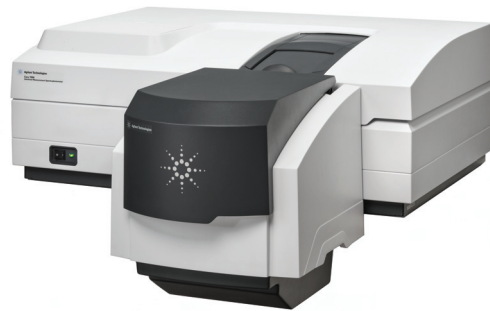


Agilent Cary 7000 Universal Measurement Spectrophotometer (UMS)

Specifications



Introduction

The Agilent Cary 7000 Universal Measurement Spectrophotometer (UMS) is designed for superior performance, flexibility and productivity. Comprising the Cary 7000 UV-Vis-NIR spectrophotometer and Universal Measurement Accessory (UMA), the Cary 7000 UMS will meet all your research and QA/QC needs for Thin Films & Coatings, Optics, Solar and Glass applications.

Key features include:

- Ability to move the detector and the sample, independently of each other, providing a true multi-modal measurement system capable of absolute reflectance, transmission and scattering without moving the sample.
- Superior stray light rejection with an unprecedented 10 Abs photometric range.
- Four detectors consisting of a high performance photomultiplier tube (PMT), proprietary PbS detector and a two-colored Si/InGaAs detector.
- “Direct View” two-colored Si/InGaAs detector that provides coverage in the UV-Vis and NIR range without using integrating spheres or light pipes that attenuate signal and can compromise data quality.
- Proprietary PbSmart technology detector that provides superior photometric linearity in the NIR up to 8 Abs.
- High resolution optical encoder technology that ensures the sample and detector never loses position during data collection – even if the system is bumped accidentally.
- Wire grid polarizers that provide superior throughput across the wavelength range, and a large acceptance angle to ensure a high degree of polarization accuracy.
- Plug-n-play installation and removal of the UMA – with no re-alignment required – enabling use of the Cary 7000 spectrophotometer with other accessories via its precision Lock Down mechanism for quick and reproducible accessory changeovers.



Performance Specifications

The Agilent Cary 7000 UMS is manufactured according to a quality management system certified to ISO 9001. Operators can routinely repeat performance tests using Agilent's dedicated instrument performance test software suite — Validate. Some tests, where indicated, require equipment or certified material, which can be obtained through Agilent or international standard organizations.

Monochromator	Double out-of-plane Littrow monochromator
Grating	70 x 45 mm
UV-Vis	Ruled line diffraction grating, 1200 lines/mm blazed at 250 nm
NIR	Ruled line diffraction grating, 300 lines/mm blazed at 1192 nm
Beam splitting system	Rotating beam splitter, which measures a sample, dark and reference signal per cycle with a speed of 30 Hz
Detectors	
UV-Vis	R928 PMT
NIR	Cooled PbSmart PbS
Limiting resolution (nm)	
UV-Vis	<0.048 nm
NIR	<0.2 nm
Stray light (%T)	
At 220 nm (10 g/L NaI ASTM method)	<0.00007%
At 370 nm (50 mg/L NaNO ₂)	<0.00007%
At 1420 nm (H ₂ O, 1 cm pathlength)	<0.0002%
At 2365 nm (CHCl ₃ , 1 cm pathlength)	<0.00045%
Wavelength range (nm) (N ₂ purge required below 185 nm)	175–3300 nm
Wavelength accuracy (nm) Deuterium lamp lines	
UV-Vis: 190–900 nm	± 0.08 nm
NIR: 760–3000 nm	± 0.4 nm
Wavelength reproducibility (nm)	
Peak separation of repetitive scanning of a UV-Vis line source	<0.025 nm
Peak separation of repetitive scanning of a IR line source	<0.1 nm
Standard deviation of 10 measurements, UV-Vis	<0.005 nm
Standard deviation of 10 measurements, NIR	<0.02 nm
Photometric accuracy (Abs)	
Using double aperture method at 0.3 Abs UV-Vis	<0.00025 Abs

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Performance specifications

Photometric linearity (Abs)

All tests performed by addition of filters technique UV-Vis (465 nm, 10 s SAT, 2 nm SBW), NIR (1200 nm, 10 s SAT, energy 3)

UV-Vis, at 1 Abs	<0.0007 Abs
UV-Vis, at 2 Abs	<0.0014 Abs
UV-Vis, at 3 Abs	<0.005 Abs
NIR, at 1 Abs	<0.0015 Abs
NIR, at 2 Abs	<0.007 Abs

Photometric range (Abs)

10 Abs

Photometric reproducibility (Abs)

Using NIST 930D filters, at 546.1 nm, 2 s SAT, 2 nm SBW

0.5 Abs, Standard deviation for 10 measurements	<0.00008
1.0 Abs, Standard deviation for 10 measurements	<0.00014

Photometric stability (Abs/hour)

After 2 hr warm up, 500 nm, 1 s SAT, 2 nm SBW

<0.00018

Photometric noise (Abs/RMS)

UV-Vis (190 nm, 1 s SAT, 2 nm SBW)

At 0 Abs	<0.00009
At 1 Abs	<0.0002

UV-Vis (500 nm, 1 s SAT, 2 nm SBW)

