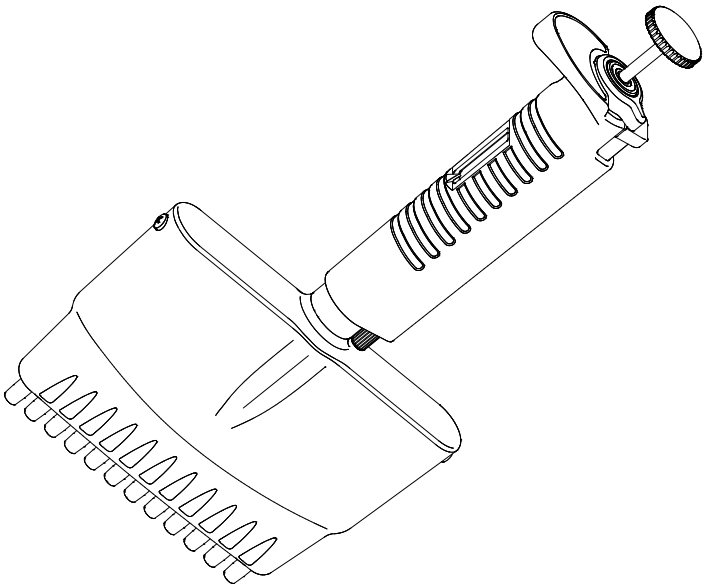
Autoclavable & UV resistant

Nichipet EX II MULTI

Multi-channel digital micro pipette

User's Manual



In Vitro Medical Diagnostic Devices (98/79/EC)

Annex III self-declared

ISO 8655 STANDARD

CE

CERTIFIED ISO9001

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

FUTURE LIFESCIENCE PARTNER
NICHIRYO

Autoclavable & UV resistant

Nichipet EX II MULTI

Multi-channel digital micro pipette

Features

- Nichipet EX II MULTI is fully autoclavable at the condition of 121°C for 20 minutes.
- Nichipet EX II MULTI is made of UV resistant material which can be used in clean bench. (If UV is applied to Nichipet EX II MULTI for a considerably long time, it may become discolored but nothing affects its performance.)
- New round shape improves friendly handling capability, and mitigates operator's fatigue from long time use.
- Sample volume can easily be set by simply rotating the push button.
- Setting of sample volume can easily be locked with one touch (one-touch lock mechanism).
- Covering a wide range of 0.5µL to 300µL with 4 models each of 8 and 12 channels.
- Patented body construction avoids permeating hand temperature through the body that prevents inaccuracy of volume measurement.
- Suitable for sampling to a micro plate with 96 well and 9 mm pitch.
- Because the handle and casing angle can be adjusted freely (360 degrees), the unit can be used at a position of your choice.
- Includes tip eject function. The tips can be removed without touching them by fingers.
- The simple casing structure enables easy maintenance.

Standard accessories

- Tip 8 ch ..... x 16
  12 ch ..... x 24
- Grease ..... x 1
- Cleaning wire ..... x 1
- User's manual ..... x 1

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

Precautions on safety

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

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

⚠ CAUTION

Be sure to observe the following instructions for using Nichipet EX II MULTI properly and safely.

If the user misuses the Nichipet EX II MULTI, or disregards 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. Do not use for any other purpose than handling of liquid.
2. Never modify this instrument, as this may cause an accident.
3. Do not use for handling of liquids that will be directly injected into the body.
4. As certain types of liquids are harmful to the body, never discharge any sample liquid while pointing the instrument at a person
5. Do not eject tips while this unit is pointed at a person.
6. Do not eject tips when there is liquid inside.
7. The sharp protruding tips of the unit are dangerous. Please use care when handling.
8. Please make sure that the tips are securely attached to the nozzle. Scattering of liquid will occur if tips fall off the nozzle.
9. If liquid that is harmful to the body has splashed onto the unit, treat it properly before using it.
10. When using liquid that is harmful to the body, never touch a tip that has been used.
11. Do not use this unit to mix liquid etc. This will cause tips to loosen, fall off, or result in liquid splashing on the unit.
12. After autoclaving or drying, do not touch the unit as it is very hot. Touching the unit could result in bodily harm.
13. Although this product is designed to resist chemicals, it may be damaged by some kinds of chemicals such as N-methyl-pyrrolidinone, etc. Please contact the manufacturer before using special chemicals.

