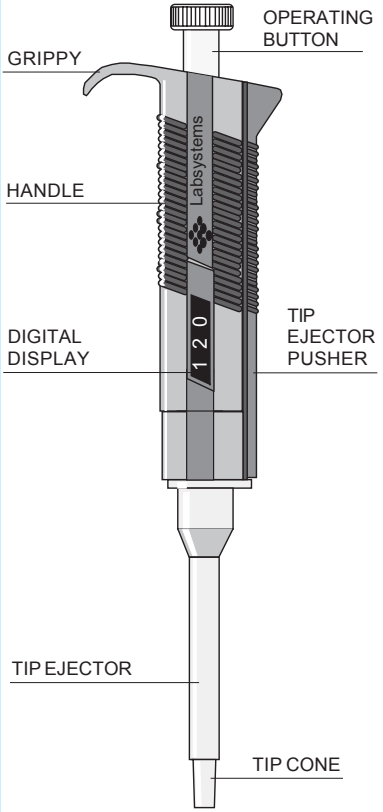
FINNPIPETTE DIGITAL

INSTRUCTIONS FOR USE



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PIPETTE DESCRIPTION

The FINNPIPETTE DIGITAL is a continuously adjustable, general purpose micropipette for sampling and dispensing accurate amounts of liquids. It operates on air displacement principle (= air interface) and uses detachable, disposable tips.
The adjusted delivery volume is displayed in clear digits on a readout window in the handle.
FINNPIPETTE DIGITAL pipettes cover a volume range of 0,5-10 ml.

Code	Volume range	Scale division
4027000	0,5 - 10 µl	0,1 µl
4027250	2 -20 µl	0,1 µl
4027010	5 - 40 µl	0,5 µl
4027260	20-200 µl	1,0 µl
4027020	40 - 200 µl	1,0 µl
4027030	200 - 1000 µl	5,0 µl
4027040	1 - 5 ml	50 µl
4027050	2-10 ml	100µl

All models are equipped with a built-in tip ejector.

RAW MATERIALS

The FINNPIPETTE DIGITAL is made of mechanically durable and chemically resistant materials.

DIGITAL DISPLAY (Fig.1)

The delivery volume of the pipette is displayed on read-out window in the handle.

DESCRIPTION OF TIPS (Page16)

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

PIPETTE OPERATION

SETTING THE DELIVERY VOLUME (Fig.2)

To increase the delivery volume turn the operating button counterclockwise and to decrease turn clockwise (operating button facing you) .
Make sure the desired delivery volume clicks into place and the digits are completely visible.
Caution: Accuracy and precision are valid only within the nominal volume range.
Do not set volumes outside the range. Using excessive force to turn the operating button outside the range may jam the mechanism and eventually cause defects.

TIP EJECTION (Fig.3)

Direct the pipette towards a suitable waste receptacle.
Press the tip ejector down and the tip will be cleanly ejected.

PIPETTE TECHNIQUES

FIGURES 4-7:

A = READY POSITION
B = FIRST STOP
C = SECOND STOP

The operation is controlled by the operating button.
For best possible accuracy:

Operate the operating button slowly and with steady speed at all times, especially when working with liquids of high viscosity.
Never let the operating button snap back.
Make sure the Finntip is firmly attached to the tip cone of the pipette and that there are no foreign bodies inside the tip itself.
Wet a newly attached tip with the solution being pipetted before any actual pipetting takes place.
This is done by filling and emptying the tip 2-3 times.
Hold the pipette vertically during intake of the solution.
The temperature of the tip and pipette should be equalized to that of the solution.
For maximum hand comfort hold the pipette lightly in your hand with the grippy resting over your index finger.

