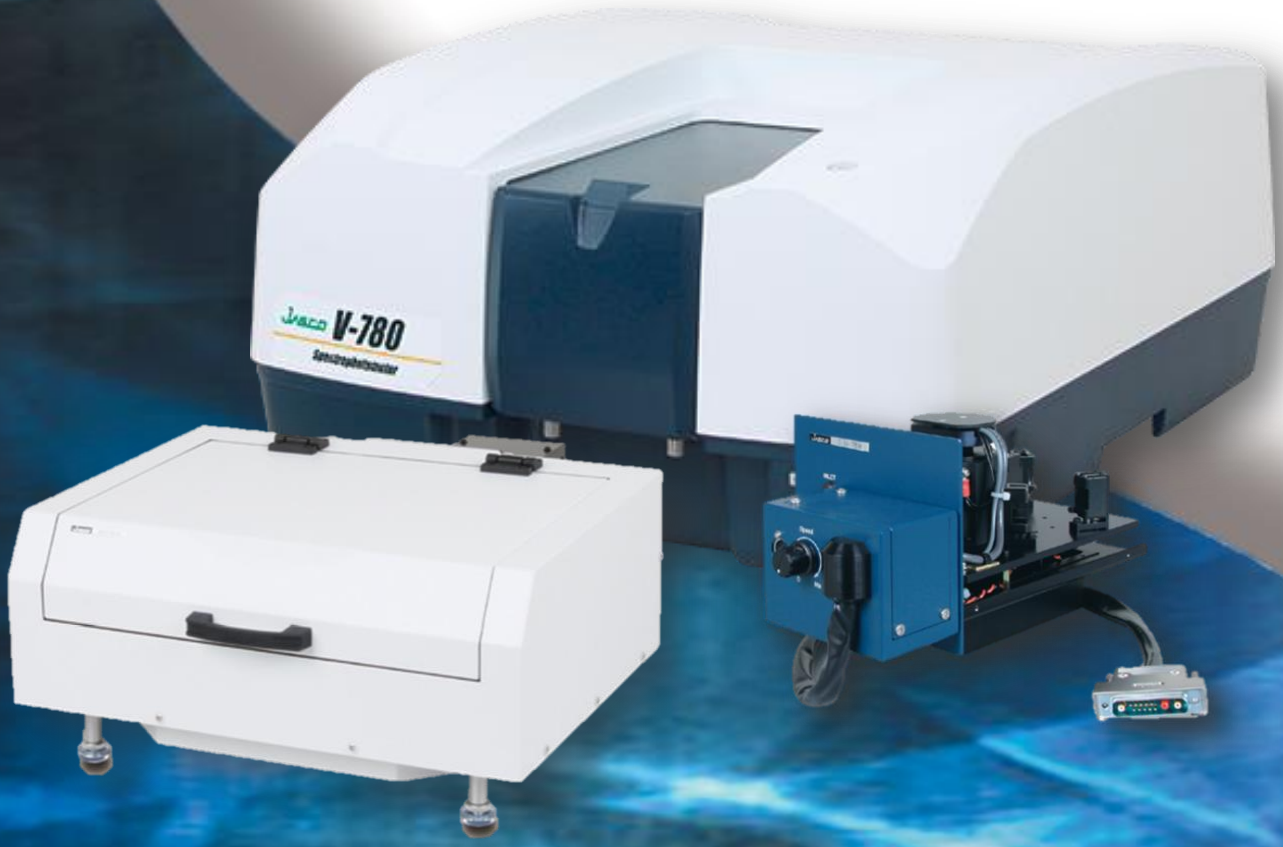
JASCO Europe

V-780

UV-Vis/NIR Double Beam Spectrophotometer



Company Presentation

JASCO Corporation - Japan was founded in 1958 to provide the scientific community with optical spectroscopy products.

In the mid-1950's a group of researchers in the Institute of Optics of what is now Tsukuba University needed an Infrared Spectrophotometer for their research.
Since a commercially available instrument was not yet existing at the time, they undertook the challenge to develop their own.

