

V-600 Series

UV-Vis/NIR Spectrophotometers

A complete line of instruments with a wide variety of sampling accessories providing the most flexible configuration for rapidly expanding requirements

V-630

UV-Vis Spectrophotometer

V-630BIO

UV-Vis Spectrophotometer

V-650

UV-Vis Spectrophotometer

V-660

UV-Vis Spectrophotometer

V-670

UV-Vis/NIR Spectrophotometer



JASCO

Comprehensive line of precision instruments

V-600 Series UV-Vis/NIR Spectrophotometers

V-630

General-purpose
UV-Vis



V-630BIO

Life Science
package



V-650

High resolution
UV-Vis



V-660

Exceptional
stray light rejection



V-670

Expansion
into the NIR region



A complete line for growing demands

The V-600 Series is a complete line of UV-Vis/NIR spectrophotometers reflecting JASCO's latest technology. From an innovative optical layout to a simple comprehensive instrument control and data analysis software interface, the V-600 Series does not compromise on accuracy, performance or reliability. There are five different models available; the compact, high-performance V-630, the V-630BIO dedicated for Life Science with specific functionality, the V-650 high quality double beam instrument, the V-660 with high specification double beam double monochromator, and the high-throughput V-670 which covers the near-IR region.



V-630

iRM-700 intelligent remote
module

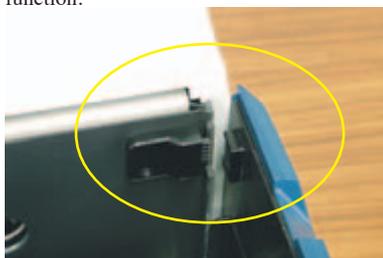


V-650

Spectra Manager II

IQ Accessory and IQ Start

The IQ Accessory function automatically recognizes an accessory when it is inserted into the sample compartment. When the IQ Accessory system recognizes the registered accessory, the assigned program automatically starts by using the IQ Start function.



Start Button

All models have a Start Button for immediate initiation of sample measurement. After placing a sample in the sample compartment, simply press the Start Button on the instrument to begin measurement.



Wide range of optional accessories and software program packages

The V-600 Series can be integrated with a complement of more than 50 accessories and over 20 optional programs to offer flexible configurations for a wide variety of analytical requirements. Experimental capabilities range from simple educational applications and routine daily use, to specific applications for advanced biochemical and semiconductor research. The range of accessories include various types of cell holders for liquid samples and options for a wide variety of solid samples.



Two graphical user interfaces

For each instrument model, two graphical user interfaces are available; the iRM-700 intelligent remote module and the Spectra Manager II software for PC control through high-speed USB communication. You can select the type of interface according to your purpose of measurement and the available bench space.

Step scan

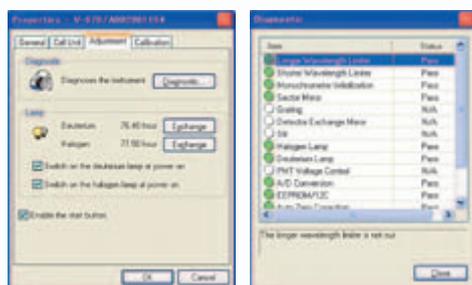
A step scanning function is available for spectral measurement in all models of the V-600 Series. This is an effective scanning mode in cases where the absorbance varies very rapidly.

L mode and M mode slit settings

The spectral bandwidth settings of the V-650, 660, and 670 have 'L' Mode and 'M' Mode settings. The 'L' Mode is effective for measurement of highly absorbing samples. The 'M' Mode focuses the incident beam for accurate measurements of trace amounts of sample in a micro cell.

Self-diagnosis

Both the iRM and PC interfaces have a function for self-diagnosis of the instruments making it easy to perform daily inspection. The light source monitor displays the total running time of the light source, providing a useful guide for performing maintenance.



Wide wavelength range from UV to NIR

The high energy throughput of the V-600 Series provides an excellent signal-to-noise ratio for the entire UV to NIR spectral range. The V-660 supports the short wavelength range down to 187 nm. The V-670 covers the Near-IR region up to 2,700 nm, while the wavelength extension kit extends this measurement range to 3,200 nm.

Micro cells

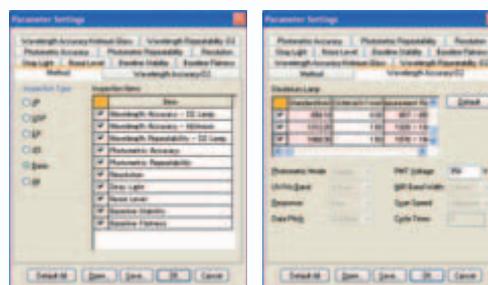
The standard cell holder of the V-600 Series accepts micro cells (optical path length of 10 mm and a minimum optical path width of 2 mm), which is useful for measurement of very small amounts of samples.

Dark correction

A Dark Correction function is standard for all models of the V-600 Series, which provides photometrically accurate measurements of highly absorbing samples.

Validation

All models include a validation program as standard to support USP, EP and JP instrument qualification procedures. By following the guidance messages in the program, a series of instrument qualification tests are obtained for electronic storage and printout.



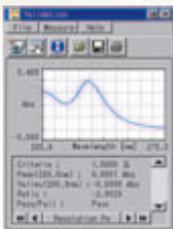
V-630 UV-Vis Spectrophotometer



The V-630 is a general-purpose UV-Vis spectrophotometer with a compact design to minimize bench space requirements. It has excellent spectroscopic performance suitable even for research applications as well as educational and routine QC applications. The advanced optical design features a wide wavelength range of 190 to 1,100 nm, stray light of less than 0.04% and a spectral bandwidth of 1.5 nm, enough to satisfy any pharmacopeia requirement. Two graphical user interfaces are available including the iRM-700 intelligent remote module and the Spectra Manager™ II cross-platform spectroscopy software allowing full-system control and advanced data processing.

- Double beam spectrophotometer with single monochromator
- Silicon photodiode detectors
- Range 190 to 1,100 nm
- Fixed bandpass of 1.5 nm
- High-speed scanning up to 8,000 nm/min

Instrument validation program

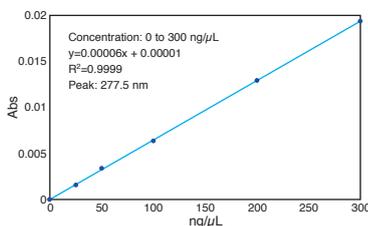


The iRM and PC types provide a standard validation program. This program supports USP, EP and JP instrument qualification requirements. The iRM display at the right shows the results of the resolution test specified by the EP. The program automatically performs an analysis of the instrument results based on defined acceptance criteria. Results of the validation tests can be printed or saved electronically for further review.

Results of validation tests

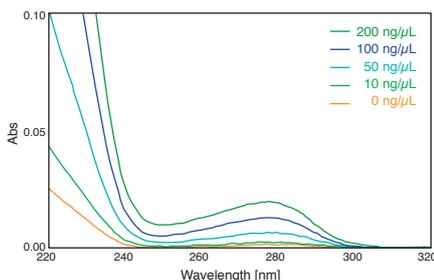
Facility to accept micro cells

The standard cell holder of the V-600 Series accepts micro cells (optical path length of 10 mm) with a minimum optical path width of 2 mm, which is useful for measurement of very small amounts of sample. Figures below illustrate highly accurate measurement of small amounts of albumen solution by using the EMC-759 Ultra-micro cell holder and a 5 μL micro cell.

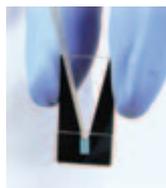


EMC-759 Micro cell holder

Calibration curve of albumen solutions

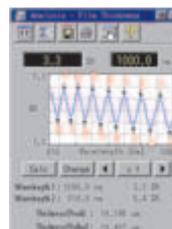


Spectra of albumen solutions



5 μL micro cell (stepped type)

Film thickness measurement



Results of film thickness calculation

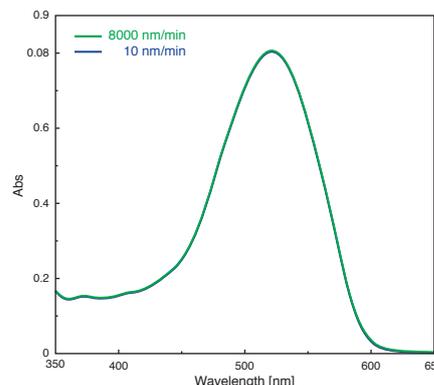


SLM-737 Specular reflectance accessory

The V-630 offers flexible support for various liquid and solid samples and measurement methods, and its function is enhanced by a range of optional accessories and programs. Above, the iRM-700 display shows the results of a reflectance spectrum measurement of a film used for food packaging using the SLM-737 Single reflection measurement unit. The film thickness is calculated from the interference fringes using the optional film thickness calculation program.

High speed scanning up to 8,000 nm/min

The V-630 can perform spectral measurements at scanning speeds up to 8,000 nm/min, which is the fastest performance within the V-600 Series. The figure below shows the comparison of spectra measured at scanning speeds of 8,000 nm/min and 10 nm/min. The two spectral shapes match very closely, and the shape does not vary even with high-speed scanning.



Comparison of high-speed scan and normal scan

V-650 UV-Vis Spectrophotometer

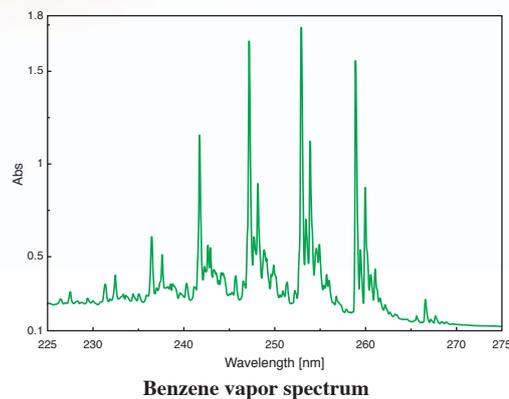


The V-650 is a double beam spectrophotometer with a single monochromator and photomultiplier tube detector. The high sensitivity of the photomultiplier tube detector enables accurate measurements of low concentration samples with excellent linearity up to an absorbance of 4. By controlling the high voltage applied to the PM tube, the dynode feedback electrical process allows a wider dynamic range. The fully symmetrical optical design results in a high optical throughput, allowing the bandwidth to be set down to 0.1 nm for high resolution work. The V-650 supports various optional accessories for liquids and solids, providing sample measurements for a wide variety of sample shapes and volumes.

- Double beam with single monochromator
- Highly sensitive PMT detector
- Range 190 to 900 nm
- Variable band pass
- High resolution down to 0.1 nm

High resolution measurement

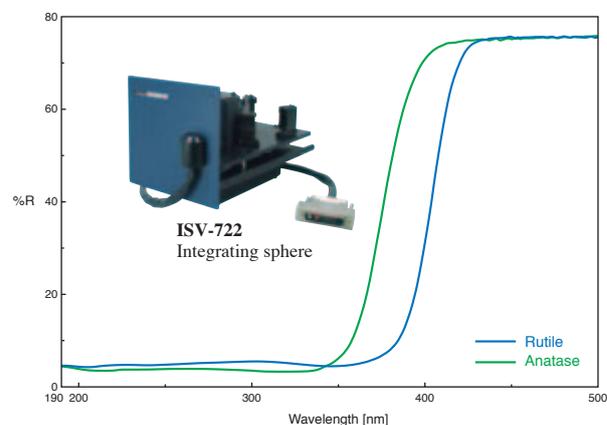
The figure illustrates the spectral measurement of benzene gas introduced into a cylindrical cell with an optical path length of 10 mm with the bandwidth set at 0.1 nm. Several sharp peaks and minute structures can be clearly observed.



Benzene vapor spectrum

Reflectance spectral measurement by integrating sphere

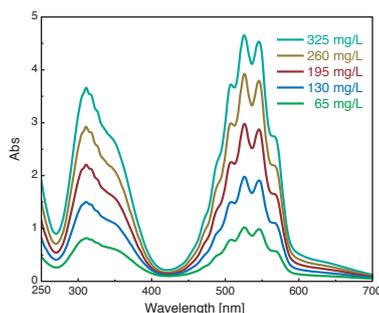
The figure below illustrates the reflectance spectral measurement of two titanium dioxide powders with different crystal structures, rutile and anatase, using the ISV-722 Integrating sphere accessory and the PSH-001 Powder sample holder. Using the light trap of the ISV-722, the specular reflection from the window of the PSH-002 is removed, to collect only the diffusely reflected light from the sample powders. Reflectivity decreases significantly for both samples at around 350 nm, where a band gap may exist. The wavelength of the band gap tends towards the short wavelength side for the anatase, reflecting the differences in the crystal structures between rutile and anatase.



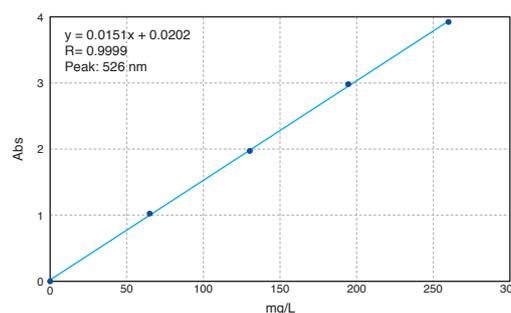
Reflectance spectra of titanium dioxide powders

Linearity up to 4 absorbance

The figures illustrate the spectral measurements of potassium permanganate solutions at several concentrations by using the V-650. The calibration curve obtained demonstrates a very high correlation coefficient of the calibration curve, 0.9999. These results illustrate the V-650's excellent linearity up to 4 absorbance.



Spectra of potassium permanganate solutions



Calibration curve of potassium permanganate solutions

Exceptional stray light rejection

V-660 UV-Vis Spectrophotometer

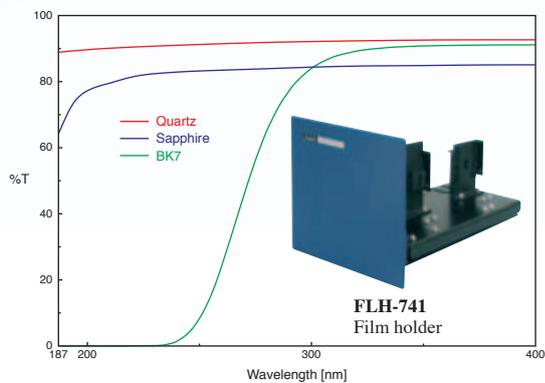


The V-660 is a double beam spectrophotometer with a double grating monochromator covering the wavelength range of 187 nm ~ 900 nm. Unlike similar instruments which use a pre-monochromator and main monochromator, the V-660 incorporates two fully symmetrical monochromators. This unique optical design provides higher resolution with extremely low stray light of 0.00008% which enables measurements of highly absorbing samples and is effective for filter measurements approaching 0%T. Linearity up to 6 Abs allows quantitative analysis of highly absorbing samples.

