



# **Finnpipette® F3** **Single Channel** **Variable & Fixed Volume** **Multichannel**

**Instructions for Use**

This product complies with the European Union Directive 98/79/EC, and it is marked with a CE-marking.

When the product is used in applications related to the directive 98/79/EC, read the additional information at [\*\*www.thermofisher.com\*\*](http://www.thermofisher.com) or contact the manufacturer at [\*\*info.pipettes@thermofisher.com\*\*](mailto:info.pipettes@thermofisher.com) to ensure correct and safe use.

The CE-mark covers the system containing the CE-marked Finnpiptette F3 pipette and the CE-marked Finntips.

Product specifications are subject to change without prior notice. Finnpiptette® and Finntip® are registered trademarks of Thermo Fisher Scientific Oy.

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## Product description

The Finnpiquette F3 is a continuously adjustable, general purpose micropipette for sampling and dispensing accurate liquid volumes.

It operates on an air displacement principle (i.e. an air interface) and uses detachable, disposable tips.

The adjusted delivery volume is displayed digitally on a readout window in the handle.

The twelve different models of Finnpiquette F3 pipettes cover a volume range from 0.2 µl to 10 ml.

<b>Order No.</b>	<b>Volume Range</b>	<b>Color code</b>	<b>Finntip</b>
4640110	0,2 µl to 2 µl	pink	Flex 10, 10, 20, 50
4640000	1 µl to 10 µl	pink	Flex 10, 10, 20, 50
4640010	1 µl to 10 µl	yellow	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4640020	2 µl to 20 µl	turquoise	50
4640030	2 µl to 20 µl	yellow	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4640080	5 µl to 50 µl	turquoise	50
4640090	5 µl to 50 µl	yellow	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4640040	10 µl to 100 µl	yellow	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4640050	20 µl to 200 µl	yellow	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4640060	100 µl to 1000 µl	blue	Flex 1000, 1000, 1000 Ext
4640100	0,5 ml to 5 ml	green	5 ml
4640070	1 ml to 10 ml	red	10 ml, Flex 10 ml Ext

The eleven different models of Finnpiquette F3 Fixed Volume pipettes cover a volume range from 1 µl to 10 ml.

<b>Order No.</b>	<b>Volume Range</b>	<b>Color code</b>	<b>Finntip</b>
4650000	1 µl	dark blue	Flex 10, 10, 20, 50
4650010	5 µl	dark blue	Flex 10, 10, 20, 50
4650020	10 µl	dark blue	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4650090	20 µl	dark blue	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4650030	25 µl	dark blue	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4650040	50 µl	dark blue	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4650050	100 µl	dark blue	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4650100	200 µl	dark blue	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4650060	250 µl	dark blue	Flex 1000, 1000, 1000 Ext
4650070	500 µl	dark blue	Flex 1000, 1000, 1000 Ext
4650080	1000 µl	dark blue	Flex 1000, 1000, 1000 Ext

The four different models of Finnpiquette F3 Multichannel pipettes cover a volume range from 5 µl to 300 µl.

<b>Order No.</b>	<b>Channel</b>	<b>Volume Range</b>	<b>Color code</b>	<b>Finntip</b>
4660010	8	5 µl to 50 µl	yellow	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4660040	12	5 µl to 50 µl	yellow	Flex 200, 250 Univ., 200 Ext, 300, Flex 300
4660020	8	30 µl to 300 µl	orange	Flex 300, 300
4660050	12	30 µl to 300 µl	orange	Flex 300, 300

### Digital display

The adjusted delivery volume is clearly indicated in the large digital display on the handle.



### Raw materials

The Finnpiquette F3 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 Finnpiquette F3.


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

## Package

The Finnpiquette F3 is shipped in a specially designed package containing the following items:

1. The Finnpiquette
2. Service tool
3. Multichannel service tool
4. Instructions for Use
5. Calibration certificate / Warranty certificate

## Safety

Cautions are marked with this symbol .

### Intended use

The intended use of the device is to transfer liquids in the volume range of 0,2 µl to 10 ml. The F3 Finnpiquette pipette and Finntips are designed as a component of an analyzing system for an end user, who is responsible for validating the system to ensure reliable and safe results.



### Damage to health

- ▶ Follow general procedures for hazard prevention and safety instructions; e.g. wear protective clothing, eye protection and gloves.
- ▶ For use and waste disposal of hazardous (e.g. radioactive and potentially infectious) material, follow the safety instructions and general laboratory practice.
- ▶ The pipette and tips are not intended for in vivo use. Do not use the pipette for pipetting any liquid to be injected into a human body.
- ▶ Do not eject the tip towards anybody.

The Finnpiquette F3 is to be used by trained personnel with required laboratory skills. The instructions for use must be read prior to and during the use of the device (pipette and tip). The F3 pipette can be used between +4°C and +40°C.



### Incorrect dispensing results

- ▶ Performance may vary due to:
  - a. pipetting method (forward pipetting technique recommended)
  - b. temperature (air, liquid, vessel, pipette, and tip)
  - c. pressure
  - d. humidity
  - e. operator, e.g. thumb movement, pipetting angle
  - f. liquid density, viscosity and vapor pressure
  - g. type of tip
- ▶ If the pipetting performance is critical to the outcome of a specific application, the result has to be assured with an alternative test, and if this is not an option, by duplicate testing. The possibility of an incorrect volume delivery during pipetting cannot be entirely mitigated.
- ▶ To avoid inaccurate dispensing and/or leakage, check that the tip is properly attached to the pipette.
- ▶ When rotating the volume adjustment button, do not exceed the volume range of the pipette. Otherwise the pipette may be damaged or affect pipetting performance.
- ▶ Pipetting performance cannot be guaranteed if the tip is reused.
- ▶ Choose only a tip and pipette with matching color coding.

## Disposal of the Materials

Follow laboratory and country-specific procedures for the disposal of biohazardous or radioactive waste. Refer to local regulations for the disposal of infectious material.

**Warning** The tips can be potentially infectious. Dispose of all used disposable tips as biohazardous waste.

**Warning** Decontaminate the pipette before disposal.

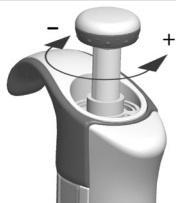
Waste disposal according to local instructions taking into account legislation in place. For more information, please contact us at [info.pipettes@thermofisher.com](mailto:info.pipettes@thermofisher.com) or your local Thermo Fisher Scientific representative.

Regarding the original packaging and packing materials, use the recycling operators known to you.

