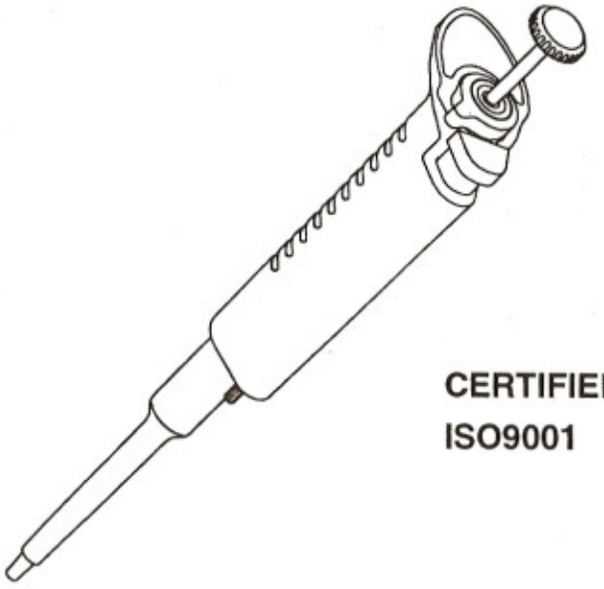
Autoclavable

Nichipet EX Plus

Digital micro pipette for liquid handling

User's Manual



CERTIFIED
ISO9001

- Thank you for your purchase of our Nichipet EX Plus.
- Before proceeding to work with your Nichipet EX Plus, carefully read this manual for proper use of it.

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NICHIRYO

For repair, service or information you may contact your local distributor.

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Digital micro pipette for liquid handling

Features

- The main body of the **Nichipet EX Plus** is autoclavable in whole (at 121˚C for 20 minutes).
- The **Nichipet EX Plus** is suitable for liquid handling on a clean bench because it is designed to be usable in irradiation of ultraviolet rays. (If ultraviolet rays are applied to the **Nichipet EX Plus** for a considerably long time, it may become discolored but nothing affects its performance.)
- Since the grip structure is easy to grasp, the user hardly gets tired when handling liquid for many hours.
- The sample volume can easily be set by simply turning the push button while looking at the digital indicator.
- Setting of the sample volume can easily be locked with one touch (one-touch lock mechanism).
- The instrument is capable of wide sampling of 8 kinds of liquid from 0.1 ul to 10,000 ul each.
- The instrument has a special structure so that its precision is hardly affected by the temperature of your hands if the instrument is used for long hours.
- Since PTFE (fluoroplastic) is used in the airtight chamber of the instrument, the instrument keeps airtightness and precise reproducibility for long hours.
- The tip of the ejector pipe reaches the bottom of a general test tube (110 mm deep) due to its thinness.
- Organic solvents can be pipetted by this instrument if the "O-ring for organic solvent" (supplied as an option) is attached to it.
- The tip can be removed without touching by hand thanks to the tip ejection mechanism. Moreover, there is no fear of breakage of test tubes, etc. caused by tip ejection, because the tip ejection part is made of plastic.

Standard accessories

- Three tips (one tip for NPL-5000/10ML)
- Three filters (for NPL-1000/5000/10mL)
- One filter replacing tool (for NPL-1000/5000/10mL)

When unpacking the package, check to make sure that the above-mentioned items are included.

Precautions on safety

- For using your **Nichipet EX Plus** properly and safely, carefully read "Precautions on safety" in this paragraph and "CAUTIONS" on the next page before starting work with it.
- The contents of "CAUTIONS" are matters that require the user's attention, not only for using the **Nichipet EX Plus** properly but for preventing the user from accidents and physical damage.
- After reading this manual, please keep it in a convenient place for refering to at any time.

Please read the following prior to use for your safety and correct usage.

⚠CAUTIONS

Be sure to observe the following instructions for using your Nichipet EX Plus properly and safely.

If the user uses the **Nichipet EX Plus** in the wrong way, disregarding the following instructions, it may result in injury to the user or/and other persons or physical damage to this instrument or/and other equipment.

