C101-E146

SHIMADZU
Excellence in Science

UV-VIS Spectrophotometer

UV-1900

SHIMADZU
Log Out
Mode Menu
Ready
Administrator
02/26 10:15
Photometric
Spectrum
Quantitation
Kinetics
Time Course
Bio Method

Navigate Your Way

Easy to Operate, Obtain Answers Easily and Rapidly

Easy-to-use user interface design

Ergonomic touch-screen display

Advanced Regulatory Compliance

Validation functions enable checks in accordance with Pharmacopeia (JP, USP, and EP) to be performed easily

In combination with LabSolutions™ DB/CS, comply with FDA 21 CFR Part 11 and PIC/S GMP guidelines

High Performance to Meet Diverse Needs

Performance at the highest level in its class, provides advanced function than UV-1800

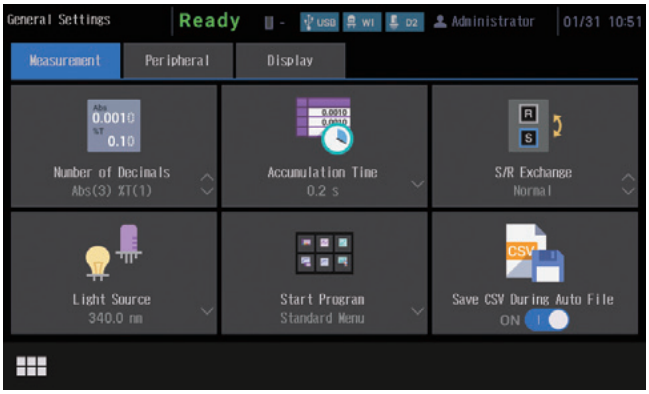
Ultra-fast scan performance, capable of obtaining high-accuracy spectra in just a few seconds

Easy to Operate, Obtain Answers Easily and Rapidly

The instrument is equipped with a stylus pen, allowing operation by this pen or a finger.

Easy-to-Use Interface
Grasp the Current Status and Operating Procedures at a Glance

The UV-1900 on-screen user interface includes large, easy-to-see icons deployed on a black background, so the instrument settings are evident at a glance. In addition, the large, easy-to-see icons improve intuitive understanding, which enables users to quickly become familiar with the operations. Furthermore, the user interface is designed to minimize transitions between windows, so users do not get confused during the operations.

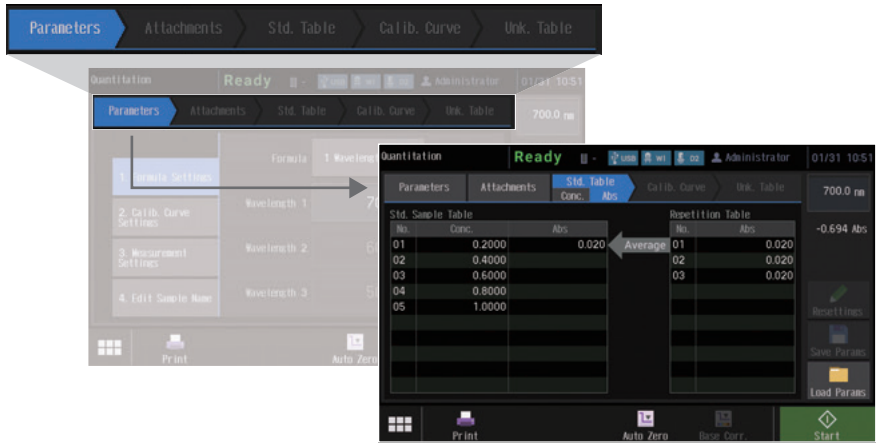


Hardware Design Based on Ergonomics

The control panel design is based on ergonomics and positioned at the very best viewing angle for the user. Users can operate easily with any posture. In addition, a stylus pen is equipped next to the panel, so users can switch easily between operations using their fingers or the stylus pen.

Navigation Tabs Improve Usability

In quantitation mode on the UV-1900, the stages of the entire measurement process and the current status are always shown on the display. As a result, users know immediately what to do in the next step.

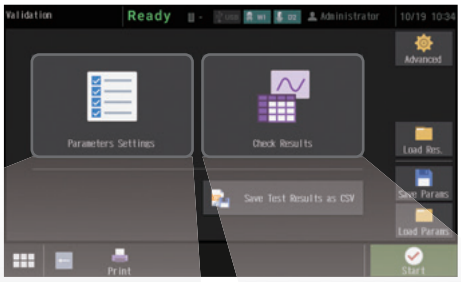


Advanced Regulatory Compliance

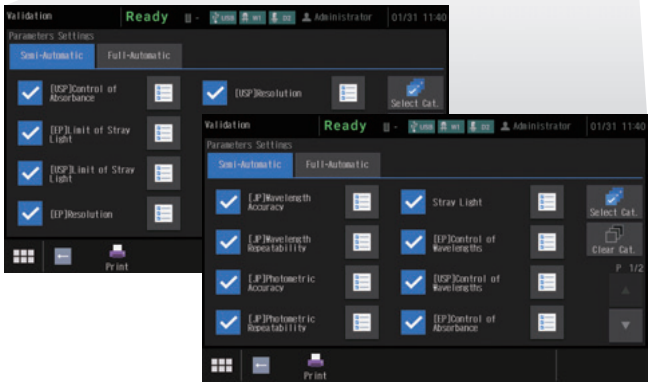
Full Support for Pharmacopeia, GLP/GMP, FDA 21 CFR Part 11 and Other Regulations

Instrument Validation Functions Compliant with JP, USP, and EP

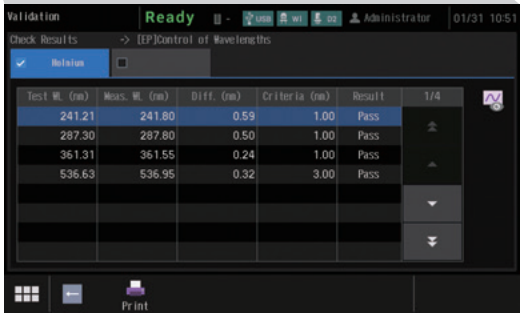
This instrument can not only run checks for nine JIS items, but also those stipulated in the Japanese Pharmacopoeia (JP), United States Pharmacopeia (USP), and the European Pharmacopoeia (EP). Naturally, the hardware is also compliant with the specifications required by each Pharmacopeia. In addition, the check conditions can be saved. As a result, once the conditions are saved, checks can be performed easily just by calling them up as needed. Check results can also be saved.