## Pipette operation

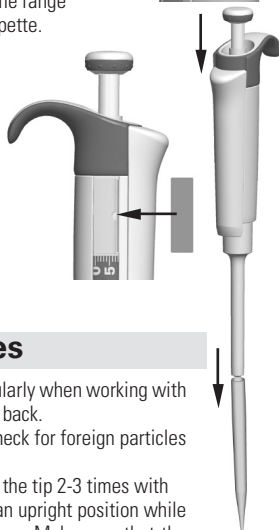
### Setting the delivery volume

1. Set the delivery volume using the push button on the top of the pipette. To increase the delivery volume, turn the push button counterclockwise. To decrease the delivery volume, turn it clockwise.
2. Make sure that the desired delivery volume clicks into place.
3. Do not set volumes outside the pipette's specified volume range. Using excessive force to turn the push button outside the range may jam the mechanism and eventually damage the pipette.



### Safety Label

You can mark the pipette application, your initials, the calibration date, etc. on the safety label. Remove the old label with a sharp needle. Mark the new label with a pencil and slide the label back in place.



### Tip ejection

To help eliminate the risk of contamination, each pipette is fitted with a tip ejector system. To release the tip, point the pipette at suitable waste receptacle and press the tip ejector with your thumb.

## Pipetting techniques

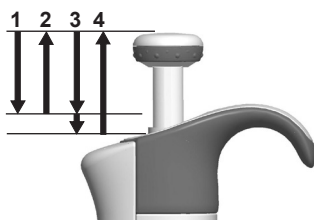
Push and release the push button slowly at all times particularly when working with high viscosity liquids. Never allow the push button to snap back. Make sure that the tip is firmly attached to the tip cone. Check for foreign particles in the tip.

Before you begin your actual pipetting work, fill and empty the tip 2-3 times with the solution that you will be pipetting. Hold the pipette in an upright position while aspirating liquid. The grippy should rest on your index finger. Make sure that the tips, pipette and solution are at the same temperature.

### Forward technique

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

1. Depress the push button to the first stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm and slowly release the push button. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.

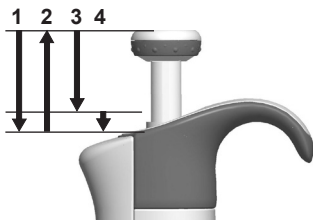


3. Deliver the liquid by gently depressing the push button to the first stop. After a delay of about one second, continue to depress the push button all the way to the second stop. This action will empty the tip.
4. Release the push button to the ready position. If necessary, change the tip and continue pipetting.

## 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.

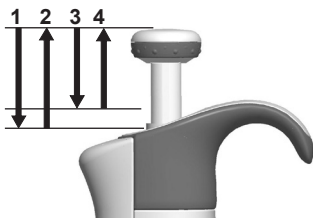
1. Depress the push button all the way to the second stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm, and slowly release the push button. This action will fill the tip. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the preset volume by gently depressing the push button to the first stop. Hold the push button at the first stop. Some liquid will remain in the tip and this should not be included in the delivery.
4. The remaining liquid should either be discarded with the tip or pipetted back into the container.



## 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. Depress the push button all the way to the second stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm, and slowly release the push button. This action will fill the tip. Withdraw the tip from the liquid touching against the edge of the reservoir to remove excess liquid.
3. Deliver the preset volume by gently depressing the push button to the first stop. Hold the push button at the first stop. Some liquid will remain in the tip and this should not be included in the delivery.
4. Continue pipetting by repeating steps 3 and 4.



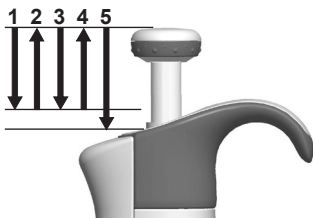
## Pipetting of heterogeneous samples

(deproteinization in blood glucose determination, for example)

Use steps 1 and 2 of the forward technique to fill the tip with blood.

Wipe the tip carefully with a dry clean tissue.

1. Immerse the tip into the reagent and depress the push button to the first stop, making sure the tip is well below the surface.
2. Release the push button slowly to the ready position. This will fill the tip. Keep the tip in the solution.
3. Depress the push button to the first stop and release slowly. Keep repeating this procedure until the interior wall of the tip is clear.
4. Finally, depress the push button all the way to the second stop to completely empty the tip.



## Calibration and adjustment

All Finnpiettes are factory calibrated and adjusted to give the volumes as specified with distilled or deionized water using the forward pipetting technique. It should be noted that the use of other pipetting techniques may affect the calibration results. The pipettes are constructed to permit re-adjustment for other pipetting techniques or 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:

<b>Volume range</b>	<b>readable graduation</b>
under 10 $\mu$ l	0.00 1 mg
10-100 $\mu$ l	0.01 mg
above 100 $\mu$ l	0.1 mg

Test liquid: Water, distilled or deionized, "grade 3" water conforming ISO 3696. Tests are done in a draft-free room at a constant ( $\pm 0.5^{\circ}\text{C}$ ) temperature of water, pipette and air between  $15^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ . The relative humidity must be above 50%. Especially with volumes under 50  $\mu$ l 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.

## Procedure to check 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 is done with both volumes. A pipette is always adjusted for delivery (Ex) of the selected volume. Use of forward pipetting technique is recommended. The maximum permissible errors are designed for forward method. It is recommended to calibrate all channels of the multichannel pipette, but a suitable method is also to calibrate only the edge channels. Adjustment check prior calibration is done using one of the middle channels. It is recommended to use the ISO8655 calibration limits presented in the following tables or user-defined specifications.

### Procedure:

1. Do 10 pipettings with the minimum volume.
2. Do 10 pipettings with the maximum volume.
3. Calculate the inaccuracy (A) and imprecision (cv) of both series.
4. Compare the results to the limits.

If the calculated results are within the selected limits, the adjustment of the pipette is correct.

## ISO8655 calibration specifications

Thermo Scientific Finnpiquette F3 specifications according to ISO8655 standard.