Note

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. Do not expose pipette directly to the sun when working with it or for 2 hours before starting work, otherwise the pipette may lose accuracy. Avoid working with pipettes in a humid and hot place.
2. Just before starting work with pipette, avoid touching tip and nozzle cylinder as far as conditions are allowed. If nozzle cylinder is warmed by your hand, accuracy may vary.
3. For 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 push button very gently. If it is quickly released, it may result not only inaccurate pipetting but also deteriorated the pipette because sample liquid may be permeated into the main body.
5. Do not reuse tip that has been used once, and carefully dispose used tip. If tip is used repeatedly, it may cause inaccurate and impure pipetting and cross contamination (*) among samples.

*. For example, if previous sample liquid is left inside tip, it is mixed with new sample liquid and the new sample is contaminated by the previous one. Therefore, pipetting of the next sample results wrong. This phenomenon is called mutual contamination of samples.

6. Do not hold pipette horizontally or upside down when there is liquid inside tip, otherwise the liquid gets into the main body and the pipette may be contaminated.
7. When autoclaving, do not pile pipettes on others in the autoclave or lean pipettes with a nozzle top facing down so that self-load is applied on the nozzle. This pipette is made of an autoclave compatible material, but because of high temperature in the sterilizer, there is a risk that parts subject to load will be deformed.
8. After autoclaving and drying pipette, leave it until it gets completely cool before using again. If the pipette is used when warm, the accuracy may not come up to the standard level.
9. After autoclaving and drying pipette, assemble the pipette after it is completely cooled, if it is assembled when it is still hot, it may cause deterioration in the pipette such as breakage of the screw threads.
10. When rotating push button, do not exceed the specified sample volume limit, otherwise pipette may be damaged or deteriorated.
11. Do not perform pipetting with less liquid than 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 pipette may deteriorate in quality.

Contents

Operating procedure

1.Volume setting

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

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

Note: After changing the volume, press and release push button for a several times before using.

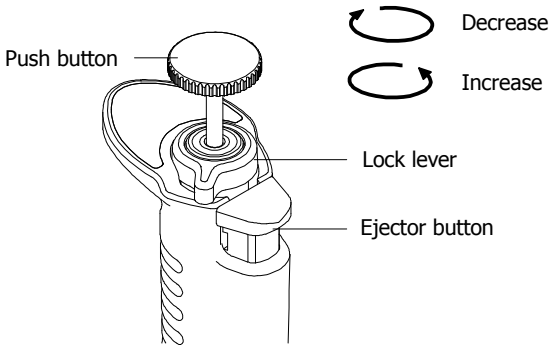


Fig. A

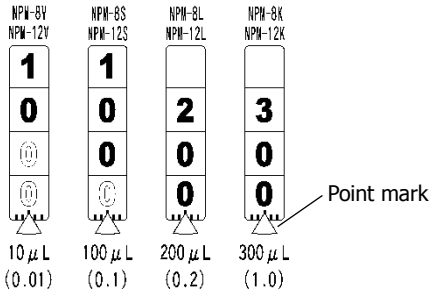


Fig. B

2. Aspiration liquid

1) Attach a new tip to the nozzle end. (We recommend that you attach it from rack)

Note: It would be recommended that tips are directly picked up from rack. And do not twist pipette when fixing tip.

2) Press down push button to first stop position "b". (Fig. C)
* Don't aspirate the liquid with the push button pressed at the second stop "c".
3) Hold the pipette vertically and immerse the tip 2mm to 3mm below the surface of the liquid. (Fig. D-①)
4) Release the push button slowly and smoothly to aspirate the set volume of the liquid. (Fig. D-②)
5) Wait 1 to 2 seconds, then withdraw the pipette vertically and carefully from the surface of the liquid. (Fig. D-②)
6) Wipe any droplets away from the outside of the tip using a medical wipe and avoid touching the tip's orifice.

Note: Do not aspirate when push button position is at "c".
Note: The push button has to be pushed and released slowly. Otherwise it may cause wrong accuracy.

