

Purpose: The purpose of this document is to describe the method to test a technician's pipetting proficiency with multichannel pipettes.

Scope: This document applies to personnel who are using multichannel pipettes.

Responsibility: The person performing this proficiency training must be trained on the use of multichannel pipettes and the MVS, by a qualified trainer.

Materials/equipment:

- Appropriate multichannel pipette(s), calibrated and verified by a qualified trainer
- Appropriate pipette tip(s)
- Reservoirs
- Artel MVS®
 - MVS Calibrator Plate
 - MVS QualAssure Baseline
 - MVS QualAssure Diluent
 - Appropriate MVS QualAssure solutions
 - MVS verification plates or other plates as appropriate

Training:

1. Technicians must be trained on the use of the equipment by a qualified trainer.
2. Technicians must be trained on proper pipetting technique using practice, observation and coaching session as needed by a qualified trainer.
3. Technicians will be periodically retrained and retested for proficiency.
4. Detailed process steps for the use of the MVS can be located in the Multichannel Pipette Calibration and Operator Assessment Standard Operating Procedure for the Artel MVS document, Doc # 15A7298.
5. When using the MVS®, special conditions or trends can actively be identified when using the heat map view. See Special Conditions section for more information.

Discussion:

1. All persons using pipettes must be documented as being proficient at the particular level for which they are testing.

| | | |
|--------------|----------------------|-------------------|
| a. Level I | Large Volumes | 200 µL and higher |
| b. Level II | Intermediate Volumes | 20 µL – 199 µL |
| c. Level III | Small Volumes | 2 µL – 19 µL |
2. Prior to testing with the MVS, the pipette and plate layout need to be defined.

Procedure:

1. Testing

- a. Set the pipette to nominal volume. Place appropriate tips on the pipette. Pre-wet the pipette tips a minimum of 3 times before aspirating.
- b. Perform a multichannel pipette verification.
- c. Take 4 (valid) data points at nominal volume (the nominal value is the largest user-selectable volume setting; e.g., a 10-100 μL pipette has a nominal volume of 100 μL).
- d. Repeat this procedure at 50% and 10% of the nominal volume. An example MVS plate layout is below:

Layout Configuration

Plate Layout Information

Layout ID: 200 uL pipette

Layout Description: tested at low, mid and high

Channels: 8 Plate Type: 96 Well Standard Profile

Calculate Overall Run Status

Calculate Overall Channel Status

Heat Map Volume Tables

Dispense Direction: Left to Right Top to Bottom

Device Orientation: Vertical Horizontal

Group Information

Target Volume: 200 μL Data Points: 3

Relative Inaccuracy 2 %

Coefficient of Variation 1 %

| Group | Volume | Data Points | Inaccuracy | CV | Description |
|-------|--------|-------------|------------|----|-------------|
| 1 | 20 | 4 | 20 | 10 | |
| 2 | 100 | 4 | 4 | 2 | |
| 3 | 200 | 4 | 2 | 1 | |

- e. Run the plate on the MVS to obtain a report.

2. Results

- a. Complete Section I of this record.
- b. Complete Section II of this record; record the precision/CV% (random error) and inaccuracy (systematic error) results of the technician.

3. Review

- a. The supervisor (or designee) must review the data and determine pass or retest. The technician must repeat the procedure for a retest. If the technician passes, issue a certificate of proficiency to the technician.

Section I

Technician Name: _____ Date: _____

Proficiency Test Level: I II III Nominal Volume: _____

MVS Plate Reader SN: _____ Pipette SN: _____

Section II

Precision (Random Error) Testing

| Volume | Precision (%CV): | Specification | Pass/Retest |
|----------------|------------------|---------------|-------------|
| Nominal | | <1% | |
| 50% of Nominal | | <2% | |
| 10% of Nominal | | <10% | |

Accuracy (Systematic Error) Testing

| Volume | % Inaccuracy | Specification | Pass/Retest |
|----------------|--------------|---------------|-------------|
| Nominal | | <2% | |
| 50% of Nominal | | <4% | |
| 10% of Nominal | | <20% | |

