C101-E107B

Access to your success

SHIMADZU

UV-3600

Shimadzu
UV-VIS-NIR Spectrophotometer

High sensitivity, high resolution,
and an ultra-low stray-light level achieved
with the latest technology lead the way to new solutions.
UV-3600

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Shimadzu UV-VIS-NIR Spectrophotometer

High sensitivity, high resolution, and an ultra-low stray-light level achieved with the latest technology lead the way to new solutions.

High Sensitivity

We developed the first UV-VIS-NIR spectrophotometer in the world with three detectors. These consist of a PMT (photomultiplier tube) for the ultraviolet and visible regions and an InGaAs detector and a cooled PbS detector for the near-infrared region. With conventional instruments, there is a drop in sensitivity in the crossover between the regions covered respectively by the PMT and the PbS detector. Using an InGaAs detector to cover this region, however, ensures high sensitivity across the entire measured wavelength range. The 1,500-nm noise level does not rise above 0.00003 Abs, which is the lowest level in the world.

High Resolution, Ultra-Low Stray-Light, and Wide Wavelength Range

Using a high-performance double monochromator makes it possible to attain an ultra-low stray-light level (0.00005% max. at 340 nm) with a high resolution (maximum resolution: 0.1 nm). The wide wavelength range of 185 to 3,300 nm enables measurement over the ultraviolet, visible, and near-infrared regions. This instrument can perform spectrophotometry for a variety of different fields.

Wide Range of Optional Accessories

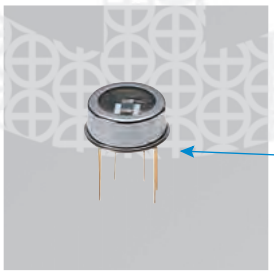
Using a large, multi-purpose sample compartment or an integrating sphere attachment enables the measurement of solid samples, and the ASR-series absolute specular reflectance attachments, for which measurement precision is assured, can be used to perform absolute specular reflectance measurement with a high level of precision. Also, a thermoelectrically temperature controlled cell holder or a microscopic cell holder can be installed and used to handle a wide range of measurement applications.

Contents

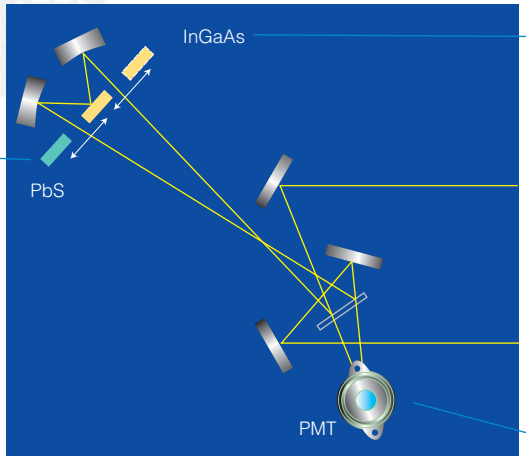
P 04 - Features
P 12 - Option
P 18 - Specifications

High Sensitivity

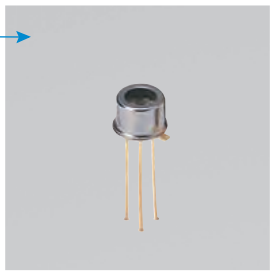
The UV-3600 can handle measurement with highly precise transmittance and reflectance, and uses three detectors to handle a range going from the ultraviolet region to the near-infrared region. The level of sensitivity for the near-infrared region has been increased significantly by using an InGaAs detector and a cooled PbS detector for this region. Spectra can be obtained for the entire range, from the ultraviolet region to the near-infrared region, with a high level of sensitivity and precision.



PbS detector

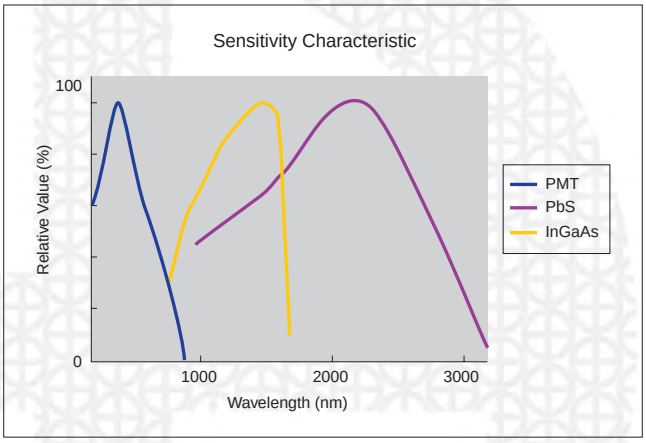


Optical system around detectors



InGaAs detector

PMT detector



Until now, conventional spectrophotometers have used a PMT (photomultiplier tube) for the ultraviolet and visible region and a PbS detector for the near-infrared region. Neither detector, however, is very sensitive near the detector-switchover region. This prevents high sensitivity measurement in this range. The UV-3600 makes it possible to take high-sensitivity measurements in the switchover range by using an InGaAs detector.

Relationship between Detectors and Measurable Range

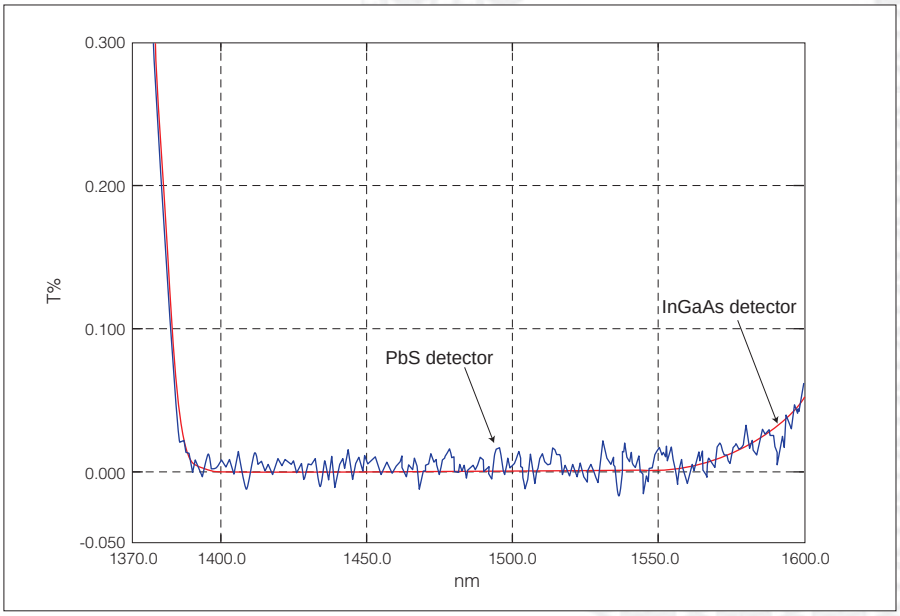
	UV (165nm–380nm)	Visible (380nm–780nm)	NIR (780nm–3300nm)
PMT	165~1000nm		
InGaAs		700~1800nm	
PbS			1600~3300nm

Switching between the photomultiplier tube and the InGaAs detector is possible in the range 700 to 1,000 nm (the default switchover wavelength is 830 nm).
Switching between the InGaAs detector and the PbS detector is possible in the range 1,600 to 1,800 nm (the default switchover wavelength is 1,650 nm).

Comparison between Two-Detectors and Three-Detectors Measurements

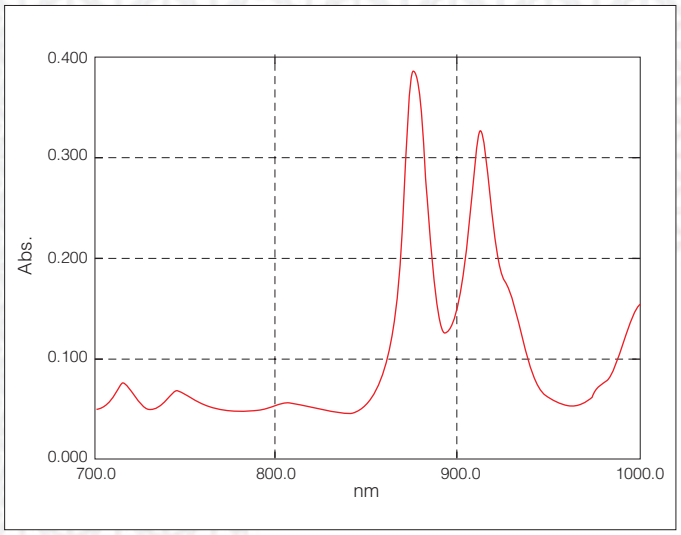
With the UV-3600, an InGaAs detector is used in addition to a PMT (photomultiplier tube) and a cooled PbS detector. In comparison with a conventional two-detector instrument (i.e., equipped with only a PMT and a PbS detector), the noise level in the InGaAs detector range (900 to 1,600 nm) is significantly reduced.