- Double-beam with double monochromators
- Highly sensitive PMT detector
- Extremely low stray light of 0.00008%
- Linearity to 6 Abs
- Range 187 to 900 nm

Optical properties of window materials

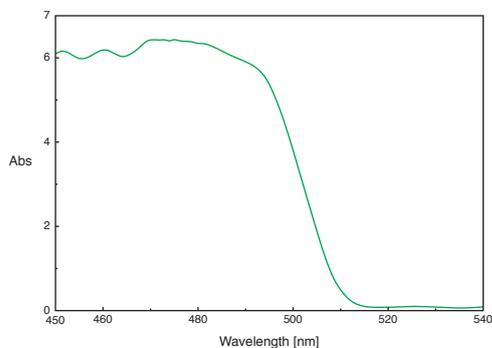
The figure below illustrates the transmission spectra of quartz, sapphire and BK7, which are generally used for optical window materials, measured by using the FLH-741 Film holder. Featuring very low stray light and a wide wavelength range down to 187 nm, the V-660 enables measurements in the short wavelength range without a nitrogen purge.



Transmission spectra of window materials in UV range

Step Scan

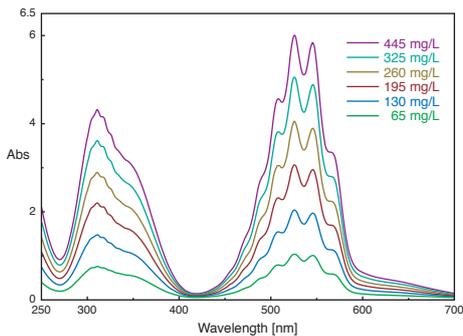
A step scanning function is available for spectral measurement in all models of the V-600 Series. This function is an effective scanning mode in cases where the sample absorbance varies very rapidly. The figure below illustrates the results of the measurement of an interference filter at a wavelength range where the absorbance changes rapidly by using the V-660 in the step scan mode. The range shorter than 490 nm has a strong absorbance of around 6 Abs. The significant variation between 490 and 510 nm can be measured very accurately using the step scan measurement mode.



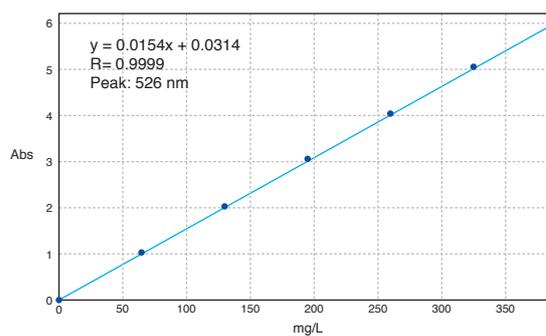
Transmittance spectrum of an interference filter using step scan mode

Linearity

The figures below illustrate the spectral measurements of potassium permanganate solutions and the resulting curve. The calibration curve shows excellent linearity up to 6 Abs with a correlation coefficient of 0.9999.



Spectra of potassium permanganate solutions



Calibration curve of potassium permanganate solutions

Expansion into the NIR region

V-670 UV-Vis/NIR Spectrophotometer

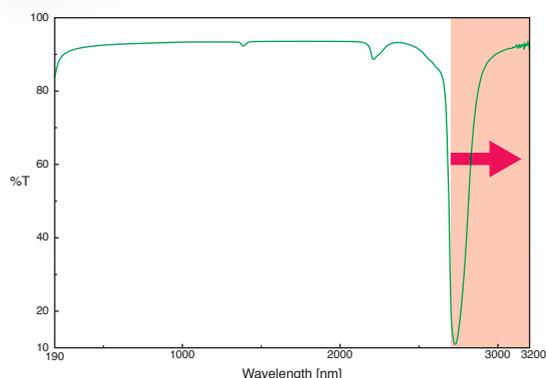


The V-670 is the only single-monochromator spectrophotometer available on the market which can measure a whole range from UV to NIR in a single scan. The optical system includes an automatically exchanged dual-grating and dual detector system. The unique single monochromator design of the V-670 utilizes fewer mirrors, providing higher throughput which results in a higher signal-to-noise ratio for the entire spectral range. This feature enables highly accurate measurements using accessories such as an integrating sphere in the NIR region. With the optional wavelength extension kit, the measurement wavelength range can be extended to 3,200 nm.

- Double-beam with single monochromator
- PMT detector (UV-Vis)
- Peltier cooled PbS detector (NIR)
- Range 190 to 2,700 nm (3,200 nm option)
- Variable band pass down to 0.1 nm (UV-Vis)

Wavelength extension kit

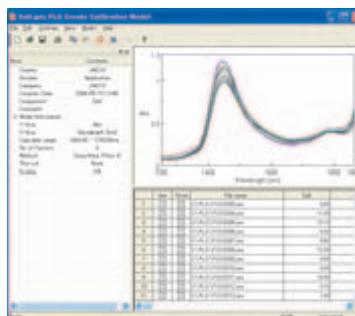
The optional wavelength extension kit extends the wavelength range to 3,200 nm. The figure below illustrates a transmission spectrum of quartz by using the wavelength extension kit. The spectrum shows all of the absorption peaks of the water in quartz.



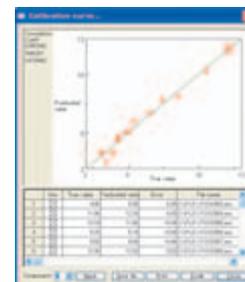
Transmittance measurement of quartz window

Multivariate quantitative analysis

The figures below illustrate the PLS quantitative analysis of concentrated soup. The samples were measured using diffuse transmission measurements in the NIR region using the V-670 and the ISN-723 integrating sphere. Although there is no absorption in the NIR region for the salt in the soup samples, it is possible to quantitate the salt content of the soups based on the peak shift of the water band at 1450 nm.



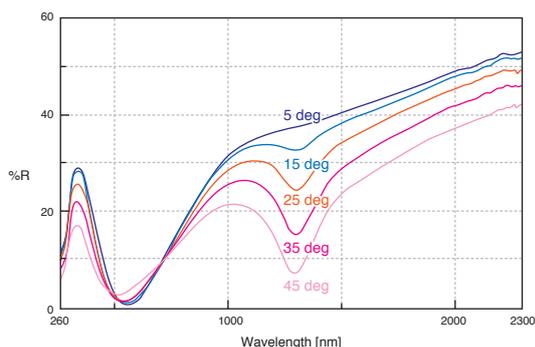
PLS calibration model window



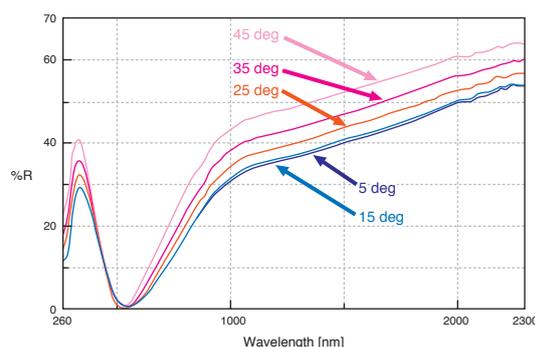
PLS calibration curve dialog

Absolute Reflectance Spectra of 50 nm ITO on Si

An Indium Tin Oxide (ITO) film is transparent in visible light while highly conductive and widely used in LCD's, PD's and touch-panel displays. The figures below illustrate the absolute reflectance measurements of a 50 nm ITO film on a silicon substrate. The polarization properties of the ITO film were examined by the measurement of p and s polarization at different incidence angles.



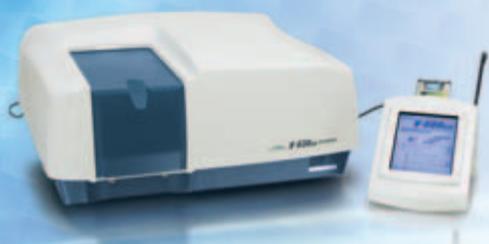
Absolute reflectance spectra (p-polarized light)



Absolute reflectance spectra (s-polarized light)

Dedicated functionality for Life Science applications

V-630BIO Stand-alone UV-Vis Spectrophotometer

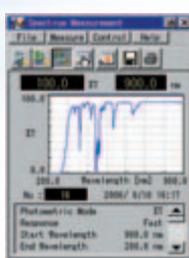


The V-630BIO is a dedicated stand-alone instrument system for Life Science applications. It consists of the V-630, an intelligent Remote Module (iRM-700) specifically designed for biochemical and clinical analysis and a micro cell holder. Dedicated bio-analytical application programs such as protein/nucleic acid measurement, temperature ramping/DNA melting analysis, kinetics measurement and analysis, and a quantitative protein analysis program with six different calibration methods are included in the software as standard. Features for simplicity and ease of use include the IQ Accessory function and IQ Start. Auto print and Auto save functions make daily analyses simple and fast.

Four basic measurement modes

The iRM conveniently guides the operator through routines encompassing data acquisition to data processing. Four measurement modes are available.

- Wavelength scanning
- Quantitative Analysis
- Time course measurement
- Fixed wavelength measurement

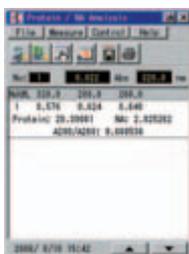


Protein nucleic acid quantitation

This program measures the absorbance of a sample at the specified wavelengths and calculates concentrations of proteins and nucleic acids using a method selected from the following five choices.

- Ratio between Abs @ 260 and 280 nm
- Ratio between Abs @ 230 and 260 nm
- Warburg/Christian factor calculation method
- User-defined absorbance ratio calculation
- User-defined concentration calculation

It is also possible to specify the wavelength for background correction and to select whether background correction is to be performed. Generally, a baseline correction at 320 nm is performed for turbid samples.



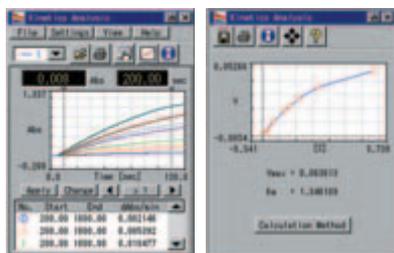
Kinetics measurement/analysis

Time course measurements of enzymatic reactions using multiple substrate solutions can be performed, then analyzed to obtain the kinetic constant K_m and the maximum velocity V_{max} . Four graphic plots are available.

- Michaelis-Menten plot*
- Lineweaver-Burk plot
- Hofstee plot
- Eadie plot

* Michaelis-Menten is graphic plot only.

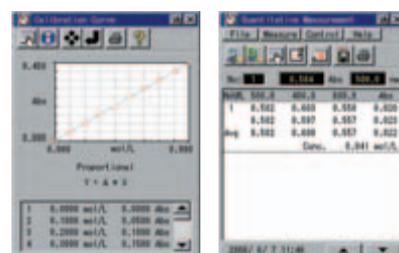
This program is compatible with automatic cell changers, thus data acquisition and analysis can be performed for multiple sample cells.



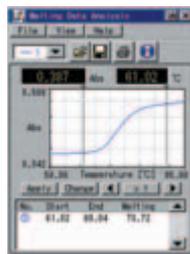
Quantitative analysis of proteins

Six kinds of calibration curves for the quantitative analysis of proteins are included:

- UV Absorption
- BCA method
- Bradford method
- Lowry method
- WST method
- Biuret method

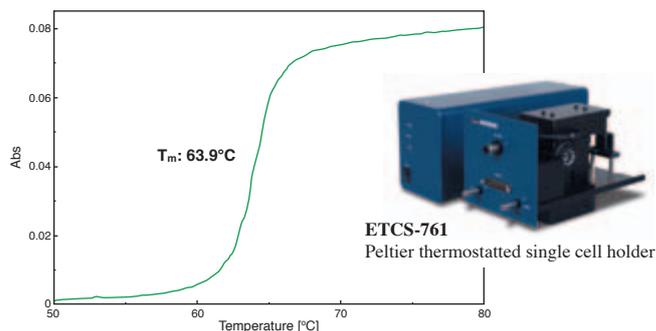


Temperature measurement and melting analysis

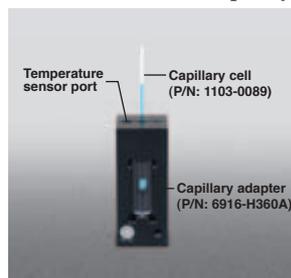


This program performs DNA melting analysis. A melting curve to calculate the melting point (T_m) is measured by using an optional Peltier accessory. The program is compatible with automatic cell changers, thus data acquisition and analysis can be performed for multiple cells.

The figure below illustrates the DNA melting analysis of 3 μ L of a DNA sample by using a capillary cell with the ETCS-761 Peltier thermostatted single cell holder. The melting temperature calculated from the data was 63.9°C.



Temperature measurement of a DNA sample at 260 nm with a capillary cell



Capillary adaptor V-630BIO V-630

The capillary adaptor enables a temperature measurement of trace amounts of sample using a quartz capillary cell (Pathlength: approx. 0.5 mm, minimum sample volume: 3 μ L). This adaptor can be used with a Peltier cell holder or cell changer for temperature measurements such as DNA melting analysis. The temperature sensor is optional.

* Capillary sealing compound (P/N: 1107-0015) is required.

rophotometer

- All models can be used with all models of the V-600 Series
- V-630BIO can be used with the V-630BIO
- V-630 can be used with the V-630
- Micro cell can be used with the rectangular cell, 10 mm path length and 2 mm path width

For measurement of very small amounts of sample

SAH-769 One drop accessory

All models

Only 0.6 µL sample volume is required.

The SAH-769 One Drop accessory is a dedicated accessory for the V-600 Series to measure micro-volume samples of protein and nucleic acid. The minimum sample volume is 5 µL for the 1 mm pathlength disk cell, while only 0.6 µL can be used for the 0.2 mm pathlength disk cell. Both disk cells are standard for the SAH-769.

Quick, but highly accurate measurement



Step 1
Drop a sample on the cell.



Step 2
Set the cover glass.



Step 3
Push the start button.

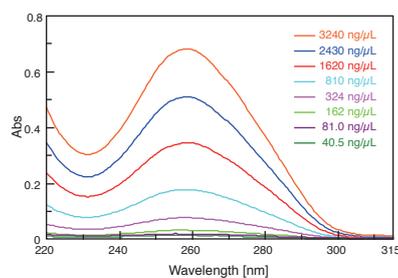


Step 4
Wipe the sample off.

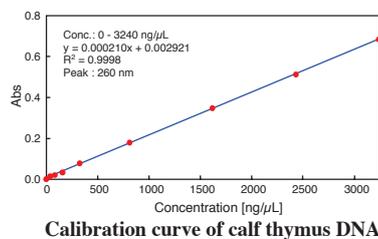


SAH-769

Quantitative analysis of calf thymus DNA using the SAH-769 with a 0.2 mm pathlength disk cell



Spectra of calf thymus DNA solutions



Calibration curve of calf thymus DNA

The figure illustrates good linearity up to approx. 3000 ng/µL. This is equivalent to a linearity up to 35 Abs by using a 10 mm pathlength cell.