The result was quite a success - a reliable instrument with excellent optical performance. As a second result, other research groups asked them to replicate the instrument for use within their laboratories.

Over the years the JASCO product line has grown to cover instruments used, not only in research but also for routine analysis applications in areas such as quality control, environmental analysis, and process control. The current spectroscopy product line encompasses instrumentation for the following methods:

- ***UV/Visible and NIR***
- ***Microscope Spectrophotomers***
- ***FT-IR, microscope FT-IR and FT-Raman***
- ***Dispersive RAMAN***
- ***Polarimeters***
- ***Spectrofluorometers***
- ***Portable Raman***
- ***Portable FT-IR***
- ***Fully Automated Dissolution Tester***

JASCO is also the world leader in the field of ***Circular Dichroism Spectropolarimeters*** and ***Vibrational Circular Dichroism Spectrometers.***

"serving the Science and Technology World by providing most advanced analytical instrumentation"

With the introduction of HPLC in the mid-1970's JASCO's experience in highly sensitive and accurate optical systems led to the development of a series of chromatographic detection systems. Fixed and variable wavelength UV/Visible and Fluorescence detectors were introduced featuring excellent sensitivity and reliability in compact modules. In order to offer complete HPLC systems JASCO developed a variety of novel solvent delivery systems as well as other accessories such as column ovens, autosamplers, and PC based control and analysis software.

Today JASCO offers a wide variety of ***HPLC modules,*** accessories and analysis software. The new ***JASCO LC-4000 Liquid Chromatography*** series is designed to operate at pressures approaching 15,000 psi for either gradient or isocratic separations, providing researchers with a powerful tool when using the new generation of small particle columns. LC-4000 Series includes a versatile series of components offering unique flexibility to build systems for routine and specialized applications. LC-4000 features the widest choice of optical HPLC detector: UV, diode array, fluorescence, chemiluminescence, CD, chiral and refractive index detector.

Finally JASCO's modular ***Supercritical Fluid Chromatography*** and ***Supercritical Fluid Extraction*** platforms provide a low-cost, fast, green technology with reliable and worry-free performance for a wide variety of applications.

JASCO has a strong global presence, supplying customers in ***over 45 different countries.***

JASCO Europe** is responsible for marketing, sales, service and support for all Jasco products throughout **Europe, Middle East and Africa.

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Make the most of your investment with

JASCO Service and Support

JASCO Service and Support agreement plans are designed for those laboratories pursuing superior productivity through the highest level of professional services.
The use of automated instrumentation is the right approach to meet today's laboratories productivity requirements, reducing analysis run times, enhancing sample throughput, and increasing analytical accuracy and precision. In this view, preventive maintenance is very important to maximize laboratory uptime and avoid unexpected expenses.

In addition to the analytical goal, proper installation and maintenance are required to achieve optimal performance. JASCO provides flexible service and support management solutions focused on your laboratory real objectives.

With its service network, JASCO is ready to maintain the perfect reliability of customer's instrumentation and minimize the laboratory down time.

· *Superior productivity*
· *Optimized analytical performance*
· *Lower cost of ownership*
· *Extended instrument life*

If your laboratory has specific Service and Support requirements, JASCO can help you with customized contract agreements. In addition, a full set of Installation Qualification (IQ), Operational Qualification (OQ), and Performance Qualification (PQ) tests are available to verify the system proper installation, operation and performance, respectively.

Get the most from your investment with

JASCO Training Courses

JASCO Training Courses ensure maximum skill development for the best value of your laboratory. Our team of highly-experienced specialists can help your staff to get the most from your instrument reducing your analysis run time and improve performance.