### Finnpiquette F3 Variable Volume Single Channel

<b>Range</b>	<b>Volume <math>\mu</math>l</b>	<b>Inaccuracy <math>\mu</math>l</b>	<b>%</b>	<b>Imprecision s.d. <math>\mu</math>l</b>	<b>cv%</b>
<i>0.2-2 <math>\mu</math>l</i>	<i>2</i>	<i><math>\pm 0.080</math></i>	<i><math>\pm 4</math></i>	<i>0.040</i>	<i>2.0</i>
	<i>0.2</i>	<i><math>\pm 0.080</math></i>	<i><math>\pm 40</math></i>	<i>0.040</i>	<i>20.0</i>
<i>1-10 <math>\mu</math>l</i>	<i>10</i>	<i><math>\pm 0.120</math></i>	<i><math>\pm 1.2</math></i>	<i>0.080</i>	<i>0.8</i>
	<i>1</i>	<i><math>\pm 0.120</math></i>	<i><math>\pm 12</math></i>	<i>0.080</i>	<i>8.0</i>
<i>2-20 <math>\mu</math>l</i>	<i>20</i>	<i><math>\pm 0.20</math></i>	<i><math>\pm 1.0</math></i>	<i>0.10</i>	<i>0.5</i>
	<i>2</i>	<i><math>\pm 0.20</math></i>	<i><math>\pm 10.0</math></i>	<i>0.10</i>	<i>5.0</i>
<i>5-50 <math>\mu</math>l</i>	<i>50</i>	<i><math>\pm 0.50</math></i>	<i><math>\pm 1.0</math></i>	<i>0.20</i>	<i>0.4</i>
	<i>5</i>	<i><math>\pm 0.50</math></i>	<i><math>\pm 10</math></i>	<i>0.20</i>	<i>4.0</i>
<i>10-100 <math>\mu</math>l</i>	<i>100</i>	<i><math>\pm 0.80</math></i>	<i><math>\pm 0.8</math></i>	<i>0.30</i>	<i>0.3</i>
	<i>10</i>	<i><math>\pm 0.80</math></i>	<i><math>\pm 8.0</math></i>	<i>0.30</i>	<i>3.0</i>
<i>20-200 <math>\mu</math>l</i>	<i>200</i>	<i><math>\pm 1.60</math></i>	<i><math>\pm 0.8</math></i>	<i>0.60</i>	<i>0.3</i>
	<i>20</i>	<i><math>\pm 1.60</math></i>	<i><math>\pm 8.0</math></i>	<i>0.60</i>	<i>3.0</i>
<i>100-1000 <math>\mu</math>l</i>	<i>1000</i>	<i><math>\pm 8.0</math></i>	<i><math>\pm 0.8</math></i>	<i>3.0</i>	<i>0.3</i>
	<i>100</i>	<i><math>\pm 8.0</math></i>	<i><math>\pm 8.0</math></i>	<i>3.0</i>	<i>3.0</i>
<i>0.5-5 ml</i>	<i>5000</i>	<i><math>\pm 40.0</math></i>	<i><math>\pm 0.8</math></i>	<i>15.0</i>	<i>0.3</i>
	<i>500</i>	<i><math>\pm 40.0</math></i>	<i><math>\pm 8.0</math></i>	<i>15.0</i>	<i>3.0</i>
<i>1-10 ml</i>	<i>10000</i>	<i><math>\pm 60.0</math></i>	<i><math>\pm 0.6</math></i>	<i>30.0</i>	<i>0.3</i>
	<i>1000</i>	<i><math>\pm 60.0</math></i>	<i><math>\pm 6.0</math></i>	<i>30.0</i>	<i>3.0</i>



**Finnpipette F3 Fixed Volume Single Channel**

<i>Fixed Volume</i> <i>µl</i>	<i>Inaccuracy</i>		<i>Imprecision</i>	
	<i>µl</i>	<i>%</i>	<i>s.d.µl</i>	<i>cv%</i>
1	±0.050	±5.00	0.050	5.00
5	±0.125	±2.50	0.075	1.50
10	±0.120	±1.20	0.080	0.80
20	±0.20	±1.00	0.10	0.50
25	±0.50	±2.00	0.20	0.80
50	±0.50	±1.00	0.20	0.40
100	±0.80	±0.80	0.30	0.30
200	±1.6	±0.80	0.60	0.30
250	±4.0	±1.60	1.50	0.60
500	±4.0	±0.80	1.50	0.30
1000	±8.0	±0.80	3.00	0.30

**Finnpipette F3 Variable Volume Multichannel**

<i>Range</i>	<i>Channel</i>	<i>Volume</i> <i>µl</i>	<i>Inaccuracy</i>		<i>Imprecision</i>	
			<i>µl</i>	<i>%</i>	<i>s.d.µl</i>	<i>cv%</i>
5-50 µl	8, 12	50	±1.0	±2.0	0.4	0.8
		5	±1.0	±20	0.4	8.0
30-300 µl	8, 12	300	±8.0	±2.7	3.0	1.0
		30	±8.0	±26.7	3.0	10.0

**Manufacturer specification limits**

**Finnpipette F3 Variable Volume Single Channel**

<i>Range</i>	<i>Volume</i> <i>µl</i>	<i>Inaccuracy</i>		<i>Imprecision</i>		<i>Factory calibration tip</i>
		<i>µl</i>	<i>%</i>	<i>s.d. µl</i>	<i>cv%</i>	
0.2-2 µl	2	±0,050	±2,50	0,040	2,00	Flex 10
	0,2	±0,024	±12,00	0,020	10,00	
1-10 µl, micro	10	±0,100	±1,00	0,050	0,50	Flex 10
	1	±0,025	±2,50	0,020	2,00	
1-10 µl	10	±0,100	±1,00	0,080	0,80	Flex 200
	1	±0,035	±3,50	0,030	3,00	
2-20 µl, micro	20	±0,20	±1,00	0,08	0,40	50
	2	±0,06	±3,00	0,05	2,50	
2-20 µl	20	±0,20	±1,00	0,08	0,40	Flex 200
	2	±0,06	±3,00	0,05	2,50	
5-50 µl, micro	50	±0,30	±0,60	0,15	0,30	50
	5	±0,15	±3,00	0,125	2,50	
5-50 µl	50	±0,30	±0,60	0,15	0,30	Flex 200
	5	±0,15	±3,00	0,125	2,50	
10-100 µl	100	±0,80	±0,80	0,20	0,20	Flex 200
	10	±0,30	±3,00	0,10	1,00	
20-200 µl	200	±1,2	±0,60	0,4	0,20	Flex 200
	20	±0,36	±1,80	0,14	0,70	
100-1000 µl	1000	±6,0	±0,60	2,0	0,20	Flex 1000
	100	±1,0	±1,00	0,6	0,60	
0,5-5 ml	5000	±25,0	±0,50	10,0	0,20	5 ml
	500	±10,0	±2,00	4,0	0,80	
1-10 ml	10000	±50,0	±0,50	20,0	0,20	10 ml
	1000	±20,0	±2,00	8,0	0,80	

