UV-Vis Cary 50, 100, 300 Spectrophotometers

**Typical Specifications** 

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Cary Spectrophotomete	rs			
	Cary spectrophotometers are manufactured according to a Quality system that is certified to the ISO-9001. The specifications listed below represent the average results of the final acceptance tests performed in the factory. With a sample of over six hundred Cary 50 instruments and over two thousand Cary 100 and 300 instruments, the specifications are indicative of the performance of Cary instruments. These specifications are not guaranteed. The guaranteed specifications are listed in a separate brochure and are based on the ±4 sigma statistical confidence level.			
Carv 50				
	Dual beam, Czerny-Turner 0.28 m monochromator, 190–1100 nm wavelength range, approximately 1.5 nm fixed spectral bandwidth, full spectrum Xe pulse lamp single source with exceptionally long life, dual Si diode detectors, quartz overcoated optics, scan rates up to 24 000 nm/min, 80 data points per second maximum measurement rate, non measurement phase stepping wavelength drive, room light immunity, centrally controlled by PC with Windows interface.			
Cary 100/300				
	Double beam, dual chopper, ra spectrophotometer, centrally c single dispersion. High light th accurate scanning. Optional ce photomultiplier tube, tungster violet source. Centrally contro	tio recording, Czerny-Turner 0.24 controlled by a PC. Cary 300 has proughput optical system with al entrally controlled accessory syst n halogen visible source with qua illed by PC with Windows interfa	8 monochromator UV-Vis double dispersion, Cary 100 has I reflective optical design, high speed em. High performance R928 rrtz window, deuterium arc ultra ace.	
	Cary 50	Cary 100	Cary 300	
Monochromator	Czerny-Turner 0.28 m	Czerny-Turner 0.28 m	Czerny-Turner 0.28 m plus pre-monochromator	
Grating	27.5 x 35 mm, 1200 lines/mm, blaze angle 8.6° at 240 nm	30 x 35 mm, 1200 lines/mm blaze angle 8.6° at 240 nm	30 x 35 mm, 1200 lines/mm blaze angle 8.6° at 240 nm Pre-monochromator: 1200 lines/mm blaze angle 8.6° at 240 nm	
Beam Splitting System	Beam splitter	Chopper (30 Hz)	Chopper (30 Hz)	
Detectors	2 silicon diode detectors	R928 PMT	R928 PMT	
UV-Vis Limiting Resolution (nm)	<1.5	0.189	0.193	
Tolune/Hexane Limiting Resolution test (nm)	1.65			
Stray Light (%T)				
At 200 nm (KCI EP/BP method) At 220 nm	0.53	0.50	0.32	
(10 g/L Nal ASTM method) At 370 nm	0.02	0.0074	0.00008	
(50 mg/L NaNO <sub>2</sub> )	0.018	0.0013	0.000041	
Wavelength Range (nm)	190-1100	190-900	190-900	
Wavelength Accuracy (nm)	0.07 at 541.92 nm 0.24 at 260.54 nm	0.02 at 656.1 nm 0.04 at 486.0 nm	0.02 at 656.1 nm 0.04 at 486.0 nm	
Wavelength Reproducibility (nm) Peak separation of repetitive scanning of a UV-Vis line source	0.01	0.008	0.008	
Spectral Bandwidth Accuracy (nm) At 0.2 At 2.0		0.193 2.03	0.189 2.03	
Photometric Accuracy (Abs) At 1 Abs (NIST filter method) At 0.3 Abs (Double Aperture method)	0.0007	0.00016	0.00016	