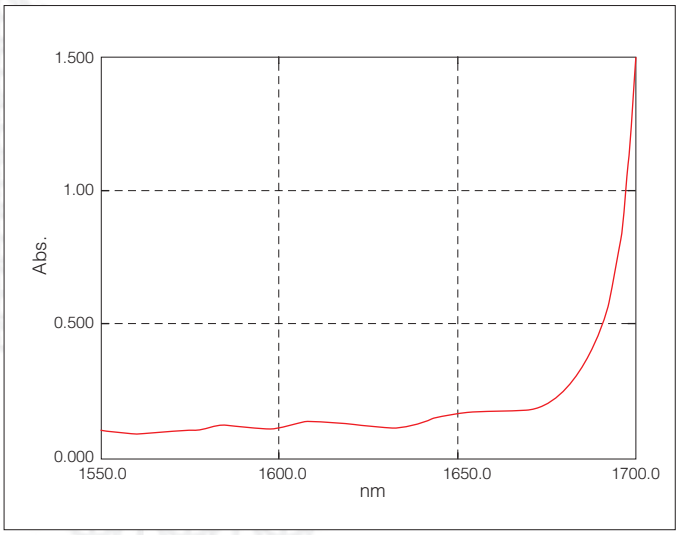
The figure on the right shows transmittance spectra for water measured with the UV-3600 (InGaAs detector and cooled PbS detector) and a conventional instrument (PbS detector) in the range 1,370 to 1,600 nm. It can be seen that the noise level is significantly less with the UV-3600. (A mesh filter is used on the reference-beam side to maintain balance with the sample-beam side.)



High-Accuracy Measurement with Minimized Detector Switchover Noise and Bump

Noise and bump caused by switching detectors is minimized to assure accurate measurement. Noise or bump is hardly observed even when using a transmission cell with a long optical path of 50 or 100 mm.



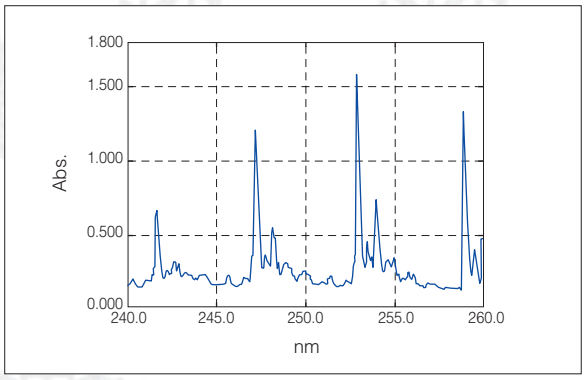


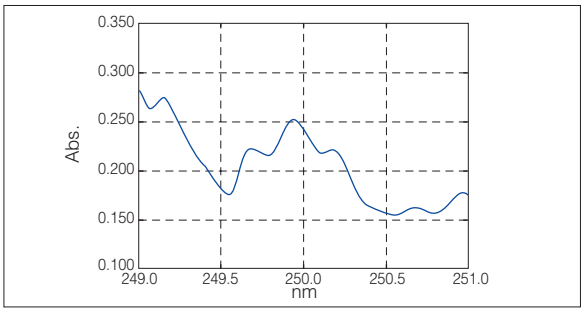
The figures above on the left and right are, respectively, transmittance spectra for ethylbenzene (obtained using a cell with an optical path of 100 mm) and cyclohexane (obtained using a cell with an optical path of 10 mm). There is hardly any level difference at the respective detector changeover wavelengths (870 and 1,650 nm).

High Resolution, Low Stray-Light

The UV-3600 is equipped with a high-performance, grating-grating double monochromator, and achieves a low stray-light level with high resolution. The wavelength range is

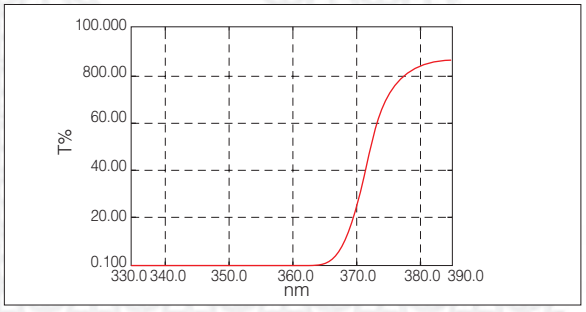
High-Resolution Spectra of Benzene Gas

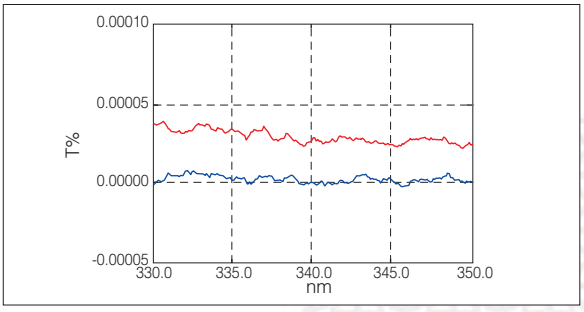




The spectrum shown on the left was obtained by enclosing benzene gas in a cell with an optical-path length of 10 mm and performing measurement. The spectral bandwidth is 0.1 nm. The triplet in the neighborhood of 250 nm (enlarged above) can be observed clearly. This instrument allows high-resolution spectra to be measured with little noise.

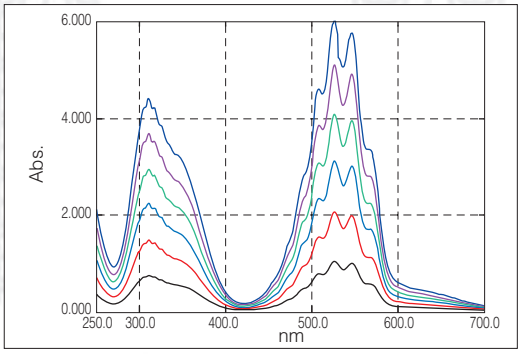
Ultra-Low Stray-Light Level of 0.00005% Max.(340nm)

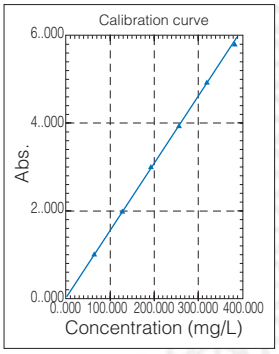




The figure above on the left is a spectrum for aqueous NaNO2 solution, and the figure on the right shows an enlarged view of the neighborhood of 340 nm. In the figure on the right, the red spectrum is for aqueous NaNO2 solution and the blue spectrum is the 0% line obtained when a shutter block is inserted on the sample-beam side. The UV-3600 achieves an ultra-low stray-light level of less than 0.00005% at 340 nm. (A mesh filter is used on the reference-beam side to maintain balance with the sample-beam side.)

Linearity Up To Absorbance Level 6





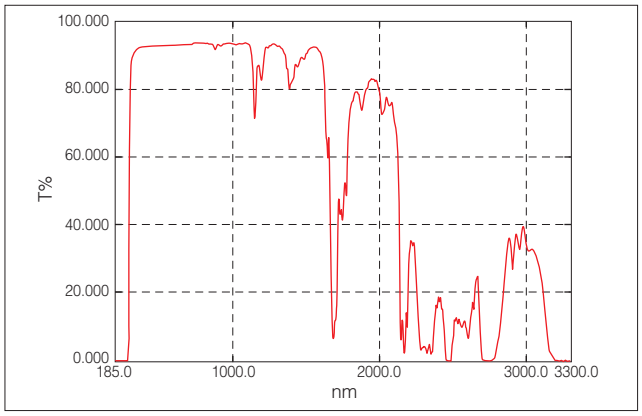
The figure on the far left shows spectra obtained by measuring aqueous $KMnO_4$ solution at six concentration levels. A mesh filter was inserted on the reference-beam side and a differential method was used to perform measurement up to absorbance level 6. Using negative absorbance enables measurement with little noise, even at high absorbance levels. The figure on the near left shows the calibration curve for aqueous $KMnO_4$ solution, and shows that linearity is maintained up to absorbance level 6.

