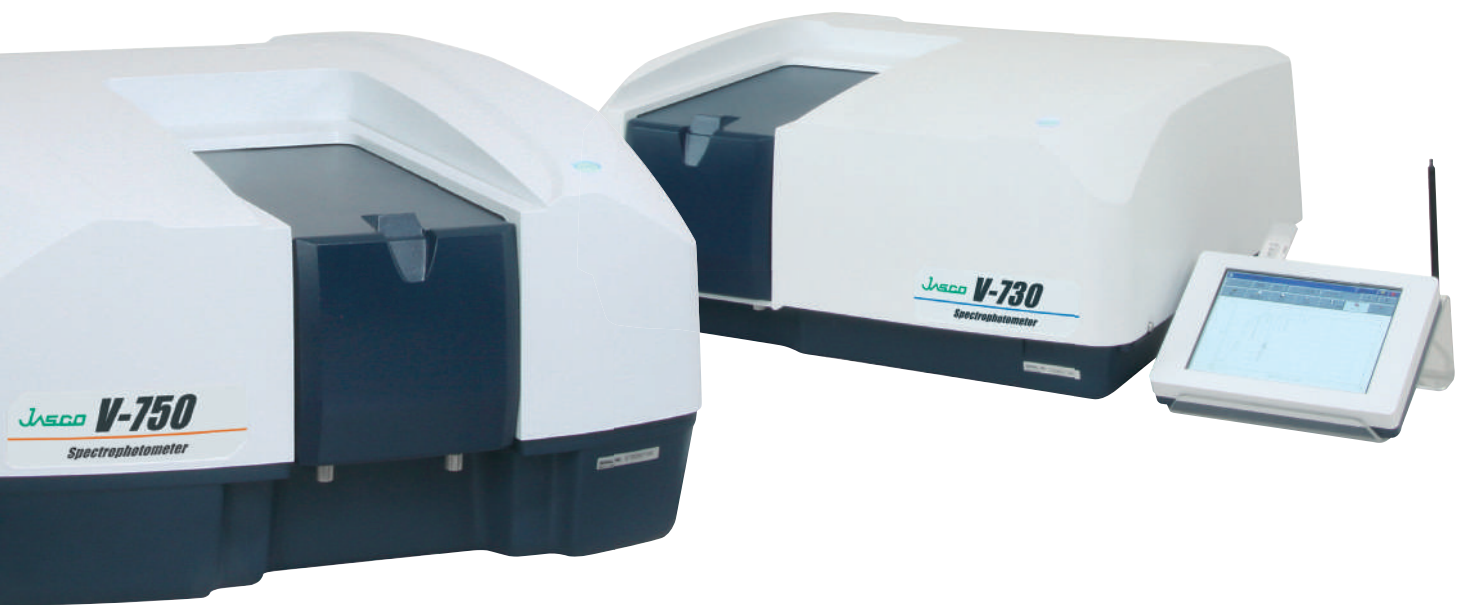


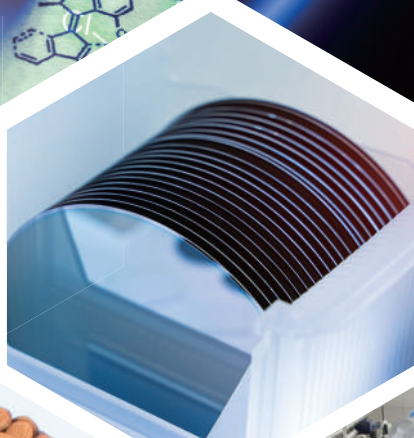
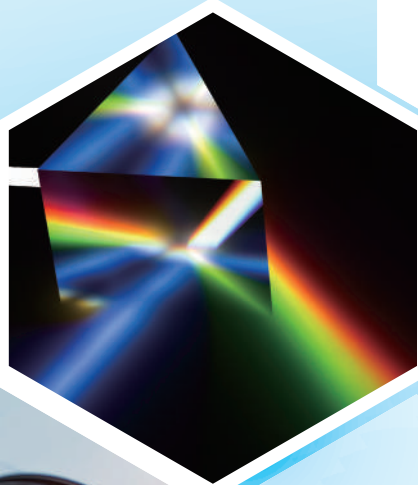
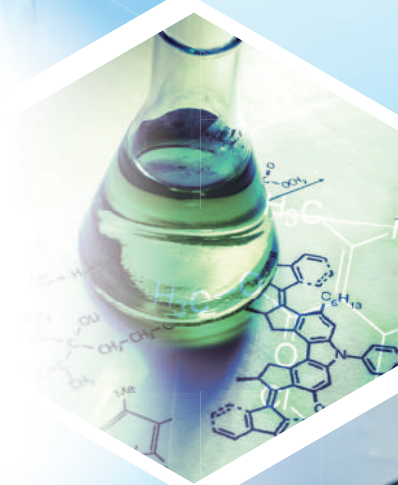
V-700 Series

UV-Vis/NIR Spectrophotometer



Jasco

Performance
Innovation
Reliability



For scientists performing spectral characterization, thermodynamic studies, and quantitative measurements for advanced bio- and materials research, who need confidence in the accuracy and reproducibility of their measurements and rely on the results. The V-700 series UV-Visible/NIR spectrophotometers provides an excellent optical system with wide wavelength range for a diverse array of applications.

The V-700 series comprises five distinct models covering the entire spectrum from the far-UV (187 nm) to the NIR (3200 nm). The compact optical design of the V-700 series UV-Visible/NIR spectrophotometers significantly reduces the requirement for bench space in the modern laboratory.

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Common Features of the V-700 Series

Compact Design

The compact design of the V-700 Series UV-Visible/NIR spectrophotometers significantly reduces the requirement for bench space in the modern laboratory.

Wide Wavelength Range

High energy throughput provides excellent signal-to-noise ratio for the entire UV-Visible to NIR spectral range, with detectors selected for the highest sensitivity and dynamic range.

User-Friendly Operation

Spectra Manager™ Suite for Windows® and iRM hand-held controller for comprehensive control, acquisition and data processing. 21 CFR part 11 compliance is available for PC.

Regulatory Compliance

All models can be used in GxP compliant laboratories, a comprehensive validation to USP, EP and JP is included as standard. Installation and Operational Qualification (IQ, OQ) are available for installation and maintenance.

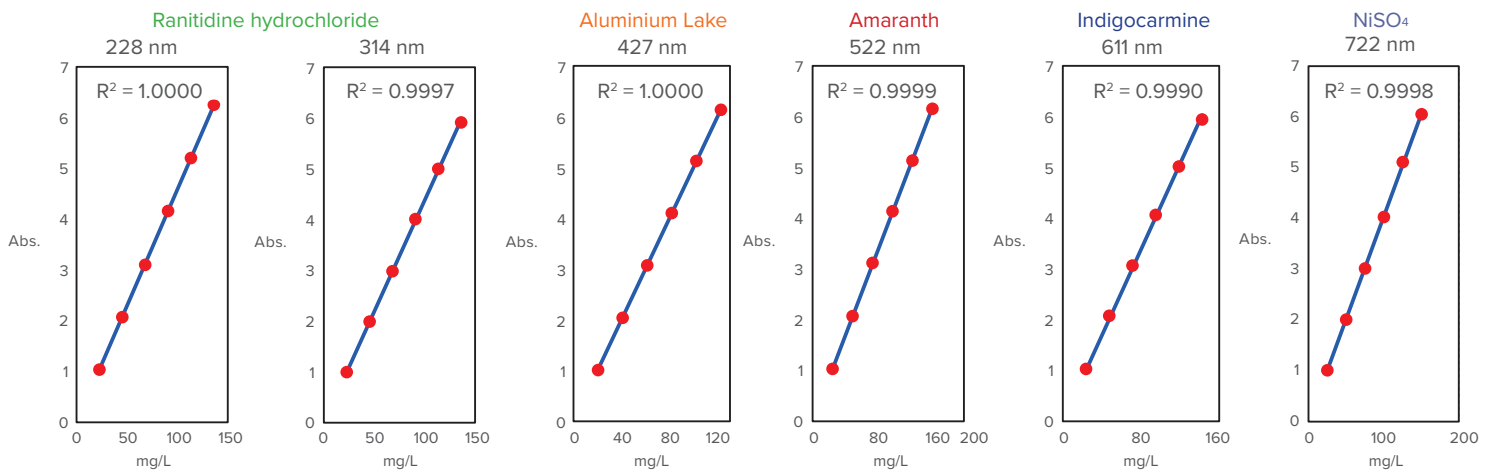
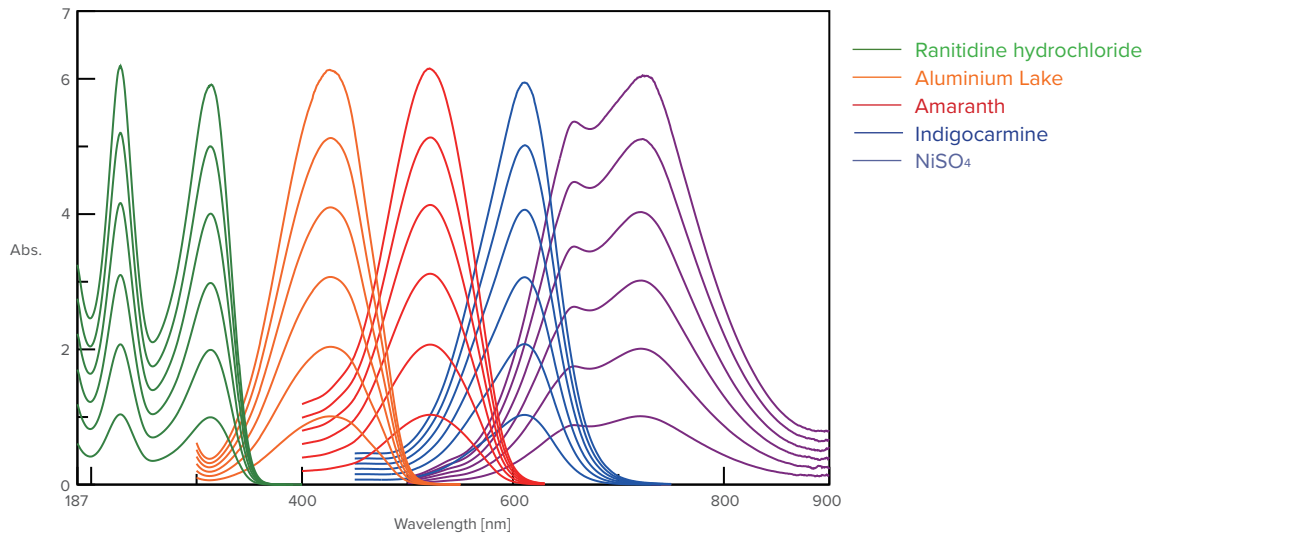
Start Button

For routine operation a measurement can be made from a simple push of the 'Start Button', great for speeding up measurement, and for multiple users.



Excellent Optical Performance

Sophisticated electronic and optical design reduces noise and stray light for highly accurate measurements over wide wavelength and photometric ranges.



Spectra of Various Solutions measured by V-760

Dark Correction

Stray light reduction features that enable accurate measurement of strongly absorbing samples.

Bandwidth settings for more effective use of light

The V-750, 760, and 770 have two bandwidth settings: L mode and M mode.

The L mode can reduce the stray light by about 1/3, and is useful when measuring samples with high absorbance.

The M mode irradiates a narrower incident light beam onto the sample, enabling accurate measurement of minute amounts of sample in a micro cell.

High Speed Scanning

High throughput optics and fast response detectors provide fast scanning without wavelength tracking errors.

Monochromator Step Scanning

Step scan provides reliable peak assignment to samples with narrow peak widths.

Wide Range of Accessories and Applications software

A comprehensive selection of over 50 sampling accessories for gas, liquid and solid samples for many different applications, with matching dedicated application programs. IQ Accessory automatically recognizes the connected accessory and selects a matching measurement program.



Spectra Manager™ Software Suite

Instrument Control

Spectra Manager™ includes control of a wide range of instruments with easy to edit parameter files and data processing functions. Data acquired from the instrument is automatically loaded into an analysis program to free up the PC and control software to acquire further data during post-acquisition processing. Each instrument also has its own range of dedicated applications for analysis, instrument diagnostics and validation.

Flexible Display Features

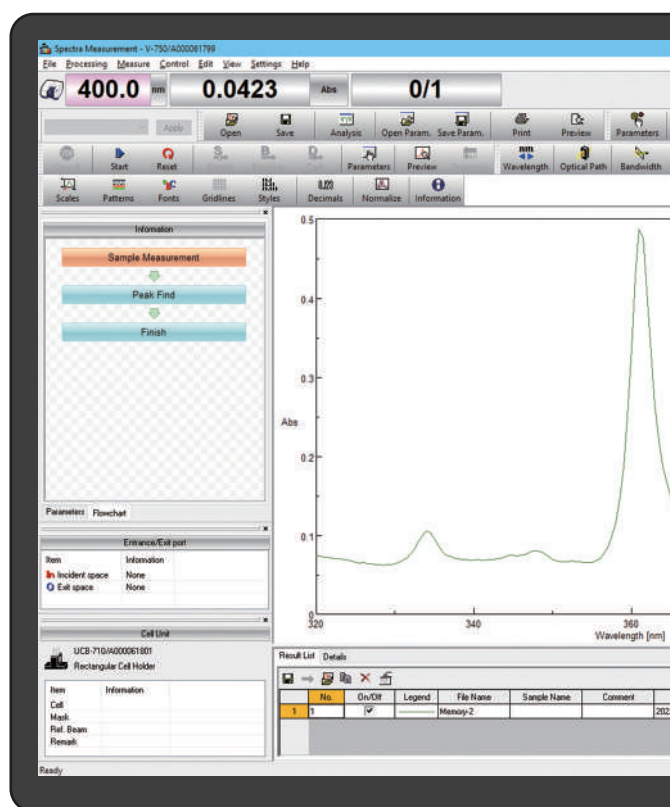
User-friendly features include flexible customization of the GUI, user-adaptable toolbars and sophisticated handling of spectral and time course data in two- and three- dimensions.

Data Processing and Spectral Analysis

View and process the different types of measurement data (UV-Visible/NIR, FTIR, Fluorescence, CD) in a single window, using a comprehensive range of data processing functions. Features include instrument specific corrections and analysis, arithmetic operations, derivatives, peak detection, smoothing, and baseline correction.

Reporting

JASCO Canvas allows the creation of bespoke layout templates of spectral data and results to meet individual reporting requirements.



Standard Measurement Programs

Spectra Measurement

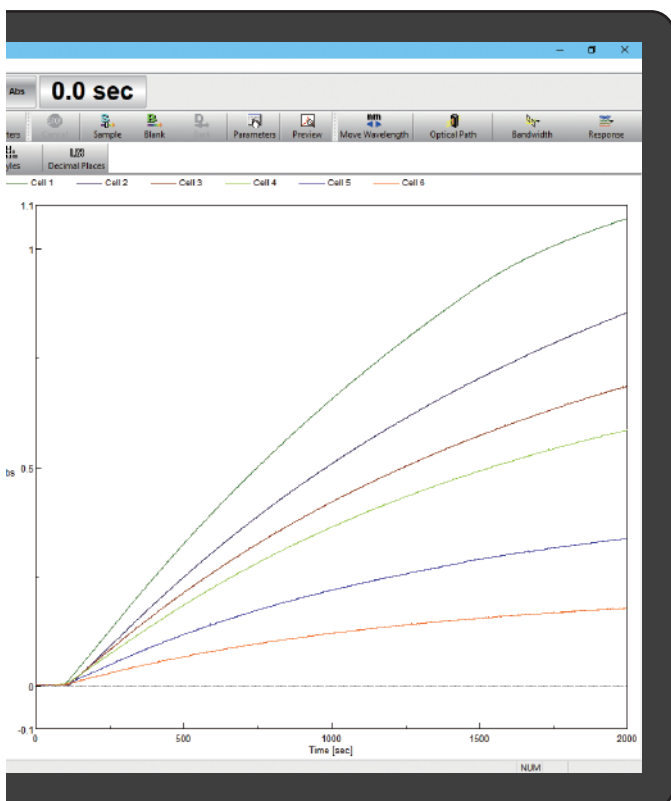
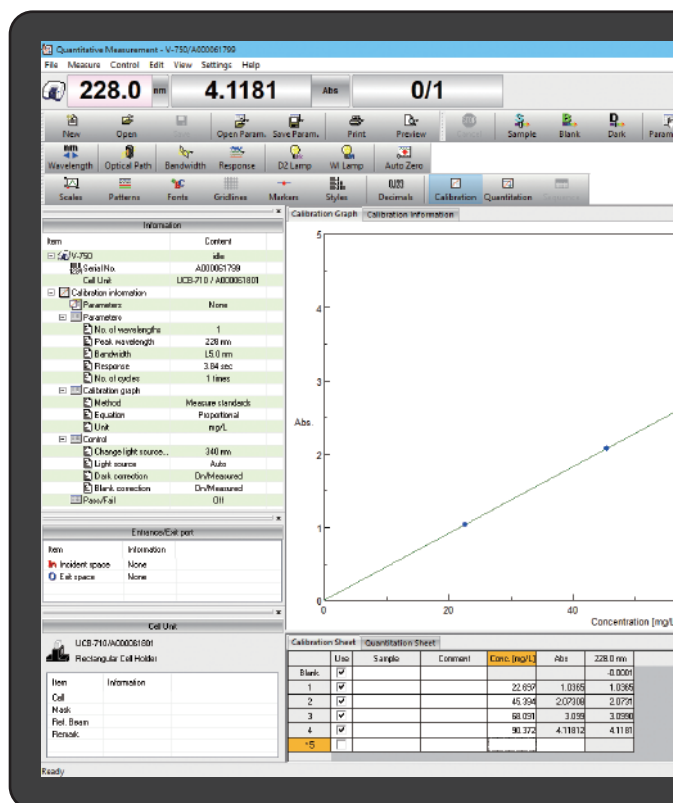
Measures the absorbance, transmittance, or reflectance spectrum of a sample. Sequential measurements can also be made on multiple samples, each of which can be assigned different measurement parameters. A customizable flowchart can be used to automate the flow of measurement, data processing, saving and reporting functions.

Quantitative Measurement

Create a calibration curve using the absorbances of standards with known concentrations, and then use the absorbance for samples with unknown concentrations to interpolate the concentration from the calibration curve. Several quantitation methods are included. The calibration curve can be constructed using linear or polynomial fitting with linearity criteria and 'goodness of fit' statistics.

Fixed Wavelength Measurement

Measure the absorbance, transmittance, or reflectance of a sample at a fixed wavelength. Up to twenty different wavelengths can be used for measurement.



Dual-Wavelength Time Course Measurement

Measure changes in absorbance, transmittance, or reflectance over a specified time at up to two fixed wavelengths. This can be used for kinetics measurement or stability testing.

Parallel Kinetics Measurement

Measures changes in the absorbance, transmittance, or reflectance at a fixed wavelength for a sample(s) over a specified time period, and is designed for use with a multi-cell changer.

Time Course Measurement

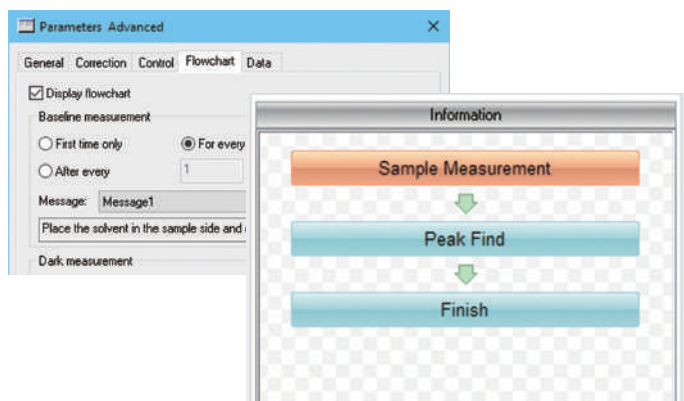
Measure changes in absorbance, transmittance, or reflectance over a specified time at a fixed wavelength. This can be used for kinetics measurement or stability testing.

Abs/%T Meter

The photometric value in absorbance or transmittance is displayed in analog, digital, or graphical modes.

Flowchart Setting

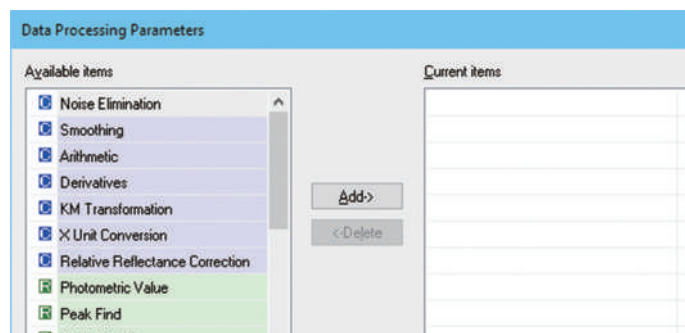
Measurement contents and data processing can be set in advance and displayed on a flowchart to visualize the measurement flow.



Data Processing Function

The data processing function enables automatic data processing, calculation, and output of measurement results. This makes measurement and analysis seamless.

**In the CFR version, the data processing function is not available.*



Sequence Measurement

Routine measurement sequences can be saved, and measurement can be started simply by reading the sequence at the time of measurement. Data can be copied and pasted to operate easily and improve the work efficiency.

Macro Command Program (Option)

This Macro Command Program can be used to develop user-designed applications for individual experimental set-up and measurement, including instrument control, data acquisition, post-acquisition data processing and reporting.

iRM-1000 Intelligent Remote Module

The **iRM-1000 intelligent remote module** incorporates a color LCD touch screen for simple operation and data measurement. The iRM-1000 conveniently guides the operator through everything from data acquisition to data processing and reporting. Results can be saved to a USB memory for further processing using Spectra Analysis on a PC or laptop.

