Finnpipette[®] Novus Single Channel

Instructions for Use Bedienungsanleitung Guide d'utilisation Instruccions de uso 取扱説明書





Analyze • Detect • Measure • Control™

WEEE Compliance:

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:



Thermo Electron has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on Thermo Electron's compliance with these Directives, the recyclers in your country, and information on Thermo Electron products which may assist the detection of substances subject to the RoHS Directive are available at **www.thermo.com/WEEERoHS**

WEEE Konformität:

Dieses Produkt muss die EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2002/ 96/EC erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet:



Thermo Electron hat Vereinbarungen getroffen mit Verwertungs-/Entsorgungsanlagen in allen EU-Mitgliederstaaten und dieses Produkt muss durch diese Firmen wiederverwertet oder entsorgt werden. Mehr Informationen über die Einhaltung dieser Anweisungen durch Thermo Electron, die Verwerter und Hinweise die Ihnen nützlich sein können, die Thermo Electron Produkte zu identifizieren, die unter diese RoHS Anweisung fallen, finden Sie unter

www.thermo.com/WEEERoHS

Conformité WEEE:

Ce produit doit être conforme à la directive européenne (2002/96/EC) des Déchets d'Equipements Electriques et Electroniques (DEEE). Il est marqué par le symbole suivant:



Thermo Electron s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devrait être collecté ou recyclé par celles-ci. Davantage d'informations sur la conformité de Thermo Electron à ces directives, les recycleurs dans votre pays et les informations sur les produits Thermo Electron qui peuvent aider la détection des substances sujettes à la directive RoHS sont disponibles sur

www.thermo.com/WEEERoHS

Este producto requiere cumplir con la Directiva 2002/96/EC WEEE (residuos de equipos electricos y electronicos). Este producto esta marcado con el simbolo WEEE, como se discribe:



En cada Estado Miembro de la Union Euorpea (EU), Thermo Electron ha contratado con diversas companias para disponer y/o re-ciclar los residuos de equipos electricos y electronicos.

Existe information adicional acerca de la conformidad de Thermo Electron con esta Directiva, incluyendo los nombres de las diversas companias autorizadas para disponer/recyclar nuestros productos.

Adicionalmente suministramos informacion acerca de los productos de Thermo Electron que pueden asistir en la deteccion de substancias mensionadas en la Directiva ROHS, explicado en **www.thermo.com.WEEE-ROHS**

Product specifications are subject to change without prior notice. Finnpipette® and Finntip® are registered trademarks of Thermo Electron Oy.

See the latest version at www.thermo.com/finnpipette

Änderung von Produktbeschreibungen ist vorbehalten ohne vorherige Benachrichtigungt. Finnpipette[®] und Finntip[®] sind eingetragene Warenzeichen von Thermo Electron Oy.

Sehen Sie die neueste Version an www.thermo.com/finnpipette

Les spécifications des produits peuvent être modifiées sans préavis. Finnpipette® et Finntip® sont des marques déposées de Thermo Electron Oy.

Voir la dernière version sur www.thermo.com/finnpipette

Las especificaciones del producto están sujetas a cambio sin notificación previa. Finnpipette® y Finntip® son marcas registradas de Thermo Electron Oy.

La última versión está disponible en www.thermo.com/finnpipette

製品の仕様は予告なく変更されることがあります。 Finnpipette® 及び Finntip® はThermo Electron の登録商標です。 最新版については **www.thermo.com/finnpipette** をご覧ください。

CONTENTS	
PRODUCT DESCRIPTION	4
PACKAGE	4
GETTING STARTED	4
PIPETTE OPERATION	5
CALIBRATION	10
MAINTENANCE	12
TROUBLE SHOOTING	14
SPARE PARTS	65-66

	5			
5		c	3	
	5			
P	ĥ	í	1	
		5	3	
	1	ī		
2	5	ŝ	ĺ	
1		h		

INHALT	
PRODUKTBESCHREIBUNG	15
PACKUNG	15
ARBEITSBEGINN	15
PIPETTENFUNKTION	16
KALIBRIERUNG	21
WARTUNG	24
FEHLERBEHEBUNG	27
ERSATZTEILE UND ZUBEHÖR	65-66

6	
Ö	
0	
<u>n</u>	

SOMMAIRE	
DESCRIPTION DU PRODUIT	28
CONDITIONNEMENT	28
PREMIERS PAS	28
UTILISATION DE LA PIPETTE	29
CALIBRAGE	34
ENTRETIEN	36
EN CAS DE PROBLEME	39
PIÈCES DÉTACHÉES	65-66

Español

日 本 語

CONTENIDO	
DESCRIPCIÓN DEL PRODUCTO	40
CONTENIDO	40
INTRODUCCIÓN	40
USO DE LA PIPETA	41
CALIBRACIÓN	46
MANTENIMIENTO	48
SOLUCIÓN DE PROBLEMAS	51
PIEZAS DE RECAMBIO	65-66

目次	
製品について	52
パッケージ	52
使用の前に	52
ピペットの操作	53
キャリブレーション	58
メンテナンス	60
トラブルシューティング	63
保証規定	63
部品及び付属品	65-66

Product description

The different models of Finnpipette Novus pipettes cover a volume range from 1 µl to 10 ml.

