Application Note

Precision and Accuracy of the CyBi®-Well vario as determined by using Artel's Dual Dye Ratiometric Calibration Technology

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ABSTRACT

The need for liquid handling equipment that constantly meets the requirements of accuracy and precision has been growing within the research community. The promise of repeatable pipetting, particularly at sub-microliter volumes, has often met obstacles in the form of inadequate instrumentation, inflexible protocols and poor quality control in the laboratory. CyBio, a manufacturer of quality liquid handling, best approximates the needs of the research scientist with a vast array of liquid handling options. With their Multichannel Verification System, MVS™, Artel offers a comprehensive tool for the routine quality assurance and protocol optimisation of any liquid handling system, spanning simultaneous pipetting to volumes as low as 0.1 µl. Following is the performance of the CyBi®-Well vario platform equipped with 96 channel 25µl and 250µl air displacement pipetting heads as determined by Artel's technology.

MATERIALS AND METHODS

A CyBi®-Well vario equipped with interchangeable 25 µl and 250 µl 96 pipetting heads with disposable tips was tested using Artel's MVS™. Reagents were dispensed in single aliquots of the target volume. Data was collected by making changes to the written protocol using CyBio's flexible control package in order to obtain the best %CV value. Once the protocol was optimized for speeds and dispensing heights, the data was used to plot the actual vs. expected volumes. The equation for the line allowed for the calculation of the average volume difference to be applied to the target volume and entered into the software CyBio® Control.

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RESULTS

After the described calibration, the performance of the 250 µl 96 dispensing head was determined to be as described in Table 1 and Figure 1.

Target volume in µl	Inaccuracy in %	Precision in %
200	-1.72	0.34
100	-1.69	0.47
50	-1.14	0.61
40	-1.40	0.63
25	-1.68	0.98
10	-0.80	2.12
8	0.00	2.38
5	2.00	4.71
2	29.00	8.91

Table 1: Optimized Inaccuracy and Precision (96 channel 250 µl head)

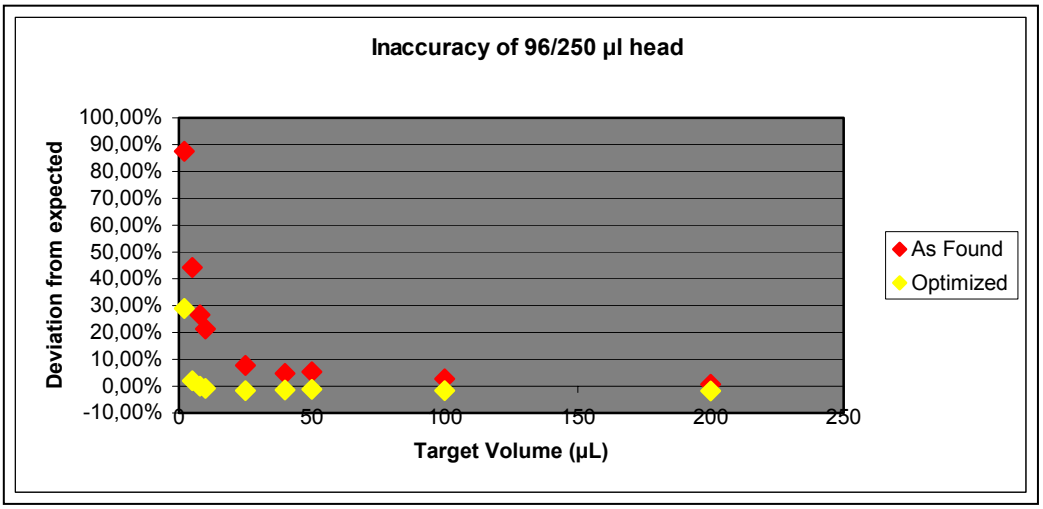

Fig. 1: Optimized vs. Standard ("out of the box") performance of 96/250 µl head

The same exercise was performed with the 96/25 µl head. Because of the reduced overall stroke volume this module promises the ability to achieve low volume transfers with increased resolution. Results are summarized in Table 2 and Figure 2.

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Target volume in µl	Inaccuracy in %	Precision in %
25	-0.32	0.52
10	2.30	0.59
8	-1.75	1.27
5	-1.60	0.81
2	-0.5	2.01
1	-3.00	1.03
0.5	-8.00	2.17
0.4	-12.50	2.86
0.25	-8.00	4.35

Table 2: Optimized Inaccuracy and Precision using 96/25 µl head

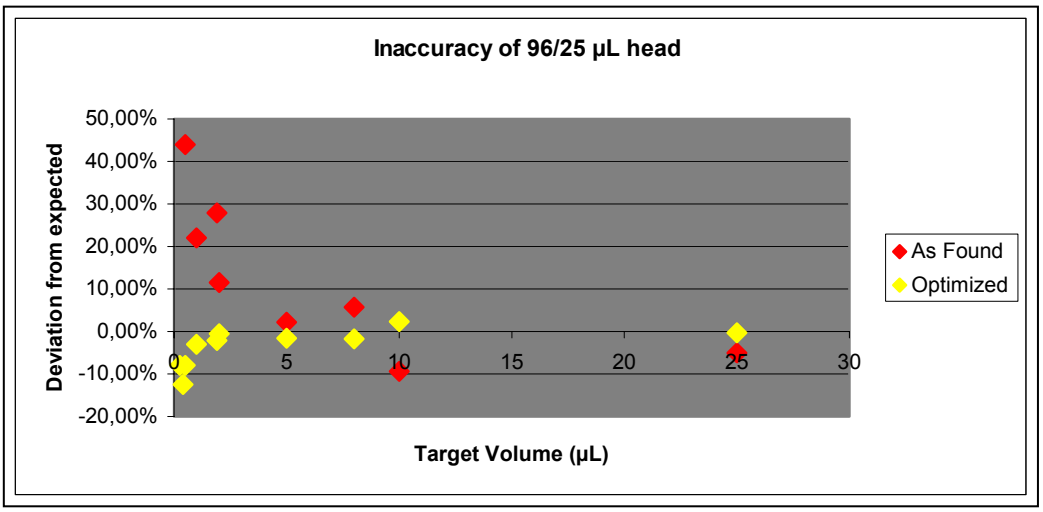

Fig. 2: Effects of optimization on overall dispense accuracy (96/25 µl head)

CONCLUSION

This experience suggests that the CyBi®-Well vario equipped with two interchangeable heads meets and often exceeds the requirements set by the research community. A single instrument, occupying a modest footprint, is capable of reliably dispensing a range of volumes of 3 orders of magnitude with less than 5% CV.

Additionally it highlights Artel's MVS™, and its ability to be used as a comprehensive and simple benchmarking and optimization tool. The ability to QC equipment with a one dispense-one readout approach for accuracy and precision is certainly a welcome addition to the tool chest of the laboratory manager. In addition, being able to optimize in less than 5 minutes, with a standardized and easily reproducible method, allows for improved efficiency and flexibility in managing liquid handling equipment.

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