Thermo Scientific
Evolution 201 and 220
UV-Visible Spectrophotometers

UV-Vis Transformed for Real Results

- Innovative
- Insightful
- Versatile
- Convenient

Thermo
SCIENTIFIC

Innovation to Keep You Ahead

Perform experiments the way you want with the Thermo Scientific Evolution 201 and 220 spectrophotometers. Powerful software, cutting-edge technology and an array of accessories consistently delivers the high quality results you expect. By using the same innovative software for on-board and computer control, your instrument is always up to date and ready for the next challenge. Complete Thermo Scientific solutions move you from samples to answers with ease.

Providing instruments, software, and accessories to tens of thousands of users worldwide helped us design the next-generation UV-Vis instrument with the latest technology to give you usability and performance without added complexity. Our innovative Thermo Scientific INSIGHT software keeps the most important features at your fingertips in a refreshingly clean and powerful user interface. Discover how the Evolution™ 201 and 220 instruments can work with you to deliver versatility and convenience to your laboratory.

Your Home Screen

Put your assays and methods on the first screen you see for easy navigation and convenience. Instantly open your workbooks and start collecting data. Create or update analysis templates quickly for the versatility your laboratory needs.
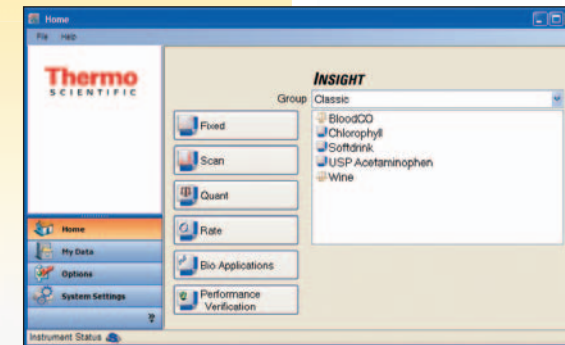
Build Your Own Analyzer With CUE Software

Have a routine application that needs to be simplified for technicians or less-frequent users? Create a dedicated workflow to guide your technicians through even the most complex assays with the touch of a button. Our unique Customized User Environment (CUE) software uses simple, step-by-step, flowchart-like tools to program complete multi-step analyses for future use. This innovative software program even allows the user to customize the screen displayed with the method when it is executed. Add interactive buttons, prompt users to perform tasks in sequence, and display, save and export results automatically.
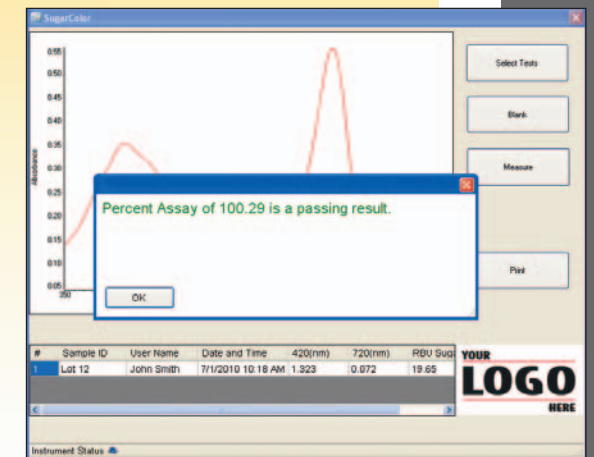
Accessories That Add Value

Our array of accessories empowers your measurements and brings versatility and productivity to your laboratory. A complete line of sample changers, temperature control and monitoring accessories, fiber optic probe systems, and tools for measuring reflectance and transmission of solid samples work together with the Evolution 200 series instruments to deliver sophistication and performance that is second to none. Integrated and straightforward communication with INSIGHT™ software gives you complete control of your measurements.

ev·o·lu·tion (ĕv′ə-lū′shən)

A gradual process in which something changes into a different and better form.

The American Heritage® Dictionary of the English Language, Fourth Edition

1.0 nm Resolution, Double-beam Configuration

Engineered to perform, the Evolution 201 and 220 systems deliver high-performance, reliable data, and features that enhance the user experience.

Double-beam Geometry
Anytime a sample changes during the course of the measurement period, a double-beam spectrophotometer delivers the most accurate data. Taking the ratio of the sample to the reference beam at each data point negates the effects of changing samples — especially useful for kinetics, long-term process monitoring and difficult samples.

Trigger Connections
Triggers help you interact with the world outside your measurements. Whether you need a trigger output to start the next part of your process or you need to wait for a trigger to take a measurement, the Evolution 201 and 220 spectrophotometers can accommodate your communication and connectivity needs.

Quick Release Lid
Unique sliding sample compartment door provides push button convenience for assays where the user has their hands full.