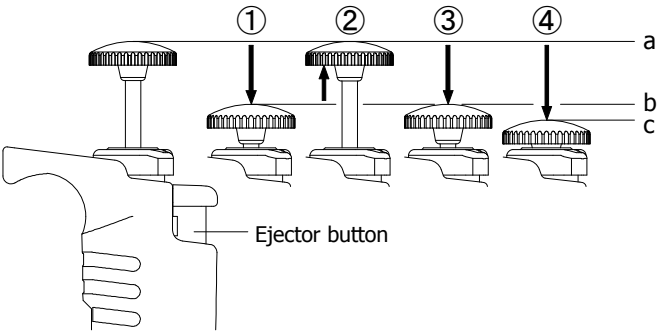


Fig. C

3. Dispensing liquid

1) Gently place the end of tip against inside wall of recipient vessel just above liquid surface 10 degrees to 45 degrees in angle.
2) Press down the push button slowly and smoothly to the first stop "b". Wait for a few seconds then press down the push button to the second stop to expel the last drop of the liquid from the tip. (Fig. D-④,⑤)
3) Release the push button slowly.
4) Press the ejector button to remove the tip and dispose of it. (Fig. D-⑥)

CAUTION **When using any toxic or harmful liquid to human, do not touch any used tips.**

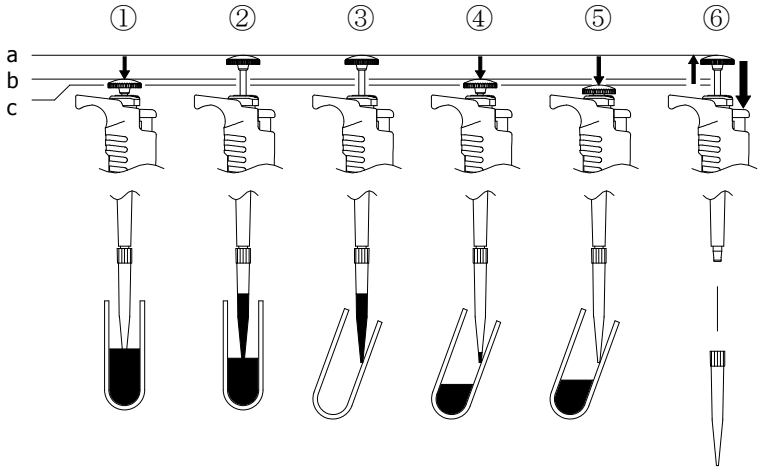


Fig. D

4. Recommendation for accurate pipetting

In addition to the above mentioned operations of pipetting, the following procedure maximizes performance of pipette.

1) Make sure that tip is firmly attached to nozzle end.
2) Before pipetting, pre-rinse the tip by filling and expelling the tip for three to five times. It gives good precision of pipetting, especially with a viscosity or a vaporous liquid.

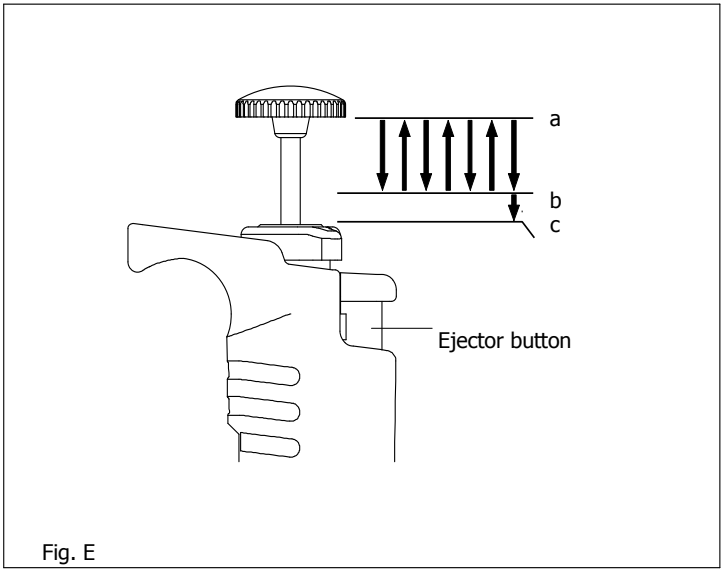


Fig. E

3) Especially with volumes under 50uL, the operation should be done very slowly and smoothly and the air humidity should be as high as possible to reduce the effect of evaporation loss.
4) Sampling high density liquids and viscous solutions.
When aspirating, once the liquid has entered the tip, wait 2 to 3 seconds before removing the tip from the surface of the liquid. When dispensing, wait 2 to 3 seconds at the first stop position before pushing to the second stop position.

