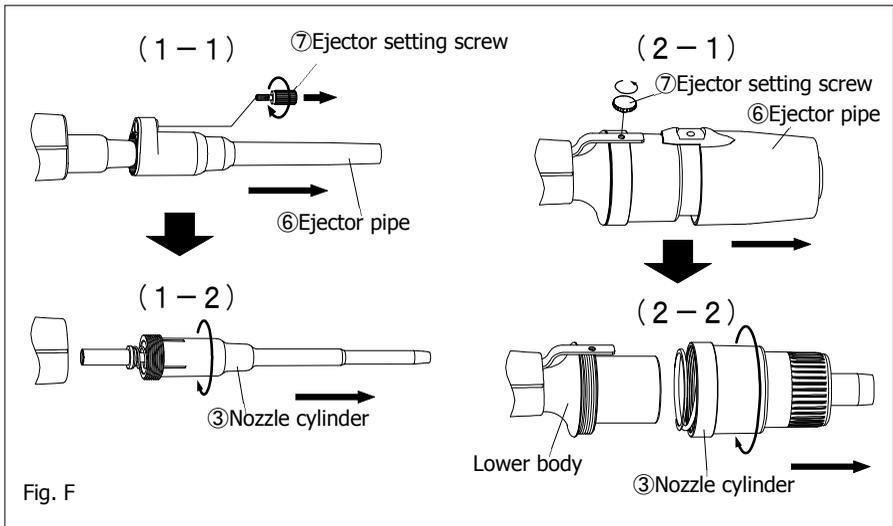
- ✓ Use of highly reactive liquids, may damage the device.
After using a highly reactive liquid or/and if contamination occurs, perform the disassembly and cleaning of the device, accordingly to the following method in this manual.



- ✓ In order to keep and use Nichipet EX Plus II in its best condition, we recommend the user carries out; periodic checks and maintenance, and volume inspection/calibration of the device.

4.2 Disassembling

- 1) Turn counterclockwise to loosen and remove the ejector setting screw.
(6 Models) - 2 μ L to 1000 μ L (Fig. F) - (1-1)
Turn the ejector setting screw counterclockwise to remove it, and then carefully pull out the ejector pipe, straight in the direction of the horizontal arrow.
(2 Models) - 5000 μ L and 10000 μ L (Fig. F) - (2-1)
- 2) · 6 Models ranging from 2 μ L to 1000 μ L (Fig. F) - (1-2)
The nozzle cylinder (Outer threading) screws into the main body.



Circled Numbers in (Fig. F) corresponds to Parts Numbers in the replacement parts list.

- For the 2 models: 5000 μ L and 10000 μ L (Fig. F) - (2-2)
The nozzle cylinder is threaded onto the lower body. (Inner threading.)
Note the differences in design; turn counterclockwise to remove the nozzle cylinder.

 CAUTION

- ✓ When removing the nozzle cylinder, the internal parts may spring out and apart from the reaction of the loaded spring inside, be mindful of this point, and take precautions when unscrewing and taking apart the nozzle cylinder.

-
- 3) Disassemble the internal parts as shown in; (Fig. G1) for Models: 2 μ L, 10 μ L and 20 μ L, (Fig. G2) for Models: 100 μ L and 200 μ L, and (Fig. G3) for the Model: 1000 μ L.
- For Models: 2 μ L and 10 μ L, remove the plunger, 1st spring, O-ring retainer in the correct and stated order. The O-ring and the seal ring cannot be detached. They are press-fitted and built into the structure as an integral part of the nozzle cylinder. Please take out only the 1st spring and the O-ring retainer.
 - For Models: 20 μ L, 100 μ L, 200 μ L and 1000 μ L, remove the plunger, 1st spring, O-ring retainer, O-ring, and the seal ring in the nozzle cylinder in the correct and stated order.
 - For Models: 5000 μ L: (Fig. G4) and 10000 μ L (Fig. G5), remove the seal spring, O-ring retainer, O-ring and seal ring in the nozzle cylinder.

Please be careful not to lose any small parts during disassembly.

-
-  ✓ Depending on the Model, the specification of the O-ring retainer will be different.

4.3 Reassembling

- 1) Reassembling the nozzle cylinder
- For models: 2 μ L, 10 μ L, 20 μ L (Fig. G1), 100 μ L and 200 μ L (Fig. G2), 1000 μ L (Fig. G3)
First, attach the 1st spring onto the plunger, set the O-ring retainer, seal ring and O-ring in order and correctly intact. Then, insert the assembly into the nozzle cylinder and screw it clockwise into the main body.
However, for Models: 2 μ L and 10 μ L, the O-ring and seal ring cannot be detached. They are press-fitted and built into the structure as an integral part of the nozzle cylinder. Please reassemble with; only the 1st spring and O-ring retainer.
 - For Models: 5000 μ L (Fig. G4) and 10000 μ L (Fig. G5)
Set the volume setting below 30% of the maximum volume. (This moves the plunger forward/out.)
Assemble together the seal ring, the O-ring and the O-ring retainer, and place the seal spring on top (Fig. H) - (1).
Place the assembly and seal spring up on a flat surface, and insert the plunger into the seal spring until the O-ring is fully inserted.
Take extreme caution not to deform or damage the seal ring, when inserting the assembly into and onto the plunger. (Fig. H-(2)).
Put the nozzle cylinder over the plunger with the seal spring, the seal ring, the O-ring retainer and O-ring in order and correctly intact, and screw the nozzle cylinder clockwise onto the lower body securely (Fig. H-(3)).



- ✓ For Models: 1000 μ L, 5000 μ L, 10000 μ L, securely set the seal ring and O-ring to the O-ring retainer. If set in an uneven and unseated state, liquid leakage will occur.
 - ✓ When screwing the nozzle cylinder into/onto the main body, hold the parts vertically as a visual reference, and slowly turn to let the threads bite together correctly. If screwed in an offset way or with force, the O-ring will be unseated, stripping of the threads and/or damage to the casing can occur, all of which, will cause leakage.
 - ✓ When reassembling, be careful not to assemble the seal ring and O-ring in the wrong order or direction. Failure to do so, may cause not only air and/or liquid leakage, but also inaccuracy, failure in extracting liquid and/or contamination.
-

2) Fitting the ejector pipe to the main body.

