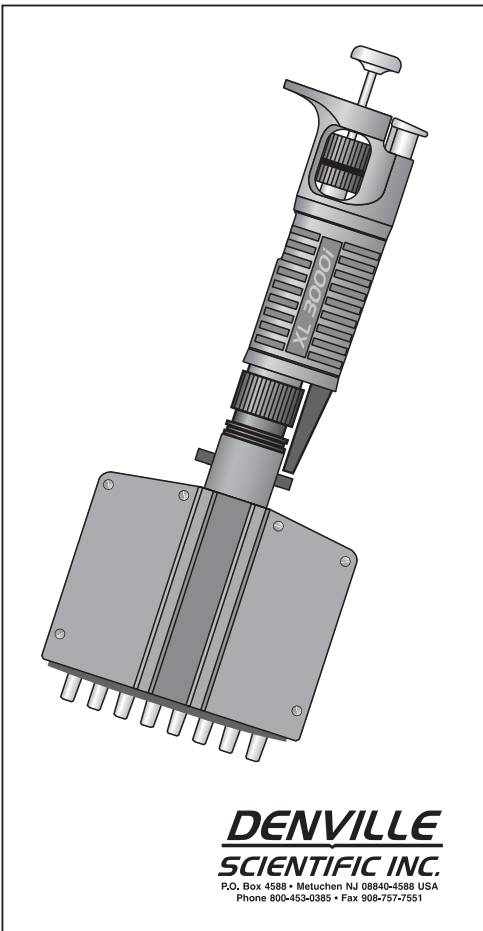


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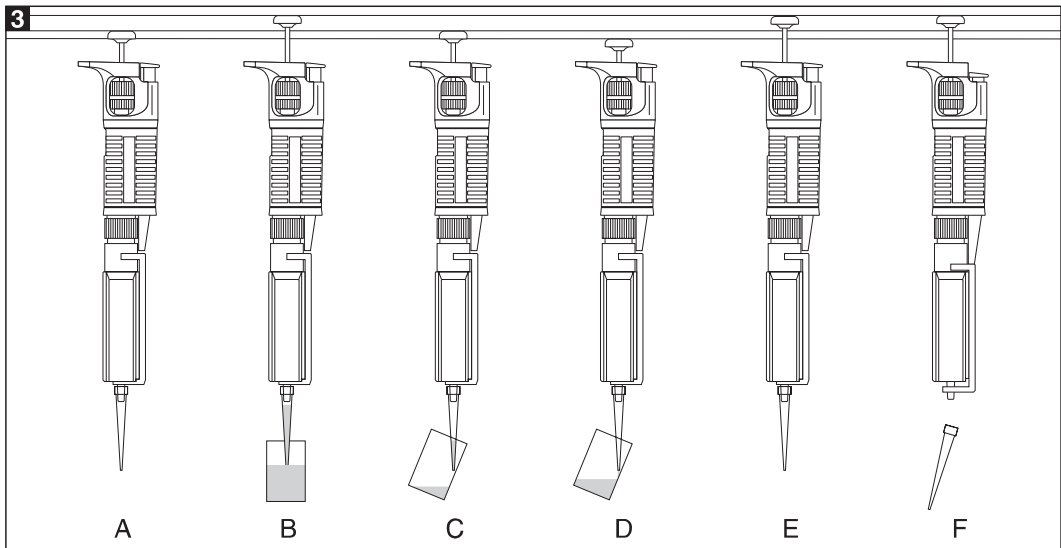
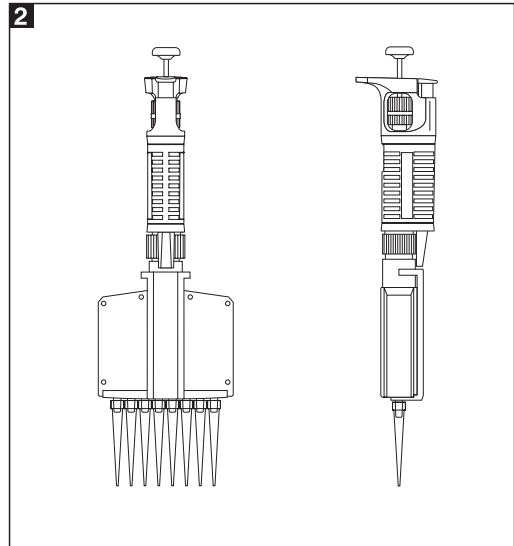
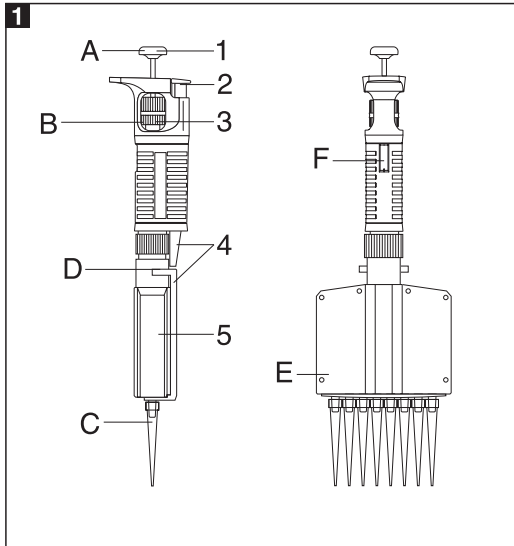