USB Interface
Connect to an external computer for INSIGHT software control, data analysis and storage. Use a USB memory device to store methods and data, connect a mouse and keyboard, or print hard copy data reports directly to an external printer.
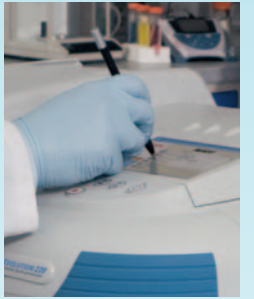
Application Focused Beam Geometry (AFBG)
AFBG technology optimizes the optics of the instrument to your application. The Evolution 220 system features AFBG options for solids and materials, fiber optics, and microcell applications. Customized to match our accessories, the Materials and Fiber Optics selections provide maximum performance. The tightly focused, small beam from the Micro AFBG allows over 80% of light to pass through the 2 x 2 mm aperture of a 40 μL microcell.

Mono Drive
Our precision monochromator drive delivers fast scanning data collection without compromising wavelength accuracy. Variable scan speeds from < 1 to 6,000 nm/min give you increased flexibility for data acquisition.

Removable Sample Beam Detector
Accommodates a wide array of accessories with their own integrated detectors. Build your own unique detector configurations for customized analysis.

Mercury Lamp Port
The Evolution 201 and 220 spectrophotometers are the only instruments in their class to offer a Mercury Lamp Calibration accessory. This accessory delivers full-range wavelength accuracy and wavelength repeatability verification. In the rare case that re-calibration is necessary, use this accessory to measure and store the same calibration as performed in our factory.

Sample Compartment
Room light immunity allows the sample compartment to remain open during measurements for maximum versatility, ease-of-use and specialized accessories.

Xenon Flash Lamp
Sending intense flashes of light only when measurements are being made, the long lifetime xenon lamp is guaranteed for 3 years of continuous use. Other benefits of the xenon flash lamp include low cost of ownership, longer time between maintenance cycles, and high intensity in the UV and visible regions of the spectrum. Most importantly, xenon lamps require no warm-up time allowing instant measurements.

Powerful Convenience at Your Fingertips

Color Touch Screen
The touch screen of the local control Evolution 201 and 220 spectrophotometers provides powerful instrument control using a built-in computer. Routine operations can be accessed with fingertip control. Use a stylus or a USB mouse and keyboard for more sophisticated tasks.
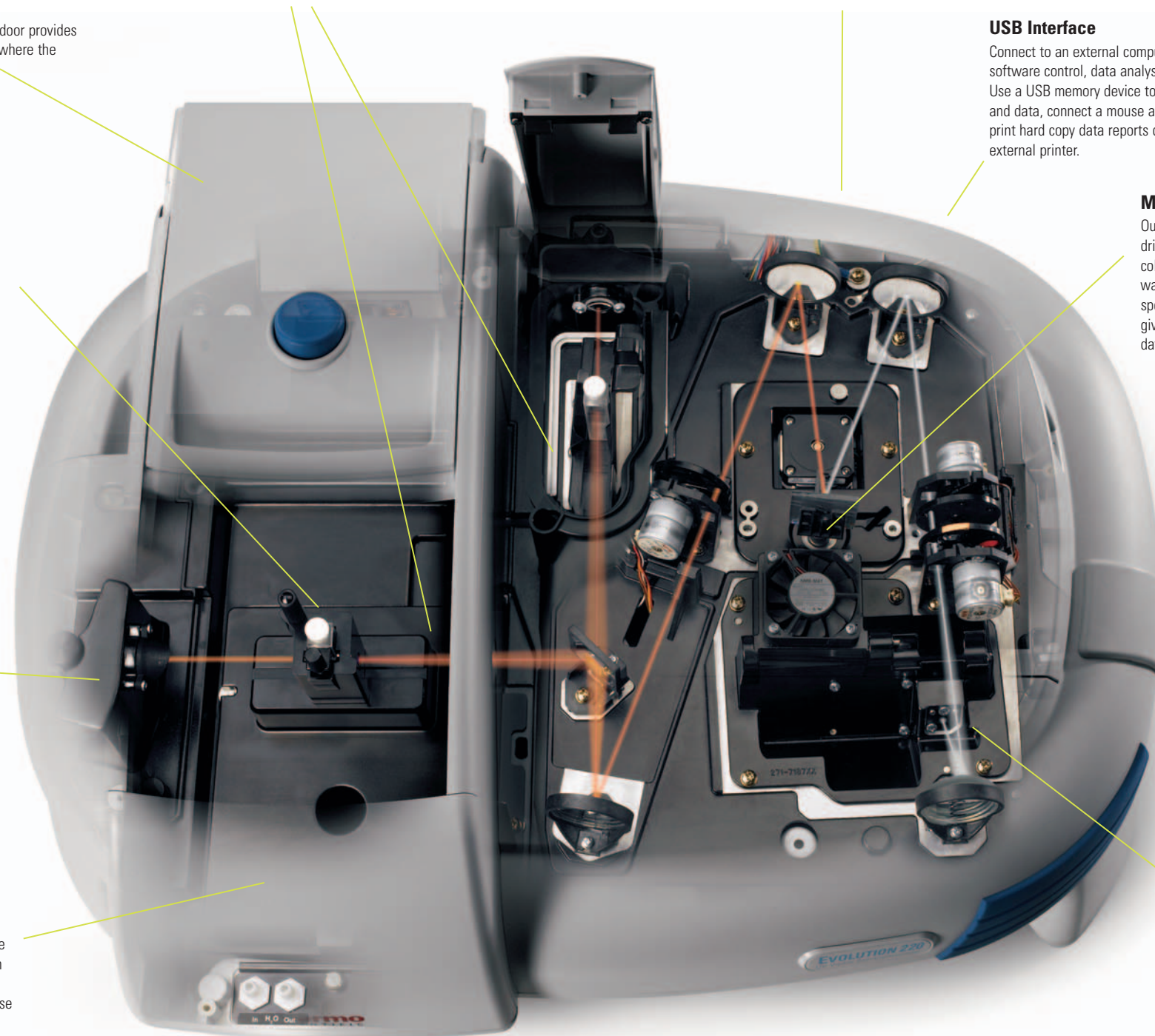
Keypad
Offered on both the local and computer control instruments, the integrated keypad allows communication with INSIGHT software. Start measurements with the Run and Zero/Baseline buttons. Launch CUE scripts or other applications using the four programmable buttons.