- Models: 2 μ L, 10 μ L, 20 μ L (Fig G1), 100 μ L and 200 μ L (Fig. G2), 1000 μ L (Fig. G3)
Press the ejector button down with your thumb to help meet and align with the position to secure, insert the ejector pipe onto the body and secure it with the ejector setting screw. If resistance is felt when ejecting, jiggle the ejector pipe back and forth very slightly, to give it better alignment, response and action (Fig. J).

After reassembling, perform several tests to inspect the pipette's function/reliability.

2 μ L / 10 μ L / 20 μ L

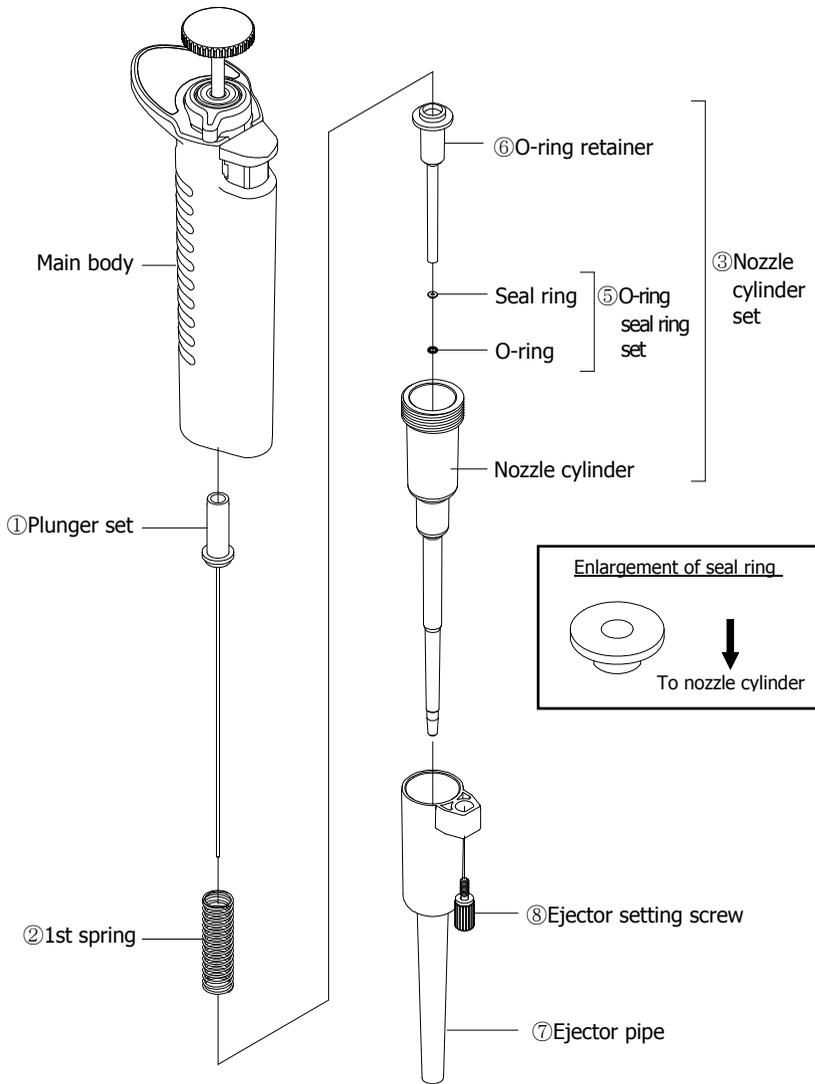


Fig. G1

Circled Numbers in (Fig. G1) corresponds to Parts Numbers in the replacement parts list.