	Cary 50	Cary 100	Cary 300
Photometric Range (Abs)	3.3	3.7	5.0
Photometric Display (Abs) (%T)	± 9.9999 ± 200.00	± 9.9999 ± 200.00	± 9.9999 ± 200.00
Photometric Reproducibility (Abs) Using NIST 930D filters, 2 second Signal Averaging Time.	At 465 nm	At 590 nm, 2 nm SBW	At 590 nm, 2 nm SBW
Maximum deviation at 1 Abs Standard deviation for 10 measurements	0.004 0.00050	<0.0008 <0.00016	<0.0008 <0.00016
2 second Signal Averaging Time Maximum deviation at 0.5 Abs Standard deviation for 10 measurements	At 546.1 nm 0.003 0.00030	At 546.1 nm, 2 nm SBW <0.0004 <0.00008	At 546.1 nm, 2 nm SBW <0.0004 <0.00008
Photometric Stability (Abs/hour) 500 nm, 1 second Signal Averaging Time	30 minute warm up <0.0004	2 hour warm up <0.0003	2 hour warm up <0.0003
<b>Photometric Noise</b> (Abs, RMS) 500 nm, 1 second Signal Averaging Time.	1.5 nm SBW 0.000063 at 0 Abs 0.00014 at 1 Abs	2 nm SBW 0.000030 at 0 Abs 0.00014 at 3 Abs, 1.5 Abs RBA	2 nm SBW 0.000030 at 0 Abs 0.00025 at 3 Abs, 1.5 Abs RBA
Baseline Flatness (Abs) 200 to 850 nm, smooth 21 applied, baseline corrected	0.0006	0.00022	0.0022 at 3 Abs, 1.3 Abs fibA
Sample Compartment Beam Separation (mm)		110	110
Compartment Size (WxDxH)	130 x 523 x 123 mm Note that sample compartment can be left open during measurement due to room light immunity of Cary 50	139 x 389 x 129 mm Extended Sample Compartment fitted	139 x 389 x 129 mm Extended Sample Compartment fitted
Access	Top and front	Top and front	Top and front
Instrument Dimensions (WxDxH)	500 x 590 x 205 mm	640 x 650 x 320 mm	640 x 650 x 320 mm
Purging	None	Sample compartment	Sample compartment
Instrument Weight	21 kg	45 kg	45 kg

#### **Recommended environmental conditions**

Instrument Storage	5-45 °C at 20-80% relative humidity, non-condensing, altitude <2133 m.		
Instrument Operation	Below 853 metres altitude: 10-35 ° Between 853 and 2133 metres altit	ow 853 metres altitude: 10-35 °C, 8-80% relative humidity, non-condensing. tween 853 and 2133 metres altitude: 10-25 °C, 8-80% relative humidity, non-condensing.	
Instrument Electrical Requirements	Instrument draws maximum of 26 W of power from the host PC power supply. The power rating is: +5 V DC <1A, + 12 V DC <1.5 A, -12 V DC <0.25A. The Cary 50 interface card fits into a standard ISA slot in the host PC and requires a standard PC internal Hard disk power supply connector. Operation of motor driven accessories may increase the +12 V requirement by a further 2 A (24 W maximum). The host PC must be certified to standard IEC 60950 or equivalent.	Mains supply of 100/120/220/240 volts AC $\pm$ 10%, 50 or 60 Hz $\pm$ 1 Hz with 400 VA power consumption.	