INSIGHT Software — Sophistication Simplified

Traditional UV-Vis Applications Redefined

Scan

- Comprehensive spectrum analysis and calculations
- Simplified peak picking and value crossing analysis
- Slider controls allow you to see the results of your analysis in real time
- Integration time, scan speed, and data interval controls merge together to give you complete control over data collection
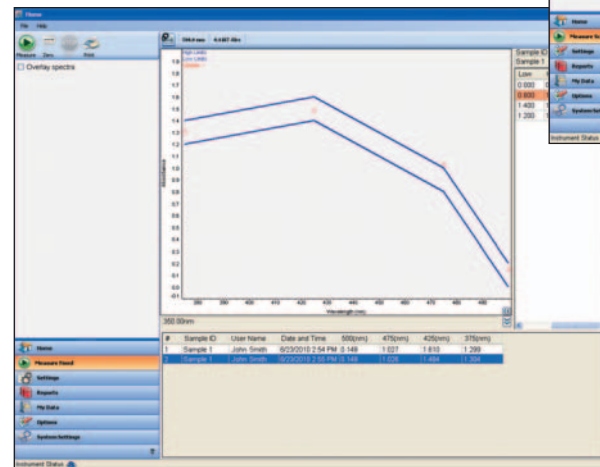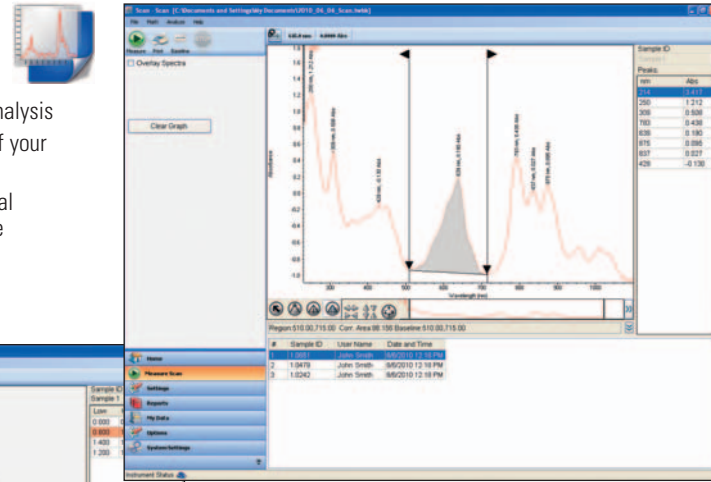
Fixed

- Run charts instantly bring data trending to life
- Control limits add clarity to your QA/QC analysis and allow for fast, visual inspection of compliance
- Intuitive controls and sample management makes acquiring additional data in the workbook fast and easy
- Pre-programmed peak height and peak mathematics analysis modes add simplicity
- Load and export sample lists for productivity

Quant

- Six different options for performing quantitative analysis experiments
- Intuitive method setup guides you through the process of setting up your analysis
- Scanning quant gives you the complete picture of the measurement, improving the method development experience
- Perform multiple calculations and extract multiple parameters in a single method to get a complete answer from one method
- Equation-based quantitative analysis for sophisticated applications

Kinetics

- Up to 100 data points per second on a single cell gives you high density data to move your kinetics research forward
- Measure reaction in segments with varying data point density and collection times
- Use our Dwell time feature to extract the most data per measurement and get a quick image of fast reaction dynamics
- Comprehensive data fitting for zero, first and second order reactions and consecutive reaction mechanisms
- Analyze your data in discrete segments for complete analysis flexibility

Convenient Local Control

A built-in computer running the Microsoft® Windows® XP embedded operating system provides the convenience of a local control system with the flexibility and power of a computer. A large hard drive has all the room you need for storing methods and data. Four USB ports on the local control version allow you to connect external devices to elevate your instrument experience. Connect a USB keyboard, mouse, and printer for operational convenience.