Build your knowledge with JASCO Training Courses:

· *Instrument and Software operation*
· *troubleshooting*
· *Maintenance*
· *Calibration*
· *Applications and Methods developments*
· *Operating Techniques*

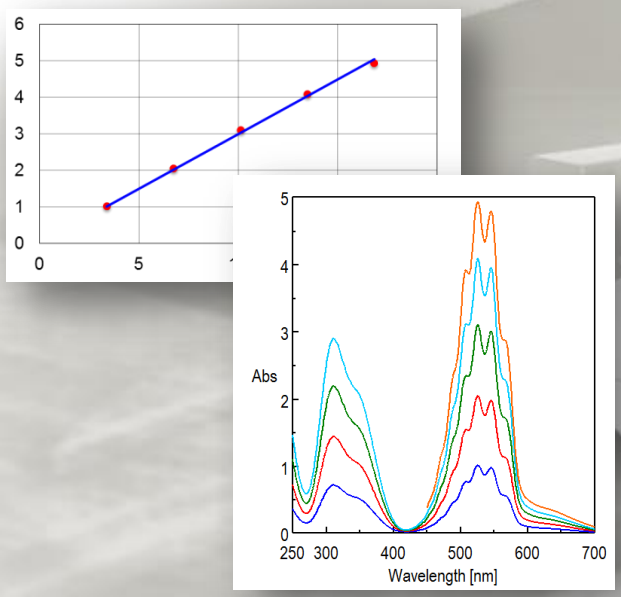
V-780 Spectrophotometer

UV-Vis/NIR Spectrophotometer JASCO V-780

V-780 is a double beam spectrophotometer with a single monochromator and double detector system (PMT and **InGaAs**). V-780 has been specifically design to achieve the highest sensitivity and resolution in NIR region **up to 1600 nm.** V-780 supports various optional accessories for liquids and solids, providing sample measurements for a wide variety of sample shapes and volumes.

JASCO V-780 KEY FEATURES

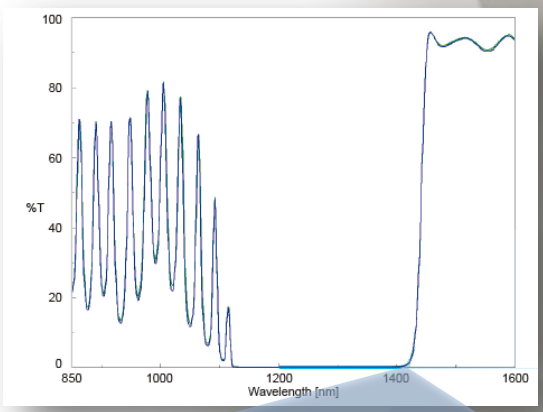
High photometric linearity - The photometric linearity range is up to 5 Abs in the visible region, up to 4 Abs in the UV-Visible region and up to 3 Abs in the NIR region. V-780 offers measurement with a wide dynamic range and high-absorbance by employing optimized high-order cut-off filters, ultra high-resolution A/D converter and simplified signal processing prior to the A/D conversion.

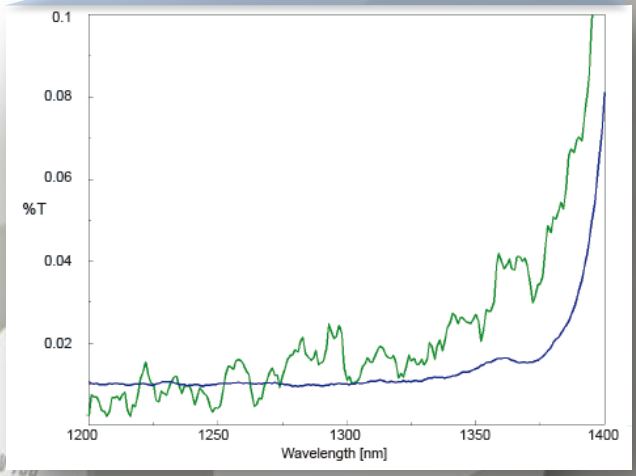


Excellent linearity up to 5 absorbance using KMnO4 solution

High sensitivity in the NIR region - The figures compare a 1.3 µm band cut-off filter for optical communication measured using a spectrophotometer with a Peltier-cooled PbS photo-conductive detector and the JASCO V-780 with a Peltier-cooled InGaAs Photodiode detector.