# Operational

	Cary 50	Cary 100	Cary 300	
Spectral Bandwidth (nm)	Fixed at 1.5 nm	0.20-4.00 nm, 0.1 nm steps, motor driven	0.20-4.00 nm, 0.1 nm steps, motor driven	
Signal Averaging (seconds)	0.0125 to 999	0.033 to 999	0.033 to 999	
Maximum Scan Rate (nm/min) (nm/min)/(cm-1/min*)/Å/min)	24000	3000/37046/30000 3000/37046/30000		
Maximum Slew Rate (nm/min) (changing between wavelengths, nm/mi	24000 n)	3000	3000	
Data Interval (nm) cm-1* Å	0.15-5.0	0.02-1.67 5.541-20.6 0.2-16.7	0.02-1.67 5.541-20.6 0.2-16.7	
Data Collection Rate (kinetic studies) points per min per cell 1 cell 6 cells 12 cells 14 cells 18 cells 6 cells, 0.0375 SAT 0.38 s Dwell time 12 cells, 0.0375 SAT 0.38 s Dwell time 18 cells, 0.033 SAT 0.34 s Dwell time 12 cells, 0.033 SAT 0.34 s Dwell time 12 cells, 0.033 SAT 0.34 s Dwell time	4800 5 3 2 40 to 50 20 to 30 10 to 20	1800 5 5 3 to 4 50 40 to 50 30 to 40	1800 5 5 3 to 4 50 40 to 50 30 to 40	
Repetitive Scanning Maximum number of cycles Maximum cycle time (min)	999 999	999 999	999 999	
Temperature Monitors	Temperature probe inside cuvette (using the Temperature Probe Accessory)	Cell block, up to 4 temperature probes inside cuvettes or elsewhere	Cell block, up to 4 temperature probes inside cuvettes or elsewhere	

# Software Functionality

Operating System	Windows <sup>®</sup> XP and Windows <sup>®</sup> 2000		
<b>Graphical Display</b> Options available for the display of data traces include:	<ul> <li>Data files can be retrieved with the associated Methods and all other settings.</li> <li>Enhanced graphics control module with automatic peak labeling, grids, multiple line types, zoom, free and tracking cursor, multiple ordinate and abscissa formats, smart copy/paste and overlay modes for easy spectral interpretation, presentation and publication.</li> <li>Graph labels and bitmaps, including chemical structures, can be displayed and saved with data files (fonts and size are selectable).</li> </ul>		
File Opening	<ul> <li>Files can be automatically opened by clicking on the file name. Files can be also be dragged and dropped into the application for easy opening.</li> </ul>		
Data Conversion	<ul> <li>Import: Cary OS/2, Cary DOS, ASCII XY formats.</li> <li>Export: ASCII (*.esv format), ASCII with Audit log format.</li> <li>Export data live to Excel or other compatible programs using Dynamic Data Exchange (DDE).</li> </ul>		
File System	Method, Report, Data, Graphic template and files can be stored individually or all together in a batch file. The number of files is limited only by hard disk capacity.		
Fast Loading of Methods	You can set up shortcut icons on the desktop for methods used frequently in your laboratory.		
Cursor Modes	Cross hair cursor in either tracking or free mode. Kinetics ruler mode also available.		
Running Multiple Cary WinUV Applications	More than one Cary application may be run at any time, allowing method development or data review and manipulation while the instrument is collecting. Either multiple same or different applications may be opened simultaneously.		
Built-in Programming Language	Applications Development Language (ADL) allows complete customization of Cary Win UV to your specific applications. ADL can be used to create new user interfaces for the software – ideal for production and routine QC applications.		
Multimedia Help	Comprehensive multimedia help includes instructional videos, animations and speech explaining how to set up the instrument and accessories and basic maintenance procedures.		

# Quantitative analysis

Calibration Curve Fits	Linear, Linear direct and Quadratic curves fits.		
Fibre Optics System	Remote read fibre optics system for in-situ measurements using Dip Probe (measure up to 180 samples/hr).		
Sipper/Autosampler Support	SPS-5 Autosampler supported for fibre optic and sipper measurements.		
Importing Sample Names	Sample names can be imported in ASCII format from disk or LAN system.		
Calibration Standards	Up to 30 standards.		
Maximum Number of Samples	Up to 500 samples.		
Measurement Replicates	Up to 5 replicates of each sample may be performed.		
Sample/Standard Averaging	Up to 3 samples/standards can be averaged.		
User Specified Data Collection	Single wavelength measurements with on-line calculations can be performed on data collected using +, -, /, x functions. For example: • Abs 540 nm - Abs 700 nm • Abs 366 nm x factor		
Weight/Volume Correction	You can correct concentration results for weight/volume differences between the sample and the nominal weight/volume in the method.		