Reviewed by: _____ Date: _____

Notes: _____

Special Conditions

Carryover Sample: residual in tip that carried over to the next well, i.e., the low reported volumes in column 3 may have been the result of droplets not transferred; and subsequently, residual droplets get transferred during the next replicate in column 4.

| 3 | 4 |
|-------|-------|
| 49.34 | 51.45 |
| 49.59 | 51.22 |
| 50.44 | 50.33 |
| 50.42 | 50.27 |
| 49.28 | 51.75 |
| 50.53 | 50.43 |
| 50.30 | 50.22 |
| 50.44 | 50.38 |

Pre-wetting of Tip Needed: the first dispense is lower than subsequent dispenses, possibly indicating a need to pre-wet or to pre-wet more.

Group 1 Well Volumes (μL)

| | 1 | 2 |
|---|-------|-------|
| A | 49.87 | 50.42 |
| B | 50.24 | 50.22 |
| C | 49.99 | 50.44 |
| D | 49.97 | 50.28 |
| E | 50.05 | 50.51 |
| F | 49.95 | 50.37 |
| G | 49.85 | 50.39 |
| H | 49.99 | 50.31 |

Angled Aspirate: pipette was positioned at an angle during aspirate sequence, causing lower volumes on one side of the results and higher on the other side.



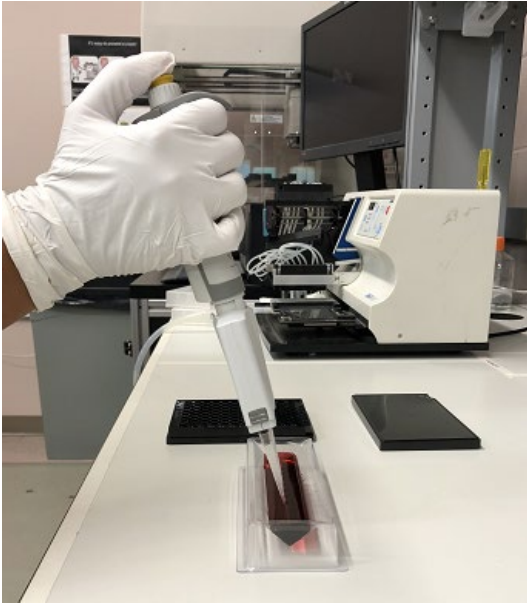
The first five tips are immersed too deep, causing more sample to flow

Group 1 Channel Statistics

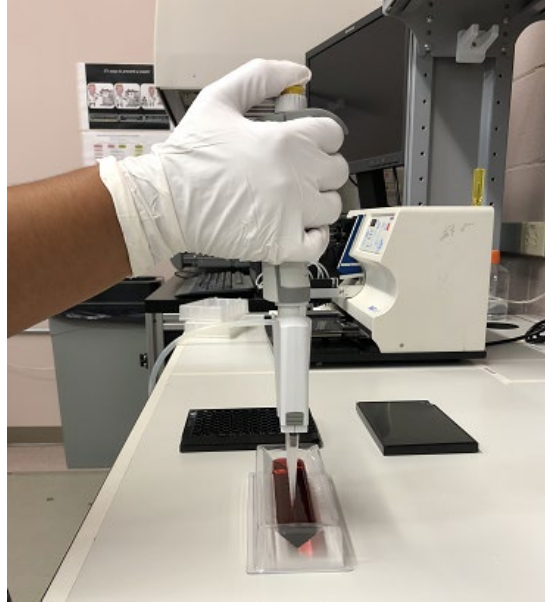
| Channel | 5 |
|---------|-------|
| 1 | 51.47 |
| 2 | 51.43 |
| 3 | 51.55 |
| 4 | 51.30 |
| 5 | 51.47 |
| 6 | 51.24 |
| 7 | 51.09 |
| 8 | 51.02 |

The last three tips are immersed too shallow, causing less sample to flow

Multichannel pipettes can be angled from side to side and/or front to back. It is important to make sure the pipette is held in a vertical, straight up/down position.



Incorrect, angled aspirate



Correct, vertical aspirate