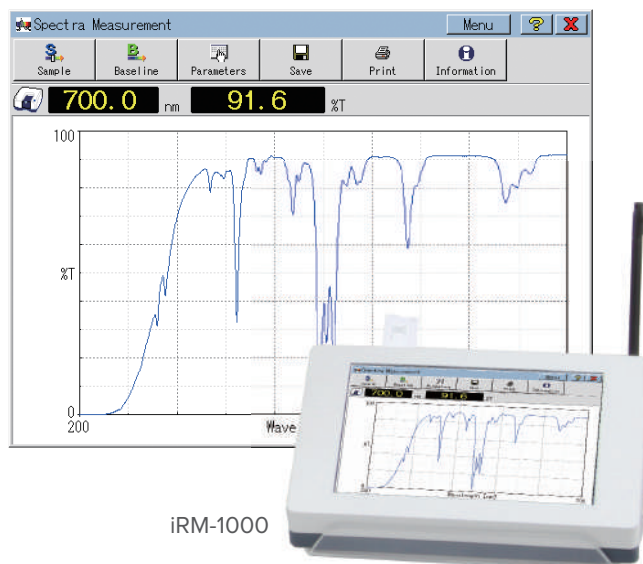
- High quality color LCD display
- Operation using finger or Touch Pen
- Spectra, fixed wavelength and quantitative analysis
- Validation
- Print to a USB printer
- Save data to a USB memory

Standard Measurement Programs for iRM

- Spectra Measurement
- Time Course Measurement
- Quantitative Analysis
- Fixed Wavelength Measurement
- Abs/%T Meter
- Macro Command
- Validation
- Daily Check

Standard Analysis Programs for iRM

- Spectra Analysis
- Enzymatic Reaction Rate Calculation
- Color Analysis
- Film thickness



iRM-1000



Easy Data Transfer to a PC



Touch-Sensitive Screen

Reliable measurement environment system

Instrument diagnostics and light source monitoring

Both iRM and PC types have a self-diagnostic function for the spectrophotometer itself to check the status of the light source, wavelength drive, etc. In addition, the light source monitoring displays the accumulated lighting time, which can be used as a guideline for maintenance.

Item	Status
Initialize	Pass
Long-wavelength limiter	Pass
Short-wavelength limiter	Pass
Monochromator initialization	Pass
Sector mirror	Pass
Slit	Pass
Halogen lamp	Pass
Deuterium lamp	Pass

Validation

Check the functional performance of a UV-Visible/NIR spectrophotometer using a variety of inspection methods, including those required by regulatory compliance. These include wavelength accuracy and repeatability, photometric accuracy and repeatability, resolution, stray light, noise level, and baseline stability and flatness.

Item	Status
Wavelength Accuracy - D2 Lamp	Pass
Wavelength Accuracy - Hg Lamp	Pass
Wavelength Accuracy - Filter	Pass
Wavelength Repeatability - D2 Lamp	Pass
Wavelength Repeatability - Hg Lamp	Pass
Wavelength Repeatability - Filter	Pass
Photometric Accuracy - Filter	Pass
Photometric Accuracy - K2Cr2O7	Pass

Std. Value (nm)	Criteria (+/-nm)
486.0	2.00
656.1	2.00

Daily Check

This simple performance check of the spectrophotometer can be made regularly by measuring the absorbance spectrum of a holmium standard supplied with the instrument. The statistics are accumulated over a period of time to monitor and ensure continuous optimal operation.

No.	DATE	Pass/Fail	Peak Position	Peak Intensity	FWHM	Comparison
0	2014/07/17 16:06	---	---	---	---	---
1	2014/07/18 11:25	Pass	Pass	Pass	Pass	Pass
2	2014/07/19 9:29	Pass	Pass	Pass	Pass	Pass
3	2014/07/20 14:05	Pass	Pass	Pass	Pass	Pass
4	2014/07/21 14:50	Pass	Pass	Pass	Pass	Pass
5	2014/07/22 10:31	Pass	Pass	Pass	Pass	Pass

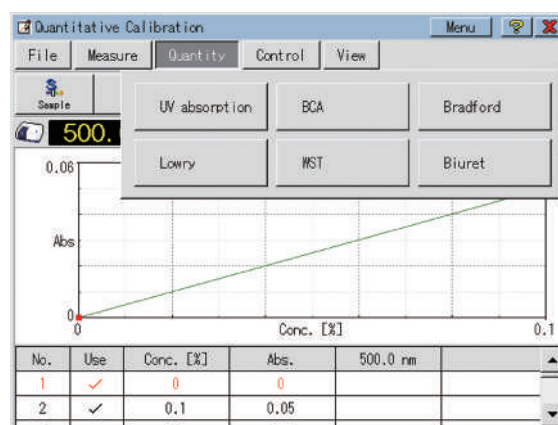


V-730BIO for Life Sciences

The dedicated V-730BIO has been designed specifically for applications in Life Sciences. Comprising a V-730, with either Spectra Manager™ or an intelligent Remote Module (iRM) for biological and clinical analysis, and a micro cell holder. Bio-analytical application programs included are: protein/nucleic acid measurement, temperature ramping/DNA melting analysis, kinetics measurement with advanced analysis, and quantitative protein analysis with six different calibration methods.



V-730BIO

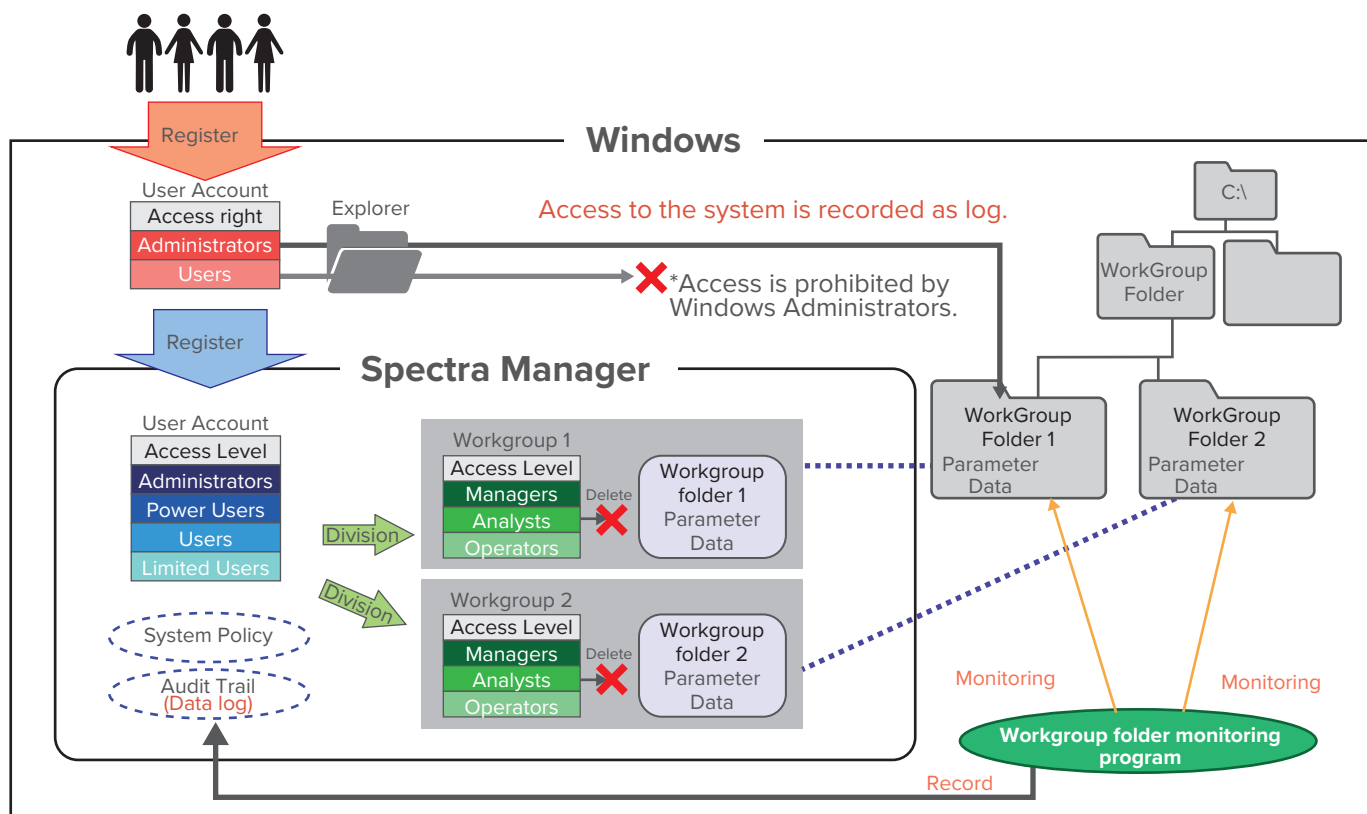


quantitative protein analysis



Regulatory Compliance with Spectra Manager CFR™

Spectra Manager CFR provides features to support laboratories in compliance with 21 CFR Part 11. A choice of complete pull-down task menus, user-friendly icons, and easily accessible pop-up menus enables new users to manage security information, control user access, and record audit trails.



User Management

Based on the dual security category ([Access Level] and [Work Group]), it is possible to manage different authorization process in flexible and independent as total analysis systems, instrumentations and analytical applications.

User Account Security

Based on functions to prevent duplicate account or to protect password, and to prevent unauthorized access, administrative authorizations as system access and electric signature etc., can be managed strictly.

Audit Trail

It is categorized as 3 different records (system log, application log and data log), and it is recorded. Each log can be filtered and displayed under recorded date, user name etc, and it can be exported for audit trail review.

Enduring Electronic Record

Based on prohibiting function to delete electronic record and to overwrite save, and also functions for backup and restore data, electronic records can be saved properly and can be searched accurately during the data lifecycle.

Category	Date and Time	Description	Extra Information
Information	2020/02/20 9:24:21	Disconnection	
Information	2020/02/20 9:24:08	Disconnection	
Information	2020/02/19 17:11:20	Quit Analysis Application	
Information	2020/02/19 17:11:19	Disconnection	
Normal	2020/02/19 17:07:46	Open Data	C:\SpectraManager\SM2.5CFR\App
Normal	2020/02/19 17:07:37	Starting up Analysis Application	
Information	2020/02/19 16:48:17	Disconnection	
Information	2020/02/19 16:47:28	Disconnection	
Information	2020/02/19 16:46:55	Disconnection	
Information	2020/02/19 16:46:01	Disconnection	
Information	2020/02/19 16:08:49	Disconnection	
Information	2020/02/19 16:08:48	Quit Analysis Application	
Normal	2020/02/19 16:08:45	Save Data	C:\SpectraManager\SM2.5CFR\App

Computerized System Validation

Spectra Manager CFR is developed and manufactured properly under quality control system adapted ISO 9001, and adapted CSV standard.



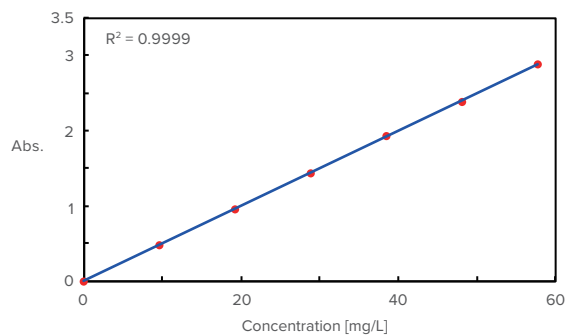
V-730 UV-Visible Spectrophotometer

System Features

- Double-beam spectrophotometer with single monochromator and silicon photodiode detectors
- Compact with dimensions of only 440 (W) × 470 (D) × 215 (H) mm
- Wide wavelength range – 190 to 1100 nm
- Fixed spectral bandwidth 1.0 nm for high resolution measurement
- High-speed scanning up to 8,000 nm/min
- Stray light 0.02 % for exceptional absorbance linearity up to 3 Abs

High linearity and S/N over a wide wavelength range

The optical and electrical systems have been optimized to reduce stray light, resulting in high linearity over the entire measurement wavelength range. In addition, measurement over a wide absorbance range is possible not only in the visible region but also in the ultraviolet region. Measurement of absorbance 3 is possible in the UV region (220 nm).



Calibration Curve of Caffeine

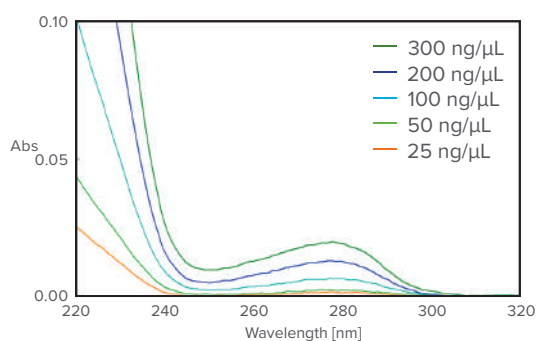
Micro volume analysis of proteins using a 5 μ L micro cell

Protein quantification is essential in various biochemical experiments, such as checking the amount of protein which has been extracted and purified, and fluorescent labeling of proteins. One of the methods for protein quantification is UV absorptiometry using a UV-visible spectrophotometer. In this protein quantification, since the samples are extremely valuable, the instrument should be capable of measuring trace samples, and measuring a wide concentration range from low to high concentrations while also ensuring stable measured values and high measurement reproducibility.

Using the EMC-759 5 μ L ultra-micro cell holder and 5 μ L micro cell, trace samples can be measured with high accuracy and the measured sample can be collected.



EMC-759 5 μ L ultra-micro cell holder



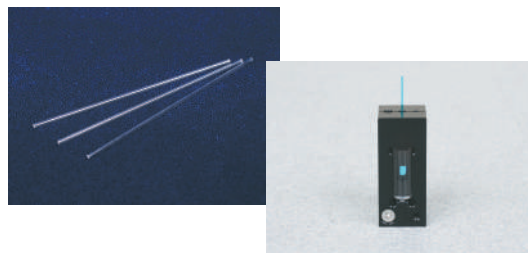
Spectra of albumin solution

Configuration example

V-730 ST	UV-Visible spectrophotometer
EMC-759	5 μL ultra-micro cell holder
	5 μL micro cell

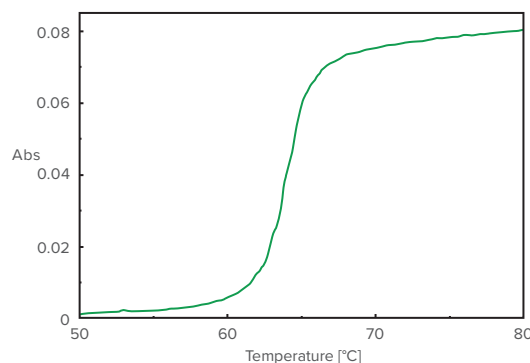
One drop melting measurement with capillary jacket

In life science fields such as structural studies of nucleic acids, T_m measurement is essential for assessing the thermal stability of DNA. In these measurements, 10 mm rectangular cells are often used and a large amount of samples are required. JASCO offers a solution for T_m measurement with a minimum sample volume of 3 μ L (with an optical path length of approx. 0.5 mm) by using a capillary cell for small volume samples.



Capillary cell and capillary cell jacket

As an example of the measurement, the temperature control measurement of Poly (dA-dT)-Poly(dA-dT) in pH7 phosphate buffer was performed by using a capillary cell. The temperature-dependent data of intensity at 260 nm indicated that melting temperature (T_m) was 63.9 $^{\circ}$ C. On the other hand, when the same sample was measured in a 10 mm cell, the calculated T_m was 63.8 $^{\circ}$ C, showing very good agreement.



Temperature-dependent data of DNA solution by using capillary cell

Configuration example

V-730 ST	UV-Visible spectrophotometer
ETCS-761	Peltier thermostatted single cell holder (water-cooled)
	Capillary cell jacket
	Capillary cell
	Seal for capillary cell
CTU-100	Circulating thermostat unit
VWTP-959	Temperature control measurement and DNA melting analysis program



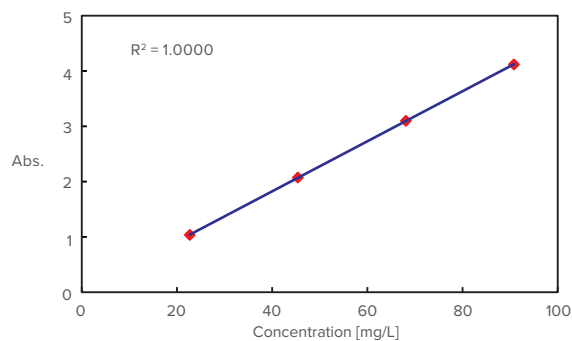
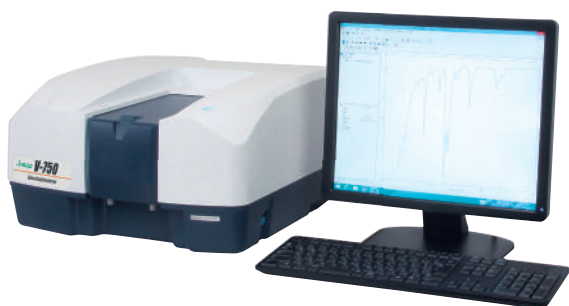
V-750 UV-Visible Spectrophotometer

System Features

- Double-beam spectrophotometer with single monochromator
- High sensitivity PMT detector
- Wide wavelength range – 190 to 900 nm
- Variable spectral bandwidth
- High-speed scanning up to 4,000 nm/min (Scanning speed in Preview Mode is 8,000 nm/min)
- Stray light 0.005%

Absorbance Linearity to Greater than 4 Abs Across a Wide Wavelength Range

The photometric linearity range is up to 4 Abs in the UV-Visible region (and up to 5 Abs in the visible region*). The V-750 offers measurement with a wide dynamic range and high absorbance by employing optimized high-order cut-off filters, ultra high-resolution A/D converter and simplified signal processing prior to the A/D conversion. *Measurement of KMnO_4 solution.



Calibration Curves of Ranitidine Hydrochloride

Step-Scan Measurement

Step-scan is useful for accurate measurement of samples such as bandpass filters for which the transmittance changes significantly over a relatively narrow wavelength range.

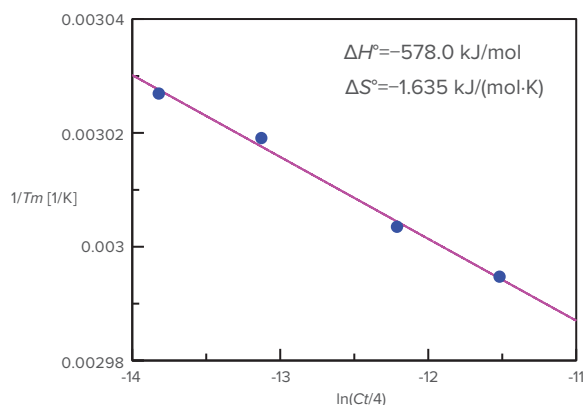
Evaluation of melting temperature and thermodynamic parameters of nucleic acids using UV-Visible spectrophotometer

In the development of nucleic acid drugs, which are based on nucleic acids such as DNA and RNA, the effectiveness of evaluation utilizing thermodynamic parameters has been attracting attention, and the establishment of an efficient method for obtaining thermodynamic parameters has been sought.

PAC-743 water-cooled Peltier cell changer enables to collect the temperature-dependent data of the same nucleic acid at various concentrations, and thermodynamic parameters can be efficiently obtained and evaluated simultaneously with melting temperature, an index of thermal stability.



PAC-743 Water-cooled Peltier cell changer



In(Ct/4) vs 1/Tm plot result

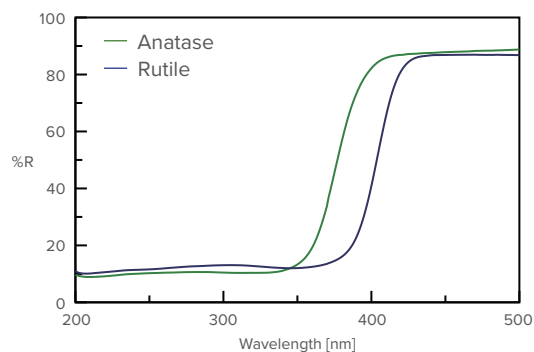
Configuration example

V-750 ST PAC-743	UV-Visible spectrophotometer Automatic 6/8x1-position Peltier cell changer (water-cooled) 8-position micro cell block 8-position micro cell (with stopper) Silicone stopper kit
CTU-100 VWTP-959	Circulating thermostat unit Temperature control measurement and DNA melting analysis program

UV Application Data: 030-UV-0047

Diffuse reflectance measurement of powder sample by using integrating sphere unit

By using an integrating sphere unit and a cell for powder sample, it is possible to evaluate powder sample that are difficult to measure. As an example, the diffuse reflectance measurements of two titanium dioxide powders with different crystal structures (rutile and anatase) were performed. The use of an optical trap cuts out the influence of the specularly reflected light from the window plate of the cell for powder sample. Both reflectance spectra show a large decrease in reflectance around 350 nm, indicating the presence of a band gap. The wavelength of the band gap of anatase is shorter than the one of rutile, indicating the difference in crystal structure. The band gap values were calculated using a band gap calculation program, and the results were in good agreement with literature values.