FORWARD TECHNIQUE (Fig.4)

1. Depress the operating button to the first stop.
2. Immerse the tip slightly about 1 cm below the surface of the solution and release the operating button slowly. The tip has now been filled.
Withdraw the tip from the solution. Wipe any drops from the outside of the tip without touching the orifice.
3. Deliver the liquid by gently depressing the operating button to the first stop. Then after a delay of about a second continue to depress the operating button all the way down to the second stop. The tip has now been emptied. Drop formation is avoided by touching the side of the vessel with the tip. Withdraw the tip.
4. Release the operating button to the ready position.

If necessary change the tip and continue with your pipetting.

REVERSE TECHNIQUE (Fig.5)

The reverse technique is suitable for pipetting solutions with high viscosity and/or solutions that tend to foam easily. This technique is also recommended for pipetting very small volumes.

1. Depress the operating button all the way to the second stop.
2. Immerse the tip slightly about 1 cm below the surface of the solution and release the push button slowly.
The tip has now been filled.
Withdraw the tip from the solution with the tip sliding along the vessel wall.
3. Deliver the liquid by gently depressing the operating button to the first stop. The tip has now been emptied. Drop formation is avoided by touching the side of the vessel with the tip.
Withdraw the tip.
Some liquid will remain inside the tip and should not be included in the delivery.
4. The remaining liquid is either discarded with the tip or pipetted back into its original container.

Please note: if bigger volumes than 4 ml are pipetted with reverse technique there is no room in the tip for the extra remaining liquid. Normally reverse technique is not used for big volumes like this.
However bigger volumes than 4 ml of foaming liquid can easily be pipetted as follows: Use forward technique steps 1 and 2 to fill the tip.

Deliver by gently depressing the operating button to the first stop. Drops outside the tip should be included in the delivery.

REPETITIVE TECHNIQUE (Fig.6)

The repetitive technique offers a rapid and simple procedure for repeated deliveries of the same liquid with the same volume.

1. Depress the operating button all the way down to the second stop.
2. Immense the tip slightly about 1 cm below the surface of the solution and release the push button slowly.
The tip has now been filled.
Withdraw the tip from the solution with the tip sliding along the vessel wall to avoid drops.
3. Deliver the liquid by gently depressing the operating button to the first stop.
The desired volume has no been delivered.
Hold the operating button at the first stop.
Some liquid will remain inside the tips and should not be included in the delivery. Drops outside the hp should be included in the delivery.
4. Immense the tip slightly below the surface of the solution and release the operating button slowly
The tip has been refilled.
5. Continue repeating procedures 3 and 4.

PIPETTING WHOLE BLOOD (Fig.7)

e.g. deproteinization in blood glucose determination)
Use forward technique procedures I and 2 to fill the tip with blood.
Wipe the tip carefully with a dry and clean tissue.

1. Immerse the tip into the reagent and depress the operating button to the first stop, making sure the tip is well below the surface.
2. Release the operating button slowly to the ready position.
The tip has now been filled with reagent.
Do not lift the hp out of the solution.
3. Depress the operating button the first stop and release slowly.
Keep repeating this procedure until the interior wall of the tip is clear.
4. Finally, depress the operating button all the way to the second stop to completely empty the tip.

MAINTENANCE

When the Finnpipette Digital is not in use make sure it is safely stored in a vertical position.

SHORT TERM 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 of the pipette.
Solvents should not be used for cleaning the pipette.

LONG TERM MAINTENANCE (0,5-5 ml) (Fig.8)

The piston and the cylinder should be checked at least twice a year if the pipette is in daily use.
Opening the pipette

1. Depress the tip ejector pusher.
2. Insert the tooth of the opener into the opening at the base of the tip ejector pusher.
3. Pull away the tip ejector shaft and tip ejector pusher.
4. Remove the tip cone by turning it in a counterclockwise direction with the service tool provided in the package.
5. Pull out the piston.
6. Remove the O-ring from the tip cone. In model 5-40 µl the two O-rings ate located deep inside the tip cone. They can be removed by using the thin end of the piston.
7. Clean the piston, the piston spring and the O-ring with a dry, napless cloth.
8. Check the cylinder for foreign particles. Please note that the cylinder must not be greased.
9. Grease the cleaned parts with high vacuum stop cock lubricant.
10. Reassemble the parts.

