

Axygen® 10 µL Automation Tips in 384-well Format for Agilent® Bravo™/Velocity 11 – Precision and Accuracy



SnAPPShots

A brief technical report
from the Corning
Applications Group

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Introduction

Automated liquid handling and high throughput screening (HTS) are widely used for drug discovery, molecular biology applications, and genomics. For HTS, reliable sample preparation and delivery methods have become critical to assay performance. Corning has a line of 10 µL pipet tips in a 384-well format, which have been specifically designed for applications using the Agilent Bravo/Velocity 11 automated liquid handling platform.

The focus of this study was to evaluate the dispensing volume accuracy and precision of the Axygen 384-well, 10 µL tips on the Agilent Bravo/Velocity 11 automation platform, as compared to Competitor 384-well, 10 µL tips. These criteria were measured using the Artel Multichannel Verification System (MVS®), which calculates the volume of dispensed samples using an absorbance-based measurement system. The results demonstrate that Axygen 384-well, 10 µL tips are comparable to Competitor 384-well, 10 µL tips using the Agilent Bravo/Velocity 11 liquid handling workstation to dispense volumes as low as 1 µL and as high as 10 µL.

Materials and Methods

Tips Evaluated

Axygen 384-well, 10 µL tips (Corning Cat. No. VT-384-10UL-R) and Competitor 384-well, 10 µL tips.

Methods

The Agilent Bravo/Velocity 11 automation platform was used to assess accuracy, as percent deviation (% D), and precision, as coefficient of variation (% CV), for Axygen 384-well, 10 µL tips and Competitor 384-well, 10 µL tips.

To test the ability of each brand of tips to dispense accurately and precisely, 384-well, 10 µL tips were used to aspirate from an Axygen Low Profile Reservoir (Corning Cat. No. RES-SW384-LP) and dispense into a Corning 384-well, black with clear bottom microplate (Corning Cat. No. 3711). For the 1 µL test volume, each tip aspirated 1 µL of Range C solution (Artel Cat. No. MVS-205) and dispensed 1 µL into 54 µL of diluent solution (Artel Cat. No. MVS-202) in a single well. For the 10 µL test volume, each tip aspirated 10 µL of Range A solution (Artel Cat. No. MVS-203) and dispensed 10 µL into 45 µL of diluent solution. To determine the volume of liquid dispensed into each well, absorbance readings for the solutions – diluted Range C solution for 1 µL dispense and diluted Range A solution for 10 µL dispense – were measured using an Artel ELx800NB® Plate Reader (Artel Cat. No. 1311197).

Each study was performed 3 independent times for each brand of tips for a total of 1,152 tip dispenses. Evaluation criteria include percent deviation from the set dispense volume (% D), and the variability in dispense volume (% CV) for the 1,152 tip dispenses.

Results/Discussion

The evaluation criteria for comparing Axygen 384-well, 10 µL tips with Competitor 384-well, 10 µL tips are listed in Tables 1 and 2. The ability of the pipet tips to dispense 1 µL and 10 µL volumes accurately and precisely was determined through the analysis of the mean volume dispensed across 3 replicates of 384 tips each. The precision of each brand of tip is represented by the coefficient of variation (% CV) of the replicates. Similarly, the accuracy is represented by the percent deviation (% D) from the target volume of the replicates. It is important to note that the accuracy of liquid dispense may vary depending on the method and liquid class selection chosen when using the liquid handling platform. However, for these studies the method and liquid used for testing was identical for Axygen 384-well, 10 µL tips and Competitor 384-well, 10 µL tips.

As demonstrated in Figure 1, Axygen 384-well, 10 µL tips displayed comparable precision to Competitor 384-well, 10 µL tips using the Agilent Bravo/Velocity 11 automation system. There was no significant difference in the precision of each brand of tips when dispensing 1 µL (Figure 1A) or 10 µL (Figure 1B).

Table 1. Evaluation Criteria for 1 µL Dispense Volume

| | Axygen | Competitor |
|-------------------------|-------------|-------------|
| No. of Wells | 1,152 | 1,152 |
| Outliers | 12 | 11 |
| Target Volume (µL) | 1.00 | 3.00 |
| % CV (n = 3 replicates) | 2.41 ± 0.29 | 2.90 ± 0.35 |
| % D (n = 3 replicates) | 6.08 ± 0.68 | 5.64 ± 0.90 |

Table 2. Evaluation Criteria for 10 µL Dispense Volume

| | Axygen | Competitor |
|-------------------------|-------------|-------------|
| No. of Wells | 1,152 | 1,152 |
| Outliers | 5 | 12 |
| Target Volume (µL) | 10.00 | 10.00 |
| % CV (n = 3 replicates) | 1.85 ± 0.28 | 1.69 ± 0.18 |
| % D (n = 3 replicates) | 1.09 ± 0.28 | 0.67 ± 0.29 |

Data in tables show ± standard deviation (SD).

