

Pearl™ Pipette Instruction Manual

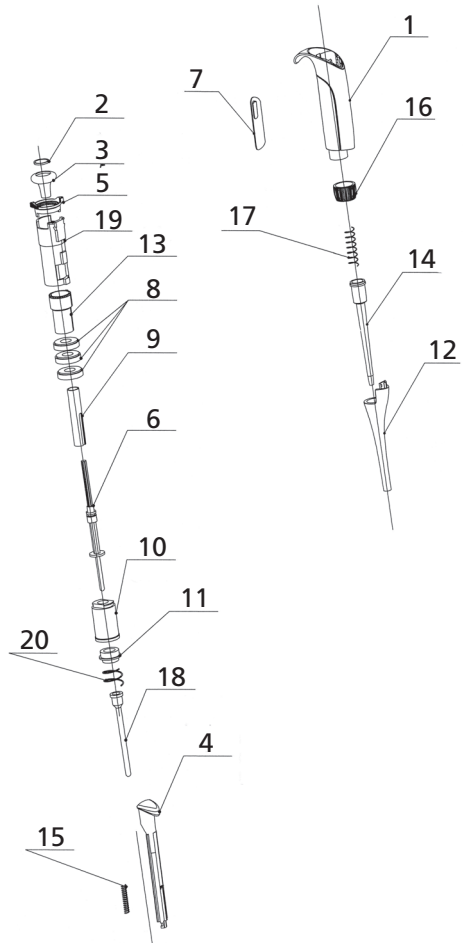


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PARTS LIST

| Part No. | Part Name |
|----------|----------------|
| 1 | Handle |
| 2 | Button Cap |
| 3 | Plunger Button |
| 4 | Ejector |
| 5 | Lock Handle |
| 6 | Shaft |
| 7 | Handle Cap |
| 8 | Digital Gear |
| 9 | Control Screw |
| 10 | Screw Holder |
| 11 | Flange |
| 12 | Eject Cylinder |
| 13 | Volume Lock |
| 14 | Cylinder |
| 15 | Spring 1 |
| 16 | Assembly Nut |
| 17 | Spring 2 |
| 18 | Piston |
| 19 | Digital Holder |
| 20 | Spring 3 |



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1. Introduction

The Pearl™ Pipette is an air displacement pipette. The pipette is made from temperature and chemical resistant materials (polypropylene, stainless steel, etc.). The pipette is equipped with a digital volume meter which is used to display the volume (Figure 1). The maximum volume for the pipette is shown on the plunger button and corresponds to the model (Figure 2). The pipette is equipped with a tip ejector to easily remove the used tip during operation.



Figure 1

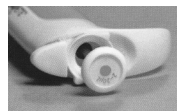


Figure 2

2 Recommendations

- Use pipettes only when a pipette tip has been attached.
- Do not allow any liquid to enter into the pipette.
- Set volume from the higher value down to the lower value, i.e. first go above the desired volume and then return to the volume.
- Make sure that you operate the push button slowly and smoothly.
- Each new tip should be pre-rinsed with the liquid to be pipetted.
- Never force the volume meter beyond its recommended limits.
- When using organic solvents and aggressive chemicals, check the chemical compatibility of the pipette tips and the pipettes.
- When using solutions with physical characteristics which are considerably different from those of water [e.g. glycerol], check the dispensing volume.
- Avoid differences in temperature between pipettes and pipette tips as well as the liquid used, because this may lead to incorrect volume.

3 Operations

3.1 Volume setting

The volume can be changed continuously by rotating the control button.

The figures in the volume meter are read from top to bottom.

It is advisable to carry out volume setting from the higher value down to the lower value, i.e. first go above the desired volume and then return to the desired volume (Figure 4).

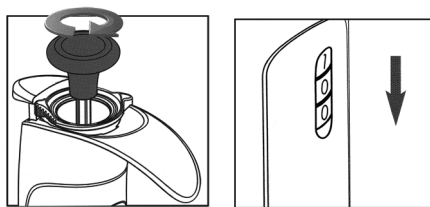


Figure 4

3.2 Attach tips

Attach suitable tips to the pipette firmly.

Remove the tips from the tip box using the pipette.

Notes:

Always fit a tip to your pipette before aspirating any liquid.

3.3 Aspirating liquid

- Press down the control button to the first stop (Figure 5).
- Immerse the pipette tip approx. 5 mm into the liquid, make sure that the pipette remains in a fully vertical position (Figure 6).

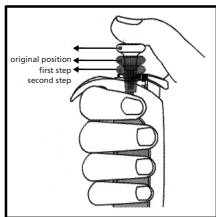


Figure 5

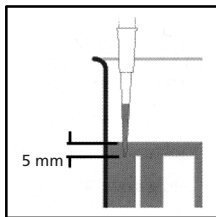


Figure 6

- Wait three seconds. Allow the control button to slide back slowly.
- Pull the tip out of the liquid.

