



VARIAN

Cary UV-Vis-NIR spectrophotometers are manufactured according to a Quality system certified to ISO-9001. The following is preliminary performance data which will form the basis for the guaranteed specifications based on the ± 4 sigma statistical confidence level of the final acceptance tests performed at the factory.

Cary 4000, 5000, 6000i

Double beam, ratio recording, double out-of-plane Littrow monochromator, UV-Vis-NIR spectrophotometer (Cary 4000 is UV-Vis only), 2 x 400 mm focal length, dual single sided gratings (Cary 4000) or double sided gratings (Cary 5000, 6000i), centrally controlled by a PC. Features Optical Isolation System for low noise spectrophotometer performance and greatly minimized impact from surrounding environment. High speed non-measurement-phase-stepping wavelength drive. UV-Vis detector: high performance R928 photomultiplier tube, NIR detector (Cary 5000 and Cary 6000i only): electrothermally controlled lead sulfide photocell (Cary 5000) incorporating PbSmart™ technology for the optimum low noise and ultimate linearity performance or electrothermally controlled Indium Gallium-Arsenide PIN photodiode (Cary 6000i). Tungsten halogen visible source with quartz window, deuterium arc UV source. Supplied as standard is a Hg lamp module for automatic wavelength accuracy validation. Features Plug-and-Go™ lamp management. Lamps are easily replaced and pre-aligned. Plug-and-Go supports a wide range of lamp designs. Unique precision Lock Down™ mechanism allows you to quickly and reproducibly position your accessories in the light path of the spectrophotometer. The Cary Lock Down system eliminates tools and time consuming alignment. Choice of software interfaces.

	Cary 4000	Cary 5000	Cary 6000i
Monochromator	Double out-of-plane Littrow monochromator	Double out-of-plane Littrow monochromator	Double out-of-plane Littrow monochromator
Grating	70 x 45 mm, 1200 lines/mm blazed at 250 nm	Dual sided, 70 x 45 mm, UV-Vis: 1200 lines/mm blazed at 250 nm, NIR: 300 lines/mm blazed at 1192 nm	Dual sided, 70 x 45 mm, UV-Vis: 1200 lines/mm blazed at 250 nm, NIR: 600 lines/mm blazed at 1000 nm
Beam Splitting System	Chopper 30 Hz	Chopper 30 Hz	Chopper 30 Hz
Detectors			
UV-Vis	R928 PMT	R928 PMT	R928 PMT
NIR		Cooled PbS Photocell	Cooled InGaAs Photodiode
Limiting Resolution (nm)			
UV-Vis	<0.05	<0.05	<0.05
NIR		<0.2	<0.1
Stray Light (%T)			
At 220 nm (10 g/L NaI ASTM method)	<0.00008%	<0.00008%	<0.00008%
At 370 nm (50 mg/L NaNO ₂)	<0.00008%	<0.00008%	<0.00008%
At 200 nm (12 g/L KCl, TGA & BPEP method)	<1%	<1%	<1%
At 370 nm (0.25 g/L K ₂ Cr ₂ O ₇ , TGA method)	<1%	<1%	<1%
At 1420 nm (H ₂ O, 1 cm pathlength)		<0.0002%	<0.0001%
At 2365 nm (CHCl ₃ , 1 cm pathlength)		<0.00045%	
Wavelength Range			
(N ₂ purge required below 187 nm)	175-900	175-3300	175-1800
Wavelength Reproducibility (nm)			
Peak separation of repetitive scanning of a UV-Vis line source	<0.025	<0.025	<0.025
Peak separation of repetitive scanning of a NIR line source		<0.1	<0.05
Standard deviation of 10 measurements, UV-Vis	<0.005	<0.005	<0.005
Standard deviation of 10 measurements, NIR		<0.02	<0.01
Wavelength Accuracy (nm)			
UV-Vis	+/- 0.1	+/- 0.1	+/- 0.1
NIR		+/- 0.4	+/- 0.2