100 μ L / 200 μ L

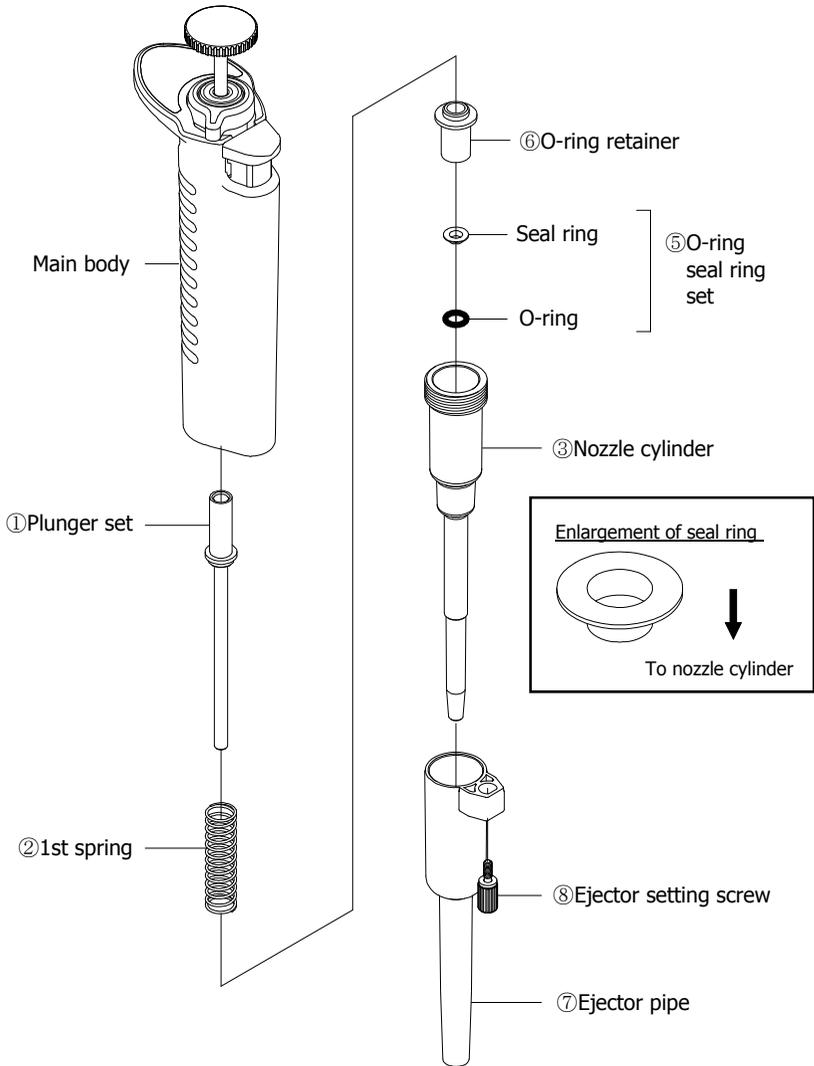


Fig. G2

Circled Numbers in (Fig. G2) corresponds to Parts Numbers in the replacement parts list.

1000 μ L

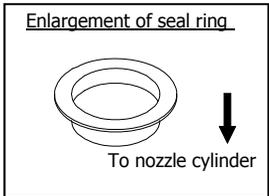
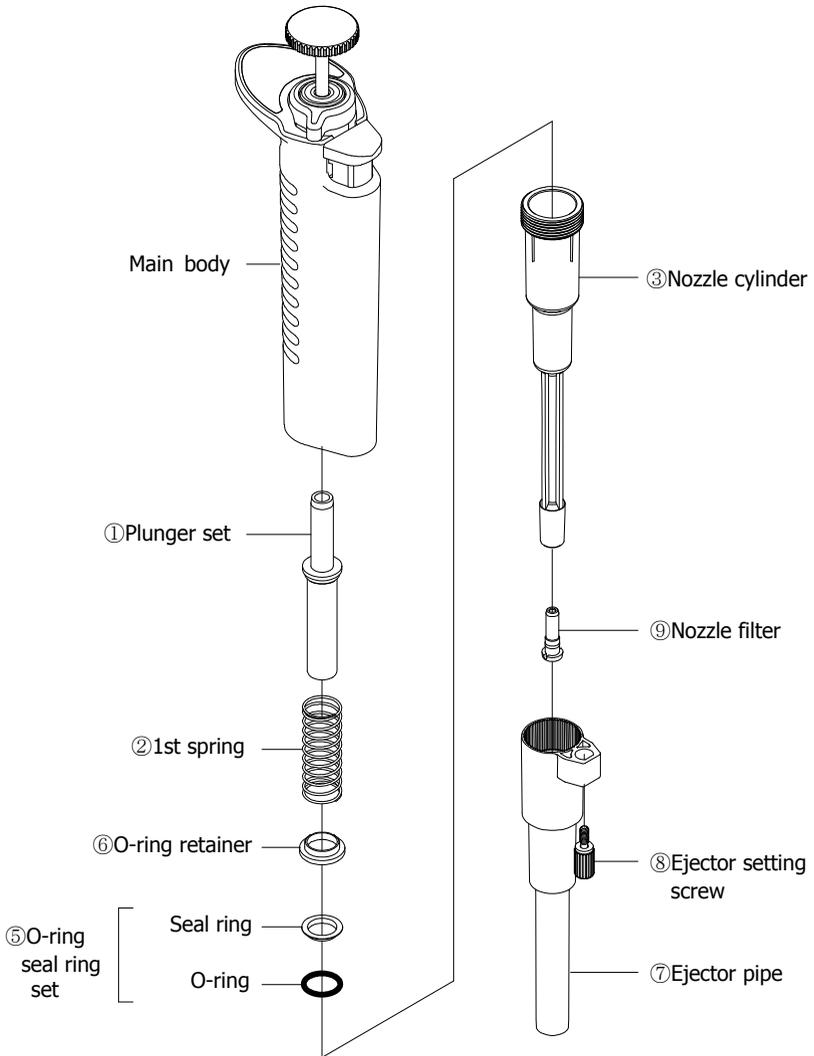


Fig. G3

Circled Numbers in (Fig. G3) corresponds to Parts Numbers in the replacement parts list.

