

Volume Measurement in Bio-Rad HSP-9601 96-Well PCR Microplates Using the Scarlett™ 01 Volume Analysis System

Summary

The Scarlett 01 Volume Analysis System accurately quantified liquid volumes in the Bio-Rad HSP-9601 96-well PCR microplate. Designed for PCR and molecular biology workflows, these plates are used in applications where reliable liquid volumes are critical to consistent assay performance. Using 10 mg/mL BSA in 1× PBS, Scarlett demonstrated reliable volume measurements across the 10–160 µL working range using reference volumes dispensed with traceably calibrated syringes.

Key Results

- Scarlett successfully measured liquid volumes in **Bio-Rad HSP-9601 96-well PCR microplates**.
- Successful volume measurement from **10–160 µL** using 10 mg/ml BSA in 1× PBS.
- Observed Inaccuracy: **–4.0% to +1.9%**
- Measurement precision improved rapidly above 20 µL, with **CV ≤1.57% at ~40 µL and above**.

Performance Overview

Table 1. Test Summary

Parameter	Value
Plate Manufacturer / Model	Bio-Rad HSP-9601
Plate Type	96-well, PCR plate, conical-bottom, polystyrene
Volume Range Evaluated	10–160 µL
Liquids Evaluated	10 mg/ml BSA in 1× PBS
Observed Inaccuracy Range	–4.0% to +1.9%
Maximum CV	4.9%

Verification Results

Across the evaluated range, volumes measured by the Scarlett 01 System closely matched the reference volumes, with inaccuracy ranging from –3.97% to +1.86%. Measurement precision improved rapidly with increasing volume, with CV decreasing from 4.89% at 10 µL to 1.57% at approximately 40 µL and remaining ≤1.10% from 80–160 µL.

Table 2. Measurement Performance Results

Reference Volume (μL)	Mean Volume (μL) (n=6)	^a Inaccuracy	CV
10.12	9.72	-3.97%	4.89%
20.06	20.36	1.49%	4.37%
39.76	40.50	1.86%	1.57%
80.20	81.49	1.61%	0.88%
99.56	100.57	1.02%	0.40%
159.50	157.80	-1.06%	1.10%

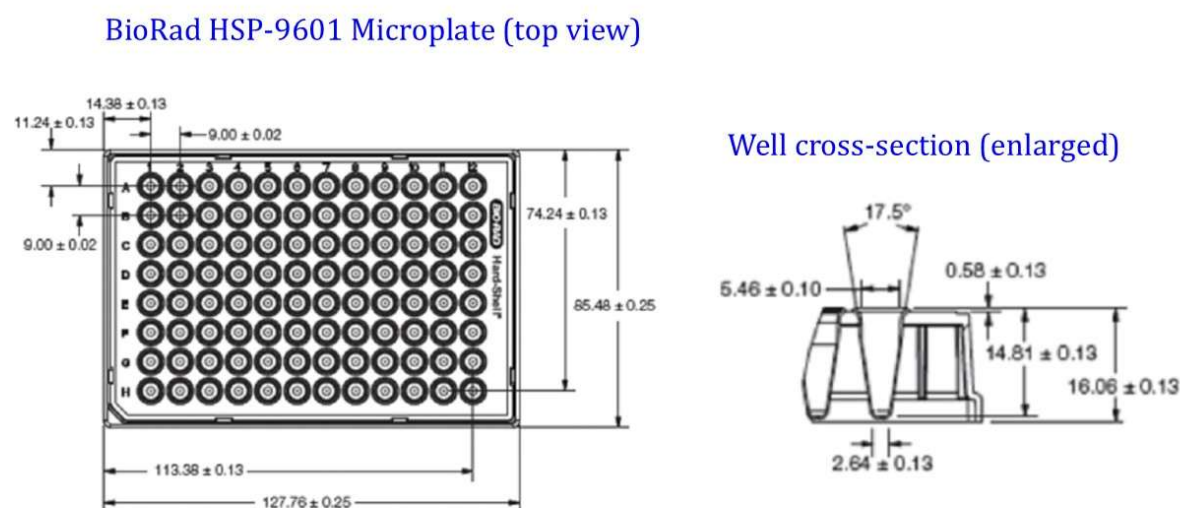
^a – Inaccuracy (%) is calculated relative to calibrated syringe reference volumes.

Measurement Method

Measurements were performed using plate- and liquid-specific calibration curves. Calibration curves were generated using reference volumes dispensed by Hamilton glass syringes calibrated by RISE (Research Institutes of Sweden) according to ISO 8655 procedures. Reported inaccuracy values are relative to calibrated reference volumes.

Conclusion

The Scarlett 01 Volume Analysis System successfully quantified liquid volumes from 10–160 μL in Bio-Rad HSP-9601 96-well PCR microplates, with accurate measurements across the evaluated range and improving precision as volume increased. These results demonstrate the ability of Scarlett 01 to provide reliable, non-contact volume verification in PCR and molecular biology workflows.

**Figure 1.** Plate and well geometry for the Bio-Rad HSP-9601 PCR microplate.

Your plates. Your reagents. Your workflow. Contact Aventix (hello@aventix.io) to learn how Scarlett 01 can provide fast, non-contact volume verification across your laboratory workflows.