1. Don't use this instrument for any purpose except pipetting/fractionizing liquid.
2. Don't modify this instrument, because modification may cause an accident.
3. Carefully handle the filter replacing tool with particular attention to its sharpened tip.
4. Don't use this instrument for pipetting any liquid to be injected into the human body.
5. Don't discharge any sample liquid while pointing the instrument at anybody, because some kinds of liquid are harmful to humans.
6. Don't eject the tip towards anybody.
7. Don't eject the tip with liquid inside.
8. Carefully handle the instrument and tip because the tip is sharply pointed.
9. Firmly fit the tip to the nozzle, otherwise the tip may fall off and the inside sample liquid may scatter.
10. If the instrument is soiled with liquid harmful to the human body, immediately take proper measures to clean it safely before proceeding with work.
11. When handling liquid harmful to the human body, be careful not to directly touch the tip during or after use.
12. Don't use this instrument for stirring liquid and so on, otherwise not only the tip may be loose and fall off but the instrument may be soiled with the scattered liquid.
13. Regarding the model NPL-10(ul), the plunger sticks out of the tip of the nozzle cylinder when the push button is completely depressed. Therefore, don't press the push button with your finger or anything else on the tip of the nozzle cylinder.
14. Since the instrument is extremely hot when it is autoclaved or dried, be careful not to touch it directly with your hand just after such treatment, otherwise it may cause a burn on the hand or another accident.
15. When pipetting an organic solvent with this instrument, use the "O-ring for organic solvent" (optional).
16. Although this instrument has good chemical-resistance in general, it may be damaged by some kinds of chemicals such as N-methyl-pyrrolidinone, etc. When using a special chemical, please make enquiries to our company.

ⓘMatters that require strict observance

Users are required to strictly observe
the following points in order for
the instrument to keep its excellent precision,
reproducibility and original performance for a long time.

1. Don't expose this instrument directly to the sun when working with it or for 2 hours before starting work, otherwise the instrument may fail in precise pipetting. Avoid working with this instrument in a humid and hot place.
2. Just before starting work with this instrument, avoid touching the tip and nozzle cylinder as far as circumstances permit. If the nozzle cylinder is warmed by your hand, it is hard to maintain accuracy.
3. For fractional pipetting, follow the forward method (the way explained in this manual). If it is performed in a different way, it may result in inaccurate pipetting.
4. Operate the push button very gently. If it is quickly released, it may result in not only inaccurate pipetting but also deterioration in the instrument, because the sample liquid is sucked into the main body. To prevent the instrument from malfunction, inaccuracy and contamination, a filter is attached to models NPL-1000, -5000 and -10ML. (A filter is supplied at time of purchase.)
5. Don't reuse a tip that has been used once, and carefully dispose of the used tip. If a tip is repeatedly used, it may cause inaccurate and impure pipetting and cross contamination (*) among samples.
   * For example, if the previous sample liquid remains inside the tip, it is mixed in with new sample liquid and the new sample is contaminated by the previous one. Therefore, pipetting of the next sample ends with a wrong result. This phenomenon is called mutual contamination of samples.
6. Don't hold the instrument horizontally or upside down when there is liquid inside the tip, otherwise the liquid gets into the main body and the instrument may deteriorate.
7. When autoclaving, do not place pipettes one on top of the other in the autoclave or stand them at angles with the nozzles facing down so that a load is applied on the nozzles. This instrument is made of an autoclave compatible material, but because the temperature inside sterilizers is high, there is a risk that parts subject to loads will be deformed.
8. After autoclaving and drying the instrument, leave it untill it gets completely cool before using again. If the instrument is used when warm, the accuracy may not come up to the standard level.
9. After autoclaving and drying the instrument, assemble the instrument after it is completely cooled. If it is assembled when it is still hot, it may cause deterioration in the instrument such as breakage of the screw threads.
10. When turning the push-button, don't exceed the specified sample volume limit, otherwise the instrument may be damaged or deteriorate.
11. Don't 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 scatter into the main body and the instrument may deteriorate in quality.

Operating procedure

1. Setting the liquid volume

1) Turn the lock handle in the unlocking direction to loosen it. (Fig. A)
2) Turn the push button to set the digital counter to a desired liquid volume. To increase the setting volume, turn the push button to pass the last set division on the scale by half a turn and then set at the higher graduation as desired. To decrease the setting volume, reset the digital counter directly at the lower graduation as desired. When setting the liquid volume, set the counter's graduation at the point mark (red) appearing in the lower part of the counter window. (Fig. B)
3) After setting the liquid volume, turn the lock handle in the locking direction to lock it. (Fig. A)

Note: Don't exceed the specified liquid volume limit, otherwise the instrument may be damaged or deteriorate in the quality.