5000 μ L

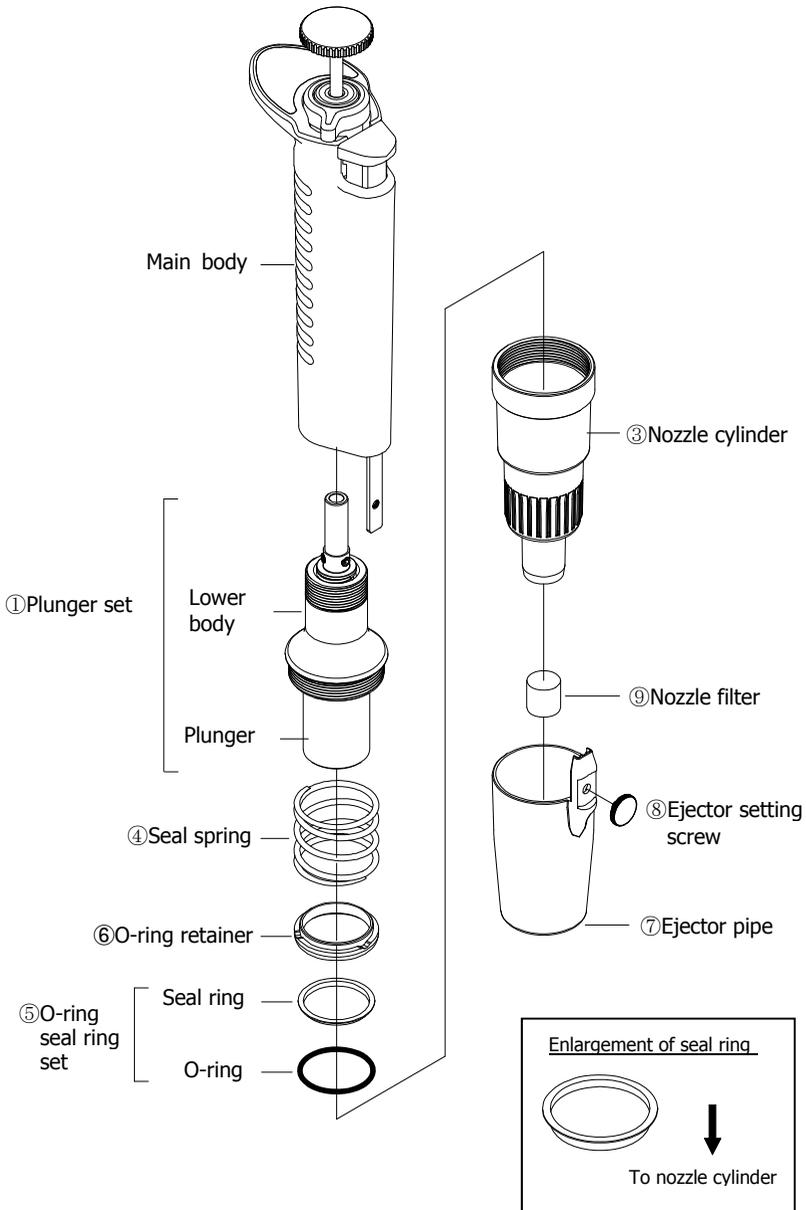


Fig. G4

Circled Numbers in (Fig. G4) corresponds to Parts Numbers in the replacement parts list.

10000 μ L

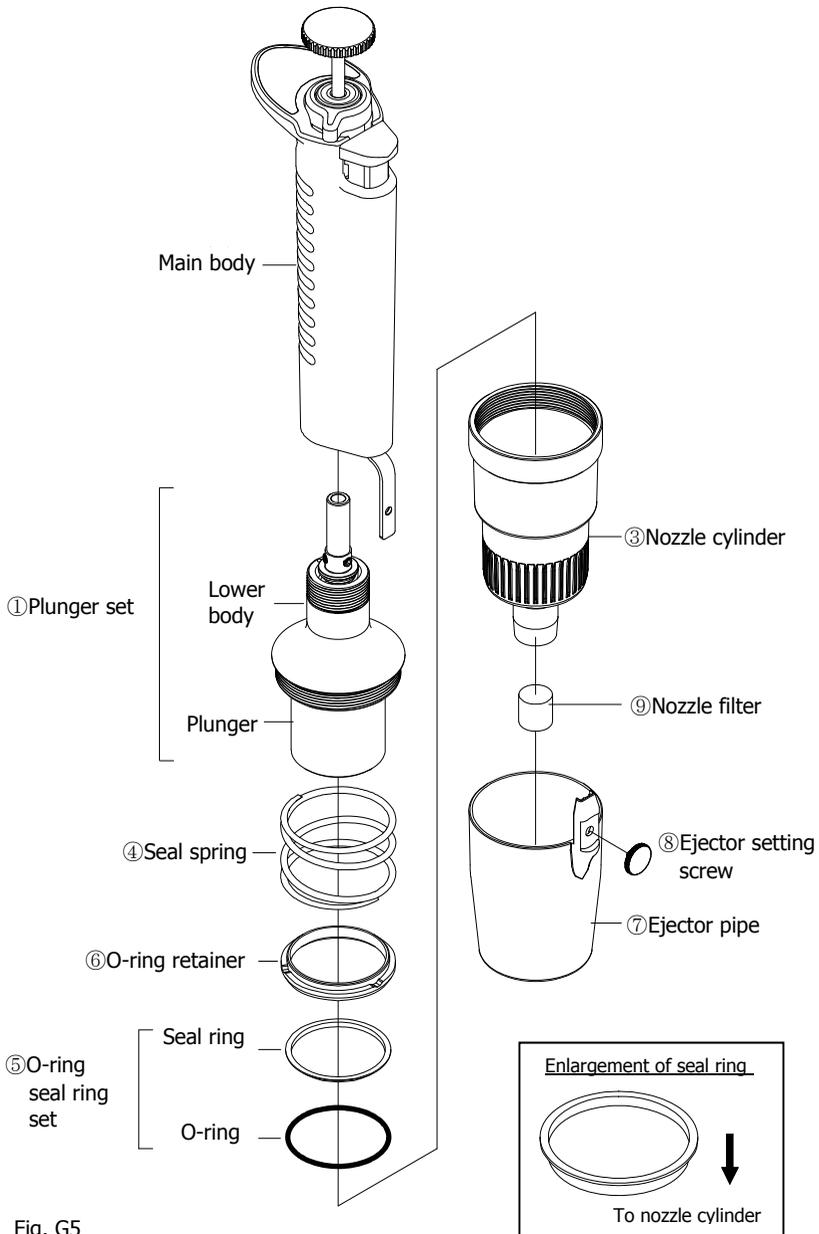


Fig. G5

Circled Numbers in (Fig. G5) corresponds to Parts Numbers in the replacement parts list.