Choose Your Own Configuration

The Evolution 201 and 220 spectrophotometers offer the flexibility to choose a configuration suited to your needs:

- Local control
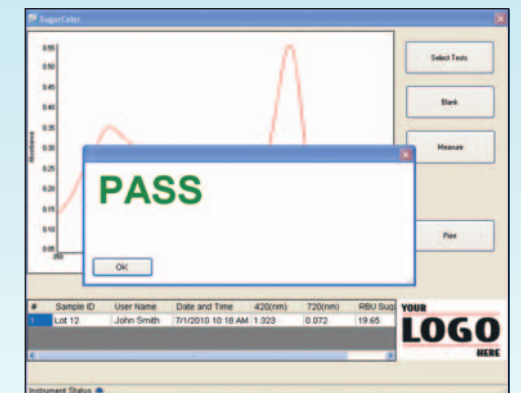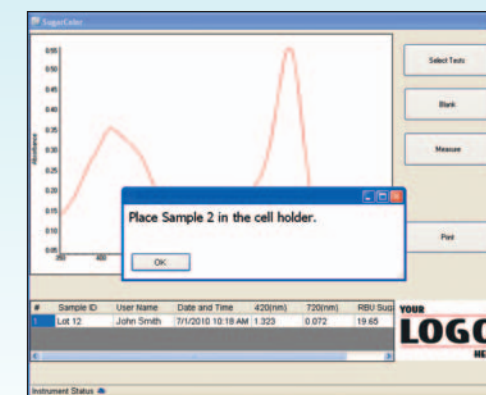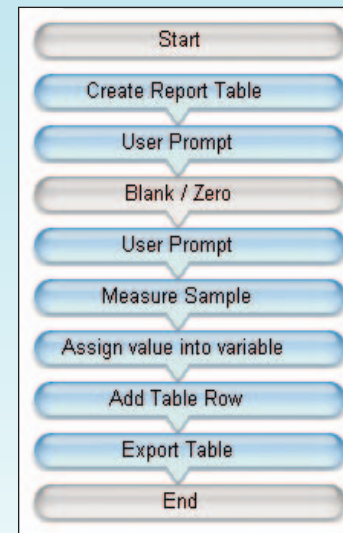- Computer control
- Both local control and computer control

Driven from the same INSIGHT software interface, local and computer control options allow you to choose which configuration is best for your laboratory. Local control offers the simplicity of instant walk-up measurements while computer control allows intense data analysis and export capabilities.

Personalized Methods with CUE Software

Simplify your most sophisticated methods with Customized User Environment (CUE) software. Ideal for quality control laboratories, this unique software transforms complex, multi-step workflows into one simplified, easy-to-execute method suitable for any level of technician. CUE scripts may be used to:

- Determine pass/fail results
- Prompt users to perform specified actions at correct times
- Automate user decisions, such as system suitability acceptance
- Perform complex data calculations and analyses
- Eliminate hard-copy methods in the laboratory

Start
Create Report Table
User Prompt
Blank / Zero
User Prompt
Measure Sample
Assign value into variable
Add Table Row
Export Table
End

For added convenience, CUE software is also compatible with cell changers, sipper systems and temperature control accessories.

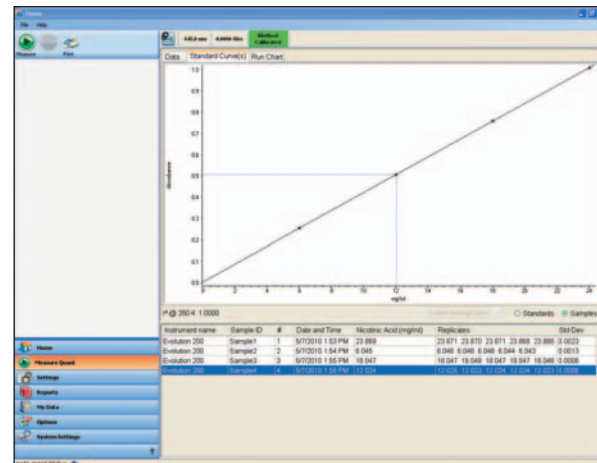# Versatility for All Your QA/QC Applications
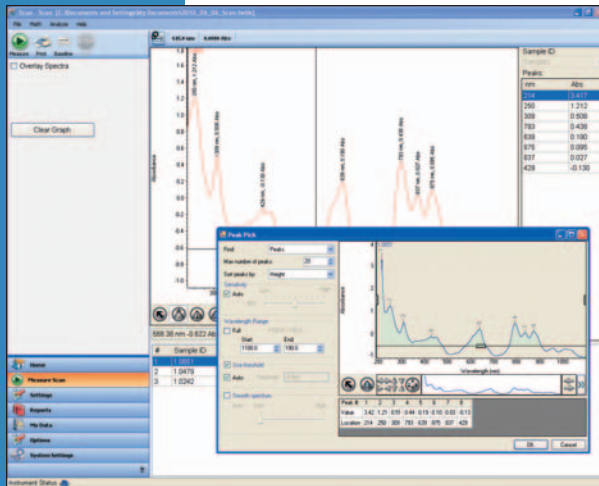
Versatile Spectral Analysis Functions