## Finnpipette F3 Fixed Volume Single Channel

<b>Fixed Volume</b> <b>µl</b>	<b>Inaccuracy</b> <b>µl</b>	<b>%</b>	<b>Imprecision</b> <b>s.d. µl</b>	<b>cv%</b>	<b>Factory</b> <b>calibration tip</b>
1	±0,040	±4,00	0,040	4,00	Flex 10
5	±0,070	±1,40	0,070	1,40	Flex 10
10	±0,090	±0,90	0,080	0,80	Flex 200
20	±0,14	±0,70	0,10	0,50	Flex 200
25	±0,15	±0,60	0,125	0,50	Flex 200
50	±0,30	±0,60	0,20	0,40	Flex 200
100	±0,40	±0,40	0,30	0,30	Flex 200
200	±0,80	±0,40	0,60	0,30	Flex 200
250	±1,0	±0,40	0,75	0,30	Flex 1000
500	±1,5	±0,30	1,5	0,30	Flex 1000
1000	±3,0	±0,30	3,0	0,30	Flex 1000

## Finnpipette F3 Variable Volume Multichannel

<b>Range</b>	<b>Channels</b>	<b>Volume</b> <b>µl</b>	<b>Inaccuracy</b> <b>µl</b>	<b>%</b>	<b>Imprecision</b> <b>s.d. µl</b>	<b>cv%</b>	<b>Factory</b> <b>calibration tip</b>
5-50 µl	8, 12	50	±0,75	±1,50	0,35	0,70	Flex 200
		5	±0,25	±5,00	0,10	2,00	
30-300 µl	8, 12	300	±3,0	±1,00	0,9	0,30	Flex 300
		30	±1,5	±5,00	0,6	2,00	

## Adjustment

Adjustment is done only for one volume. The recommended adjustment volume is the minimum volume or 10% of the maximum volume. Multichannel pipettes adjustment check prior calibration is done using one of the middle channels.

1. Place the service tool into the openings of the calibration nut at the top of the handle.
2. Turn the service tool clockwise to increase, or counterclockwise to decrease the volume.
3. After adjustment check the calibration according to the instructions above.



## Formulas for calculating results

### Conversion of mass to volume

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

V = volume (µl)

w = weight (mg)

e = evaporation loss (mg)

Z = conversion factor for µl/mg 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. 6 mg = 0.2 mg/s).

Compare this to the pipetting time from taring to reading. Typically pipetting time might be 10 seconds and the mass loss is 2 mg (10 s x 0.2 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 1.0032 µl/mg at 22°C and 95 kPa. See the conversion table on page 14.

### Inaccuracy (systematic error)

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

$$A = \bar{V} - V_0$$

$\bar{V}$  = inaccuracy

$\bar{V}$  = mean volume

$V_0$  = nominal volume

Inaccuracy can be expressed as a relative value: **A% = 100% x A / V<sub>0</sub>**

## Imprecision (random error)

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

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

$s$	=	standards deviation
$\bar{v}$	=	mean volume
$n$	=	number of measurements

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

## Maintenance

When the Finnpiquette F3 is not in use, make sure it is stored in an upright position. We recommend a Finnpiquette stand for this purpose.

The part # refer to exploded views beginning at page 15.

### Short-term service

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.

### Long-term maintenance, single channel pipettes

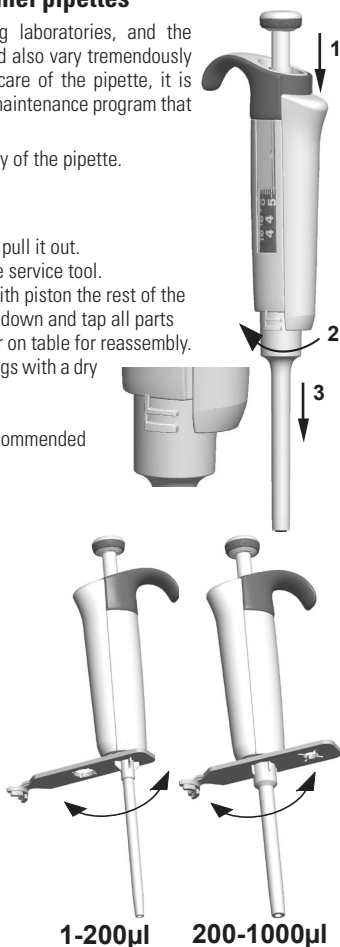
Annual pipette usage varies significantly among laboratories, and the types of substances being aspirated and dispensed also vary tremendously among laboratories. In order to maintain proper care of the pipette, it is the laboratory's responsibility to develop a proper maintenance program that meets its specific needs and requirements.

The servicing procedure starts with the disassembly of the pipette.

#### 1-1000 $\mu$ l pipettes

1. Press the tip ejector.
2. Rotate the tip ejector 11 counterclockwise and pull it out.
3. Turn out the tip cone counterclockwise with the service tool.
4. Pull out the piston and other parts. Push out with piston the rest of the piston assembly. Then turn the tip cone upside down and tap all parts from tip cone. Remember keep all parts in order on table for reassembly.
5. Clean the piston, the piston spring and the O-rings with a dry napless cloth.
6. Check the tip cone for foreign particles.
7. Grease the cleaned parts with the lubricant recommended by the manufacturer.
8. Reassemble the pipette components.

**0.2-2 $\mu$ l & 1-10  $\mu$ l:** First, slide spring 22, o-ring support 23 and o-ring 24 on the tube 21. With the 0.2-2 $\mu$ l model insert the tube 27 into the tube 21. Then slide the spring 13, spring support 16 and tubes 17 and 18, bigger o-ring 19 and smaller sealing 20 back on the piston. Compress the spring with fingers by pressing piston and spring support 16 against each other and slide the tube 21 with rest of the parts on the piston. Hold the spring compressed and carefully slide the entire assembly into the tip cone and release the spring.



**2-20 µl & 5-50 µl:** Slide the spring 13, spring support 16 and tubes 17 and 18, bigger o-ring 19 and smaller o-ring 20 back on the piston. Compress the spring with fingers by pressing piston and spring support 16 against each other and slide the bigger o-ring 19, smaller o-ring 20, spring support 21 and the spring 22 (smaller diameter against spring support 21) on the piston. Hold the spring compressed and carefully slide the entire assembly into the tip cone and release the spring.