Diffuse reflectance spectra of titanium dioxide powder sample

Calculation result

Sample	Bandgap [eV]	
	Measurement	Reference*
Rutile	3.05	3.0
Anatase	3.24	3.2

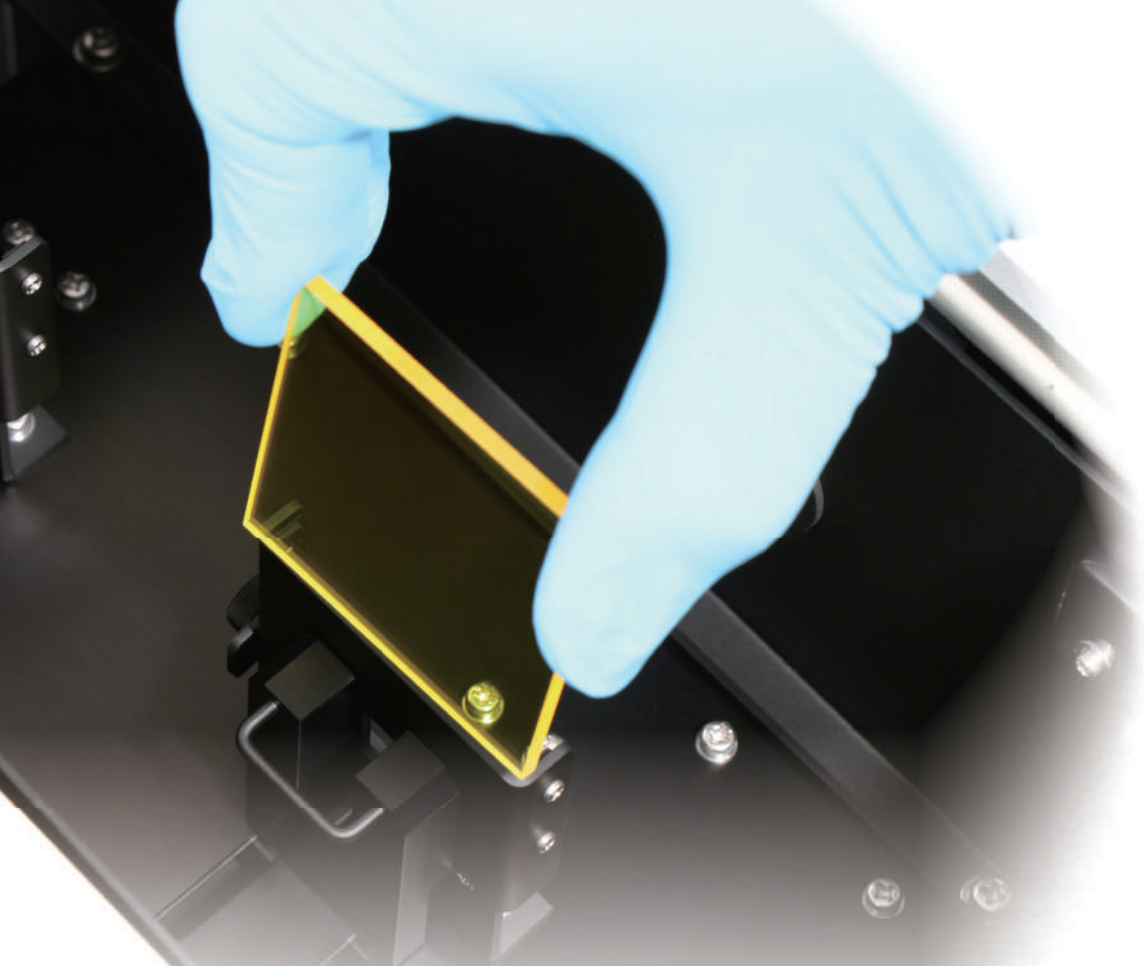
Combination of a trace powder sample holder and a beam focus attachment for reflectance measurement also enables measurement of trace powder sample.

*Kavan L., Gratzel M., Gilbert S. E., Kelmencz C., Scheel H. J.: *J. Am. Chem. Soc.*, **118**, 6716 (1996)
Tang H., Berger H., Schmid P. E., Levy F., Burri G.: *Solid State Commun.*, **87**, 847 (1993)
Pascual J., Camassel J., Mathieu H.: *Phys. Rev. Lett.*, **39**, 1490 (1977)
Cronemeyer D. C.: *Phys. Rev.*, **87**, 876 (1952)
Serpone N., Lawless D., Khairutdinov R. J.: *Phys. Chem.*, **99**, 16646 (1995)

Configuration example

V-750 ST ISV-922 PSH-002 VWBG-773	UV-Visible spectrophotometer Integrating sphere Powder sample holder Band gap calculation program
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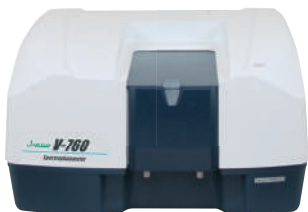
UV Application Data: 190-UV-0023B



V-760 UV-Visible Spectrophotometer

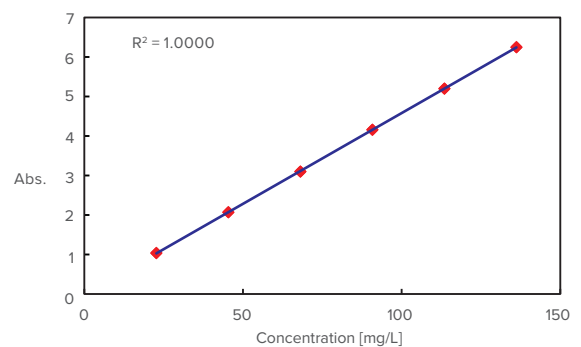
System Features

- Double-beam spectrophotometer with double monochromator
- High sensitivity PMT detector
- Wide wavelength range – 187 to 900 nm
- Variable spectral bandwidth
- Low stray light 0.00008 %
- High-speed scanning up to 4,000 nm/min (Scanning speed in Preview Mode is 8,000 nm/min)



Double monochromator - Achieves Abs. 6 over a wide range of wavelengths

The V-760 is equipped with double monochromator optics and achieves a wide dynamic range from UV to visible by optimizing the optical system, employing high resolution A/D converters, and optimizing signal processing.



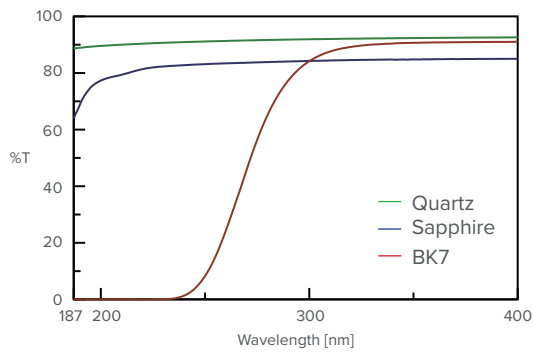
Calibration Curves of Ranitidine Hydrochloride

Characterization of optical materials

Transmission spectra of quartz, sapphire, and BK7, optical materials used as window plates, were measured using V-760. The low stray light design allows measurement in the UV region without nitrogen purging, with a measurement wavelength range starting at 187 nm.



FLH-741 Film holder



Transmission spectra of optical material in the UV region

Configuration example

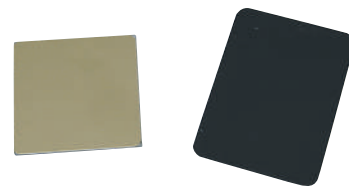
V-760 ST	UV-Visible spectrophotometer
FLH-741	Film holder

Transmission spectra of notch filter at various incident angle

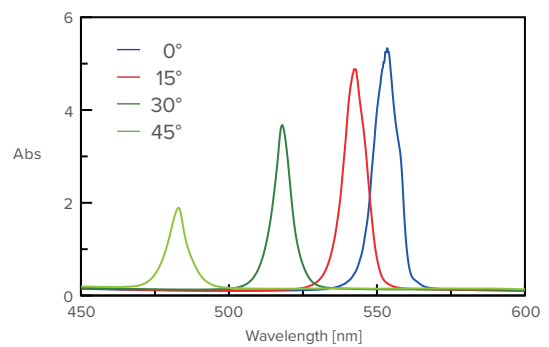
Transmission measurements of notch filter were performed on a V-760 with a VTA-752 film holder (variable incident angle), which can change the incident angle, and a high absorbance measurement kit. The dark correction was performed, and baseline correction was also performed with reference beam attenuation. As the angle of incidence was increased from 0°, the peak position shifted to shorter wavelengths and the peak intensity became weaker.



VTA-752 Film holder (variable incident angle)



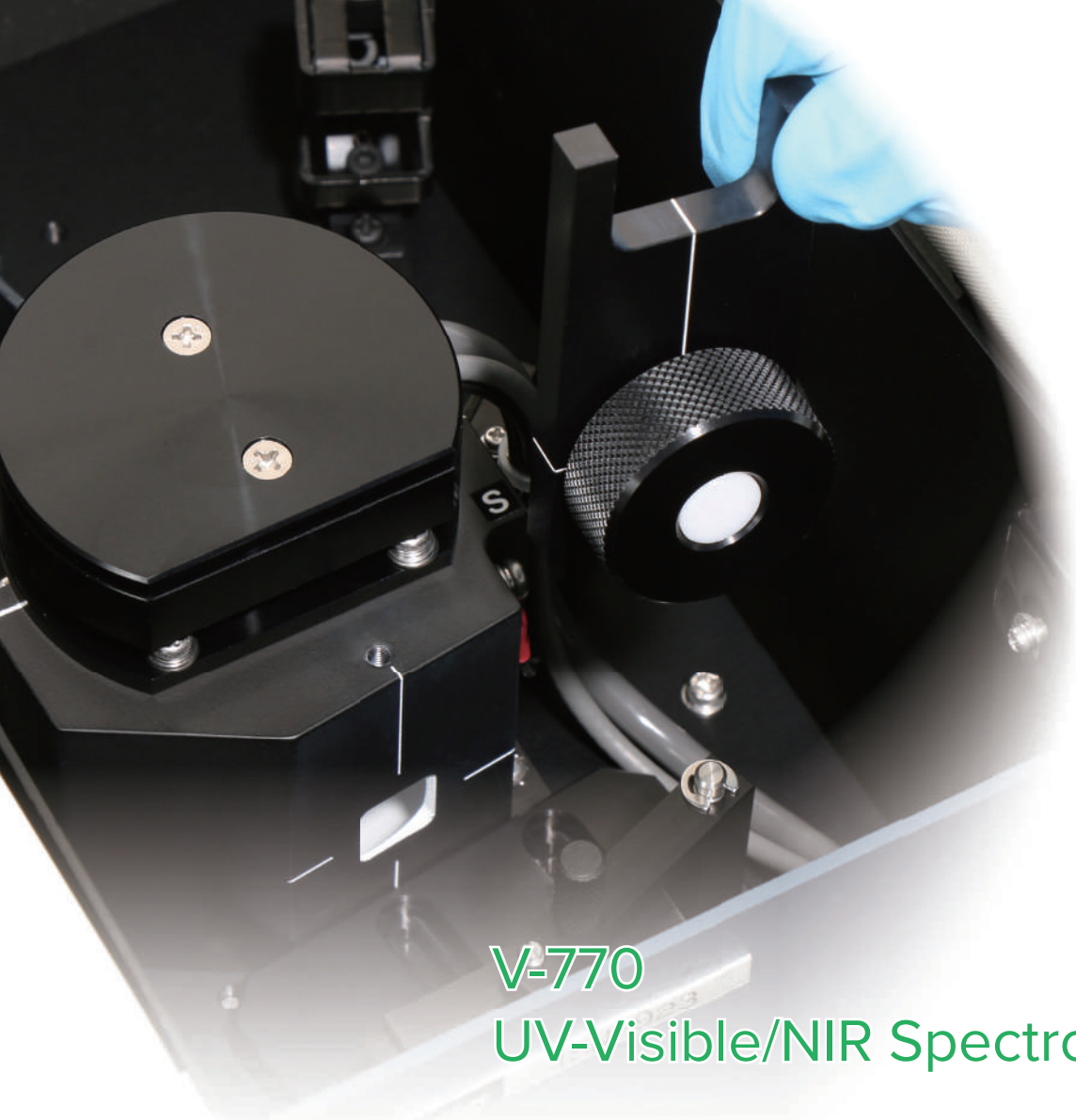
High absorbance measurement kit



Absorption spectra of notch filter at various incident angle

Configuration example

V-760 ST	UV-Visible spectrophotometer
VTA-752	Film holder (variable incident angle)
	High absorbance measurement kit



V-770 UV-Visible/NIR Spectrophotometer

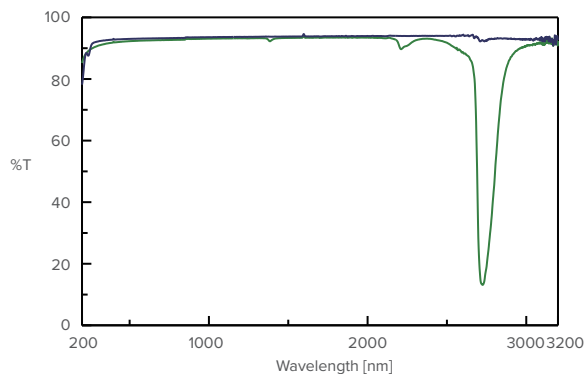
System Features

- Double-beam spectrophotometer with single monochromator
- High sensitivity PMT and PbS detectors
- UV-Visible and NIR optimized gratings
- Wide wavelength range PbS detector
- Wide wavelength range – 190 to 2700 nm (3200 nm as option)
- Variable spectral bandwidth
- High-speed scanning up to 4,000 nm/min (Scanning speed in Preview Mode is 8,000 nm/min)
- Stray light 0.005% (UV-Visible) to 0.04% and 0.1% (NIR)



Wide Wavelength Range

The V-770 uses a combination of wide range monochromator, PbS detector and anhydrous windows to cover the wavelength range to 3200 nm. The high optical throughput of a single monochromator design provides excellent signal to noise when measuring transmission, diffuse and absolute reflectance to longer wavelengths.



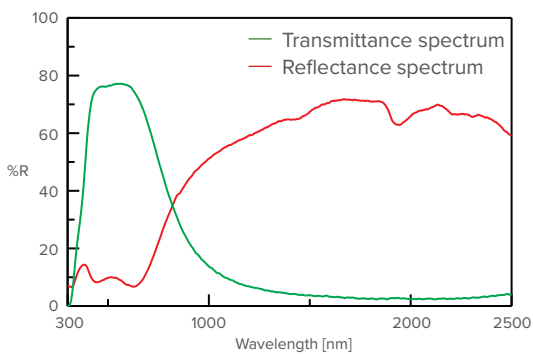
The NIR UV-Visible spectra shows the water band in a quartz substrate (Blue) compared to anhydrous quartz (Green).

Evaluation of heat-shielding glass (compliant with ISO 9050)

Several standards including ISO 9050 have been published with methods for determining the characteristic parameters of flat glass, including light transmittance/reflectance (for illuminant D65) and direct solar transmittance/reflectance/absorptance, and are used to evaluate the heat-shielding glass.

By combining V-770 with an integrating sphere unit, it is possible to measure the transmittance and reflectance spectra of heat-shielding glass, and to calculate the light transmittance/reflectance and the direct solar transmittance/reflectance. Furthermore, from the reflectance measurement by FTIR, the total solar energy transmittance can be calculated to comprehensively evaluate the performance of heat-shielding glass as specified in ISO 9050.

*The evaluations of single flat glass are available.



Measurement result

Analysis result based on ISO 9050

	result
Light transmittance [%]	76.5
Light reflectance [%]	8.8
Direct solar transmittance [%]	45.1
Direct solar reflectance [%]	29.0
Direct solar absorptance [%]	26.0
Total solar energy transmittance [%]	49.4
UV transmittance [%]	24.8
CIE damage factor [%]	55.8
Skin damage factor [%]	7.8
General color rendering index [%]	98.0

Configuration example

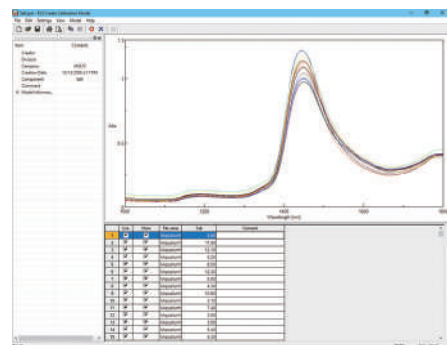
V-770 ST **UV-Visible/NIR spectrophotometer**
ISN-923 **Integrating sphere**
SSH-506 **Solid sample holder**
VWST-964 **Solar transmittance/reflectance measurement program**

UV Application Data: 190-UV-0032B

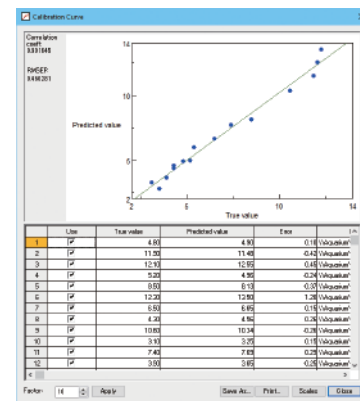
Food analysis by NIR spectroscopy

Near-infrared (NIR) spectroscopy is widely used as an analytical method for quantifying components in food, as it is non-destructive and can measure both solids and liquids. In addition, combining the NIR spectroscopy with multivariate analysis enables simultaneous quantification of multiple components without separating them by curve fitting, making it possible to obtain a large amount of information easily and quickly.

As the measurement example, diffusion transmittance measurements of 15 soups with different concentrations of various components were performed, and PLS calibration curve was created by using the measurement result. As the result, the calibration curves with high correlation were obtained for salt, moisture, and protein.



Calibration curve creation window (salt)



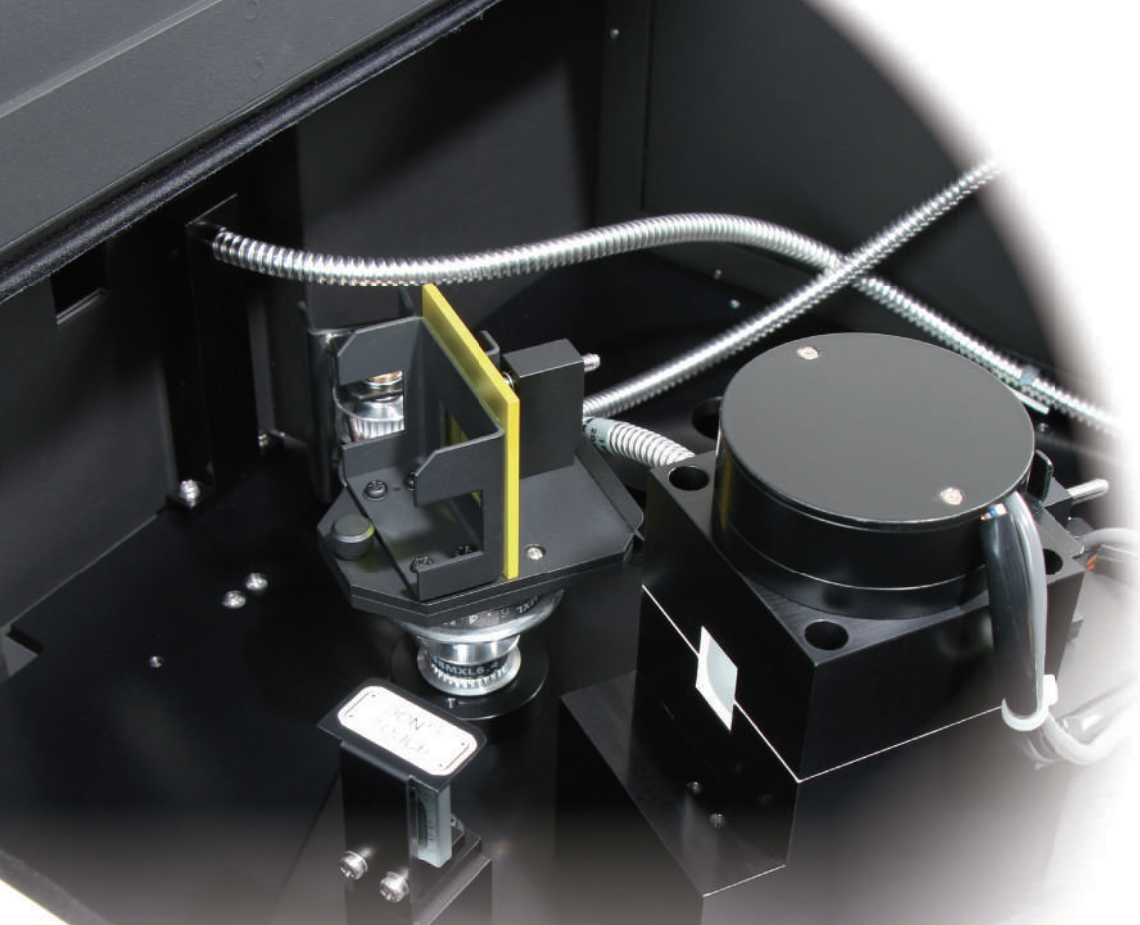
Calibration curve

Result

Component	Correlation coefficient
Salt	0.992
Protein	0.926
Water	0.970

Configuration example

V-770 ST **UV-Visible/NIR spectrophotometer**
ISN-923 **Integrating sphere**
VWPL-956 **PLS quantitative measurement program**



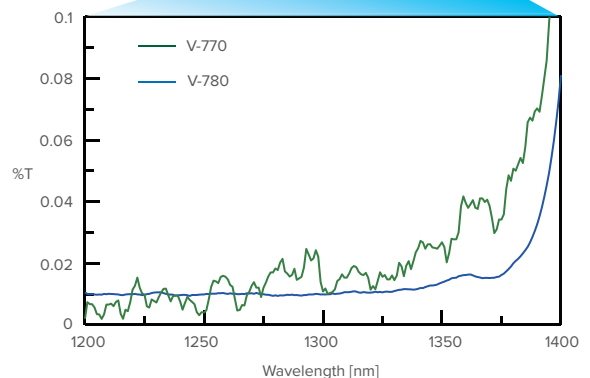
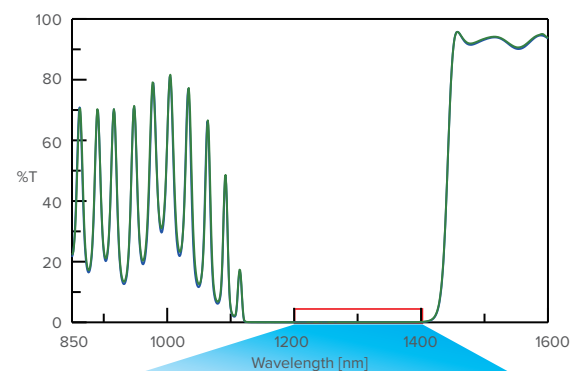
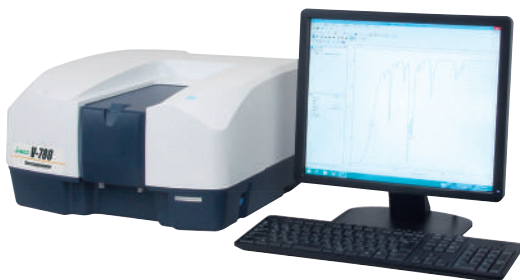
V-780 UV-Visible/NIR Spectrophotometer

System Features

- Double-beam spectrophotometer with single monochromator
- High sensitivity PMT and InGaAs detectors
- UV-Visible and NIR optimized gratings
- Wide wavelength range – 190 to 1600 nm
- Variable spectral bandwidth
- High-speed scanning up to 4,000 nm/min (Scanning speed in Preview Mode is 8,000 nm/min)
- Stray light 0.005% (UV-Visible) to 0.04% (NIR)

High Sensitivity

The figure (below) compares a 1.3 μm band cutoff filter for optical communication measured using the V-770 with a Peltier-cooled PbS photo-conductive detector and the V-780 with a Peltier-cooled InGaAs photodiode detector. The V-780 offers significantly increased S/N.