UCB-710 Standard rectangular cell holder

V-630BIO Micro cell

The UCB-710 is the standard cell holder for the V-630BIO. A cell height adjustment function provides the ability to use a 50 µL micro cell. A mask for a 50 µL micro cell is standard.



UCB-710

EMC-709 Micro cell holder

All models

The EMC-709 is a cell holder for a 50 µL micro cell. A 5 µL micro cell can be used with an optional spacer.



EMC-709

EMC-759 5 µL Ultra-micro cell holder

V-630BIO V-630

The EMC-759 is a cell holder for a 5 µL micro cell.



EMC-759

TCH-703 8-position Micro turret cell holder

V-630BIO V-630

The TCH-703 is a cell holder for an optional 8-position turret micro cell, containing eight cells with a volume of approximately 4 µL arranged in a circle.



TCH-703

● 8-position micro turret cell (P/N: 6916-4822A)



Optical path length: 1 mm
 Sample volume: 4 µL

● MW-2000 µWash

The µWash is a device specifically designed for washing micro cells whose volume is several µL to 100 µL.



User-friendly graphical interface

iRM-700 Intelligent Remote Module

The iRM-700 intelligent remote module incorporates a color LCD touch screen to easily access all functions. The iRM-700 conveniently guides the operator through routines encompassing data acquisition to data processing. The obtained data can be automatically printed to USB PictBridge printers, or saved to a compact flash memory card for further processing on a PC.

- High quality color LCD display
- Operation using Touch Pen
- Enhanced quantitative analysis
- Equipped with instrument validation software



iRM-700



Touch-sensitive screen



Easy data transfer to a PC



Print to a USB printer

IQ accessory and IQ Start

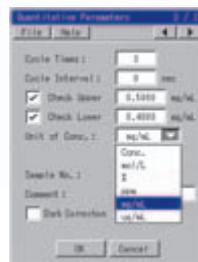
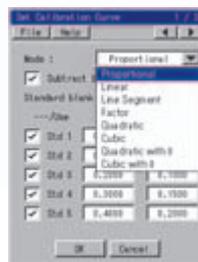
User-friendly features include the IQ Accessory function for automatic accessory recognition and IQ Start for immediate start of pre-registered programs when conducting routine measurements.



Standard measurement modes

Four measurement modes including quantitative measurement, fixed wavelength measurement, spectral measurement and time course measurement are available. All the measurement modes have a dark correction function, enabling highly accurate measurement of highly absorbing samples.

Quantitative Analysis



No.	Conc.	Abs
1	0.000	0.400
2	0.000	0.801
3	0.000	0.801
4	0.000	0.401
5	0.000	0.401
6	0.000	0.401
7	0.000	0.401
8	0.000	0.401
9	0.000	0.401
10	0.000	0.401
11	0.000	0.401
12	0.000	0.401
13	0.000	0.401
14	0.000	0.401
15	0.000	0.401
16	0.000	0.401
17	0.000	0.401
18	0.000	0.401
19	0.000	0.401
20	0.000	0.401

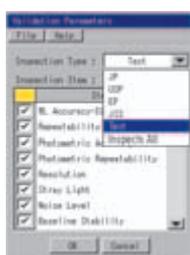
Validation program

A validation program is included as standard. The test methods are compliant with USP, EP and JP protocols.

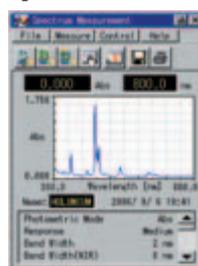
The program includes ten validation items:

- Wavelength accuracy
- Wavelength repeatability
- Photometric accuracy
- Photometric repeatability
- Resolution
- Resolution power
- Stray light
- Noise level
- Baseline stability
- Baseline flatness

* Optional standards and tools are required for some validation tests.



Spectral Measurement



Fixed WL Measurement

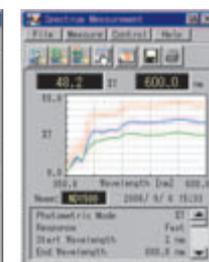
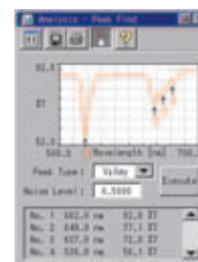
No.	Wavelength [nm]	Abs
1	400.0	0.400
2	400.0	0.801
3	400.0	0.801
4	400.0	0.401
5	400.0	0.401
6	400.0	0.401
7	400.0	0.401
8	400.0	0.401
9	400.0	0.401
10	400.0	0.401
11	400.0	0.401
12	400.0	0.401
13	400.0	0.401
14	400.0	0.401
15	400.0	0.401
16	400.0	0.401
17	400.0	0.401
18	400.0	0.401
19	400.0	0.401
20	400.0	0.401

Time Course Measurement



Data processing functions

Data processing functions include scale change, trace, zooming, peak picking, peak area, peak ratio, derivatives, smoothing, arithmetic, overlay, vertical/horizontal axis conversion and spectral concatenation.

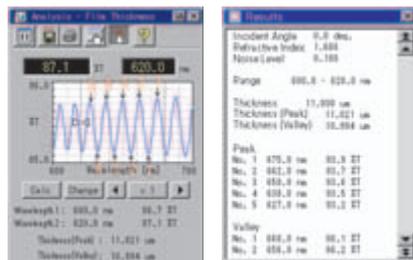


Optional programs for the iRM-700

VRFT-761 Film thickness analysis program

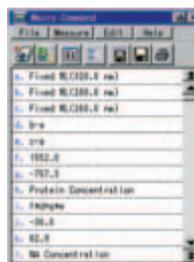
The VRFT-761 program calculates the film thickness from the interference pattern that appears in the transmittance or the reflectance spectra of film samples such as coating films on a metal, semiconductor devices and electroconductive thin films for electrodes.

* Specular reflectance accessory (such as SLM-736/SLM-737/SLM-738) is required.



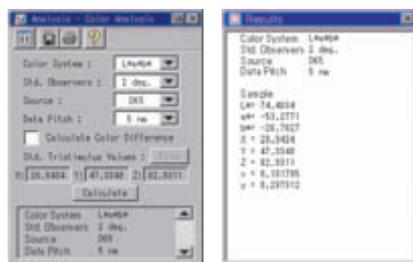
VRMC-764 Macro command program

The VRMC-764 software can be used to automatically execute a user-defined sequence of procedures such as parameter settings, measurement procedures, data processing and result printout.



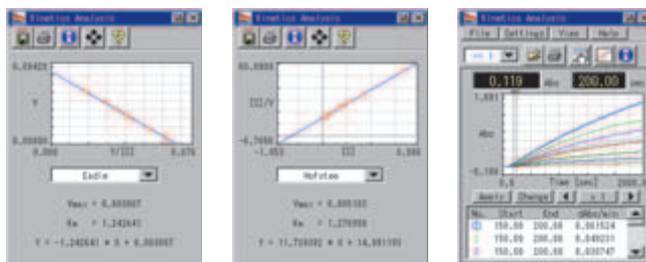
VRCA-762 Color analysis program

The VRCA-762 package calculates the tristimulus values, chromaticity coordinates, lightness index and chromaticity index in accordance with the XYZ color system set forth by the Commission Internationale de l'Eclairage (CIE) using a spectrum from 380-780 nm. The VRCA-762 calculates the sample and the standard sample color systems, and the color difference can be calculated for any of three color systems, Lab, L*a*b* and L*u*v*.



VRKN-765 Kinetics analysis program

The VRKN-765 software measures the time course data of multiple samples by using an automated cell changer. The enzyme reaction velocity parameters (Michaelis-Menten constant K_m and maximum velocity V_{max}) are calculated from the obtained data. Four plot methods, Michaelis-Menten, Lineweaver-Burk, Hofstee and Eadie are available. K_m and V_{max} are calculated by using the Lineweaver-Burk, Hofstee and Eadie methods.



VRPN- 766 Protein nucleic acid quantitation program

The VRPN-766 program measures the absorbances of protein/nucleic acid solutions at the specified wavelengths, and calculates their concentrations. It is possible to select the wavelength for baseline correction and to select whether baseline correction is to be performed. Generally, baseline correction at 320 nm is performed for turbid samples.

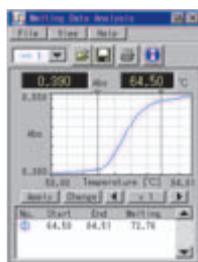
Available calculation methods include:

- Absorbance ratio of 280/260 nm
- Absorbance ratio of 230/260 nm
- Warburg-Christian method
- User-defined absorbance ratio
- User-defined concentration calculation

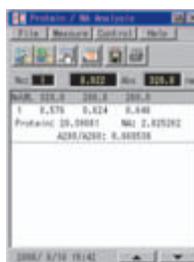
VRTP-763 Temperature measurement and melting analysis program

The VRTP-763 module offers the measurement control and analysis functions for DNA melting experiments. Controlling the temperature of a Peltier accessory (single or multi-cell), the program provides measurement of the absorbance at a specific wavelength during temperature changes, and then calculates the melting temperature (T_m) from the results of the measurements.

* Accessories such as the ETCS-761 water-cooled Peltier cell holder or the PAC-743/PAC-743R water-cooled Peltier cell changers (among others) are required.



PAC-743
Automatic 6/8-position Peltier cell changer



A unique, single platform software package for any JASCO spectroscopy system

Spectra Manager™ II and CFR Cross-p



JASCO is the first manufacturer to develop a powerful, cross-platform software package, “Spectra Manager”, for controlling a wide range of spectroscopic instrumentation. The Spectra Manager program is a comprehensive package for capturing and processing data, eliminating the need to learn multiple software packages and offering the user a shallower learning curve. Several types of measurement data files (UV-Vis/NIR, FT-IR, Fluorescence, etc.) can be viewed in a single window, and processed using a full range of data manipulation functions. The latest version, Spectra Manager II, includes four measurement programs, a spectra analysis program, an instrument validation program and the JASCO Canvas program as standard. It is possible to analyze data even during sample measurements.



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.



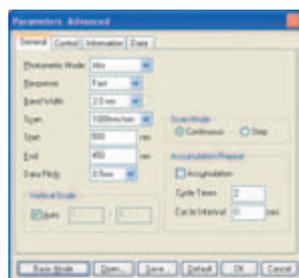
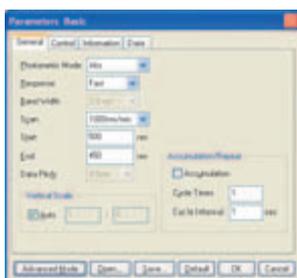
IQ Accessory and IQ Start



When an accessory supported by IQ Accessory is inserted into the sample chamber, Spectra Manager automatically recognizes the accessory, and the accessory’s information such as model name and serial number are transferred to Spectra Manager. The IQ Start function automatically starts an assigned program with parameters previously declared by the user.

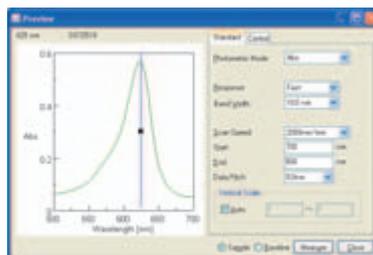
Basic mode and Advanced mode

Two types of parameter setting modes, the basic mode and the advanced mode are available. In the basic mode, measurements can be simply carried out by setting basic parameters. The advanced mode allows the user to establish detailed measurement conditions.



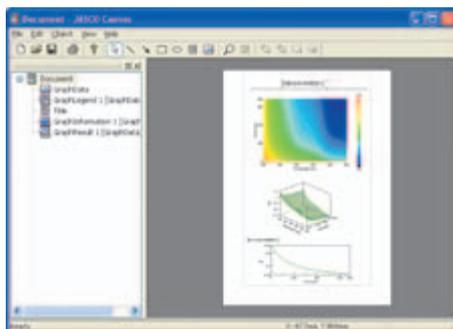
Spectrum preview function

The spectrum preview function allows a user to monitor changes to a spectrum by varying parameters in real-time. A spectrum can be rapidly obtained using the maximum scanning speed of 8,000 nm/min. This function allows verification of the optimum set of instrument parameters and to check sample conditions before actual measurements.



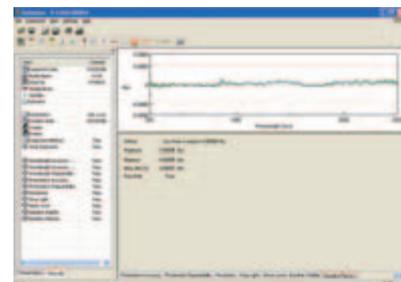
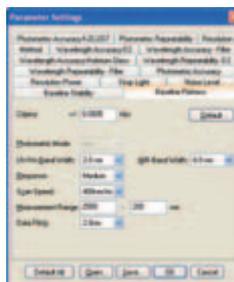
JASCO Canvas

The JASCO Canvas program allows the user to prepare publication quality layouts of spectra, measurement parameters, text and images (BMP and WMF formats) to meet the user’s own report requirements. The program also includes a set of drawing tools for professional documentation. Newly created documents can be stored as templates for routine data presentation.



Validation program

The Validation program offers assistance for verifying instrument performance to meet regulatory requirements set by GxP. The test methods are compliant with USP, EP and JP procedures. The program includes validation tests for wavelength accuracy, wavelength repeatability, photometric accuracy, photometric repeatability, resolution, resolution power, stray light, noise level, baseline stability and baseline flatness. Optional standards and tools are required for some validation tests.