Disassembling/Reassembling the airtight chamber

If such symptoms as mentioned in "Troubleshooting" (page 17) occur, disassemble and inspect pipette according to the following procedures.

1. Disassembling

①Remove screws for E-casing on both sides (Fig. F).
②Remove E-casing B (Fig. G).
③Remove casing pin U-P on both sides by using tool such as precision screwdriver (Fig. H).
④Pull off nozzle case unit (Fig. I). The plunger unit is exposed.

2. Reassembling

① If plungers of the plunger unit is out of grease, apply a very little amount of grease over the indicated area of the plungers (Fig. J).

Note: Please make sure to use designated grease for Nichipet EX II MULTI. Warranty for the product may not be applied if the different grease is used.

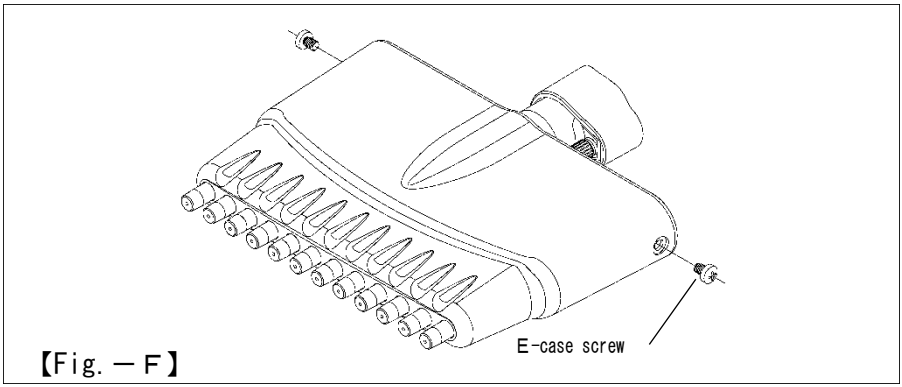
② Insert the plunger unit into the nozzle case unit. Gently adjust the plunger unit to radial direction while setting it to the nozzle case unit so that the plungers are properly set in the nozzle case unit.

Note: The adjustment of the plunger unit and nozzle case unit works to make proper clearance between plunger and nozzle case. It is important for smoother stroke of the push button.

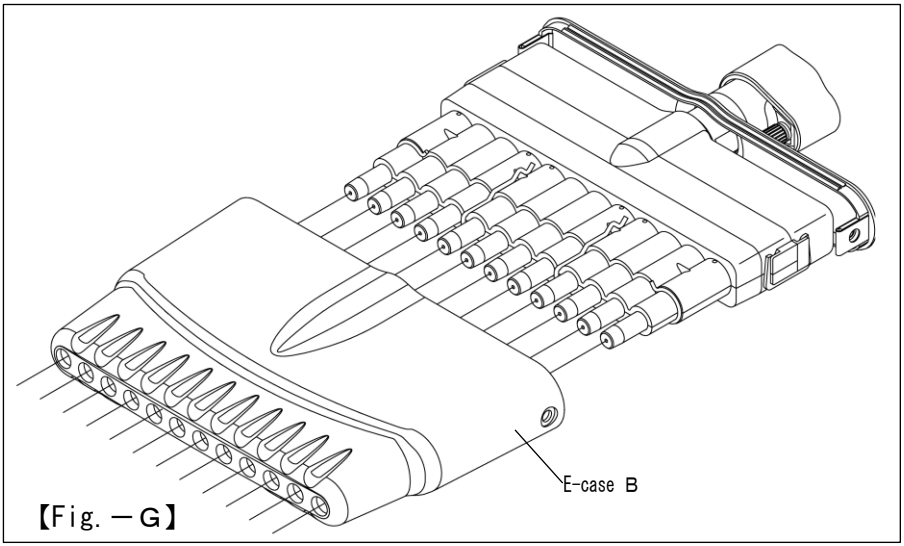
③ Set the casing pin U-P as shown in Fig. H.

Note: Please be careful not to set the casing pin U-P in wrong way since casing pin U-P is not axisymmetric.