Main Screen



Parameters Setting Screen



Check Results Screen

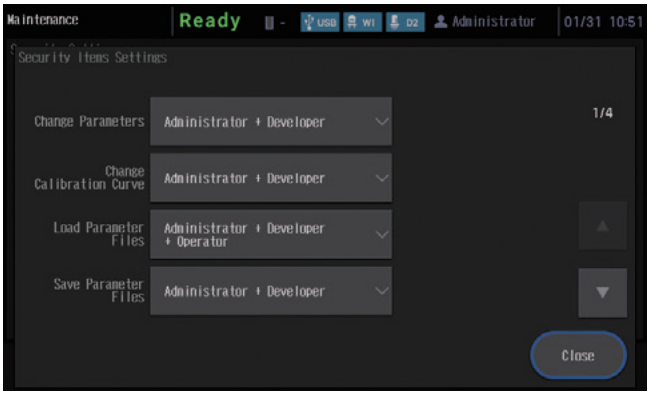
During Testing Screen

Resolution of 1 nm, the Highest in its Class

In addition to achieving a resolution of 1 nm, the highest in its class, by using a monochromator with a Czerny-Turner mounting, the UV-1900 also features a compact, bright optical system. The instrument is more than capable of meeting the wavelength resolution required in the European Pharmacopoeia.

Improved Security Functions

An external control security function has been added to provide more support for compliance with regulations.
Three user authority levels, "Administrator", "Developer", and "Operator", can be set for instrument users.



Support for FDA 21 CFR Part 11, PIC/S GMP Guidelines and Other Regulations and Guidelines

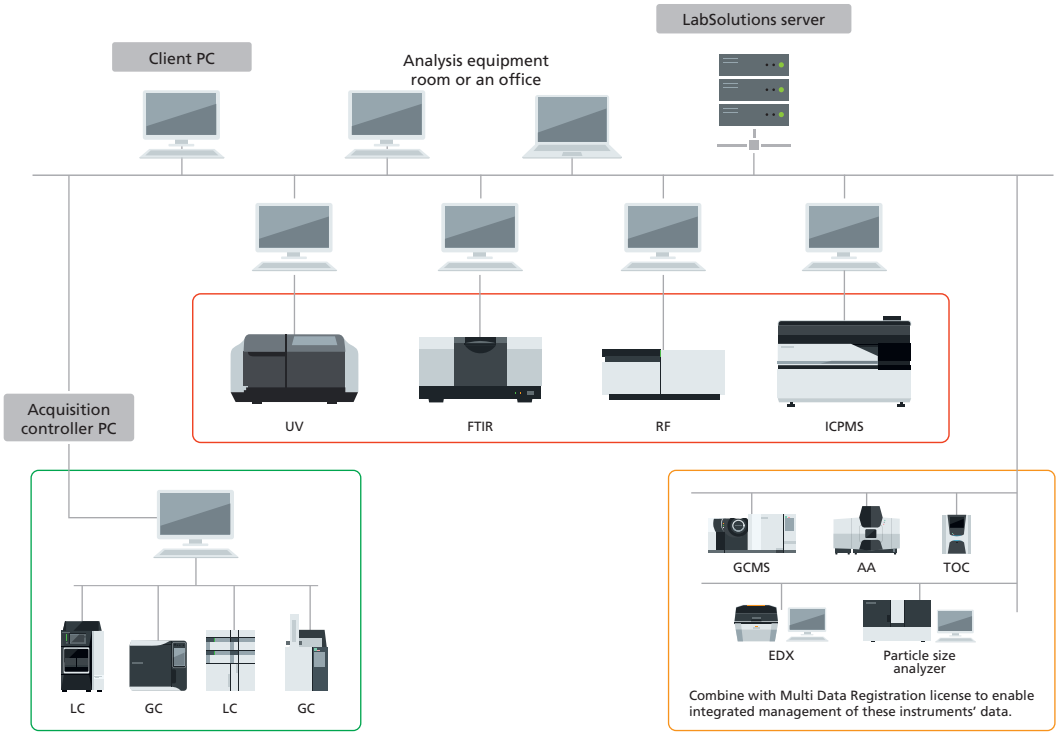
Ensuring the integrity of data (database management), including the user management, user authority management, and data audit trails required for compliance with FDA 21 CFR Part 11, PIC/S GMP guidelines, and other ER/ES regulations, is possible.

LabSolutions DB UV-Vis or UVProbe / LabSolutions DB System

The system allows for data management and user management with a database. Compliant with ER/ES regulations, the system is optimally configured for customers using a PC.

LabSolutions CS UV-Vis* or UVProbe / LabSolutions CS System (Network System)

The system is optimally configured for customers who want to manage data on a server together with LC and GC data for ER/ES compliance.

