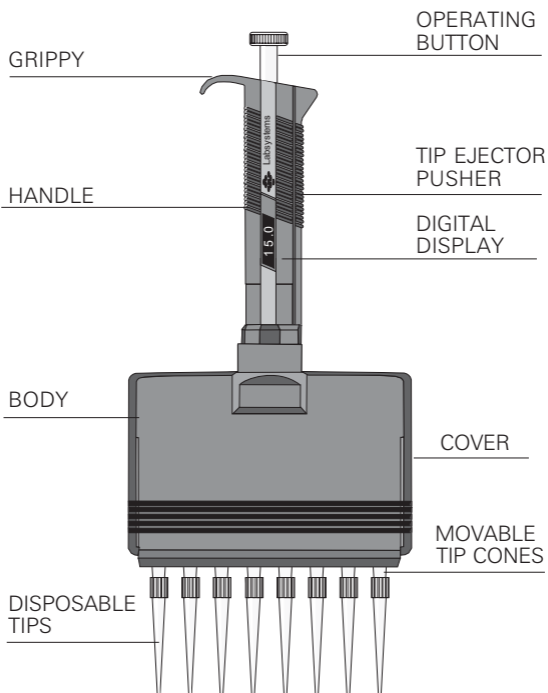


FINNPIPETTE VARICHANNEL

INSTRUCTIONS FOR USE

Code	Volume range
4347010	5-50 μl
4347020	40-200 μl
4347030	200-1000 μl



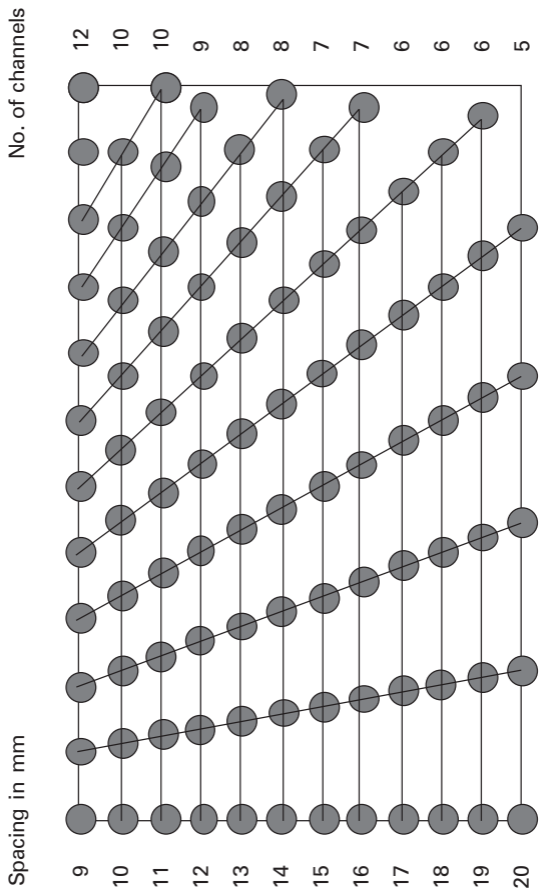
Thermo Labsystems

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TIP CONE SPACINGS



ADJUSTING THE TIP CONE SPACING fig. 1

Follow these steps:

1. Press the operating button all the way down.
2. Move and adjust the tip cones to the spacing required.
3. Use the accompanying drawing for help to adjust the spacing accurately.
4. The maximum spacing available with different number of channels is shown in the table below.

Number of channels	Spacing 200-1000 μ l	Spacing 5-200 μ l
2	100 mm	100 mm
3	50 mm	50 mm
4	25 mm	25 mm
6	20 mm	20 mm
7	16.7 mm	16.7 mm
8	14.3 mm	14.3 mm
9	12.5 mm	12.5 mm
10	11 mm	11 mm
11	——	10 mm
12	——	9 mm

Maximum spacing

PRODUCT DESCRIPTION

The VARICHANNEL DIGITAL MULTICHANNEL PIPETTE is a hand held, adjustable volume and adjustable channel spacing micropipette for sampling and dispensing of accurate liquid volumes.

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

The VARICHANNEL can be assembled and adjusted into any configuration between 1 and 12-channel pipettes with variable tip spacing starting from a minimum of 9 mm. A tip ejector system is provided adjusting automatically to the selected tip spacing.