Order No.		Volu	ume Ran	ge		Finntip
4620000X	1	μl	to	10	μl	10
4620010X	1	μl	to	10	μl	250 Universal, 200 Ext
4620020X	5	μl	to	50	μl	50
4620030X	5	μl	to	50	μl	250 Universal, 200 Ext
4620040X	10	μl	to	100	μl	250 Universal, 200 Ext
4620050X	30	μl	to	300	μl	300
4620060X	100	μl	to	1000	μl	1000
4620070X	0,5	ml	to	5	ml	5 ml
4620080X	1	ml	to	10	ml	10 ml

X=0=Eur. 1=US 2=Jap. 3=UK 4=Australia

The Finnpipette Novus is an electronically assisted pipette for a wide range of liquid handling operations. Thanks to the electronic motor and electronic control, pipetting is easy and comfortable, yet still fast and accurate. It operates on the air displacement principle (i.e. an air interface) and uses detachable, disposable tips, which are easy to remove with a soft touch tip ejector.

The adjustable, index finger operated pipetting trigger uses natural hand movement, increasing comfort and reducing the risk of repetitive stress injuries. The Finnpipette Novus provides many functions which are very practical for daily use in laboratory work, such as forward-, reverse- and repetitive pipetting, stepper and diluting modes.

The guiding and easy user-interface is very fast to learn. The adjusted delivery volume is clearly indicated in the LCD display on top of the handle. The long lasting Lithium-Ion -battery is always charged with rapid charge technique. If needed, the battery can be charged over the lunch hour.

Raw materials

The Finnpipette Novus is made of mechanically durable and chemically resistant materials. The tip cone modules can be repeatedly autoclaved at 121°C.

Description of tips

Finntips are recommended for use with the Finnpipette Novus. They are made of natural colour polypropylene, generally regarded as the only contamination free material suitable for tips. Finntips are also autoclavable (121°C).

Package

The complete Finnpipette Novus package contains:

- 1. Finnpipette Novus
- 2. Charger
- 3. Self hanger
- 4. Piston removal tool
- 5. Instructions for use
- 6. Spare O-ring and tube of grease
- 7. Sample Finntips

Getting started

Remove the content from the package and verify that all items listed above are included. Inspect for possible shipping damage. Make sure that the pipette is desired volume range and that the voltage of the charger is correct.

Charging the battery

Warning: Use only the original Finnpipette Novus charger and battery pack.

The pipette battery may be empty when delivered and must be charged before initial use. Connect the lead of charger to the socket on the back of pipette. Then connect the charger to an AC wall socket. If the battery is completely empty, it may take a few minutes before the pipette will turn on. You can use the pipette while the charger is connected. The charging time is typically less than one hour. An indicator in the LCD display shows the charge level of the battery. When the indicator shows empty battery, pipetting is no more possible, and the pipette has to be charged again.

Adjusting the trigger position

The index finger operated trigger, which activates the piston movement, can be adjusted by rotating it 60 degrees to both directions of the center position. Usually right handed operators turn it left (counter clockwise) to get the best possible position for the thumb to eject the tip. See picture on page 5.

Tip ejection

To help eliminate the risk of contamination, each pipette is fitted with a tip ejector system. The tip ejector system consists of a soft-touch tip ejector and specially designed gearing mechanism. To release the tip, point the pipette at suitable waste receptacle and press the tip ejector with your thumb.

Shelf hanger

You can attach the pipette shelf hanger on a counter, pipette stand or anywhere where you want to hang your pipette. Clean the area where you plan to attach the shelf hanger. Apply two stickers to the underside of the shelf hanger. Press the shelf hanger firmly into place — on a shelf, countertop or pipette stand. To use, hang the grippy finger rest on the shelf hanger.



Choosing pipetting functions and speed

To choose the pipetting function press *Menu* (left selection key). Scroll the function list and select the desired function with OK (right selection key). In most cases the volume can be selected simply by pressing the scroll key up or down. Accept the volume with OK. In some

cases the initial piston position has to be changed and a text PRESS TRIGGER appears on display. Press the trigger to move the piston to the new initial position.

Pipetting speeds can be selected with the right selection key whenever the text *SPEED* is displayed. Press *SPEED* and the speed in starts to blink. Select the speed with scroll key and accept with *OK*. Now the speed out starts to blink. Select the speed with scroll key and accept with *OK*.





Pipette (Forward technique)

Choose the PIPETTE function as described above.

Select the pipetting volume simply by pressing the scroll key up or down. Accept the volume with *OK*. Optionally press *SPEED* and the speed in starts to blink. Select the speed with scroll key and accept with *OK*. Select the speed out with scroll key and accept with *OK*.