	Cary 4000	Cary 5000	Cary 6000i
Photometric Accuracy (Abs)			
Using double aperture at 0.3 Abs			
UV-Vis	0.0003	0.0003	0.0003
NIR			0.0003
Photometric Linearity (Abs)			
All tests performed by addition of filters technique (UV-Vis: 500 nm, 1 sec Signal Averaging Time; NIR: 1200 nm, energy level 3)			
UV-Vis, At 1 Abs	0.0005	0.0005	0.0005
UV-Vis, At 2 Abs	0.001	0.001	0.001
UV-Vis, At 3 Abs	0.005	0.005	0.005
NIR, At 1 Abs		0.001	0.0005
NIR, At 2 Abs		0.005	0.001
Photometric Range (Abs)			
with RBA	8	8	8
Photometric Display			
Abs	9.9999	9.9999	9.9999
%T	200.0000	200.0000	200.0000
Photometric Reproducibility (Abs)			
Using NIST 930D filters, at 590 nm, 2 nm SBW, 2 second Signal Averaging Time			
Maximum deviation at 1 Abs	<0.0008	<0.0008	<0.0008
Standard deviation for 10 measurements	<0.00016	<0.00016	<0.00016
Using NIST 930D filters, at 546.1 nm, 2 nm SBW, 2 second Signal Averaging Time			
Maximum deviation at 0.5 Abs	<0.0004	<0.0004	<0.0004
Standard deviation of 10 measurements	<0.00008	<0.00008	<0.00008
Photometric Stability (Abs/hr)			
After 2hr warm up, 500 nm, 2 nm SBW, 1 sec Signal Averaging Time			
	<0.0002	<0.0002	<0.0002
Photometric Noise (Abs, RMS)			
UV-Vis (500 nm, 1 second Signal Averaging Time, 2 nm SBW)			
At 0 Abs	0.00003	0.00003	0.00003
At 1 Abs	0.00005	0.00005	0.00005
At 2 Abs	0.0001	0.0001	0.0001
At 3 Abs, 1.6 Abs RBA	0.0003	0.0003	0.0003
At 4 Abs, 1.6 Abs RBA	0.0008	0.0008	0.0008
At 5 Abs, 1.6 Abs RBA	0.002	0.002	0.002
At 6 Abs, 3 Abs RBA	0.005	0.005	0.005
NIR (1500 nm, 1 second Signal Averaging Time)			
At 0 Abs		2 nm SBW	0.4 nm SBW
At 1 Abs		0.00002	0.00002
At 2 Abs		0.00005	0.00005
At 3 Abs		0.0005	0.0001
		0.004	0.001
Baseline Flatness (Abs)			
4 nm SBW UV/Vis, Energy 1 NIR, baseline corrected, smooth 21 filter applied	+/- 0.001 (at 200 to 850 nm)	+/- 0.001 (at 200 to 3000 nm)	+/- 0.001 (at 200 to 1700 nm)
Sample Compartment			
Beam Separation	190.5 mm	190.5 mm	190.5 mm
Compartment size (WxDxH)			
Extended sample compartment fitted	160 x 433 x 221 mm	160 x 433 x 221 mm	160 x 433 x 221 mm

	Cary 4000	Cary 5000	Cary 6000i
Access	Top, front and base	Top, front and base	Top, front and base
Purging			
Sample Compartment	Yes	Yes	Yes
Optics	Yes	Yes	Yes
Instrument Dimensions (WxHxD)	1020 x 380 x 710 mm	1020 x 380 x 710 mm	1020 x 380 x 710 mm
Instrument Weight (kg)	91	91	91

Recommended environmental

Instrument storage	5-45 °C at 20-80% relative humidity, non-condensing, altitude < 2133 m.
Instrument operation	Below 853 metres altitude: 10-35 °C, 8-80% relative humidity, non-condensing. Between 853 and 2133 metres altitude: 10-25 °C, 8-80% relative humidity, non-condensing.
Instrument electrical requirements	Mains supply of 85-264 volts AC with 300 VA power consumption. Frequency 47-63 Hz.

Operational

	Cary 4000	Cary 5000	Cary 6000i
Spectral Bandwidth (nm)	UV-Vis 0.01 nm to 5.00 nm, 0.01 nm steps	UV-Vis 0.01 nm to 5.00 nm, 0.01 nm steps, NIR 0.04 to 20 nm	UV-Vis 0.01 nm to 5.00 nm, 0.01 nm steps, NIR 0.02 to 10 nm
Signal Averaging (seconds)	0.033 to 999	0.033 to 999	0.033 to 999
Maximum Scan Rate (nm/min)/(cm ⁻¹ /min*)/Å/min)			
UV-Vis	2000/31206/20000	2000/31206/20000	2000/31206/20000
NIR		8000/57142/80000	4000/28571/40000
*max. rate is dependent upon range			
Slew Rate (changing between wavelengths, nm/min)			
UV-Vis	16000	16000	8000
NIR		64000	32000
Data Interval			
UV-Vis (nm)	0.005-1.111	0.005-1.111	0.005-1.111
cm ⁻¹ *	1.633-13.699	1.627-17.335	1.627-17.335
Å	0.05-11.1	0.05-11.1	0.05-11.1
NIR(nm)/(cm ⁻¹ *)/Å)		0.02 to 4.444/ 0.3145- 4.0753/ 0.2-44.44	0.01 to 2.222/0.1572- 2.0377/0.1-22.22
*Interval range is dependent upon scan range			
Data Collection Rate (kinetic studies) points per min per cell			
1 cell	1800	1800	1800
6 cells	3 to 4	3 to 4	3 to 4
12 cells	3 to 4	3 to 4	3 to 4
6 cells, 0.033 SAT 0.34 s Dwell time	30 to 40	30 to 40	30 to 40
12 cells, 0.033 SAT 0.34 s Dwell time	30 to 40	30 to 40	30 to 40
Repetitive Scanning			
Max. number of cycles	999	999	999
Maximum cycle time (min)	9999	9999	9999
Temperature Monitors	Cell block, up to 4 temperature probes inside cuvettes or elsewhere.		