2. Extracting liquid

1) Attach a disposable tip to the nozzle. (We recommend that you attach it from the rack tip.)
2) Press the push button down from point "a" to the point "b". (Fig. C)
3) While depressing the push button, immerse the tip into the liquid to the extracting volume (approximately 3 mm deep). (Fig. D-①)
4) Pull up the push button to point "a" to suck the liquid into the tip. With the tip still immersed in the liquid, keep the instrument stationary for about 1 second to wait untill the liquid is completely sucked into the tip. (Fig. D-②)
5) Gently extract the instrument to separate the tip from the liquid so that there are no drops of liquid left on the outside of the tip. If there are some drops left on the outside of the tip, wipe them off with a tissue, or the like, taking care not to touch the tip.

Note: Don't extract liquid with the push button depressed at point "c" shown in the Fig. C.

Note: Be careful to operate the push button very gently. If it is rapidly released, the liquid may possibly be sucked into the main body and pipetting may end with an inaccurate result.

3. Discharging the liquid

1) Gently place the tip on the inner wall of a proper vessel. (Fig . D-③)
2) Gently press the push button down from point "a" to point "b". Five seconds later, press down the push button again from point "b" to point "c". The liquid is discharged from the tip. (Fig. D-④,⑤)
3) Press the ejector button to remove the used tip from the instrument. (F ig. D-⑥)

⚠ **When handling liquid harmful to humans, be careful not to touch the tip during and after operation.**

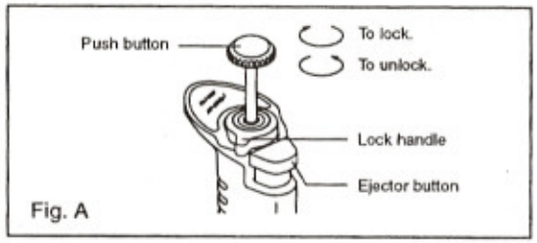

Fig. A

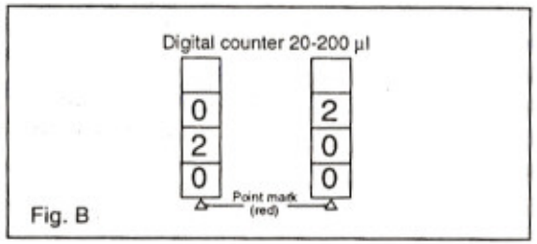

Fig. B

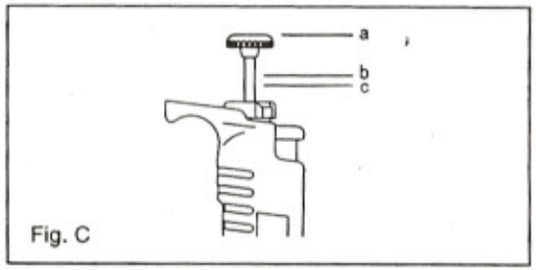

Fig. C

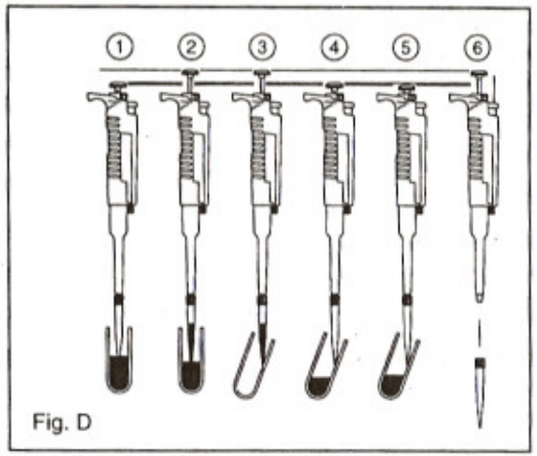

Fig. D

Disassembling/Reassembling the airtight chamber

If such symptoms as mentioned in "Troubleshooting" (page 13) is occur, disassemble and inspect the instrument according to the following procedures.

1. Disassembling

① Remove the ejector pipe setscrew.

- 2 ul - 200 ul: Figure E-①
  Turn the ejector pipe setscrew in the direction of the arrow to remove it, and then pull out the ejector pipe in the direction of the arrow.
- 5000 ul: Figure E-②
  Remove the three ejector pipe setscrews with a Phillips head (+) screwdriver, and then pull out the ejector pipe in the direction of the arrow.
- 10 ml: Figure E-③
  Remove the ejector pipe setscrew with a Phillips head (+) screwdriver, and then pull out the ejector pipe in the direction of the arrow.