- 1. Dip the tip under the surface of the liquid in the reservoir and press the trigger. The liquid is drawn in to the tip.
- Wait until the liquid is not moving in the tip and withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
- To deliver the liquid press the trigger and hold it down. The blow-out is also included to empty the tip.
- 4. Release the trigger to return to the ready position.
- If necessary, change the tip and continue pipetting.

Rpipet (Reverse & Repetitive)

With RPIPET function both reverse and repetitive techniques are possible.

Choose the RPIPET function as described above.

Select the pipetting volume simply by pressing the scroll key up or down. Accept the volume with *OK*. Press *SPEED* and the speed in starts to blink. Select the speed with scroll key and accept with *OK*. Select the speed out with scroll key and accept with *OK*.

Reverse technique

The reverse technique is suitable for dispensing liquids that have a high viscosity or a tendency to foam easily. The technique is also recommended for dispensing very small volumes. Fill a clean reagent reservoir with the liquid to be dispensed.

- 1. Dip the tip under the surface of the liquid in the reservoir and press the trigger. This action will fill the tip.
- 2. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
- Deliver the preset volume by shortly pressing the trigger. Some liquid will remain in the tip and this should not be included in the delivery. A text BLOWOUT is displayed.
- 4. To empty the tip, press trigger again.

If necessary, change the tip and continue pipetting.

Repetitive technique

The repetitive technique offers a rapid and simple procedure for repeated delivery of the same volume. Fill a clean reagent reservoir with the liquid to be dispensed.

- 1. Dip the tip under the surface of the liquid in the reservoir and press the trigger. This action will fill the tip.
- 2. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
- Deliver the preset volume by pressing and holding the trigger down. Some liquid will remain in the tip and this should not be included in the delivery.
- Dip the tip again to reagent reservoir and release the trigger. This action will fill the tip again.
- Continue pipetting by repeating steps 3 and 4.
- To empty the tip completely, dispense by shortly pressing the trigger. Some liquid will remain in the tip and this should not be included in the delivery. A text BLOWOUT is displayed.
- 7. To empty the tip completely, press trigger again.
- If necessary, change the tip and continue pipetting.

Stepper (multi dispensing)

With STEPPER function repeated dispensing of selected volume is possible.

Choose the STEPPER function as described above.

Select the pipetting volume simply by pressing the scroll key up or down. The display shows always the maximum number of steps during volume selection. Accept the volume with *OK*. Next choose the number of steps with scroll key and accept with *OK*.

Optionally select the speed. Press *SPEED* and the speed in starts to blink. Select the speed with scroll key and accept with *OK*. Select the speed out with scroll key and accept with *OK*.

Fill a clean reagent reservoir with the liquid to be dispensed.

- 1. Dip the tip under the surface of the liquid in the reservoir and press the trigger. This action will fill the tip.
- 2. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
- 3. Deliver the preset volume by pressing the trigger. The display shows the number of steps left.
- 4. Continue dispensing by repeating step 3. After last step a text BLOWOUT is displayed.
- 5. To empty the tip completely, press trigger and hold it down.
- 6. Release the trigger.

If necessary, change the tip and continue pipetting.

Note: The pipette can be emptied at any time by pressing CANCEL (left selection key)

Dilute

With DILUTE function dispensing of two selected volume is possible.

Choose the DILUTE function as described above. First volume (VOL 1) is shown on display.

Select the pipetting first volume simply by pressing the scroll key up or down. Accept the volume with *OK*. Next select the second volume (VOL 2) with scroll key and accept with *OK*.

Optionally select the speed. Press *SPEED* and the speed in starts to blink. Select the speed with scroll key and accept with *OK*. Select the speed out with scroll key and accept with *OK*.

- 1. Dip the tip under the surface of the first liquid in the reservoir and press the trigger. The first volume is drawn in to the tip. A text AIR appears on display.
- 2. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid. Press trigger again to aspirate air buffer.
- 3. Dip the tip under the surface of the second liquid and press the trigger. The second volume is drawn in to the tip.
- 4. Withdraw the tip from the liquid.
- 5. To deliver the both volumes, press the trigger and hold it down. The blow-out is also included to empty the tip.
- 6. Release the trigger to return to the ready position.

If necessary, change the tip and continue pipetting.

Program

Programs are stored settings, that can be edited, stored and retrieved. Additional functions as mixing, counter etc. are available in program mode.

To retrieve a program, choose PROGRAM from menu as described above. The display shows the first program (PROG1). Select the desired program with scroll key and accept with OK. If you want to change the settings, press EDIT. Select the function with scroll key and accept with OK. Note that there are additional functions available compared to main menu. After selecting the function, set the volumes, speeds etc. as described in the function instruction above. When working with programs, the scroll key selects the program and it is a very fast way to switch between different settings.