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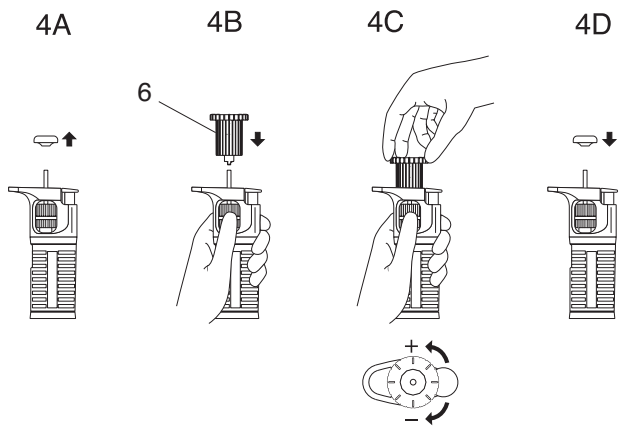
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1 - INTRODUCTION

XL 3000i™ Multichannel pipettes have been designed for use with microplates. The pipettes enable precise and simultaneous delivery of 8 or 12 preset-volumes of liquid. **XL 3000i™ Multichannel** pipettes are produced in four ranges of volumes: 1-10 µl, 5-50 µl, 20-200 µl, 50-300 µl.

XL 3000i™ Multichannel pipettes are equipped with a digital readout counter, built into the pipette's handle, for measuring volumes, (Fig. 1F). Volume settings are continuously adjustable and are controlled by rotating the calibration knob, (Fig 1B). The volume range of the pipette is indicated on the pipetting push-button, (Fig. 1A).

XL 3000i™ Multichannel pipettes should be used with polypropylene disposable tips, to ensure safety and accuracy, (Fig. 1C). The shafts ensure the compatibility of the pipettes with a broad assortment of tips, and the special ejector shape reduces the force required for their ejection. In order to protect the user against inadvertent contact with used tips, the pipettes are equipped with tip ejectors, (Fig. 1D). By turning the multichannel module clockwise in

relation to the handle, (Fig. 2), it is possible to disable the ejector's operation in order to avoid accidental use, or to change its position in such a way as to make filling of microplates more convenient.

The specifications for accuracy and precision given in the following table are obtained using **XL 3000i™** tips. These figures are only guaranteed when **XL 3000i™** tips are used.

XL 3000i™ 8 channel

SPECIFICATIONS			
Model No.	Volume [µl]	Inaccuracy [%]	Imprecision [%]
XL8-10	Min 1	±8.0	≤ 8.0
	Max 10	±2.0	≤ 2.0
XL8-50	Min 5	±4.0	≤ 3.0
	Max 50	±1.6	≤ 1.0
XL8-200	Min 20	±2.0	≤ 1.5
	Max 200	±1.0	≤ 0.8
XL8-300	Min 50	±1.6	≤ 1.5
	Max 300	±1.0	≤ 0.8

XL 3000i™ 12 channel

SPECIFICATIONS			
Model No.	Volume [µl]	Inaccuracy [%]	Imprecision [%]
XL12-50	Min 5	±4.0	≤ 3.0
	Max 50	±1.6	≤ 1.0
XL12-200	Min 20	±2.0	≤ 1.5
	Max 200	±1.0	≤ 0.8
XL12-300	Min 50	±1.6	≤ 1.5
	Max 300	±1.0	≤ 0.8

The specifications for the volumetric performance are derived from extensive gravimetric tests as prescribed by the Deutsches Institut für Normung e.V. To verify the performance of your pipette request document DIN 12650.