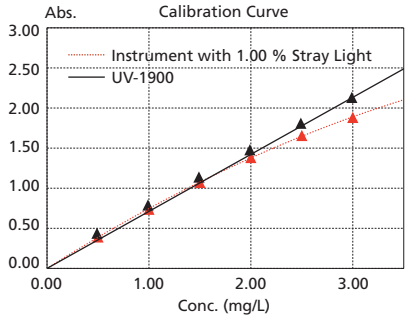


*: coming soon

High Performance to Meet Diverse Needs

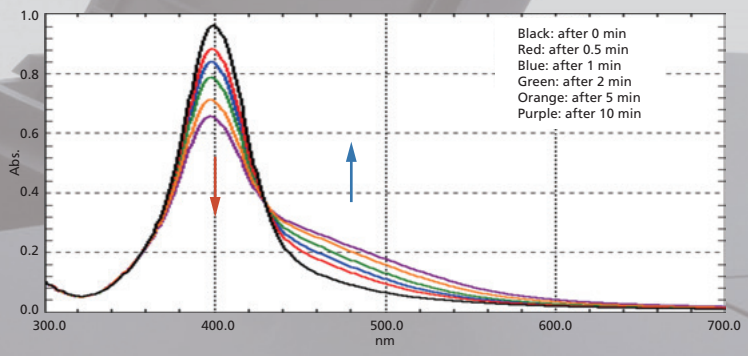
Low Stray Light

Stray light is at 0.5 % max. (198 nm), twice as low as the performance level of the UV-1800. With this stray light reduction, accurate measurements are possible up to the vicinity of 2 Abs even in the ultraviolet region. In addition, high-concentration samples can be quantified accurately.
The figure on the right is a calibration curve for acetic acid, created with absorbance at 200 nm.
The correlation coefficient is 0.9997, and correct measured values are obtained even in the vicinity of 2 Abs. Linearity will be lost in the high absorbance region due to the stray light.

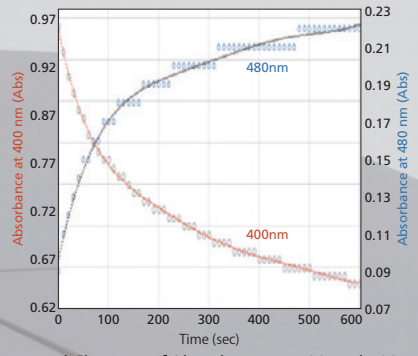


Ultra-Fast Scan

Spectra can be acquired as fast as 29,000 nm/min. Ultra-fast scan is effective in tracking chemical reactions in a short time. In addition to the absorbance change at specified wavelengths, spectra can also be acquired in a short time with the UV-1900. Therefore, more detailed behavior can be investigated by observing spectra with the UV-1900.
The figures below show the analysis of particle agglomeration process when salts are added to silver nanoparticles. Measurements of the 300 to 700 nm region were performed in ultra-fast scan mode. In addition to the decrease of absorbance at 400 nm and the increase of absorbance at 480 nm, the temporal changes of spectra can also be observed.



Absorption Spectra of Silver Nanoparticles



Temporal Changes of Absorbance at 400 and 480 nm

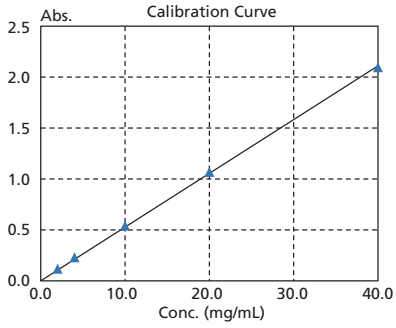
High Reproducibility and Repeatability Accuracy

The photometric repeatability accuracy is 0.0002 Abs max. (0.5 Abs and 1.0 Abs), an improvement of five times over the performance level of the UV-1800. With this high photometric repeatability accuracy, variance in the measurement results is suppressed, enabling more accurate quantitation and the detection of low-concentration samples.

The figure on the right is a calibration curve for caffeine, created with absorbance at 273 nm. The calibration curve has an Abs = 0.0528 Conc., the lower limit of quantitation determined from the standard deviation is 0.0051 mg/L at a point where it would be 0.051 mg/L[Note] for the UV-1900.

Note: One method of determining the lower limit of quantitation is to use ten times the standard deviation. This is an actual measured value and is not guaranteed.

No.	Absorbance of Blank Solution (273 nm)
1	-0.00001
2	0.00001
3	-0.00002
4	0.00002
5	0.00001
6	-0.00003
7	0.00001
8	-0.00004
9	0.00001
10	0.00005
Standard Deviation σ	0.000025



A Diversity of Measurement Modes

Photometric

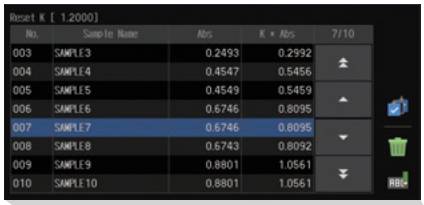
Measures the photometric value at a single wavelength or multiple (up to eight) wavelengths.

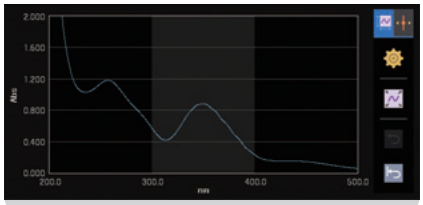
Spectrum

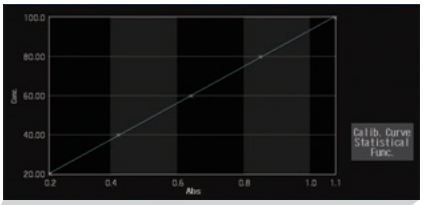
Measures a sample spectrum using wavelength scanning.

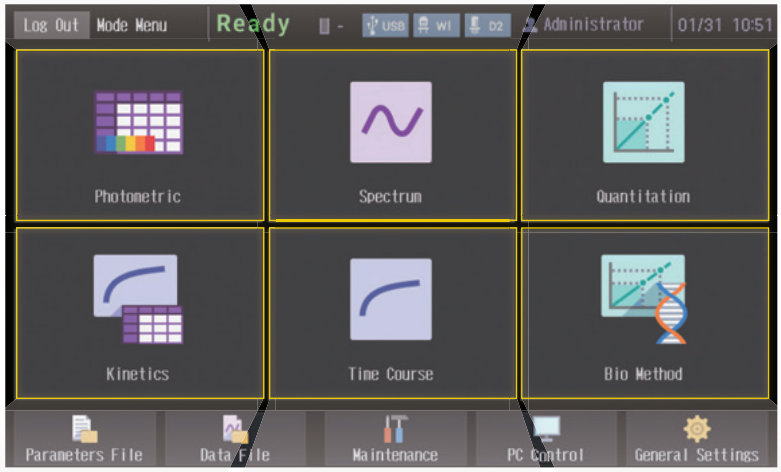
Quantitation

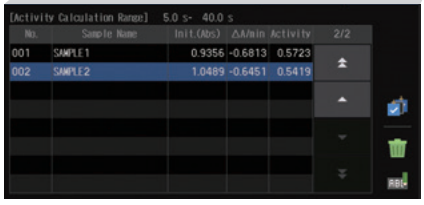
Generates a calibration curve from the measurement of standards, and then calculates the concentrations of unknowns.