Additional functions in program mode Mix + Pipette

This function adds automatic mixing after normal pipetting. First select the desired volume with scroll key and accept with OK. Then select pipetting speeds accordingly. After dispensing the volume a text MIX appears on display. By pressing trigger the pipette starts to pipette ca. 70% of the selected volume several times as long as the trigger is held pressed. After releasing the trigger the pipettes stops after next dispensing and a text BLOWOUT appears to display. A normal blowout function is done by pressing the trigger and pipette is again ready for next pipetting.

Pipette + Count

This function adds automatic count number to pipetting. First select the desired volume with scroll key and accept with OK. Then select pipetting speeds accordingly. Next choose the max. number of pipettings, the default value is 999. After the max. number of pipettings is reached, the counter returns to zero. The counter can be reset at any time to zero by pressing SCROLL DOWN; OK; SCROLL UP; OK.

Seq stepper

The sequential stepper mode enables serial dispensing of different volumes (in normal stepper mode only fixed volume). First choose the amount of dispensings (max. 20) with SCROLLKEY and accept with OK. Vol 1 appears to display and highest possible volume is flashing. Select the first volume with SCROLLKEY and accept with OK. Now Vol 2 appears to display and highest possible volume left is flashing. Select the second volume with SCROLLKEY and accept with OK. After selecting the last volume the total volume is shown on display and speed in is flashing. Select the pipettings speeds and the pipette is ready for pipetting.

- 1. Dip the tip under the surface of the liquid in the reservoir and press the trigger. This action will fill the tip and the first volume appears on the display.
- 2. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
- 3. Deliver the first volume by pressing the trigger. The display shows the next volume.
- 4. Continue dispensing by repeating step 3. After last step a text BLOWOUT is displayed.
- 5. To empty the tip completely, press trigger.
- 6. If necessary, change the tip and continue pipetting.

Note: The pipette can be emptied at any time by pressing CANCEL (left selection key)

Mix + Dilute

Select the pipetting first volume by pressing the scroll key up or down. Accept the volume with OK. Next select the second volume (VOL 2) with scroll key and accept with OK. Then select the pipetting speeds.

- 1. Dip the tip under the surface of the first liquid in the reservoir and press the trigger. The first volume is drawn in to the tip. A text AIR appears on display.
- 2. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid. Press trigger again to aspirate air buffer.
- 3. Dip the tip under the surface of the second liquid and press the trigger. The second volume is drawn in to the tip.
- 4. Withdraw the tip from the liquid.
- 5. To deliver the both volumes, press the trigger. Text MIX appears on the display.
- 6. By pressing trigger the pipette starts to pipette ca. 70 % of the total volume several times as long as the trigger is held pressed.
- After releasing the trigger the pipette stops after next dispensing and a text BLOWOUT appears to display.
- 8. Withdraw the tip from the liquid and press the trigger and hold it down to empty the tip.

- 9. Release the trigger to return to the ready position.
- 10. If necessary, change the tip and continue pipetting.

Manual

With manual mode it is possible to measure volumes. In manual mode only slower speeds are available to ensure a quick stop. First select a limit for total volume, the default is the max. volume. Then select the pipetting speeds and zero volume appears to the display.

- Dip the tip under the surface of the liquid in the reservoir and press the trigger. The liquid is drawn in to the tip and the actual volume is shown on the display.
- 2. The pipetting direction can be changed with IN/OUT key (Left selection key).
- 3. To deliver the liquid selected the down direction and press the trigger.
- 4. To deliver out the rest of the liquid, press the trigger and hold it down.
- 5. If necessary, change the tip and continue pipetting.

Note: The volume display can be reset to zero at any time by pressing RESET with right selection key.

Seq + Aspirate

The sequential aspirate mode enables serial aspirating of different volumes. First choose the number of volumes (max. 20) with SCROLLKEY and accept with OK. Vol 1 appears to display and highest possible volume is flashing. Select the first volume with SCROLLKEY and accept with OK. Now Vol 2 appears to display and highest possible volume left is flashing. Select the second volume with SCROLLKEY and accept with OK. After selecting the last volume the total volume is shown on display and speed in is flashing for selecting the pipettings speeds. After selecting the speeds the first volume is shown on the display and the pipette is ready for pipetting.

- Dip the tip under the surface of the liquid and press the trigger. This action will take up first volume and the next volume appears on the display.
- 2. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
- 3. Dip the tip under the surface of the next liquid and press the trigger. This action will take up current volume and the next volume appears on the display.
- 4. Repeat steps 2. and 3. until last volume is drawn in to the tip. The total volume is shown on the display.
- Deliver the total volume by pressing the trigger and hold it down. The blowout volume is included in the delivered volume.
- 6. Release the trigger to return to the ready position.
- 7. If necessary, change the tip and continue pipetting.

Note: The pipette can be emptied at any time by pressing CANCEL (left selection key)

Options

Calibrate

Calibration mode. See chapter calibration.

Service

The piston can be disconnected and reconnected in Service mode. For details see chapter Maintenance.