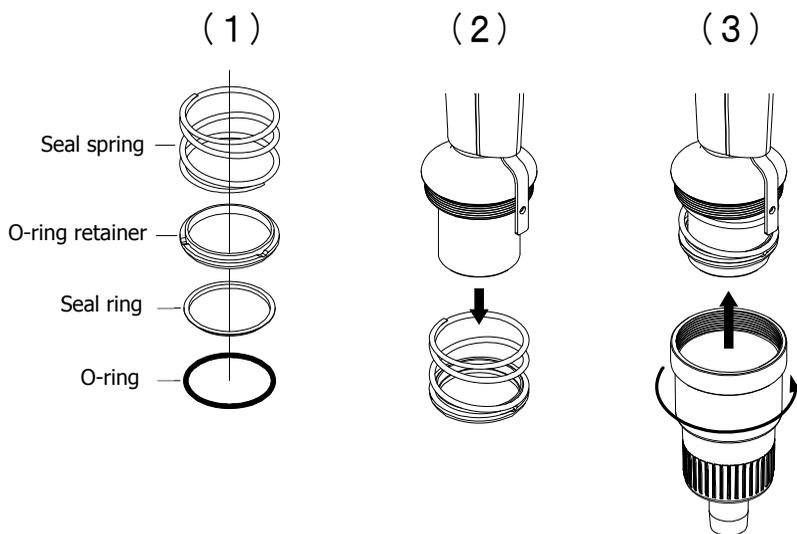


Fig. H

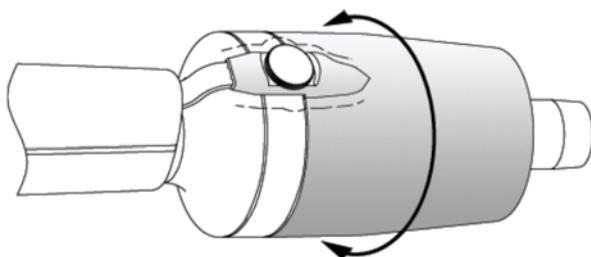


Fig. J

4.4 Changing the Nozzle Filter

• Filter removal procedure

Model 1000 μ L: (Fig. K) - (1)

Insert the tips of the filter remover tweezers into the two notches on the sides of the filter and pull it out, straight in the direction of the arrow.

Model 5000 μ L and 10000 μ L: (Fig.K) - (2)

Insert the filter remover pick into the center of the filter end and pull it out, straight in the direction of the arrow.

• Installing the filter

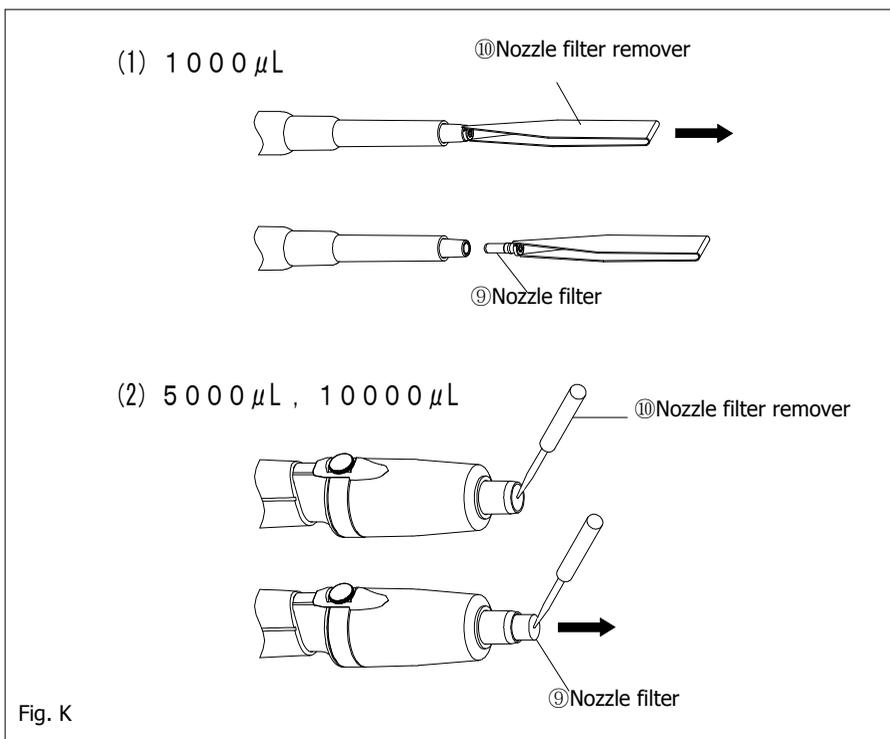
Insert a new filter firmly and flush, into the nozzle cylinder.

WARNING

- ✓ Never directly touch filters, that may be contaminated by harmful or toxic substances.

CAUTION

- ✓ The filter replacement tool tip is very sharp and can be dangerous. Please handle it with caution.



Circled Numbers in (Fig. K) corresponds to Parts Numbers in the replacement parts list.

4.5 Autoclaving

The whole pipette is autoclavable. Carry out the autoclaving process at 121°C for 20 minutes, following the procedure below.

- 1) For Models: 1000µL, 5000µL and 10000µL, remove the filter.
(Refer to "Filter removal procedure" on P.20)
- 2) When autoclaving, always leave the lock mechanism loosened, and always check and be sure to set the volume indicator to the 'Maximum Volume' of the pipette's volume range. (This moves the plunger back/in.)
- 3) Start the autoclaving process. After autoclaving is done, please promptly dry out the pipette with the following procedure.

WARNING

- ✓ Due to high temperature and high pressure use in autoclave sterilization, it is very dangerous. Please operate equipment according to safety guidelines and standards.
-

CAUTION

- ✓ When autoclaving, do not stack items on top of each other, do not place the nozzle downward, or lean the device diagonally against anything, as this will apply load and stress to the heated structure.
Always autoclave the pipette with the nozzle facing upward and standing.
Although the pipette is made of autoclave compatible material, due to the high temperature and pressure used in the sterilizer, there is a risk that heated parts subjected to load and stress to deform.
 - ✓ Do not autoclave at temperatures above 121°C (There is a risk of causing damage.)
-

4.6 Drying the pipette

- 1) As with the same when autoclaving the device, also unlock and loosen the lock lever when drying.
- 2) Remove the ejector pipe following the procedure in 4.2 Disassembling (Fig. F).
- 3) Turn the nozzle cylinder counterclockwise by two and a half turns to just loosen it.
- 4) Dry it with a blower type constant temperature dryer, and confirm that it is completely dried out.
- 5) After drying, wait until the main unit has returned to room temperature, tighten the nozzle cylinder, and reattach the ejector pipe back into/onto the main body.