The VARICHANNEL is available in three models covering a total volume range of 5 to 1000 μ l. The volume ranges are:

Volume range	Scale Division
5-50 μ l	0,5 μ l
40-200 μ l	1,0 μ l
200-1000 μ l	5,0 μ l

PIPETTE OPERATION

DIGITAL DISPLAY Fig.2

The adjusted delivery volume is clearly indicated by a digital display on the pipette handle.

SETTING THE DELIVERY VOLUME Fig. 3

The delivery volume is set using the operating button on the top of the pipette. To increase the delivery volume turn the operating button counter clockwise and to decrease turn it clockwise.

Ensure that the desired delivery volume clicks into place and that the digits for the volume are completely visible on the handle display.

Do not try to set volumes by force outside the pipette's specified volume range!

TIP EJECTION Fig.4

Each pipette is fitted with a tip ejector system to help eliminate any contamination possibilities.

The tip ejector system consists of a set of tip ejector squares (same amount as tip cones) operating together with the ejector ribs and tip ejector plunger.

Direct the pipette towards a suitable waste receptacle and press the tip ejector plunger with your thumb. The tips will be ejected cleanly.

PIPETTING TECHNIQUES

FIGURES 5-7:

A = READY POSITION

B = FIRST STOP

C = SECOND STOP

Ensure that clean tips are firmly pushed on to the tip cones of the pipette.

The operation of the pipette is controlled by the operating button. For the best possible accuracy: Operate the button slowly and with steady speed at all times, particularly when working with liquids having high viscosity. Never let the operating button snap back.

When working with serum or biological fluids rinse the tips with the liquid before pipetting. This is done by filling and emptying the tips.

Hold the pipette vertically (10 degrees maximum from vertical) during the liquid intake. For maximum hand control, hold the pipette tightly in the hand with the "Grippy" resting on the index finger.

FORWARD TECHNIQUE fig.5

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

1. Depress the operating button to the first stop.
2. Dip the tips just under the surface of the liquid in the reservoir (2-3 mm) and slowly release the operating button. Withdraw the tips from the liquid touching them against the edge of the reservoir to remove excess liquid.
3. Deliver the liquid by gently depressing the operating button to the first stop. After a delay of about a second, continue to depress the operating button all the way down to the second stop. This action will empty the tips.
4. Release the operating button to the ready position. If necessary, change the tips and continue with the pipetting.

REVERSE TECHNIQUE fig.6

The reverse technique is suitable for dispensing liquids having high viscosity or which have 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 operating button all the way down to the second stop.
2. Dip the tips just under the surface of the liquid in the reservoir (2-3 mm) and slowly release the operating button. This action will fill the tips. Withdraw the tips from the liquid touching them against the edge of the reservoir to remove excess liquid.

3. Deliver the preset volume by gently depressing the operating button to the first stop. Hold the operating button at the first stop. Some liquid will remain in the tip and should not be included in the delivery.
4. The remaining liquid is either discarded with the tips or pipetted back into the container.

REPETITIVE TECHNIQUE fig.7

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 operating button all the way down to the second stop.
2. Dip the tips just under the surface of the liquid in the reservoir (2-3 mm) and slowly release the operating button.

This action will fill the tips.

Withdraw the tips from the liquid touching them against the edge of the reservoir to remove excess liquid.

3. Deliver the preset volume by gently depressing the operating button to the first stop. Hold the operating button at the first stop. Some liquid will remain in the tip and should not be included in the delivery.
4. Continue pipetting by repeating the steps 2 and 3.

INSERTING THE VARICHANNEL SYRINGES Fig.8, 9

To install or remove a cylinder-piston combination follow the steps below:

1. Open the lid at the end of the body.
2. Depress the operating button all the way down.
3. To remove a syringe just pull it out of the body by holding it at the tip cone.
4. To insert a syringe is an opposite operation. Be sure that the round piece at the end of the piston is in the right position (see figures) as well as the tip ejector square.
5. Push the combination into its place taking care that each of the three parts goes into its appropriate grooves,
 - piston
 - cylinder
 - tip ejector square
6. Reinstall the lid.

ASSEMBLING THE TIP EJECTOR PUSHER Fig.11

To remove or install the tip ejector pusher, first unscrew the small screw visible from the back of the handle, see figure below.