② Turn the nozzle cylinder counterclockwise to remove it, as it is screwed into the main body.

Note: When removing the nozzle cylinder, take care with the internal parts as some of them occasionally spring out of the body (for types of 2 ul to 1000 ul capacity).

③ Remove internal parts one after another.

- 2 ul - 1000 ul: Fig. F
  Remove the plunger, single spring, O-ring retainer, O-ring, and seal ring from the nozzle cylinder.
  * The shape of the O-ring retainer differs depending on the capacity of the instrument. (Fig. G)
- For the 20 ul type, remove the fluoroplastic (PTFE) spacer that is inside.
- 5000 ul, 10 ml: Figure H, Fig. I
  Remove the O-ring retainer and seal ring from the nozzle cylinder.

Note: Take care not to lose small parts during disassembling.

2. Reassembling

① Reassemble the nozzle cylinder.

- 2 ul - 1000 ul: Fig. F
  First set the single spring on the plunger, next set the O-ring retainer, seal ring and O-ring in this order. Then, insert the assembled plunger into the nozzle cylinder and screw it into the body.

- 5000 ul - 10 ml: Fig. H, Fig. I
  Set the seal ring, O-ring on the plunger in this order, and then insert the assembled plunger into the nozzle cylinder while taking care that the O-ring does not come off the center. After insertion, screw the nozzle cylinder into the body.

Note: When reassembling, be careful not to put the seal ring and O-ring in the wrong order. If they are put together in the wrong order, it not only affects airtightness but causes liquid to leak, inaccuracy, failure in extracting liquid, etc.

② Fit the ejector pipe to the body.

- 2 ul - 1000 ul: Fig. F
  While pressing down the ejector button with your finger so that the metal stay sticks out from the center of the body, insert the ejector pipe into the body and fasten it with the setscrew.
- 5000 ul - 10 ml: Fig. H, Fig. I
  While pressing down the ejector button with your finger, insert the ejector pipe into the body so that its hole meets the tapped hole on the metal stay and fasten the ejector pipe with the setscrew (s).

Note: After reassembling, repeat trial operation several times and check to see that there is nothing wrong with the instrument.