CAUTION

- ✓ Immediately after autoclaving and drying, the pipette and parts are extremely hot, so please do not touch them directly with your hands.
- ✓ When autoclaving, there is a possibility of damage, and performance may be affected, due to other items that are in the autoclave at the same time, and/or by substances that may be present in the water that is being used in the autoclave.
- ✓ Assembling the pipette in a heated or warm condition after drying, can lead to damage, such as stripping of the threads. Please let it cool down first. Also, if used in a heated or warm condition, accuracy will not be obtained.



- ✓ Accuracy and precision may change with the autoclaving conditions, and also with many other various factors. We recommend testing the accuracy and precision after autoclaving, and at other times when needed.
-

5. Specifications (Accuracy/Precision)

Table-1 Maximum Permissive Errors.

Pipette types (Code)	Volume range	Volume (μL)	Accuracy (systematic error) AC (%)	Precision (random error) CV(%)
2 μL (00-NPLO2-2)	0.1-2 (μL)	0.2	$\pm 12.0^*$	$\leq 6.0^*$
		1	± 5.0	≤ 2.5
		2	± 3.0	≤ 1.0
10 μL (00-NPLO2-10)	0.5-10 (μL)	1	± 4.0	≤ 3.0
		5	± 1.0	≤ 1.0
		10	± 1.0	≤ 0.5
20 μL (00-NPLO2-20)	2-20 (μL)	2	± 5.0	≤ 3.0
		10	± 1.0	≤ 1.0
		20	± 1.0	≤ 0.4
100 μL (00-NPLO2-100)	10-100 (μL)	10	± 2.0	≤ 1.0
		50	± 1.0	≤ 0.3
		100	± 0.8	≤ 0.3
200 μL (00-NPLO2-200)	20-200 (μL)	20	± 1.0	≤ 0.5
		100	± 0.8	≤ 0.3
		200	± 0.8	≤ 0.2
1000 μL (00-NPLO2-1000)	100-1000 (μL)	100	± 1.0	≤ 0.5
		500	± 0.8	≤ 0.3
		1000	± 0.7	≤ 0.2
5000 μL (00-NPLO2-5000)	1000-5000 (μL)	1000	± 1.0	≤ 0.3
		2500	± 0.8	≤ 0.3
		5000	± 0.6	≤ 0.2
10000 μL (00-NPLO2-10000)	1000-10000 (μL)	1000	± 2.0	≤ 0.4
		5000	± 0.8	≤ 0.3
		10000	± 0.4	≤ 0.2

* Accuracy and precision of 0.2 μL or less of "2 μL model" are greatly affected by the user's sampling skills, and/or by various factors and conditions.

- Tips used: Nichiryo original tip (BMT2)
- Measurement temperature: Between 20°C to 25°C
- Relative humidity: above 50%
- Measurement medium: distilled water
- Barometric pressure, 101kPa

Volume measurement is in accordance with ISO 8655-6.

6. Calibration (Adjustments)

Please have adequate foreknowledge to responsibly perform all operations. We cannot guarantee, accuracy/precision, or trouble in pipetting operation, after the user has arbitrarily performed any adjustments after factory settings. We thank you in advance for your understanding.

Perform the volume adjustment and volume inspection in the following method.

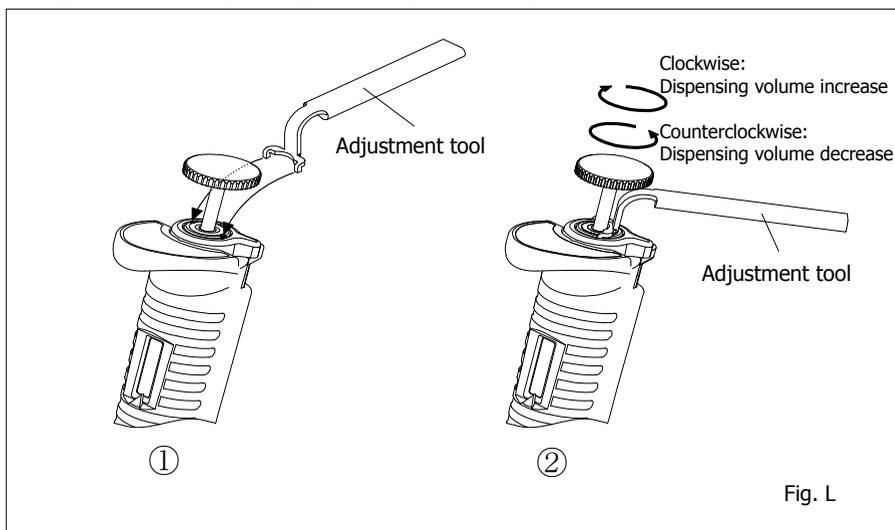
6.1 Volume adjustment method

To perform a good and reliable calibration for all the models of pipettes in this manual, conduct the adjustment at minimum volume setting first, and then conduct the maximum volume setting adjustment.

Please perform the volume check of the maximum volume after the minimum volume accuracy falls within the standard accuracy on [Table 1].

Volume adjustment procedure

- 1) Loosen and unlock the lock mechanism.
- 2) Insert the adjustment tool's prongs into the two grooves (Fig. L①).
- 3) Hold the unit in one hand and make sure the adjustment tool is fixed in (Fig. L②).
- 4) Rotate clockwise to increase the dispensing volume, and counterclockwise to decrease the dispensing volume.
- 5) Please refer to [Table 2] for the required fine adjustment of the volume.



Circled Numbers in (Fig. L) corresponds to Parts Numbers in the replacement parts list.