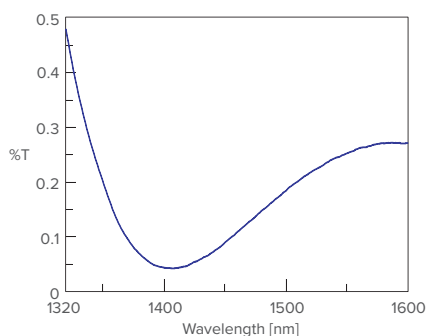
Spectra of 1.3 μm cut-off filter

Evaluation of Anti-Reflection Coatings using Absolute Reflectance Measurement System

Anti-reflection coatings are used for windows and lenses in the visible range and for optical elements incorporated into optical communications and laser diodes in the near-infrared range. In recent years, the performance of anti-reflection coatings has improved, and to evaluate them, it is important to select a measurement system that can accurately and reproducibly evaluate anti-reflection coatings with reflectance of 0.1% or less. Absolute reflectance measurement system using V-780 enables to measure the high performance anti-reflection coatings with reflectance of 0.1 % or less (refer to page 41 for more information about the absolute reflectance measurement unit).



Automated absolute reflectance measurement unit



Reflectance spectrum of AR coating

Configuration example

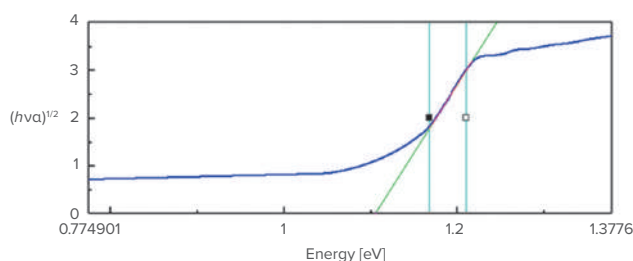
V-780 ST	UV-Visible/NIR spectrophotometer
ARMN-921i	Automated absolute reflectance measurement unit

UV Application Data: 190-UV-0040

Band gap measurement of crystalline silicon

The band gap can be determined from the transmittance and reflectance of semiconductor materials. There are the demands that semiconductor materials with band gaps in the near-infrared (NIR) region, such as silicon, want to be evaluated.

The V-780 can be used to evaluate semiconductor materials with band gaps in the NIR region. As an example, the band gap of crystalline silicon was measured. As a result of the analysis, the band gap value was determined to be 1.10 [eV], which is in good agreement with the literature value of 1.1 [eV]*.



$h\nu - (h\nu\alpha)^{1/2}$ plot of crystalline silicon

*Streetman Ben G., Sanjay Banerjee: "Solid State electronic Devices", 5th ed., p. 524, (2000), (Prentice Hall, New Jersey)

Configuration example

V-780 ST	UV-Visible/NIR spectrophotometer
FLH-741	Film holder
VWBG-773	Band gap calculation program

UV Application Data: 220-UV-0030B

Temperature Control

Automatic Peltier Multi-Cell Holders

PSC-763 | Automatic 6 × 1-position Peltier Cell Changer (Air-Cooled) ●●



PSC-763

Specification

- Cell (sample side):
Optical path length 10 mm rectangular cell × 6
- Cell (reference side):
Optical path length 10 mm rectangular cell
- Temperature control system:
Heating/cooling system utilizing Peltier effect
Controlling the temperature of the sample side
- Heat radiating system:
Air cooled
- Stirring system:
Magnetic stirrer × 6 (with variable stirring speed control)
(stirring system does not work with the micro cell.)
- Temperature setting range:
10 to 70 °C
- Temperature control range:
15 to 60 °C (when the room temperature is 20 °C)
- Temperature control accuracy:
±0.1 °C (cell holder sensor)
- Temperature accuracy (cell holder sensor):
20 to 40 °C ±0.5 °C
Out of the above range ±1 °C
- Temperature accuracy (cell sensor):
±0.2 °C

Optional accessory

Optional temperature sensor (cell sensor, 5 pcs/set)

Temperature sensor (cell holder sensor) is located in the sample side cell holder, and measures and controls the temperature. Beside this, measurement of the temperature in the cell and temperature control can be performed using an optional cell sensor in the cell.

*A cell sensor will be included in a standard configuration.

- Micro cell** micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available
- V-730** used only with V-730/V-730BIO
- V-750** used only with V-750
- V-760** used only with V-760
- V-770** used only with V-770
- V-780** used only with V-780
- V-700** compatible with all V-700 Series instruments

PAC-743 | Automatic 6/8 × 1-position Peltier Cell Changer (Water-Cooled) ●●

PAC-743R | Automatic 6/8 × 1-position Peltier Cell Changer (Water-Cooled, Thermostatted Reference) ●●



PAC-743/PAC-743R

Specification

- Cell (sample side):
Optional cell block (refer to page 11.)
- Cell (reference side):
Optical path length 10 mm rectangular cell
- Temperature control system:
Heating/cooling system utilizing Peltier effect
Controlling the temperature of the sample side (PAC-743)
Controlling the temperature of the sample and reference sides (PAC-743R)
- Heat radiating system:
Water cooled
- Temperature setting range:
-10 to 110 °C
- Temperature control range:
0 to 100 °C (for cooling water temperature at 20 °C)
- Temperature control accuracy:
±0.1 °C (cell holder sensor)
- Temperature accuracy (cell holder sensor):
20 to 40 °C ±0.5 °C
Out of the above range ±1 °C
- Temperature accuracy (cell sensor):
±0.2 °C

Circulating Water Bath

CTU-100 | Circulating Thermostat Unit ●



CTU-100

Specification

- Temperature control range:
Room temperature - 10 to 40 °C
(Directly connecting between "IN" and "OUT")
- Temperature control accuracy:
±0.5 °C
- Dimension:
200 (W) × 311 (D) × 170 (H) mm
- Weight:
5.0 kg

Optional accessory for PAC-743 and PAC-743R
(Continued)

6-position cell block ●



Specification

Available cells:
Optical path length 10 mm rectangular cell × 6
Stirrer:
Available (with variable stirring speed control)
(stirring system does not work with the micro cell.)

Optional accessory

Optional temperature sensor (cell sensor, 5 pcs/set)

Temperature sensor (cell holder sensor) is located in the sample side cell holder, and measures and controls the temperature. Beside this, measurement of the temperature in the cell and temperature control can be performed using an optional cell sensor in the cell.

*A cell sensor will be included in a standard configuration.

Capillary cell jacket ●

Φ 0.5 (ID) mm capillary cell (with a minimum sample volume of 3 μL) can be mounted to 6-position cell block by using the dedicated capillary cell jacket. Optional temperature sensor is required.

8-position cell block



Specification

Available cells:
Optical path length 5 mm rectangular cell × 8
Stirrer:
Available (with variable stirring speed control)

Optional accessory

Optional temperature sensor (cell sensor, 7 pcs/set)

Temperature sensor (cell holder sensor) is located in the sample side cell holder, and measures and controls the temperature. Beside this, measurement of the temperature in the cell and temperature control can be performed using an optional cell sensor in the cell.

*A cell sensor will be included in a standard configuration.

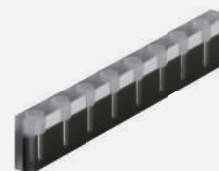
1 mm 8-position micro cell block



Temperature monitoring in the cell and temperature control can be performed using the cell sensor. It consists of silicone stoppers and fixing plate.

*The cell for temperature monitoring cannot be measured.

1 mm 8-position micro cell



Specification

Optical path length: 1 mm
Sample volume: 10 μL

8-position micro cell block



Temperature monitoring in the cell and temperature control can be performed using the cell sensor.

*The cell for temperature monitoring cannot be measured.

8-position micro cell

Specification

Optical path length: 10 mm
Sample volume: 100 μL

Optional accessory

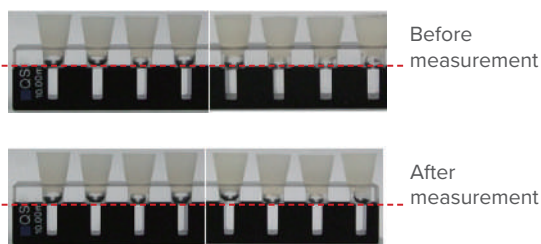
Silicone stopper kit

Use of the optional silicone stopper kit with the 8-position micro cell can prevent the sample from evaporating.



DNA melting measurement using PAC-743/743R water-cooled Peltier cell changer

One of the difficulties in temperature control measurements of trace samples, such as DNA melting measurements, is the volatilization of the sample when measured at high temperatures. By using a silicone stopper and fixing plate, volatilization of the trace sample of 10 μ L can be prevented.



Change in sample volume before and after measurement

Another difficulty in temperature control measurement of trace samples is accurately monitoring of the sample's temperature.

To improve the temperature accuracy of the X-axis, a temperature sensor can be inserted inside the cell and the actual temperature of the sample can be reflected on the X-axis. When using the 1 mm 8-position micro cell, the temperature sensor interferes with the optical path for measurement. Utilizing one of the eight wells as the temperature monitoring, the temperature control measurement using the actual temperature inside the cell can be performed. In order to confirm the effectiveness of the above technique, the melting temperatures were measured using the in-cell sensor in a 10 mm rectangular cells and a 1 mm 8-position micro cell. The measurements using the 1 mm 8-position micro cell with a sample volume of 10 μ L could be performed with results no less accurate than those obtained using the 10 mm rectangular cells.

Melting temperature evaluation results

	Ave. [°C]	S.D	C.V [%]
1 mm 8-position micro cell	63.6	0.04	0.06
10 mm rectangular cells	63.5	0.10	0.15

Configuration example

V-730 ST UV-Visible spectrophotometer
PAC-743 Automatic 6/8x1-position Peltier cell changer (water-cooled)
1 mm 8-position micro cell block (with stopper)
1 mm 8-position micro cell
CTU-100 Circulating thermostat unit
VWTP-959 Temperature control measurement and DNA melting analysis program

UV Application Data: 210-UV-0008, 210-UV-0009, 210-UV-0010

Peltier Thermostatted Single Cell Holders

EHCS-932 | Peltier Thermostatted Single Cell Holder (Air-Cooled) ●●●



EHCS-932

Specification

- Cell (sample side):
Optical path length 10 mm rectangular cell
- Cell (reference side):
Optical path length 10 mm rectangular cell
- Temperature control system:
Heating/cooling system utilizing Peltier effect
Controlling the temperature of the sample side
- Heat radiating system:
Air cooled
- Stirring system:
Magnetic stirrer (with variable stirring speed control)
(stirring system does not work with the micro cell.)
- Temperature control range:
0 to 100 °C
(when the room temperature is 25 °C)
- Temperature control accuracy:
±0.1 °C (cell holder sensor)
- Temperature accuracy (cell holder sensor):
20 to 40 °C ±0.5 °C
Out of the above range ±1 °C
- Temperature accuracy (cell sensor):
±0.2 °C

* A cell sensor will be included in a standard configuration.

- Micro cell** micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available
- V-730** used only with V-730/V-730BIO
- V-750** used only with V-750
- V-760** used only with V-760
- V-770** used only with V-770
- V-780** used only with V-780
- V-700** compatible with all V-700 Series instruments

ETCS-761 | Peltier Thermostatted Single Cell Holder (Water-Cooled) ●●

ETCR-762 | Peltier Thermostatted Single Cell Holder (Water-Cooled, Thermostatted Reference) ●●



ETCS-761



ETCR-762

Specification

- Cell (sample side):
Optical path length 10 mm rectangular cell
- Cell (reference side):
Optical path length 10 mm rectangular cell
- Temperature control system:
Heating/cooling system utilizing Peltier effect
Controlling the temperature of the sample side (ETCS-761)
Controlling the temperature of the sample and reference sides (ETCR-762)
- Heat radiating system:
Water cooled
- Stirring system:
Magnetic stirrer (with variable stirring speed control)
(stirring system does not work with the micro cell.)
- Temperature setting range:
-10 to 110 °C
- Temperature control range:
0 to 100 °C
(for cooling water temperature at 20 °C)
- Temperature control accuracy:
±0.1 °C (cell holder sensor)
- Temperature accuracy (cell holder sensor):
20 to 40 °C ±0.5 °C
Out of the above range ±1 °C
- Temperature accuracy (cell sensor):
±0.2 °C

* A cell sensor will be included in a standard configuration.

Optional accessory for EHCS-932, ETCS-761 and ETCR-762

Mask and height adjustment stand for micro cell

This optional accessory makes it possible to measure the sample with a minimum sample volume of 100 µL by the micro cell.

Capillary cell jacket ●

Φ 0.5 (ID) mm capillary cell (with a minimum sample volume of 3 µL) can be mounted by using the dedicated capillary cell jacket.

Cell spacers

For cells with an optical path length of 1, 2 and 5 mm.

Automation of temperature control measurement

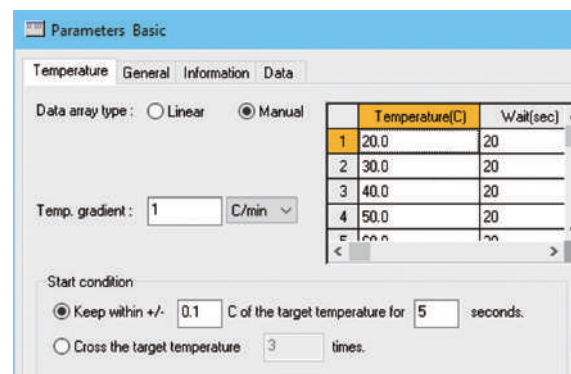
In many cases, users have to manually perform the measurements by visually checking the temperature and timing the measurement to meet their objectives. JASCO offers the following optional software to set detailed conditions and automate measurement according to the user's objectives.

VWTP-959 Temperature control measurement program

- Changes in absorbance of a sample due to temperature change can be measured at a fixed wavelength (up to 20 wavelengths)
- Capable of acquiring data in temperature intervals from 0.1 °C minimum to 10 °C maximum
- Temperature parameters can be set at unequal intervals
- Sensors for temperature control and temperature monitoring can be selected from the holder and the cell
- When using a cell changer, interval data can be created for each cell
- Heat treatment before measurement can be performed (Pre-measurement annealing)

VWTS-958 Temperature interval scan measurement program

- Capable of acquiring spectral data at set temperature intervals
- Unit of temperature gradient parameter is selected from °C/min and °C/hour
- Capable of acquiring data in temperature intervals from 0.1 °C minimum to 10 °C maximum
- Temperature parameters can be set at unequal intervals
- Sensors for temperature control and temperature monitoring can be selected from the holder and the cell
- Temperature-dependent data can be monitored at specified wavelengths (up to 4 wavelengths)
- When using a cell changer, interval data can be created for each cell



Parameter setting window
(Temperature Interval Scan Measurement Program)

Constant Temperature Cell Holders/Cell Changers

The following cell holders can be used with water circulators for maintaining samples at a constant temperature.

STR-773 | Water Thermostatted Cell Holder with Stirrer



STR-773

Specification

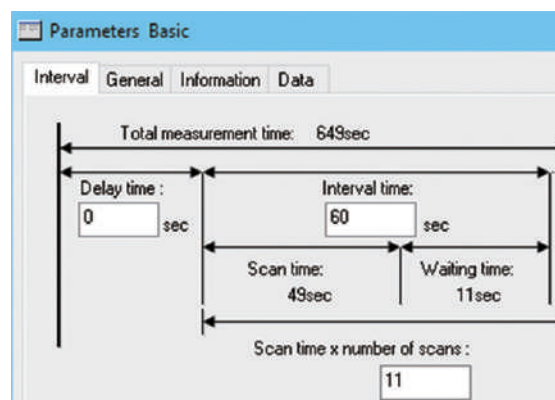
- Cell (sample side):
Optical path length 10 mm rectangular cell
- Cell (reference side):
Optical path length 10 mm rectangular cell
- Temperature control system:
Thermostatted water circulation for sample and reference
- Operating temperature:
10 to 90 °C
- Stirring system:
Magnetic stirrer (with variable stirring speed control)
(stirring system does not work with the micro cell.)

Automation of interval scan measurements

There are many cases where measurements are made manually, with timing to be adjusted in order to measure changes over time in accordance with the user's objectives. JASCO offers the following optional software to set detailed conditions and automate measurement according to the user's objectives.

VWIS-957 interval scan measurement program

- Capable of acquiring spectrum data at set time intervals
- Unit of time parameter can be selected from sec and min.
- Up to 24 days interval scan measurement is available. Data interval can be set up to 1 day.
- Up to 60000 spectra can be acquired in a single interval scan measurement
- Time-dependent data can be monitored at the specified wavelengths (up to 4 wavelengths)
- When using a cell changer, interval data can be created for each cell



Parameter setting window
(Interval Scan Measurement Program)

Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available

V-730 used only with V-730/V-730BIO

V-750 used only with V-750

V-760 used only with V-760

V-770 used only with V-770

V-780 used only with V-780

V-700 compatible with all V-700 Series instruments

NCP-706 | Water Thermostatted 6-position Automatic Cell Changer



NCP-706

Specification

- Cell (sample side):
Optical path length 10 mm rectangular cell × 6
- Cell (reference side):
Optical path length 10 mm rectangular cell
- Temperature control system:
Thermostatted water circulation for sample and reference
- Operating temperature:
10 to 90 °C
- Cell switching:
Software controlled

Other Temperature Control Accessories

CSP-909 | Optional Sample Compartment Lid with Syringe Port



CSP-909

Used for fast reaction to inject a reaction initiator into the cell without opening the sample chamber lid.

Compatible with the following cell holders: STR-773, EHCS-932, ETCS-761, ETCR-762

Specification

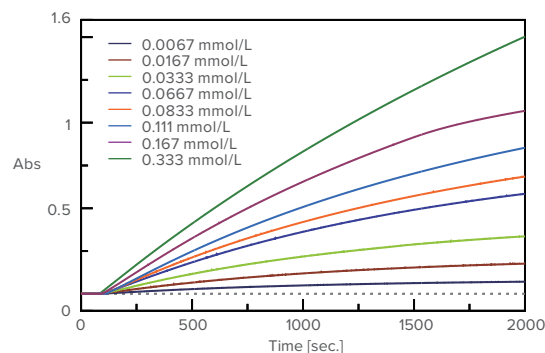
- Applicable syringe:
Micro syringe with 2 inch (approx. 50 mm) needle length
- Sample cell:
Optical path length 10 mm rectangular cell
- Septum:
Φ 9.5 mm × 1.5 (T) mm; silicone rubber



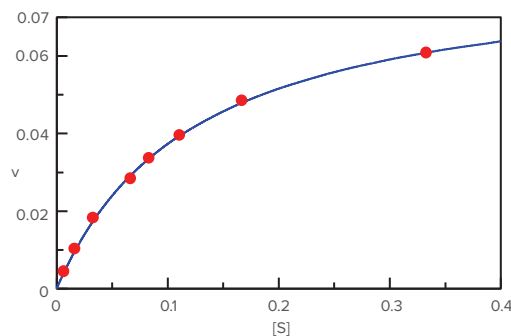
Kinetics Analysis - Measurement of ALP activity

In pharmaceutical and other life science fields, enzyme-substrate reactions are measured and analyzed to determine enzyme-substrate affinity and enzyme activity. The combination of a temperature-controlled accessory and a kinetic program enables the analysis of enzyme activity values, Michaelis constant (K_m), maximum reaction rate (V_{max}), and inhibitor constants. Advanced kinetic program is also compatible with Peltier cell changers.

As the example, enzyme-substrate reactions involving *p*-nitrophenyl phosphate and the enzyme (ALP: alkaline phosphatase) were evaluated. When ALP acts on *p*-nitrophenyl phosphate, which is used in blood tests, inorganic phosphoric acid and *p*-nitrophenol are released. Performing the time course measurement at the absorption maximum of the released *p*-nitrophenol, K_m and V_{max} can be obtained by using the Michaelis-Menten equation, where the initial velocity v (slope) is plotted against the substrate concentration [S].



Time-dependent data of each substrate concentration



Michaelis-Menten plot

Configuration example

V-730 ST	UV-Visible spectrophotometer
STR-773	Water thermostatted cell holder (Water circulator is required)
CSP-909	Optional sample compartment lid with syringe port (Syringe is required)
VWKN-772	Advanced kinetic analysis program

UV Application Data: 210-UV-0029

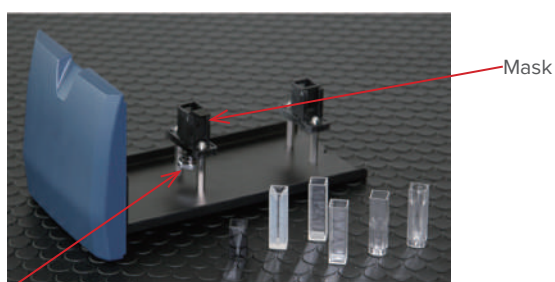
Micro Volume

UCB-710 | Rectangular Cell Holder ● ●



UCB-710

UCB-710 has the mask and the capability to adjust the cell height for use with 100 μ L micro cells. (50 μ L as an option)



Mask

Adjustment screw
for cell height

Specification

Available cell:
Optical path length 10 mm rectangular cell

SAH-769 | One Drop Measurement Unit ●



SAH-769

The SAH-769 One Drop accessory is a dedicated accessory for the V-700 Series to measure micro-volume samples of protein and nucleic acid. The minimum sample volume is 5 μ L for the 1 mm pathlength disk cell, while only 0.6 μ L can be used for the 0.2 mm pathlength disk cell. Both disk cells are standard for the SAH-769.