Optional Software Packages for Spectroscopy

Biochemical software packages

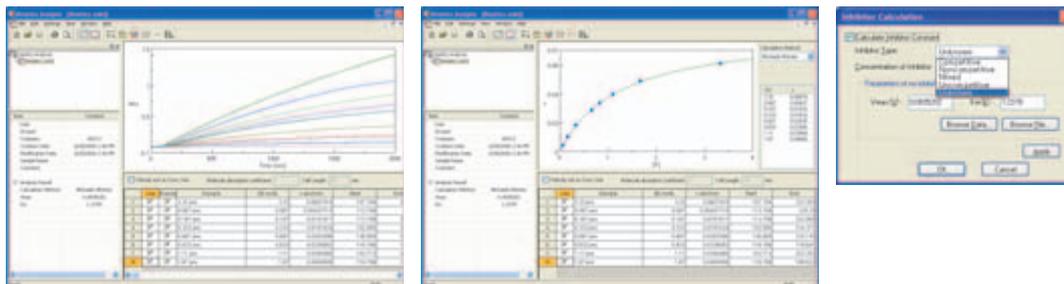
VWKN-772 Kinetics analysis program

CFR Compliant

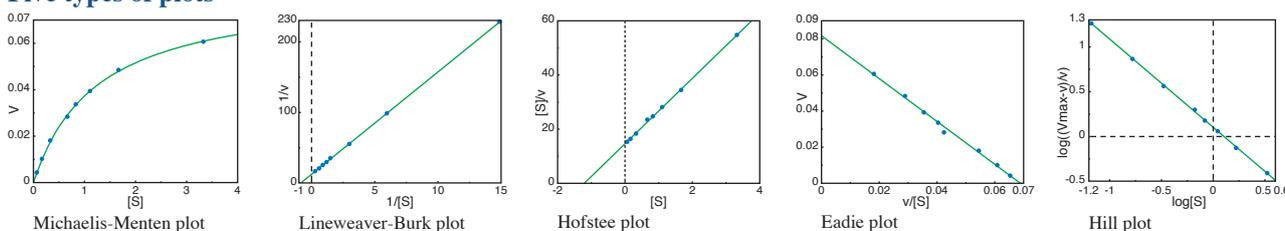
The VWKN-772 Kinetics Analysis program performs time course measurements of multiple samples, plots the graphs and calculates the maximum reaction velocity (V_{max}), Michaelis Menten constant (K_m) and the Hill constant (n). The program also supports calculation of inhibitor constant and determination of inhibitor type by comparing data obtained with and without an inhibitor. An automated cell changer can be utilized, enabling batch analysis of multiple data.

Five types of plots: Michaelis-Menten, Lineweaver-Burk, Hofstee, Eadie, and Hill

Calculation items: Maximum reaction velocity (V_{max}), Michaelis-Menten constant (K_m), Hill constant (n), determination of inhibitor type, and inhibitor constant

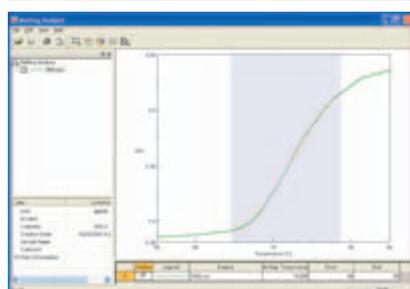


Five types of plots



VWTP-780 Temperature gradient measurement and DNA melting analysis program

CFR Compliant



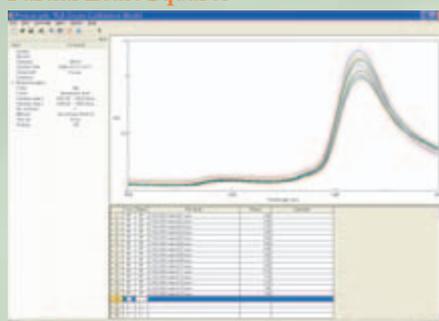
The VWTP-780 temperature programming software offers DNA or protein melting analysis. Controlling the temperature of a Peltier accessory (single or multi-cell), the VWTP-780 provides measurement of the absorbance at a specific wavelength during temperature changes, then calculates the melting temperature (T_m) from the results of the measurement.

* Accessories such as the ETCS-761 water cooled Peltier cell holder or the PAC-743/ PAC-743R water-cooled Peltier cell changers (among others) are also required.

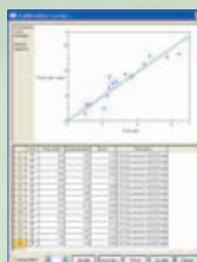
Multivariate Quantitative Analysis Software Packages

VWPL-784 PLS Quantitative program

Partial Least Squares



PLS calibration model editing program

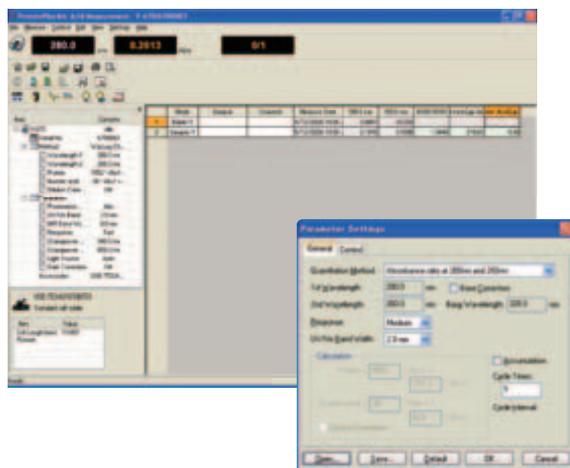


Calibration curve display

The VWPL-784 software creates calibration models from the spectra of standard samples at several known concentrations of the target component(s). A regression curve is then derived to provide a relationship between the spectra and the concentrations of the target component(s). Next, a similar calculation is performed repeatedly with the spectrum residual and concentration residual until the error becomes sufficiently small to quantitate the target components. Since this method can perform a calibration without needing to know the characteristics of all components, this method allows the analysis of only the target compounds in a sample, which can also include unknown components, such as natural foods or other multi-component samples.

VWPN-786 Protein nucleic acid quantitation program

CFR Compliant



The VWPN-786 program measures the absorbance of protein and nucleic acid solutions at specified wavelengths and calculates the concentration of the protein and nucleic acids based on a calculation method selected from five different types listed below. It is possible to select the wavelength for baseline correction and to choose whether baseline correction is to be performed. Generally, correction is performed for turbid solutions at a wavelength of 320 nm. Dilution rate correction is also possible for the user-defined concentration calculation method.

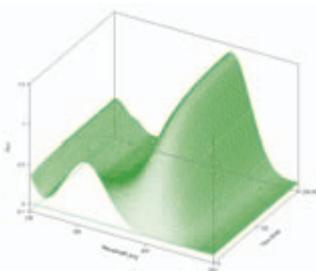
- * Available calculation methods include:
 - Absorbance ratio of 280/260 nm
 - Absorbance ratio of 230/260 nm
 - Warburg-Christian method
 - User-defined absorbance ratio
 - User-defined concentration calculation.

VWIS-778 Interval scan measurement program

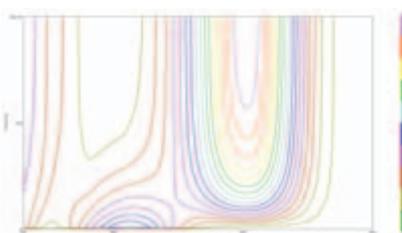
VWTS-779 Temperature interval scan measurement program

The VWIS-778 program measures spectra of samples automatically with a user-defined time interval between scans. The final data array can be displayed as a 2-D spectral display; a 3-D spectral display; contour, color-image or cross-section images; or 2-D displays of the peak height/ratio, peak area/ratio, FWHM or peak shift calculations. The VWTS-779 program measures spectra of samples automatically with a user-defined temperature interval between scans, providing a data array similar to the VWIS-778 program, but related to sample temperature. Data plots similar to the VWIS-778 software can be obtained using the VWTS-779 data array. The VWIS-778 and VWTS-779 programs can be used with an automated cell changer accessory for spectral data collection of multiple samples.

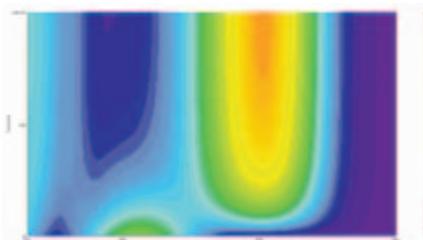
* Accessories such as the ETCS-761 water cooled Peltier cell holder or the PAC-743/ PAC-743R water-cooled Peltier cell changers (among others) are also required for using the VWTS-779.



3-D spectral display



Contour map



Color-image

VWCL-782 CLS Quantitative program

Classical Least Squares

The VWCL-782 software calculates the virtual spectrum of each component from the spectra of standard samples and the concentration information of all the components using the least-squares method. Using a calibration model calculated from the spectra of the pure components, batch quantitation of all components in a sample is performed. This program is effective only when all the components in the multi-component spectrum are known. Since the CLS program examines the contribution to the spectral interaction between each component, this method is suitable for quality control of manufactured products whose component concentrations are well characterized.

VWPC-783 PCR Quantitative program

Principal Components Regression

The VWPC-783 software performs the principal component analysis for multiple standard samples, creating a calibration model characterizing the changes in concentration of target component(s) in the standards to quantify the target component(s) and provide quantitative analysis of unknown samples. The PCR software can be used for the analysis of foods or polymers and as a non-invasive analysis method for cosmetics, etc.

VWPA-785 PCA Quantitative program

Principal Component Analysis

The VWPA-785 Principal Components Analysis (PCA) software recognizes characteristic spectral patterns from spectra of the standard samples, and creates PCA models for classification of an unknown sample. The PCA models can then be used for analysis of unknown sample spectra, identifying the 'class' of the spectrum which most closely matches the grouped standard spectra. This method can be used for acceptance inspections of pharmaceutical products and for quality inspection of foods, polymers, paints, etc.

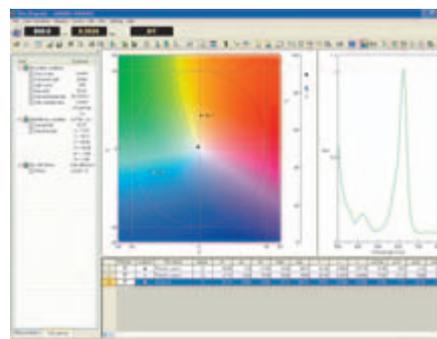
Color analysis software packages

VWCD-790 Color diagnosis program

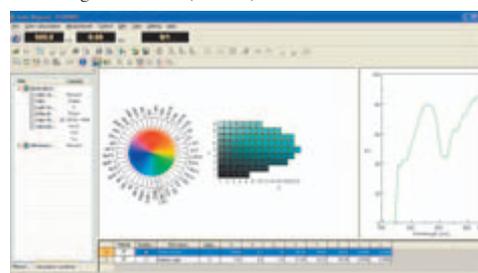
The VWCD-790 software measures the spectrum of a sample from 380 to 780 nm, performs color calculations of the sample using the various color systems, and plots the results on a selected color system graph. The program also includes a function for providing a pass/fail judgement according to pre-set criteria. It is also possible to retrieve several measured spectra and perform a batch calculation for the multiple spectra.

Specifications:

Light source:	A, D65, C, B, user-defined light source
Viewing angle:	2°, 10°
Wavelength calculation range:	380~780 nm
Calculation data interval:	5 nm, 10 nm
Result table:	Maximum 100 files
Available color system:	XYZ (JIS Z8701), L*a*b* (JIS Z8729), Lab, Munsell (JIS Z8721), L*u*v* (JIS Z8729)
Color calculation items:	Tristimulus value: XYZ; chromaticity coordinate: xy; whiteness level (JIS Z8715), yellowness level: YI; Lightness, Hue, and Chroma for each color system; chromaticity coefficient; hue angle; color difference; dominant wavelength: λ_d ; pure stimulus value: P_c ; and pass/fail judgement.



Color diagnosis results (L*a*b*)



Color diagnosis results (Munsell)

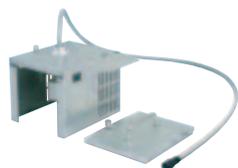
VWLU-788 Luminous color measurement program

The VWLU-788 package measures a luminescence emission spectrum of a light emitting source such as an LED, and perform color calculations. Results can be plotted in a chromaticity diagram and pass/fail judgments can be performed according to the pre-set criteria.

Specifications:

Viewing angle:	2°, 10°
Wavelength calculation range:	380~780 nm
Calculation data interval:	5 nm
Result table:	Maximum 100 files
Available color system calculations:	X Y Z (Y is relative luminance), Luv, Lu'v' (JIS Z8701)
Chromaticity coordinates:	(x, y), (u, v), (u', v')
Calculation items:	Tristimulus value: XYZ; dominant wavelength λ_d (complementary wavelength λ_c); related color temperature T_{cp} and deviation Δ_w (JIS Z8725); color rendering index Ra, R1-R15 (JIS Z8726); fluorescent lamp light source color classification (JIS Z9112), and pass/fail judgement.

* Additional accessories such as the ELM-742 External light source interface and a calibrated light source for correction of instrument characteristics are required.



ELM-742
External Light Source Interface

VWCM-795 Color matching program

This program includes two functions, the standard color library management and Computer Color Matching (CCM). The standard color library management provides the registration of the standard color pigment spectrum files in a library. The CCM function can perform color mixing calculations from previously collected spectra of target colors.

VWSC-797 Saybolt color analysis program

The VWSC-797 program calculates the Saybolt color value of petrochemical product samples such as kerosene, gasoline and other fuels according to the Saybolt color measurement standard (JIS K2580).

* The LSE-701 Long path cell holder is required depending upon the required sample conditions.

VWAC-796 ASTM Color analysis program

This program calculates the ASTM color of petrochemical products such as lubricating oil, diesel and heating oils based on the ASTM and JIS K2580 standards.

* The LSE-701 Long path cell holder is required for chromaticity measurement.



LSE-701
Long path cell holder

VWWQ-789 Chromaticity/turbidity measurement program

The VWWQ-789 software measures the turbidity and chromaticity of a sample based on the Standard Methods for the Examination of Water, Testing Methods for Industrial Water (JIS K0101), Testing Methods for Industrial Wastewater (JIS K0102) and APHA (Hazen). The turbidity is measured by using an integrating sphere at 660 nm. The chromaticity is measured with transmittance method at 390 nm using Platinum-Cobalt reference solutions.

* The LSE-701 Long path cell holder and/or the ISV-722/ISN-723 Integrating sphere accessories are required.

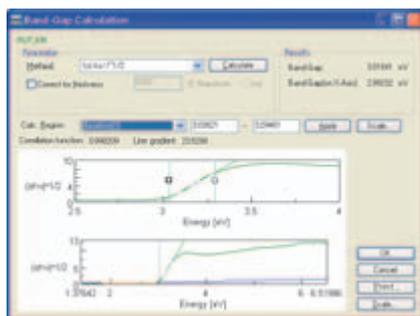
* An optional color diagnosis program is required for displaying chromaticity using the calculated chromaticity coordinates.

Spectra Manager™ II

Materials analysis software packages

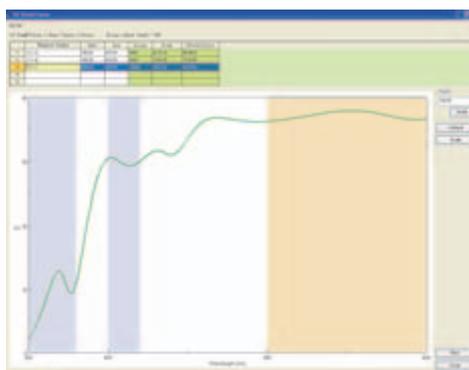
VWBG-773 Band gap analysis program

The VWBG-773 command calculates the band gap of a semiconductor sample from the transmission and reflectance spectra. Four calculation methods are available according to the type of electronic transition.



