

SOP: Eppendorf Research Plus Performance Verification

Approvals:

Preparer: Jason McMillan

Date: 08JAN14

Reviewer: Dr. Maggie Bryans

Date: 10JAN14

1. **Purpose:** To verify the calibration of a single channel pipette.
2. **Scope:** Covers the cleaning, decontamination and verification of a single channel pipette.
3. **Responsibilities:**
 - 3.1. It is the responsibility of the course instructor/lab assistant to ensure that this SOP is performed as directed and to update the procedure when necessary.
 - 3.2. It is the responsibility of the students/technicians to follow the SOP as described and to inform the instructor about any deviations or problems that may occur while performing the procedure.
4. **References:**
 - 4.1. balance operation SOP
 - 4.2. balance calibration SOP
 - 4.3. Tuttnauer 3850 ELV Autoclave SOP
 - 4.4. Eppendorf Research Plus Operation and Maintenance SOP
5. **Definitions:** N/A
6. **Precautions:** N/A
7. **Materials:**
 - 7.1. balance
 - 7.2. weigh boats
 - 7.3. MilliQ water
 - 7.4. small beaker for holding MilliQ water
 - 7.5. verification labels
 - 7.6. verification form
 - 7.7. verification Pass/Fail form
 - 7.8. pipette tips
 - 7.9. Eppendorf Research Plus (P20, P200, and P1000)
 - 7.10. 70% isopropyl alcohol (IPA)
 - 7.11. lab towels
 - 7.12. tweezers
 - 7.13. thermometer
 - 7.14. calculator
 - 7.15. barometer
8. **Procedure:**
 - 8.1. **Clean the pipette** (See Figure 2.)

Note: Most pipettes are designed so that the parts that normally come into contact with liquid contaminants can easily be cleaned and decontaminated.

 - 8.1.1. Wipe entire pipette with a lab towel dampened with a mild detergent solution.
 - 8.1.2. Wipe entire pipette with a lab towel dampened with distilled water.
 - 8.1.3. Remove the ejector sleeve by holding down the ejection button and pulling on the ejector sleeve (Figure 2: Step 1).
 - 8.1.4. Slide up the ring on the lower part with the label "PUSH TO RELEASE"

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approximately 5mm until the lower part is released (Figure 2: Step 2 & 3).

- 8.1.5. The lower part is then removed from the upper part (Figure 2: Step 4).
- 8.1.6. Wipe the ejector sleeve and lower part with a lab towel dampened with a mild soap solution or 70% IPA.
- 8.1.7. Wipe the ejector sleeve and lower part with a lab towel dampened with MilliQ water.
- 8.1.8. Refit the lower part into the upper part until it engages audibly.
- 8.1.9. Refit the ejector sleeve and allow the pipette to dry.
- 8.1.10. Dispose of lab towels in bio-hazardous waste receptacle.

8.2. Chemical decontamination

- 8.2.1. Spray a lab towel with 70% IPA to dampen the lab towel.
- 8.2.2. Wipe upper part of body with dampened lab towel.
- 8.2.3. Wipe ejector sleeve with dampened lab towel.
- 8.2.4. Wipe entire pipette with a lab towel dampened with MilliQ water.
- 8.2.5. Leave pipette to dry or wipe pipette dry with lab towel.
- 8.2.6. Dispose lab towels in bio-hazardous waste receptacle.

8.3. Autoclaving

- 8.3.1. Place the whole Eppendorf research Plus unit into the autoclave
- 8.3.2. Run the autoclave on the Unwrapped Delicate Instruments per Tuttnauer 3850 ELV Autoclave SOP
- 8.3.3. Remove the Eppendorf research Plus unit and allow it to dry completely and cool down.