Wavelength scanning is a key aspect of UV-Visible analysis. Peaks in a spectrum help to identify and quantify samples. With a slew speed of 31,000 nm/min and scan speeds up to 6,000 nm/min, the Evolution 201 and 220 spectrophotometers are the fastest double-beam UV-Visible instruments in their class.

INSIGHT software allows the user to find up to 100 peaks and valleys in scan mode. Results can be sorted by height or location. Value level crossing functions allow the user to determine the location where spectra cross a particular value on the y-axis.

OUR PLEDGE OF SUPPORT

Your Evolution 200 and 220 instruments are backed by a highly trained service and applications support team dedicated to improving your productivity, reducing your total cost of ownership and ensuring compliance across your laboratory. Available products and support services for installing, qualifying and maintaining your Thermo Scientific system include:

- UV Validator IQ/OQ Documentation
- Installation and Operational Qualification Services
- Depot and On-Site Maintenance and Repair Services
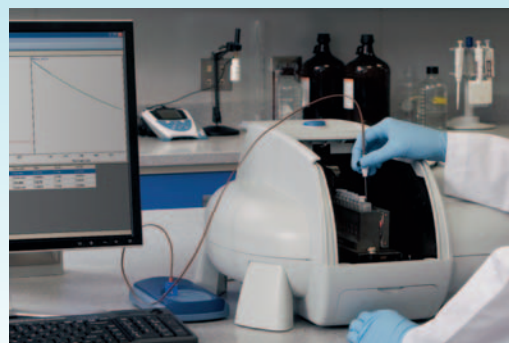- Technical and Operational Assistance
- Training Support Services

Comprehensive Quantitative Analysis Solutions

Reliable results are an essential component of quality control analyses across many disciplines, including the pharmaceutical, food and beverage and specialty chemical industries. From simple, single-standard comparisons to standard curves based on peak area, we have the tools to get the answers you need every time. Our INSIGHT software offers users six ways to perform Quantitative Analysis with ease:

- Manually entered factor
- Measure single standard
- Standard curve
- Standard curve with two wavelengths
- Advanced standard curve
- Advanced without standards

Choose to perform your analysis in fixed or scan mode, select a curve fit and standard averaging if desired. Set minimum correlation coefficients or use concentration limits to define the requirements for your standards and samples. After measurements are complete, a run chart neatly displays the data and error bars and indicate whether or not each sample measurement fell within the defined concentration range.
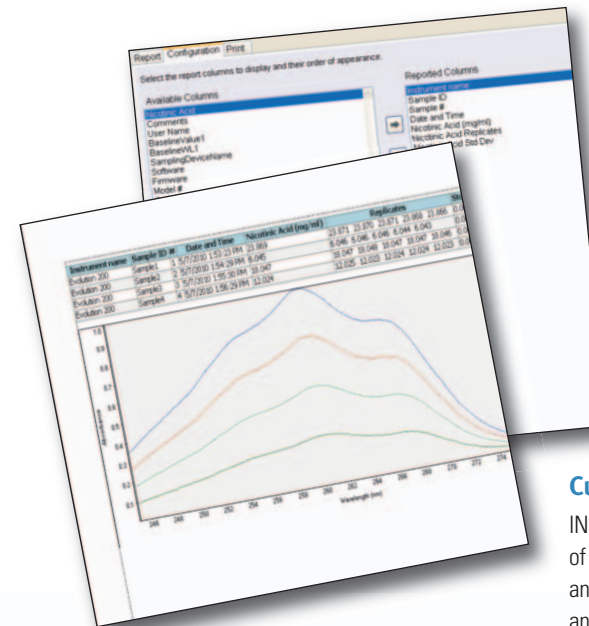
Customized Reporting

INSIGHT software allows you to configure reports to fit the needs of your laboratory. Simply select the items you wish to include and the report creates itself. Customize headers, footers, tables and graphs for a personalized look. Optional Thermo Scientific INSIGHT Security software enables data handling in accordance with the U.S. FDA's 21 CFR Part 11 requirements for electronic signatures and control of retained data.

Precision Temperature Control

Leverage the capabilities of precise temperature control for accurate and reliable measurements. Whether you are performing kinetics experiments or simply have a temperature sensitive sample, we have a temperature accessory for you. Choose from a Peltier Single Cell Holder or a Smart 8-Cell Peltier system for temperature control and sample monitoring from 0 to 100 °C. Use our temperature probe hub to monitor the temperature in up to eight individual cells. The Thermostatted Smart Linear 8-Cell Changer, Smart Rotary 7-Cell Changer and Single Cell Holder offer temperature control using liquid recirculation for temperatures from -10 to 100 °C.