LONG TERM MAINTENANCE (10ml) (Fig.9-10)

If the pipette is used daily it should be checked at least twice a year. The servicing procedure starts with disassembly of the pipet.

1. First remove the Tip Ejector pusher by pushing it all the way down and lifting the base with a screwdriver blade or with the tooth of the Service Tool to release the snap joint.
2. Next remove the Tip Ejector part 2 from part 1 using the maintenance pliers to release the snap joint.

3. Remove the Cylinder by pressing the tip ejector part 1 firmly towards the cylinder. This action releases the snap joint and you can pull the cylinder away.
4. Clean the O-ring and cylinder. Regrease the O-ring and the cylinder.
5. Assemble the parts in the opposite order to removal. All joints are a snap fit and are made simply by pushing the parts together by hand. Be careful not to bend the pipette during assembly because this could damage the snap joints or the piston.

CAUTION!
The Finnpipette is designed to allow easy in-lab service. If you, however, want to send the pipette to us or to our local representative for service, please enclose a list of any infectious, radioactive or otherwise hazardous materials that have been pipetted. Also please note that the postal authorities in your country may limit the sending of contaminated material by mail.

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**
under 10 µl	0.001 mg
10-100 µl	0.01 mg
above 100 µl	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 (±0.5°C) temperature of water, pipette and air between 20°C to 25°C.
The relative humidity must be above 55%. 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.

CHECKING THE CALIBRATION

The pipette is checked with the maximum volume (nominal volume) and with the minimum volume or 10% of maximum volume, whichever is higher. E.g. Finnpipette 0.5-10 µl is tested at 10µ and 1 µ. 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. If the calculated results are in the limits, the calibration of the pipette is correct.

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 results are in the limits of Table 1, then the calibration of the pipette is correct. Otherwise the pipette must be adjusted and checked again.

Range	Volume µl	Accuracy µl	%	Precision s.d.* µl	cv%
0,5-10µl	10	±0.10	±1.0	0.08	0.8
	1	±0.04	±3.5	0.03	3.0
2-20µl	20	±0.200	±1.0	0.080	0.4
	2	±0.060	±3.0	0.030	1.5
5-40µl	40	±0.240	±0.6	0.120	0.3
	5	±0.125	±2.5	0.100	2.0
20-200µl	200	±1.2	±0.6	0.6	0.3
	20	±0.6	±3.0	0.3	1.5
100-1000µl	1000	±5.0	±0.5	2.0	0.2
	100	±1.5	±1.5	0.6	0.6
1-5 ml	5000	±25.0	±0.5	10.0	0.2
	1000	±15.0	±1.5	5.0	0.5
2-10 ml	10000	±50.0	±0.5	20.0	0.2
	2000	±20.0	±1.0	6.0	0.3

ADJUSTMENT (Fig.10)

Adjustment is done with the service tool.

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) x Z

V = volume (µl)
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. 6 mg = 0.2 mg/s). Compare this to the pipetting time from tareing to reading. Typically pipetting time might be 10 seconds and the mass loss is 2 mg (10s x 0.2mg/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 10.

Accuracy (systematic error)

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

$A = \bar{V} - V_0$ A = accuracy
$\bar{V}$ = mean volume
V_0 = nominal volume

Accuracy can be expressed as a relative value:

$A\% = 100\% \times A / V_0$

Precision (random error)