Name

This function enables user to set a name to the pipette. The name is always shown on the display when the pipette is in sleep mode. To change the default name choose NAME from the menu and press edit. The first digit starts to flash. Change the digit with SCROLLKEY and accept and move to next digit with OK. When the last digit is accepted the name is changed.

Power

With this function the power can be turned off. Pressing any key turns on the power.

Buzzer

The buzzer can be turned on and off with this function.

Version

The software version is displayed.

Calibration

All Finnpipettes are factory calibrated and adjusted to give the volumes as specified with distilled or deionized water. Normally, the pipettes do not need adjustment, but they are constructed to permit recalibration and adjustment for liquids of different temperature and viscosity.

Device requirements and test conditions

An analytical balance must be used. The scale graduation value of the balance should be chosen according to the selected test volume of the pipette:

Volume range	readable graduation	Precision repeatability(s) and linearity	Uncertainty of measurement	
under 10 µl	0.00 1mg	0.001mg	0.002µl	
10-100 µl	0.01 mg	0.02mg	0.02µİ	
above 100 µl	0.1 mg	0.2mg	0.2µl	

If the uncertainty of measurement of the balance is known, this may be used instead of the repeatability and linearity.

Test liquid: Water, distilled or deionized, "grade 3" water conforming ISO 3696. Tests are done in a draft-free room at a constant (±0.5°C) temperature of water, pipette and air between 15°C to 30°C. The relative humidity must be above 50%. Especially with volumes under 50µl the air humidity should be as high as possible to reduce the effect of evaporation loss. Special accessories, such as the evaporation trap, are recommended.

Calibration Counter

By selecting MENU -> OPTIONS -> CALIBRATE -> COUNTER the number of pipetttings since last calibration is shown on the display. The counter is reset to zero when calibration is performed.

Checking the calibration

The pipette is checked with the maximum volume (nominal volume) and with the minimum volume. A new tip is first pre-wetted 3-5 times and a series of ten pipettings are done with both volumes. A pipette is always adjusted for delivery (Ex) of the selected volume. Measuring volumes taken from balance is not allowed.

Procedure:

- 1. Do 10 pipettings with the minimum volume.
- 2. Do 10 pipettings with the maximum volume.
- 3. Calculate the accuracy (A) and precision (cv) of both series.
- 4. Compare the results to the limits in the Table 1.

If the calculated results are within the selected limits, the adjustment of the pipette is correct. TABLE1: Maximum permissible errors according ISO8655

Range	Volume	Accu	racy	Precis	Precision	
	μl	μl	%	s.d. µl	cv%	
1-10 µl	10	±0.120	±1.2	0.080	0.8	
	1	±0.120	±12	0.080	8.0	
5-50 µl	50	±0.50	±1.0	0.20	0.4	
	5	±0.50	±10	0.20	4.0	
10-100 µl	100	±0.80	±0.8	0.30	0.3	
,	10	±0.80	±8.0	0.30	3.0	
30-300 µl	300	±4.0	±1.3	1.5	0.5	
	30	±4.0	±13	1.5	5.0	
100-1000 µl	1000	±8.0	±0.8	3.0	0.3	
	100	±8.0	±8.0	3.0	3.0	
0,5-5 ml	5000	±40.0	±0.8	15.0	0.3	
	500	±40.0	±8.0	15.0	3.0	
1-10 ml	10000	±60.0	±0.6	30.0	0.3	
	1000	±60.0	±6.0	30.0	3.0	

Adjustment

Two point calibration

Normally the two-point calibration should be used.

- 1. Do the pipetting series with both max. and min. volumes.
- 2. Calculate the actual results.
- 3. Press MENU and select options with SCROLLKEY and accept with OK.
- 4. Select CALIBRATE and press OK.
- Select two points and confirm with OK. The target max. and target min. volumes are shown on the display.
- 6. Press EDIT and change the actual max. volume with the SCROLLKEY and accept with OK.
- 7. Change the actual min. volume with the SCROLLKEY and accept with OK.
- 8. A text SAVE? appears on the display.
- 9. Accept with YES
- 10. The adjustment has been changed.

One point calibration

The one point calibration can be used if a single specific volume must be calibrated. The calibration volume can be selected from the entire volume range. Note that the accuracy of other volumes changes also and the performance for other volumes cannot be assured.

- 1. Do the pipetting series with calibration volume.
- 2. Calculate the results.
- 3. Press MENU and select options with SCROLLKEY and accept with OK.
- 4. Select CALIBRATE and press OK.
- 5. Select one point and confirm with OK. The calibration volume is shown on the display.
- 6. Press EDIT and change the calibration volume with the SCROLLKEY and accept with OK.
- 7. Change the actual volume with the SCROLLKEY and accept with OK.
- 8. A text SAVE? appears on the display.
- 9. Accept with YES
- 10. The adjustment has been changed.

Formulas for calculating results

Conversion of mass to volume

 $V = (w + e) \times Z$

 $V = volume (\mu I)$

w = weight (mg)

e = evaporation loss (mg) Z = conversion factor for mg/µl conversion

Evaporation loss can be significant with low volumes. To determine mass loss, dispense water

to the weighing vessel, note the reading and start a stopwatch. See how much the reading decreases during 30 seconds (e.g. 6mg = 0.2mg/s).

