

# Performance Verification of CERTUS Nano Liquid Dispenser using the Artel MVS



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## Abstract

The need to downsize assay formats is growing, but technically it is a hard challenge for equipment manufacturers. Verification and calibration of automated liquid handling instruments are important for applications that demand high levels of data integrity, such as drug discovery and development, proteomics, genomics, and molecular diagnostics. It requires accurate verification to within a few nanoliters, which is not easily achieved. For accurate verification, the Artel MVS was used to verify CERTUS's precision and accuracy across a range of aqueous target volumes.

## CERTUS Nano Liquid Dispenser

- Assay miniaturization needs precise and reliable liquid handling. Although in HTS high speed is of importance, during assay development, flexibility and convenient handling of hard- and software are required.
- The Certus (Gyger) is a 5-channel non-contact liquid handler which can operate high density assay formats.
- Air pressure is used as primary driving force and is controlled via a high speed miniature solenoid valve. All channel pressures are separately adjustable between 0-1 bar. The valves inlet includes optional filters to prevent clogging and can, if needed, be replaced with little effort. Liquid properties such as viscosity are taken into account.
- The dispense volume ranges from 35 nL - 2 mL. To minimize dead volume (down to 65  $\mu$ L) two of the 5 channels can be supplied with small standard syringes placed directly above the micro valve.
- Micro-valves of 0.1-0.6 mm diameter size are available.
- An single adjustment for volume setting is included.

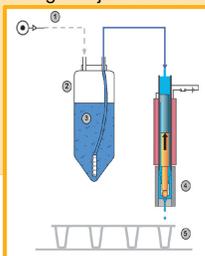


Figure : Dispenser principle

1. Pressure air or gas
2. Medium container
3. Medium
4. Micro valve
5. Well plate



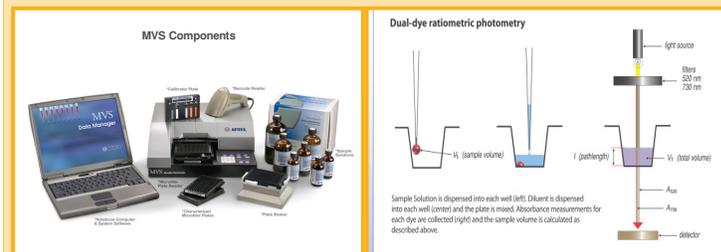
Figure : CERTUS (Gyger AG), A five channel Nano-Dispenser.

Figure : Mettler Toledo scale



## Artel MVS

Artel has developed the Multichannel Verification System (MVS) on the basis of patented Dual-Dye Ratiometric Photometry method for verifying accuracy and precision performance of automated multichannel liquid delivery equipment.