Optimize the Performance of Your Instrument

CALIBRATION VALIDATION CAROUSELS

Calibration validation carousels (CVCs) maximize your lab's efficiency by minimizing errors and instrument downtime. Choose a pharmacopoeia compliant CVC for compliance with either the USP or PhEur or a standard CVC for general performance verification. U.S and European CVC configurations feature traceable, permanently sealed standard solutions designed to comply with the best practice guidelines of these regulations. Pharmacopoeia compliant CVC's include:

- **Holmium Oxide** solution for wavelength accuracy
- **Potassium Dichromate** solution for photometric accuracy
- **Toluene in Hexane** for Resolution
- **Potassium Iodide** solution for Stray Light *(USP Only)*
- **Potassium Chloride** solution for Stray Light *(PhEur Only)*

Our standard CVC features traceable standards for routine instrument testing. For added convenience, unique serial numbers associated with each CVC provide automatic identification and matching of standard values to the associated calibration file and instrument specifications eliminating the need for manual calculations, transcriptions and reporting of results.
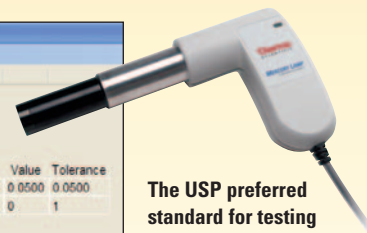
HANDS-FREE PERFORMANCE VERIFICATION

Ensure the accuracy and reliability of your data while saving time and money with hands-free performance verification of the Evolution 201 and 220 spectrophotometers in accordance with the United States or European Pharmacopoeias and GxP guidelines. Automated testing can save more than four hours of your analyst's time, improving the efficiency and performance of your laboratory. Simply select your configuration from the software menu and press the start button. Collected results are returned ready for sign-off when the tests are complete.

The USP preferred standard for testing wavelength accuracy, the mercury lamp can also be used to perform instrument calibration just as it was in the factory.

System Validation

The Thermo Scientific UV Validator package provides support for system qualification and validation activities for the Evolution 201 and 220 spectrophotometers, software and accessories. It provides all of the documentation and reference materials needed to facilitate compliance of your system with the requirements of FDA, GxP, ISO 9001:2008 and ISPE 2001 guidelines and regulations. The UV Validator streamlines Installation Qualification (IQ), Operational Qualification (OQ) and assists in Performance Qualification (PQ) procedure and development for simple and efficient use.

Integrated Security Software

If your laboratory requires 21 CFR Part 11 compliance, INSIGHT Security software is here to make your life easier. Using the same easy-to-use interface, INSIGHT Security software combines security and data integrity assurance with the versatility required for your multi-user laboratory. Our security software integrates seamlessly with the security features of the Windows operating system, ensuring that changes to all files associated with INSIGHT Security software are monitored and logged even when the software is not running. For large enterprises with multiple systems, Thermo Scientific Security Administration Server software allows you to manage all users from one central server location making maintenance simple and straightforward.

Premier Performance with Integrating Sphere

SCATTERED TRANSMITTANCE

Light-scattering material can be found in samples as diverse as natural water and biological homogenates. The Evolution 220 system offers simple support for transmittance measurements on scattering materials and turbid solutions that are impractical to measure accurately by conventional methods. By collecting and integrating the scattered light, the Integrating Sphere accessory for the Evolution 220 spectrophotometer (ISA-220) allows you to measure these challenging samples. The ISA-220 accessory offers a unique level of performance for an instrument in this price class. It combines a built-in 10 mm silicon photodiode with a 60 mm Spectralon® sphere and a dedicated AFBG optical system to yield smooth, accurate data each time you measure.
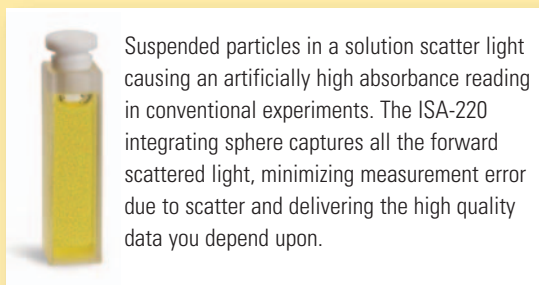
REFLECTANCE

In its reflectance configuration, the ISA-220 accessory installs on the right side of the sample compartment to place your sample at the focal point of the measurement beam. Position samples with or without an 8° wedge to measure total reflectance (SPIN) or diffuse reflectance only (SPEX). Single beam substitution error is minimized by the small reflectance port and virtually eliminated when you select the unique automated correction feature in INSIGHT software. The ISA-220 accessory offers exceptional performance for research and routine reflectance measurements at an unprecedented price.