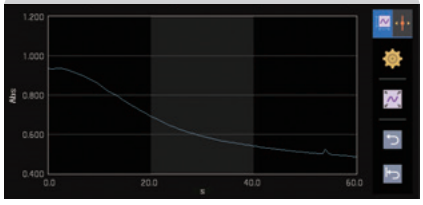


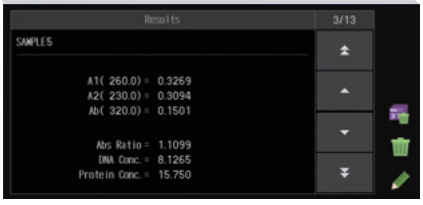












Kinetics

Measures absorbance changes as a function of time, and obtains the enzymatic activity values. The kinetics measurement method or the rate measurement method can be selected.

Time Course

Measures changes over time in photometric values at a specified wavelength.

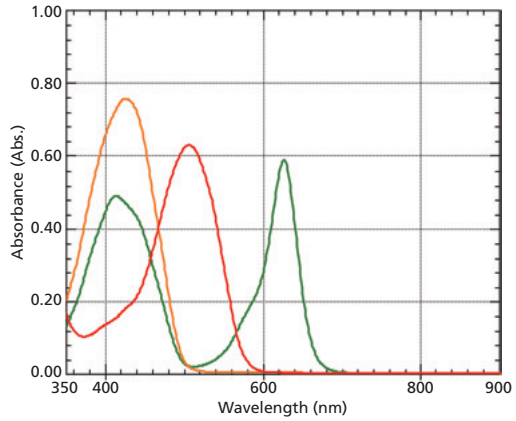
Biomethod

Quantifies DNA or protein concentrations.

Applications

Foods

This is an example of the analysis of food dyes. By using ultra-fast scan mode, the time needed for routine spectral checks can be shortened. The 350 nm to 900 nm region can be measured at 1 nm intervals in approx. 4 seconds.



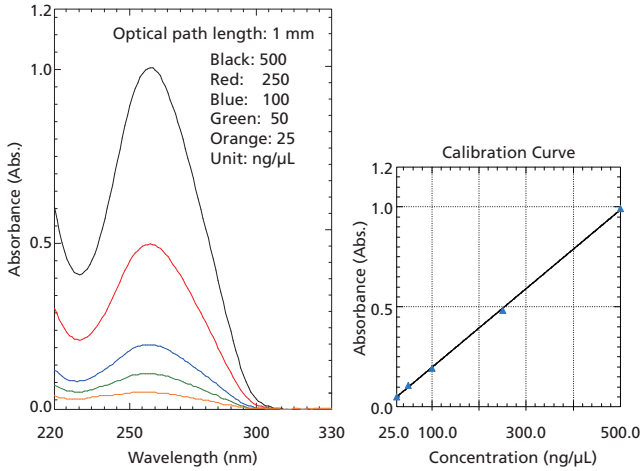
Absorption Spectra of Food Dyes

Pharmaceuticals and Life Sciences

This is an example of the analysis of λDNA. Trace quantities (on the order of a few µL) can be measured by combining the instrument with NanoStick and TrayCell™.
Using TrayCell, a calibration curve for 4 µL of λDNA was obtained correctly in the range between 25 µL and 500 µL.

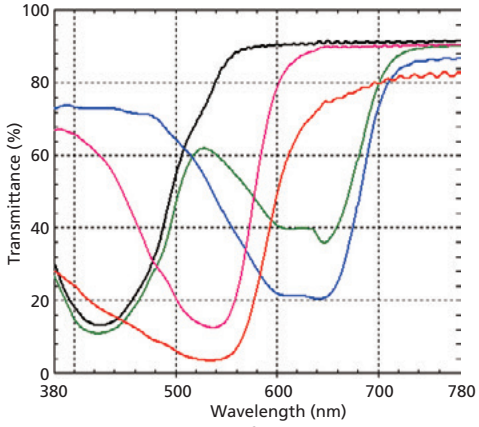
TrayCell

NanoStick

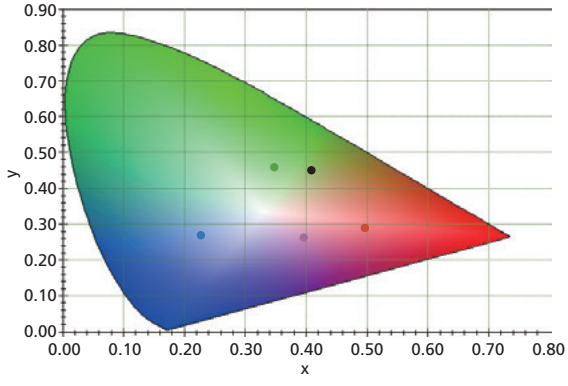


Chemistry

This is an example of the analysis of colored cellophane tape. Materials can be confirmed quantitatively by using LabSolutions UV-Vis and color measurement software.



Transmittance Spectra of Colored Cellophane Tape



Chromaticity Diagram of XY Color System

Optional Software

Control with LabSolutions UV-Vis Software

The UV-1900 can be controlled using LabSolutions UV-Vis software. LabSolutions UV-Vis is a next-generation Shimadzu UV control software pursuing efficiency of analysis. The simple design layout enables even first-time users to perform operations easily. A new spectrum evaluation function automates the measurement, analysis, and printing of reports to significantly enhance the efficiency of routine analysis. In addition, it achieves the easy transfer of measurement data. Users can export the measurement data in text format and import it into other software for analysis with Excel®.

