

GeneMate Pipettor

MULTICHANNEL

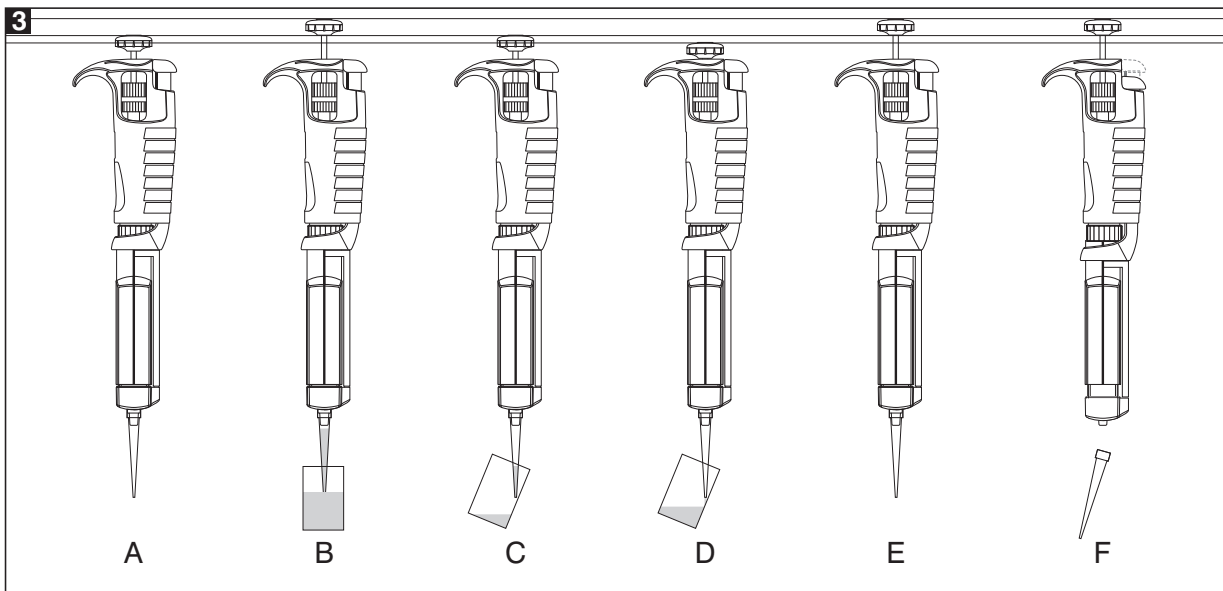
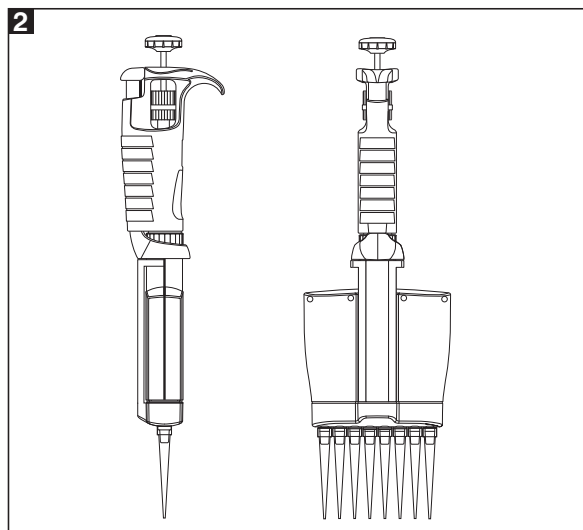
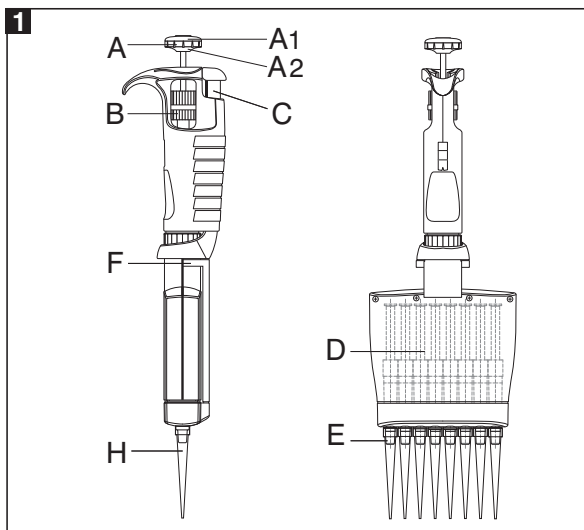