### **Biochemical analysis**

#### Data Comments

Extra information about the sample, which is stored with the data file	The User Data Form allows entry of information about the samples analyzed, eg: pH, ionic, substrate and inhibitor concentration etc.		
Minimum sample volume	The smallest volume of sample that can be measured accurately is approximately 2.5 $\mu$ L.		
Preset methods Methods for common measurements that are built into the software	RNA/DNA application: • Protein estimation • Nucleic acid estimation • 260/280 ratio readings • Warburg & Christian co-efficient Concentration application: • Bradford • Lowry HS, LS • Biuret • BCA • Direct UV		
RNA/DNA Calculations	User-selectable background correction, and Warburg Christian protein and nucleic acid factor entry.		

### **Biochemical analysis – Kinetics**

	Cary 50	Cary 100	Cary 300
Temperature Measurement	Up to 2 temperature probes can be measured directly inside the cuvettes with the optional Temperature probe accessory.	Measurement via a temperature block. Additionally, up to 4 tem directly inside the cuvettes with probe accessory.	probe built into the multicell perature probes can be measured the optional Temperature
Number of Stages	5 different data collection rates can be specified. A different fit can be used for each stage.		
Kinetics Ruler	To visually define the area of the data to be used for rate calculations, use the cursor to nominate the range for a point to point least squares slope calculation.		
Plot Fits	Kinetic rate plots can be displayed with the data and stored.		
Fastest data collection rate for single cells (points/sec)	80	30	30
Stop time extension	The time of the data collection can be extended without stopping the analysis.		
Min/Max data collection time	0.01 to 8000 min	0.01 to 8000 min	0.01 to 8000 min
Pause control	Measurement can be paused to allow the addition of a reagent before continuing.		
Synchronized start	A 2 minute countdown is provided before data collection begins.		
Cell loading guide	A visual guide is provided to show how to load the multicell holder before starting the data collection.		
User specified data collection	Single wavelength, Multi-wavelength (up to 6), and combinations of wavelengths using the user collect function.		

### **Biochemical analysis – Thermal Denaturation/Renaturation** (Cary 100/300 only)

Thermal analysis data collection	Up to 20 different te	mperature ramp rates/direction	ons can be specified for a single	analysis.
End of measurement temperature	The user can specify what temperature the sample is held at after the data collection is complete.			
Hold time	Holding time can be specified at the start and end of each stage of the measurement to allow the temperature to equilibrate.			
Data smoothing	Data may be smooth	ed with Savitzky Golay algori	thm with a selectable interval a	nd filter size.
Calculations provided	Derivative and Hyperchromaticity (including alpha curve and Van't Hoff) are provided.			
Scanning				
Baseline Correction	<ul> <li>Unlimited Baseline scans can be stored. These baselines can be retrieved and re-used.</li> <li>Baselines correction modes include: 0% and 100% correction (normal, DRA – as per ASTM E903), known mirror correction for specular reflectance measurements.</li> </ul>			
Ordinate Modes	A, %R, %T, Log A, F(F	R), Log F(R), Absorptivity, Abso	lute %R, Log (1/R)	
Abscissa modes	Nm Stepped mode can b an abscissa mode.)	e applied to this abscissa mod	de. (The Kinetics application prov	vides time as
	cm <sup>-1</sup> , Å (Cary 100/30 Stepped mode can b an abscissa mode an	0 only) e applied to any of these abso d the Thermal application pro	cissa modes. (The Kinetics applic wides temperature as an absciss	ation provides time as a mode.)
Signal to noise mode scanning (Cary 100/300 only)	A signal to noise rati of precision.	o can be specified for the aut	comatic collection of data with a	a constant level
Reports	You can choose to in	clude method parameters, gr	aphics and/or results tables, all	with various options.
Spectral smoothing	Yes			
	as, +,-,,), og and 5 as well as: • Smooth (up to 101 • Mean • Normalize • 1st to 4th Derivativ • and convert to: • %T, A, Log(A), %R,	points) Savitzky Golay ve F(R), log (F(R)), Log(1/R)		
	Validation tests are s USP, EP/BP, TGA (Aus as well as other spec are automatically sto	upplied as a standard with al tralia). Also provided are all tl ification tests. The results of red by the system.	l software packages. The tests c he performance tests used durir tests performed using the Instru	omply with: 1g instrument manufacture 1ment Validation package
Instrument validation	US Pharmacopeia	European Pharmacopeia	Australia Code for GMP for Therapeutic Goods	Additional test
Wavelength Accuracy Holmium Oxide test Holmium Perchlorate Xe emission lines (Cary 50 only)	•	٠	•	•
Wavelength Reproducibility				•
Resolution Power Maximum resolution Toluene/Hexane test		•	•	•
Baseline Flatness			٠	•
Photometric Noise				•
Stray Light Nal test at 220 nm NaNO <sub>2</sub> test at 370 nm KCl test at 200 nm K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> test at 370 nm		•	•	•
Photometric Linearity				•
Photometric Accuracy NIST filters test K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> test KNO <sub>3</sub> test	•	•	•	
Photometric Stability				•