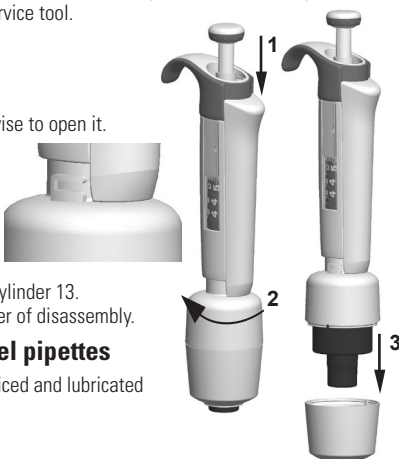
**10-100 µl & 20-200 µl:** Slide the spring 13, spring support 16 and o-ring 17 back on the piston. Slide the entire assembly into the tip cone.

**100-1000µl:** Put the o-ring 17 and support ring 16 to the tip cone. Slide the spring 13 on the piston and slide the entire assembly into the tip cone.

9. **All:** Put the spring 15 and support 14 on top of the tip cone and carefully insert the tip cone assembly to the handle. Attach the tip cone by turning it first clockwise tight by hand, then do the final tightening with the service tool.
10. Reassemble the tip ejector.

### 0.5-5ml & 1-10 ml pipettes

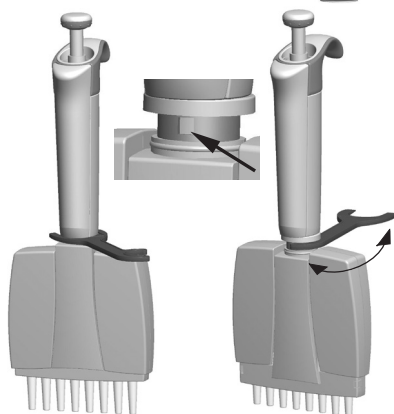
1. Press the tip ejector.
2. Rotate the tip ejector 10 counterclockwise to open it.
3. Disassemble the lower part of the tip ejector 14 (snap fitting).
4. Turn the cylinder 13 counterclockwise and pull out the tip cone assembly.
5. Remove the cylinder 13 by pressing the snaps fittings of the cylinder.
6. Clean and regrease the O-ring 12 and cylinder 13.
7. Assemble the parts in the opposite order of disassembly.



### Long-term service, multichannel pipettes

If the pipette is used daily it should be serviced and lubricated every three months.

1. Place the service tool head#1 between ring 15 and ejector 23. Push the tool until the parts snap from each other.
2. Check that the ejector lever is in up position and pull down the tip ejector part of the module. Place the service tool head#2 in the hole of adapter tube 46.
3. Open the upper end of the tip ejector slightly and remove the tip ejector.
4. Screw out the module of the handle.
5. Pull out the module spring 19 and clip 22.
6. Press the spring 13 and remove the locking pieces 12 from the groove. Remove the spring 13.
7. Take off the locking claws 44 and 45 and pull out the adapter tube 43 and tube 46.
8. Use a screwdriver to remove the four/six screws in the module cover and lift off the cover.
9. Remove the piston bar and clean the pistons and tip cones with a dry nap-free cloth.
10. If needed, service the tip cones:



Open the tip cone by carefully releasing the cover ring from its snap joint with the screwdriver. Remove all the parts from the tip cone. Clean all the parts. If needed, replace the o-rings. Take one piston. Slide cover ring 32 (larger hole), spring 34, support ring 35, (o-ring 37 bigger 5-50µl) and o-ring 36 (smaller) onto the piston. Grease the o-ring with the lubricant recommended by the manufacturer. Slide all the parts into the tip cone and close the snap joint of the cover ring. Repeat procedure to each tip cone.

11. Install the piston bar with pistons and tip cones in the cover. Place aligning studs to the same side when assembling the module. Close the cover with the four/six screws. Insert the clip 22.
12. Place the adapter tube 43 and tube 46 on the neck of the module and insert the locking claws 44 and 45. Insert the module spring 19.
13. Insert spring 13 and locking pieces 12 to the piston rod 16.
14. Place the tip ejector on the module. Push the spring 19 inside tip ejector parts and close the upper end of the ejector and keep closed with fingers.
15. Screw the module in the handle and tighten with service tool head#2.
16. Push the tip ejector lever down, until you hear a "click".

## Replacing Multichannel Pipette Tip Cones

To ensure even performance between all channels in a multichannel pipette, all tip cones have to be changed at the same time, if any of them needs to be changed. Don't mix tip cones of different packages, because one bag contains a matched set of tip cones. Place aligning studs to the same side when assembling the module. See picture on page 20.

## Sterilization

The tip cone module can be sterilized by autoclaving it at 121°C (252°F) (2 ata) for 20 minutes. You can use steam sterilization bags if needed.

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.

<b>Defect</b>	<b>Possible reason</b>	<b>Solution</b>
<i>Leakage</i>	<i>Tip incorrectly attached</i>	<i>Attach firmly</i>
	<i>Foreign particles between tip and tip cone</i>	<i>Clean tip cones attach new tips</i>
	<i>Foreign particles between the piston, the O-ring and the cylinder</i>	<i>Clean and grease O-ring and cylinder.</i>
	<i>Insufficient amount of grease on cylinder and O-ring</i>	<i>Grease accordingly</i>
<i>Inaccurate dispensing</i>	<i>O-ring damaged</i>	<i>Change the O-ring</i>
	<i>Incorrect operation</i>	<i>Follow instructions carefully</i>
	<i>Tip incorrectly attached</i>	<i>Attach firmly</i>
	<i>Calibration altered: caused by misuse, for example</i>	<i>Recalibrate according to instructions</i>
<i>Inaccurate dispensing with certain liquids</i>	<i>Tip cone (Single channel) or module (Multichannel) loose</i>	<i>Tighten the tip cone or module with the service tool.</i>
	<i>Unsuitable calibration</i>	<i>Recalibrate with the liquids in question</i>
	<i>High viscosity liquids may require recalibration</i>	