Measurement flow

Specification

Cell (sample side):
Optical path length 1.0 mm designated cell (volume: 5 to 8 μ L)
Optical path length 0.2 mm designated cell (volume: 0.6 to 1.0 μ L)
Cell (reference side):
Optical path length 10 mm rectangular cell
Solvent:
Water

Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available

V-730 used only with V-730/V-730BIO

V-750 used only with V-750

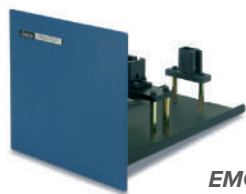
V-760 used only with V-760

V-770 used only with V-770

V-780 used only with V-780

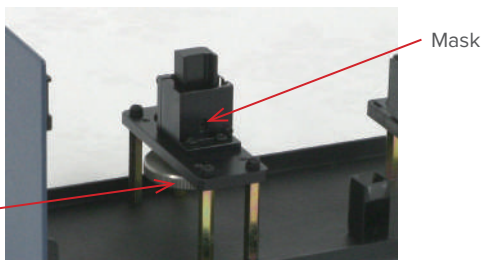
V-700 compatible with all V-700 Series instruments

EMC-709 | Micro Cell Holder



EMC-709

The mask for micro cell is equipped with EMC-709, and it is suitable to measure micro volume samples.



Mask

Adjustment screw for cell height

Specification

Compatible cell:

Optical path length	10 mm
Optical path width	2 mm
Thickness of base	2.5 mm or less

Recommended cell:

- 50 μ L micro cell (optical path length 10 mm)
- 5 μ L micro cell (optical path length 1 mm, optional spacer is required.)



50 μ L micro cell



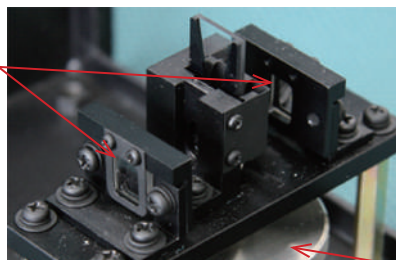
5 μ L micro cell and spacer

EMC-759 | 5 μ L Ultra-micro Cell Holder



EMC-759

EMC-759 includes focusing optics for use with a 5 μ L micro cell only for use with the V-730 and V-730BIO.



Lens

Adjustment screw for cell height

Specification

Compatible cell:

Optical path length	1 mm
Optical path width	2 mm
Thickness of base	3.5 mm or less

Recommended cell:

- 5 μ L micro cell

Sippers, Autosampler & Flow Cells

NQF-930 | Vacuum Sipper

NQF-929 | Vacuum Sipper (with 50 mm flow cell unit)



NQF-930

Vacuum sipper for fast measurement, the sample cannot be recovered. These units can be operated simply by inserting the nozzle into a container filled with the sample solution and pressing the nozzle lever.

Specification

- Optical path length:
10 mm (NQF-930), 50 mm (NQF-929)
- Flow cell capability:
Approx. 70 μ L (NQF-930), approx. 1400 μ L (NQF-929)
- Flow cell material:
Quartz
- Carryover:
Less than 1% (for low-viscosity samples)
- Minimum sample requirement:
0.7 mL (NQF-930), 5 mL (NQF-929)
- Tubing:
Teflon

Optional accessory

Optical path length 50 mm rectangular cell holder (for NQF-930)

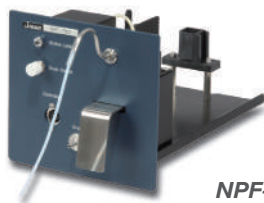
Exchanging the optical path length 10 mm rectangular cell holder of the NQF-930 with the optical path length 50 mm cell holder enables measurement with a optical path length 10, 20, or 50 mm.

Optical path length 1 mm flow cell (for NQF-930)

Exchanging the optical path length 10 mm flow cell of the NQF-930 with the optical path length 1 mm flow cell enables measurement with optical path length 1 mm.

- Micro cell** micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available
- V-730** used only with V-730/V-730BIO
- V-750** used only with V-750
- V-760** used only with V-760
- V-770** used only with V-770
- V-780** used only with V-780
- V-700** compatible with all V-700 Series instruments

NPF-782 | Peristaltic Sipper



NPF-782

Peristaltic sipper with sample recovery. NPF-782 can also be used with optical path length 10 mm rectangular cell by switching-out the flow cell.

Specification

- Optical path length: 10 mm (optical path length 1 mm flow cell block is available as option.)
- Flow cell capability: Approx. 70 µL
- Flow cell material: Quartz
- Carryover: Less than 1% (for low-viscosity samples)
- Minimum sample requirement: 0.7 mL
- Tubing: PharMed tubing, etc.

ASU-800 | Autosampler Unit



Configuration example: ASU-800 with NPF-782 Peristaltic Sipper

Automates the measurement of multiple liquid samples when used with a sipper or syringe pump. Various optional racks can be used with a range of test tubes, vials or microplates.

Compatible with the following pumps: NQF-930, NQF-929, NPF-782, ASP-849

Specification

- Nozzle material: SUS-316
- Tubing: Teflon

- Micro cell** micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available
- V-730** used only with V-730/V-730BIO
- V-750** used only with V-750
- V-760** used only with V-760
- V-770** used only with V-770
- V-780** used only with V-780
- V-700** compatible with all V-700 Series instruments

Optional accessory for ASU-800

Option racks

	Rack	Sample volume	Max. number of samples
SRA-811	15 (OD) mm test tube rack	10 mL	100
SRA-812	13 (OD) mm test tube rack	7 mL	100
SRA-813	12 (OD) mm test tube rack	5 mL	150
SRA-814	10 (OD) mm test tube rack	3 mL	150
SRA-816	Microplate rack	1 mL	192
SRA-818	Vial rack	1.5 mL	120

Dust Cover

ASU-800 protective cover.

AWU-828 | Washing Unit

Automatic washing system for the ASU-800 autosampler. For use with NQF-930, NQF-929 and NPF-782 sippers.



Dust Cover



AWU-828

ASP-849 | Syringe Pump



ASP-849

Used with the ASU-800 and SFC-712 flow cell holder. The syringe pump is suitable for measurement of small sample volumes. The unit includes a 2.5 mL syringe (1, 5 and 10 mL are optional).

Specification

- Reproducibility of volume delivery: Within ±1%
- Syringe capability: 2.5 mL (1, 5 and 10 mL options)

SFC-712 | Flow Cell Holder



SFC-712

Flow cell holder, select from optical path length 5 and 10 mm flow cells with a volume of 35 and 70 μL , respectively.

Specification

Flow cell capacity:

35 μL (optical path length 5 mm flow cell block),

70 μL (optical path length 10 mm flow cell block)

Flow cell material:

Quartz

* The cell block must be ordered separately.

LFC-713 | Long Path Flow Cell Holder

Flow cell holder, select from optical path length 30, 50 and 100 mm flow cells with a volume of 0.6, 1 and 2 mL, respectively.



LFC-713

Specification

Flow cell capacity:

Approx. 0.6 mL (optical path length 30 mm flow cell block)

Approx. 1 mL (optical path length 50 mm flow cell block)

Approx. 2 mL (optical path length 100 mm flow cell block)

Flow cell material:

Quartz

* The cell block must be ordered separately.

MFC-714 | Micro Flow Cell Holder

FIC-715 | Micro Flow Cell Holder



MFC-714



FIC-715

MFC-714 has stainless-steel flow cell with optical path length 10 mm, and FIC-715 has Teflon flow cell with optical path length 10 mm.

Specification

Optical path length:

10 mm

Flow cell capacity:

20 μL

Tubing:

Stainless-steel (MFC-714), Teflon, etc. (FIC-715)

Flow cell window material:

Quartz

Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available

V-730 used only with V-730/V-730BIO

V-750 used only with V-750

V-760 used only with V-760

V-770 used only with V-770

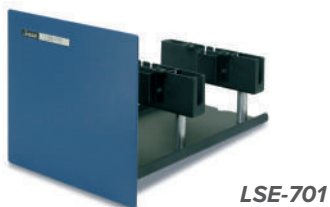
V-780 used only with V-780

V-700 compatible with all V-700 Series instruments

Ambient Accessories

Liquid Cell Holders Liquid Cell Changers

LSE-701 | Long Path Cell Holder



Specification

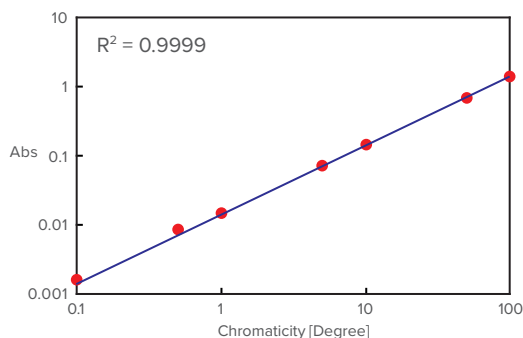
- Cell (sample side):
Optical path length 10, 20, 50 or 100 mm rectangular cell
- Cell (reference side):
Optical path length 10, 20, 50 or 100 mm rectangular cell



Chromaticity measurement system for ISO 7887 (Method C)

Chromaticity measurement is a test to determine the degree of coloration caused by humic acid in water. JASCO can provide systems capable of evaluating chromaticity as specified in ISO 7887 (Method C).

As an example, the calibration curve of chromaticity standard solution was created by using V-750. A calibration curve showing a high correlation of $R^2=0.9999$ or higher was obtained for chromaticities from 0.1 to 100 degrees.



Calibration curve of chromaticity

Configuration example

V-750 ST	UV-Visible spectrophotometer
LSE-701	Long path cell holder
VWWQ-953	100 mm rectangular quartz cell with lid Chromaticity/Turbidity measurement program

UV Application Data: 290-UV-0038

FSE-702 | 4-position Long Path Cell Holder



FSE-702

Specification

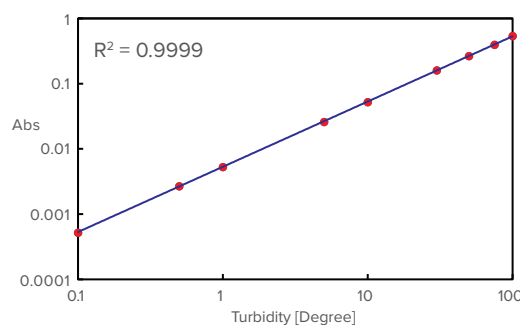
- Cell (sample side):
Optical path length 10, 20, 50 or 100 mm rectangular cell × 4
- Cell (reference side):
Optical path length 10, 20, 50 or 100 mm rectangular cell
- Cell switching:
Manual



Turbidity measurement system for ISO 7027 and ASTM D 7315

Turbidity measurement is a test to determine the degree of turbidity caused by insoluble particles, microorganisms, and organic matter in drinking water and sewage. JASCO can provide systems capable of evaluating turbidity as specified in ISO 7027 and ASTM D 7315.

As an example, the calibration curve of turbidity standard solution was created by using V-750. A calibration curve showing a high correlation of $R^2=0.9999$ or higher was obtained for turbidities from 0.1 to 100 degrees.



Calibration curve of turbidity

Configuration example

V-750 ST	UV-Visible spectrophotometer
LSE-701	Long path cell holder
VWWQ-953	20 mm rectangular quartz cell with lid Chromaticity/Turbidity measurement program

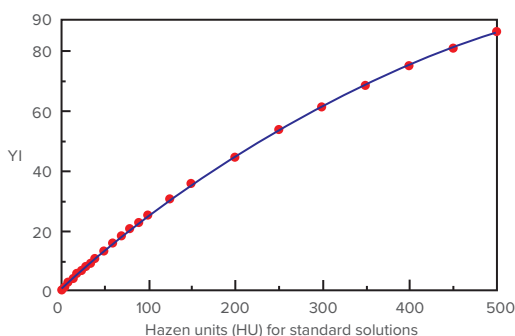
UV Application Data: 290-UV-0039



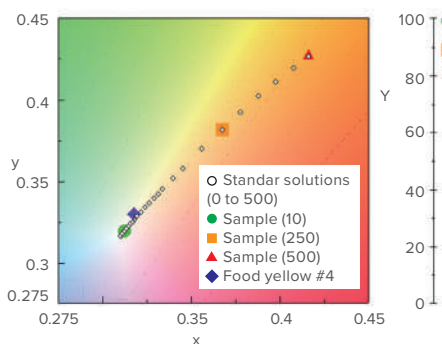
Hazen color measurement system for ISO 6271

The test of color in Hazen units using an UV-Visible spectrophotometer is specified by ISO 6271. This Hazen color test evaluates the degree of coloration of liquid chemicals used as raw materials, such as drying oils, varnishes and petroleum, and chemicals that melt when heated. The Hazen color number is calculated by numbering the yellowish standard solutions in several concentrations, comparing the color of the standard solution with that of the sample, and expressing the color of the sample as the number of the standard solution whose color is closest to the color of the sample.

JASCO can provide a solution that can objectively evaluate Hazen units in accordance with ISO 6271.



Calibration curve for yellowness against Hazen color



xy Chromaticity diagram showing color coordinates for standard solutions and samples

Configuration example

V-750 ST	UV-Visible spectrophotometer
LSE-701	Long path cell holder
VWHC-977	50 mm rectangular quartz cell with lid
	Color evaluation (Hazen) program

UV Application Data: 040-UV-0031B

SSE-704 | 6-position Manual Cell Holder



SSE-704

Specification

- Cell (sample side):
Optical path length 5, 10 or 20mm rectangular cell × 6
- Cell (reference side):
Optical path length 5, 10 or 20mm rectangular cell
- Cell switching:
Manual

NCP-705 | 6-Position Automatic Cell Changer

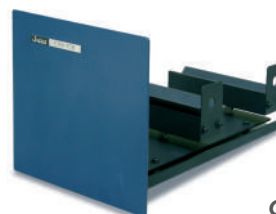


NCP-705

Specification

- Cell (sample side):
Optical path length 10 mm rectangular cell × 6
- Cell (reference side):
Optical path length 10 mm rectangular cell
- Cell switching:
Software controlled

CYH-708 | Cylindrical Cell Holder



CYH-708

Specification

- Cell (sample side):
Optical path length 50 or 100 mm cylindrical cell
- Cell (reference side):
Optical path length 50 or 100 mm cylindrical cell
- Outer diameter of cylindrical cell:
Φ 22 or Φ 30 mm

Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available

V-730 used only with V-730/V-730BIO

V-750 used only with V-750

V-760 used only with V-760

V-770 used only with V-770

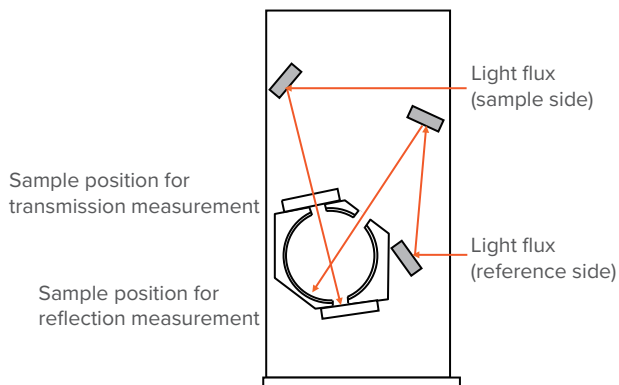
V-780 used only with V-780

V-700 compatible with all V-700 Series instruments

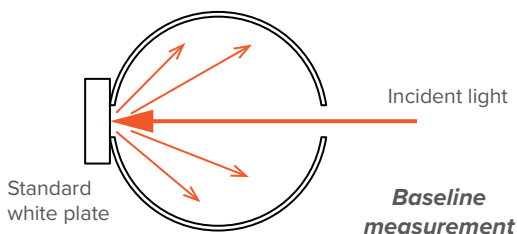
Integrating Spheres

The integrating spheres are used to measure the diffuse transmittance and diffuse reflectance of the sample that diffuses light.

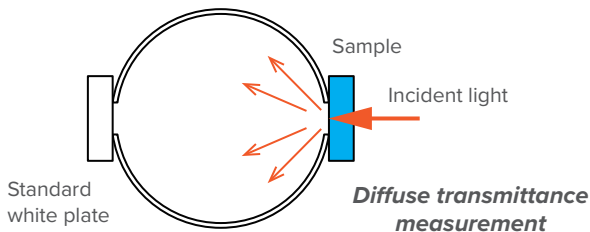
Normally, UV-Visible and UV-Vis/NIR spectrophotometers can measure the transmittance of homogeneous, transparent liquid or solid samples. Measuring suspended liquid or opaque solid samples, the light incident upon the sample is diffused and only a small portion of the light reaches the detector, resulting in an inaccurate measurement. The integrating sphere acquires most of the diffusely transmitted or diffusely reflected light and introduces it to the detector, permitting accurate measurement.



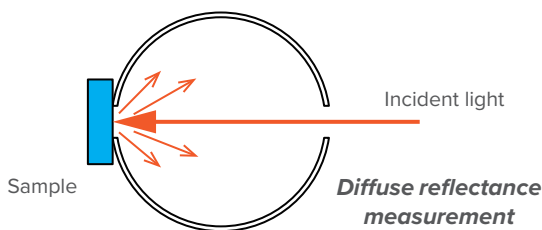
Overview (ISV/ISN)



Baseline measurement



Diffuse transmittance measurement



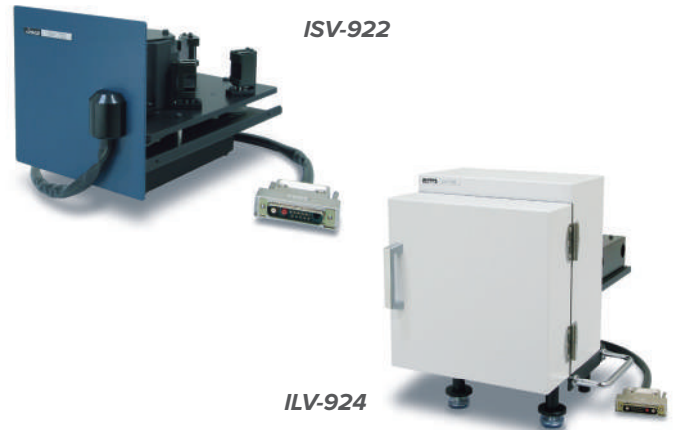
Diffuse reflectance measurement

Measurement Overview

ISV-922/ILV-924 | Integrating Sphere (60 mm Φ / 150 mm Φ) ●●

ISN-923/ILN-925 | Integrating Sphere (60 mm Φ / 150 mm Φ) ●

ISN-901i/ISN-902i | Integrating Sphere (60 mm Φ / 150 mm Φ) ●



Specification

Inside diameter of integrating sphere:

Φ 60 mm (ISV/ISN), Φ 150 mm (ILV/ILN)

Sample size (reflectance measurement):

Minimum 20 (W) \times 20 (H) \times 0.5 (T) mm

Maximum 50 (W) \times 65 (H) \times 25 (T) mm (ISV/ISN)

50 (W) \times 100 (H) \times 30 (T) mm (ILV/ILN)

Sample cell (transmittance measurement, sample side):

Optical path length 5, 10, 20, 30 or 50 mm rectangular cell

Sample cell (ISV/ISN, transmittance measurement, reference side):

Optical path length 5, 10 or 20 rectangular cell

(reference cell block option)

Wavelength range:

200 to 870 nm (ISV-922), 220 to 850 nm (ILV-924)

200 to 2500 nm (ISN-923), 220 to 2200 nm (ILN-925)

200 to 1600 nm (ISN-901i), 220 to 1600 nm (ILN-902i)

Incident angle to reflection surface:

0° (ISV/ISN), approx. 5° (ISV/ISN/ILV/ILN)

Optional Accessories

PSH-002 | Powder sample holder (for ISV/ISN/ILV/ILN)

For diffuse reflectance measurements of powder samples. Sample: Φ 16 mm, thickness: 0.5 to 6 mm

PSH-003 | Powder sample holder (for ISV/ISN)

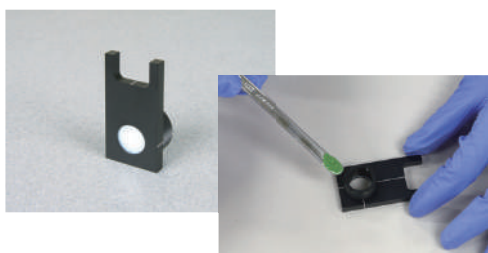
For diffuse reflectance measurements of powder samples. Sample: Φ 5 mm, thickness: 0.5 to 3 mm
 *When using the PSH-003, beam focus attachment for reflectance measurement is required.

SSH-506 | Solid sample holder (for ISV/ISN)

For diffuse transmittance measurement of solid samples. Minimum sample size: 20 (W) \times 20 (H) \times 0.5 (T) mm, maximum sample size: 40 (W) \times 70 (H) \times 35 (T) mm.

SSH-507 | Solid sample holder (for ILV/ILN)

For diffuse transmittance measurements of solid samples. Minimum sample size: 20 (W) \times 20 (H) \times 0.5 (T) mm, maximum sample size: 30 (W) \times 70 (H) \times 40 (T) mm.

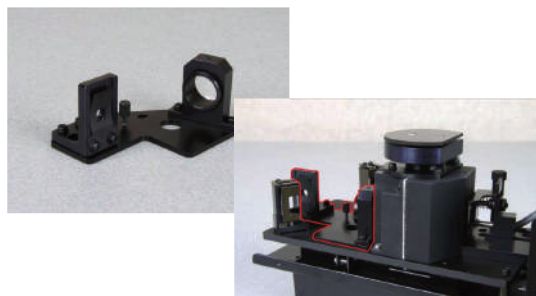


PSH-002

Beam focus attachment for reflectance measurement (for ISV/ISN)

Beam focus attachment for transmittance measurement (for ISV/ISN)

These units consist of the lens and the masks (Φ 1, Φ 2 and Φ 3 mm), and using Φ 1 mm mask makes it possible to condense the beam size down to Φ 1 mm.