Level, and Wide Wavelength Range

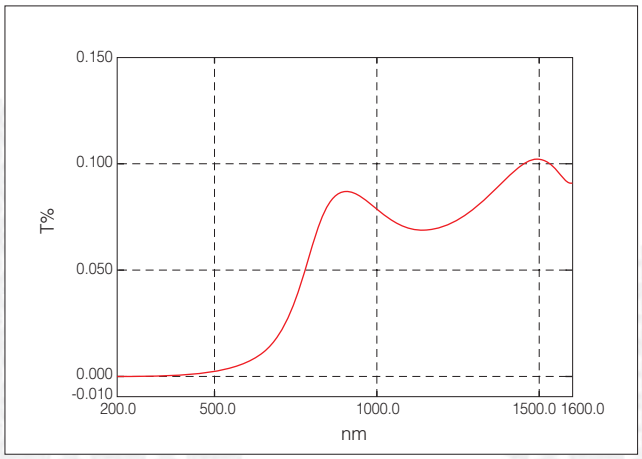
185 to 3,300 nm. This instrument can perform spectrometry for various types of sample, ranging from samples requiring a high resolution, such as gas, to high-concentration liquid samples.

Covers Wide Wavelength Range from Ultraviolet to Near-Infrared

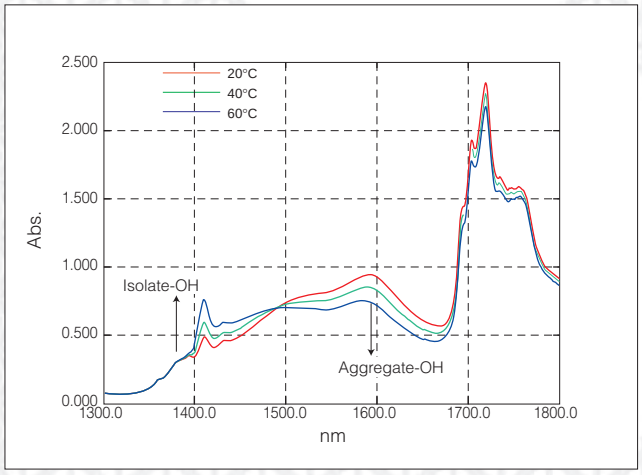
The wide wavelength range of 185 to 3,300 nm enables measurement over the ultraviolet, visible, and near-infrared regions. Spectra exhibiting little noise can also be obtained over a wide range of wavelengths.



The figure on the left shows a spectrum obtained by measuring toluene in the range 185 to 3,300 nm using a cell with an optical-path length of 2 mm. Spectra in the ultraviolet, visible, and near-infrared regions can be obtained.



The figure on the left shows the spectrum for a low-transmittance film on a silica wafer in the range 200 to 1,600 nm. Although the film is a special type of film with a transmittance of almost zero, it has been measured with high precision and little noise. (A mesh filter is used on the reference-beam side to maintain balance with the sample-beam side.)



Molecules of alcohol such as 1-butanol are thought to consist of a mixture of non-hydrogen-bonded isolates and aggregates formed through relatively weak hydrogen-bonding between OH groups.
As the temperature rises, the hydrogen-bonding becomes weaker and the aggregates separate into isolates.
The figure on the left shows near-infrared spectra for 1-butanol obtained at 20°C, 40°C, and 60°C. The peaks in the neighborhood of 1,400 nm that become larger as the temperature increases are OH peaks for a non-hydrogen-bonded isolate. The peaks in the neighborhood of 1,600 nm that become smaller as the temperature increases are OH peaks for a hydrogen-bonded aggregate.

UVProbe

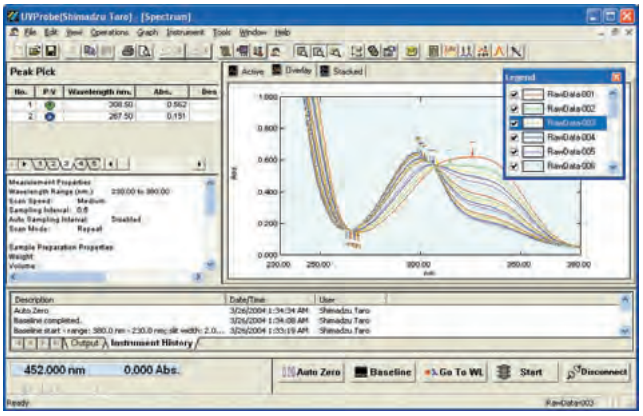
All-in-one Software

UVProbe is an all-in-one software package used to control the UV-3600 and incorporates the following four functions:

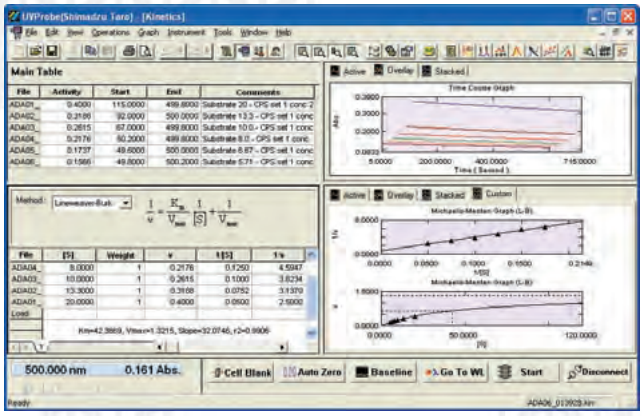
- Spectrum
- Photometric (Quantitation)
- Kinetics
- Report Generator

Each function can be easily operated with its dedicated screen. Included as standard are a wide variety of data processing such as peak/valley detection, area calculation, and others. Security features by which each user is limited to the use of specific functions, and an audit trail for the instrument and the data are all standard as well.

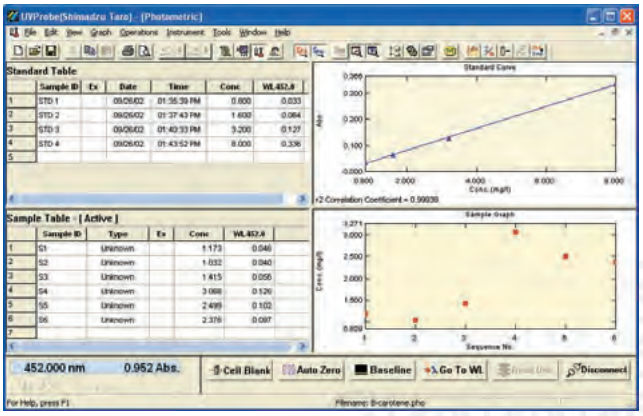
Spectrum



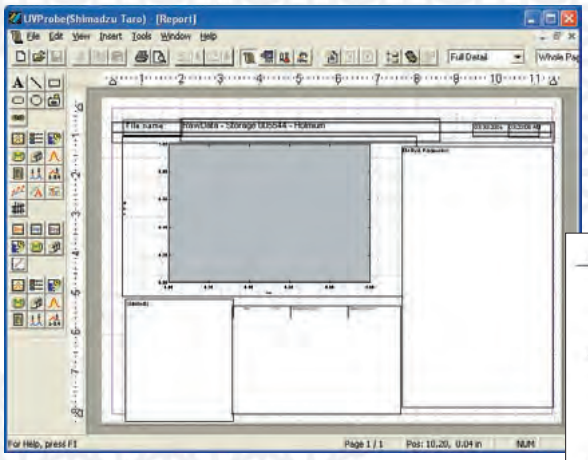
Kinetics



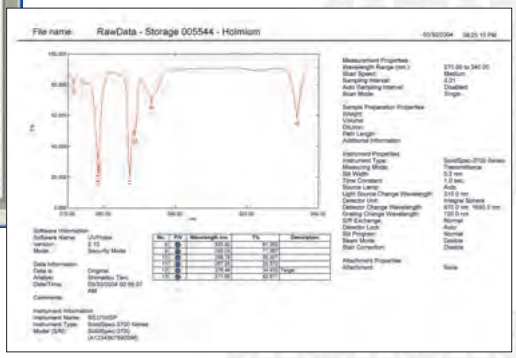
Photometric



Report Generator

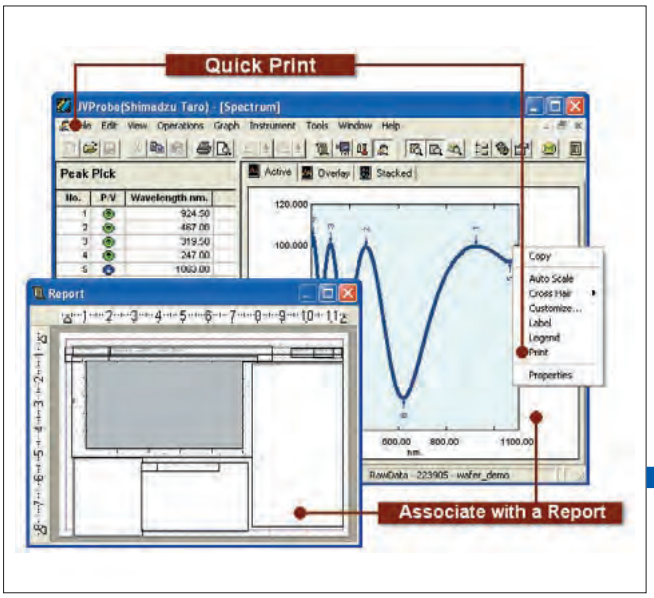


The report generator gives you the freedom to arrange graphs, tables, etc. to suit your needs. The thickness and color of graph lines, as well as font size can be specified. Pasting labels on graphs and editing text is as easy as can be, allowing you to effectively print comments along with the analysis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



Quick Print

Quick Print allows you to print data directly from the Spectrum, the Kinetics and the Photometric modules without moving to the Report Generator. Once the report template is stored as the report file, the report can be printed simply by utilizing the 4th step, without steps 1~3.