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

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

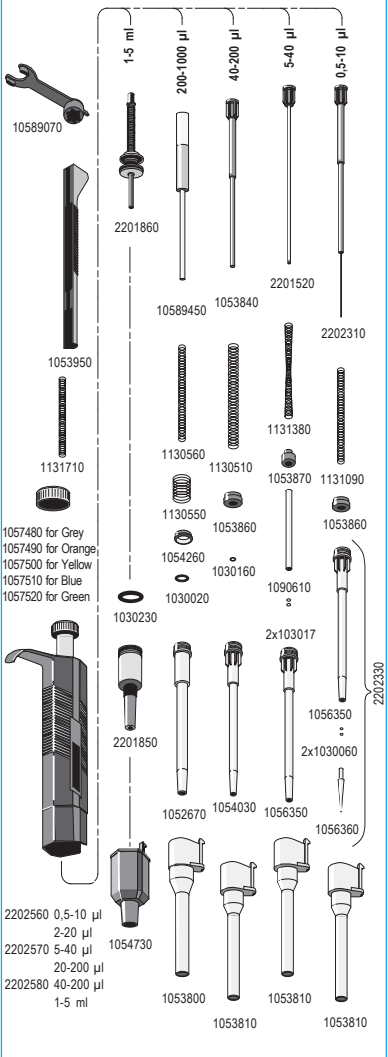
s = standards deviation
v = mean volume
n = number of measurements

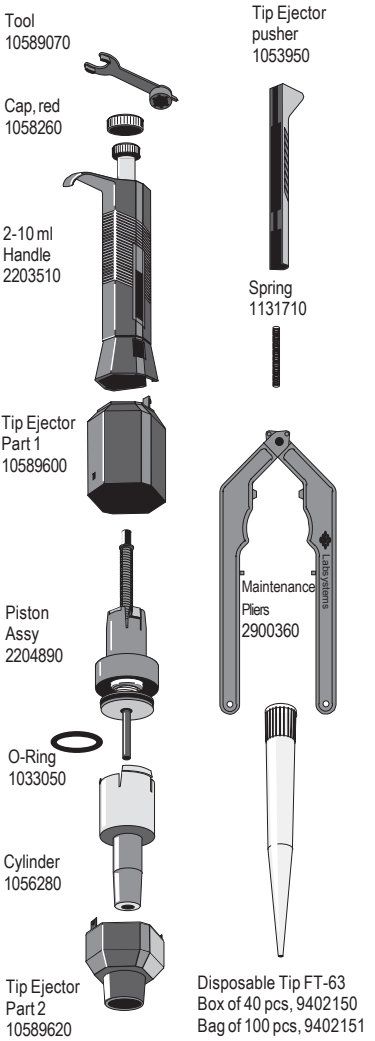
cv is the relative value of standard deviation.
cv = 100% x s / $\bar{v}$

CONVERSION TABLE

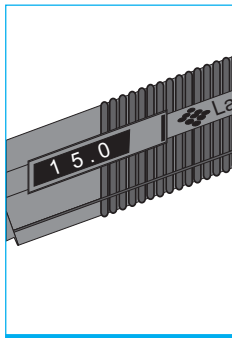
Value of the conversion factor Z (µl/mg), as a function of temperature and pressure, for distilled water.

Temperature °C	Air pressure hPA (mbar)					
	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


1-5 ml
200-1000 µl
40-200 µl
5-40 µl
0,5-10 µl
10589070
2201860
10589450
1053840
2201520
2202310
1053950
1131380
1130560
1130510
1131090
1131710
1053870
1130550
1053860
1053860
1057480 for Grey
1057490 for Orange
1057500 for Yellow
1057510 for Blue
1057520 for Green
1054260
1030160
1090610
1030020
1030230
2x103017
2202330
1056350
2x1030060
2201850
1052670
1054030
1056350
1056360
2202560 0,5-10 µl
2-20 µl
2202570 5-40 µl
20-200 µl
2202580 40-200 µl
1-5 ml
1054730
1053800
1053810
1053810
1053810



SPARE PARTS 10 ml



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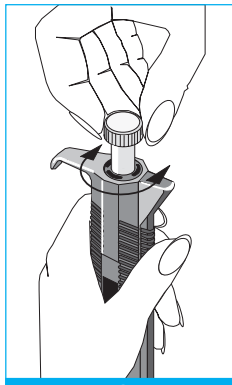