### CAUTION!

**The Finn timer 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.**

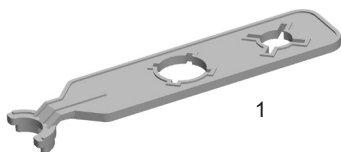
## Conversion table

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

<b>Temperature °C</b>	<b>Air pressure kPa</b>						
	80	85	90	95	100	101,3	105
15,0	1,0017	1,0018	1,0019	1,0019	1,0020	1,0020	1,0020
15,5	1,0018	1,0019	1,0019	1,0020	1,0020	1,0020	1,0021
16,0	1,0019	1,0020	1,0020	1,0021	1,0021	1,0021	1,0022
16,5	1,0020	1,0020	1,0021	1,0021	1,0022	1,0022	1,0022
17,0	1,0021	1,0021	1,0022	1,0022	1,0023	1,0023	1,0023
17,5	1,0022	1,0022	1,0023	1,0023	1,0024	1,0024	1,0024
18,0	1,0022	1,0023	1,0023	1,0024	1,0025	1,0025	1,0025
18,5	1,0023	1,0024	1,0024	1,0025	1,0025	1,0026	1,0026
19,0	1,0024	1,0025	1,0025	1,0026	1,0026	1,0027	1,0027
19,5	1,0025	1,0026	1,0026	1,0027	1,0027	1,0028	1,0028
20,0	1,0026	1,0027	1,0027	1,0028	1,0028	1,0029	1,0029
20,5	1,0027	1,0028	1,0028	1,0029	1,0029	1,0030	1,0030
21,0	1,0028	1,0029	1,0029	1,0030	1,0031	1,0031	1,0031
21,5	1,0030	1,0030	1,0031	1,0031	1,0032	1,0032	1,0032
22,0	1,0031	1,0031	1,0032	1,0032	1,0033	1,0033	1,0033
22,5	1,0032	1,0032	1,0033	1,0033	1,0034	1,0034	1,0034
23,0	1,0033	1,0033	1,0034	1,0034	1,0035	1,0035	1,0036
23,5	1,0034	1,0035	1,0035	1,0036	1,0036	1,0036	1,0037
24,0	1,0035	1,0036	1,0036	1,0037	1,0037	1,0038	1,0038
24,5	1,0037	1,0037	1,0038	1,0038	1,0039	1,0039	1,0039
25,0	1,0038	1,0038	1,0039	1,0039	1,0040	1,0040	1,0040
25,5	1,0039	1,0040	1,0040	1,0041	1,0041	1,0041	1,0042
26,0	1,0040	1,0041	1,0041	1,0042	1,0042	1,0043	1,0043
26,5	1,0042	1,0042	1,0043	1,0043	1,0044	1,0044	1,0044
27,0	1,0043	1,0044	1,0044	1,0045	1,0045	1,0045	1,0046
27,5	1,0045	1,0045	1,0046	1,0046	1,0047	1,0047	1,0047
28,0	1,0046	1,0046	1,0047	1,0047	1,0048	1,0048	1,0048
28,5	1,0047	1,0048	1,0048	1,0049	1,0049	1,0050	1,0050
29,0	1,0049	1,0049	1,0050	1,0050	1,0051	1,0051	1,0051
29,5	1,0050	1,0051	1,0051	1,0052	1,0052	1,0052	1,0053
30,0	1,0052	1,0052	1,0053	1,0053	1,0054	1,0054	1,0054

## Spare parts

**1062800 1µl-10ml**

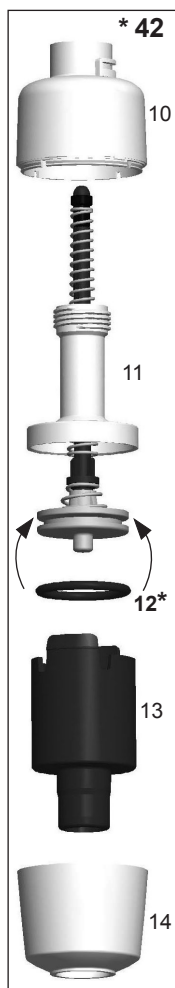


- \* 2. Cap
- \* 3. Handle
- \* 12. O-ring
- \* 42. Tip Cone assy

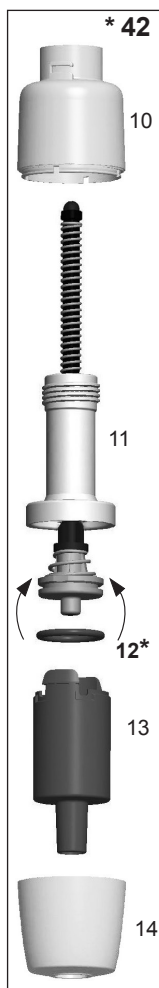
**1-10 ml**  
**0,5-5 ml**

- 2. 2210670 **Fixed 1-1000µl**
- 2. 2214770 **5 ml**
- 2. 2210480 **10 ml**
- 3. 2214780 **5 ml**
- 3. 2210150 **10 ml**
- 12. 1030230 **5 ml**
- 12. 1033050 **10 ml**
- 42. 2214800 **5 ml**
- 42. 2210290 **10 ml**

**1-10 ml**



**0.5-5 ml**

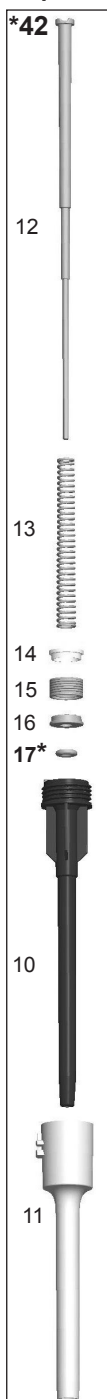


Bag of grease 1g (**Order No. 3300200**)

**100-1000µl**  
**250/500/1000µl**  
**Fixed**



**20-200µl**  
**200µl Fixed**



- \* 2. Cap
- \* 3. Handle
- \* 17. O-ring
- \* 42. Tip Cone Assy

**100-1000 µl**  
**250 / 500 / 1000 µl Fixed**

- 2. 2210470 **100-1000µl**
- 3. 2210140 **100-1000µl**
- 3. 2210210 **Fix 250µl**
- 3. 2210220 **Fix 500µl**
- 3. 2210230 **Fix 1000µl**
- 17. 1030020
- 42. 2210280