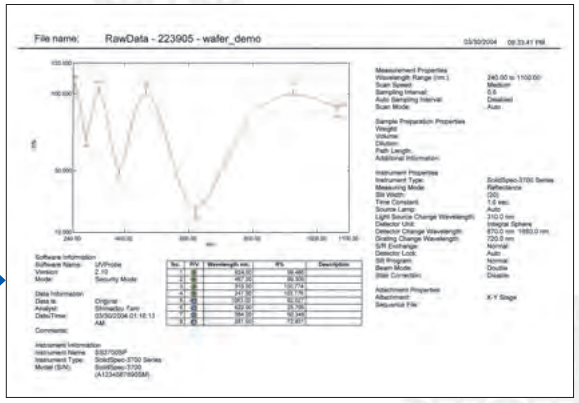


Step 1 – Make the report template

Step 2 – Assign the data to the report template

Step 3 – Check the report to be printed

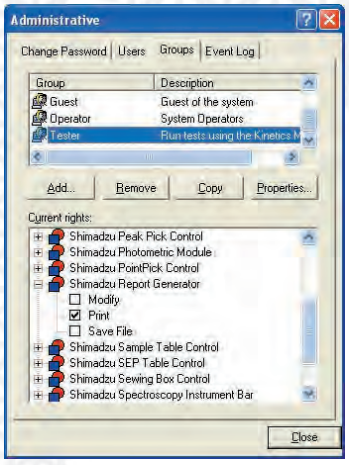
Step 4 – Print the report by Quick Print



Reliability and Management of Data

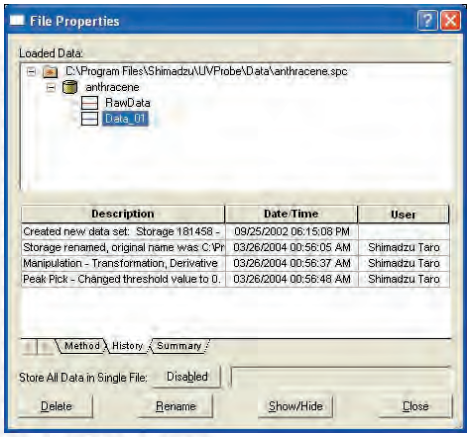
As represented by ISO9001, recently the reliability and management of data have been increasingly required. UVProbe has security functions in which operations are limited for the individual user, the data audit trail function and the instrument audit trail function. This ensures the reliability of data.

Security



UVProbe enables software operations to be limited for the individual user. User management can be done for user groups as well.

Audit Trail

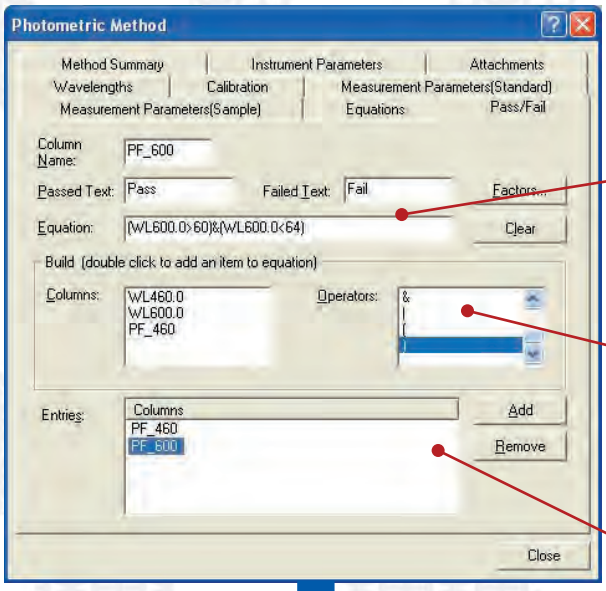


For example, when data processing is performed, the resultant data is stored together in the same file with the original data, which remains intact. The audit trail function tracks the instrument's history.

UVProbe

Pass or Fail Judgement Functions

Formulas to judge pass/fail for measurement results within the Measurement Method in the Photometric Module can be created. Once the formula for the measurement values or the calculation results is created, the judgments are shown in the sample table. Complicated formulas with multiple wavelengths are also available.



Creation of Formula

Formulas for measurement result values or calculation results can be created. For example, this formula expresses that if the transmittance at 600nm (WL600.0) is higher than 60% and less than 64%, the Pass criteria is met. If not, a result of Fail is given.

Operators

The operators which can be used in the formula are given here.

Stored Formulas

The stored formulas are shown here. Multiple formulas can be stored. Here, the above formula is registered under the name of "WL600_evaluation." A column for this formula is created in the sample table, where the evaluation results are displayed.

Measurement

Sample Table - [Active]

	Sample ID	Type	Ex	WL460.0	WL600.0	PF_460	PF_600	Result	Comm
1	Filter_1	Unknown		57.669	62.621	Pass	Pass	Pass	
2	Filter_2	Unknown		56.184	61.475	Fail	Pass	Fail	
3	Filter_3	Unknown		59.351	64.758	Pass	Fail	Fail	
4	Filter_4	Unknown		60.579	65.907	Fail	Fail	Fail	
5	Filter_5	Unknown		57.100	62.468	Pass	Pass	Pass	
6	Filter_6	Unknown		58.841	63.947	Pass			
7	Filter_7	Unknown		57.901	63.139	Pass			
8	Filter_8	Unknown		56.076	61.423	Fail			
9									

The judgments given by the formula are shown with the measurement values.

Performs logical operation to determine if a sample is within a specified range or above or below a specified value.
Formula: (WL600.0>60)&(WL600.0<64)

A brief explanation for the column can be shown.

Open/Save for Measurement methods

UVProbe can open and save all of the created measurement methods as individual files. Once the measurement method, which also includes the formula is saved, measurements under the same conditions can be repeated at any time.

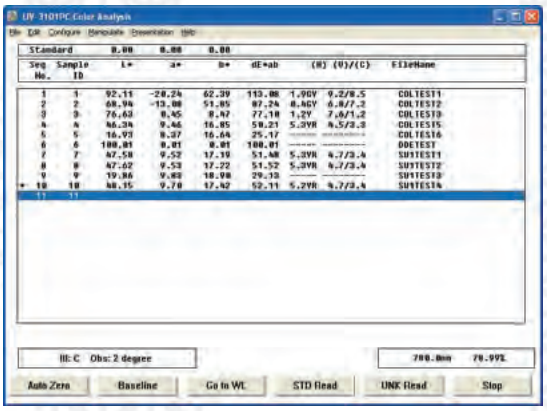
Optional Software

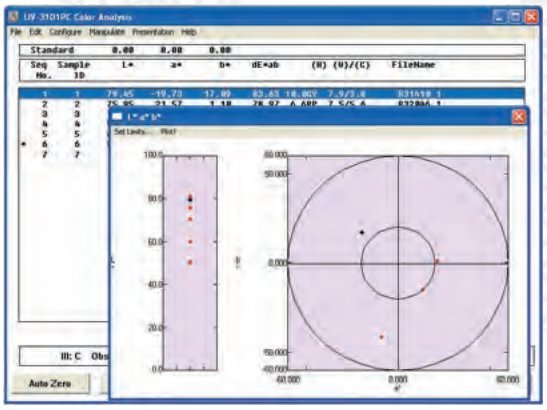
Color Measurement Software (P/N 206-67449)

This software calculates color indices from the spectra given by the spectrophotometer.