Suspended particles in a solution scatter light causing an artificially high absorbance reading in conventional experiments. The ISA-220 integrating sphere captures all the forward scattered light, minimizing measurement error due to scatter and delivering the high quality data you depend upon.

ISA-220 configured for reflectance. The sphere is located to place your sample at the focal point of the beam and to provide easy access to the spring-loaded sample clamp.
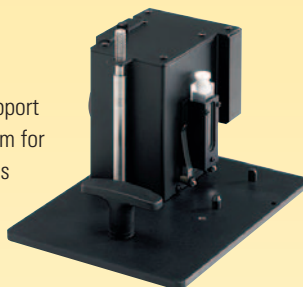
ISA-220 Accessory in Reflectance Configuration

Cuvette holder adapts to support cuvettes from 1 mm to 50 mm for even the most dilute samples

ISA-220 Accessory in Transmittance Configuration

The powder cell holder is optimized to help you analyze small samples.

DRA Cuvette Holder

Evolution series spectrophotometers support an array of solid sample mounting and specular reflectance accessories (SRAs) that mount on 2 x 3" slide plates. Drop-in SRAs for measurements at 15°, 20°, 30°, 45° and 60° are available for the Evolution 200 series.
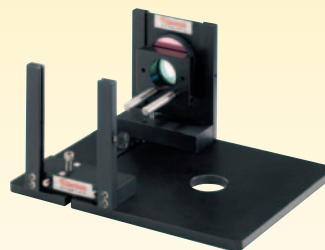
Solid Sample Holder

Drop-in Specular Reflectance Accessory

Expand the Functionality of Your Spectrophotometer

Complete Solutions Move You from Samples to Answers Faster

A complete line of accessories allows you to customize your Evolution 200 Series spectrophotometer to assemble the best analytical system for your laboratory. Our thoughtfully designed accessories complement your work and allow you to get the best productivity from your UV-Visible spectrophotometer. For added convenience, many of the Evolution 300 and 600 spectrophotometer accessories you are already familiar with are compatible with Evolution 200 Series spectrophotometers. Versatility, easy software interaction and unique sampling features make these accessories the right fit for your laboratory.

PERFORMANCE VERIFICATION AND CALIBRATION

Calibration Validation Carousels (General, EP, USP)