# GLP, 21 CFR Part 11 and Validation functionality

	Compliant with Good Laboratory Practice (GLP) requirements for password protection and record keeping, setting of privileges for users or groups of users. Allows password protection of data and methods from change or deletion. Audit log saved with all data collected. Inclusion of operator name and Lab ID, data file name, report creation date and time, full documentation and parameters in reports.
	Optional software is able to assist in achieving compliance to US Food and Drug Administration's Part 11 "Electronic Records; Electronic Signatures" of Title 21 of the Code of Federal Regulations (21 CFR 11) for electronic signatures and data security.
	Optional Validation package documenting Varian's Design Qualification (DQ), Installation Qualification (IQ), Operating Qualification (OQ) and Performance Qualification (PQ) for the Cary series of spectrophotometers. Includes details of all development and design history, company compliance standards, installation and operation tests.
Computer minimum red	quirements
	The following configuration is suitable for operation of the Cary Win UV software.
	Pentium <sup>®</sup> III processor with 128 Mbytes of RAM, 10 Gigabyte hard drive, 8 speed CD-ROM, 16 bit sound card, super VGA monitor with high color (16 bit) display, 800 x 600 resolution, 101 keyboard and mouse, one PCI compatible slot for IEEE communications card, Windows 2000/XP, compatible laser printer recommended.
	For recommended PC configurations, refer to www.varianinc.com/osi/general/
Ordering information	
	For part numbers and other ordering details, please consult either your Varian sales person or the Varian parts and supplies catalog on Varian's web site.
Varian Customer Suppo	ort Policies
Warranty	Warranty on parts, labour and freight (one way) for 12 months, although this may vary according to location. Warranty does not include on-site labour. Varian paid installation includes 90 days on-site warranty and the nine months workshop warranty as above. An extended three year warranty is available. Two year Xenon Lamp module warranty. Covers total failure only (i.e. fails to strike).
Hardware support period	Five (5) years from date of last unit manufacture. After this time, parts and supplies will be provided if available.
Software support	Telediagnostic capability is available for some instrument models. Availability of Telediagnostic support may vary according to location. Software upgrades to fix non-conformances or safety problems will be issued free of charge. Software upgrades to add additional functionality will attract a fee. The customer is solely responsible for selecting a Varian instrument to achieve their desired results or for particular applications.

Varian, Inc. serving worldwide markets in: Agriculture Basic Chemical Biotechnology Clinical Electronics Environmental Photonics Toxicology Pharmaceutical Food and Beverage Metals and Mining Petroleum and Petrochemical



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