VWSE-798 UV Shield factor calculation program

The VWSE-798 command calculates the UV shield factor (shield factor = 100 - transmittance) indicating the amount of light blocked in a certain wavelength region. A maximum of five wavelength regions can be specified for calculations.

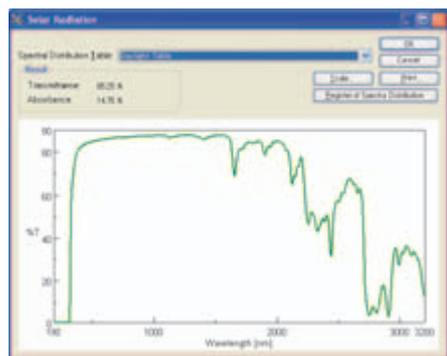


VWST-774 Solar/visible light measurement program

The VWST-774 command calculates the transmittance and reflectance of both solar radiation and visible light for a single plate glass according to the JIS R3106-1998 standard, and calculates the reflectance of solar radiation for a paint film according to procedure JIS K5602. A spectral weighting factor is applied to the measured spectrum to calculate the solar transmittance, solar reflectance, visible light transmission, visible light reflection or visible light absorption.

* Accessories such as the ISV-722 / ISN-723 60 mm diam. integrating sphere and/or the ARSV-732 / ARSN-733 absolute reflectance measurement unit are required.

* For calculating solar transmittance and reflectance, a spectrum measurement with a range wider than 300 to 2,500 nm is necessary. For calculating visible light transmission and reflectance, spectrum measurement with a spectral range wider than 380 to 780 nm is necessary.



VWHZ-775 Haze measurement program

The VWHZ-775 software calculates the haze value for plastic, film, vinyl, or glass. Using an integrating sphere, instrument diffuse transmittance, total luminous transmittance and sample diffuse transmittance are measured to calculate the haze value. A pass/fail function is provided, making the program suitable for quality control and product evaluation.

* The ILV-724 / ILN-725 150 mm dia. integrating sphere is required.

VWSP-787 SPF/PA calculation program

The VWSP-787 program calculates the SPF (Sun Protection Factor) values, which indicate UVB blocking effectiveness, and the PA (Protection Grade of UVA) values by applying a spectral weighting factor to each wavelength in the spectrum of a sample. This program allows the automated calculation of the ultraviolet protection effects of clothing, cosmetics and sunscreen formulations without additional processing.

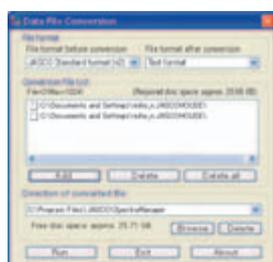
* Accessories such as the ILV-724 / ILN-725 150 mm diam. integrating sphere are required.

VWSQ-776 Spectral quantitative analysis program

The VWSQ-776 package provides the quantitative analysis for a maximum of ten peaks by applying the Beer-Lambert law to each selected sample peak. Simultaneous determination of multiple components of a sample is possible if the absorption peaks of each component do not overlap. Two calculation methods are available, using either the peak height or peak area of the selected absorption peaks.

Other optional programs

FCV-SPCMGR2 Data file conversion program



The FCV-SPCMGR2 package is a program to provide batch file conversion of multiple Spectra Manager data files to file formats usable by other processing programs.

- Conversion:
 - JASCO format (previous format) JCAMP-DX
 - TXT formats to JASCO format (current format)
 - JASCO format (current format) to TXT format

VWLK-777 Spectral concatenation program

The VWLK-777 software offers the ability to concatenate two spectral data files such as a UV-Vis/NIR spectrum and a mid-infrared spectrum.

VWMC-781 Macro command program

The VWMC-781 software is a macro command software that provides the ability to easily edit macro scripts, and automatically execute a series of operations including measurements, analyses and printing.

Flexible support for a wide range of analysis from advanced research to routine d

V-600 Series Optional accessories fo

Cell holders/cell changers used at ambient temperature



LSE-701



FSE-702



SSE-704



NCP-705



CYH-708

LSE-701 Long path cell holder

Specifications: Sample: 1 Reference: 1 All models

Compatible cell:	Rectangular cell, 10 × 10, 20, 50 or 100 mm, 1 pc.
Reference:	Rectangular cell, 10 × 10, 20, 50 or 100 mm, 1 pc.

SSE-704 6-position manual cell changer

Specifications: Sample: 6 Reference: 1 All models

Compatible cell:	Rectangular cell, 10 × 10 mm, max. 6 pcs.
Reference:	Rectangular cell, 10 × 10 mm, 1 pc.

CYH-708 Cylindrical cell holder

Specifications: Sample: 1 Reference: 1 All models

Compatible cell:	Cylindrical cell, 10, 20, 50 or 100 mm path length, 1 pc.
Reference:	Cylindrical cell, 10, 20, 50 or 100 mm path length, 1 pc.

FSE-702 4-position manual long path cell changer

Specifications: Sample: 4 Reference: 1 All models

Compatible cell:	Rectangular cell, 10 × 10, 20, 50 or 100 mm, max. 4 pcs.
Reference:	Rectangular cell, 10 × 10, 20, 50 or 100 mm, 1 pc.

NCP-705 6-position automatic cell changer

Specifications: Sample: 6 Reference: 1 All models

Compatible cell:	Rectangular cell, 10 × 10 mm, max. 6 pcs.
Reference:	Rectangular cell, 10 × 10 mm, 1 pc.
Cell switching:	Software controlled

Constant temperature cell holders/cell changers

The following cell holder accessories can be used with water circulators for maintaining samples at a uniform temperature. The circulator is available separately.



STR-773



MHT-745



HMC-711



NCP-706

HMC-711 Water thermostatted micro cell holder

Specifications: Sample: 1 Reference: 1 All models Micro cell

Minimum sample volume is 50 μ L by using a rectangular cell, 5 mm path length and 2 mm path width.

Specifications:

Compatible cell:	Rectangular cell, 10 × 10 or 5, 2 or 4 × 10, 2 × 5 mm, 1 pc.
Reference:	Rectangular cell, 10 × 10 or 5, 2 or 4 × 10, 2 × 5 mm, 1 pc.
Temperature control:	Thermostatted water circulation for sample and reference
Operating temperature:	10 to 90°C
Cell masks (standard):	Mask for 100 μ L cell (2 pcs.) for micro cell, 2 × 10 Mask for 200 μ L cell (2 pcs.) for micro cell, 4 × 10

STR-773 Water thermostatted cell holder with stirrer

Specifications: Sample: 1 Reference: 1 All models Micro cell

Compatible cell:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, 1 pc.
Reference:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, 1 pc.
Temperature control:	Thermostatted water circulation for sample and reference
Operating temperature:	10 to 90°C
Stirring system:	Integrated variable speed magnetic stirrer (2 mm path width micro cell cannot be used with the stirrer.)

Optional lid for sample compartment with syringe port for STR-773, EHCS-760, ETCS-761, ETCR-762



- CSP-748 Lid with syringe port for V-650/660/670
- CSP-749 Lid with syringe port for V-630

When monitoring a substrate-enzyme reaction, this accessory allows addition of an enzyme solution without opening the sample chamber lid. Can only be used with a 10 × 10 rectangular cell. Required needle length for the syringe is 2 inches (50 mm).

Recommended syringe:
P/N: 0507-0220 Micro syringe, 10 μ L
P/N: 0507-0223 Micro syringe, 100 μ L

NCP-706 Water thermostatted 6-position automatic cell changer

Specifications: Sample: 6 Reference: 1 All models Micro cell

Compatible cell:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, max. 6 pcs.
Reference:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, 1 pc.
Temperature control:	Thermostatted water circulation for sample and reference
Operating temperature:	10 to 90°C
Stirring system:	Integrated variable speed magnetic stirrer (2 mm path width micro cell cannot be used with the stirrer.)
Cell switching:	Software control

MHT-745 Manual 4-position water thermostatted turret cell holder

Specifications: Sample: 4 Reference: 1 All models Micro cell

Compatible cell:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, max. 4 pcs.
Reference:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, 1 pc.
Operating temperature:	10 to 90°C
Temperature control:	Thermostatted water circulation for sample and reference
Cell switching:	Manual

MCB-100 Mini water circulation bath



MCB-100

Specifications:

Temperature control range:	10°C below ambient temperature to 40°C (IN and OUT connected)
Bath capacity:	Approx. 200 mL
Temperature sensor accuracy:	±0.2°C (at 20°C)
Cooling/heating capacity:	52 W
Dimensions:	160(W) × 263(H) × 225(D) mm

daily use for liquid samples

- All models used with all models of the V-600 Series
- V-630BIO used only with the V-630BIO
- V-630 used only with the V-630
- Micro cell can be used with a rectangular cell of 10 mm path length and minimum 2 mm path width
- PC control only must be used with Spectra Manager only

Peltier thermostatted cell holders/cell changers

EHCS-760 Peltier thermostatted single cell holder (air-cooled)

ETCS-761 Peltier thermostatted single cell holder (water-cooled)

ETCR-762 Peltier thermostatted single cell holder (water-cooled, thermostatted reference)

Specifications:

	Sample: 1	Reference: 1	All models	Micro cell
Model name:	EHCS-760	ETCS-761	ETCR-762	
Compatible cell:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, 1 pc.			
Reference cell:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, 1 pc.			
Temperature control system:	Heating/cooling system utilizing Peltier effect			
Heat radiating system:	Sample only	Sample only	Sample and Reference	
Stirring system:	Integrated variable speed magnetic stirrer			
Temperature setting range:	5 to 70°C	-10 to 110°C	-10 to 110°C	
Temperature control range:	10 to 60°C (at 25°C)	0 to 100°C (for cooling water temperature at 20°C)		
Temperature control accuracy:	±0.1°C (cell holder sensor)			
Temperature accuracy:	With cell holder sensor: ±0.5°C (20°C to 40°C), ±1°C (other temp. range) With optional temp. sensor: ±0.2°C			

Options for EHCS-760/ETCS-761/ETCR-762

● **6916-J262A Cell mask kit**

This kit includes sample masks and a cell-height adjustment stand to raise the cell height. Using the cell-height adjustment stand, a 2 mm path width micro cell can be used to measure sample with a minimum 100 µL volume.

● **OPS-515 In-cell sensor with holder (factory option)**

This is an optional sensor which can be used to monitor the temperature inside of the sample cell.

● **Cell spacers**

Spacers for cells with an optical path length of 1, 2 and 5 mm are available. (P/N: 6939-0501PA for 1 mm cell, 6916-6018PA for 2 mm cell and 6916-6019PA for 5 mm cell)

● **Capillary adapter (for V-630/V-630BIO only)**

The capillary adapter is used for a capillary cell (minimum sample volume of 3 µL). The optional sensor (OPS-515) in the cell adapter is required for temperature monitoring.

P/N: 6916-H360A Capillary adapter
1103-0089 Capillary cell, 100 pcs/set
1107-0015 Capillary sealing compound



EHCS-760



ETCS-761



ETCR-762

PSC-763

Automatic 6-position Peltier cell changer (air-cooled)

Specifications:

	Sample: 6	Reference: 1	All models	Micro cell
Compatible cell:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, max. 6 pcs.			
Reference:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, 1 pc.			
Temperature control system:	Heating/cooling system utilizing Peltier effect (Sample side only)			
Heat radiating system:	Air-cooled			
Stirring system:	Integrated variable speed magnetic stirrer (not available for the 2 mm path width cell)			
Temperature setting range:	10 to 70°C			
Temperature control range:	15 to 60°C (for room temperature at 20°C)			
Temperature setting precision:	±0.1°C (cell holder sensor)			
Temperature accuracy:	With cell holder sensor: ±0.5°C (20°C to 40°C), ±1°C (other temp. range) With optional temperature sensor: ±0.2°C			

Options for PSC-763

● **OPS-513 In-cell sensor with holder (factory option)**

This is an optional sensor to monitor the temperature inside of a single sample cell.



PSC-763

PWC-758

Automatic 8 × 8-position Peltier cell changer (water-cooled)

Specifications:

	Sample: 8	Reference: 8	All models	Micro cell	PC control only
Compatible cell:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, max. 8 pcs.				
Reference:	Rectangular cell, 10 × 10, 2 or 4 × 10 mm, max. 8 pcs.				
Temperature control system:	Heating/cooling system utilizing Peltier effect				
Heat radiating system:	Water-cooled				
Stirring system:	Integrated variable speed magnetic stirrer (not available for 2 mm path width cell)				
Temperature setting range:	-10 to 110°C				
Temperature control range:	0 to 100°C (for cooling water temperature at 20°C)				
Temperature setting precision:	±0.3°C				
Temperature accuracy:	With cell holder sensor: ±0.5°C (20°C to 40°C), ±1°C (other temp. range)				

Options for PWC-758

● **6916-H058A Optional in-cell sensor (factory option)**

This is an optional sensor to monitor the temperature inside of the sample cell. Up to eight sensors can be attached to monitor all eight sample cells.



PWC-758

Flexible support for a wide range of analysis from advanced research to routine d V-600 Series Optional accessories fo

Peltier thermostatted cell changers

PAC-743 Automatic 6/8-position Peltier cell changer (water-cooled)

PAC-743R Automatic 6/8-position Peltier cell changer (water-cooled, thermostatted reference)

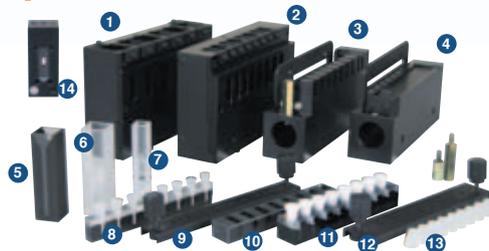
Sample: 6 or 8 Reference: 1 All models

The PAC-743/PAC-743R allow measurements of the transmittance/absorbance of multiple samples by using dedicated cell blocks with temperature control. The PAC-743R provides temperature control of the reference cell in addition to temperature control of the sample cells.

Specifications:

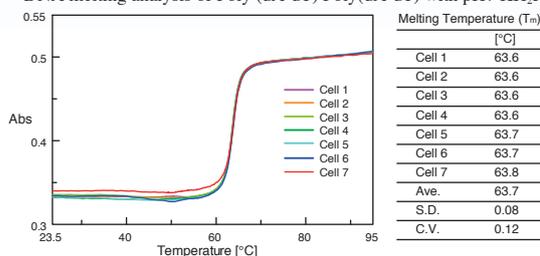
Reference:	Rectangular cell 10 × 10, 4 × 10, or 2 × 10mm, 1 pc.
Temperature control system:	Heating/cooling system utilizing Peltier effect (PAC-743: sample side only)
Heat radiating system:	Water-cooled
Temperature setting range:	-10 to 110°C
Temperature control range:	0 to 100°C (at 20°C)
Temperature setting precision:	±0.1°C
Temperature accuracy:	With cell holder sensor: ±0.5°C (20°C to 40°C), ±1°C (other temp. range)

Options for PAC-743 and PAC-743R



Parallel melting measurement with the PAC-743 and 8-position micro cell block

DNA melting analysis of Poly (dA-dT)-Poly(dA-dT) with pH7 KH₂PO₄-NaOH buffer solution



* The cell positions 1st to 7th were used for samples, and the 8th cell position was used for the temp. sensor for temperature monitoring.