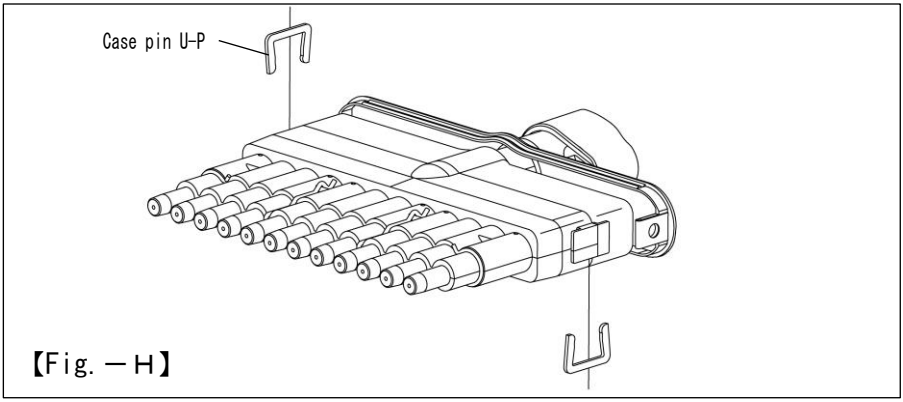
④ Set E-casing B and fix it with screws for E-casing on both sides (Fig. G, Fig. F).



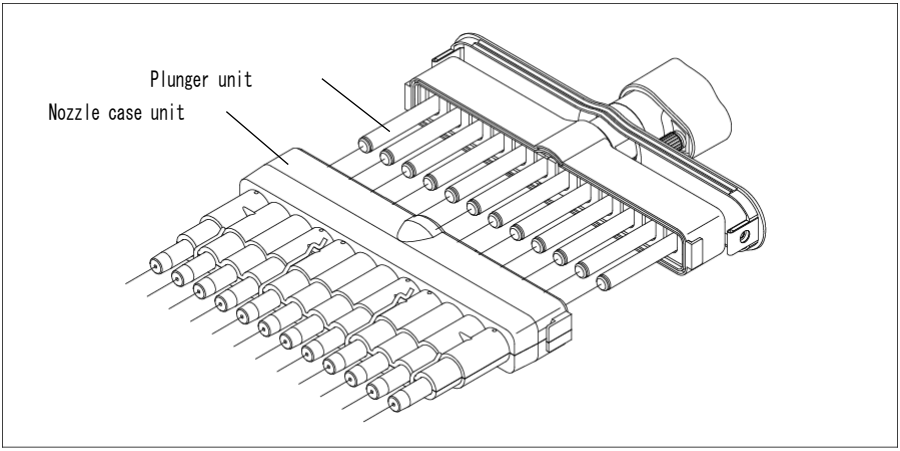
【Fig.－F】



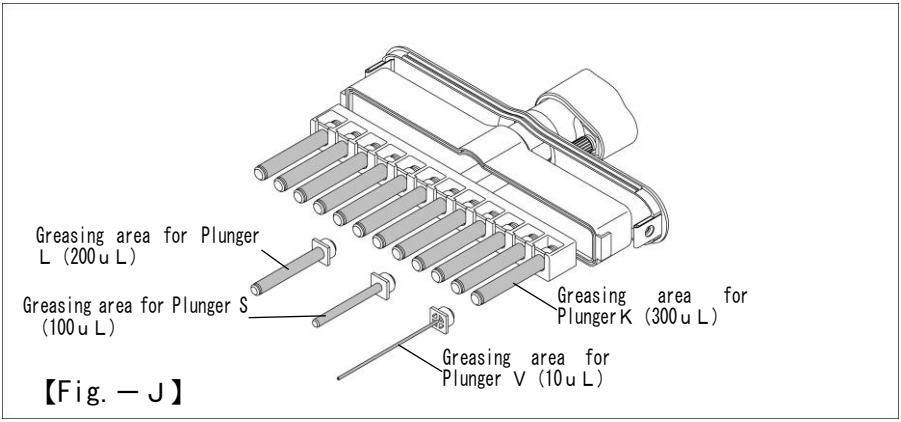
【Fig.－G】



【Fig.－H】


Plunger unit
Nozzle case unit

【Fig.－Ⅰ】


Greasing area for Plunger L (200ｕL)
Greasing area for Plunger S (100ｕL)
Greasing area for Plunger K (300ｕL)
Greasing area for Plunger V (10ｕL)

【Fig.－J】

Autoclaving

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

① Make sure that the lock lever is released from the locked position and set the counter to the maximum volume number of the volume range (page no. 5, Fig. A).
② After autoclaving is complete, dry the pipette completely.