**20-200µl**  
**200 µl Fixed**

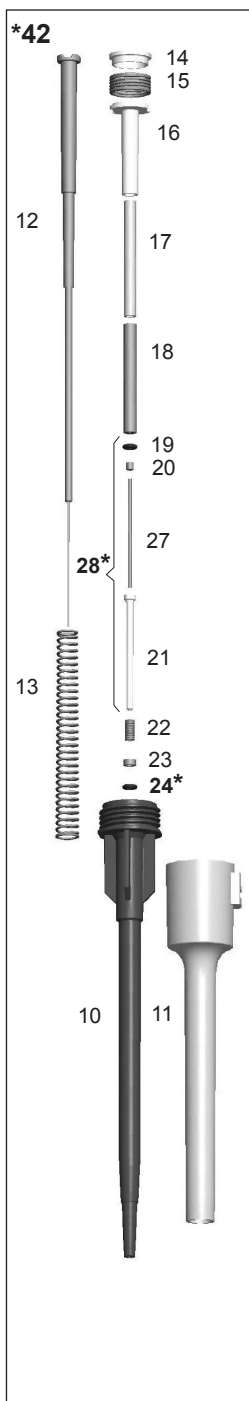
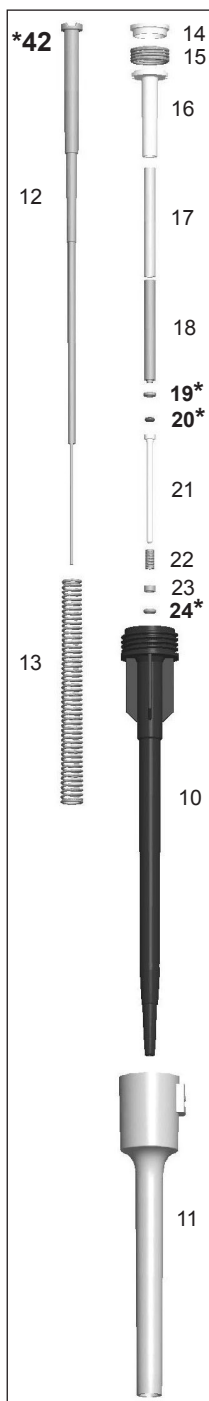
- 2. 2210460 **20-200µl**
- 3. 2210130 **20-200µl**
- 3. 2213540 **Fix 200µl**
- 17. 1030160
- 42. 2210270



2. 2210460 **5-50µl**  
2. 2210500 **5-50µl Micro**  
3. 2212960 **5-50µl**  
3. 2212940 **5-50µl Micro**  
19. 1030500  
20. 1033060  
42. 2212970 **5-50µl**  
42. 2212950 **5-50µl Micro**

**10μl Fixed**

- \* 2. Cap
- \* 3. Handle
- \* 19. O-ring
- \* 20. O-ring
- \* 24. O-ring
- \* 42. Tip Cone assy



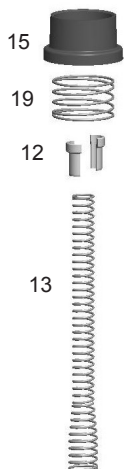
**5  $\mu$ l Fixed**

2. 2210460 **1-10µl**  
2. 2210490 **1-10µl Micro**  
3. 2210100 **1-10µl**  
3. 2210430 **1-10µl Micro**  
3. 2210450 **Fix 1µl**  
3. 2210160 **Fix 5µl**  
3. 2210170 **Fix 10µl**  
  
19. 1030380  
20. 1030060  
24. 1030170  
  
42. 2210240 **1-10µl/Fix 10µl**  
42. 2210380 **1-10µl Micro/  
Fix 1 / 5 µl**

0.2-2  $\mu$ l

2. 2210490 **0.2-2µl**  
3. 2215560 **0.2-2µl**  
24. 1030170  
28. 2205730  
42. 2215550 **0.2-2µl**

**\* 50**



**\* 2. Cap**

**\* 3. Handle**

**\* 42. Tip Cone assy**

**\* 50. Module**

**5-50 $\mu$ l**

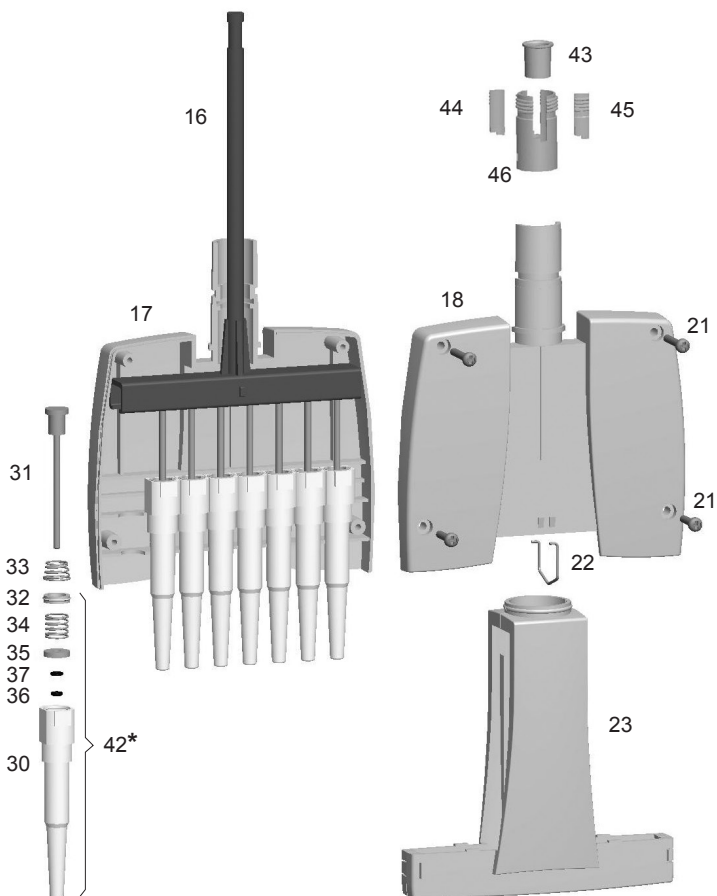
2. 2210460

3. 2212870

42. 2209090 12 pcs

50. 2212890 8-ch

50. 2212900 12-ch



**\* 50**



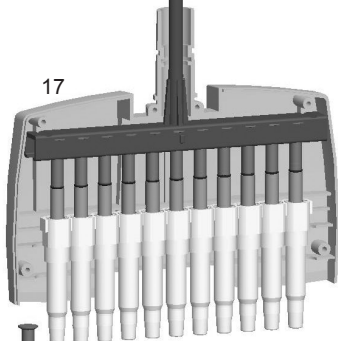
13



16



17



31



33



32



34



35



36



30



42\*

**\* 2. Cap**

**\* 3. Handle**

**\* 42. Tip Cone assy**

**\* 50. Module**

### **30-300µl**

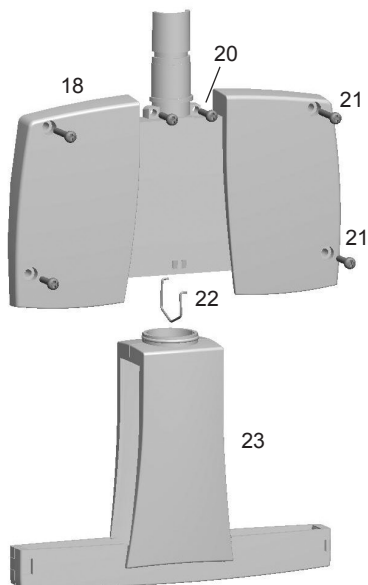
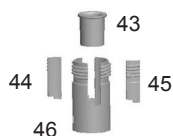
2. 2212930