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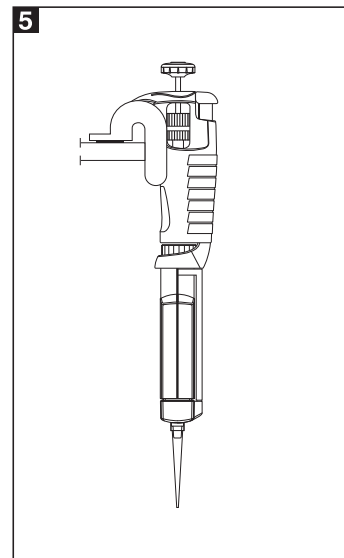
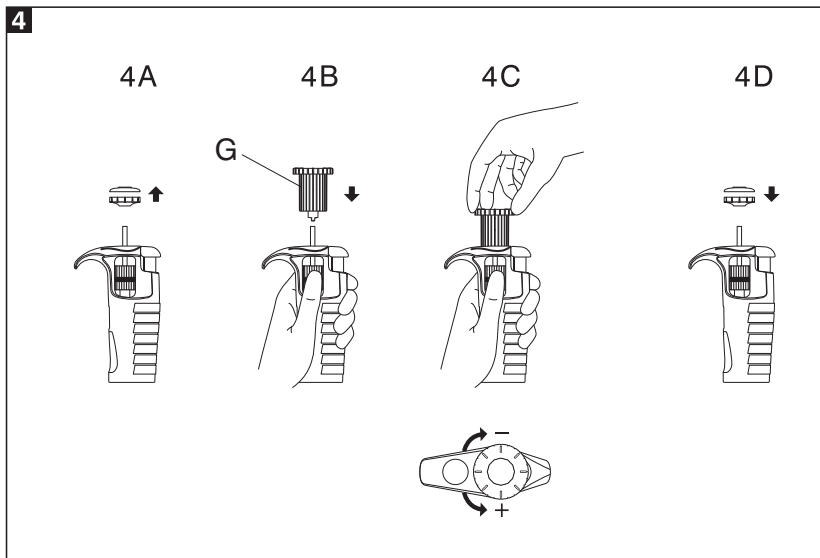
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1 - INTRODUCTION

The **GeneMate Multichannel** pipettors have been designed for the filling of laboratory microplates. The pipettors enable precise and simultaneous delivery of 8 or 12 preset-volume doses of liquid.

GeneMate Multichannel pipettors are produced in four ranges of volumes: 1-10 μl , 5-50 μl , 20-200 μl , 50-300 μl .

GeneMate Multichannel pipettors are equipped with a digital counter which shows the pipetting volume. The set volume is visible in the window on the handle. The setting of the volume is done by turning of the pipetting pushbutton knob (Fig. 1A2) or by turning of the black knurled adjustment knob (Fig. 1B) in the right direction. The range of the volume of the aspired liquid is shown on the pipetting pushbutton (Fig. 1A1).

GeneMate Multichannel pipettors should be used with polypropylene disposable tips, to ensure safety and accuracy, (Fig. 1H). The shafts without O-rings ensure the compatibility of the pipettors 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 pipettors are equipped with tip ejectors, (Fig. 1F). The pipettor construction allows to rotate the multichannel module and to eject the tips through 360°, therefore, the most convenient position may be selected to fill the microplates. It is recommended to turn the module clockwise, (Fig.2).