Beam focus attachment for reflectance measurement



Beam focus attachment for transmittance measurement

RLH-603 | Reference cell block for integrating sphere (for ISV/ISN)

For installing the rectangular cell on the reference side. Sample cell: optical path length 5, 10 or 20 mm rectangular cell

Fluorescence cut-off filter (for ISV/ISN)

For transmittance/reflectance measurement of the sample that emits fluorescence (450 to 650 nm) using light at a wavelength near 300 nm. When using the fluorescence cut-off filter, FCH-002 is required.

FCH-002 | Fluorescence cut-off filter holder (for ISV/ISN)

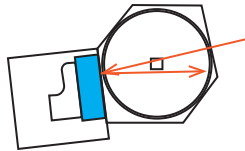
For holding the fluorescence cut-off filter on the integrating sphere

- Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available
- V-730 used only with V-730/V-730BIO
- V-750 used only with V-750
- V-760 used only with V-760
- V-770 used only with V-770
- V-780 used only with V-780
- V-700 compatible with all V-700 Series instruments

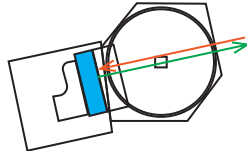
Elimination of specularly reflected light

The JASCO's integrating sphere is equipped with an optical trap, which allows reflection measurements with and without the specularly reflected light.

Diffuse reflection and specular reflection



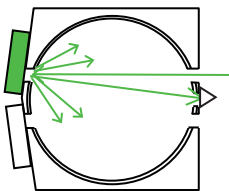
Diffuse reflection



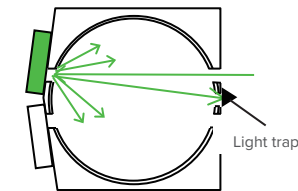
Specularly reflected light is removed using the adapter.

Elimination of specularly reflected light (ISV/ISN)

Diffuse reflection and specular reflection



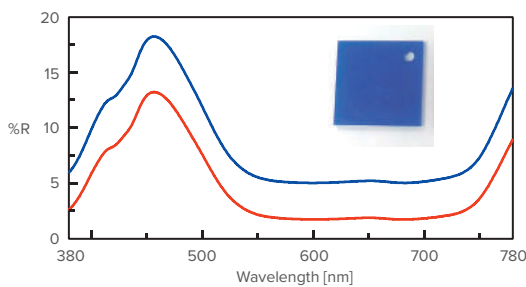
Diffuse reflection



Specularly reflected light is removed by light trap.

Elimination of specularly reflected light (ILV/ILN)

To confirm the effectiveness of the removal of the specularly reflected light, a plastic color reflector with mirror-like surface was measured using an integrating sphere. It was confirmed that there was the difference in reflectance spectra between the cases with and without removal of the specularly reflected light.



Reflectance spectra of plastic color reflector (blue: with specularly reflected light, red: without specularly reflected light)

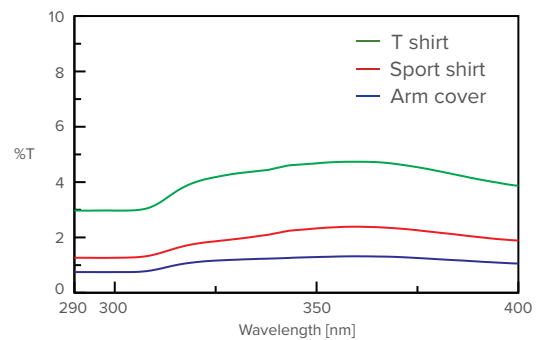
Configuration example

V-750 ST UV-Visible spectrophotometer
ISV-922 Integrating sphere

Evaluation of sun-protective textile products by UPF evaluation system

The UPF value (ultraviolet protection factor), which indicates the UV shielding performance of sun-protective textile products, can be obtained by test methods using UV-Visible spectrophotometer, which is specified by standards such as AS/NZS 4399:2017 and others, including BS EN 13758-1:2002, AATCC Test Method 183:2010, GBT18830:2009, etc.

JASCO can provide a system to evaluate and objectively compare the UPF value, UPF grade, UVA transmittance, and UVB transmittance of sun-protective textile products as defined by standards.



Transmittance spectra of each sample

Analysis result based on AS/NZS 4399:2017

Sample	T shirt	Sport shirt	Arm cover
UPF	29.9	113.5	67.7
UPF rating	15	50 +	50 +
UVA transmittance [%]	4.3	1.2	2.1
UVB transmittance [%]	3.1	0.8	1.3

Configuration example

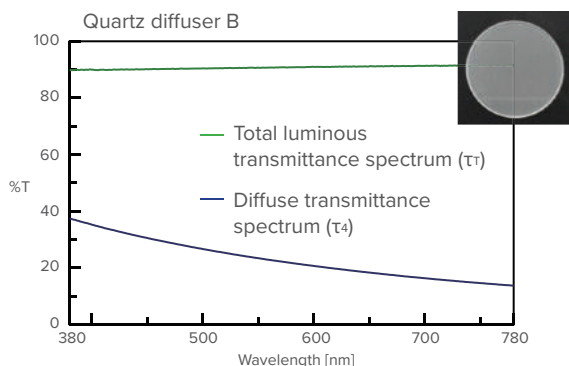
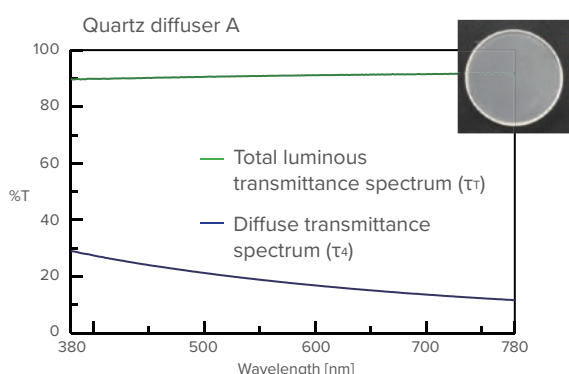
V-750 ST UV-Visible spectrophotometer
ISV-922 Integrating sphere
SSH-506 Solid sample holder
VWUP-967 UPF measurement program

UV Application Data: 070-UV-0036C

Haze value measurement by UV-visible spectrophotometer

Haze value is used as an indicator of the degree of fogging of a sample, and has recently been used to evaluate the transparency and diffusion properties of touch panel materials and solar cell materials, in addition to evaluating the transparency of plastics and films.

By using an integrating sphere unit and a haze value calculation program, the haze value and total luminous transmittance can be calculated, allowing objective evaluation of product comparisons where it is difficult to visually determine the degree of fogging.



Transmittance spectra of each sample

Calculation result

	Haze [%]
Quartz diffuser A	20.5
Quartz diffuser B	25.4

Configuration example

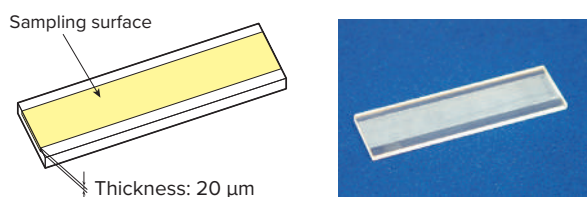
V-750 ST UV-Visible spectrophotometer
ILV-924 150 mm Φ integrating sphere
SSH-507 Solid sample holder
VWHZ-965 Sample haze calculation program

UV Application Data: 190-UV-0042

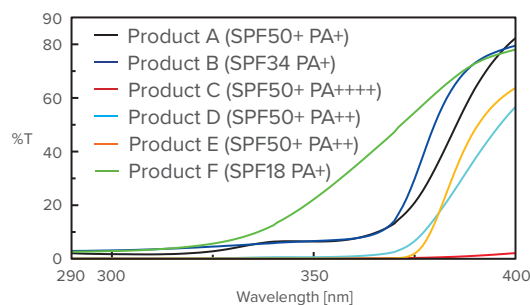
Evaluation of sun-protective cosmetics by SPF/PA evaluation system

SPF (sun protection factor) and PA (UV-A protection factor) values are widely used as indicators of the UV shielding performance of skin care products with UV-blocking effects, such as sunscreen creams.

JASCO offers the solution that SPF and PA values is calculated from the transmission spectrum of sun-protective cosmetics measured by a spectrophotometer with reference to ISO and other standards.



SPF cell



Transmission spectra of sunscreen cosmetics (SPF and PA values calculated from spectra)

Configuration example

V-750 ST UV-Visible spectrophotometer
ISV-922 Integrating sphere
VWSP-966 SPF/PA calculation program
SPF cell
SPF cell holder

UV Application Data: 130-UV-0041

PIV-756 | Horizontal Sampling Integrating Sphere



PIN-757 | Horizontal Sampling Integrating Sphere

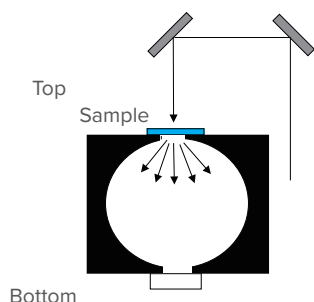


PIN-903i | Horizontal Sampling Integrating Sphere



PIN-757

Integrating spheres for horizontal sampling, models PIV-756/PIN-757, can mount the sample horizontally and provide measurements of small sample sizes by using a lens.



Specification

- Inside diameter of integrating sphere:
Φ 60 mm
- Sample size (transmittance measurement):
Minimum Φ 3 × 0.5 (T) mm
Maximum 50 × 50 × 2 (T) mm
- Sample size (reflectance measurement):
Maximum 30 × 30 × 10 (T) mm (reflection sample holder)
Maximum Φ 20 × 2 (T) mm (reflection sample adapter)
- Wavelength range:
250 to 800 nm (PIV-756)
250 to 2000 nm (PIN-757)
250 to 1600 nm (PIN-903i)

Optional accessory

Lens unit for transmittance measurement

Lens unit for reflectance measurement

These units consist of the lens and the masks (Φ 1, Φ 2 and Φ 3 mm), and using Φ 1 mm mask makes it possible to condense the beam size down to Φ 2 mm.

Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available

V-730 used only with V-730/V-730BIO

V-750 used only with V-750

V-760 used only with V-760

V-770 used only with V-770

V-780 used only with V-780

V-700 compatible with all V-700 Series instruments



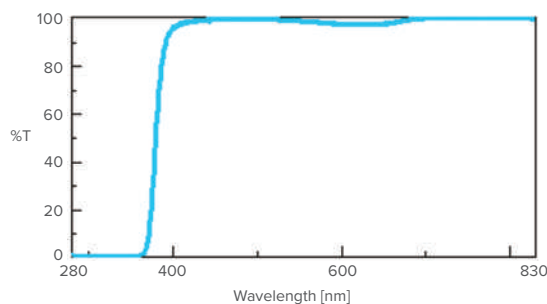
Transmission measurement of contact lens

The horizontal sampling integrating sphere is an effective tool when measuring samples that cannot be placed vertically. As an example, the contact lens was measured. The sample can be easily set up, which improves work efficiency.

The horizontal sampling integrating sphere can also be used to visually confirm the measurement location, ensuring measurement accuracy, and can be applied to locality evaluation.



Contact Lens Holder



Transmittance spectrum of contact lens

Configuration example

V-750 ST	UV-Visible spectrophotometer
PIV-756	Horizontal sampling integrating sphere
	Contact lens measurement kit

UV Application Data: 200-UV-0049

IJV-726 | Dedicated Gemstone Integrating Sphere



IJN-727 | Dedicated Gemstone Integrating Sphere

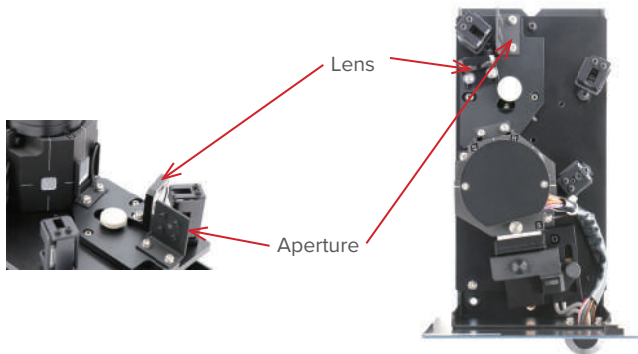


IJN-904i | Dedicated Gemstone Integrating Sphere

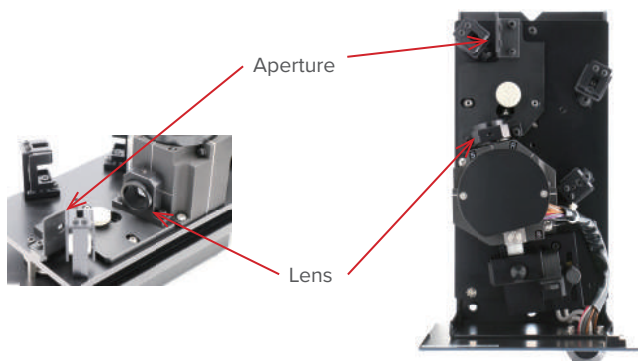


This integrating sphere has the dedicated lens for focusing the beam, and has been specially designed for measuring gemstones. In addition, with the various attachments provided as standard, measurement of precious stones mounted on rings and necklaces is possible.

Use with the GHP-506 polarizer (option) is recommended.



Overview (transmittance measurement)



Overview (reflectance measurement)

Specification

Inside diameter of integrating sphere:

Φ 60 mm

Sample size:

Φ 2 to Φ 30 mm (reflectance measurement)

Φ 2 to Φ 10 mm (transmittance measurement)

Wavelength range:

220 to 850 nm (IJV-726)

220 to 2000 nm (IJN-727)

220 to 1600 nm (IJN-904i)

Attachment for pearl

Attachment for ring



Sample holders

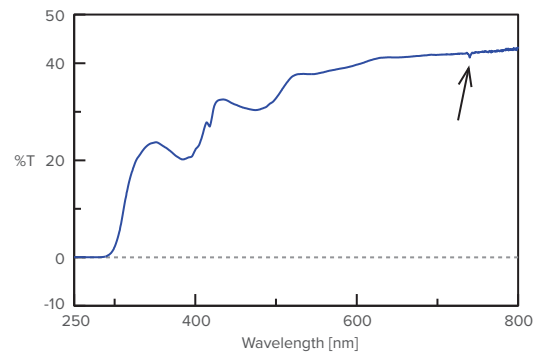


Transmission measurement of diamond

The transmittance measurement of diamond was performed using the dedicated gemstone integrating sphere. Polarizers and a focusing lens were used to eliminate false peaks and to ensure the amount of incident light.

A peak at 740 nm was detected, which is considered to be the observed trace of radiation treatment.

This integrating sphere can easily measure mineral and crystal samples that could not be hung on a conventional spectrophotometer because of their small size or irregular shape.



Transmittance spectrum of diamond

Configuration example

V-750 ST	UV-Visible spectrophotometer
IJV-726	Dedicated gemstone integrating sphere
GPH-506	Polarizer

SIV-767 | 60mm Φ Integrating Sphere with Stirrer



SIN-768 | 60mm Φ Integrating Sphere with Stirrer



SIV-767

The SIV-767 and SIN-768 include a rectangular cell holder for diffuse transmittance of a turbid liquid sample and holders for diffuse reflectance of solid samples as standard. The standard magnetic stirrer for a 10 mm path length rectangular cell enables diffuse transmittance measurements of turbid liquid samples, using the stirrer to maintain sample homogeneity. A thermostatted cell holder for the 10 mm rectangular cell is also available as an option.

Specification

- Inside diameter of integrating sphere:
 Φ 60 mm
- Sample cell (transmittance measurement, sample side):
Optical path length 5, 10, 20, 30 or 50 mm rectangular cell
- Sample cell (transmittance measurement, reference side):
Optical path length 5, 10 or 20 rectangular cell
(reference cell block option)
- Stirring system:
Magnetic stirrer (with variable stirring speed control)
- Sample size (reflectance measurement):
Minimum 20 (W) \times 20 (H) \times 0.5 (T) mm
Maximum 50 (W) \times 65 (H) \times 25 (T) mm
- Wavelength range:
250 to 800 nm (SIV-767)
250 to 2500 nm (SIN-768)

Optional Holders

RLH-603 | Reference rectangular cell holder

Required for the reference side when performing diffuse transmittance measurements of turbid liquid samples. Optical path length 5, 10 or 20 mm rectangular cells can be used with this cell holder.

Thermostatted cell holder

Allows temperature-controlled diffuse reflectance and transmittance measurements using optical path length 10 mm rectangular cell with a temperature range of 10 to 90 °C. A thermostatted water circulator is required. Thermostatted cell holder cannot be used with RLH-603.

Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available

V-730 used only with V-730/V-730BIO

V-750 used only with V-750

V-760 used only with V-760

V-770 used only with V-770

V-780 used only with V-780

V-700 compatible with all V-700 Series instruments

HISV-728 | Portable Integrating Sphere



HISN-729 | Portable Integrating Sphere



HISV-728

The HISV-728/HISN-729 accessories are suitable for the diffuse reflectance measurement of a sample which cannot be accommodated in the standard sample chamber. Select from the optional, dedicated optical fibers of 1 or 2 meter length, as required.



Specification

- Inside diameter of integrating sphere:
 Φ 60 mm
- Window size:
 Φ 25 mm
- Wavelength range:
250 to 800 nm (HISV-728)
250 to 2000 nm (HISN-729)

**It is necessary to choose an optional fiber from followings for operating HISV-728 and HISN-729.*

Optional Accessories

OFV-624B/625B | Optical fiber for HISV-728

Wavelength range: 250 to 800 nm, length: 1 m (OFV-624B), 2 m (OFV-625B)

OFN-626B/627B | Optical fiber for HISN-729

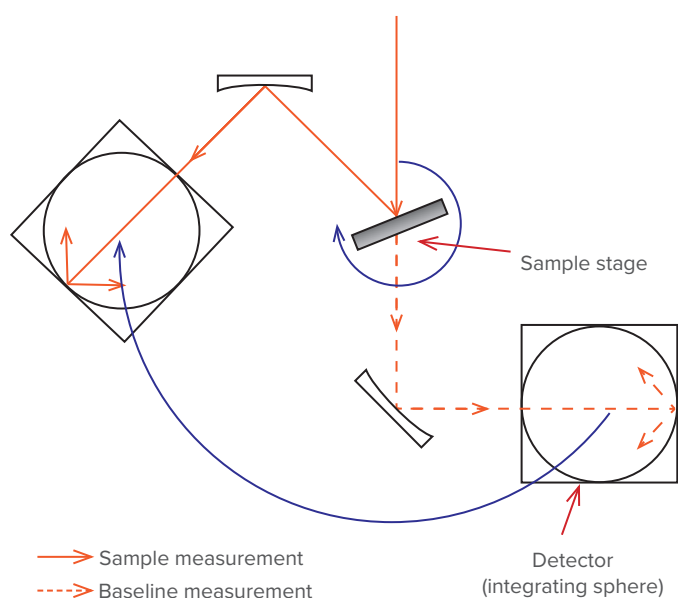
Wavelength range: 250 to 2000 nm, length: 1 m (OFN-626B), 2 m (OFN-627B)

Absolute Reflectance

JASCO's absolute reflectance measurement system employs a unique detector movement method.

First, a baseline measurement is performed with the detector set to the 0° position in the transmission configuration without a sample attached. Next, the sample is mounted and the incident angle and detector angle are set for the measurement. Since the optical arrangement from the center of rotation to the detector during the baseline measurement is the same as the one from the sample to the detector during the sample measurement, the absolute reflectance of the sample can be measured.

This allows measurements of absolute reflectance and transmittance at variable incident angles, which are not possible with the conventional method (V-N method).



Measurement Overview

ARV-913/ARSV-916 |

Absolute Reflectance Measurement Unit
(Synchronous /Asynchronous) ● ●

ARN-914/ARSN-917 |

Absolute Reflectance Measurement Unit
(Synchronous /Asynchronous) ●

ARN-915i/ARSN-918i |

Absolute Reflectance Measurement Unit
(Synchronous /Asynchronous) ●



ARV-913

The ARV and ARN accessories are used for absolute reflectance measurements with manual, synchronous movement of the sample stage and detector. The angle of incidence of the sample and the detector positions are moved simultaneously, the absolute reflectance of the sample can be measured at varied incident angles. The ARSV and ARSN are used for manual asynchronous movement of the sample stage and detector to obtain independent absolute reflectance and transmittance spectra. Optional polarizers can be used to evaluate the properties of the sample with polarized light.

Specification

Wavelength range:

250 to 850 nm (ARV-913/ARSV-916)

250 to 2000 nm (ARN-914/ARSN-917)

250 to 1600 nm (ARN-915i/ARSN-918i)

Inside diameter of integrating sphere:

Φ 60 mm

Angle of incidence:

5 to 60° (absolute reflectance measurement)

0 to 60° (transmittance measurement, ARSV/ARSN)

Vertical incidence (relative reflectance measurement)

Setting of angle of incidence:

2.5° interval (ARV/ARN)

0.1° interval (sample stage, ARSV/ARSN), 1° interval (detector stage, ARSV/ARSN)

Sample size (absolute reflectance measurement holder):

Minimum 20 (W) × 20 (H) × 1 (T) mm

Maximum 100 (W) × 70 (H) × 10 (T) mm

Sample size (relative reflectance measurement holder):

Minimum 20 (W) × 20 (H) × 0.5 (T) mm

Maximum 100 (W) × 70 (H) × 10 (T) mm

Absolute reflectance measurement accuracy:

$\pm 1.5\%$ (angle of incidence 6°)

ARMV-919 |

Automated Absolute Reflectance Measurement Unit ●●

ARMN-920 |

Automated Absolute Reflectance Measurement Unit ●

ARMN-921i |

Automated Absolute Reflectance Measurement Unit ●



ARMV-919

The ARMV and ARMN automated absolute reflectance measurement. An integrating sphere also allows measurement of the relative reflectance of a diffusely reflecting sample. Since the angles of the sample stage and the detector can be changed independently, the absolute reflectance and transmittance can be measured with varied angles of incidence. A software controlled polarizer is included as standard for evaluation of the polarization properties of a sample. In addition to S and P polarizations, N polarization obtains the same measurement results as non-polarized light.