Compare this to the pipetting time from tareing to reading. Typically pipetting time might be 10 seconds and the mass loss is $2 \text{ mg}(10 \text{ s} \times 0.2 \text{ mg/s})$ in this example. If an evaporation trap or lid on the vessel is used the correction of evaporation is usually unnecessary.

The factor Z is for converting the weight of the water to volume at test temperature and pressure. A typical value is 1.0032μ //mg at 22°C and 95 kPa. See the conversion table on page 64.

Accuracy (systematic error)

Accuracy is the difference between the dispensed volume and the selected volume of a pipette.

V_o = nominal volume

Accuracy can be expressed as a relative value: A% = 100% x A / V

Precision (random error)

 $A = \overline{V} - V_{a}$

Precision refers to the repeatability of the pipettings. It is expressed as standard deviation (s) or coefficient of variation (cv)

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

$$S = \text{standards deviation}$$

$$\overline{V} = \text{mean volume}$$

$$n = \text{number of measurements}$$

Standard deviation can be expressed as a relative value (CV) $CV = 100\% \times S / \overline{V}$

Maintenance

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

The part # refer to exploded views beginning at page 65.

Daily checking

The pipette should be checked at the beginning of each day for dust and dirt on the outside surfaces of the pipette. Particular attention should be paid to the tip cone. No other solvents except 70 % ethanol should be used to clean the pipette.

Short-term service

If the pipette is used daily it should be checked and lubricated every three months. The servicing procedure starts with choosing the Service-mode from the menu (Menu -> Options -> Service).

Pipettes up to 1000 µl

- 1. Remove the lower tip ejector sleeve 13 by pulling it out (snap fitting).
- Push down the ejector button and take the upper ejector top 11 between fingers.
- 3. Release the ejector button to up position, but hold the tip ejector top 11 in down position with the fingers.
- 4. Remove the tip cone by pulling it out (snap fitting).
- 5. Press and hold the trigger down to drive out the piston.
- Insert the special piston removal tool and pull out the piston 14. The number 2 end is for 300µl and 1000µl pistons, the number 1 end for all the smaller volumes. See picture. Release the trigger.
- 7. Check the tip cone for foreign particles.
- 8. Grease the cleaned parts with the lubricant that comes with the pipette.
- 9. Reassemble the pipette components.
- 10. Insert carefully the piston to the tip cone.
- Push the tip cone back to the handle while holding the ejector top 11 down, until you hear a "click".
- 12. Press trigger to reconnect the piston to drive mechanism.
- 13. Press READY to return from service mode.

5ml and 10ml pipettes

- 1. Pull down the lower tip ejector sleeve.
- 2. Note that the tip ejector button is in fully up position.
- 3. Remove the tip cone by pulling it out (snap fitting).
- 4. Remove the ejector sleeve by pulling it to two parts (snap fitting). 1
- 5. Push the snap joints to release and remove the cylinder 14.
- 6. Push forward and clean the piston with a dry napless cloth.
- 7. Check the tip cone for foreign particles.
- 8. Grease the cleaned parts with the lubricant that comes with the pipette.
- 9. Reassemble the pipette components in reverse order.
- 10. Push the tip cone back to the handle while holding the ejector top 11 down, until you hear a "click"

2

- 11. Press trigger to reconnect the piston to drive mechanism.
- 12. Press READY to return from service mode.

Long-term service

If the pipette is used daily it should be serviced every six months. The servicing procedure starts with the disassembly of the pipette.

Pipettes up to 1000 µl

- 1. Remove the lower tip ejector sleeve 13 by pulling it out (snap fitting).
- 2. Push down the ejector button and take the upper ejector top 11 between fingers.
- 3. Release the ejector button to up position, but hold the tip ejector top 11 in down position with the fingers.
- 4. Remove the tip cone by pulling it out (snap fitting).
- 5. Press and hold the trigger down to drive out the piston.

- Insert the special piston removal tool and pull out the piston 14. The number 2 end is for 300µl and 1000µl pistons, the number 1 end for all the smaller volumes. See picture on page 12. Release the trigger.
- 7. Remove spring hatch 25 by pressing it down and in the same time turning 90 degrees. Take out the spring 16.
- 8. Remove the rest of the parts from tip cone with the piston.
- 9. Clean the parts with a dry napless cloth.
- 10. Check the tip cone for foreign particles.
- 11. Grease the cleaned parts with the lubricant that comes with the pipette.

5ml and 10ml pipettes

The long-term service for 5ml and 10ml pipettes is the same as short-term service.