Condition of measurements: distilled water at temperature 20±1°C.

The pipette design enables the user to perform the recalibration process according to the guidelines presented in section 5.

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2 - SETTING THE VOLUME

In order to set the volume of the sample to be delivered, the calibration knob with display is used. The volume shown by the display is represented by three digits, which should be read from top to bottom. Typical meter readings are shown in the following table:

Model No.	Counter readings	Set volume	Basic increment
XL8-10	0 3 5	3.5 µl	0.02 µl
XL8-50 XL12-50	0 6 5	6.5 µl	0.10 µl
XL8-200 XL12-200	0 8 5	85.0 µl	0.20 µl
XL8-300 XL12-300	2 5 0	250.0 µl	1.0 µl

To achieve accurate delivery of the required volume, the operator should turn the calibration knob in the direction diminishing display readings. If the volume being currently set is higher than the previous one, the operator should turn the calibration knob 1/3 of a turn beyond the required value, and then slowly rotate it backwards, observing diminishing readings, until the required value is achieved.

3 - METHOD OF PIPETTING

Fit the tips onto the cones of the multichannel module. When you put the tips on the shafts the pipette should be pressed against the tips in the box. The liquid aspirated into the tips should not flow out by gravity from properly fixed tips. While holding the pipette in a vertical position, tips should be immersed in the liquid to a depth of 2-4 mm, and flushed once by drawing a volume of liquid and dispensing it out with slow and steady movement.

Next, still holding the pipette vertically, the operator should press the pipetting button until the first resistance point is felt, and immerse the tips in the liquid to the depth of 2-4 mm, (Fig. 3B). Releasing the pipetting button with a slow and uniform movement during 2-3 seconds, the liquid should be drawn into the tips, (Fig. 3B) which should then be lifted above the liquid's surface. The pipette should next be positioned at an angle of 10-45 degrees in relation to inner walls of the destination vessels and tips should be emptied by pressing the pipetting button slowly until the first resistance point is felt, (Fig. 3C). After waiting one second, the pipetting button should be pressed to the second resistance point in order to dispense remaining liquid, (Fig. 3D). Then tips should be lifted out from the vessels while maintaining contact between the ends of the tips and the inner walls of the vessel until the pipetting button has been released, (Fig. 3E). Finally, pressing the ejector button, the operator should separate the tips from the multichannel module's cones, (Fig. 3F).

4 - RECOMMENDATIONS

To achieve maximum safety, precision and reliability, the following principles should be observed:

- do not draw liquids without tips fitted on the pipette cones,
- do not lay the pipette flat with tips filled,
- do not draw volumes of liquid exceeding the pipette's range,
- check if the tips are fitted properly,
- during operation, the pipette must be held vertically, tips should be immersed in liquid to the depth of 2 to 4 millimeters and the pipetting button should be depressed and released slowly and evenly,
- new tips must be re-wetted prior to pipetting, by drawing and expelling the liquid to be measured. This is especially important when working with liquids of viscosities and densities different from that of water and in temperatures other than ambient temperature,

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- when pipeting liquids which tend to wet walls of tips, such as serums, proteins, organic solvents, measuring must be performed much slower than with other liquids,
- tips must be replaced with new ones, when changing from one liquid to another, or if drops of liquid remain inside the tips,
- after use, the pipette should be stored vertically in a holder with tips removed.

5 - RECALIBRATION

XL 3000i™ Multichannel pipettes are calibrated by gravimetric method, using distilled water, at the temperature $20 \pm 1^\circ\text{C}$, according to DIN 12650.

If during pipette operation you find that the accuracy error (the difference between the real aspirated volume and the preset volume) exceeds the permissible value given in the table in section 1, the pipette recalibration procedure should be carried out.

