Technical Overview

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Comparing the Performance of the Cary 3500 and Cary 100/300 UV-Vis Spectrophotometers

For sample quantification measurements





Introduction

The Agilent Cary 100 and Cary 300 UV-Vis spectrophotometers have offered excellence in photometric performance and research grade instrument capabilities for over 30 years. With the introduction of the Agilent Cary 3500 UV-Vis spectrophotometers, this photometric performance is extended and coupled with improvements to workflows that amplify the experimental capabilities of UV-Visible spectrophotometers.

This technical note compares the Cary 3500 with the Cary 100/300 UV-Vis spectrophotometers in terms of features or analytical performance capabilities. Both systems include optional software packages that provide tools to meet 21 CFR part 11 requirements. Both also have dedicated system verification software that enable instrument tests to global pharmacopeia requirements.

The following tables provide a comparison of the analytical performance capabilities of the Cary 100/300 and the Cary 3500 spectrophotometer systems as well as a comparison of the system features that allow use in regulated environments.

Table 1. Comparison of how the Cary 100/300 and Cary 3500 spectrophotometer systems meet the hardware and software requirements for UV-Vis systems in regulatory environments.

Regulation	Requirement	Cary 100/300 UV-Vis system	Cary 3500 UV-Vis system
21 CFR Part 11/ EU Annex 11	User access accounts	Inbuilt	Inbuilt or active directories
	Configurable levels of application access and user permissions for efficient workflows	✓	✓
	Access only for registered users	✓	✓
	Electronic signature workflow	✓	✓
	Data integrity and traceability with system and application audit trails	✓	✓
	Data security in a protected database for application method and result files	✓	✓
United States Pharmacopeia (USP) British/European Pharmacopeia (BP/EP) Chinese Pharmacopeia (ChP)	Resolution	✓	✓
	Stray light	✓	✓
	Photometric accuracy and precision	✓	✓
	Wavelength accuracy and precision	✓	✓

Table 2. Equivalence of system features and capabilities for the Cary 100/300 and the Cary 3500 spectrophotometers.

System Feature	Cary 100/300 UV-Vis system	Cary 3500 UV-Vis system
Application software	Cary WinUV software for: – Collecting wavelength reads and scans – Generating calibration curves – Time based wavelength measurements at 30 data points per second – Time based scanning measurements at 3,000 nm/min – Temperature dependent measurements including thermal ramping	Cary UV Workstation software for: – Collecting wavelength reads and scans – Generating calibration curves – Time based wavelength measurements at 250 data points per second – Time based scanning measurements at 150,000 nm/min – Temperature dependent measurements including thermal ramping
Wavelength range	190 – 900 nm	190 – 1100 nm
Light source	Tungsten and deuterium lamps, typically requires yearly replacement, warm up required for optimum performance	Xenon flash lamp that typically lasts 10 years, minimizing lamp replacement, no warm up time and only flashes when measurement is taken
Monochromator	Czerny-Turner, Cary 300 includes a pre-monochromator	Double out-of-plane Littrow monochromator
Spectral bandwidth	Variable bandwidth (0.2 to 4 nm) allowing optimization of light throughput	Variable bandwidth (0.1 to 5 nm) allowing optimization of light throughput
Scanning speed	Full wavelength scan in approximately 4.6 seconds at 5 nm data interval and 0.033 sec signal averaging time	Full wavelength scan in less than 1 second at 5 nm data interval and 0.004 sec signal averaging time
Multicell measurements	– Double beam multicell for 6 or 8 samples and 6 reference positions – Each sample cell measured sequentially – Ambient, water thermostatted or Peltier options (all require external waterbath)	– Double beam multicell for 4, 6 or 7 samples and 4, 2 or 1 reference positions – All positions measured simultaneously – Ambient or Peltier options (air cooled)
Temperature control	– Static or ramping – -10 to 100 °C (water bath required) – < ± 0.2 °C cell to cell variation – 0.06 to 30 °C temperature ramp rate – Maximum 2 sample probes	– Static (1, 2 and 4 temperatures simultaneously) or ramping – 0 to 110 °C (air cooled) – < ± 0.15 °C cell to cell variation – 0.1 to 40 °C temperature ramp rate – Maximum 4 sample probes for four temperature zone control
Sample stirring	Manually controlled from multicell accessory	Software controlled with Peltier modules
Z Height	20 mm	15 mm



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