Software functionality

Operating system	Windows® XP and Windows® 2000
Graphical display Options available for the display of data traces include:	<ul style="list-style-type: none"> • Data files can be retrieved with the associated Methods and all other settings. • 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. • Graph labels and bitmaps, including chemical structures, can be displayed and saved with data files (fonts and size are selectable).
File opening	<ul style="list-style-type: none"> • 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.

Data Conversion	<ul style="list-style-type: none"> • Import: Cary OS/2, Cary DOS, ASCII XY formats. • Export: ASCII (*.csv format), ASCII with Audit log format. • Export data live to Excel or other compatible programs using Dynamic Data Exchange (DDE).
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.
Sample name importation	Sample names can be imported 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	<p>Single wavelength measurements with on-line calculations can be performed on data collected using +, -, /, x functions.</p> <p>For example:</p> <ul style="list-style-type: none"> • Abs 540 nm - Abs 700 nm • Abs 366 nm x factor
Quality checks	Not available
Weight/volume correction for sample results	Yes

Scanning

Baseline Correction	<ul style="list-style-type: none"> • Unlimited Baseline scans can be stored. These baselines can be retrieved and re-used. • Baselines correction modes include: 0% and 100% correction (normal, DRA – as per ASTM E903), known mirror correction for specular reflectance measurements.
Ordinate Modes	A, %R, %T, Log A, F(R), Log F(R), Absorptivity, Absolute %R, Log (1/R)
Abscissa modes	<p>Nm, cm⁻¹, Å, time, angle, distance.</p> <p>Stepped mode can be applied to any of these abscissa modes (The Kinetics application provides time as an abscissa mode and the Thermal application provides temperature as an abscissa mode).</p>
Independent NIR control	Signal averaging time, data interval, scan rate, SBW/Energy can be specified for the UV-Vis the NIR regions separately.
Signal to noise mode scanning	A signal to noise ratio can be specified for the automatic collection of data with a constant level of precision.
Reports	You can choose to include method parameters, graphics and/or results tables, all with various options in a printed report.
Spectral smoothing	Yes
Maths Advanced Spectrum Calculator	<p>Yes, +, -, /, x, log and Square root functions as well as:</p> <ul style="list-style-type: none"> • Smooth (up to 101 points) Savitzky Golay • Mean • Normalize • 1st to 4th Derivative • Integration • and convert to: • %T, A, Log(A), %R, F(R), log (F(R)), Log(1/R) • Kubelka-Munk correction algorithm

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 μ L.

Preset methods

Methods for common measurements that are built into the software

Simple Reads 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

Temperature measurement

Temperature can be measured inside the cuvette with the optional Temperature probe accessory or the temperature of the multicell block can be used. Temperature data is stored with the data file.

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.

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

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

Thermal analysis data collection

Up to 20 different temperature ramp rates/directions 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 smoothed with Savitzky Golay algorithm with a selectable interval and filter size.

Calculations provided

Derivative and Hyperchromaticity (including alpha curve and Van't Hoff) are provided.

Instrument validation

Validation tests are supplied as a standard with all software packages. The tests comply with: USP, EP/BP, TJA (Australia). Also provided are all the performance tests used during instrument manufacture as well as other specification tests. The results of tests performed using the Instrument Validation package are automatically stored by the system.

Instrument validation	US Pharmacopeia	British Pharmacopeia	Australia Code for GMP for Therapeutic Goods	Additional test
Wavelength Accuracy				
Holmium Oxide test	•		•	
Holmium Perchlorate		•	•	
Wavelength Reproducibility				•
Resolution Power				
Maximum resolution				•
Toluene/Hexane test		•	•	
Baseline Flatness			•	
Photometric Noise				•
Stray Light				
Nal test at 220 nm				•
NaNO ₂ test at 370 nm				•
KCl test at 200 nm		•	•	
K ₂ Cr ₂ O ₇ test at 370 nm			•	
Photometric Linearity				•
Photometric Accuracy				
NIST filters test	•			
K ₂ Cr ₂ O ₇ test	•	•	•	
KNO ₃ 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 requirements

The following configuration is suitable for operation of the Cary Win UV software.

Pentium® 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 Support Policies

Warranty	12 months, though this may vary according to locations.
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.

servicing worldwide markets in:

- Agriculture
- Basic Chemical
- Biotechnology
- Clinical
- Electronics
- Environmental
- Photonics
- Toxicology
- Pharmaceutical
- Food and Beverage
- Metals and Mining
- Petroleum and Petrochemical



Varian, Inc. is committed to a process of continuous improvement which demands that we understand and then meet or exceed the needs and expectations of our customers—both inside and outside the company—in everything we do.

• Varian Sales and Dealer Offices



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