Table-2 Calibration guideline

	1 scale mark	2 scale marks	5 scale marks	10 scale marks
2µL	0.0015	0.0029	0.0073	0.0145
10µL	0.0077	0.0154	0.0385	0.0769
20µL	0.013	0.025	0.063	0.126
100µL	0.079	0.158	0.396	0.791
200µL	0.13	0.25	0.63	1.26
1000µL	0.79	1.58	3.96	7.92
5000µL	8.0	16.0	40.0	80.0
10000µL	8.0	16.0	39.9	79.9

The numerical values (volume) above are for reference only. For actual measurement, please use a balance which is properly calibrated.

6.2 Volume Measurement/Inspection Procedure

- 1) In order to avoid influence from temperature differences, ready the pipettes for inspection, the distilled water, the balance and tips 2 to 3 hours before use, in the environ where the measurement is to be conducted to attain temperature equilibrium.
* The measurement room should be in a controlled temperature between 20°C to 25°C, and the measurement should be held where there is no direct influence from wind blowing from an air-conditioner, heater or fan.

Please use the Nichiryo Original BMT 2 Tip Series (volume compatible ones), and be sure to install it on the pipette from the rack.

- 2) Using distilled water as the sample, aspirate and dispense the volume to be calculated inside the weighing vessel on the balance. Please use a vessel with a lid for the weighing vessel inside the balance. Also, include a small amount of distilled water in the vessel, prior to adjusting the balance and measurement.
- 3) Read the mass (mg) measured with the balance, and then convert it with the "Z correction Factor for Distilled Water[table3]" to obtain the dispensed measured volume (µL).

$$V_i = m_i \times Z$$

V_i : Volume

m_i : Measured mass

Z : Z correction factor

- 4) Add together 1the 10 volumes delivered and divide the sum by 10 to provide the mean volume.

$$\bar{V} = \frac{1}{10} \times \sum_{i=1}^n V_i$$

\bar{V} : Mean volume

- 5) Calculate the systematic error e_s [%] with the equation below.

$$e_s = 100 \times \frac{(\bar{V} - V_s)}{V_s}$$

e_s : systematic error [%]
 V_s : selected volume

- 6) Calculate the random error CV [%] with the equation below. Where n is the number of measurements, in this case $n=10$.

$$CV = \frac{100}{\bar{V}} \times \sqrt{\frac{\sum_{i=1}^n (V_i - \bar{V})^2}{n - 1}}$$

CV : random error [%]

Table-3 Z correction factor for distilled water

Temperature (°C)	Air Pressure (kPa)			
	95	100	101.3	105
20.0	1.0028	1.0028	1.0029	1.0029
20.5	1.0029	1.0029	1.0030	1.0030
21.0	1.0030	1.0031	1.0031	1.0031
21.5	1.0031	1.0032	1.0032	1.0032
22.0	1.0032	1.0033	1.0033	1.0033
22.5	1.0033	1.0034	1.0034	1.0034
23.0	1.0034	1.0035	1.0035	1.0036
23.5	1.0036	1.0036	1.0036	1.0037
24.0	1.0037	1.0037	1.0038	1.0038
24.5	1.0038	1.0039	1.0039	1.0039
25.0	1.0039	1.0040	1.0040	1.0040

7. Troubleshooting

Symptom	Possible cause	Remedy
Tip cannot be ejected.	The nozzle cylinder is loose	Securely, tighten up the nozzle cylinder.
Pipette fails to aspirate liquid.	Filter is soaked with liquid. (1000 μ L, 5000 μ L, 10000 μ L)	Replace the filter with a new one (supplied as a standard accessory, or purchase a filter set for replacement).
	Seal ring and O-ring are assembled in reverse order.	Reset the seal ring and O-ring set according to the manual in "Disassembling /reassembling".
	Seal ring and/or O-ring set is worn.	Replace the seal ring and O-ring set.
Extracted liquid leaks from the tip.	The nozzle cylinder is loose	Securely, tighten up the nozzle cylinder.
	Nozzle cylinder is worn (stepped wear can be checked by eye).	Replace the nozzle cylinder.
	Seal ring and O-ring set are worn, because the plunger is damaged or rusty.	Replace the seal ring and O-ring set.
	The tip is loosely attached.	Reattach the same loosened tip, or with a new one firmly.
Push button moves stiffly.	The liquid has aspirated and leaked inside the nozzle cylinder.	If the push button does not work well after dispensing, or it is sticking to the body, disassemble the pipette and wash/clean every part (or wipe down every part with a soft cloth). If some parts get rusty or corroded inside the body, replace the part(s) with new one(s).



- ✓ When the pipette cannot be fixed after examining and conducting the above mentioned procedure, immediately stop using the pipette and ask us or our agent to repair it.
Before bring the pipette for repair, be sure to check whether it has been contaminated with microbes, and/or harmful or toxic substance.

8. Replacement parts list

8.1 Consumables

•Tip (Autoclavable)

Code	Volume range (μL)	Color	Applicable models	Q'ty
00-BMT2-UT	0.1-10	Clear	2μL	1000
00-BMT2-SSW	0.5-10	Clear	10μL	1000
00-BMT2-SG	2-200	Clear	20/100/200μL	1000
00-BMT2-LG	100-1000	Clear	1000μL	1000
00-BMT2-X	1000-5000	Clear	5000 μL	200
00-BMT2-Z	1000-10000	Clear	10000 μL	200

•Racked tip (Autoclavable)

Code	Volume range (μL)	Color	Applicable models	Q'ty
00-BMT2-UTWR	0.1-10	Clear	2μL	960 (96pcs x 10 cases)
00-BMT2-SSWR	0.5-10	Clear	10μL	960 (96pcs x 10 cases)
00-BMT2-SGR	2-200	Clear	20/100/200μL	960 (96pcs x 10 cases)
00-BMT2-LGR	100-1000	Clear	1000μL	960 (96pcs x 10 cases)
00-BMT2-XR	1000-5000	Clear	5000 μL	100 (50pcs x 2 cases)
00-BMT2-ZR	1000-10000	Clear	10000 μL	80 (40pcs x 2 cases)