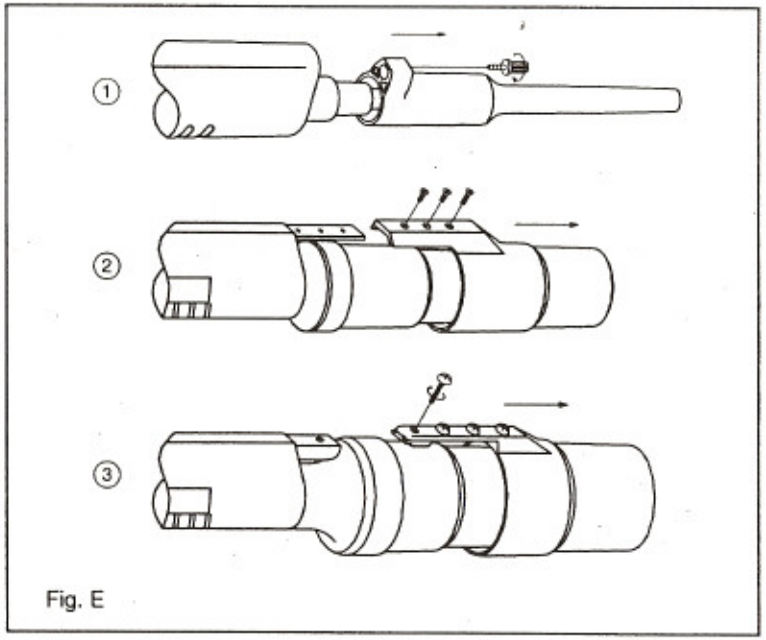

Fig. E

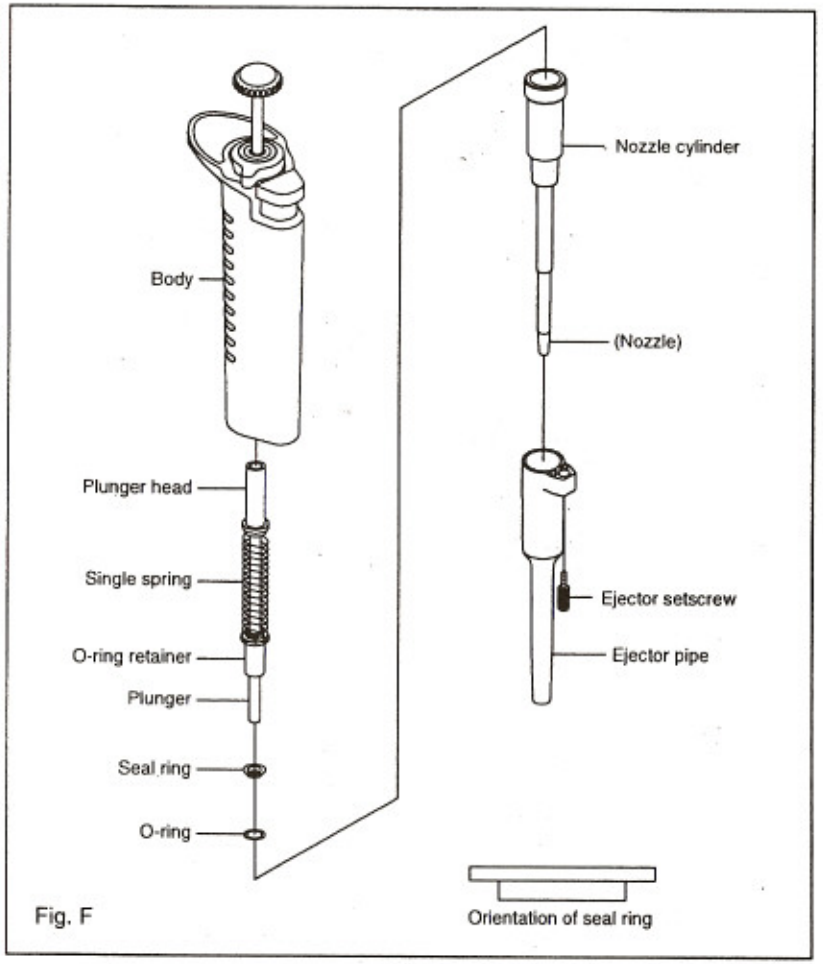

Fig. F

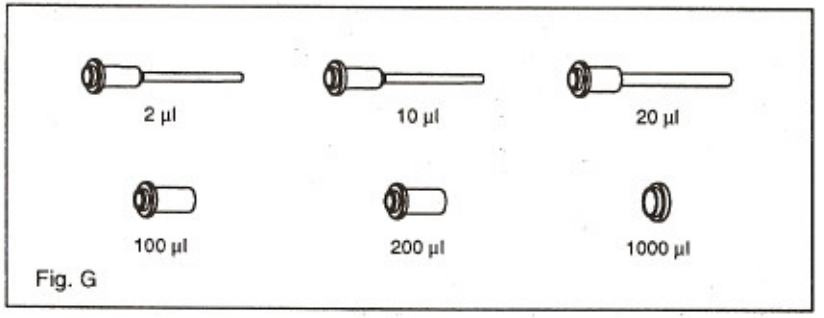

Fig. G

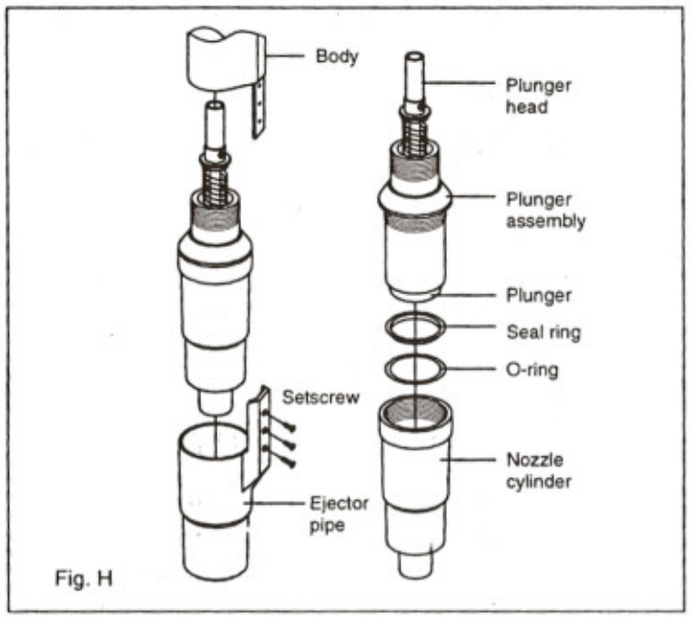

Fig. H

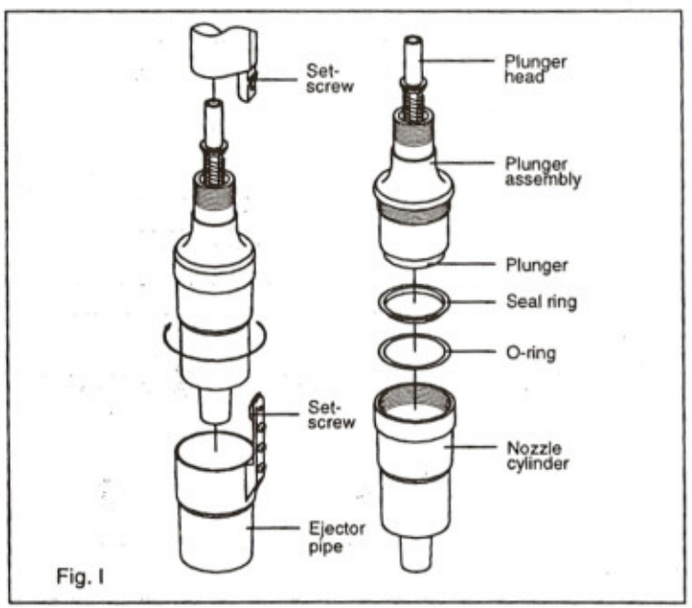

Fig. I

Calibration

Carry out calibration as follows.

1. Turn the lock handle to the "LOCK→" side and lock securely so that the counter does not move.
2. Hold the unit in one hand and hold the push button with your fingers so that it does not turn. (Fig. J).
3. Insert the adjustment tool's tabs into the two grooves on the adjustment head (Fig. K).
4. Carry out fine adjustment of volume by turning the adjustment tool to the left and right.
   Using the adjustment tool's point mark and the push button's graduation marks as a guide will allow easy adjustment of the necessary volume.
5. Please refer to the "Volume guide chart" below for the necessary fine adjustment volume.

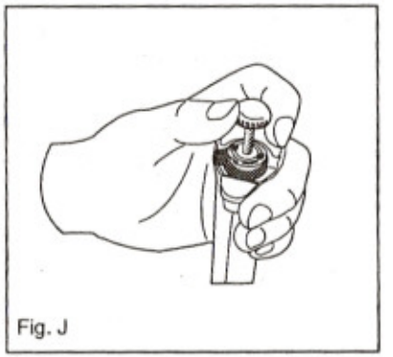
Fig. J

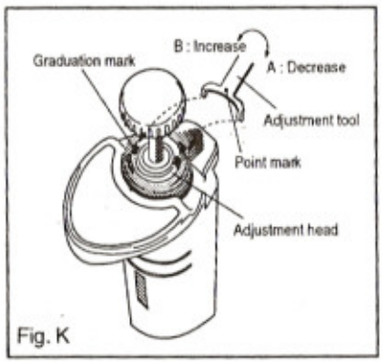

Fig. K

Note: **Be sure to lock the counter securely.**

Note: **Volume adjustment:**
A: Turning clockwise decreases volume.
B: Turning counter-clockwise increases volume.

● Volume guide for turning (moving) with the NPL (Nichipet EX-Plus) volume variable tool.

(Unit: ul)

Code (Model No.)	1/2 graduation mark	1 graduation mark	5 graduation marks	10 graduation marks
NPL-2	0.0013	0.0026	0.013	0.026
NPL-10	0.0065	0.013	0.065	0.132
NPL-20	0.013	0.026	0.131	0.263
NPL-100	0.067	0.133	0.665	1.330
NPL-200	0.132	0.264	1.322	2.644
NPL-1000	0.659	1.319	6.597	13.194
NPL-5000	3.332	6.663	33.316	66.633
NPL-10ML	6.696	13.393	66.966	133.932

The above numerical values (volume) are meant as a guide only. When checking volume, be sure to confirm using a calibrated balance.

Filter replacement procedure

1000 ul: Fig. L-①, ②

① Insert the tips of the filter replacing pincers into the two notches on the sides of the filter, and pull the filter in the direction of the arrow.

② Set the projection of a new filter in the internal groove of the nozzle, and then press the filter into the nozzle.