Cell block (Cell and temp. sensor are optional.)	Compatible cell	In-cell sensor (factory option)
6916-H243A 6-position cell block 1 with integrated variable speed magnetic stirrer for rectangular cell, 10 × 10	Rectangular quartz cell, 10 × 10, max. 6 pcs. 6 Rectangular quartz cell, 4 × 10, max. 6 pcs. Rectangular quartz cell, 2 × 10, max. 6 pcs. 5 6916-H360A Capillary cell adaptor, max. 6 pcs. 14 and 1103-0089 Capillary cell *1	6916-H516A Sensor in cell, 1 pc. 6916-H517A Sensor in cell, 6 pcs/set
6916-H343A 8-position cell block 2 with integrated variable speed magnetic stirrer for rectangular cell, 5 × 5	Rectangular quartz cell, 5 × 5, up to 8 pcs. 7	6916-H516A Sensor in cell, 1 pc. 6916-H518A Sensor in cell, 8 pcs/set
6916-H743A 10 mm 8-position micro cell block 3 * Stirrer function is not available.	1103-0202A 8-position 10 mm micro cell, 10 mm path length, 100 μL for each position, without capability for well caps 10 1103-1168 8-position 10 mm micro cell with Teflon caps, 10 mm path length, 100 μL for each position 11 6916-H543A Silicon cap kit for 1103-1168, to prevent volatilization of samples at high temperatures, consisting of Silicon cap × 8 13 , Silicon cap with sensor hole × 1, and cap fixture 12	N/A 6916-H516A Sensor in cell, 1 pc. * The 8th cell position is used only to monitor cell block temperature.
6916-H643A 1 mm 8-position micro cell block including Silicon cap × 8, Silicon cap with sensor hole × 1, and cap fixture 9 * Stirrer function is not available.	1103-1171A 8-position 1 mm micro cell, 1 mm path length, 10 μL for each position 8	6916-H516A Sensor in cell, 1 pc. * The 8th cell position is used only to monitor cell block temperature.

*1 A sealing compound (P/N: 1107-0015) is required for using capillary cells.

Flow cell holders



SFC-712



LFC-713



MFC-714



FIC-715

SFC-712 Flow cell holder

All models

Two different cell blocks are available as options, please specify.

Options for SFC-712

- **6156-H607A** 5 mm path length flow cell block (50 μL cell capacity)
- **6156-H608A** 10 mm path length flow cell block (100 μL cell capacity)

MFC-714 Micro flow cell holder

All models

Specifications:

Light path length:	10 mm
Cell Capacity:	20 μL
Tubing:	SUS

LFC-713 Long path flow cell holder

All models

Three different cell blocks are available as options, please specify.

Options for LFC-713

- **6522-J343A** 30 mm path length flow cell block (approx. 0.6 mL cell capacity)
- **6522-J333A** 50 mm path length flow cell block (approx. 1 mL cell capacity)
- **6522-J243A** 100 mm path length flow cell block (approx. 2 mL cell capacity)

FIC-715 Micro flow cell holder

All models

Specifications:

Light path length:	10 mm
Cell Capacity:	20 μL
Tubing:	Teflon

daily use for liquid samples

- All models used with all models of the V-600 Series
- V-630BIO used only with the V-630BIO
- V-630 used only with the V-630
- V-650 used only with the V-650
- V-660 used only with the V-660
- V-670 used only with the V-670

Autosampler, syringe pump and sippers

ASU-800 Autosampler unit



The ASU-800 autosampler automates measurements of multiple liquid samples employing a sipper or syringe pump. Various racks are available to be used with test tubes and/or vials. The PC control software is included as standard. All models

Option racks

Rack	Compatible test tube and vial	Max number of samples
6989-J111A SRA-811 15 mm O.D. test tube rack	6774-H110A 15 mm O.D. test tube, 15 mm (O.D.) × 105 mm (H), 10 mL, 100 pcs/set	100
6989-J112A SRA-812 13 mm O.D. test tube rack	6774-H109A 13 mm O.D. test tube, 13 mm (O.D.) × 100 mm (H), 7 mL, 100 pcs/set	100
6989-J113A SRA-813 12 mm O.D. test tube rack	6905-H146A 12 mm O.D. test tube, 12 mm (O.D.) × 105 mm (H), 5 mL, 100 pcs/set	150
6989-J114A SRA-814 10 mm O.D. test tube rack	6774-H111A 10 mm O.D. test tube, 10 mm (O.D.) × 90 mm (H), 3 mL, 100 pcs/set	150
6989-J118A SRA-818 Vial rack	0410-0102 Screw top vial, 2 mL, 500 pcs/set	120

NQF-720 Vacuum sipper

All models



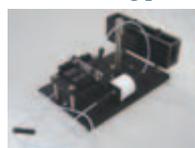
A 10 mm rectangular cell holder is integrated in addition to the 10 mm flow cell, and can be easily switched.

Specifications:

Light path length:	10 mm
Cell capacity:	Approx. 50 µL
Cell material:	Quartz
Carryover:	Less than 1%
Minimum sample requirement:	0.7 mL with low-viscosity samples
Wavelength range:	220 ~ 830 nm (V-630/650/660), 220 ~ 2000 nm (V-670)

Option for NQF-720

LPY-611 Long path length sipper cell unit



Specifications:

Light path length:	50 mm
Cell capacity:	Approx. 1.4 mL
Cell material:	Quartz
Carryover:	Less than 1%
Minimum sample requirement:	2.4 mL with low-viscosity samples
Tubing:	Teflon, Viton

Option for NQF-720/NPF-721

AWU-820 Washing unit

This is a washing unit specifically for the NQF-720 and NPF-721. The AWU-820 can automatically wash the ASU-800 autosampler system.



NPF-721 Peristaltic sipper

All models



A 10 mm rectangular cell holder is integrated in addition to the 10 mm flow cell, and can be easily switched. The sample can be recovered by reversing the 'drain' direction.

Specifications:

Light path length:	10 mm
Cell capacity:	Approx. 50 µL
Cell material:	Quartz
Carryover:	Less than 1%
Minimum sample requirement:	0.7 mL with low-viscosity samples
Wavelength range:	220 ~ 830 nm (V-630/650/660), 220 ~ 2000 nm (V-670)

ASP-849 Syringe pump

All models

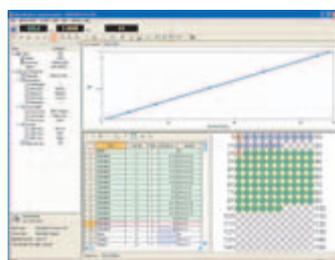


The ASP-849 can be used in conjunction with the ASU-800 and SFC-712 flow cell holder. The syringe pump is suitable for drawing small quantities of sample.

Specifications:

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

Autosampler systems for multiple samples

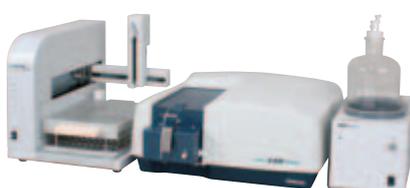


Quantitative analysis dialog

A dedicated system for automated measurements of multiple samples can be configured, combining any of the V-600 series spectrophotometers, the ASU-800 autosampler and selecting the appropriate syringe pump/sipper/flow cell accessories. The system with the NQF-720 vacuum sipper rapidly recovers of samples after measurement. The system with the NQF-720 vacuum sipper rapidly measures multiple samples. The ASP-849 syringe pump and the SFC-712 micro flow cell can be used with a microwell plate to measure small amounts of samples. The dedicated Spectra Manager control program can automate a sequence for a simple sample spectrum collection or methods for quantitative analysis of multiple samples.



ASU-800
with NPF-721 peristaltic sipper



ASU-800
with NQF-720 vacuum sipper



ASU-800
with ASP-849 syringe pump
and the SFC-712 micro flow cell

Accessories to meet increasing demands for UV-Vis to NIR evaluation of new materials

V-600 Series Optional accessories for

Integrating spheres

Integrating spheres are designed to measure either the diffuse transmittance or diffuse reflectance of a sample. Normally, the UV-Vis/NIR spectrophotometers measure the transmittance of a homogeneous, transparent liquid or solid sample. However, when a turbid liquid sample or opaque solid sample is measured, the light incident upon the sample is diffusely transmitted or reflected and only a small portion of the light reaches the detector. The integrating sphere accessory acquires the light diffuse-transmitted or diffuse-reflected from the sample into the integrating sphere and introduces it to the detector.

ISV-722 Integrating sphere, 60 mm diam. for UV-Vis V-650 V-660

ISN-723 Integrating sphere, 60 mm diam. for UV-Vis to NIR V-670

ILV-724 Integrating sphere, 150 mm diam. for UV-Vis V-650 V-660

ILN-725 Integrating sphere, 150 mm diam. for UV-Vis to NIR V-670

The ISV-722/ISN-723/ILV-724/ILN-725 integrating spheres are provided with a light trap so that the reflectance of samples can be measured with or without the specular reflection component. The ISV-722 and ISN-723 employ a 60 mm diam. integrating sphere, while the ILV-724 and ILN-725 employ a 150 mm diam. integrating sphere to accept larger samples. The rectangular cell holder for diffuse transmittance of a turbid liquid sample and holders for diffuse reflectance of solid samples are standard. A range of sample holders, a fluorescence cut filter and polarizer are available as options.

Options for ISV-722/ISN-723/ILV-724/ILV-725

● PSH-002 Powder sample holder

- For diffuse reflectance measurements of powder samples
- Size of sample area: 16 mm diameter
- Thickness: 0.5 - 6 mm

Options for ISV-722/ISN-723

● PSH-003 Powder sample holder

- For diffuse reflectance measurements of small amount of powder samples
- Size of sample area: 5 mm diameter
- Thickness: 0.5 ~ 4 mm

* The lens and mask kit is required.

● 6916-H123A Lens and mask kit

This accessory kit consists of a lens to focus the light beam onto a small amount of a powder sample and three types of masks (1, 2, 3 mm diam.). The lens focuses the beam down to a 1 mm diameter by using the 1 mm diam. mask for diffuse reflectance measurements of a very small area of the sample.

● SSH-506 Solid sample holder

- For diffuse transmittance measurements of a solid sample
- Minimum sample size: 20(H) × 20(W) × 0.5(T) mm
- Maximum sample size: 70(H) × 40(W) × 35(T) mm

● RLH-603 Reference-side rectangular cell holder

This cell holder is used for the reference side when performing diffuse transmittance measurements of turbid liquid samples. Cell to be used: 5, 10 or 20 mm optical pathlength rectangular cell

Option for ILV-724/ILV-725

● SSH-507 Solid sample holder

- For diffuse transmittance measurements of a solid sample
- Minimum sample size: 20(H) × 20(W) × 0.5(T) mm
- Maximum sample size: 70(H) × 30(W) × 40(T) mm

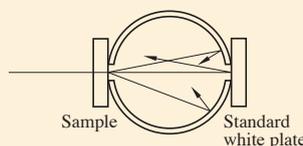


ISV-722

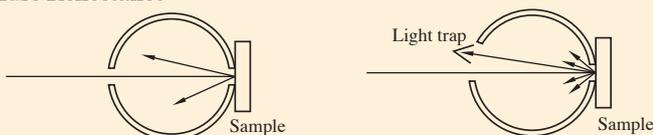


ILV-724

Diffuse Transmittance



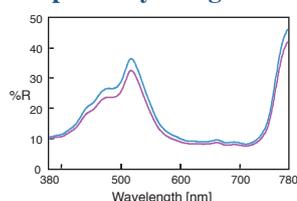
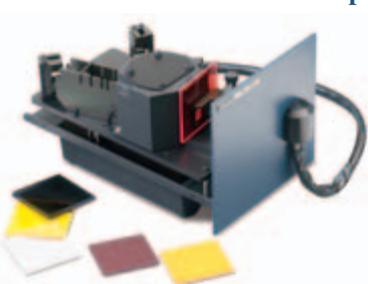
Diffuse Reflectance



Specifications of ISV-722/ISN-723/ILV-724/ILN-725:

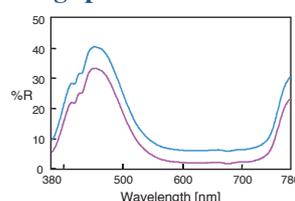
Model name:	ISV-722	ISN-723	ILV-724	ILN-725
Main unit:	V-650/660	V-670	V-650/660	V-670
Inside diameter of integrating sphere:	60 mm	60 mm	150 mm	150 mm
Minimum sample size (Reflectance):	20 (H) × 20 (W) × 0.5 (T) mm	20 (H) × 20 (W) × 0.5 (T) mm	20 (H) × 20 (W) × 0.5 (T) mm	20 (H) × 20 (W) × 0.5 (T) mm
Maximum sample size (Reflectance):	65 (H) × 50 (W) × 25 (T) mm	65 (H) × 50 (W) × 25 (T) mm	100 (H) × 50 (W) × 30 (T) mm	100 (H) × 50 (W) × 30 (T) mm
Sample cell (Transmittance):	Rectangular cell 5, 10, 20, 30, 50 mm path length		Rectangular cell 5, 10, 20, 30, 50 mm path length	
Reference cell (Transmittance):	Rectangular cell 5, 10, 20 mm path length* *Reference cell block is optional.		Rectangular cell 5, 10, 20, 30, 50 mm path length	
Wavelength range:	200 ~ 870 nm	200 ~ 2,500 nm	200 ~ 850 nm	200 ~ 2,200 nm
Incident angle to reflection surface:	0°, approx. 5°			Approx. 5°

Reflectance measurements of plastic plates by using the integrating sphere



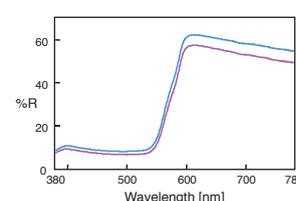
Green plastic plate

- Including specular reflection
- Excluding specular reflection



Blue plastic plate

- Including specular reflection
- Excluding specular reflection



Orange plastic plate

- Including specular reflection
- Excluding specular reflection

For solid samples

- All models used with all models of the V-600 Series
- V-650 used only with the V-650
- V-660 used only with the V-660
- V-670 used only with the V-670

IJV-726 Dedicated gemstone integrating sphere, 60 mm diam. for UV-Vis V-650 V-660

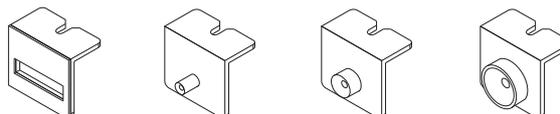
IJN-727 Dedicated gemstone integrating sphere, 60 mm diam. for UV-Vis to NIR V-670

The IJV-726 and IJN-727 are specially designed to measure the diffuse transmittance and diffuse reflectance of small and irregularly shaped samples such as gemstones. Various sample holders are included as standard for measurements of precious stones mounted on rings and necklaces. Use with the GHP-506 polarizer (option) is recommended.