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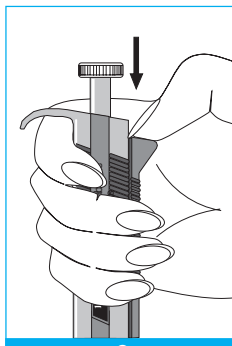

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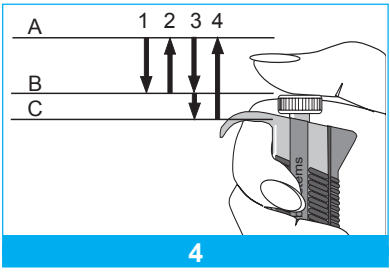

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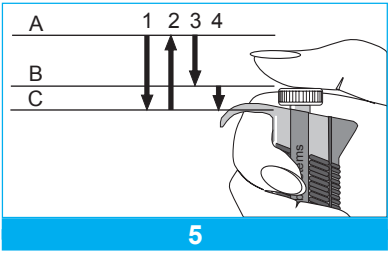

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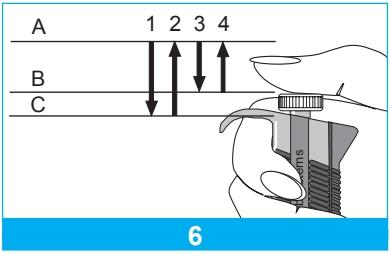

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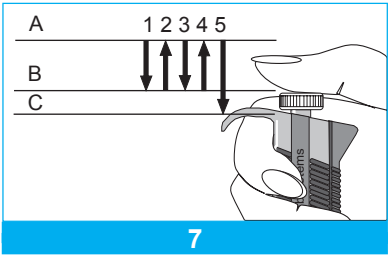

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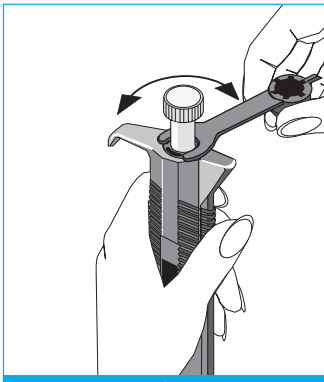

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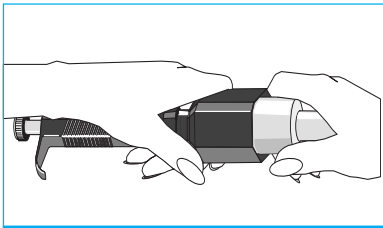

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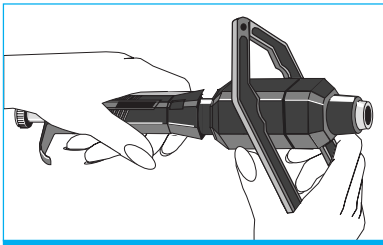

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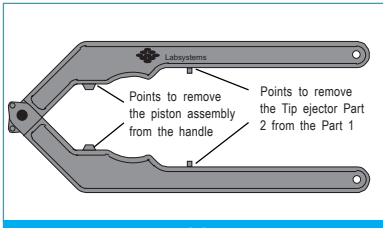
Labsystems
Points to remove the piston assembly from the handle
Points to remove the Tip ejector Part 2 from the Part 1

11

TIP ORDERING INFORMATION

Code	Finntip	Volume	Qty
9400310	10	0,2 - 10 µl	1000/bag
9400300	10	0,2 - 10 µl	10x96/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
9401070	1000	100 -1000 µl	200/box
9401110	1000	100-1000 µl	10x96/rack
9402070	5 ml	1-5 ml	5x54/tray
9402160	10 ml	2-10 ml	5x24/tray

10

250
Universal

300

200 Ext

1000

5 ml

10 ml

TIPS

1502260-03