To remove any remaining droplets, dab with non-fibrous cellulose. When doing so ensure that no liquid comes out of the tip.

3.4 Dispensing liquid

- Hold the tip at an angle against the inside wall of the vessels (Figure 7).

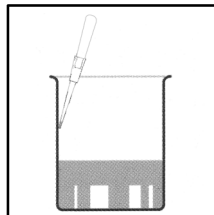


Figure 7

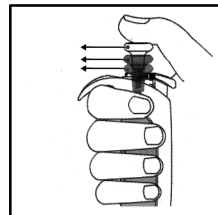


Figure 8

- Press down the control button slowly to the first stop. Wait one second.
- Press down the control button to the second stop to blow out any remaining liquid (Figure 8).
- Hold down the control button and pull the tip from the inner wall of the tube.
- Allow the control button to slide back slowly.

Tips are removed by pressing the ejection button on the side of the pipette.

Notes:

Please do not lay down the pipette when a filled pipette tip is attached, because this may result in liquid entering the pipette's internal mechanism.

When pipetting serum or high-viscosity solutions, wait a few seconds longer when aspirating and dispensing.

5 Special notes

To guarantee precision and accuracy, we recommend rinsing new tips by aspirating and dispensing liquid three times before pipetting.

Explanation:

To compensate for the properties of the liquid.

4 Calibrations

The test can be performed by weighing the volume using an analytical balance with a suitable level of sensitivity.

Notes:

The distilled water, weighing vessel, pipette and pipette tip must all be in the same temperature.

4.1 When should calibration be carried out?

The pipettes were tested during production in accordance with the test conditions for pipetting water samples.

In the case of doubts arising with regard to the accuracy of the pipetted volume, the following points should be clarified prior to making any adjustment to the pipette:

Is the pipette leaking?

What is the temperature of the sample?

What is the temperature of the pipette?

What is the temperature of the air?

Does the sample have a different density to that of water?

Is the pipetting speed too fast?

If these checks prove to be unsuccessful, it is safe to assume that the calibration of the pipette has been altered.

4.2 Follow-up calibration in the case of error.

From a technical point of view, this is a zero-decimal shift. The value by which the setting of the pipette is shifted remains constant across the entire measuring range.

If, for example, in the case of a 10-100ul, follow-up alignment of 1 ul takes place at 100 ul (=1%), the pipette is also adjusted by 1 ul at 10 ul (=10%!)

1) The pipette, tip and water must all be the same temperature (20-25°C, ±0.5).

2) In the case of adjustable pipettes, the pipette is set to the nominal volume required.

3) With a pipette tip attached to the pipette, the desired volume is pipetted and weighed 10 times. The mean of this weighing is converted into ul using the following formula:

Volume = Weight / Density of liquid (at the temperature specified)

4) To align to the volume displayed, the wrench (figure 9) is inserted horizontally into the alignment opening in the pipette grip. (When doing so, hold the pipette vertically.) To reduce the volume, turn the setting ring clockwise. To increase the volume, turn the setting ring counterclockwise. (see figures 10-12)

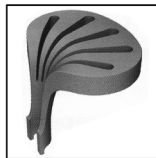


Figure 9



Figure 10

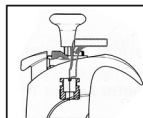


Figure 11

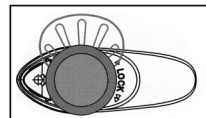


Figure 12

Notes:

When the setting ring is rotated (either in the + or - direction), the piston stroke of the pipette is altered (although the volume-setting remains unchanged).

5) Remove the wrench and move the setting ring backwards and forwards until the counter and the stroke system lock together.

6) Repeat step 3). The readings must be within the tolerances specified. If the nominal volume does not correspond with the measuring result, repeat steps 4).

Since this adjustment affects the entire measuring range, it is imperative to check the other volumes of this pipette specified in the technical data.

5 Varying density liquids

The pipette lets you compensate for solutions of density much different from water, by setting the volume slightly higher or lower than that required.

For liquids less dense than water compensation is possible by setting the volume meter lower than the required value.

For liquids denser than water compensation is possible by setting the volume meter higher than the required value.

Example:

If pipetting 80 ul of serum using 100 ul pipette.

- Set the volume meter to 80 ul.
- Aspirate a volume of liquid and measure it gravimetrically.
- If the volume is measured as 79.1 ul, the error is 0.9 ul. Increase the volumeter setting by 0.9 to 80.9 ul and repeat the measurements.
- If the second measurement is not accurate enough, make another slight volume adjustment until the measurements are as desired. (Proceed as described in steps 1 to 6 of Section 4.2.)

6 Clean / Sterilization

6.1 Clean

Periodic cleaning of the pipettes may be necessary using a soap solution or 60% Isopropanol. The pipette should then be rinsed in distilled water and dried.

The seals are maintenance-free and the pistons should be lubricated lightly (using silicone grease) when cleaned or replaced.