- Presents indices of XYZ, Lab(Hunter), L*a*b*, L*u*v*, Munsell, whiteness, yellowness, metamerism, and many others.
- Recalculates any results with different parameters and conditions.
- Chromaticity diagram and magnifild color difference diagram may be graphically displayed.
- Permits computation using user-defined illuminants, besides the standard ones. The user-defined illuminants may be stored as files to be recalled at any time.
- Correction using the standard white plate ensures high accuracy in color computation. The set standard values may be stored as files to be recalled at any time.
- Calculates color differences using the arbitrarily selected standard samples.
- Available convenient functions include thickness correction, smooting, averaging, and standard deviation calculation.
- Up to 100 data may be displayed together.

Note) This software runs on Windows 2000/XP.





Film Thickness Measurement Software (P/N 206-66877)

This software provieds calculation of film thickness from the peak positions of the interference patten.

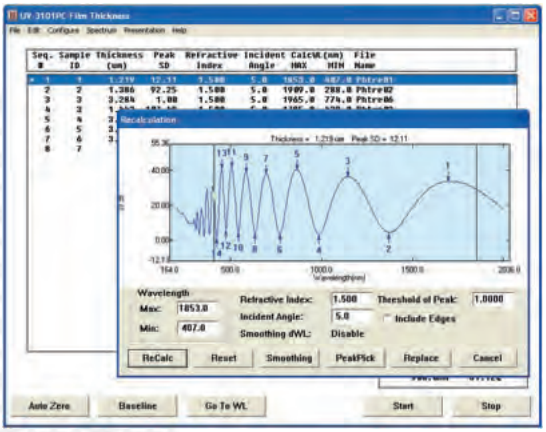
- Measurable thickness range is expressde by the next equation, though it is somewhat differs with the type of samples

$$\frac{\lambda e}{n} > d > \frac{50\lambda s}{n}$$

λe : Shortest measured wavelength
λs : Longest measured wavelength
n : Refractive index of sample

- Automatically detects valleys and peaks of interference spectrum.
- Calculates film thickness from the wavelengths of all the peaks and valleys within the specified wavelength range.
- Wavelength range may be selected watching the interference pattern.

Note) This software runs on Windows 2000/XP.

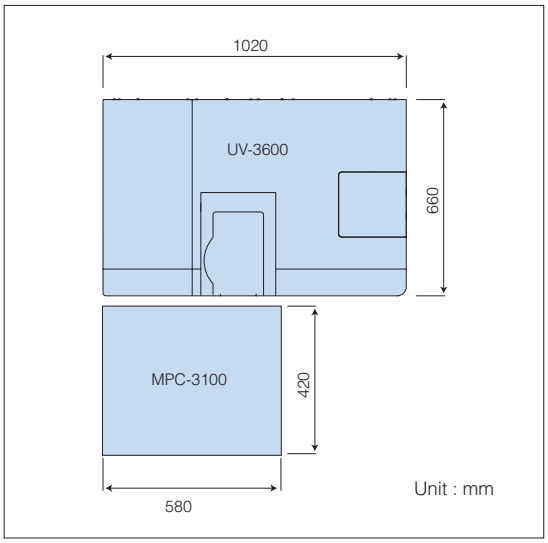


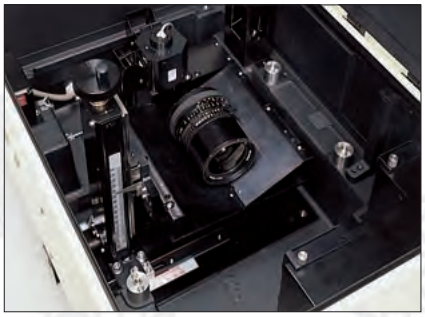
Accessories

MPC-3100 Multi-Purpose Large-Sample Compartment (P/N 206-23831-91)

This multi-purpose sample compartment allows measurement of various shaped samples to obtain both reflection and transmission spectra. An integrating sphere is built-in to ensure accurate measurement of solid samples.

- Wide wavelength range : 240 ~ 2600 nm
- Maximum sample size : Transmission 305 mm dia. ~50 mm thick or 204 mm dia. ~300 mm long
  Reflection 305 mm dia. ~50 mm thick
- Original S-beam/R-beam switching function allows reflection measurement using incidence angles of 0 deg. and 8 deg. without leaning the sample.
- The V stage is built-in. The sample position can be freely adjusted both forward and backward as well as up and down.



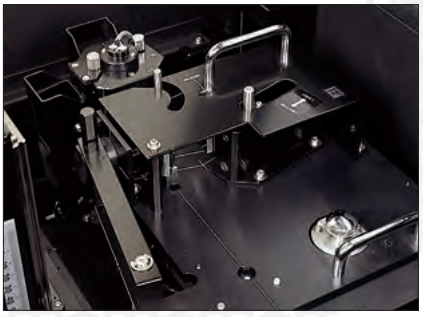


Zoom lens set inside the MPC-3100

Note 1) A separate space must be provided for the personal computer.
Note 2) A small table for the MPC-3100 must be provided separate from that for the UV-3600.
Table dimensions: Able to accommodate MPC-3100 unit (580W x 420D mm)
Table height: Within +8 ~ -15 mm of the UV-3600 table height

BIS-3100 Sample Base Plate Integrating Sphere Set (P/N 206-17059) (Accessory for MPC-3100)

This is used to install an absolute specular reflectance attachment to the MPC-3100.



ASR-3112 attached on the BIS-3100

Large Polarizer Set, Polarizer Type Ⅰ, Type Ⅱ, Type Ⅲ, Polarizer Adaptor Set (Accessory for MPC-3100)

Polarizers are needed to obtain highly precise absolute reflectance at large incident angles without effecting the polarization characteristics. The Polarizer Adaptor set (Cat. No. 206-15693) is required for the Polarizer Type Ⅰ, Type Ⅱ and Type Ⅲ.

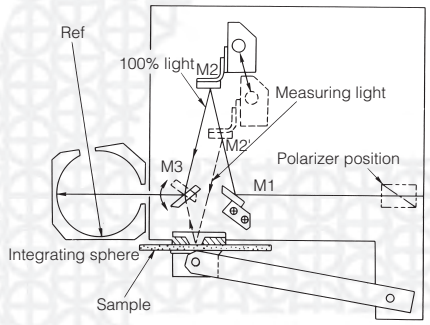
	Cat. No.	Effective Diameter	Wavelength Range
Large Polarizer Set	206-15694	20mm	250~2500nm
Polarizer Type Ⅰ	206-13236-01	18mm	400~800nm
Polarizer Type Ⅱ	206-13236-02	17mm	260~700nm
Polarizer Type Ⅲ	206-13163	11mm	260~2500nm

Absolute Specular Reflectance Attachments

ASR-3105 Absolute Specular Reflectance Attachment, 5 degrees (P/N 206-16817)
ASR-3112 Absolute Specular Reflectance Attachment, 12 degrees (P/N 206-16100)
ASR-3130 Absolute Specular Reflectance Attachment, 30 degrees (P/N 206-15001)
ASR-3145 Absolute Specular Reflectance Attachment, 45 degrees (P/N 206-15002)

These attachments are used for the measurements of solid samples such as mirrors etc, and require the BIS-3100 (206-17059). Since the polarization characteristics are more pronounced at higher angles of incidence (30 or 45 degrees), the optional Polarizer attachment is required to obtain accurate reflectance measurements.

- V-N method : Optical path is easily switched between 100% measurement setting and sample measurement.
- Approximate sample size : 25 to 200 mm dia, or 20 to 150 mm square, up to 30 mm thick.



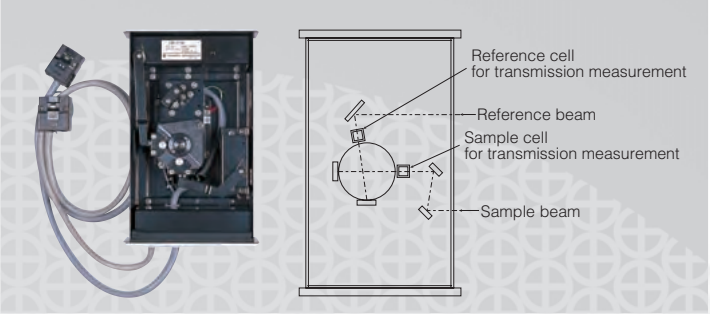
Structure of Absolute Specular Reflectance Attachment

Wavelength Range	5 degrees	: 300~2400nm
	12 degrees	: 300~2500nm
	30 and 45 degrees	: 300~2300nm

ISR-3100 Integrating Sphere Attachment, 60 mm dia. (P/N 206-23851-91)

This attachment is used for measurement of diffuse/specular reflectance and measurement of transmission of liquid or solid sample.