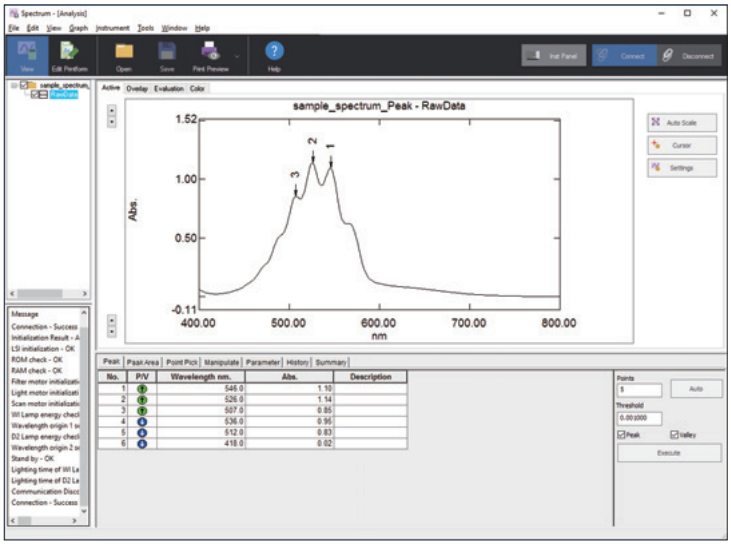
(A separate USB cable is required to connect with a computer.)

For more details, refer to LabSolutions UV-Vis brochure (C101-E147).

Note: LabSolutions UV-Vis is the latest optional software. UV-1900 is equipped with UVProbe software as standard.

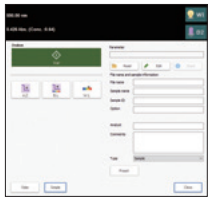
Simple Design

From the start, the software's user-friendliness allows users to perform operations with ease.
With extensive features, LabSolutions UV-Vis meets a wide range of users' expectations.



Simple Main Window

Clear and simple layout of the graphs and measurement results makes it easy to read.



Instrument Control Panel

The instrument control panel that brings together the measurement functions enables automatic measurement, analysis and reporting.

Easy-to-follow Configuration Window

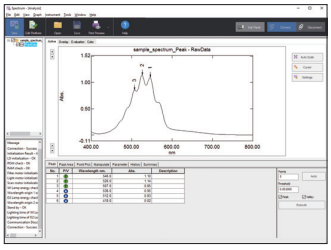
Large icons make it easy for users to understand and operate.

Four Measurement Modes

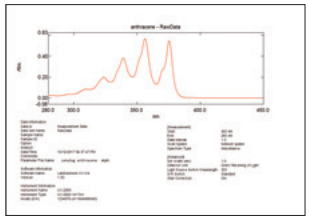
It permits four measurement modes: spectrum, quantitative, photometric, and time course.
Users can open multiple measurement modes at the same time, so that data analysis can be performed in one mode while collecting data in another mode.

Report

Easily create report layouts.



Print from the measurement window with one click.

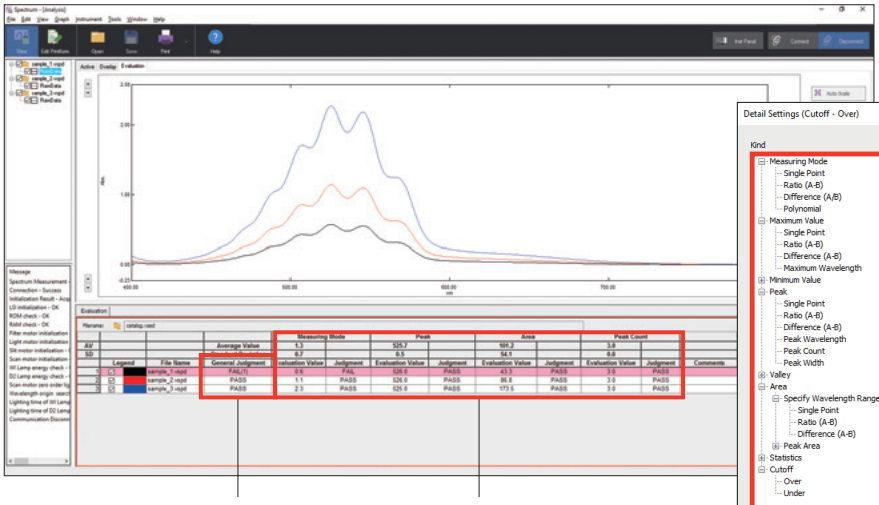


Report is printed.

Spectra Evaluation Function

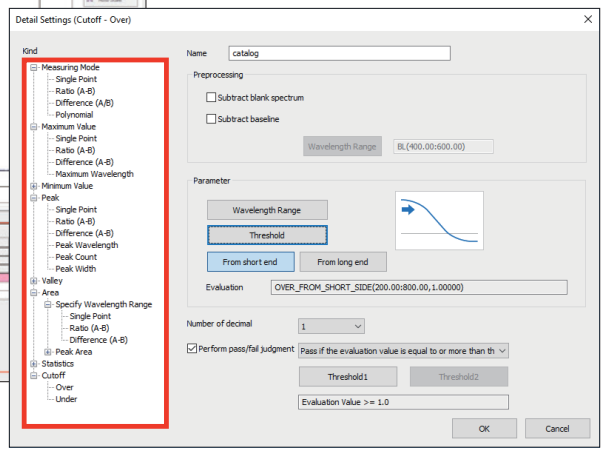
In addition to providing measurement and analysis results, judgment results are also provided.

With this feature, LabSolutions UV-Vis enables users to maintain a product's quality.



Quality of the sample can be determined with comprehensive judgment at a glance.

Multiple evaluation criteria can be set.

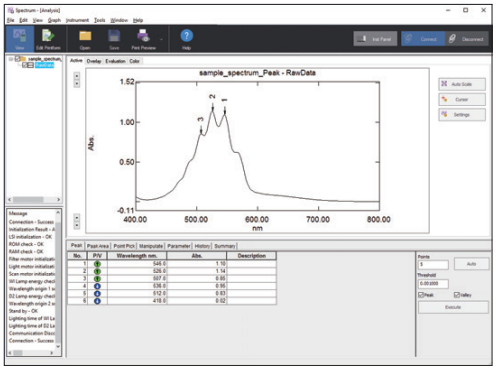


Detail Settings Window

Evaluation method can be selected from a wealth of choices.