At 0 Abs	<0.00003
At 1 Abs	<0.00005
At 2 Abs	<0.0001
At 3 Abs with 1.5 Abs RBA	<0.0003
At 4 Abs with 1.5 Abs RBA	<0.0008
At 5 Abs with 1.5 Abs RBA	<0.002
At 6 Abs with 3.0 Abs RBA	<0.0045

NIR: Fixed SBW

(1500 nm, 1 s SAT, 2 nm SBW)

At 0 Abs	<0.00003
At 1 Abs	<0.0001
At 2 Abs	<0.0005
At 3 Abs	<0.007

NIR: Variable SBW

(1500 nm, 1 s SAT, Energy 1)

At 0 Abs	<0.00004
At 2 Abs	<0.0005
At 3 Abs with 1.5 Abs RBA	<0.0003

Performance specifications

Baseline flatness (Abs)	
UV-Vis (0.1 s SAT, 4 nm SBW), NIR (0.2 s SAT, Energy 1), baseline corrected	± 0.0012 (200 to 3000 nm)
UV-Vis (0.2 s SAT, 2 nm SBW), NIR (0.24 s SAT, Energy 1), no smoothing applied	± 0.0007 (200 to 3000 nm)
Sample compartment beam separation (mm)	190.5 mm
Compartment size (width x depth x height) Extended sample compartment fitted	160 x 433 x 221 mm
Access	Top, front and base
Instrument dimensions (width x depth x height)	1020 x 710 x 378 mm
Purging	
Sample compartment	Yes
Optics	Yes
Instrument weight	91 kg

Operational

Spectral bandwidth (nm)*	
UV-Vis	0.01–5.00 nm, 0.01 nm steps
NIR	0.04–20 nm
* At optimum environmental conditions. See page 5 for details.	
Signal averaging (seconds)	0.033–999 s
Maximum scan rate (nm/min)	
UV-Vis	2000 nm/min
NIR	8000 nm/min
Slew rate (changing between wavelengths, nm/min)	
UV-Vis	16000 nm/min
NIR	64000 nm/min
Data interval (UV-Vis)	
(nm)	0.005–1.111 nm
cm ⁻¹ *	1.627–17.335 cm ⁻¹ *
Å	0.05–11.1 Å
Data interval (NIR)	
(nm)	0.02–4.444 nm
cm ⁻¹ *	0.3145–4.0753 cm ⁻¹ *
Å	0.2–44.44 Å
* Interval range is dependent upon scan range	
Repetitive scanning	
Maximum number of cycles	999
Maximum cycle time (min)	9999

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Cary UMA Specifications

Measurement Modes	<ul style="list-style-type: none">• Absolute specular reflection at variable angle from 5 to 85 degrees in 0.02 degree intervals• Direct transmission and variable angle transmission from 0 to 180 degrees in 0.02 degree intervals• Diffuse scattering, reflection or transmission through independent sample rotation (360 degrees) and detector positioning (10 – 350 degrees) at 0.02 degree intervals• Absorptance, A where $A = 1 - R - T$ at variable angle without moving the sample or beam onto the sample for improved productivity and greater accuracy• Reflection/Transmission at single wavelength (read) or wavelength range (scan)
Wavelength Range	190 – 2800 nm
Auto Polarizer Wavelength Range	250 – 2500 nm
Detectors	Two-colored Si/InGaAs
Aperture Masks	Incident beam: 1, 2 and 3 degrees Detector: 1, 1.8, 2, 3, 4, 4.4, 5 and 6 degrees

Recommended environmental conditions

Instrument storage	5–45 °C at 20–80% relative humidity, non-condensing, altitude < 2133 m
Instrument operation*	Below 853 m altitude: 10–35 °C, 15–80% relative humidity, non-condensing Between 853 and 2133 m altitude: 10–25 °C, 15–80% relative humidity, non-condensing
Instrument electrical requirements	Mains supply of 100–240 volts AC with 300 VA power consumption. Frequency 50-60 Hz

* For optimum analytical performance, it is recommended that the ambient temperature of the laboratory be between 20 and 25 °C (68 and 77 °F) and be held constant to within ± 2 °C (± 3.6 °F) throughout the entire working day. When performing the limiting resolution test on the Cary 4000/5000/6000i/7000 systems it is a requirement that these environment conditions are met.

Accessories

The Agilent Cary 7000 UMS is compatible with a wide range of sample compartment accessories when the UMA is removed. Some major accessories include:

Cary 7000 UMS Accessories	<ul style="list-style-type: none">• Diffuse Reflectance Accessory (DRA) – Internal (110mm sphere) and External (150mm sphere)• Fixed angle Specular Reflectance Accessories (SRA)• Variable Angle Specular Reflectance Accessory (VASRA)• Polarizers – Glan Taylor, Glan Thompson and Wire Grid• Variable angle transmission holder• Automated thin film holder• Peltier temperature software controlled single and multi-cell cuvette holders
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Support policies

Type	Policy
Warranty	12 months, though this may vary according to location
Hardware support period	Seven (7) 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 add additional functionality will attract a fee

Further details

More information	For further information please consult your Agilent office or supplier, or our Web site at www.agilent.com
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