**Please note that ARMV-919, ARMN-920 and ARMN-921i cannot work with iRM-1000.*

Specification

- Wavelength range:
 - 250 to 850 nm (ARMV-919)
 - 250 to 2000 nm (ARMN-920)
 - 250 to 1600 nm (ARMN-921i)
- Inside diameter of integrating sphere:
 - Φ 60 mm
- Angle of incidence:
 - 5 to 60° (absolute reflectance measurement)
 - 0 to 60° (transmittance measurement)
 - Vertical incidence (relative reflectance measurement)
- Setting of angle of incidence:
 - 0.1° interval (sample stage), 0.1° interval (detector stage)
- Sample size (absolute reflectance measurement holder):
 - Minimum 20 (W) × 20 (H) × 1 (T) mm
 - Maximum 70 (W) × 70 (H) × 10 (T) mm
- Sample size (relative reflectance measurement holder):
 - Minimum 20 (W) × 20 (H) × 0.5 (T) mm
 - Maximum 70 (W) × 70 (H) × 10 (T) mm
- Absolute reflectance measurement accuracy:
 - ±1.5% (angle of incidence 6°)
- Polarizer:
 - Standard

Optional accessory for Absolute Reflectance Measurement Unit

SSH-508 | Solid sample holder

Used at the entrance to the detector for diffuse transmittance measurement. Minimum sample size: 30 (W) × 30 (H) × 0.5 (T) mm, maximum sample size: 70 (W) × 80 (H) × 10(T) mm.

Wide incident angle sample holder

Widens the angle of incidence up to 85° (minimum angle is 0°). Minimum sample size: 60 (W) × 30 (H) × 1 (T) mm (ARV/ARN), 30 (W) × 30 (H) × 1 (T) mm (ARSV/ARSN/ARMV/ARMN), maximum sample size: 100 (W) × 70(H) × 10 (T) mm. Angle of incidence: 0 to 85°

PDU-926 | Phase difference measurement unit

Uses an angle selective analyzer to obtain reflectance and transmittance phase difference measurements. Wavelength range: 250 to 850 nm (ARV-913/ARSV-916/ARMV-919), 250 to 2000 nm (ARN-914/ARSN-917/ARMN-920), 250 to 1600 nm (ARN-915i/ARSN-918i/ARMN-921i). Polarization rotation angle: 0 to 90°.

ARG-476 | Polarizer (for ARV/ARN/ARSV/ARSN)

ARG-476 is used to accurately measure the absolute reflectance when the angle of incidence is 30° or greater. When the polarizer is set to 45°, a result can be obtained that is equivalent to that when non-polarized light is used. Wavelength range: 250 to 850 nm (ARV-913/ARSV-916), 250 to 2000 nm (ARN-914/ARSN-917), 250 to 1600 nm (ARN-915i/ARSN-918i). Polarization rotation angle: 0 to 90°.

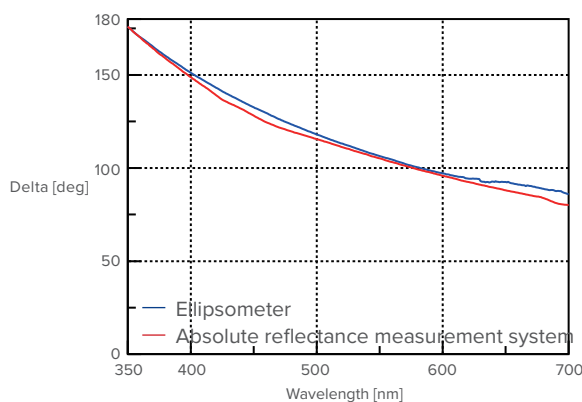


Phase difference measurement using absolute reflectance measurement system

By combining an automated absolute reflectance measurement unit with an analyzer and a phase difference measurement program, it is possible to evaluate the transmission and reflection phase difference of waveplates, retarder, retarder films, etc.

In order to confirm the effectiveness of the absolute reflectance measurement system, the phase difference measurements were performed using both its system and an ellipsometer which serves as the standard method for phase difference measurement. Consequently, the absolute reflectance measurement system could demonstrate the comparable results to the ellipsometer.

Given its utilization of a general-purpose spectrophotometer and its ease of sample measurement, this system is well-suited for relative evaluations of the same sample, routine analyses, and similar applications.



Phase difference measurement of quarter-wave plate (transmission)

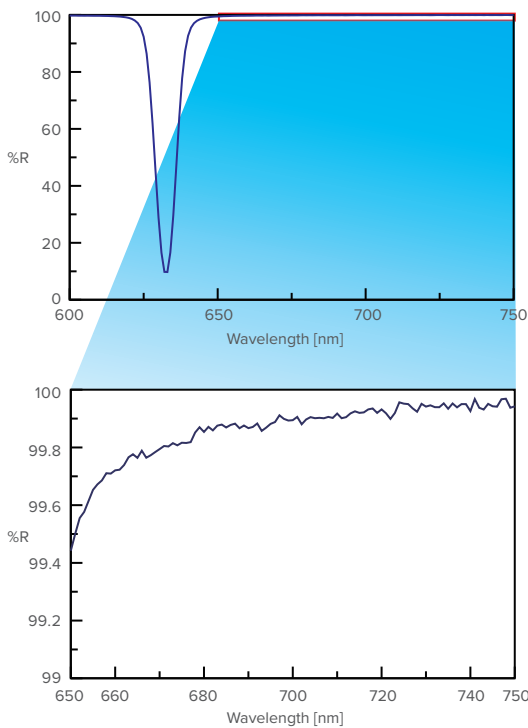
Configuration example

V-750 ST	UV-Visible spectrophotometer
ARMV-919	Automated absolute reflectance measurement unit
PDU-926	Phase difference measurement unit

Reflectance measurement of dielectric multilayer mirror with high reflectance using absolute reflectance measurement system

Dielectric multilayer mirrors, which consist of alternating layers of dielectric thin films with high and low refractive indices, can achieve reflectance of nearly 100% in a specific wavelength region. These mirrors are used in cameras, telescopes, optical systems for optical communication, etc. Evaluating their reflectance is crucial for quality control and research and development.

The V-700series absolute reflectance measurement system has excellent photometric stability thanks to its double-beam optical system. It can measure absolute reflectance at any incident angle, enabling highly accurate evaluation of the absolute reflectance of dielectric multilayer mirrors at the designed incident angle.



Absolute reflectance spectrum of dielectric multilayer mirror

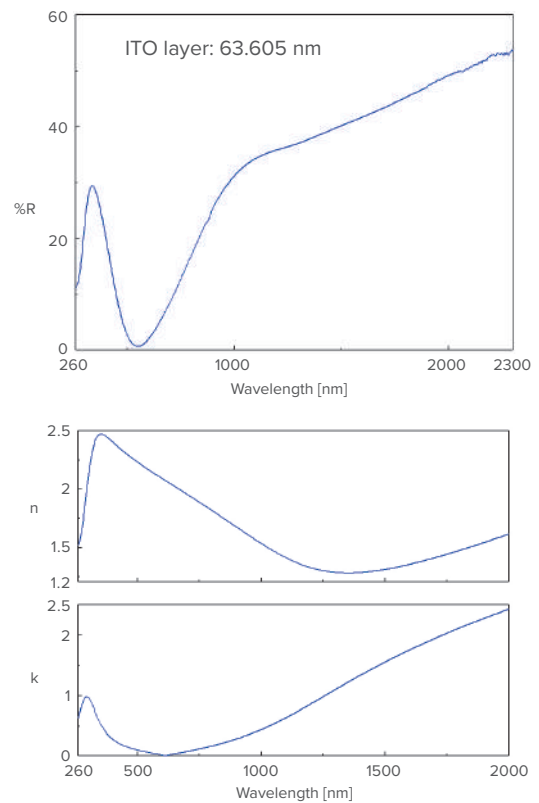
Configuration example	
V-750 ST ARMV-919	UV-Visible spectrophotometer Automated absolute reflectance measurement unit

UV Application Data: 190-UV-0043

Multi-layer film thickness analysis using absolute reflectance measurement system

The combination of an absolute reflectance measurement system and a multilayer film thickness analysis program enables highly accurate calculation of film thicknesses below 100 nm, which cannot be obtained by ordinary film thickness measurement of interference pattern, and simulates wavelength dispersion of optical constants.

In addition, the absolute reflectance measurement system can obtain angle-variable and polarization-variable data, which is not possible with general reflectance measurement (relative reflectance measurement), and thus enables more accurate analysis.



Reflectance spectrum of ITO layer (top) and its optical constants simulated by multi-layer analysis (bottom)

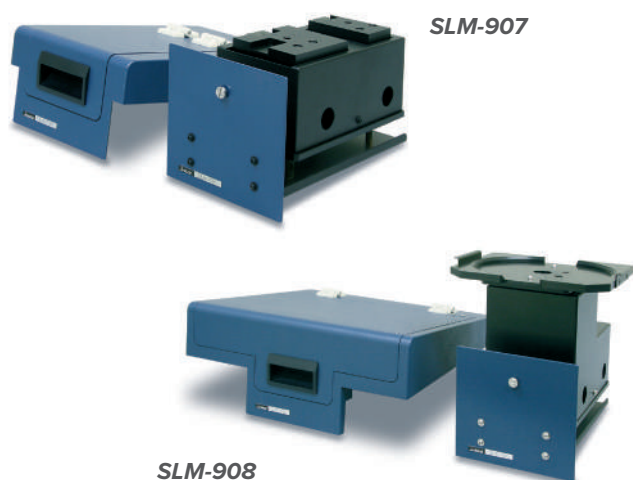
Configuration example	
V-770 ST ARMN-920	UV-Visible/NIR spectrophotometer Automated absolute reflectance measurement unit
VWML-791	Multi-layer film thickness analysis program

- Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available
- V-730 used only with V-730/V-730BIO
- V-750 used only with V-750
- V-760 used only with V-760
- V-770 used only with V-770
- V-780 used only with V-780
- V-700 compatible with all V-700 Series instruments

Solid sample holders & Others

SLM-907 | Specular Reflection Unit ●

SLM-908 | Specular Reflection Unit (accommodating 6-inch Silicon Wafers) ● ● ●



Measure the relative specular reflectance of a sample using an aluminum-deposited plane mirror as a reference. The SLM can be used to measure the reflectance and thickness of metal-deposited films. The SLM-908 can measure larger samples such as 6 inch silicon wafers.

Specification

- Angle of incidence:
Approx. 5°
- Sample size:
Minimum 10 × 10 mm
Maximum 100 × 120 mm (SLM-907), Φ 150 mm (SLM-908)
- Window size:
Φ 7 mm (SLM-907), Φ 8 mm (SLM-908)
- Reflection reference:
Aluminum-deposited plane mirror
- Wavelength range:
250 to 1000 nm (V-730 with SLM-907)
200 to 870 nm (V-750/760 with SLM-907 or SLM-908)
200 to 2500 nm (V-770 with SLM-907 or SLM-908)
200 to 1600 nm (V-780 with SLM-907 or SLM-908)

Optional Accessories

- MSK-001 | Sample stage with Φ 2 mm port (for SLM-907)**
Minimum sample size: 3 × 3 mm, Maximum sample size: 50 × 50 mm
- MSK-002 | Sample stage with Φ 4 mm port (for SLM-907)**
Minimum sample size: 5 × 5 mm, Maximum sample size: 50 × 50 mm

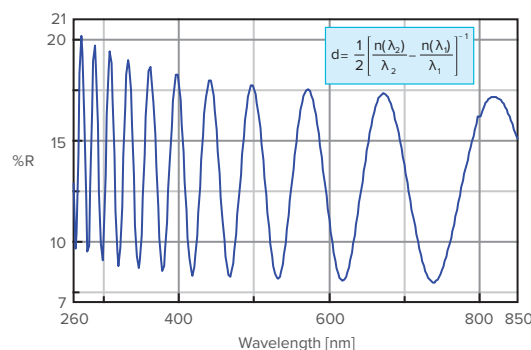
Micro cell micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available

- V-730** used only with V-730/V-730BIO
- V-750** used only with V-750
- V-760** used only with V-760
- V-770** used only with V-770
- V-780** used only with V-780
- V-700** compatible with all V-700 Series instruments



Calculation of monolayer film thickness by interference pattern

Film thickness can be determined from the wavelength (or wavenumber) interval of peaks and valleys, and it is well-known as the classical method. The refractive index must be given in advance. Although it is a simple method, it can be used to determine the thickness of a monolayer film quickly and stably. It can measure from several 100 nm to several μm in visible light, and from several μm to several 10 μm in near-infrared light.

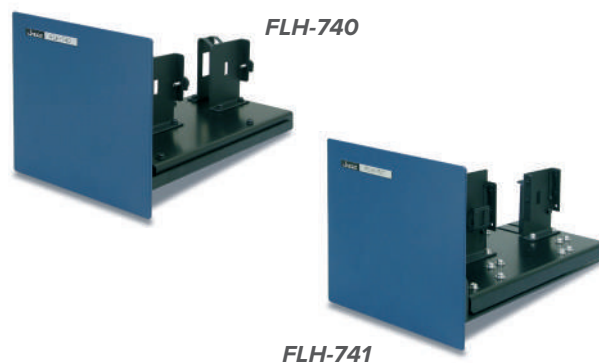


Reflectance spectra of YAG layer on glass substrate

Configuration example

V-770 ST SLM-907	UV-Visible spectrophotometer Specular reflection unit
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FLH-740/FLH-741 | Film Holder ●



Used to measure the transmittance of solid and transparent samples such as films, plate glass, and filters.

Specification

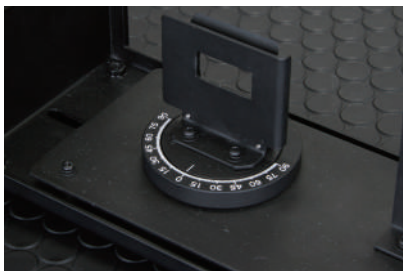
- Sample size:
Minimum 15 (W) × 15 (H) × 0.5 (T) mm (FLH-740)
5 (W) × 5 (H) × 0.5 (T) mm (FLH-741)
Maximum 100 (W) × 80 (H) × 10 (T) mm (FLH-740)
100 (W) × 80 (H) × 25 (T) mm (FLH-741)
- Sample holding:
Leaf spring (FLH-740), holding plate (FLH-741)

VTA-752 | Film Holder (Variable Incident Angle) ●



VTA-752

Used to measure transmittance of a film-like sample when the incident angle of the light beam is varied.



Specification

Sample size:
 Minimum 35 (W) × 15 (H) × 1 (T) mm
 Maximum 70 (W) × 80 (H) × 2 (T) mm
 Sample holder rotation range:
 ±90°

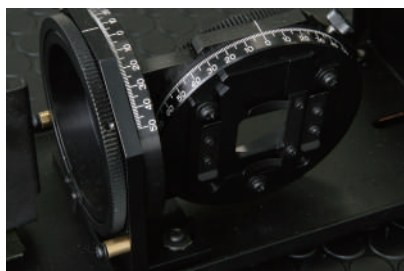
*The sample holder rotation range depends on the thickness of the sample and its refractive index.

RSH-744 | Rotary Sample Holder ●



RSH-744

Used to measure a film (planar) sample, which can be rotated 360° around the optical axis and the inclination/tilt of the sample versus the source beam can be varied within a range of ±50°.



Specification

Sample size:
 Minimum 30 (W) × 10 (H) × 1 (T) mm
 Maximum 38 (W) × 18 (H) × 2 (T) mm
 Angle of rotation (optical axis):
 360°
 Angle of rotation (perpendicular to the optical axis):
 ±50°

Optical Fiber Units

FAP-927 | Optical Fiber Unit ●●●●



FAP-927

Used for measurement of external samples using fiber probes and the internal detector of the spectrophotometer.

*The optical fiber must be ordered separately.
 *SMA connector type must be specified as the fiber port.

ELM-928 | External Light Source Fiber Optic Interface



ELM-928

Used to introduce light from an external light source into the spectrophotometer. It can be used for evaluation of the spectral characteristics or intensity of external light sources.

*A calibrated reference source is required for spectral correction of a measured spectrum.
 *The optical fiber must be ordered separately.
 *SMA connector type must be specified as the fiber port.

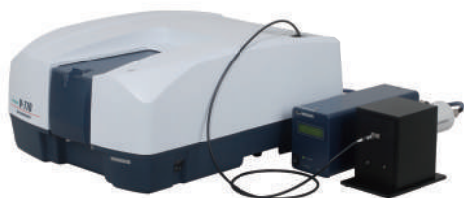
- Micro cell** micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available
- V-730** used only with V-730/V-730BIO
- V-750** used only with V-750
- V-760** used only with V-760
- V-770** used only with V-770
- V-780** used only with V-780
- V-700** compatible with all V-700 Series instruments



Luminous color measurement

In the development of lighting and displays, it is necessary to objectively evaluate the color and color rendering properties of the luminous substance itself and the finished product.

By using a spectrophotometer and an external light source fiber optic interface, the spectra measurement of LEDs, OLEDs, etc. can be performed. In addition, to accurately measure the characteristics of the luminous material, the spectra obtained must be calibrated with the instrument function. JASCO can provide a solution to accurately measure spectra using the calibrated light source with a known emission pattern. Optional software is also available to objectively evaluate luminous color and color rendering properties (refer to page 48).



Installation example of the calibrated light source

Configuration example

V-750 ST	UV-Visible spectrophotometer
ELM-928	External light source fiber optic interface
	Optical fiber
	Calibrated light source unit
VWLU-963	Luminous color measurement program

UV Application Data: 190-UV-0006

Polarizer, Depolarization Plate

GPH-506 | Polarizer ●●●●



Linear polarizer for the incident beam entering the sample compartment. The plane of polarization can be set at 0° or 90°. Spectral range from 215 to 2300 nm.

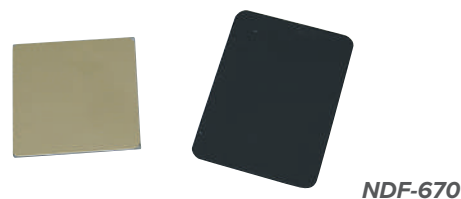
DPL-515 | Depolarizer ●●●●



Ensures that the incident light is non-polarized. Non-polarization is obtained with the rotation angle set to 45°. Spectral range is from 350 to 2500 nm.

Options for high absorbance measurement

NDF-670 | High absorbance measurement kit for solid samples ●●●●



The NDF-670 kit, which can be used with solid sample holders such as a film holder, includes a neutral density (ND) filter for reference beam attenuation and a shutter plate for dark measurements.

NDF-601 | ND filter (OD 2) for liquid samples ●●●●

The NDF-601 filter can be inserted into the standard cell holder to attenuate the light beam. The holmium glass holder which is included as standard for the V-700 Series can be used as a shutter plate for a dark measurement, by rotating it 90° from its usual position.

- Micro cell** micro cell (optical path width 2 mm, 1103-0037 and 1103-0040) available
- V-730** used only with V-730/V-730BIO
- V-750** used only with V-750
- V-760** used only with V-760
- V-770** used only with V-770
- V-780** used only with V-780
- V-700** compatible with all V-700 Series instruments

Optional Programs

Bio Applications

VWTP-959 | Temperature Control Measurement and DNA Melting Analysis

Temperature Control Measurement Program performs thermal melting measurement by monitoring changes in the photometric value of samples at a fixed wavelength with change in temperature. The melting temperature can be calculated from the measured temperature-dependent data using the Melting Temperature Calculation program.

The DNA Melting Analysis Program estimates the melting temperature of a protein or nucleic acid based on temperature-dependent data using either the Temperature Control Measurement or Temperature Interval Scan Measurement programs. The melting temperature can be calculated using any of three methods: 2nd derivative, Least squares, and One-point.

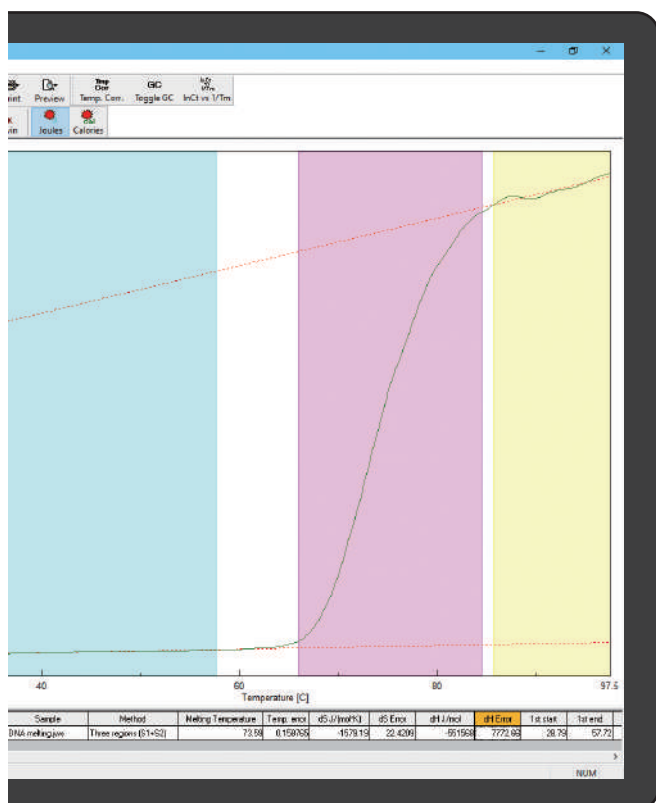
*A Peltier thermostatted cell holders is required.

VWPN-952 | Protein/Nucleic Acid Measurement

Measure spectra or fixed wavelength of proteins and/or nucleic acids and calculate the sample concentration. Quantitation can be made using one of six fixed methods or a user-defined method.

VWKN-772 | Advanced Kinetic Analysis

Calculate initial velocity, v_i , of enzymatic reactions based on time-course data, and velocity parameters (maximum velocity, V_{max} , Michaelis-Menten constant, K_m , and the Hill coefficient, n) based on a plot of the initial velocity, v_i , versus the substrate concentration [S]. The enzymatic activity can also be determined.