8.4. Verification of Calibration

Note: To test the accuracy of the pipette you will pipette a set volume 10 times and then weigh the total pipetted volume. 1mL of MilliQ water should weigh 1g and 1 μ L should weigh 1mg. Calculate your % Error using the equation below:

$$\frac{\text{Expected Mass} - \text{Actual Mass}}{\text{Expected Mass}} \times 100 = \% \text{ Error}$$

If the % Error is $\leq 2\%$ the pipette passes verification, if the % Error is $>$ than 2% the pipette fails. We will verify the pipette once at the maximum volume for the pipette, once at the $\frac{1}{2}$ maximum volume, and once at the minimum volume. Altogether you will pipette 30 volumes and weigh 3 times for each pipette.

- 8.4.1. Record the necessary information on the Verification form. Enter information in the empty box to the right of the box specifying the information.
- 8.4.2. Verify that the calibration label of the balance is within the dated calibration time period.
- 8.4.3. Fill a small beaker with MilliQ water.
- 8.4.4. Place the weigh boat on the balance.
- 8.4.5. Tare the balance and verify that 0.00 is being displayed.
- 8.4.6. Verify that the pipette is set to the maximum volume (e.g. the maximum volume for a P-20 pipette is 20 μ L.).

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- 8.4.7. On the Pipette Verification Form, beside Selected Volume, enter the volume you will be pipetting and the value of that volume times 10 (e.g. for a 20 μ L pipette you will record 20 μ L for the selected volume and 200 μ L for the selected volume times 10.).
- 8.4.8. Calculate the expected mass by converting the selected volume times 10 using the following conversions: 1 μ L = 1mg and 1mL = 1g. Use the selected volume times 10 as the volume (e.g. for a 20 μ L pipette, 200 μ L multiplied by 1mg/ μ L = 200mg). Record the expected mass in the box beside Expected Mass.
- 8.4.9. Verify that the pipette is set to the maximum volume recommended by the manufacturer for the pipette.
- 8.4.10. Place pipette tip securely on the pipette.
- 8.4.11. Aspirate MilliQ water into pipette tip from the beaker and dispense it into weigh boat.
- 8.4.12. Repeat the above step 9 times. Each time you dispense the selected volume mark the Verification form in the numbered box beside Dispense Repetitions.
- 8.4.13. Record the final mass on the Verification form next to Recorded Mass.
- 8.4.14. Tare the balance and verify that 0.00 is being displayed.
- 8.4.15. Set the volume of the pipette to half capacity (e.g. For a P-20 pipette, set it to 10 μ L.) and verify the volume.
- 8.4.16. Repeat steps 8.4.9. through 8.4.16 with the pipette set to the half-capacity volume.
- 8.4.17. Tare the balance and verify that 0.00 is being displayed.
- 8.4.18. Set the volume of the pipette to the minimum capacity recommended by the manufacturer (e.g. For a P-20 pipette, set it to 2 μ L.)
- 8.4.19. Repeat steps 8.4.9. through 8.4.16 with the pipette set to the minimum-capacity volume.
- 8.4.20. Calculate the % Error (as directed in the note at the beginning of section 8.4) for each test (maximum, half-capacity, and minimum volumes) and record the results on the verification form.
- 8.4.21. Verify that all fields of the verification form have been filled out and fill out the Pipette Verification Pass/Fail form according to the results of the tests.

9. Attachments:

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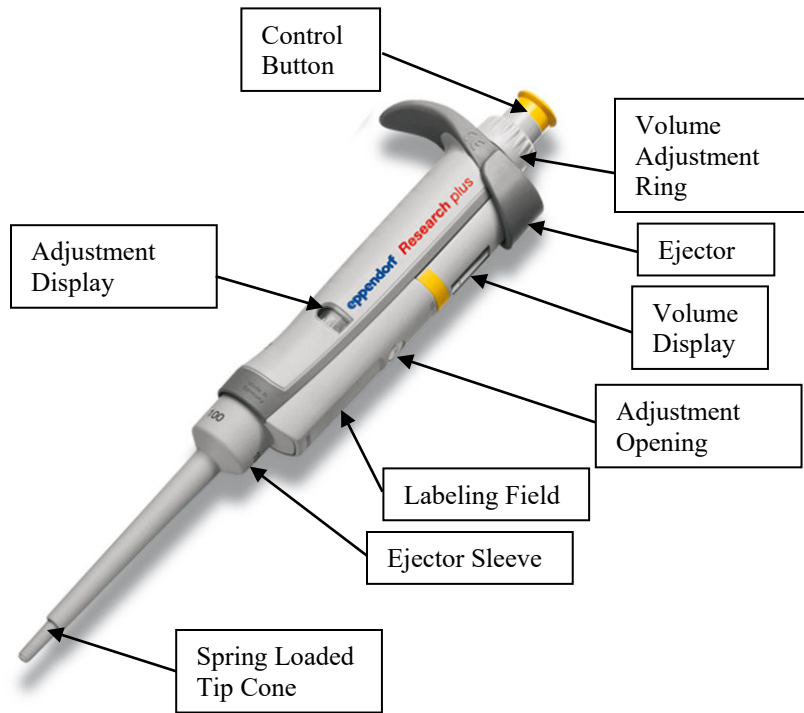