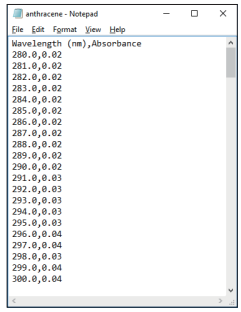
Easy Transfer of Measurement Data

Users want to export measurement data immediately in text format, and import for analysis in other software, such as Excel.



To Analysis Software

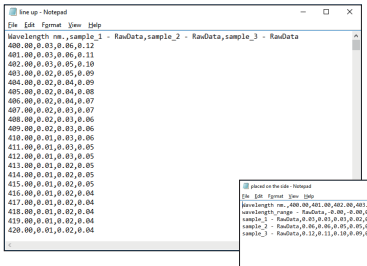
Automatically generates a text file when the spectra data are saved. It can be immediately imported into other software.



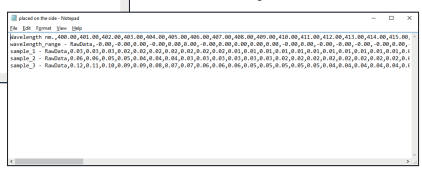
Matrix Output

Outputs multiple spectra to one text file.
Easy to import data into multivariate analysis software.

Line up wavelengths vertically.



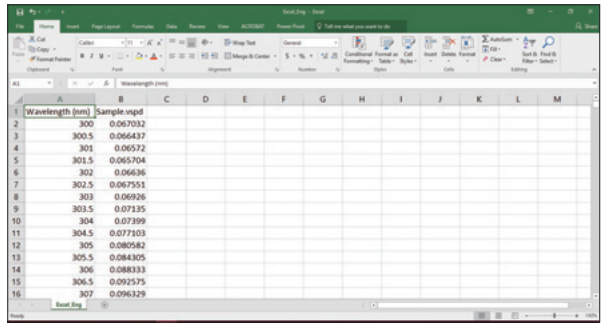
Line up wavelengths horizontally.



Select how the data is ordered

To Excel

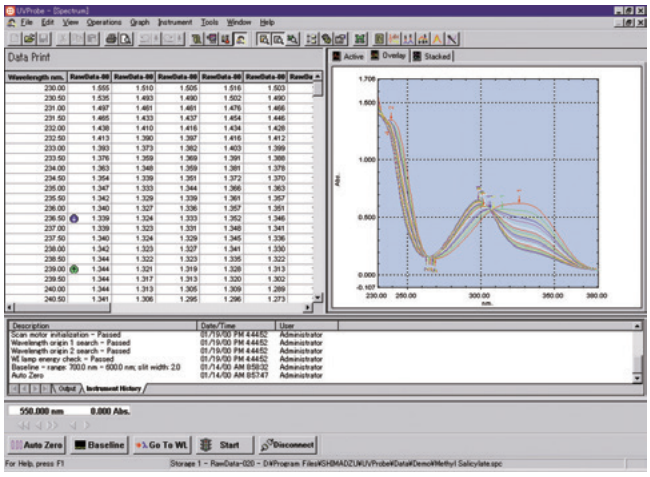
Real-time transfer of the spectrum waveform to Excel during measurement.
No need to create a CSV file each time.



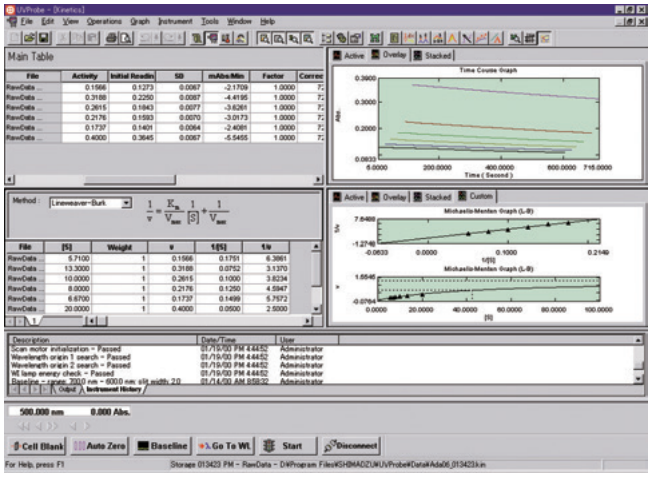
Control with UVProbe Software

UVProbe software contains the following four functions, each of which can be performed easily with its own screen.
Spectrum Module
Photometric Module (Quantitation)
Kinetics Module (Time Course Measurement)
Report Generator
In addition to peak detection, area calculation and other data processing functions, UVProbe is equipped with various functions including: security functions that limit each user limited to specific functions, a data history log function, and an instrument audit trail function.