Specifications:

Integrating sphere:	60 mm diam.
Sample size:	Minimum 2 mm diam. (Transmittance/Reflectance), Maximum 10 mm diam. (Transmittance), Maximum 30 mm diam. (Reflectance)
Wavelength range:	220 ~ 850 nm (IJV-726), 220 ~ 2,000 nm (IJN-727)

Various sample holders for rings, pearls, gemstones, etc. (standard)



PIV-756 Horizontal sampling integrating sphere, 60 mm diam. for UV-Vis V-650 V-660

PIN-757 Horizontal sampling integrating sphere, 60 mm diam. for UV-Vis to NIR V-670

The PIV-756/PIN-757 can mount samples horizontally and allows the simple measurement of small and powder samples with little to no sample preparation.

Specifications:

Integrating sphere:	60 mm diam.
Sample size (Transmittance):	Minimum 3 mm diam. × 0.5(T) mm Maximum 50(H) × 50(W) × 2(T) mm
Sample size (Reflectance):	Maximum 30(H) × 30(W) × 10(T) mm
Reflectance measurement adaptor:	20 mm diam. × 2 mm (no window required)
Wavelength range:	250 ~ 800 nm (PIV-756), 250 ~ 2,000 nm (PIN-757)

Options for PIV-756/PIN-757

- 6916-J156A Lens and mask for reflectance measurement (mask size: 1, 2 and 3 mm diam.)
- 6916-J256A Lens and mask for transmittance measurement (mask size: 1, 2 and 3 mm diam.)

These lens and mask kits are used to focus the light beam for measurement of a small area. When the 1 mm diameter mask is used, the beam diameter of the incident light upon the sample is decreased to a minimum of 2 mm in diameter.



SIV-767 Integrating sphere with stirrer, 60 mm diam. for UV-Vis V-650 V-660

SIN-768 Integrating sphere with stirrer, 60 mm diam. for UV-Vis to NIR V-670

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.

Specifications:

Integrating sphere:	60 mm diam.
Cell (Sample side):	Rectangular cell, 5, 10, 20, 30, and 50 mm path length
Cell (Reference side):	Rectangular cell, 5, 10 and 20 mm path length * Reference cell block is optional.
Sample size for reflectance measurement:	Minimum 20(H) × 20(W) × 0.5(T) mm Maximum 65(H) × 50(W) × 25(T) mm
Stirring system:	Integrated variable speed magnetic stirrer
Wavelength range:	250 ~ 850 nm (SIV-767), 250 ~ 2,500 nm (SIN-768)

Options for SIV-767/SIN-768

- RLH-603 Reference-side rectangular cell holder
This cell holder is required for the reference side when performing diffuse transmittance measurements of turbid liquid samples. The 5, 10 and 20 mm pathlength rectangular cells can be used with this cell holder.

- 6916-J367A Thermostatted Cell Holder
This cell holder allows measurements under temperature control by using a 10 × 10 mm rectangular cell with a temperature range of 10 to 90°C. A thermostatted water circulator is required.

* This cell holder cannot be used with the RLH-603.



HISV-728 Portable integrating sphere for UV-Vis V-650 V-660

HISN-729 Portable integrating sphere for UV-Vis to NIR V-670

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.

Specifications:

Integrating sphere:	60 mm diam.
Window size:	25 mm diam.
Wavelength range:	250 ~ 800 nm (HISV-728), 250 ~ 2,000 nm (HISN-729)

Options for HISV-728/HISN-729

- OFV-624/625 Optical fiber for HISV-728
 - Length: 1 m (OFV-624), 2 m (OFV-625)
 - Wavelength range: 250 ~ 800 nm
- OFN-626/627 Optical fiber for HISN-729
 - Length: 1 m (OFN-626), 2 m (OFN-627)
 - Wavelength range: 250 ~ 2,000 nm



Accessories to meet increasing demands for UV-Vis to NIR evaluation of new materials

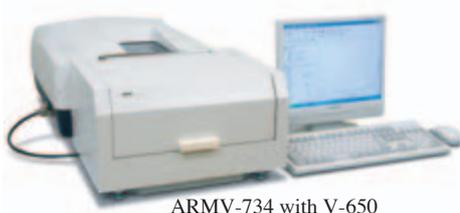
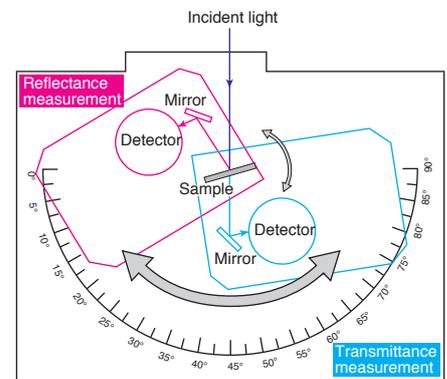
V-600 Series Optional accessories for

Absolute reflectance measurement accessory

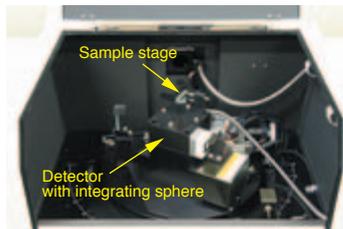
ARMV-734 Automated absolute reflectance measurement accessory for UV-Vis V-650 V-660 PC control only

ARMN-735 Automated absolute reflectance measurement accessory for UV-Vis to NIR V-670 PC control only

The ARMV-734 and ARMN-735 automate the absolute reflectance measurements of specularly reflecting samples such as metal or glass samples. The detector is equipped with an integrating sphere and thus it also permits 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 of a sample can be measured with varied angles of incidence. A software controlled polarizer is provided as standard for the examination of the polarization properties of a sample. In addition to S and P polarized lights, N polarized light that obtains the same measurement results as non-polarized light is available.



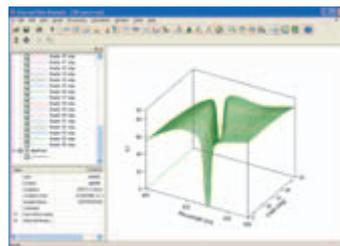
ARMV-734 with V-650



Sample stage
Detector with integrating sphere



Sample measurement dialog



3-D display of the interval data analysis program

The interval data analysis program which is standard for the ARMV-734 and ARMN-735 can display the measurement results in three dimensions of the wavelength, photometric value and angle.

The figure to the left illustrates a 3-D display of the measurement results for a notch filter at variable incident angles. The peak shift and the change of the peak intensity when varying the incident angle are observed.

ARV-730 Absolute reflectance measurement accessory for UV-Vis V-650 V-660

ARN-731 Absolute reflectance measurement accessory for UV-Vis to NIR V-670

ARSV-732 Absolute reflectance measurement accessory for UV-Vis V-650 V-660

ARSN-733 Absolute reflectance measurement accessory for UV-Vis to NIR V-670



The ARV-730 and ARN-731 accessories provide absolute reflectance measurements of samples by the manual, synchronous movement of the sample stage and detector. Changing the incident angle of the sample by manually moving the detector position, the absolute reflectance of the sample can be measured at varied incident angles. The ARSV-732 and ARSN-733 accessories provide an asynchronous movement of the sample stage and detector, thus, the positions of the sample stage and detector can be independently varied to obtain the absolute reflectance and transmittance spectra of the sample at varied incident and detection angles. Using the optional ARG-476 or GPH-506 polarizers, the polarization properties of the sample can also be examined.

Specifications:

Model name:	ARV-730	ARN-731	ARSV-732	ARSN-733	ARMV-734	ARMN-735
Main unit:	V-650/660	V-670	V-650/660	V-670	V-650/660	V-670
Wavelength range:	250 ~ 850 nm	250 ~ 2,000 nm	250 ~ 850 nm	250 ~ 2,000 nm	250 ~ 850 nm	250 ~ 2,000 nm
Movement of sample stage and detector:	Synchronous	Synchronous	Asynchronous	Asynchronous	Asynchronous	Asynchronous
Control of sample stage and detector:	Manual			Automated		
Measurement mode:	Absolute reflectance Relative reflectance		Absolute reflectance Relative reflectance Transmittance			
Integrating sphere:	60 mm diam.					
Incidence angle:	Absolute reflectance mode: 5° to 60° Relative reflectance mode: Vertical incidence Transmittance mode: 0° to 60°					
Angle setting:	2.5° step (manual)		Sample stage: 0.1° step (manual) Detector stage: 1° step (manual)		0.1° step automatic	
Sample size:	Absolute reflectance mode: Minimum Absolute reflectance mode: Maximum Relative reflectance mode: Minimum Relative reflectance mode: Maximum		20(H) × 20(W) × 1(T) mm 70(H) × 100(W) × 10(T) mm 20(H) × 20(W) × 0.5(T) mm 70(H) × 100(W) × 10(T) mm		20(H) × 20(W) × 1(T) mm 70(H) × 70(W) × 10(T) mm 20(H) × 20(W) × 0.5(T) mm 70(H) × 70(W) × 10(T) mm	
Accuracy:	±1.5% at incidence angle of 6°					
100% line flatness:	Within ±1%					
Polarizer:	Option				Standard	
Standard software:	-				Absolute reflectance spectral measurement, Interval analysis	

Materials for solid samples

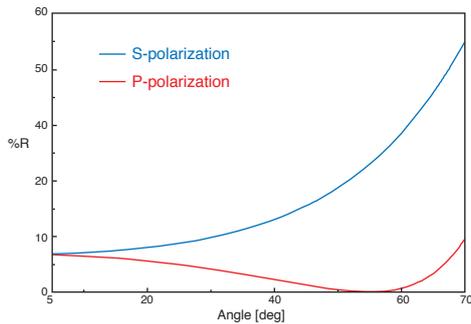
- All models used with all models of the V-600 Series
- V-650 used only with the V-650
- V-660 used only with the V-660
- V-670 used only with the V-670
- PC control only must be used with Spectra Manager only

Optional software for ARV-730/ARN-731/ARSV-732/ARSN-733/ARMV-734/ARMN-735

● VWAS-793 Variable incident angle measurement program (for ARMV-734/ARMN-735)

The VWAS-793 software measures the change of photometric values of a sample, scanning the angle of incidence at a maximum of eight different wavelengths. The program can also calculate the refractive index (n) and the extinction coefficient (k) based on the results of S and P polarization measurements.

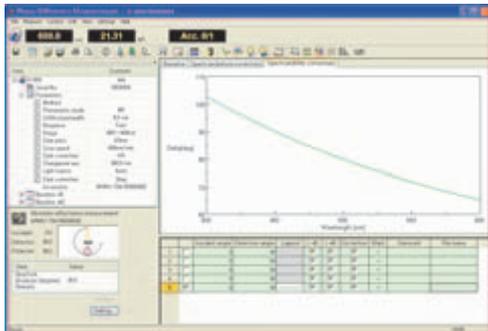
The figure below illustrates the determination of the Brewster's angle of SiO₂ from the reflectance measurement results of SiO₂ varying the angle of incidence. In the figure, the P-polarized reflectance is a minimum at approx. 56°.



Angular reflectance spectra of SiO₂

● VWAP-794 Phase difference measurement program (for ARV-730/ARN-731/ARSV-732/ARSN-733/ARMV-734/ARMN-735)

The VWAP-794 software is included in the PDU-755 phase difference measurement accessory as standard. The VWAP-794 program measures transmittance and reflectance phase difference spectra with multiple incident angles by using a polarizer and analyzer.



Phase Difference Measurement dialog

Options for ARV-730/ARN-731/ARSV-732/ARSN-733/ARMV-734/ARMN-735

● SSH-508 Solid sample holder

The SSH-508 is set on the entrance to the detector for diffuse transmittance measurements of scattering samples at a vertical (0°) incidence.

Specifications:

Sample size:	Minimum 30(H) × 30(W) × 0.5(T) mm, Maximum 70(H) × 80(W) × 10(T) mm
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● PDU-755 Phase difference measurement unit

The PDU-755 option provides the measurement of the reflectance phase difference and the transmittance phase difference. It consists of an angle selective analyzer and the VWAP-794 phase difference measurement program.

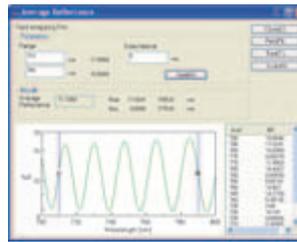
Specifications:

Wavelength range:	250 ~ 850 nm (ARV/ARSV/ARMV) 250 ~ 2,000 nm (ARN/ARSN/ARMN)
Polarization rotation angle:	0 ~ 90°

● VWAL-799 Average reflectance calculation program (for ARV-730/ARN-731/ARSV-732/ARSN-733/ARMV-734/ARMN-735)

The VWAL-799 program calculates the average reflectance, transmittance, or absorption of a spectrum. The average photometric value can be calculated by specifying the wavelength range for a spectrum. The VWAL-799 software is effective for the evaluation of glass or film samples or for evaluating optical components containing an interference pattern due to a film coating.

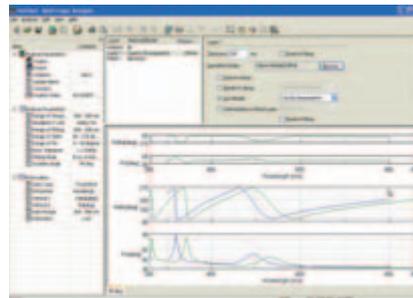
* The VWAL-799 software can also be used with the SLM-736/737/738 single reflection measurement accessories.



Results of average calculation

● VWML-791 Multi layer film thickness analysis program (for ARV-730/ARN-731/ARSV-732/ARSN-733/ARMV-734/ARMN-735)

The VWML-791 software calculates the refractive index, extinction coefficient and film thickness of an unknown layer of a multi-layer film by using the least squares method. The multilayer data is created by input of the predicted thickness of the unknown layer and selecting from standard sample data for the substrate and the individual layers from an optical constant library. The simulation is executed based on the created multilayer data. By creating the simulated waveform to be similar to the unknown spectral waveform, the program executes fitting calculations and calculates the unknown thickness. The criteria for thickness calculations are approx. 50 to 1,000 nm. The optical constant libraries of metals, semiconductors, isolators and polymers are included as standard.



Multilayer analysis dialog

● Wide incident angle sample holder

6708-H163A for ARV-730/ARN-731/ARSV-732/ARSN-733

6708-H460A for ARMV-734/ARMN-735

This sample holder is attached to the sample stage to allow an angle of incidence up to a maximum of 85°.