Note: When autoclaving, don't pile pipettes on others in the autoclave or lean pipettes with a nozzle top facing down so that self-load is applied on the nozzle. This pipette is made of an autoclave compatible material, but because of high temperature in the autoclave, there is a risk that parts subject to load will be deformed.

Drying the pipette

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

① Dry the product in the same condition as when it was autoclaved.
② Be careful not to damage the nozzle when placing the unit in the dryer. Also make sure that the unit is placed in a position that does not place any weight on the nozzle.

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

CAUTION **: Don't touch the pipette directly right after drying, because it will have got very hot during drying. Touching the hot pipette directly may cause injury. Components of water used for autoclave may cause pipette malfunction or performance.**

Specifications

Nichipet EX II MULTI is a high quality pipette. The technical figures given in the Table-1 "Nichipet EX II MULTI Maximum Permissible Errors" were obtained using genuine Nichiryo BMT Tips.

Table-1:Nichipet EX II MULTI Maximum Permissible Errors

Pipette types (Volume range)	Standard volume range	Measured volume (µL)	Accuracy (%)	Precision (%)
NPM-8V NPM-12V (0.5 - 10µL)	1 - 10 (µL)	1	±8.0	≦5.0
		5	±4.0	≦2.0
		10	±2.0	≦1.0
NPM-8S NPM-12S (5 - 100µL)	10 - 100 (µL)	10	±3.0	≦2.0
		50	±1.0	≦0.8
		100	±0.8	≦0.3
NPM-8L NPM-12L (20 - 200µL)	20 - 200 (µL)	20	±3.0	≦0.6
		100	±1.0	≦0.4
		200	±0.9	≦0.3
NPM-8K NPM-12K (30 - 300µL)	30 - 300 (µL)	30	±3.0	≦1.0
		150	±1.0	≦0.5
		300	±0.6	≦0.3

Conditions of measurement

Pipette tip used: Nichiryo designated tip
Room temperature: 20 – 25 degrees Celsius
Relative humidity: More than 50%
Measuring object: Distilled water

Volume setting procedure

1. Loosen the lock lever.

2. Depress the tip ejector button fully. (Fig. L)

3. Loosen the lock lever by turning it to counterclockwise and stop when the oval opening under the lever faces over the tip ejector button. (Fig. L)

4. Rotate the push button until one of two hex head screws comes to the top of oval opening. (Fig. L)

5. Loosen both hex head screws with a hex head wrench (1.5mm) by turning them to counterclockwise one by one. (Fig. L)

6. Keeping the hex head wrench inserted into one hex head screw, turn the push button to calibrate the pipette. (Fig. M)

7. The pipetting volume can be adjusted by rotating the push button to clockwise to increase and counterclockwise to decrease. Please refer to the volume correction table.

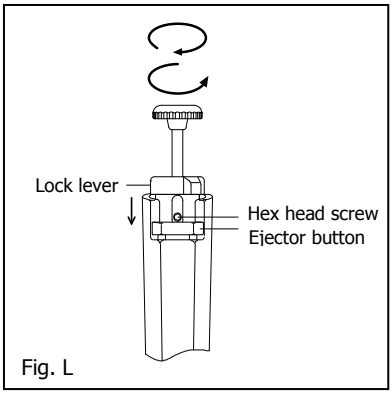


Fig. L

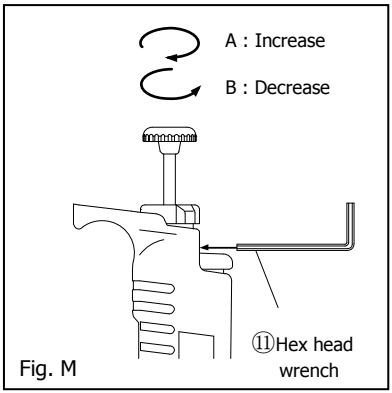


Fig. M

● Volume correction table

Angle	0.5-10uL	5-100uL	20-200uL	30-300uL
360°	0.31uL	1.6uL	6.5uL	9.6uL
720°	0.63uL	3.2uL	13uL	19.2uL

8. Tighten the both hex head screws after adjusting the push button and measure the accuracy of the pipette.

9. Repeat the above procedures until the pipette is calibrated within the specified accuracy. An accuracy test should be made at the specified minimum and maximum volume of each pipette.

Volume measurement

<Procedure>

① In order to avoid influence from temperature, prepare pipettes for inspection, distilled water, balances and tips 2 to 3 hours before using at where measurement is conducted.