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

GeneMate 8 channel

SPECIFICATIONS				
Model	Volume [μl]	Accuracy [%]	Precision [%]	Fit to tips [μl]
GM8-10	Min 1	± 8.0	± 6.0	10
	5	± 4.0	± 2.0	
	Max 10	± 2.0	± 1.2	
GM8-50	Min 5	± 4.0	± 2.5	200
	25	± 3.0	± 1.2	
	Max 50	± 1.6	± 0.6	
GM8-200	Min 20	± 3.0	± 1.5	200
	100	± 1.5	± 0.8	
	Max 200	± 1.0	± 0.6	
GM8-300	Min 50	± 1.6	± 1.5	300
	150	± 1.2	± 1.0	
	Max 300	± 1.0	± 0.6	

GeneMate 12 channel

SPECIFICATIONS				
Model	Volume [μl]	Accuracy [%]	Precision [%]	Fit to tips [μl]
GM12-10	Min 1	± 8.0	± 6.0	10
	5	± 4.0	± 2.0	
	Max 10	± 2.0	± 1.2	
GM12-50	Min 5	± 4.0	± 2.5	200
	25	± 3.0	± 1.2	
	Max 50	± 1.6	± 0.6	
GM12-200	Min 20	± 3.0	± 1.5	200
	100	± 1.5	± 0.8	
	Max 200	± 1.0	± 0.6	
GM12-300	Min 50	± 1.6	± 1.5	300
	150	± 1.2	± 1.0	
	Max 300	± 1.0	± 0.6	

These specifications are obtained in forward mode, using a gravimetric method with the temperature of the distilled water, tips and all other conditions stabilized between 19°C and 21°C. The values given include all components of error due to both normal hand warming and changing of the tips.

Performance tests: The pipettor is calibrated in accordance with EN ISO 8655. Performance can be verified by checking the pipettor using the procedures outlined in the EN ISO 8655 standard.

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The pipettor design enables the user to perform the recalibration process according to the rules presented in section 5.

2 - SETTING THE VOLUME

The volume shown by the counter is represented by three digits, which should be read from top to bottom. Typical meter readings are shown in the following table:

Model	Counter readings	Set volume	Basic degree			
GM8-10 GM12-10	<table border="1"><tr><td>0</td></tr><tr><td>3</td></tr><tr><td>5</td></tr></table>	0	3	5	3.5 μ l	0.02 μ l
0						
3						
5						
GM8-50 GM12-50	<table border="1"><tr><td>0</td></tr><tr><td>6</td></tr><tr><td>5</td></tr></table>	0	6	5	6.5 μ l	0.10 μ l
0						
6						
5						
GM8-200 GM12-200	<table border="1"><tr><td>0</td></tr><tr><td>8</td></tr><tr><td>5</td></tr></table>	0	8	5	85.0 μ l	0.20 μ l
0						
8						
5						
GM8-300 GM12-300	<table border="1"><tr><td>2</td></tr><tr><td>5</td></tr><tr><td>0</td></tr></table>	2	5	0	250.0 μ l	1.0 μ l
2						
5						
0						

To attain the maximum accuracy, set volume must be approached from a higher value. If the desired value is lower than the previous value, simply use the knob in the pushbutton (Fig. 1A2) or the black adjustment knob (Fig. 1B) to adjust the value down to 1/3 turn above the required setting. If the desired value is higher than the previous value, use the knob in the pushbutton or the black adjustment ring to adjust the value to 1/3 turn above the required value. The setting should then be performed in the following manner:

With the volume set to 1/3 above the required setting, slowly turn the pipetting pushbutton knob or the black adjustment knob to the required volume.

If the knob is accidentally turned too far, ie is set lower than the required value, the process must be repeated. The approach to the set volume must always be made in the order of decreasing value.

3 - METHOD OF PIPETTING

Fit the tips onto shafts of the multichannel module. In order to put tips on the multichannel shafts hold the pipettor vertically and press it against the tips in the rack box, until the shafts retreat about 1.5 mm into the multichannel module. The suspension system of the shafts ensures even and tight sealing of tips. The pipettor does not need to be rolled back and forth to seal the tips tightly. The liquid aspirated into the tips should not flow out by gravity from properly fixed tips. While holding the pipettor in a vertical position, tips should be immersed in the liquid to a depth of 2-4 mm, and flushed once by drawing a dose of liquid and dispensing it out with slow and steady movement. Next, still holding the pipettor 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 pipettor should next be positioned at an angle of 10-45 degrees in relation to inner walls of destination vessels and tips should be emptied by pressing the pipetting button slowly until the first resistance point is felt, (Fig. 3C). After waiting second, the pipetting button should be pressed to the second resistance point in order to expell 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 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 pipettor shafts,
- do not lay down the pipettor with tips filled,
- do not draw volumes of liquid exceeding the pipettor's range,
- check if the tips are fitted properly,

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- during operation, the pipettor 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 rewetted 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 different from ambient temperature,
- when pipeting liquids which tend to wet walls of tips, such as serums, proteins or 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 work, the pipettor should be stored vertically in a holder with tips removed.