Mercury Lamp Calibration Accessory

RAPID MIXING KINETICS

Rapid Mixing Accessory

SAMPLE AND CELL HOLDER ACCESSORIES

Smart Thermostatted 7-Cell Changer

Rectangular and Cylindrical Reference Cell Holders

Holder for 1" square cell holder

Cylindrical Cell Holder

Adjustable Pathlength Rectangular Cell Holder

Combination Test Tube and Rectangular Cell Holder

TEMPERATURE MONITORING

Temperature Probe Hub and Temperature Probes

TEMPERATURE CONTROL

Peltier Single Cell Holder System

Smart Peltier 8-Cell Changer

SMALL VOLUME SAMPLING

nanoCell Accessory

SOLID SAMPLING

ISA-220 Accessory

15°, 20°, 30°, 45°, and 60° Specular Reflectance Accessories

Solid Sample Slide Holder with Universal Sample Holder

FIBER OPTIC PROBES

Integrated Fiber Optics Module
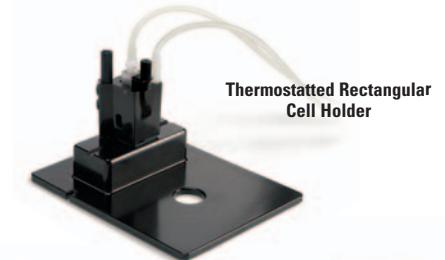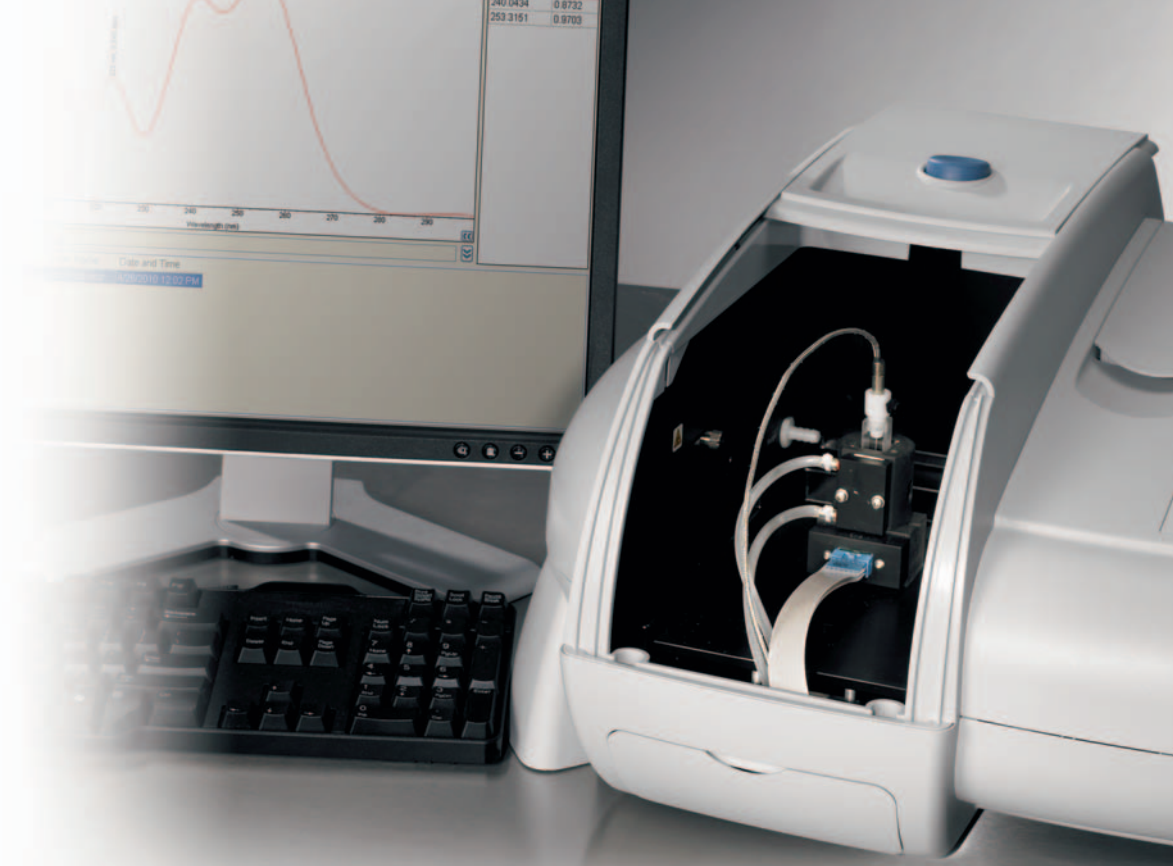
SIPPER SYSTEMS

Smart Sipper Accessory

Thermostatted Rectangular Cell Holder

Smart Thermostatted 8-Cell Changer

TPS-1500W Sealed Peltier Recirculator

Specifications

Specifications	Evolution 201 UV-Visible Spectrophotometer	Evolution 220 UV-Visible Spectrophotometer
Optical Design	Double-beam with sample and reference cuvette positions; Czerny-Turner Monochromator	Double-beam with sample and reference cuvette positions; Application Focused Beam Geometry; Czerny-Turner Monochromator
Spectral Bandwidth(s)	1.0 nm	Variable: 1 nm; 2 nm; AFBG Microcell optimized; AFBG Fiber optic optimized; AFBG Materials optimized
Light Source	Xenon flash lamp, 3-year warranty (5 years typical lifetime)	
Detector	Dual Silicon Photodiodes	
Scan Ordinate Modes	Absorbance, % Transmittance, % Reflectance, Kubelka-Munk, log (1/R), log (Abs), Abs*Factor, Intensity	
Resolution	> 1.6 (peak-to-valley ratio; toluene in hexane)	
Wavelength		
Range	190 – 1100 nm	
Accuracy	± 0.8 nm (full range 190 to 1100 nm) ± 0.5 nm (546.11 nm mercury line)	
Repeatability	≤ 0.1 nm (546.11 nm mercury line, SD of 10 measurements)	
Scanning Speed	< 1 to 6000 nm/min; variable	
Data Intervals	10, 5, 2, 1.0, 0.5, 0.2, 0.1 nm	
Photometric		
Range	> 3.5 A	
Display Range	-0.3 to 4.0 A	
Accuracy – Instrument	0.5 A: ± 0.004 A 1A: ± 0.006 A 2A: ± 0.010 A Measured at 440 nm using neutral density filters traceable to NIST/NPL	
Accuracy – Sealed Solutions (EP/BP/TGA)	± 0.010 A (60 mg/L $K_2Cr_2O_7$)	
Noise	0A: ≤ 0.00015 A 1A: ≤ 0.00050 A 2A: ≤ 0.00080 A 260 nm, 1.0 nm SBW, RMS	
Drift (Stability)	< 0.0005 A/hr 500 nm, 1.0 nm SBW, 1 hour warm-up	
Stray Light	KCl, 198 nm: ≤ 1% T NaI, 220 nm: ≤ 0.05% T $NaNO_2$, 340 nm: < 0.05% T	
Baseline Flatness	± 0.0010 A 200 – 800 nm, 1.0 nm SBW, smoothing	
Keypad	Sealed Membrane	
Local Control Option		
Display	Touchscreen LCD panel; 800 × 480; 17.8 cm (7 in) diagonal	
Operating System	Microsoft Windows XP embedded	
Dimensions	62.2 cm L × 48.6 cm W × 27.9 cm H (24" L × 19" W × 11" H)	
Weight	14.4 kg (32 lb)	
Electrical Supply	100 – 240 V, 50 – 60 Hz, selected automatically 150 W maximum	

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