5000 ul, 10 ml: Fig. L-③, ④

③ Insert the filter replacing tool into the filter and pull in the direction of the arrow.

④ Insert a new filter into the nozzle.

⚠ **Don't touch a filter that is polluted with liquid harmful to humans.**

⚠ **The filter replacing tool for the filters for the 5000 ul and 10 ml types is dangerous because of its sharpened tip.**

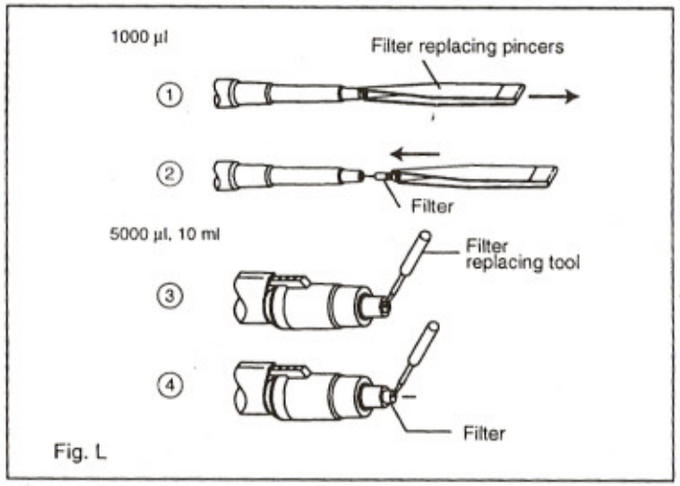

Fig. L

Autoclaving instrument

This instrument is autoclavable. When autoclaving, carry it out at 121°C for 20 minutes following the procedure mentioned below.

① For the 1000 ul, 5000 ul and 10 ml types, remove the filter referring to the "Filter replacement procedure"above.

② Release the lock handle from the locked position and set the counter graduation to the allowable limit of the liquid volume.

③ After autoclaving is complete, dry the instrument completely.

Drying the instrument

Dry the instrument immediately after autoclaving is complete. It is necessary to dry the instrument with a constant temperature air-drier at 60°C for 60 minutes or longer.

① Pull out the ejector pipe, referring to "Disassembling" on page 6.

② Turn the nozzle cylinder counterclockwise by two and a half turns to loosen it.

③ Put the instrument in a constant temperature air-drier for drying.

④ After the instrument is dry, wait until it returns room temperature and then fasten the nozzle cylinder and reassemble the ejector pipe into the body.

Note: If the instrument is reassembled when it is still warm, it may cause breakdown or deterioration of the instrument such as breakage of the screw threads, etc. Be sure to reassemble the instrument after it has completely cooled down.
If the instrument is used when it is warm, accurate liquid handling can not be carried out.

Note: Don't touch the instrument directly with your hands just after it is dry, because it will have gotten very hot during drying. Directly touching the hot instrument may cause injury.

Code (Model No.)	Variable capacity (ul)	Liquid volume (ul)	Accuracy (%)	Reproducibility (%)
NPL-2	0.1~2	0.1	*	*
		1	±5.0	<2.5
		2	±3.0	<1.0
NPL-10	0.5~10	0.5	±5.0	<3.0
		5	±1.0	<1.0
		10	±1.0	<0.5
NPL-20	2~20	2	±5.0	<3.0
		10	±1.0	<1.0
		20	±1.0	<0.4
NPL-100	10~100	10	±2.0	<1.0
		50	±1.0	<0.3
		100	±0.8	<0.3
NPL-200	20~200	20	±1.0	<0.5
		100	±0.8	<0.3
		200	±0.8	<0.2
NPL-1000	100~1000	100	±1.0	<0.5
		500	±0.8	<0.3
		1000	±0.7	<0.2
NPL-5000	1000~5000	1000	±1.0	<0.3
		2500	±0.8	<0.3
		5000	±0.6	<0.2
NPL-10ML	1000~10000	1000	±2.0	<0.4
		5000	±0.8	<0.3
		10000	±0.4	<0.2

*When the liquid volume in the NPL-2 is 0.2 ul or less, its accuracy and reproducibility are greatly affected by the operator's sampling skill.