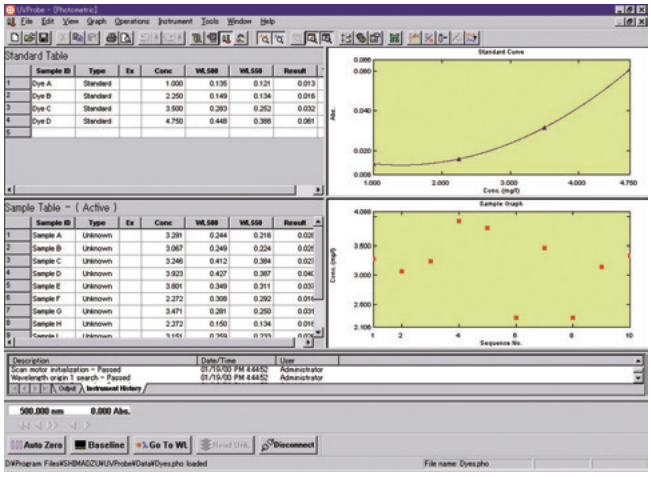
Spectrum Module



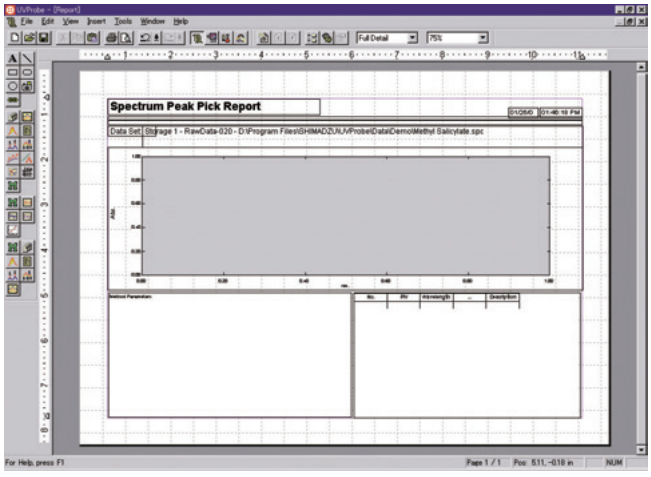
Kinetics Module



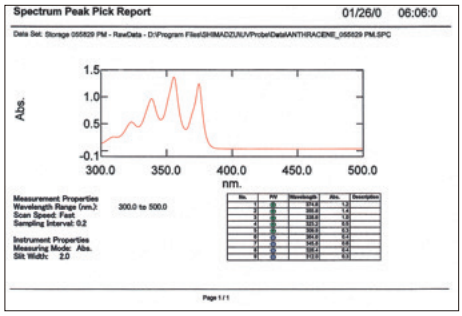
Photometric Module



Report Generator



The report generator gives you the freedom to arrange graphs, tables, etc. to suit your needs. You can now specify the thickness and color of graph lines, as well as font size. Pasting labels on graphs and editing text is easy, allowing you to effectively print comments along with the analysis results.



Accessories

Film Holder (P/N 204-58909)

Used in transmittance measurement of thin samples such as films and filters. Holds thin samples, such as films and filters, for analysis.

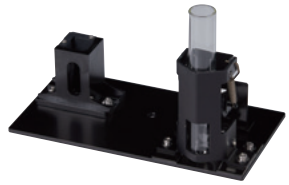
Long-Path Rectangular Cell Holder (P/N 204-23118-01)

Holds two rectangular cells with an optical path length of 10, 20, 30, 50, 70, or 100 mm.

Test Tube Holder (P/N 207-23510-41)

Holds test tube instead of sample compartment.

- Specifications:
  Outside diameter: φ15 to 18 mm
  Height: 84 to 115 mm
  Note: Test tube is not included.

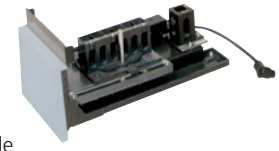


Multi-Cell Sample Compartment (P/N 206-69160-41)

Holds up to six 10-mm square cells on the sample side. No temperature control capability.

- Number of cells: 6 on the sample side
  1 on the reference side

Note: Square cells are not included, please purchase separately.

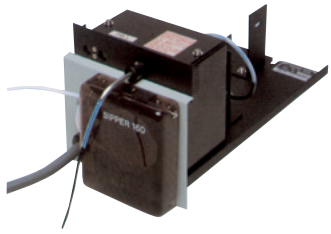


Sipper Unit

Model	P/N	Standard Sample Volume
Sipper Unit 160L (Standard Sipper)	206-23790-51	2.0 mL
Sipper Unit 160T (Triple-Pass Sipper)	206-23790-52	1.5 mL
Sipper Unit 160C (Constant-Temperature Sipper)	206-23790-53	2.5 mL
Sipper Unit 160U (Supermicro Sipper)	206-23790-54	0.5 mL

Four types of sipper units with different flow cells are available. The stepping motor-driven peristaltic pump ensures reliable and smooth aspiration of sample solution.

(Direct driving is possible from the UV-1900 so no interface is required.)



Note: The use of a Solenoid Valve (Fluoropolymer) (P/N 204-06599-01) and the SWA-2 Sample Waste Unit (206-23820-58) are recommended when strong acids, strong alkalis, or organic solvents are to be measured.

CPS-100 Cell Positioner, Thermoelectrically Temperature Controlled (P/N 206-29500-**)

This attachment permits measurement of up to six sample cells under constant-temperature conditions. Combination of this attachment and the Kinetics mode provides measurement of temperature-sensitive enzyme kinetics of one to six samples.

- Number of cells: 6 on the sample side (temperature-controlled)
  1 on the reference side (temperature not controlled)
- Temperature control range: 16°C to 60°C
- Temperature display accuracy (difference from the true value): ± 0.5°C
- Temperature control precision (variation of temperature): ± 0.1°C
- Ambient temperature: 15°C to 35°C

Note: Square cells (P/N 200-34442) are not included, please purchase separately.
A USB adapter CPS (P/N 206-25234-91) is required.

TCC-100 Thermoelectrically Temperature Controlled Cell Holder (P/N 206-29510-**)

Uses Peltier effect for controlling the sample and reference temperature, so no thermostated bath or cooling water is required.

- Number of cells: One each on the sample and reference sides (temperature-controlled)
- Temperature control range: 7°C to 60°C
- Temperature display accuracy (difference from the true value): ± 0.5°C
- Temperature control precision (variation of temperature): ± 0.1°C

Note: Square cells (P/N 200-34442) are not included, please purchase separately.

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Typical Specifications

UV-1900

UV-VIS Spectrophotometer

The UV-1900 is a double-beam UV-Vis spectrophotometer using Shimadzu's original LO-RAY-LIGH™ diffraction grating technology. In addition to its high optical performance, the UV-1900 features high resolution, low stray light, high reproducibility, and an ultra-fast scan function. It also has an easy-to-use interface on a color touch-screen display. The UV-1900 is designed to meet the needs of both high performance and usability.