Reassembly:

1-10µl pipettes

- 1. Put the spring hatch 25, the spring 16, spring support 17 and the tube 18 back on the piston.
- 2. Slide the bigger O-ring 19, smaller O-ring 20 and tube 21 on the piston.
- 3. Slide the small spring 22, spring support 23 and O-ring 24 on the tube 21.
- 4. Carefully slide the entire assembly into the tip, then push the spring hatch 25 down and turn it 90 degrees.
- 5. Take the upper ejector top 11 between fingers and pull it down.
- 6. Push the tip cone into the handle while holding the ejector top 11 down, until you hear a "click".
- 7. Reassemble the lower tip ejector sleeve 13 (snap fitting).
- 8. Press trigger to reconnect the piston to drive mechanism.
- 9. Press READY to return from service mode.

5-50µl pipettes:

- 1. Put the spring hatch 25, the spring 16, spring support 17 and the tube 18 back on the piston.
- 2. Slide the bigger O-ring 19, smaller O-ring 20 and O-ring support 21 on the piston.
- 3. Slide the small spring 22 on the piston.
- 4. Carefully slide the entire assembly into the tip, then push the spring hatch 25 down and turn it 90 degrees.
- 5. Take the upper ejector top 11 between fingers and pull it down.
- 6. Push the tip cone into the handle while holding the ejector top 11 own, until you hear a "click".
- 7. Reassemble the lower tip ejector sleeve 13 (snap fitting).
- 8. Press trigger to reconnect the piston to drive mechanism.
- 9. Press READY to return from service mode.

10-100µl pipette:

- 1. Put the spring hatch 25, the spring 16, spring support 17 and the O-ring 20 back on the piston.
- 2. Carefully slide the entire assembly into the tip, then push the spring hatch 25 down and turn it 90 degrees.
- 3. Take the upper ejector top 11 between fingers and pull it down.
- 4. Push the tip cone into the handle while holding the ejector top 11 down, until you hear a "click".
- 5. Reassemble the lower tip ejector sleeve 13 (snap fitting).
- 6. Press trigger to reconnect the piston to drive mechanism.
- 7. Press READY to return from service mode.

30-300µl pipette:

- 1. Put the spring hatch 25, the spring 16, spring support 17 and the O-ring 20 back on the piston.
- 2. Carefully slide the entire assembly into the tip, then push the spring hatch 25 down and turn it 90 degrees.
- 3. Take the upper ejector top 11 between fingers and pull it down.
- 4. Push the tip cone into the handle while holding the ejector top 11 down, until you hear a "click".
- 5. Reassemble the lower tip ejector sleeve 13 (snap fitting).
- 6. Press trigger to reconnect the piston to drive mechanism.
- 7. Press READY to return from service mode.

100-1000µl pipettes:

- 1. Put the spring hatch 25, the spring 16, spring support 17 and the O-ring 20 back on the piston.
- 2. Carefully slide the entire assembly into the tip cone.
- 3. Push the spring hatch 25 down and turn it 90 degrees.
- 4. Take the upper ejector top 11 between fingers and pull it down.

- 5. Push the tip cone into the handle while holding the ejector top 11 down, until you hear a "click".
- 6. Reassemble the lower tip ejector sleeve 13 (snap fitting).
- 7. Press trigger to reconnect the piston to drive mechanism.
- 8. Press READY to return from service mode.

Sterilization

The tip cone module can be sterilized by autoclaving it at 121°C The tip cone module can be sterilized by autoclaving it at 121°C (252°F) for 20 minutes. You can use steam sterilization bags if needed.

- 1. Remove the lower tip ejector sleeve 13 by pulling it out (snap fitting).
- 2. Push down the ejector button and take the upper ejector top 11 between fingers.
- 3. Release the ejector button to up position, but hold the tip ejector top 11 in down position with the fingers.
- 4. Remove the tip cone by pulling it out (snap fitting).
- 5. Press and hold the trigger down to drive out the piston.
- Insert the special piston removal tool and pull out the piston 14. The number 2 end is for 300 µl and 1000 µl pistons, the number 1 end for all the smaller volumes. See picture on page 12. Release the trigger.
- Remove spring hatch 25 by pressing it down and in the same time turning 90 degrees. Take out the spring 16.
- 8. Autoclave all module parts at 121°C (252°F) for 20 minutes.
- 9. Let the parts cool down to room temperature for at least two hours.
- 10. With pipettes up to 100 μl reassemble the plate 25 and spring 16. With pipettes 300 μl and 1000 μl reassemble the spring 16.
- 11. Attach the module back to the pipette as described in Maintenance section.

After autoclaving the module must be cooled to room temperature for at least two hours. Before pipetting, make sure that the module is dry. We recommend that you check the calibration after every sterilization cycle.

Trouble shooting

The table below lists possible problems and their solutions.