8.2 Spare parts list

	Code	Description	Content	Type in volume
①	00-LO2-1000002	Plunger set 2μL	Plunger head/plunger	2μL
①	00-LO2-1000010	Plunger set 10μL	Plunger head/plunger	10μL
①	00-LO2-1000020	Plunger set 20μL	Plunger head/plunger	20μL
①	00-LO2-1000100	Plunger set 100μL	Plunger head/plunger	100μL
①	00-LO2-0100200	Plunger set 200μL	Plunger head/plunger	200μL
①	00-LO2-0101000	Plunger set 1000μL	Plunger head/plunger	1000μL
①	00-LO2-0105000P 00-LO2-010500GP	Plunger set 5000μL	Plunger / Joint block(w/O-ring) / Joint shaft / Joint plate / Plunger head / Setting screw / First spring / Lower body	5000μL
①	00-LO2-0110000P	Plunger set 10000μL	Plunger / Joint block(w/O-ring) / joint shaft / Joint plate / Plunger head / Setting screw / First spring / Lower body	10000μL
②	00-LO2-2000002	First spring 2μL	-----	2μL
②	00-LO2-2000010	First spring 10μL	-----	10μL
②	00-LO2-2000020	First spring 20μL	-----	20μL
②	00-LO2-2000100	First spring 100μL	-----	100μL
②	00-LO2-2000200	First spring 200μL	-----	200μL
②	00-LO2-2001000	First spring 1000μL	-----	1000μL
—	00-LO2-2005000	First spring 5000μL	-----	5000μL
—	00-LO2-2010000	First spring 10000μL	-----	10000μL
③	00-LO2-4000002	Nozzle cylinder set 2μL	Nozzle cylinder/K bush	2μL
③	00-LO2-4000010	Nozzle cylinder set 10μL	Nozzle cylinder/K bush	10μL
③	00-LO2-0400020	Nozzle cylinder set 20μL	Nozzle cylinder/K bush	20μL
③	00-LO2-0400100	Nozzle cylinder 100μL	-----	100μL
③	00-LO2-0400200	Nozzle cylinder 200μL	-----	200μL
③	00-LO2-0401000	Nozzle cylinder 1000μL	-----	1000μL
③	00-LO2-0405000 00-LO2-0405000G	Nozzle cylinder 5000μL	-----	5000μL
③	00-LO2-0410000 00-LO2-0410000G	Nozzle cylinder 10000μL	-----	10000μL
④	00-LO2-2205000	Seal spring 5000μL	-----	5000μL
④	00-LO2-2210000	Seal spring 10000μL	-----	10000μL

	Code	Description	Content	Type in volume
⑤	00-LO2-3000002	O-ring seal ring set 2 μ L	O-ring/seal ring	2 μ L
⑤	00-LO2-3000010	O-ring seal ring set 10 μ L	O-ring/seal ring	10 μ L
⑤	00-LO2-3000020	O-ring seal ring set 20 μ L	O-ring/seal ring	20 μ L
⑤	00-LO2-3000100	O-ring seal ring set 100 μ L	O-ring/seal ring	100 μ L
⑤	00-LO2-3000200	O-ring seal ring set 200 μ L	O-ring/seal ring	200 μ L
⑤	00-LO2-3001000	O-ring seal ring set 1000 μ L	O-ring/seal ring	1000 μ L
⑤	00-LO2-3005000 00-LO2-3005000G	O-ring seal ring set 5000 μ L	O-ring/seal ring	5000 μ L
⑤	00-LO2-3010000N	O-ring seal ring set 10000 μ L	O-ring/seal ring /O-ring retainer	10000 μ L
⑤	00-LO2-0090001	O-ring retainer	-----	2 μ L
⑤	00-LO2-0090002	O-ring retainer	-----	10 μ L
⑤	00-LO2-0090003	O-ring retainer	-----	20 μ L
⑤	00-LO2-0090004	O-ring retainer	-----	100 μ L
⑤	00-LO2-0090005	O-ring retainer	-----	200 μ L
⑤	00-LO2-0090006	O-ring retainer	-----	1000 μ L
⑤	00-LO2-0090007	O-ring retainer	-----	5000 μ L
⑥	00-LO2-0900010	Ejector pipe A	-----	2/10 μ L
⑥	00-LO2-0900200	Ejector pipe B	-----	20/100/200 μ L
⑥	00-LO2-0901000	Ejector pipe C	-----	1000 μ L
⑥	00-LO2-0905000	Ejector pipe D	-----	5000 μ L
⑥	00-LO2-0910000	Ejector pipe E	-----	10000 μ L
⑦	00-LO2-0801000	Ejector setting screw set	Setting screw/Spring washer/Washer	2/10/20/100/ 200/1000 μ L
⑦	00-LO2-0815000	Ejector setting screw	-----	5000/10000 μ L
⑧	00-LO2-0601000	Nozzle filter (10pcs)	-----	1000 μ L
⑧	00-NX2-0615000	Nozzle filter (100pcs)	-----	5000/10000 μ L
⑨	00-NX2-1100000	Nozzle filter remover	-----	1000 μ L
⑨	00-NX2-1500000	Nozzle filter remover	-----	5000/10000 μ L
⑩	00-LO2-1600000	Volume adjustment tool	-----	All

Please note that the specifications of the accessories may be changed without notice.
Always check our website for the latest specifications and information.

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Inspection and Calibration Statement

The enclosed pipette was tested and calibrated under closely controlled environmental conditions to ensure that it meets published calibration specifications. The precision and accuracy results obtained for this pipette are provided on the enclosed calibration certificate. Because temperature and humidity conditions affect the calibration results of liquid measurement devices, your pipette should be calibrated under conditions of use. The calibration results obtained in your laboratory may vary from our results, due to differences in the environmental testing conditions.

Information on repair or servicing, when contacting your local distributor.



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SB-NPLOII002E