3. 2212880

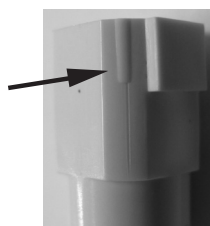
42. 2207090 12 pcs

50. 2212910 8-ch

50. 2212920 12-ch



**Picture**



	Finntip (sterile and non-sterile)										Finntip Filter (sterile)																														
	10 Micro	10 Flex Micro	20 Micro	50 Micro	250 univ	200 ext	200 Flex	300	300 Flex	1000 Ext	1000	1000 Flex	1200 Flex	5 ml	10ml	10ml Flex Ext	10 Micro	10 Flex Micro	10 Univ	20 Univ	20 Micro	30 Univ	30 Flex	50 Micro	100 Ext	100 Univ	100 Flex	200 Ext	200 Univ	200 Flex	300	300 Flex	1000 Ext	1000	1000 Flex	1200 Flex	5 ml	10ml	10ml Flex Ext		
FP F3 0.2 - 2 µl micro	*	*	*	*													*	*			*	*	*	*																	
FP F3 1 - 10 µl micro	*	*	*	*													*	*			*	*	*	*																	
FP F3 1 - 10 µl					*	*	*	*	*										*		*	*	*	*																	
FP F3 2 - 20 µl micro			*	*																*		*	*	*																	
FP F3 2 - 20 µl				*	*	*	*	*	*										*		*	*	*	*																	
FP F3 5 - 50 µl micro			*	*																	*	*	*	*																	
FP F3 5 - 50 µl				*	*	*	*	*	*														*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 10 - 100 µl				*	*	*	*	*	*														*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 20 - 200 µl				*	*	*	*	*	*														*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 100 - 1000 µl										*	*	*	*	*														*	*	*	*	*	*	*	*	*	*	*	*	*	*
FP F3 0.5 - 5 ml														*																							*	*	*	*	
FP F3 1 - 10 ml															*	*																						*	*	*	
FP F3 Fixed Volume 1µl	*	*	*	*													*	*		*	*	*	*	*																	
FP F3 Fixed Volume 5µl	*	*	*	*													*	*		*	*	*	*	*																	
FP F3 Fixed Volume 10µl				*	*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 Fixed Volume 20µl				*	*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 Fixed Volume 25µl				*	*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 Fixed Volume 50µl				*	*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 Fixed Volume 100µl				*	*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 Fixed Volume 200µl				*	*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 Fixed Volume 250µl										*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 Fixed Volume 500µl										*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 Fixed Volume 1000µl										*	*	*	*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 8-Ch 5-50 µl				*	*	*	*	*	*														*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 12-Ch 5-50 µl				*	*	*	*	*	*														*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
FP F3 8-Ch 30-300 µl							*	*	*																					*	*	*	*	*	*	*	*	*	*	*	
FP F3 12-Ch 30-300 µl							*	*	*																					*	*	*	*	*	*	*	*	*	*	*	

## Tip Ordering Information

Code	Finntip	Volume	Qty
* 9400300	10 Micro	0,2-10 µl	10x96/rack
9400303	10 Micro sterile	0,2-10 µl	10x96/rack
* 94060100	Flex 10	0,2-10 µl	10x96/rack
94060103	Flex 10 sterile	0,2-10 µl	10x96/rack
* 9400610	20 Micro	0,2-20 µl	10x384/rack
9400613	20 Micro sterile	0,2-20 µl	10x384/rack
* 9400370	50 Micro	0,2-50 µl	10x384/rack
9400373	50 Micro sterile	0,2-50 µl	10x384/rack
* 9400130	200 Ext	5-200 µl	10x96/rack
9400133	200 Ext sterile	5-200 µl	10x96/rack
* 94060310	Flex 200	1-200 µl	10x96/rack
94060313	Flex 200 sterile	1-200 µl	10x96/rack
* 9400260	250 Univ.	0,5-250 µl	10x96/rack
9400263	250 Univ. sterile	0,5-250 µl	10x96/rack
* 9401250	300	5-300 µl	10x96/rack
9401253	300 sterile	5-300 µl	10x96/rack
* 94060510	Flex 300	5-300 µl	10x96/rack
94060513	Flex 300 sterile	5-300 µl	10x96/rack
* 9401110	1000	100-1000 µl	10x96/rack
9401113	1000 sterile	100-1000 µl	10x96/rack
* 94060710	Flex 1000	100-1000 µl	10x96/rack
94060713	Flex 1000 sterile	100-1000 µl	10x96/rack
* 9402070	5 ml	1-5 ml	5x54/rack
9402073	5 ml sterile	1-5 ml	5x54/rack
* 9402160	10 ml	1-10 ml	5x24/rack
9402163	10 ml sterile	1-10 ml	5x24/rack
94060970	Flex 10ml Ext	1-10 ml	100 pcs/bag
94060973	Flex 10ml Ext sterile	1-10 ml	50 pcs/bag

**\* Also available in bags**

Code	Finntip Filter	Volume	Qty
94052000	10 Micro sterile	0,2-10 µl	10x96/rack
94056980	Flex 10 sterile	0,2-10 µl	10x96/rack
94052100	10 sterile	0,5-10 µl	10x96/rack
94052020	20 Micro sterile	0,2-20 µl	10x384/rack
94052150	20 sterile	0,5-20 µl	10x96/rack
94052160	30 sterile	0,5-30 µl	10x96/rack
94056510	Flex 30 sterile	5-30 µl	10x96/rack
94052060	50 Micro sterile	0,2-50 µl	10x384/rack
94052200	100 µl sterile	0,5-100 µl	10x96/rack
94052310	100 µl Ext sterile	5-100 µl	10x96/rack
94056520	Flex 100 sterile	5-100 µl	10x96/rack
94052300	200 µl sterile	0,5-200 µl	10x96/rack
94052320	200 µl Ext sterile	5-200 µl	10x96/rack
94056380	Flex 200 sterile	1-200 µl	10x96/rack
94052350	300 µl sterile	5-300 µl	10x96/rack
94056580	Flex 300 sterile	5-300 µl	10x96/rack
94052410	1000 µl sterile	100-1000 µl	10x96/rack
94052430	1000 µl Ext sterile	100-1000 µl	5x96/rack
94056710	Flex 1000 sterile	100-1000 µl	10x96/rack
94052550	5 ml sterile	1-5 ml	5x54/rack
94052600	10 ml sterile	1-10 ml	5x24/rack
94056970	Flex 10 ml Ext sterile	1-10 ml	50/bag



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