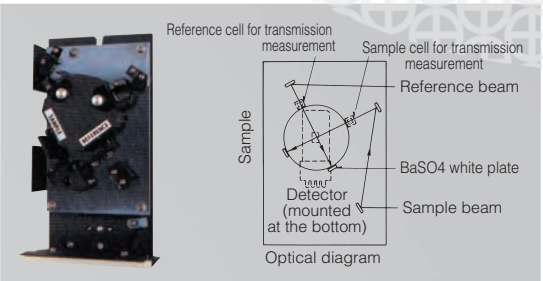
- Wavelength range: 220 ~ 2600 nm
- Integrating sphere: 60 mm in inner diameter, equipped with a photomultiplier and a PbS cell.
- Maximum size of reflection sample: About 100 mm dia.x15 mm thick
- Incident angle: 0 deg. / 8 deg.



ISR-240A Integrating Sphere Attachment, 60 mm dia. (P/N206-23860-91)

This attachment is used for measurement of diffuse, total and reflectance and measurement of transmission of liquid or solid sample.

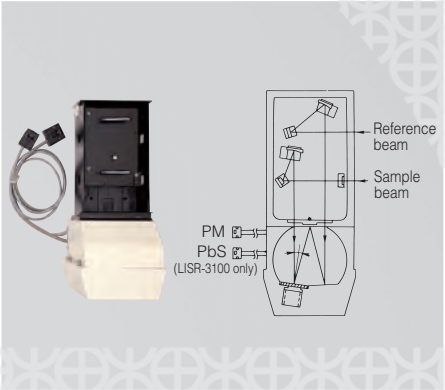
- Wavelength range: 240 ~ 800 nm
- Integrating sphere: 60 mm in inner diameter, equipped with a photomultiplier.
- Maximum size of reflection sample: 40 x70 mm wide, 10 mm thick or 70 x 70 mm wide, 5 mm thick.
- Incident angle: 0 deg.



LISR-3100 Integrating Sphere Attachment, 150 mm dia. (P/N 206-23862-92)
LISR-2100 Integrating Sphere Attachment, 150 mm dia. (P/N 206-23862-91)

This attachment is used for measuring reflection spectra of solid samples, such as powders, papers, and cloth. This is also used for transmission measurement of solution and solid samples, featuring high stability, excluding the influence of the state of the sample surface. The accessory is ideally suited for color measurement.

- Wavelength range:
  LISR-3100 240 ~ 2400 nm
  LISR-2100 240 ~ 800 nm
- Integrating sphere:
  LISR-3100 150 mm in inner diameter, equipped with a photo-multiplier and a PbS cell.
  LISR-2100 150 mm in inner diameter, equipped with a photo-multiplier.
- Space to mount reflection sample: About 150W x 170H x 30T mm
- Incident angle: 7 deg.



Specular Reflectance Attachment (5 deg. incident angle) (P/N206-14046)

The technique of specular reflectance is often applied to the examination of semiconductors, optical materials, multiple layers, etc. The 5 deg. Incident angle minimizes

- Samples as large as 160W x 140H x 10T mm can be readily measured.

Accessories

CPS-240A Cell Positioner,Thermoelectrically Temperature Controlled (P/N 206-23760-∗∗)

1) Supports time course monitoring of up to 6 samples
The multicell holder or the single cell holder have no temperature control capability. This option permits measurement of up to six samples under constant temperature conditions.

2) Supports enzyme activity assay
Combination with the appropriate Kinetics Program Pack or software, permits measurement of enzyme kinetics for up to six samples under constant temperature conditions.

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

Note) Cells are not included in the standard contents.

TCC-240A Thermoelectrically Temperature Controlled Cell Holder (P/N 206-23780-∗∗)

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 range : 7 to 60°C
- Temperature display accuracy (difference from the true value): ±0.5°C
- Temperature control precision (variation of temperature): ±0.1°C

Note) Cells are not included in the standard contents.

S-1700 Thermoelectric Single Cell Holder (P/N 206-23900-∗∗)

This cell holder permits setting of a temperature program to increase and decrease the sample cell temperature.

- The thermoelectric system allows prompt control of sample temperature between 0°C and 110°C.
- Temperature increase/decrease speed can be changed using 12 settings, which means the holder can be used in analysis of melting curves for nucleic acids, etc., that occur during quick as well as slow heating (or cooling).
- A stirrer also is provided to ensure uniform temperature distribution throughout the cell.
- A cooling water circulation is required for Peltier element cooling. And though tap water can be used, it is recommended that a commercially available constant-temperature water circulator be used, as the following conditions must be fulfilled to exact maximum performance from the S-1700
  · Cooling water specification: 20±2°C
  · Water flow: 4.8L / min or more
- Temperature is not controlled at the reference side.
- Cells are not supplied. Please use 10mm square tight-sealing cells (a Hellma product).

Type	Optical Path	Minimum Sample Volume Required
110-QS-10	10mm	3.5mL
115B-QS-10	10mm	400µL

- Temperature accuracy in cell (when room temperature is 25°C)
  · Within ±25°C (0 to 25°C)
  · Within ±1%°C of set value (25 to 75°C)
  · Within ±2%°C of set value (75 to 110°C)

Sipper Unit 160L (Standard Sipper) (P/N 206-23790-91)
Sipper Unit 160T (Triple Pass Sipper) (P/N 206-23790-92)
Sipper Unit 160C (Constant Temperature Sipper) (P/N 206-23790-93)
Sipper Unit 160U (Supermicro Sipper) (P/N 206-23790-94)

The four sippers listed above are available, depending on the flow cell shape. A peristaltic pump driven by a stepping motor ensures reliable and smooth aspiration of sample solution. Direct drive is possible from the UV, so no interface is required.

Syringe Sipper N (P/N 206-23890-91)
Constant-temperature type. Flow-thru cell sold separately. (Select from the recommended flow-thru cells given below.)

Syringe Sipper CN (P/N 206-23890-92)
Constant-temperature water-circulation type. Flow-thru cell sold separately. (Select from the recommended flow-thru cells given below.)

These sipper units are characterized by a syringe-pump operating mechanism. The wetted parts are made up of Teflon, glass, and silica, giving these units superior chemical resistance and maintainability, and they can be used for the measurement of almost all types of sample. They also achieve suction-volume reproducibility (repeat accuracy: ± 0.03 mL) with an extremely high level of quantitivity, making them ideal for performance validation.

- The flow-thru cell can be selected in accordance with the application.
- The flow cell can be changed independently for excellent ease of maintenance.
- Excellent chemical resistance allows measurement of almost any sample.
- The level of suction-volume quantitivity is extremely high.

Model	Cat. No.	Remarks
Syringe Sipper N	206-23890-91	Constant-temperature type. Flow-thru cell sold separately. (Select from the recommended flow-thru cells given below.)
Syringe Sipper CN	206-23890-92	Constant-temperature water-circulation type. Flow-thru cell sold separately. (Select from the recommended flow-thru cells given below.)

Cell type	Cat. No.	Optical path length	Dimensions of aperture	Standard required sample volume
Square (Ultra-micro)	208-92114	10 mm	ø2mm	0.9mL
Square (micro)	208-92113	10 mm	ø3mm	1.0mL
Square (Semi-micro)	208-92005	10 mm	11(H) x 3.5(W)mm	5.0mL

ASC-5 Auto Sample Changer (P/N 206-23810-∗∗)

This attachment is combined with a sipper unit to build up an automated multisample spectrophotometry system.

- The aspirating nozzle is programmed to move in the X, Y and Z (vertical) directions by the built-in “TEACHING MODE”.
- Up to 8 sets of parameters such as the size of sample racks and the number of test tubes can be stored in the backup memory.
- Direct control from a personal computer connected to the system is also possible.
- Accepts 1 to 100 test tubes.

Film Holder (P/N 204-58909)

This holder is used to measure thin samples such as films.

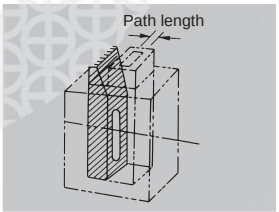
- Applicable sample size: Minimum 16W x 32H (mm)
  Maximum 80W x 40H x 20t (mm)

Accessories

Spacer for Short-Path Cell (P/N 204-21473-∗∗)

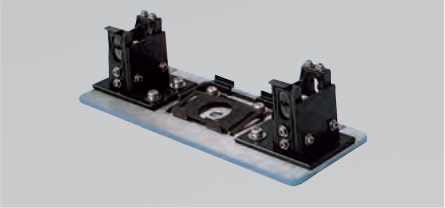
- Sample too dense to be measured with a standard 10 mm path cell can measured reliably without dilution by means of a short-path cell.
- Spacers are available for three types of cells corresponding to path length of 1, 2 or 5 mm. As shown in the figure, the spacer is sandwiched between the cell and the inner wall of the square cell holder.