MAINTENANCE

When the FINNPIPETTE VARICHANNEL is not in use make sure it is safely stored in a vertical position. We recommended a FINNPIPETTE stand for this purpose.

SHORT TERM CHECKING

The pipette should be checked at the beginning of each day for dust and dirt on outside surfaces of the pipette. Particular attention should be paid to the pipettes tip cones.

Solvents should not be used for cleaning the pipette.

LONG TERM MAINTENANCE

If the pipette is used daily it should be checked at least twice a year. The servicing procedure is as follows:

1. Open the lid on the body and remove all the syringes.
2. Clean the pistons and O-rings with a dry napless cloth and grease them with high vacuum silicone grease (included in the package).
3. Reassemble the pipette.

In the event of a malfunction send the pipette to nearest Labsystems representative. Please, enclose a complete list of liquids which have entered the pipette.

CALIBRATION

All Finnpiettes 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 20C to 25C. The relative humidity must be above 55%. Especially with volumes under 50 μl 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 CALIBRATION

One of the middle channels of 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. Finnpiette 0.5-10 μl is tested at 10 μl and 1 μl . A new tip is first pre-wetted 3-5 times and series of ten pipetting 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.

Channel	Range	Volume	Accuracy		Precision	
		μl	μl	%	s.d.* μl	cv%
12	5-50 μl	50 μl	$\pm 0,75$	$\pm 1,5$	0,40	0,8
		5 μl	$\pm 0,25$	$\pm 5,0$	0,13	2,5
12	40-200 μl	200 μl	$\pm 2,00$	$\pm 1,0$	0,80	0,4
		40 μl	$\pm 1,80$	$\pm 4,5$	0,60	1,5
10	200-1000 μl	1000 μl	$\pm 12,00$	$\pm 1,2$	6,00	0,6
		200 μl	$\pm 6,00$	$\pm 3,0$	5,00	2,5

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

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

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 = 0,2mg/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 (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 $\mu\text{l}/\text{mg}$ at 22°C and 95 kPa. See the conversion table on page 9.

Accuracy (systematic error)

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

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

\bar{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 = standard deviation
 \bar{V} = mean volume
 n = number of measurements
 cv is the relative value of standard deviation.
 $cv = 100\% \times s / \bar{V}$

PACKAGE

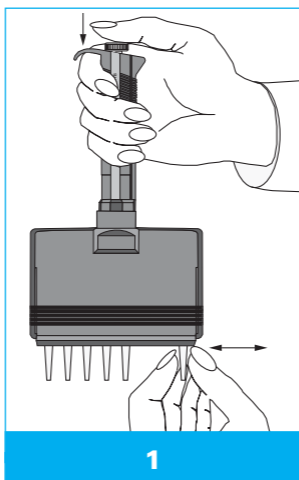
The FINNPIPETTE VARICHANNEL is shipped in a custom made expanded polystyrene package. The package contains the following items:

1. VARICHANNEL pipette
2. Instruction Manual
3. Tube of Lubric Grease
4. Samples of Tips
5. Service tool

TROUBLE SHOOTING TABLE

The following table is a guide to possible problems and their solutions.

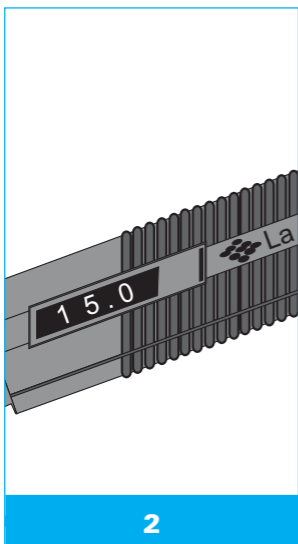
Fault	Possible reason	Solution
Leakage	Tip incorrectly attached	Attach firmly
	Foreign bodies between tips and tip cones	Clean tip cones thoroughly and attach new tips
	Foreign bodies between the piston and the O-rings in the cylinders	Clean and grease O-rings and pistons Use high vacuum silicone grease
	Insufficient amount of grease on pistons and O-rings	Grease accordingly
	O-rings damaged	Change the O-rings
Inaccurate dispensing	Incorrect operation	Follow instructions carefully
	Tips incorrectly attached	Attach firmly
	Calibration altered: caused e.g. by misuse	Recalibrate according to instructions
Inaccurate dispensing with certain	Unsuitable calibration. Many high viscosity	Recalibrate with the liquids in question