Specifications:

Sample size:	Minimum 30(H) × 60(W) × 1(T) mm (ARV/ARN), 30(H) × 30(W) × 1(T) mm (ARSV/ARSN/ARMV/ARMN) Maximum 70(H) × 100(W) × 10(T) mm
Incident angle:	0 ~ 85°

● ARG-476 Polarizer (for ARV-730/ARN-731/ARSV-732/ARSN-733)

The ARG-476 is a Glan-Taylor polarizer and is recommended for absolute reflectance measurements using incident angles of 30° or greater. By setting the polarizer at 45°, the same result can be obtained as for measurements with non-polarized light.

Specifications:

Wavelength range:	250 ~ 850 nm (ARV-730/ARSV-732), 250 ~ 2,000 nm (ARN-731/ARSN-733)
Polarization rotation angle:	0 ~ 90°

Accessories to meet increasing demands for UV-Vis to NIR evaluation of new materials

V-600 Series Optional accessories for

Film holders

FLH-740/FLH-741 Film holder All models

The FLH-740 and FLH-741 accessories are used to measure the transmittance of solid, transparent samples such as films, plate glass, and filters.

Specifications:

FLH-740	Thickness of sample:	0.5 to 10 mm
	Sample size:	Maximum 80 × 100 mm, minimum 15 × 15 mm
FLH-741	Thickness of sample:	0.5 to 25 mm
	Sample size:	Maximum 80 × 100 mm, minimum 5 × 5 mm



FLH-740



FLH-741

VTA-752 Film holder (variable incident angle) All models

The VTA-752 is a film holder to measure transmittance of a film type sample, changing the incident angle of the light beam. The incident angle of the source light beam can be set in 1° increments.

Specifications:

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



VTA-752

RSH-744 Rotary sample holder All models

The RSH-744 accessory can be used to measure a film type sample and rotating the sample manually. The sample 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°.

Specifications:

Sample size:	Minimum 10 × 30 mm, maximum 18 × 38 mm
Sample thickness:	1 to 2 mm
Angle of rotation:	Optical axis: 360°
	Perpendicular to the optical axis: ±50°



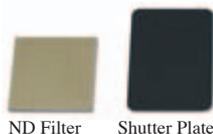
RSH-744

Options for high absorbance measurement

All models in the V-600 Series are provided with a dark correction function as standard. High absorbance sample measurements can be obtained by using the dark correction and reference beam attenuation kits outlined below. Reference beam attenuation increases the dynamic range of the instrument for accurate and precise measurements of high-optical density filters and/or strongly absorbing liquid samples which cannot be diluted.

● 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.



ND Filter Shutter Plate

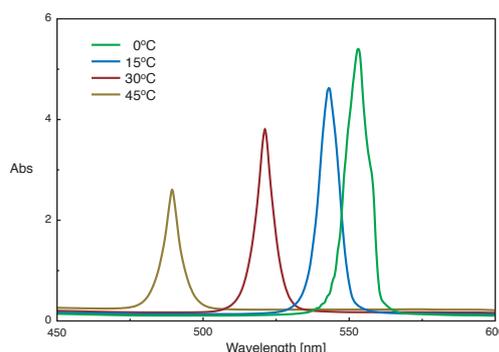
● NDF-601 ND filter (OD 2) for liquid samples

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-600 Series can be used as a shutter plate for a dark measurement, by rotating it 90° from its usual position.



ND Filter (OD 2)

The figure below illustrates the transmittance measurement of a notch filter by varying the angle of incidence by using the NDF-670 High absorbance measurement kit and the RSH-744 rotating sample holder with the V-660. As the angle of incidence is increased, the peak position shifts to the short wavelength side, and a weakening of the peak intensity can be observed.



Transmittance spectra of notch filter at variable angles of incidence

Polarizer, Depolarization plate

GPH-506 Polarizer

The GPH-506 polarizer converts the source light from the instrument monochromator into linearly polarized light. The plane of polarization can be set at 0° (vertical linearly polarized light) and 90° (horizontal linearly polarized light). The applicable spectral range is from 215 to 2,300 nm.



DPL-515 Depolarization plate

The DPL-515 depolarizer converts incident light to non-polarized light. Non-polarized light is obtained when the rotation angle is set to 45°. The applicable spectral range is from 350 to 2,500 nm.



- All models used with all models of the V-600 Series
- V-630 used only with the V-630
- V-650 used only with the V-650
- V-660 used only with the V-660
- V-670 used only with the V-670

Specular reflectance measurement accessories

- SLM-736** Specular reflectance accessory V-650 V-660 V-670
- SLM-737** Specular reflectance accessory V-630
- SLM-738** Specular reflectance accessory V-650 V-660 V-670

The SLM-736 and SLM-737 accessories are designed to measure the relative reflectance of a sample using the reflected light from an aluminum-deposited plane mirror as a reference. These accessories allow measurement of the reflectance of metal-deposited films and/or metal plating, as well as measurement of film thickness using a film thickness analysis program. The SLM-738 accessory can measure larger samples such as 6 inch silicon wafers.

Options for SLM-736/737

- **MSK-001** Sample stage with mask, 2 mm diam. (Sample size: min. 3 × 3 mm, max. 50 × 50 mm)
- **MSK-002** Sample stage with mask, 4 mm diam. (Sample size: min. 5 × 5 mm, max. 50 × 50 mm)

These sample stages can be used with the SLM-736/737 to measure small samples that cannot be measured using the standard sample stage.

Specifications:

Model name:	SLM-736	SLM-737	SLM-738
Main unit:	V-650/660/670	V-630	V-650/660/670
Angle of Incidence:	Approx. 5° fixed	Approx. 5° fixed	Approx. 5° fixed
Minimum Sample Size:	10 × 10 mm	10 × 10 mm	-
Maximum Sample Size:	100 × 120 mm	100 × 120 mm	∅150 mm
Beam Port Diameter:	7 mm diam. (1 mm, 2 mm diam. options)		7 × 7 mm
Reflection Reference:	Aluminum-deposited plane mirror (Standard)		
Wavelength Range:	200 to 870 nm (V-650/660) 200 to 2,500 nm (V-670)	250 to 1,000 nm	200 to 870 nm (V-650/660) 200 to 2,500 nm (V-670)
Sample chamber lid:	Standard		

Optional software for SLM-736/737/738

- **VWRR-769** Reflectance correction program

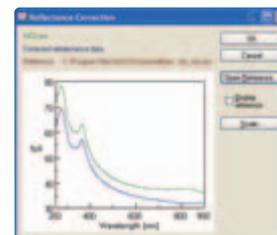
The VWRR-769 program can convert a relative reflectance spectrum, obtained by using a specular reflectance accessory (SLM-736/737/738), to an absolute reflectance spectrum by multiplying the absolute reflectance spectrum of the reflectance standard with a relative reflectance spectrum of the sample. The VWRR-769 software includes typical absolute reflectance data of an evaporated aluminum mirror for conversion.



SLM-736



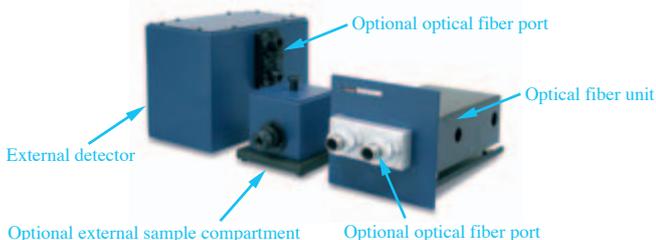
SLM-738



Reflectance correction dialog

Optical fiber probe units

- FAV-750** Optical fiber unit V-650 V-660
- FAN-751** Optical fiber unit V-670



The FAV-750/FAN-751 accessories, consisting of an optical fiber unit and external detector, enables the measurement of bulky samples that cannot be set in the sample compartment and/or samples that are in special environments. The light from the main instrument is introduced to the optical fiber. The light from a sample is introduced to the external detector via the optical fiber.

* Optical fiber, optical fiber ports, and external sample compartment are optional.

Specifications:

Main unit:	V-650/660 (FAV-750), V-670 (FAN-751)
External detector:	Photomultiplier tube (FAV-750) Photomultiplier tube and PbS (FAN-751)
Wavelength range:	250 ~ 800 nm (FAV-750), 250 ~ 2,000 nm (FAN-751)

Options for FAV-750/FAN-751/FAP-754

- **Optional fiber connection port**

- 6916-J254A Fiber connection port, Bundle type for FAV-750/FAN-751
- 6916-J154A Fiber connection port, Bundle type for FAP-754
- 6916-J250A Fiber connection port, FC connector type for FAV-750/FAN-751
- 6916-J150A Fiber connection port, FC connector type for FAP-754
- 6916-J251A Fiber connection port, SMA connector type for FAV-750/FAN-751
- 6916-J151A Fiber connection port, SMA connector type for FAP-754

- FAP-754** Optical fiber unit V-650 V-660 V-670



The FAP-754 accessory can be used for sample measurement using the internal detector of the spectrophotometer. The light from the main instrument is introduced to an optical fiber. The light from a sample is introduced to the detector of the spectrophotometer via a return optical fiber.

* Optical fiber and optical fiber port are optional.

ELM-742 External light source interface

- V-650 V-660 V-670



This interface is for introducing light from an external light source into the spectrophotometer, and measuring the spectrum of the external source. It can be used for the spectral/intensity evaluation of external light sources.

- * For correction of the measured spectrum, a secondary reference source is also required.
- * The optical fiber is optional.

Options for ELM-742

- **Optical fiber**

- 1120-0109 Optical fiber (bundle type), 1m
- 1120-0110 Optical fiber (bundle type), 1.5m

Specifications

	V-630, V-630BIO	V-650	V-660	V-670
Optical system:	Double beam Single monochromator Modified Rowland mount	Fully symmetrical double beam Single monochromator Czerny-Turner mount	Fully symmetrical double beam double monochromator Czerny-Turner mount	Fully symmetrical double beam Single monochromator Czerny-Turner mount
Light source:	Deuterium lamp and Halogen lamp (Light source exchange wavelength: User-selectable within a range of 330 to 350 nm)			
Wavelength range:	190 to 1,100 nm	190 to 900 nm	187 to 900 nm	190 to 2,700 nm (3,200 nm, option)
Wavelength accuracy:	±0.2 nm (at 656.1 nm)	±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 1,312.2 nm)
Wavelength repeatability:	±0.1 nm	±0.05 nm	±0.05 nm	±0.05 nm (UV-Vis) ±0.2 nm (NIR)
Scanning speed:	10 to 8,000 nm/min	10 to 4,000 nm/min (8,000 nm/min in preview mode)		
Slew speed:	12,000 nm/min			12,000 nm/min (UV-Vis) 48,000 nm/min (NIR)
Spectral bandwidth (SBW):	1.5 nm	0.1, 0.2, 0.5, 1, 2, 5, 10 nm, M1, M2 nm*1, L2, L5, L10 nm*2		UV-Vis. region: Same as V-650 NIR region: 0.4, 0.8, 2, 4, 8, 20, 40 nm, M4, M8 nm*1, L8, L20, L40 nm*2
Photometric range:	0 to 10,000%T -2 to 3 Abs	0 to 10,000%T -2 to 4 Abs	0 to 10,000%T -2 to 6 Abs	0 to 10,000%T -2 to 4 Abs (UV-Vis) -2 to 3 Abs (NIR)
Photometric accuracy:	±0.002 Abs (0 to 0.5 Abs), ±0.003 Abs (0.5 to 1 Abs), ±0.3 % (Tested with NIST SRM 930)			
RMS Noise:	0.00006 Abs*3	0.00003 Abs*4	0.00005 Abs*4	0.00003 Abs*4
Baseline flatness:	±0.0006 Abs*5	±0.0003 Abs*6	±0.0005 Abs*7	±0.0005 Abs*8
Baseline stability:	0.0004 Abs/hour*9	0.0003 Abs/hour*10		
Stray light:	1 % (198 nm, 12 g/L KCl) 0.04 % (220 nm, 10 g/L NaI) 0.02 % (340 nm, 50 g/L NaNO ₂) 0.02 % (370 nm, 50 g/L NaNO ₂) SBW: 1.5 nm	1 % (198 nm, 12 g/L KCl) 0.005 % (220 nm, 10 g/L NaI) 0.005 % (340 nm, 50 g/L NaNO ₂) 0.005 % (370 nm, 50 g/L NaNO ₂) SBW: L2 nm	1 % (198 nm, 12 g/L KCl) 0.00008 % (220 nm, 10 g/L NaI) 0.00008 % (340 nm, 50 g/L NaNO ₂) 0.00008 % (370 nm, 50 g/L NaNO ₂) SBW: L2 nm	1 % (198 nm, 12 g/L KCl) 0.005 % (220 nm, 10 g/L NaI) 0.005 % (340 nm, 50 g/L NaNO ₂) 0.005 % (370 nm, 50 g/L NaNO ₂) SBW: L2 nm 0.04 % (1420 nm, H ₂ O) 0.1 % (1690 nm, CH ₂ Br ₂ , 50 mm cell) SBW: L8 nm
Detector:	Silicon photodiode	PMT	PMT	PMT, Peltier cooled PbS
Dimension and weight:	486 (W) × 441 (D) × 216 (H) mm 15 kg	460 (W) × 602 (D) × 270 (H) mm 27 kg	460 (W) × 602 (D) × 270 (H) mm 29 kg	460 (W) × 602 (D) × 270 (H) mm 28 kg
Power requirements:	105 VA	145 VA	145 VA	145 VA

*1. 'M' designates the micro cell mode.

*2. 'L' designates the low stray light mode.

*3. Conditions: 0 Abs, wavelength: 500 nm, measurement time: 60 sec, response: medium

*4. Conditions: 0 Abs, wavelength: 500 nm, measurement time: 60 sec, response: medium, spectral bandwidth: 2 nm

*5. Value obtained after baseline correction with a temperature variation of less than 5°C, wavelength: 200 to 1,000 nm, response: medium, wavelength scanning speed: 400 nm/min, processed with a 25-point moving average smoothing function.

*6. Value obtained after baseline correction with a temperature variation of less than 5°C, wavelength: 200 to 850 nm, response: medium, wavelength scanning speed: 400 nm/min, spectral bandwidth: 2 nm, processed with a 25-point moving average smoothing function.

*7. Value obtained after baseline correction with a temperature variation of less than 5°C, wavelength: 200 to 800 nm, response: medium, wavelength scanning speed: 400 nm/min, spectral bandwidth: 2 nm, processed with a 25-point moving average smoothing function.

*8. Value obtained after baseline correction with a temperature variation of less than 5°C, wavelength: 200 to 2500 nm, response: medium, wavelength scanning speed: 400 nm/min, spectral bandwidth: 2 nm (200 to 850 nm) and 8 nm (850 to 2,500 nm), processed with a 25-point moving average smoothing function.

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

*10. Value obtained more than two hours after turning on the light source, when the room temperature is stabilized, wavelength: 250 nm, response: slow, spectral bandwidth: 2 nm.



● Specifications are subject to change without notice.

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