Cat. No. (Spacer)	Path length of cell
204-21473-03	1 mm
204-21473-01	2 mm
204-21473-02	5 mm



Spacer for Short-Path Cell (P/N 206-14334)

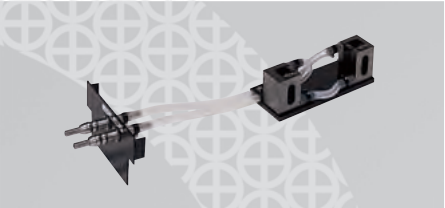
- Holds supermicro cells for measurement of extremely small samples.
- The cell height is adjustable and the sample volume required is variable from 50µL to 200µL, depending on the type of black cell used.
- Applicable cell: ⑦ , ⑦' and ⑧ in the list of cells on the back cover.
- Mask: Choice of 1.5W x 1H mm and 1.5W x 3H mm



Constant-Temperature Cell Holder (P/N 202-30858-04)

This holder keeps the sample and reference cells at a desired, uniform temperature by circulating constant-temperature water.

- Temperature range: 5 to 90°C (Temperature range is restricted by the temperature controller used.)
- Cell holder: Accepts 10 mm rectangular cells (2 pieces as a pair)

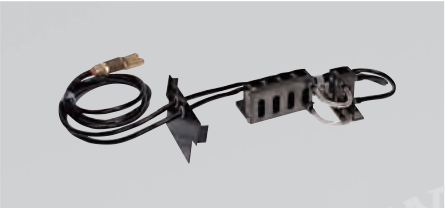


Constant-Temperature Four Cell Holder (P/N 204-27206-02)

Maintains four sample cells and a reference cell at a desired, uniform temperature by circulating constant-temperature water.

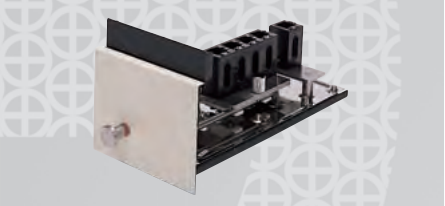
- Temperature range: 5 to 90°C

*A Four-Cell Sample Compartment Unit (Cat. No. 206-23670-91) is required.



Four-Cell Sample Compartment Unit (P/N 206-23670-91)

Accommodates a four cell holder of cylindrical, rectangular, and other types of cells. Incorporates a four cell holder for 10 mm square cells.



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

This holder accepts a pair of rectangular cells having an optical path of 10, 20, 30, 50, 70, or 100 mm.

Universal Rectangular Cell Holder, Four-Cell Type (P/N 204-27208)

This holder accepts four rectangular cells having an optical path of 10, 20, 30, 50, 70, or 100 mm.
A Four-Cell Sample Compartment Unit (Cat. No. 206-23670-91) is required. If a reference cell is desired, the Rectangular Cell Holder (Cat. No. 204-28720) should also be used.

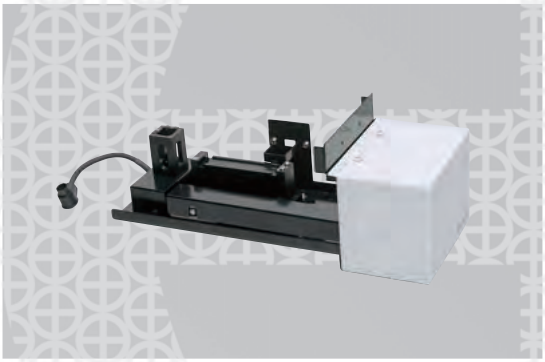
Cylindrical Cell Holder (P/N 204-06216-02)

Holds two cylindrical cells, 10, 20, 50, or 100 mm in path length.

8/16 Series Micro Multi-Cell

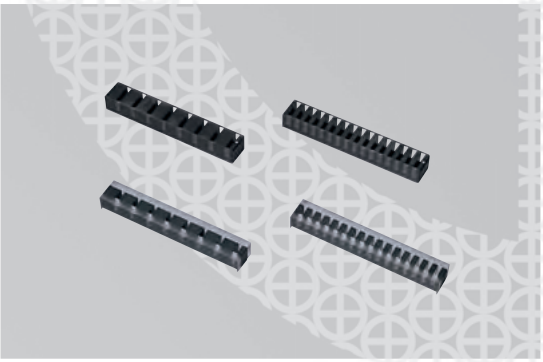
Cell Holder

Model	Cat. No.
8/16 Series Micro Multi-Cell Holder MMC-1600	206-23680-91
8/16 Series Constant Temperature Micro Multi-Cell Holder MMC-1600C	206-23690-91



This cell holder holds one micro multi-cell, either 8 or 16 cell, for micro volume measurement. Two types of micro multi-cell holders are available, the standard type MMC-1600 and the constant temperature water circulation type MMC-1600C.

Model	Cat. No.
8 Series Micro Multi-Cell; optical path length 10 mm, cell volume 100µL	208-92089
16 Series Micro Multi-Cell; optical path length 10 mm, cell volume 100µL	208-92088
8 Series Micro Multi-Cell; optical path length 5 mm, cell volume 50µL	208-92086
16 Series Micro Multi-Cell; optical path length 5 mm, cell volume 50µL	208-92085

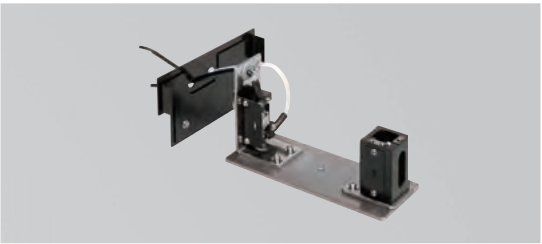


These are two types of micro multi-cells available in both the 8 Series and the 16 Series models, a 50µL type and a 100µL type. The cell intervals of the 8 Series Micro Multi-Cell are applicable for use with 8 x 12 well microplates and 8 channel pipettes. Microplate samples aspirated into multi channel pipettes can be injected directly into the cells for measurement.

- Micro volume samples can be measured.
  Minimum sample volume: 50µL or 100µL, respectively
- Support for commercial microplates and micro pipettes (with 8 Series micro cell).
- Up to 16 samples can be measured at a time (with 16 Series micro cell).

10 mm Micro Flow-thru Cell with Holder (P/N 204-06222)
5 mm Micro Flow-thru Cell with Holder (P/N 204-06222-01)

Model	Optical path length	Volume
10 mm Micro Flow-thru Cell	10 mm	0.3 mL
5 mm Micro Flow-thru Cell	5 mm	0.15 mL



NTT-2200P Constant-Temperature Water Circulator (P/N 208-97263)

Circulates temperature controlled water to a constant-temperature cell holder.

- Temperature range: Ambient + 5°C to + 80°C
- Temperature control precision: ± 0.05°C~
- Max. pumping rate: 27/31 L/min., 9.5/13 m (50/60 Hz)
- External circulation nozzle: 10.5 mm OD (both outlet and return)
- Tank capacity: About 10 L (9 L during use)
- Safety feature: Detection of over-temperature of upper or lower limits, Detection of heater wire malfunction, Protection of heating too few circulating water, Detection of sensor malfunction, Independent over teat protection,Over current circuit protector
- Standard accessories: Lid with handles, Rubber hose (4 m), Hose clamps (4pc.), Instruction manual
- Dimensions: 270W x 560H x 400D (mm)
- Power requirements: 100 VAC, 1250 VA, with 1.7 m power cord and grounded plug