* Measurement room should be controlled temperature between 20-25°C, and measurement should be held at where there is no direct wind from Air-conditioner.

② Pick up a proper tip from tip rack, and aspirate sample water.

③ Dispense the sample for measuring with a balance.

④ Read volume measurement by the balance, and compute accurate volume by following formula.

$$V_i = m_i \times Z$$

V_i :Volume
m_i :Measured volume
Z :Z correction factor

⑤ Add all 10-time V_i volumes, and divide the sum by 10 to compute a mean volume.

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

⑥ Calculate the systematic error e_s of the pipette, where V_s is the selected test volume.

$$e_s = 100 \times \frac{\left(\overline{V} - V_s\right)}{V_s}$$

⑦ Calculate the coefficient of variation, CV, by formula for standard deviation.

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

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

Troubleshooting

Symptom	Possible cause	Remedy
Liquid is not sucked in.	Foreign matter in the nozzle.	Remove foreign matter with provided cleaning wire.
Liquid leakage from tip.	X ring is worn or damaged.	Replace the "X ring set" with the new set.
	Plunger is damaged or rusty.	Replace the "X ring set" and "Plunger set" with the new sets.
	Nozzle tip attachment part is damaged.	Replace the "nozzle set" with the new set.
	Attached tips are loose.	Attach the tips firmly.
Push button movement is poor.	Plunger has shifted.	Press the push button a few times.
	X ring is damaged.	Replace the "X ring set" with the new set.
	No grease on the plungers and/or X rings.	Coat the plungers and/or X rings lightly with the provided grease.
	Liquid in the nozzle.	If immediately after suction or if there just some adherence of liquid, disassemble and clean the parts.

CAUTION

If the pipette can not 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 or harmful substance. Contaminated pipette can not be accepted for repair.

Consumables

●Tip (Autoclavable)

Code	Volume range (uL)	Color	Applicable pipette	Tip length (mm)	Q'ty
BMT2-UT	0.1-10	Clear	NPM-8V,12V	31.5	1000
BMT2-SG	2-200	Clear	NPM-8S,12S,8L,12L	53.0	1000
BMT2-K	30-300	Clear	NPM-8K,12K	58.9	1000

●Racked tip (Autoclavable)

Code	Volume range (uL)	Color	Applicable pipette	Q'ty
BMT2-UTWR	0.1-10	Clear	NPM-8V,12V	960 (96pcs x 10 racks)
BMT2-SGR	2-200	Clear	NPM-8S,12S,8L,12L	960 (96pcs x 10 racks)
BMT2-RK	30-300	Clear	NPM-8K,12K	960 (96pcs x 10 racks)

Replacement parts list (Please specify volume and channel number when ordering)

	Code	Part name	Contents	Pipette types
1	00-NPM -000100V	E-casing B set for 8V	E-casing B for 8V x 1 Screw for E-casing x 2	8V
2	00-NPM -000100S	E-casing B set for 8S	E-casing B for 8 x 1 Screw for E-casing x 2	8S
3	00-NPM -000100L	E-casing B set for 8L	E-casing B for 8 x 1 Screw for E-casing x 2	8L
4	00-NPM -000100K	E-casing B set for 8K	E-casing B for 8 x 1 Screw for E-casing x 2	8KP
5	00-NPM -000101V	E-casing B set for 12V	E-casing B for 12 x 1 Screw for E-casing x 2	12V
6	00-NPM -000101S	E-casing B set for 12S	E-casing B for 12 x 1 Screw for E-casing x 2	12S
7	00-NPM -000101L	E-casing B set for 12L	E-casing B for 12 x 1 Screw for E-casing x 2	12L
8	00-NPM -000101K	E-casing B set for 12K	E-casing B for 12 x 1 Screw for E-casing x 2	12K
9	00-NPM -0001200	Case pin U set	Case pin U x 2 pcs	Common
10	00-NPM -3400000	Grease	Grease x 1	Common

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

Manufacturer:

NICHIRYO CO.,LTD.

Tokyo office
1-10-1 Kandanishiki-cho, Chiyoda-ku, Tokyo 101-0054, Japan
TEL: +81-3-6273-7652 (English) FAX: +81-3-6273-7944
URL: http://www.nichiryo.co.jp/
E-mail: i-sales@nichiryo.co.jp

2016.Ver.2