Troubleshooting

Symptom	Possible cause	Remedy
The tip cannot be ejected.	The nozzle cylinder has come loose.	Try to screw the nozzle cylinder firmly into the body again.
The instrument fails to extract liquid.	The filter has soaked up liquid (1000 ul or more).	Replace the filter with a new one (supplied as a standard accessory, or purchase an optional filter set for replacement).
	The O-ring and seal ring are assembled in the wrong order.	Reset the O-ring and seal ring set according to the instructions in "Disassembling / reassembling".
	The O-ring or/and seal ring set are worn.	Purchase an optional O-ring and seal ring set for replacement.
Extracted liquid leaks from the tip.	The nozzle cylinder has come loose.	Screw the nozzle cylinder firmly into the body again.
	The nozzle cylinder is worn (stepped wear can be checked by eye).	Purchase an optional nozzle cylinder for replacement.
	The O-ring and seal ring set is worn because the plunger is damaged or rusty.	Purchase an optional O-ring and seal ring set for replacement.
	The tip is loosely attached.	Try to attach the tip to the nozzle tightly again.
The push button operates poorly.	Liquid has been sucked into the main body.	If the push button does not work well just after extracting liquid or it is just sticking to the body, disassemble the instrument and wash /clean every part (or wipe down every part with a soft cloth). If there are some parts getting rusty or corroded inside the body, replace the parts with new ones by purchasing optional replacement parts.

If there is still something wrong with the instrument after checking the above-mentioned, immediately stop using the instrument and ask us or our agent to repair it. Before bringing the instrument for repair, be sure to check whether it has been polluted with microbes or matter harmful to humans.

● Replacement parts list

(When placing an order, make sure to specify the capacity of each item.)

	Name of replacement part	Contents of set Capacity	.Capacity (ul)
1	Plunger set	Plunger head/Plunger	2, 10, 20, 100, 200, 1000ul
2	Plunger assembly	Plunger/Joint block, Joint plate, Joint shaft	5000ul, 10ml
3	Single spring	–	Common to all capacities
4	Nozzle cylinder	–	Common to all capacities
5	O-ring, seal ring set	O-ring/seal ring,	2, 10, 20, 100, 200, 1000ul
6	O-ring, seal ring set	O-ring/seal ring,	5000ul, 10ml
7	O-ring, seal ring set (for organic solvent)	O-ring for organic solvent, Seal ring/O-ring retainer	2, 10, 20, 100, 200, 1000ul
8	O-ring, seal ring set (for organic solvent)	O-ring for organic solvent, Seal ring	5000ul, 10ml
9	Ejector pipe	–	Common to all capacities
10	Ejector setscrew set	Spring/Washer	2, 10, 20, 100, 200, 1000ul
11	Ejector setscrew (3 pcs)	–	5000ul
12	Ejector setscrew (4 pcs)	–	10ml
13	Filter (10 pcs)	–	1000ul
14	Filter (100 pcs)	–	5000ul, 10ml
15	Filter replacing tool	–	1000, 5000ul, 10ml

* Specifications of the instruments and optional accessories as well as contents of accessory sets are subject to change without notice.
* No part of this manual may be reproduced/reprinted in any form without permission of the copyright holder. (This is strictly prohibited by the copyright law.)

● Tips (autoclavable)

Code	Variable capacity (ul)	Color	Applicable model	Tip length	Number of pieces a lot
BMT-UT	0.1~10	Clear	NPL-2	31.0 mm	1000
BMT-SS	0.5~10	Clear	NPL-10	45.5 mm	1000
BMT-SE	2~200	Clear	NPL-20, 100, 200	51.1 mm	1000
BMT-SG	2~200	Clear	NPL-20, 100, 200	53.0 mm	1000
BMT-L	100~1000	Blue	NPL-1000	77.0 mm	1000
BMT-X	1000~5000	Green	NPL-5000	132.0 mm	200
BMT-Z	1000~10000	Clear	NPL-10ML	158.0 mm	200

● Rack tips (autoclavable)

Code	Variable capacity (ul)	Color	Applicable model	Number of pieces a lot
BMT-UTR	0.1~10	Clear	NPL-2	960 (96pcs. X 10cases)
BMT-SSR	0.5~10	Clear	NPL-10	960 (96pcs. X 10cases)
BMT-SER	2~200	Clear	NPL-20, 100, 200	960 (96pcs. X 10cases)
BMT-SGR	2~200	Clear	NPL-20, 100, 200	960 (96pcs. X 10cases)
BMT-LR	100~1000	Blue	NPL-1000	1000 (100pcs. X 10cases)
BMT-XR	1000~5000	Green	NPL-5000	100 (50pcs. X 2cases)

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 environmental testing conditions.