Sample contamination caused by the liquid entering the pipette can be removed after the pipette has been disassembled.

6.2 Sterilization

The entire pipette can be sterilized by steam-autoclaving (121° C, 15psi, 15 minutes). The pipette will need to be re-calibrated after autoclaving. It is recommended to allow the pipette to dry at room temperature before use. Any discoloration which may occur has no effect on the function of the pipette.

7 Troubleshooting

- Droplets on the inner wall of the pipette tip.

Cause: A contaminated or dirty pipette tip has been used.

Solution: Attach a new pipette tip.

- Pipette is dripping and/or the volume pipetted is incorrect.

Cause: The tip is loose.

Solution: Press the tip onto the end of the shaft firmly.

Cause: A unsuitable pipette tip has been used.

Solution: Use a correct tip.

Cause: The tip is removed too quickly from the liquid.

Solution: Pull the tip slowly out of the liquid.

Cause: Piston is contaminated.

Solution: Clean and lightly lubricate the piston.

Cause: Piston/seal is damaged.

Solution: Replace the piston/seal.

Cause: Assembly is loose.

Solution: Tighten the pipetteassembly nut.

- The control button jams and does not move smoothly.

Cause: The piston is contaminated.

Solution: Remove the piston/seal from the pipette. Clean the piston/seal with distilled water. Replace the piston/seal if necessary.

Cause: Liquid has entered the nose cone and dried.

Solution: Remove the piston from the pipette lower part, rinse out the lower part with warm water, then rinse with distilled water and dry.

When removing the shaft from the pipette body, make sure the spring, seal and o-ring do not fall off the piston, especially on the smaller models.

8 Specifications

These manufacturer's specifications should be used as guidelines when establishing your own performance specification.

| Model No. | Cat. No. (μL) | Volume (μL) | Increment | Rel. % | Abs μL | Rel. CV% | Abs SD μL |
|------------|-------------------------------|-----------------------------|-----------|--------|----------------------|-------------|-------------------------|
| PEARL2 | 120097 | 0.2 | 0.002 | 12.0 | 0.024 | 6.00 | 0.012 |
| | | 1 | | 2.7 | 0.027 | 1.30 | 0.013 |
| | | 2 | | 1.5 | 0.030 | 0.70 | 0.014 |
| PEARL10 | 120098 | 1 | 0.02 | 2.5 | 0.025 | 1.20 | 0.012 |
| | | 5 | | 1.5 | 0.075 | 0.60 | 0.030 |
| | | 10 | | 1.0 | 0.10 | 0.40 | 0.040 |
| PEARL20 | 120099 | 2 | 0.02 | 7.5 | 0.15 | 2.00 | 0.040 |
| | | 10 | | 1.5 | 0.15 | 0.50 | 0.050 |
| | | 20 | | 1.0 | 0.20 | 0.30 | 0.060 |
| PEARL50 | 120100 | 5 | 0.02 | 7.5 | 0.15 | 2.00 | 0.040 |
| | | 25 | | 1.5 | 0.15 | 0.50 | 0.050 |
| | | 50 | | 1.0 | 0.20 | 0.30 | 0.060 |
| PEARL100 | 120101 | 10 | 0.2 | 3.5 | 0.35 | 1.00 | 0.10 |
| | | 50 | | 0.8 | 0.40 | 0.24 | 0.12 |
| | | 100 | | 0.8 | 0.80 | 0.15 | 0.15 |
| PEARL200 | 120102 | 20 | 0.2 | 2.5 | 0.5 | 1.00 | 0.20 |
| | | 100 | | 0.8 | 0.8 | 0.25 | 0.25 |
| | | 200 | | 0.8 | 1.6 | 0.15 | 0.30 |
| PEARL300 | 120103 | 30 | 0.2 | 2.5 | 0.5 | 1.00 | 0.20 |
| | | 150 | | 0.8 | 0.8 | 0.25 | 0.25 |
| | | 300 | | 0.8 | 1.6 | 0.15 | 0.30 |
| PEARL1000 | 120104 | 100 | 2.0 | 3.0 | 3.0 | 0.60 | 0.6 |
| | | 500 | | 0.8 | 4.0 | 0.20 | 1.0 |
| | | 1000 | | 0.8 | 8.0 | 0.15 | 1.5 |
| PEARL5000 | 120105 | 500 | 5.0 | 2.4 | 12.0 | 0.60 | 3.0 |
| | | 2500 | | 0.6 | 15.0 | 0.20 | 5.0 |
| | | 5000 | | 0.6 | 18.0 | 0.16 | 8.0 |
| PEARL10000 | 120106 | 1000 | 2.0 | 3.0 | 3.0 | 0.60 | 0.6 |
| | | 5000 | | 0.8 | 4.0 | 0.20 | 1.0 |
| | | 10000 | | 0.8 | 8.0 | 0.15 | 1.5 |