Hardware Specifications

Item	Specification
Wavelength range	190 to 1,100 nm
Spectral bandwidth	1 nm (190 to 1,100 nm)
Wavelength display	0.1 nm increments
Wavelength setting	0.1 nm increments (1 nm increments when setting scanning range)
Wavelength accuracy	± 0.05 nm at D2 peak 656.1 nm, ± 0.3 nm for entire range
Wavelength repeatability	± 0.1 nm
Wavelength slew rate	About 14,500 nm/min
Wavelength scanning speed	3,000 to 2 nm/min 29,000 nm/min when survey scanning
Lamp interchange wavelength	Automatic interchange linked to wavelength. The interchange wavelength can be set freely in the range of 295 to 364 nm (0.1 nm increments).
Stray light	Less than 0.02% at 220 nm (NaI) Less than 0.01% at 340 nm ($NaNO_2$) Less than 0.5% at 198 nm (KCl)
Photometric system	Double beam optics
Photometric range	Absorbance: -4 to 4 Abs Transmittance: 0% to 400%
Photometric accuracy	± 0.002 Abs at 0.5 Abs ± 0.0025 Abs at 1.0 Abs ± 0.006 Abs at 2.0 Abs (measured using NIST930D/NIST1930 or equivalent.)
Photometric repeatability	Less than ± 0.0001 Abs at 0.5 Abs Less than ± 0.0001 Abs at 1 Abs Less than ± 0.0005 Abs at 2 Abs

The specifications shown here represent the average performance of the UV-1900. These specifications are typical values, not guaranteed values. The guaranteed specifications are listed in a separate publication.

Item	Specification
Baseline stability	Less than 0.0003 Abs/Hr (700 nm, one hour after light source turned ON)
Baseline flatness	Less than ± 0.0006 Abs (1,100 to 190 nm, one hour after light source turned ON)
Noise level	Less than 0.00003 Abs (700 nm)
Light source	20-W halogen lamp and deuterium lamp Built-in light source auto position adjustment
Monochromator	LO-RAY-LIGH grade blazed holographic grating in Czerny-Turner mounting
Detector	Silicon photodiode
Sample compartment	Internal dimensions: W110 × D250 × H115 mm Distance between light beams: 100 mm
Power requirements	AC100,120,220,230,240 V, 50/60 Hz, 140 VA
Environmental requirements	Temperature: 15°C to 35°C Humidity: 30% to 80% (without condensation; 70% max. at 30°C or higher)
Dimensions	W450 × D501 × H244 mm
Weight	16.6 kg
Output device	USB memory (optional) Data files saved in text format or UVPC format. UVPC-format files can be read directly by UVProbe and LabSolutions™ UV-Vis.
PC compatibility	UVProbe software (standard) LabSolutions UV-Vis software (optional) External control possible via USB.
Display	24-bit color touch screen
Supported languages	Japanese, English, Chinese, Spanish (Mexico), Portuguese (Brazil).

Software Specifications

Measurement mode	Specification
Photometric mode	Single-wavelength measurement 1. Photometric modes: T% or Abs 2. Quantitation using K-factor method 3. Data table storage and recall functions Multiple-wavelength measurement 4. Photometric modes: T% or ABS 5. Measurements at up to eight designated wavelengths (set in 0.1 mm increments) 6. Data calculation at up to four wavelengths (difference or ratio between two wavelengths, calculation between three wavelengths, etc.) is possible.
Spectrum mode	1. Measurement modes: ABS, T%, E 2. Number of repeat scans: 1 to 99 3. Recording system: Selection between single spectrum and data overlay 4. Data storage and recall 5. Data processing: Peak/valley detection, arithmetic operations, differentiation, smoothing, area calculation, point picking, data reading at cursor-specified point
Quantitation mode	1. Measurement methods: 1-wavelength, 2-wavelength, 3-wavelength, and 1st to 4th derivative methods 2. Quantitation methods: Automatic concentration calculation using K-factor Automatic concentration calculation using single-point calibration curve Multi-point calibration curve method (1st to 3rd order regression curves) 3. Measurement parameters: Number of standards (2 to 10) Number of repeat measurements (1 to 10 times) to obtain a mean value for quantitation.
Kinetics mode	1. Measures absorbance changes as a function of time and calculates the enzymatic activity values. 2. Measurement time: 1 to 9,999 sec/min 3. Measurement methods: 1-wavelength, 2-wavelength, multi-cell, and rate measurements
Time scan mode	1. Measures changes in measured values as a function of time. 2. Measurement mode: ABS, T%, E 3. Measurement time: 1 to 9,999 sec/min 4. Data processing functions (same as spectrum mode)

Measurement mode	Specification
Biomethod mode	DNA/Protein Quantitation 1. Calculation of DNA/protein concentration and absorbance ratio DNA concentration = K1 × A1 - K2 × A2 Protein concentration = K3 × A2 - K4 × A1 2. Factors and measurement wavelengths can be set freely. 3. Background correction is possible. Quantitation of proteins 1. Quantitation methods: Lowry method, BCA method, Biuret method, CBB method (Bradford method), UV method
Maintenance	1. Baseline correction 2. Lamp usage time display and reset. 3. Security settings Functions can be restricted according to the user. 4. Instrument validation functions: 1) Compatible with 9 JIS items Wavelength accuracy, wavelength repeatability, resolution, stray light, photometric accuracy, photometric repeatability, baseline flatness, baseline stability, noise level. 2) Semi-automatic validation Validation inspections conducted interactively while inserting and removing inspection jigs. 3) Fully automatic validation Automatic validation inspections from measurement to evaluation and printout. 4) Setting inspection parameters and pass/fail criteria Authority to make changes can be protected by password access. 5) Detailed printout of results. 6) Bulk printout of results. 7) Equipped with method in accordance with Pharmacopeia (JP, USP, EP).
Shared functions	1. Automatic setting of measurement mode after instrument initialization. It's possible to specify standby and parameter files in the parameter setting window for each measurement mode. 2. Selection of displayed number of decimal places Absorbance: 3 or 4 decimal places Transmittance: 1 or 2 decimal places 3. Number of files that can be saved (built-in memory) Measurement parameters: 100 files max. Tabular data: 15 files max. Curve data: 16 files max. Validation condition: 10 files max. Validation result: 3 files max. 4. Setting of integration time (for fixed-wavelength measurement) 5. PC control Spectrophotometer can be controlled by an external PC. This function is also used when performing operation with the standard UVProbe software and the optional LabSolutions UV-Vis software provided. *A USB cable is required.

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