5 - RECALIBRATION

GeneMate Multichannel pipettors are calibrated by gravimetric method, using **GeneMate** tips and distilled water, at the temperature $20 \pm 1^\circ\text{C}$, according to EN ISO 8655 standard.

If during pipettor 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 pipettor 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 pipettor, tips and water was identical
- the density of the liquid used is close to that of distilled water
- a 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

- mg/ μl 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 pipettor 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 pipettor, 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 dose volume depending on the pipettor volume according to the following table:

Model	Range of the pipettor volumes [μl]	Preset volume [μl]	Permissible volumes [μl]	Volume change ΔV for full turn of the calibration key [μl] (24 increments)
GM8-10 GM12-10	1 - 10	1	0.92 - 1.08	0.33
GM8-50 GM12-50	5 - 50	5	4.8 - 5.2	1.67
GM8-200 GM12-200	20 - 200	20	19.6 - 20.4	6.30
GM8-300 GM12-300	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:

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Temperature [°C]	Pressure [kPa]		
	95.0	101.3	105.0
20	1.0028	1.0029	1.0029
21	1.0030	1.0031	1.0031
22	1.0032	1.0033	1.0033
23	1.0034	1.0035	1.0036
24	1.0037	1.0038	1.0038
25	1.0039	1.0040	1.0040

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

- Remove the pipetting pushbutton, (Fig. 4A),

Warning: The pipetting pushbutton consists of 2 parts: the knob (Fig. 1A2) and the pushbutton (Fig. 1A1). After removal of the pushbutton, both parts are separated.

- Holding the black knurled volume adjustment 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. One full turn of the calibration key changes the pipettor aspiration volume by the amount given in the table, (Fig. 4C),
- Take out the key and fix the pipetting pushbutton (Fig. 4D). The pipetting pushbutton should be fixed by placing the knob on the arbor first (Fig. 1A2) and then the pushbutton (Fig. 1A1).

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 - CLEANING AND STERILIZATION

Cleaning

External surfaces of the pipetting pushbutton, the ejector button, the handgrip, shaft and the adjustment knob may be cleaned using a cloth dampened in isopropyl alcohol.

Sterilization:

The pipettor can be sterilized in the autoclave at 121°C for 20 minutes. After sterilization, the pipettor should be dried and cooled to room temperature.

It is recommended:

- to sterilize the pipettor in autoclave with an initial vacuum and drying cycle,
- prior to sterilization unscrew the nut connecting the handle and module slightly. After autoclaving these parts should be screwed tight again.

The precision of the results should not alter if the pipetting process and autoclaving are carried out as described in this manual. Because a slight change in the accuracy of the dosage may occur, it is recommended to:

- check the calibration of the pipettor after the initial first, third and fifth autoclaving cycles and then after every 10 autoclaving cycles.

7 - PIPETTOR KIT AND ACCESSORIES

Pipettor kit:

The pipettors are delivered in the kits including:

- Pipettor
- Instruction manual
- Calibration key
- Pipettor stand
- Identification labels

The stand assembly diagram is shown in Fig. 5.

Accessories:

BioExpress offers wide range of tips and racks system ideally suited for multichannel pipettors.

Please call for details: 800-999-2901.

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8 - SPARE PARTS

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

A: Pipetting pushbutton **A1: Pushbutton** **A2: Knob**

B: Adjustment knob

C: Ejector button

D: Piston's assembly

E: Shaft

F: Ejector

G: Calibration key

can be ordered from your **BioExpress** representative (type of pipettor and name of the part for this pipettor should be specified).

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

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

Contact **BioExpress** at 800-999-2901