Figure 1: Eppendorf Research Plus

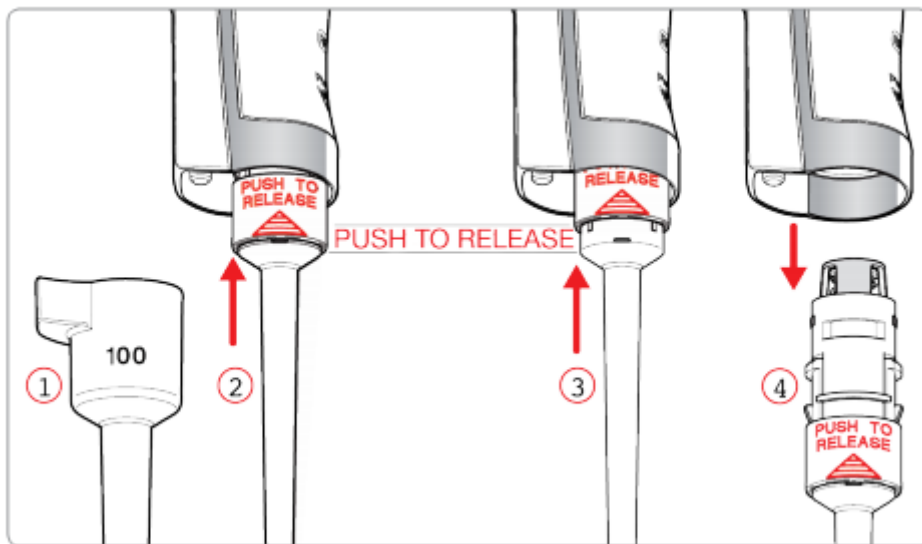


Figure 2: Removing the Lower Part
Eppendorf Research Plus Manual

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10. History

<i>Revision Number</i>	<i>Effective Date</i>	<i>Preparer</i>	<i>Description of Change</i>
0	08JAN14	Jason McMillan	Initial release
1	10JAN14	Jason McMillan	Added pipette verification form

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Pipette Information
Name and Description: _____
Model: _____
Serial Number: _____

Verification		Pipette	
Technician		Volume Range	
Date		Number of Channels	

Test Conditions			
Balance Serial #		Balance Model	
Sensitivity		Balance Calibration Date	
Correction Factor		Balance Calibration Technician	
Air Temperature			
Barometric Temperature			
Relative Humidity			

Tests			
Test 1 (Max. volume)			
Selected Volume		Expected Mass	
Selected Volume X 10		Recorded Mass	
Dispense Repetitions	1 2 3 4 5 6 7 8 9 10		
Test 2 (Half cap. volume)			
Selected Volume		Expected Mass	
Selected Volume X 10		Recorded Mass	
Dispense Repetitions	1 2 3 4 5 6 7 8 9 10		
Test 3 (Min. volume)			
Selected Volume		Expected Mass	
Selected Volume X 10		Recorded Mass	
Dispense Repetitions	1 2 3 4 5 6 7 8 9 10		

Test results	
% Error Test 1	
% Error Test 2	
% Error Test 3	
Pass or Fail	