Specifications

Software

Data Acquisition Modes	Spectrum, Kinetics and Photometric
General	Multitasking (Possible to execute data processing while measurement is being executed.)
	Customizable measurement screen layout (wavelengths, data display font and font size, colors, displayed number of rows)
	GLP/GMP compliant (security, history), Real time concentration display
Spectrum Mode	Comparison of multiple spectra/relative processing(note)
	Save all processed data with original data set including a history of all manipulations)
	Spectrum enlargement/shrinking, auto scale and Undo/Redo of these operations. Annotation on spectrum screen.
Data Processing in Spectrum Mode	Normalization, Point pick, Peak/Valley detection, Area calculation, Transformation: 1st-4th derivatives, Smoothing, Reciprocal,
	Square root, Natural log, Logarithm power, Abs to %T conversion, Exponential conversion, Kubelka-Munk conversion,
Photometric (Quantitation) Mode	Ensemble averaging, Interpolation, data set and constants arithmetic (between spectra, between spectra and constants)
	Single wavelength, Multi wavelength (includes 1, 2 or 3 wavelengths), Spectrum quantitation (peak, maximum
	minimum, area, etc. for specified wavelength ranges)
	Multi-point, Single point, K-factor calibration curces (1st, 2nd, 3rd order function fits, pass-through-zero specification)
	Photometric processing with user-defined functions (+, -, x, /, Log, Exp, etc. functions, including factors)
	Weight correction, Dilution factor correction and other corrections using factors
	Averaging of repeat measurement data, Simultaneous display of standard table, unknown table and calibration curves, Display of Pass/Fail indications
Kinetics (Time Course) Mode	Comparison/relative data processing of multiple time course data (note)
	Single or double wavelength measurement (difference or ratio)
	Unitary management of sample information includeing original data, sample weight and dilution factors, etc.
	Time course spectrum data processing (same as in data processing)
	Preview and print function for customized formats, Layout and editing of templates, Quick printing using report template
Report Generator	Multi-page printout support. Insert data, time, text and drawing objects including lines, circles and rectangles
	Insert spectrum and quantitation data, method and history
	Headers and footers easily inserted, Specify graph line thickness (as in all modulules), font style and size

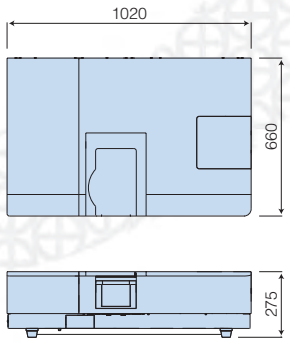
Note) A PC (and a power supply for the PC) is required separately.

PC Requirements

Type	Desktop and Notebook
Operating System	Windows XP Professional
CPU	Celeron 250GHz
Video	SVGA video monitor, 1024 x 768 dot screen resolution
RAM	128MB and more
HDD	40MB and more for free space

Even with the above configuration, UVProbe operating performance cannot be guaranteed, depending on Windows settings, hardware state, etc.
Use Shimadzu recommended equipment, if possible.

Dimensions



Unit : mm

Space for installing the PC and printer is also required.

Hardware

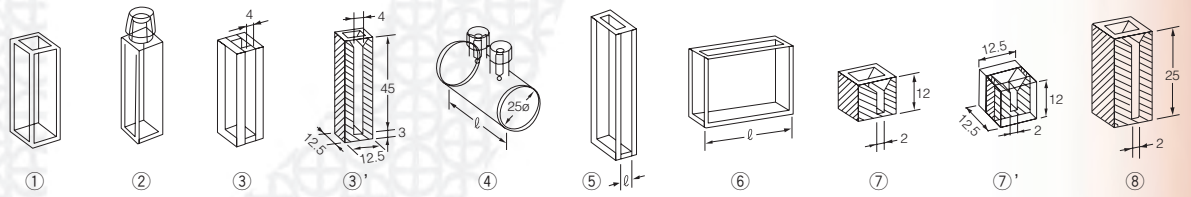
Wavelength range	185 to 3,300 nm	
Spectral bandwidth	8 steps in ultraviolet and visible regions: 0.1, 0.2, 0.5, 1, 2, 3, 5, 8 nm	
	10 steps in near-infrared region: 0.2, 0.5, 1, 2, 3, 5, 8, 12, 20, 32 nm	
Resolution	0.1 nm	
Wavelength sampling pitch	0.01 to 5 nm	
Wavelength accuracy	Ultraviolet and visible regions: ± 0.2 nm	Near-infrared region: ± 0.8 nm
Wavelength repeat accuracy	Ultraviolet and visible regions: Within ± 0.08 nm	Near-infrared region: Within ± 0.32 nm
Wavelength scanning speed	During wavelength transfer Ultraviolet and visible regions: Approx. 18,000 nm/min	Near-infrared region: Approx. 70,000 nm/min
	During wavelength scanning Ultraviolet and visible regions: Approx. 4,500 nm/min max.	Near-infrared PMT/InGaAs region: Approx. 9,000 nm/min max.
	Near-infrared PbS region: Approx. 4,000 nm/min max.	
	(Figures do not include time required for switching.)	
Light-source switching	The light source is switched automatically in accordance with the wavelength.	
	The wavelength at which the light source is switched can be set freely in the range 282 to 393 nm (in 0.1 nm increments).	
Stray light	0.00008% max. (220 nm, NaI)	
	0.00005% max. (340 nm, $NaNO_2$)	
	0.0005% max. (1,420 nm, H_2O)	
	0.005% max. (2,365 nm, $CHCl_3$)	
Photometric system	Double beam	
Photometric range	-6 to 6 Abs	
Photometric accuracy	± 0.003 Abs (1 Abs), ± 0.002 Abs (0.5 Abs), determined with NIST930D standard filter	
Photometric repeat accuracy	0.0008 Abs (0 to 0.5 Abs), 0.0016 Abs (0.5 to 1 Abs), determined using 1-second accumulation, taking the maximum deviation over five measurements	
Noise	0.00005 Abs max. (500 nm), 0.00008 Abs max. (900 nm), 0.00003 Abs max. (1,500 nm), determined using RMS values for 1-second responses, 2 nm slit width	
Baseline flatness	± 0.004 Abs (185 to 200 nm)	
	± 0.001 Abs (200 to 3,000 nm)	
	± 0.005 Abs (3,000 to 3,300 nm)	
Baseline stability	Within 0.0002 Abs/h (2 hours after power ON, 500 nm, 1-second accumulation)	
Light sources	50W halogen lamp (2,000-hour service life), deuterium lamp (socket type, 2,000-hour service life), built-in mechanism	
	for automatically adjusting the light-source position	
Monochromator	2 x 2 grating-type double monochromator	
	Pre-monochromator: Concave diffraction-grating monochromator	
	Main monochromator: Aberration-corrected Czerny-Turner monochromator	
	The diffraction gratings are high-performance, blazed, holographic gratings.	
Detector	Ultraviolet and visible regions: R-928 photomultiplier tube or equivalent	
	Near-infrared region: InGaAs photodiode and cooled PbS photoconductive element	
Sample compartment	Internal dimensions: 150 (W) x 260 (D) x 140 (H) mm	
Size	1,020 (W) x 660 (D) x 275 (H) mm	
Weight	96 kg	
Operating temperature	15°C to 35°C	
Operating humidity	35% to 80% (with no condensation, 35% to 70% at 30°C or higher)	
Power supply	100/120/220/230/240 VAC, 50/60 Hz	
Power consumption	300 VA Note)	

Note : A PC (and a power supply for the PC) is required separately.

Catalog numbers for UV-3600: Cat. No. 206-23000-31, -32, -38 ("-31" denotes the 100V model, "-32" denotes the 120V model, and "-38" denotes the 220, 230, and 240V models.)

Cells

Description		Type	Fused silica (S) cell	Glass (G) cell	Fused silica (IR) cell
Square cell	Optical path length = 10mm	①	200-34442	200-34565	200-66579-01
	Optical path length = 20mm	⑥	200-34446	200-34446-01	200-66579-02
	Optical path length = 50mm	⑥	200-34944	200-34944-01	200-66579-03
	Optical path length = 100mm	⑥	200-34676	200-34676-01	200-66579-04
Square cell with stopper	Optical path length = 10mm	②	200-34444	200-34444-01	200-66579-21
Semi-micro cell	Optical path length = 10mm	③	200-66501	200-66501-01	200-66579-11
Semi-micro black cell	Optical path length = 10mm	③'	200-66551	–	200-66579-12
Micro black cell	Optical path length = 10mm	⑧	200-66578-12	–	–
Ultra-micro black cell	Optical path length = 10mm	⑦	200-66578-11	–	–
	Optical path length = 5mm	⑦'	208-92116	–	–
Cylindrical cell	Optical path length = 10mm	④	200-34448(silica window)	200-34448-01(glass window)	200-66579-31(IR silica window)
	Optical path length = 20mm		200-34472(silica window)	200-34472-01(glass window)	200-66579-32(IR silica window)
	Optical path length = 50mm		200-34473-01(silica window)	200-34473-03(glass window)	200-66579-33(IR silica window)
	Optical path length = 100mm		200-34473-02(silica window)	200-34473-04(glass window)	200-66579-34(IR silica window)
Short path cell	Optical path length = 1mm	⑤	200-34660-01	200-34662-01	200-66579-05
	Optical path length = 2mm		200-34655	200-34662-11	200-66579-06
	Optical path length = 5mm		200-34449	200-34449-01	200-66579-07



Unit: mm

JQA-0376

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