VRBP-790 | Bio Package

The Bio Package for Intelligent Remote Module and Spectra Manager™ versions includes: Protein Nucleic Acid Measurement, Kinetics Analysis, Temperature Control Measurement, and DNA Melting Analysis.

Interval Measurement

VWIS-957 | Interval Scan Measurement

Measure changes with time for sample absorbance at up to four wavelengths, as well as for a selected wavelength range. The measurement time interval can also be set in either minutes or seconds for up to 24 days of continuous measurement (maximum time interval is 1 day). Up to 60,000 spectra can be saved in a single interval scan measurement file.

VWTS-958 | Temperature Interval Scan Measurement

Measure spectral scans at selected temperature intervals. Temperature-dependent data can also be monitored at up to four wavelengths with a temperature ramp range from 0.1 to 10° C/min, depending on the type of temperature controlled cell holder. The sample temperature can be monitored and/or controlled either using the cell holder sensor or a temperature probe inserted into the cell. Stirring may be available depending on the cell holder.

*A Peltier thermostatted cell holder is required.

Quantitation and Chemometrics

VWQM-978 | Spectrum Quantitative Measurement

Measure the spectrum of a sample and perform quantitation using either the absorbance at a specified wavelength, or the peak absorbance for a standard sample with maximum concentration. The quantitation method can be selected from the following: no base (1-wavelength quantitative analysis), one-point base (2-wavelength quantitative analysis), or two-point base (3-wavelength quantitative analysis).

VWSQ-776 | Spectral Quantitative

This program can create calibration curves for multiple components, and can perform quantitative analysis on samples having multiple components simultaneously.

VWWQ-953 | Chromaticity/Turbidity Measurement

Measure the absorbance or transmittance of a sample in order to determine its chromaticity or turbidity. The turbidity can also be measured using an integrating sphere in order to evaluate both transmitted and scattered light.

VWCL-954 | CLS Quantitative Measurement

Measure samples and automatically perform a quantitative analysis using the classical least squares (CLS) method. A CLS calibration model must first be created and contain correlation curves for quantifying the normal absorbance of the components to be analyzed.

VWPC-955 | PCR Quantitative Measurement

Measure samples and automatically perform a quantitative analysis using the principle component regression (PCR) method. A PCR calibration model must first be created and contain correlation curves for quantifying the normal absorbance of the components to be analyzed.

compatible with 21 CFR Part 11 **CFR**

VWPL-956 | PLS Quantitative Measurement

Measure samples and automatically perform a quantitative analysis using the partial least squares (PLS) method. A PLS calibration model must first be created and contain correlation curves for quantifying the normal absorbance of the components to be analyzed.

VWPA-785 | PCA Analysis

This program can create the PCA model from the spectrum of a known substance and can predict the classification of an unknown sample from the spectrum by using the PCA model.

Color Analysis

VWCD-960 | Color Evaluation – Color Diagnosis

Comprehensive color analysis software with calculations for several different color standards including ASTM, ISO and JIS. Color and color differences are calculated from an absorbance spectrum measured from 360-830 nm. Chromaticity coordinates are plotted in the selected color system. Comparison can also be made to previously measured color spectra.

VWHC-977 | Color Evaluation – Hazen Color

Measure the spectrum of a sample in the wavelength range from 380 to 780 nm, and calculate the color in Hazen units using any of the following methods:

- Yellowness index (YI) calculated based on tristimulus values (X, Y and Z)
- Color difference ΔE^*_{ab}
- Chromaticity coordinate b^*
- Absorbance at a specific wavelength

**The long path cell holder and the optical path length 50 mm rectangular cell must be ordered separately.*

VWGC-976 | Color Evaluation – Gardner Color

Measure the spectrum of a sample in the wavelength range from 380 to 780 nm, and perform color calculations, and evaluate the Gardner color number based on ASTM, ISO or JIS.

VWSC-794 | Saybolt Color Analysis

Calculate the Saybolt color of a sample spectrum for wavelengths between 380 to 780 nm, according to the XYZ color system described by the International Commission on Illumination (CIE).

**The long path cell holder must be ordered separately depending on the sample.*

VWAC-769 | ASTM Color Analysis

Calculate the sum of the tristimulus values (X, Y, Z) and optical density from a sample absorbance, reflectance, or transmittance spectrum and obtain the ASTM color. The ASTM color, sum of optical densities, and tristimulus values are all reported. The ASTM color analysis can only be performed in the wavelength range between 380 to 780 nm.

VWLU-963 | Luminous Color Measurement

Measure the luminescence spectrum for a sample and calculate its chromaticity using the Luminous Color Analysis program, pass/fail criteria can also be included. To correct for the spectrophotometer's instrument characteristics (i.e. wavelength-dependent grating efficiencies and detector sensitivities), spectral correction can be made using a standard light source.

**not for use with the V-730. External light source interface and calibrated reference source are required.*

VWCM-795 | Computer Color Matching Analysis

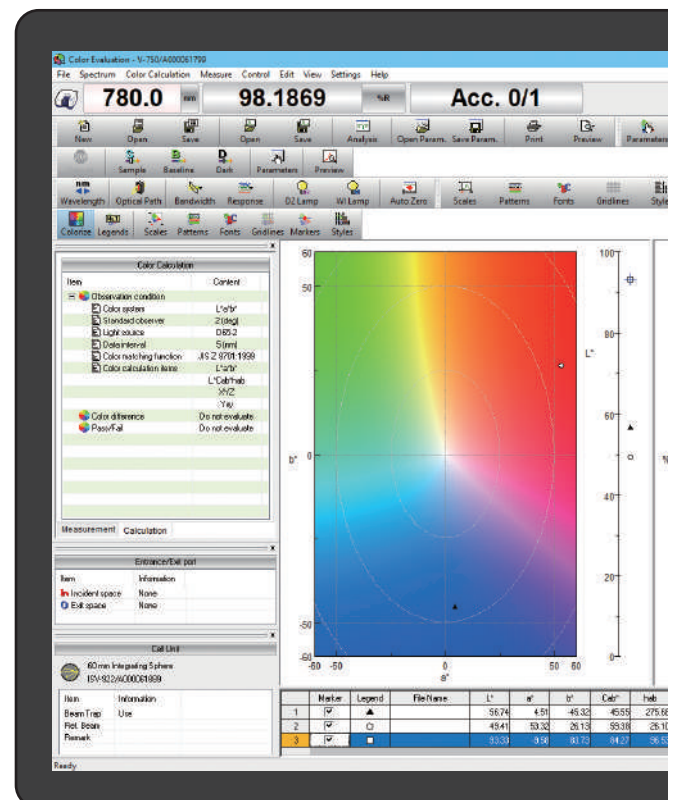
Match a spectrum with a target color using a library created with the Computer Color Matching Library program. The Color Matching Library program allows a total of 16 reference color spectra to be registered, edited, deleted, and displayed. All color matching calculation parameters, such as selecting the reference color library, color system, color matching function, standard observer, and light source, can be user defined.

Reflectance Measurement

VWAM-968 | Absolute Reflectance Spectra Measurement

Measure reflectance and transmittance spectra by setting the incidence and detection angles. For reflectance measurements, the incident angle can be set from 5 to 85° and from 0 to 85° for transmittance measurements. S- (0°), P- (90°), or N- (45°) polarization can be set for the incident light.

**This program is included in ARMV-919, ARMN-920 and ARMN-921i as standard.*



VWAS-969 | Absolute Reflectance with Variable Incident Angle Measurement

Measures the angular dependence of the reflectance and transmittance spectra by setting the incident and detection angles, for up to 20 wavelengths. For reflectance measurements, the incident angle can be set from 5 to 85° and from 0 to 85° for transmittance measurements. S- (0°), P- (90°), or N- (45°) polarization can be set for the incident light.

**Absolute Reflectance Measurement Unit is required.
This program is included in ARMV-919, ARMN-920 and ARMN-921i as standard in V-700 series.

VWAP-970 | Phase Difference Spectra Measurement

Automatically measure transmittance and reflectance phase difference spectra with multiple incident angles using an automated absolute measurement accessory. The spectrum can be measured by rotation of either polarizer or analyzer.

**This program is included in PDU-926 as standard.*

Solar Measurement and Sun Protection

VWST-964 | Solar Transmittance/Reflectance Measurement

Measure the spectral transmittance and reflectance of a sample and calculates the solar reflectance, transmittance, and absorptance, as well as the light transmittance, reflectance etc.

**V-770 only. Integrating sphere is required.*

VWSP-966 | SPF/PA Calculation

Using an integrating sphere, this application is used for evaluating the criteria the sun protection factor (SPF) and PA for sunscreens and cosmetics

**requires an integrating sphere and SPF cell*

VWUP-967 | UPF Measurement

Used to measure the transmittance of a sample to calculate the ultraviolet protection factor (UPF), UPF rating, UVA transmittance and blocking, and UVB transmittance and blocking according to a variety of standards.

**cannot be used with a V-730, requires an integrating sphere*

VWSE-798 | UV Shield Factor Calculation

Calculate the UV shield factor for a specified wavelength range from a transmittance, reflectance, or absorbance spectrum. A maximum of five wavelength ranges can be specified.

VWHZ-965 | Sample Haze Calculation

Using an integrating sphere, the measured total luminous transmittance and diffuse transmittance spectra are used to calculate haze. Criteria can be specified to perform a pass/fail evaluation.

**cannot be used with a V-730, requires an 150 mm dia. integrating sphere*

Material Analysis

VWSD-961 | Spectrum Diagnosis

Perform data processing with pass/fail evaluation on a measured spectrum based on photometric values at a specified wavelength, full width at half maximum, peak photometric values, peak wavelengths etc. Sequential measurements can also be carried out on multiples samples, each of which can be assigned different sample measurement parameters.

VWML-791 | Multi-Layer Film Thickness Analysis

Use reflectance spectra and select a multilayer model to calculate the refractive index (n), extinction coefficient (k), and layer thickness (d) of unknown layer(s) using a least squares method. Standard libraries are included for metals, semiconductors and insulators. The user can also create their own library. **Absolute Reflectance Measurement Unit is required.*

VWBG-773 | Band Gap Calculation

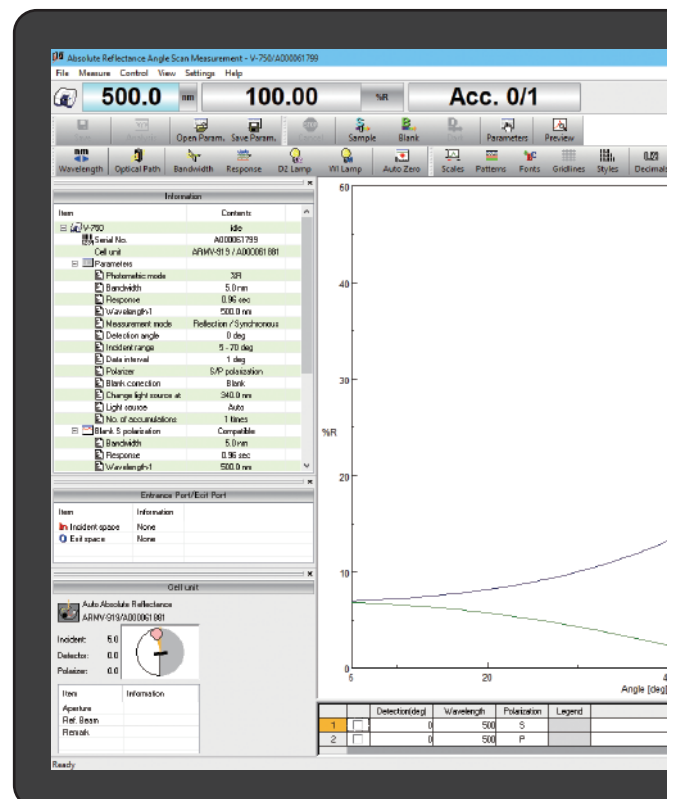
Calculate the band gap of a semiconductor sample from its spectrum. The following calculation methods can be selected:

- Direct transition: allowed
- Direct transition: forbidden
- Indirect transition: allowed
- Indirect transition: forbidden

VWAL-799 | Average Reflectance Calculation

Calculate the average reflection, transmission, or absorption of a spectrum. The function of program is described below:

- The average value can be calculated by specifying the wavelength range for a spectrum. The maximum and minimum values can also be displayed.
- The data values can be displayed by specifying a wavelength range and a data interval in a spectrum.
- The displayed data values and the average value can be saved as a text file.



Specifications

Model	V-730
Optical System	Rowland off-circle arrangement Single monochromator Double beam type
Light Source	Halogen lamp, Deuterium lamp (Light source exchange wavelength: Any wavelength between 330 and 350 nm can be selected)
Detector	Silicon photodiode
Wavelength Range	190 to 1100 nm
Wavelength Accuracy	±0.2 nm (at 656.1 nm)
Wavelength Repeatability	±0.1 nm
Scanning Speed	10 to 8000 nm/min
Slew Speed	24000 nm/min
Spectral Bandwidth (SBW)	1.0 nm fixed
Photometric Range	-3 to 3 Abs
Photometric Accuracy	±0.0015 Abs (0 to 0.5 Abs) ±0.0025 Abs (0.5 to 1 Abs) ±0.3 %T Tested with NIST SRM 930
RMS Noise ¹	0.00004 Abs
Baseline Flatness	±0.0005 Abs ²
Baseline Stability	±0.0004 Abs/hour ⁷
Stray Light	1 % (198 nm KCl 12 g/L) 0.02 % (220 nm NaI 10 g/L) 0.02 % (340 nm NaNO ₂ 50 g/L) 0.02 % (370 nm NaNO ₂ 50 g/L) Aqueous solution, SBW: 1.0 nm
Dimensions and Weight	486(W)x441(D)x216(H) mm, 15 kg
Power Requirements	120 VA

*1: 0 Abs, wavelength: 500 nm, measurement time: 60 sec, response: medium, SBW: 1 nm (V-730), 2 nm (V-750, 760, 770, 780)

*2: Value obtained more than two hours after turning on the light source, when the room temperature is stabilized, wavelength: 200 to 1000 nm, response: Slow and wavelength scanning speed: 400 nm/min with smoothing processing

*3: Value obtained more than an hour after turning on the light source, when the room temperature is stabilized, wavelength: 200 to 850 nm, response: Slow, SBW: 2 nm and wavelength scanning speed: 400 nm/min with smoothing processing

*4: Value obtained more than an hour after turning on the light source, when the room temperature is stabilized, wavelength: 200 to 800 nm, response: Slow, SBW: 2 nm, wavelength scanning speed: 400 nm/min with smoothing processing

*5: Value obtained more than an hour after turning on the light source, when the room temperature is stabilized, wavelength: 200 to 2500 nm (200 to 850nm: SBW 2 nm, 850 to 2500 nm: SBW 8 nm), response: Slow, wavelength scanning speed: 400 nm/min with smoothing processing

*6: Value obtained more than an hour after turning on the light source, when the room temperature is stabilized, wavelength: 200 to 1600 nm (200 to 850 nm: SBW 2 nm, 850 to 1600 nm: SBW 4 nm), response: Slow, wavelength scanning speed: 400 nm/min with smoothing processing

*7: Value obtained more than two hours after turning on the light source, when the room temperature is stabilized, wavelength: 250 nm, response: slow

*8: Value obtained more than an hour after turning on the light source, when the room temperature is stabilized, wavelength: 250 nm, response: slow and SBW: 2 nm

Model	V-750	V-760	V-770	V-780
Optical System	Czerny-Turner mount Single monochromator Fully symmetrical double beam type	Czerny-Turner mount Double monochromator Fully symmetrical double beam type	Czerny-Turner mount Single monochromator Fully symmetrical double beam type	Czerny-Turner mount Single monochromator Fully symmetrical double beam type
Light Source	Halogen lamp, Deuterium lamp (Light source exchange wavelength: Any wavelength between 330 and 350 nm can be selected)			
Detector	Photomultiplier tube		Photomultiplier tube Peltier cooled PbS	Photomultiplier tube Peltier cooled InGaAs photodiode
Wavelength Range	190 to 900 nm	187 to 900 nm	190 to 2700 nm (3200 nm, option)	190 to 1600 nm
Wavelength Accuracy	±0.2 nm (at 656.1 nm)	±0.1 nm (at 656.1 nm)	±0.3 nm (at 656.1 nm) ±1.5 nm (at 1312.2 nm)	±0.3 nm (at 656.1 nm) ±1.0 nm (at 1312.2 nm)
Wavelength Repeatability	±0.05 nm	±0.05 nm	±0.05 nm (UV-Vis) ±0.2 nm (NIR)	±0.05 nm (UV-Vis) ±0.1 nm (NIR)
Scanning Speed	10 to 4000 nm/min (8000 nm/min in preview mode)			
Slew Speed	12000 nm/min		UV-Vis: 12000 nm/min NIR: 48000 nm/min	UV-Vis: 12000 nm/min NIR: 24000 nm/min
Spectral Bandwidth (SBW) L: Low Stray Light Mode M: Micro Cell Mode	0.1, 0.2, 0.5, 1, 2, 5, 10 nm L2, L5, L10 nm M1, M2 nm		UV-Vis: 0.1, 0.2, 0.5, 1, 2, 5, 10 nm L2, L5, L10 nm M1, M2 nm NIR: 0.4, 0.8, 2, 4, 8, 20, 40 nm L8, L20, L40 nm M4, M8 nm	UV-Vis: 0.1, 0.2, 0.5, 1, 2, 5, 10 nm L2, L5, L10 nm M1, M2 nm NIR: 0.2, 0.4, 1, 2, 4, 10, 20 nm L4, L10, L20 nm M2, M4 nm
Photometric Range	-4 to 4 Abs	-4 to 6 Abs	UV-Vis: -4 to 4 Abs NIR: -3 to 3 Abs	UV-Vis: -4 to 4 Abs NIR: -3 to 3 Abs
Photometric Accuracy	±0.0015 Abs (0 to 0.5 Abs) ±0.0025 Abs (0.5 to 1 Abs) ±0.3 %T Tested with NIST SRM 930			
RMS Noise ¹	0.00003 Abs	0.00003 Abs	0.00003 Abs	0.00003 Abs
Baseline Flatness	±0.0002 Abs ⁻³	±0.0003 Abs ⁻⁴	±0.0002 Abs ⁻⁵	±0.0002 Abs ⁻⁶
Baseline Stability	±0.0003 Abs/hour ⁸			
Stray Light	1% (198 nm KCl 12 g/L) 0.005% (220 nm NaI 10 g/L) 0.005% (340 nm NaNO ₂ 50 g/L) 0.005% (370 nm NaNO ₂ 50 g/L) Aqueous solution, SBW: L2 nm	1% (198 nm KCl 12 g/L) 0.00008% (220 nm NaI 10 g/L) 0.00008% (340 nm NaNO ₂ 0 g/L) 0.00008% (370 nm NaNO ₂ 0 g/L) Aqueous solution, SBW: L2 nm	1% (198 nm KCl 12 g/L) 0.005% (220 nm NaI 10 g/L) 0.005% (340 nm NaNO ₂ 50 g/L) 0.005% (370 nm NaNO ₂ 50 g/L) Aqueous solution, SBW: L2 nm 0.04% (1420 nm: H ₂ O) 0.1% (1690 nm: CH ₂ Br ₂ 50 mm cell) SBW: L8 nm	1% (198 nm KCl 12 g/L) 0.005% (220 nm NaI 10 g/L) 0.005% (340 nm NaNO ₂ 50 g/L) 0.005% (370 nm NaNO ₂ 50 g/L) Aqueous solution, SBW: L2 nm 0.04% (1420 nm: H ₂ O) SBW: L4 nm
Dimensions and Weight	460(W)x602(D)x268(H) mm, 27 kg	460(W)x602(D)x268(H) mm, 29 kg	460(W)x602(D)x268(H) mm, 29 kg	460(W)x602(D)x268(H) mm, 29 kg
Power Requirements	150 VA	150 VA	150 VA	150 VA



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Products described herein are designed and manufactured by ISO-9001 and ISO-14001 certified JASCO Corporation

6704-2402ENG

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ISO 9001

CERTIFICATE OF REGISTRATION

Registered Organization and Address

JASCO Corporation

2967-5, Ishikawa-machi, Hachioji, Tokyo 192-8537, Japan

ASSOCIATED ORGANIZATION : JASCO Techno CO., LTD.

2967-5, Ishikawa-machi, Hachioji, Tokyo 192-8537, Japan

The Scope of the Registration

Design, development and production of analytical instruments

JSA Solutions Co.,Ltd. registers

the Quality Management System of the above organization, which conforms to

JIS Q 9001:2015, ISO 9001:2015

Certificate of registration No: JSAQ 2699

Initial certification date: 1995/2/10

Valid until: 2027/5/10

Recertification date: 2024/5/11

Issue date: 2023/12/7

Decision date: 2023/11/27

Transfer date: 2014/3/17

Note: This organization was transferred from JAPAN QUALITY ASSURANCE ORGANIZATION to JSA-SOL

and registered.



A handwritten signature in black ink, appearing to read 'Oku', positioned above a horizontal line.

Senior Executive
Management Systems Enhancement Department
JSA Solutions Co.,Ltd.

The registered organization shall abide by the Rules Governing the Maintenance of Registration.
Details of Registration information are based on Management System Registration information.

JSA Solutions Co.,Ltd. Management Systems Enhancement Department 3-13-12, Mita, Minato-ku, TOKYO, JAPAN



DECLARATION OF CONFORMITY

We,

JASCO CORPORATION
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Tokyo 192 -8537- JAPAN

hereby declare under our full responsibility that the product:

Type of Product UV/VIS Spectrophotometer

Name V-730/730BIO

which this declaration is referred to is in compliance with following norm(s):

EN61326 -1: 2013
and EN61000-3-2:2006 +A1:2009 + A2:2009
and EN61010-1: 2010
as established by EMC Directive 2014/30/EU and Low Voltage Directive
2014/35/EU, respectively.

April 1,2015

Kazuya Isoda
General Manager
Quality Assurance Division