Defect	Possible reason	Solution
Leakage	Tip incorrectly attached	Attach firmly
	Foreign particles between tip and tip cone	Clean tip cones attach new tips
	Foreign particles between the piston, the O-ring and the cylinder	Clean and grease O-ring and cylinder.
	Insufficient amount of grease on cylinder and O-ring	Grease accordingly
	O-ring damaged	Change the O-ring
Inaccurate	Incorrect operation	Follow instructions carefully
dispensing	Tip incorrectly attached	Attach firmly
	<i>Calibration altered: caused by misuse, for example</i>	Recalibrate according to instructions
Inaccurate dispensing with certain liquids	Unsuitable calibration High viscosity liquids may require recalibration	Recalibrate with the liquids in question
No dispensing	Pistons stuck or not connected	Remove tip cone module. Move piston by hand or with piston removal tool. Attach the module in service mode.

CAUTION!

The Finnpipette is designed to allow easy in-lab service. If you would prefer to have us or your local representative service your pipette, please make sure that the pipette 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.

Conversion table

Value of the conversion factor Z ($\mu l/mg$), as a function of temperature and pressure, for distilled water.

Umrechnungstabelle

Wert des Umrechnungsfaktors Z ($\mu\text{I}/\text{mg}$) als eine Funktion von Temperatur und Druck für destilliertes Wasser.

Table de conversion

Valeur du facteur de conversion Z ($\mu l/mg$), comme fonction de la température et de la pression, pour de l'eau distillée.

Tabla de conversiones

Valor del factor de conversión Z ($\mu l/mg$), como función de temperatura y presión, para el agua destilada.

変換係数表

変換係数 Z (μ 1/mg)は温度と気圧の関数になります。蒸留水の場合の値を表に示します。

Temper- ature °C			Air pressu hPA (mbar	re r)		
	800	853	907	960	1013	1067
15	1.0018	1.0018	1.0019	1.0019	1.0020	1.0020
15.5	1.0018	1.0018	1.0019	1.0020	1.0020	1.0021
16	1.0019	1.0020	1.0020	1.0021	1.0021	1.0022
16.5	1.0020	1.0020	1.0021	1.0022	1.0022	1.0023
17	1.0021	1.0021	1.0022	1.0022	1.0023	1.0023
17.5	1.0022	1.0022	1.0023	1.0023	1.0024	1.0024
18	1.0022	1.0023	1.0024	1.0024	1.0025	1.0025
18.5	1.0023	1.0024	1.0025	1.0025	1.0026	1.0026
19	1.0024	1.0025	1.0025	1.0026	1.0027	1.0027
19.5	1.0025	1.0026	1.0026	1.0027	1.0028	1.0028
20	1.0026	1.0027	1.0027	1.0028	1.0029	1.0029
20.5	1.0027	1.0028	1.0028	1.0029	1.0030	1.0030
21	1.0028	1.0029	1.0030	1.0030	1.0031	1.0031
21.5	1.0030	1.0030	1.0031	1.0031	1.0032	1.0032
22	1.0031	1.0031	1.0032	1.0032	1.0033	1.0033
22.5	1.0032	1.0032	1.0033	1.0033	1.0034	1.0035
23	1.0033	1.0033	1.0034	1.0035	1.0035	1.0036
23.5	1.0034	1.0035	1.0035	1.0036	1.0036	1.0037
24	1.0035	1.0036	1.0036	1.0037	1.0038	1.0038
24.5	1.0037	1.0037	1.0038	1.0038	1.0039	1.0039
25	1.0038	1.0038	1.0039	1.0039	1.0040	1.0041
25.5	1.0039	1.0040	1.0040	1.0041	1.0041	1.0042
26	1.0040	1.0041	1.0042	1.0042	1.0043	1.0043
26.5	1.0042	1.0042	1.0043	1.0043	1.0044	1.0045
27	1.0043	1.0044	1.0044	1.0045	1.0045	1.0046
27.5	1.0044	1.0045	1.0046	1.0046	1.0047	1.0047
28	1.0046	1.0046	1.0047	1.0048	1.0048	1.0049
28.5	1.0047	1.0048	1.0048	1.0049	1.0050	1.0050
29	1.0049	1.0049	1.0050	1.0050	1.0051	1.0052
29.5	1.0050	1.0051	1.0051	1.0052	1.0052	1.0053
30	1.0052	1.0052	1.0053	1.0053	1.0054	1.0055





Tip Ordering Information Bestellinformation: Pipettenspitzen Renseignements pour commander des cônes Información para pedidos de puntas

チップの注文について

Code	Finntip	Volume	Qty
9400310	10	0,2-10 µl	1000/bag
9400300	10	0,2-10 µl	10x96/rack
9400360	50	0,2-50 µl	1000/bag
9400370	50	0,2-50 µl	10x384/rack
9400130	200 Ext	5-200 µl	10x96/rack
9400260	250 Univ.	0,5-250 µl	10x96/rack
9401250	300	5-300 µl	10x96/rack
94060510	Flex 300	0,5-300 µl	10x96/rack
9401070	1000	100-1000 µl	200/box
9401110	1000	100-1000 µl	10x96/rack
94060810	Flex 1200	100-1200 µl	10x96/rack
9402070	5 ml	1-5 ml	5x54/rack
9402160	10 ml	2-10 ml	5x24/rack