Before starting the recalibration it is necessary to check whether the following requirements have been fulfilled during error determination:

- the ambient temperature, and the temperature of the pipette, tips and water was identical
- the density of the liquid used is close to that of distilled water
- the balance with appropriate sensitivity has been used

Volume checked [μl]	Balance sensitivity [mg]
0.1 - 10	≤ 0.001
10 - 100	≤ 0.01
> 100	≤ 0.1

- $\text{mg}/\mu\text{l}$ conversion factor has been taken into account
- the requirements given in sections 3 and 4 have been fulfilled

If the above conditions are satisfied and the accuracy error for selected volume given in section 1 exceeds the permissible value, the pipette recalibration procedure should be carried out.

The recalibration can be performed within one full turn of the key to the right or to the left only.

Recalibration conditions:

- Ambient temperature and the temperature of the pipette, tips and liquid should be within the range $20\text{-}25^\circ\text{C}$ and stabilized during weighing within $\pm 0.5^\circ\text{C}$
- Measurements should be conducted using distilled water
- Balance sensitivity should be suitable for the volume to be controlled

Recalibration procedure:

- Set the volume depending on the pipette volume according to the following table:

Range of the pipette volumes [μl]	Preset volume [μl]	Permissible volumes [μl]	Volume change ΔV for full turn of the calibration key [μl] (24 increments)
1 - 10	1	0.92 - 1.08	0.33
5 - 50	5	4.8 - 5.2	1.67
20 - 200	20	19.6 - 20.4	6.30
50 - 300	50	49.2 - 50.8	10.00

- Perform three aspiration series (each series should include the aspirations from all channels), weigh each time and calculate the average value of the aspirations.
- Calculate average aspirated volume in μl multiplying the average aspiration amount [mg] by the distilled water density coefficient [$\mu\text{l}/\text{mg}$], which depends on temperature and pressure according to the following table:

Temperature [$^\circ\text{C}$]	Pressure [hPa]		
	960	1013	1067
20	1.0028	1.0029	1.0029
21	1.0031	1.0032	1.0032
22	1.0032	1.0033	1.0033
23	1.0035	1.0035	1.0036
24	1.0037	1.0038	1.0038
25	1.0039	1.0040	1.0041

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If the average aspirated volume exceeds the permissible value, the following should be done:

- Remove the pipetting pushbutton, (Fig. 4A)
- Holding the volume setting knob to protect it against rotation, insert the calibration key into the cuts of the calibration screw, (Fig. 4B)
- Turn the key clockwise to reduce the aspirated volume, or counter-clockwise to increase the volume, (Fig. 4C). One full turn of the calibration key changes the pipette aspiration volume by the amount given in the table
- Take out the key and replace the pipetting pushbutton, (Fig. 4D).

Determine the average aspirated volume. The average volume should be within the permissible range given in the table. If the volume exceeds the values stated, the recalibration procedure should be repeated.

6 - MAINTENANCE

Cones should be kept clean using ethyl alcohol.

7 - PIPETTE KIT AND ACCESSORIES (OPTIONAL)

Pipette kit

The pipettes are delivered in the kits including:

- Pipette
- Instruction manual
- Calibration key
- Identification labels

Accessories (Optional)

Pipette	Tip Choices
XL8-10	10 µl, 10 racks of 96 (960 tips per package)
XL8-50 XL8-200 XL12-50 XL12-200	200 µl, 10 racks of 96 (960 tips per package)
XL8-300 XL12-300	300 µl, 10 racks of 96 (960 tips per package)

Pipette	Stand Choices
XL8	Stand for eight channel pipette
XL12	Stand for twelve channel pipette

8 - SPARE PARTS

The spare parts for multichannel, (Fig. 1, Fig. 4):

1. **Pushbutton**
2. **Ejector pushbutton**
3. **Calibration knob**
4. **Ejector**
5. **Piston assembly**
6. **Calibration key**

can be ordered from **Denville** (type of the pipette and name of the part for this pipette should be specified).

Warning: The replacement of the plunger requires conducting of calibration procedure according to section 5.

Before returning a pipette to **Denville** please ensure that the pipette is completely free of any contamination (chemical, microbial or radioactive).

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