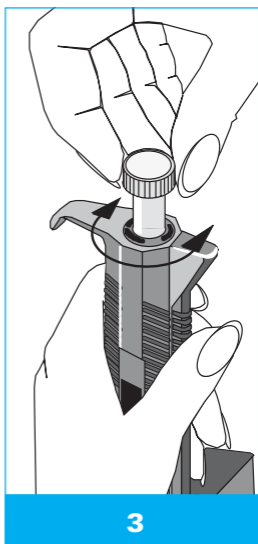
Conversion table

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

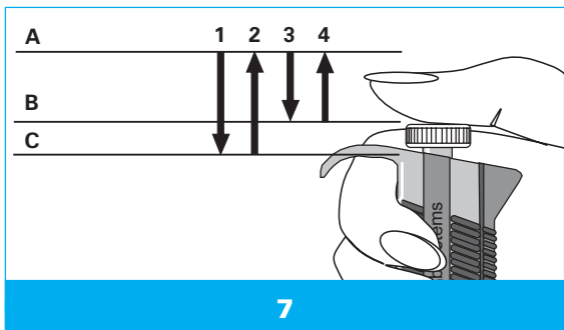
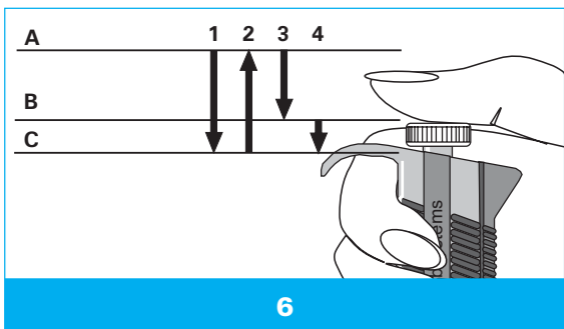
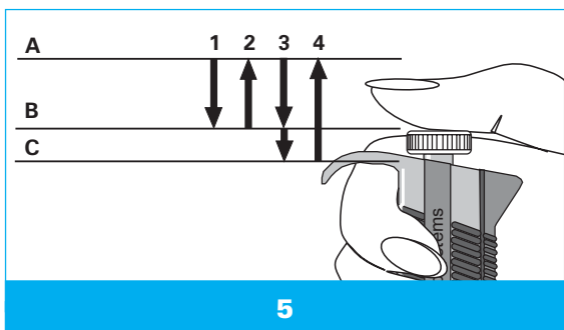
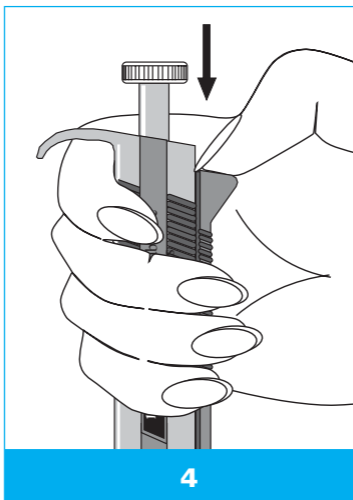
Temperature °C	Air pressure hPA (mbar)					
	800	853	907	960	1013	1067
15	1.0018	1.0018	1.0019	1.0019	1.0020	1.0020
15.5	1.0018	1.0018	1.0019	1.0020	1.0020	1.0021
16	1.0019	1.0020	1.0020	1.0021	1.0021	1.0022
16.5	1.0020	1.0020	1.0021	1.0022	1.0022	1.0023
17	1.0021	1.0021	1.0022	1.0022	1.0023	1.0023
17.5	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