As demonstrated in Figure 2, Axygen® 384-well, 10 µL tips displayed comparable accuracy to Competitor 384-well, 10 µL tips using the Agilent® Bravo™/Velocity 11 automation system. There was no significant difference in the accuracy of each brand of tips when dispensing 1 µL (Figure 1A) or 10 µL (Figure 1B).

Conclusions

- Axygen 384-well, 10 µL tips demonstrate comparable precision and accuracy to Competitor 384-well, 10 µL tips using the Agilent Bravo/Velocity 11 liquid handling workstation to dispense volumes as low as 1 µL and as high as 10 µL.

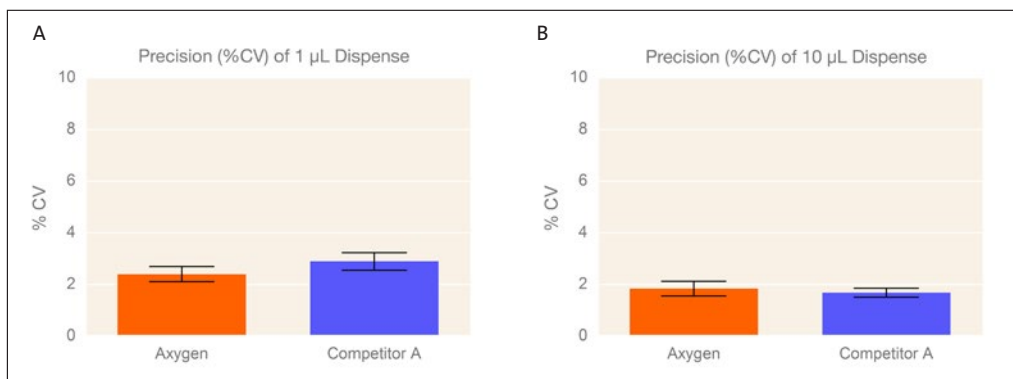


Figure 1. Precision (% CV) analysis of 384-well, 10 µL tips. The % CV of Axygen and Competitor 10 µL tips dispensing (A) 1 µL and (B) 10 µL volume using the Agilent Bravo/Velocity 11 liquid handler was determined using the Artel MVS® system. There was no significant difference in % CV between each brand. Data shown with standard deviation (SD) for 3 independent experiments of 384 wells each.

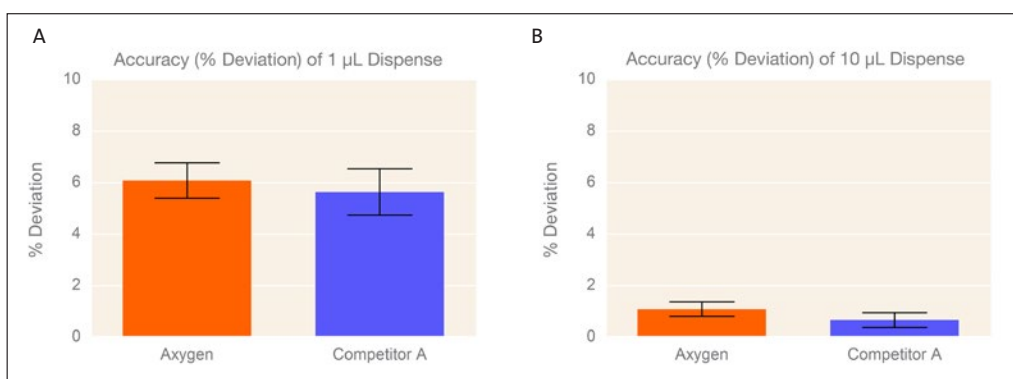


Figure 2. Accuracy (% D) analysis of 384-well, 10 µL tips. The % D of Axygen and Competitor 10 µL tips dispensing (A) 1 µL and (B) 10 µL volume using the Agilent Bravo/Velocity 11 liquid handler was determined using the Artel MVS system. There was no significant difference in % D between each brand. Data shown with SD for 3 independent experiments of 384 wells each.

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