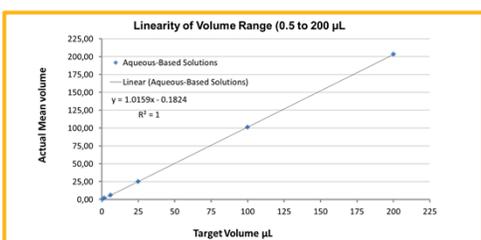
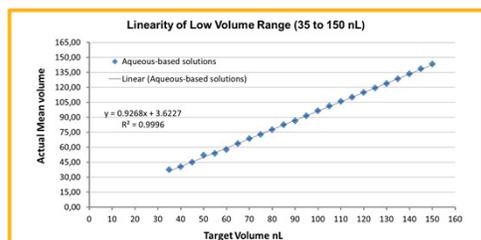
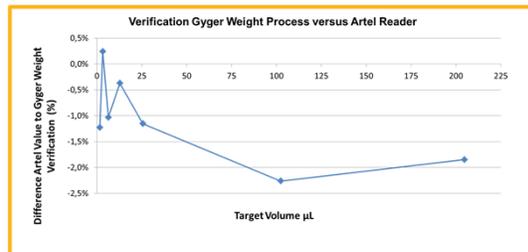
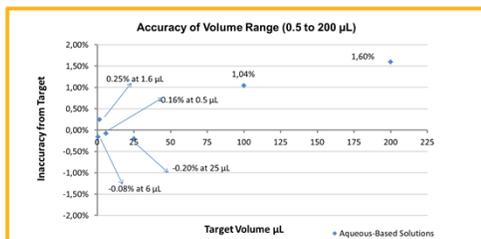
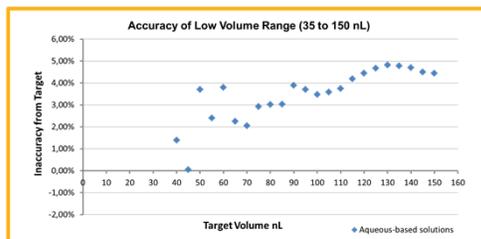
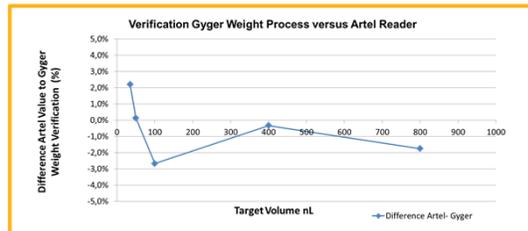
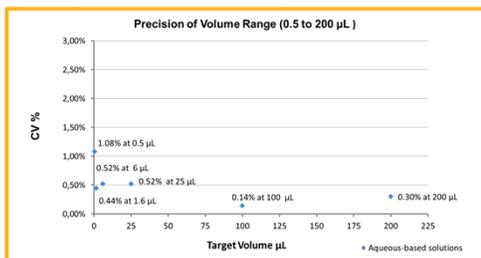
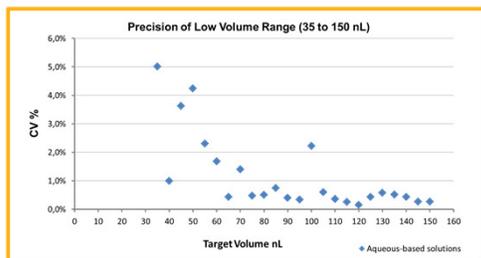


MVS sample solutions contain two dyes with distinct absorbance maxima at 520 nm (red dye) and 730nm (blue dye). Four of six available sample solutions containing different concentrations of the red dye are used for testing the performance of CERTUS by dispensing into 96-well and 384-well plates over an entire volume range of 35 nL to 200  $\mu$ L, which are summarized in following table:

	Range A	Range B	Range C	Range E
96-well std. profile	50.0 to 200.0 $\mu$ L			
384-well std. profile	10.0 to 55.0 $\mu$ L	2.500 to 9.999 $\mu$ L	0.500 to 2.499 $\mu$ L	0.0300 to 0.1499 $\mu$ L

The concentration of blue dye is constant in all sample solutions across the volume ranges. The blue dye is therefore used as an internal standard to calculate solution depth in each well. The CERTUS with 1-Channel (SMLD 300G Nozzle (0.15) valve) was used for dispensing sample solution into the wells of a microplate, and the absorbance at both wavelengths was measured for every well. By applying the Beer-Lambert law, the MVS used absorbance values and automatically calculated both the precision and accuracy of the volume delivered by one channel of the CERTUS.

## Results



## Conclusion

- The MVS is quick and easy to use for measuring the accuracy and precision performance of CERTUS.
- The MVS measurements indicate inaccuracy and CV are less than 5% and 2% over volume range 35 to 150 nL and 16 to 200  $\mu$ L respectively of aqueous based samples.
- Gyger performed its own calibration processes with water. An approximate 2.7% deviation was observed between "Artel" and "Gyger" values.
- CERTUS dispenses different types of medium with equivalent precision performance as well .