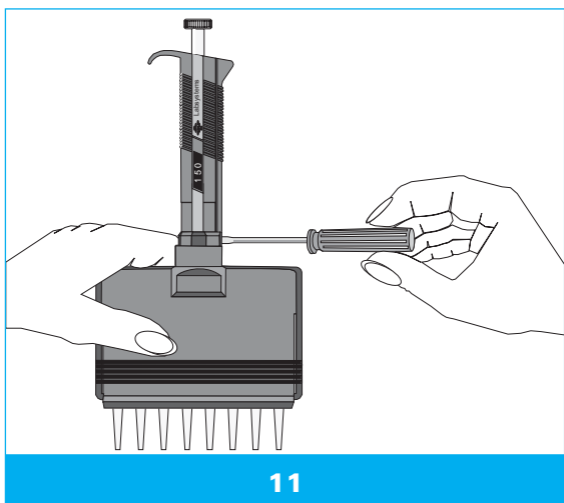
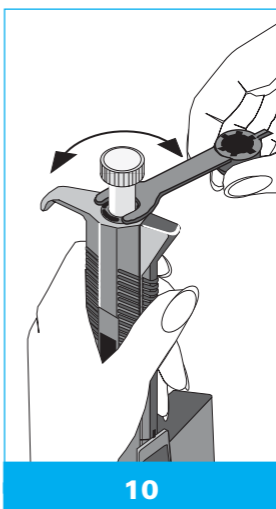
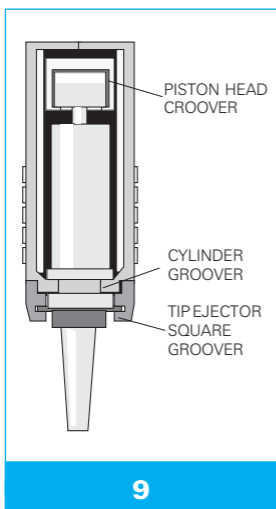
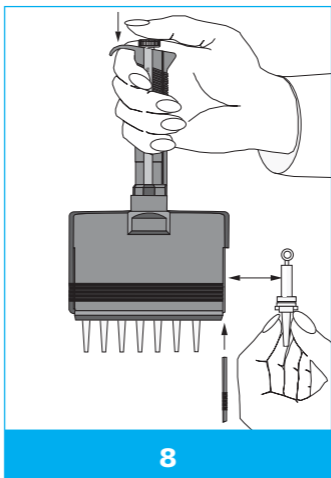


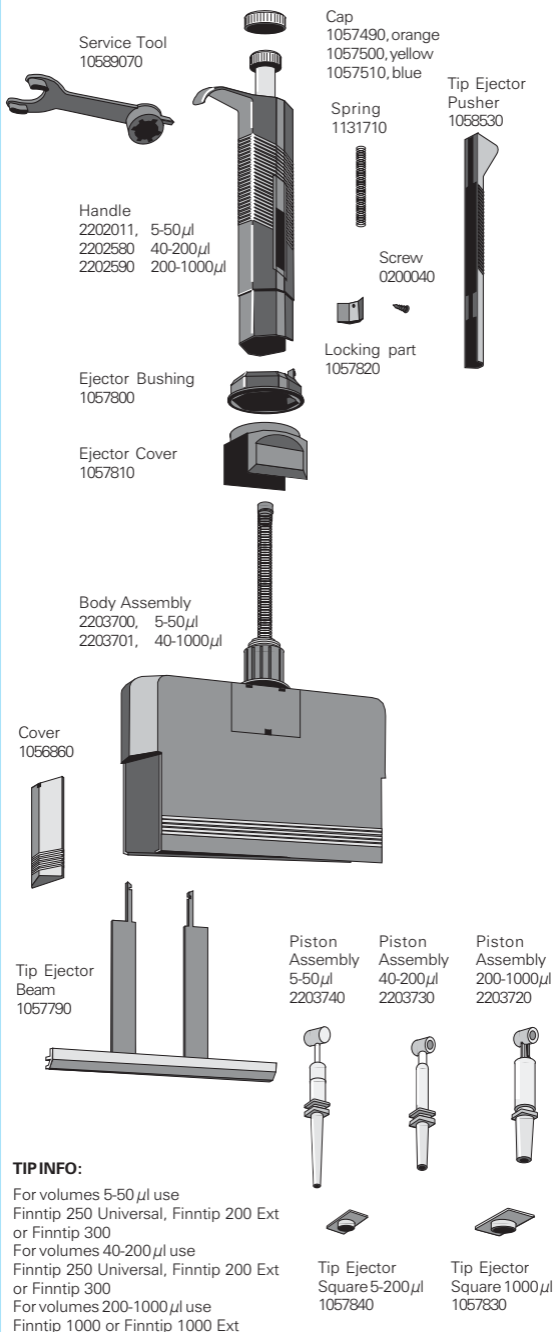
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3







SPARE PARTS

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