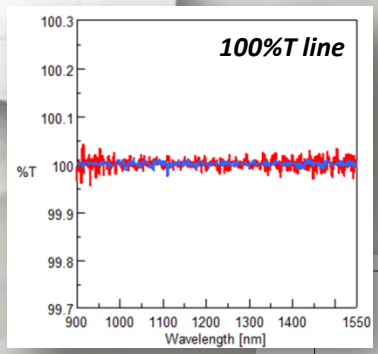
Transmittance Spectra of 1.3 µm Cut-Off Filter

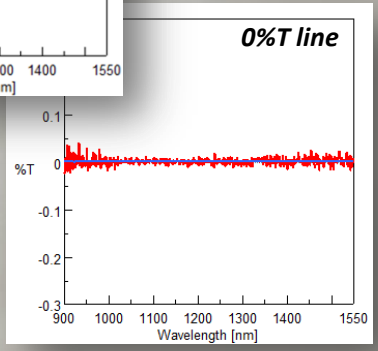




Zoomed View

The InGaAs detector offers significant S/N enhancement over the PbS detector. Here below S/N ratio with 60 mm Integrating Sphere

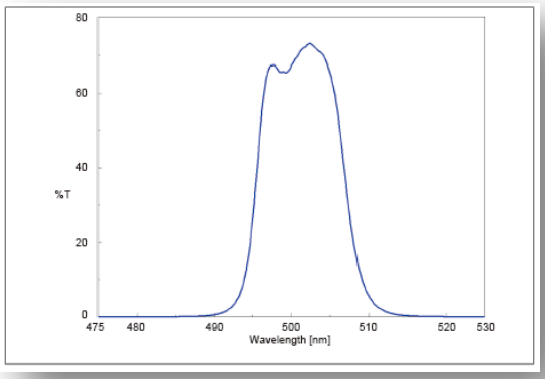




InGaAs photodiode (JASCO V-780)
PbS photocell

V-780 Spectrophotometer

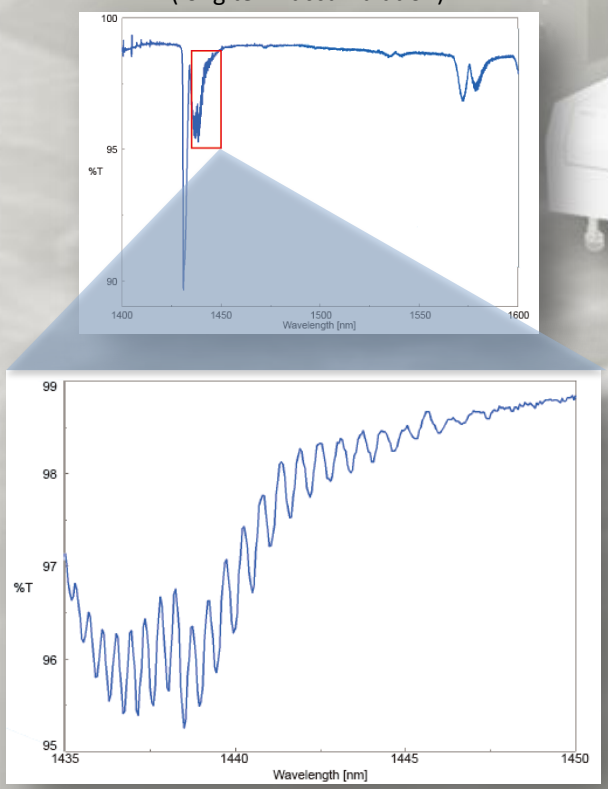
Step-scan measurement - Step-scan is a very useful tool for accurate measurement of samples such as bandpass filters for which the transmittance changes significantly over a narrow wavelength range.



Transmittance Spectrum of Bandpass Filter

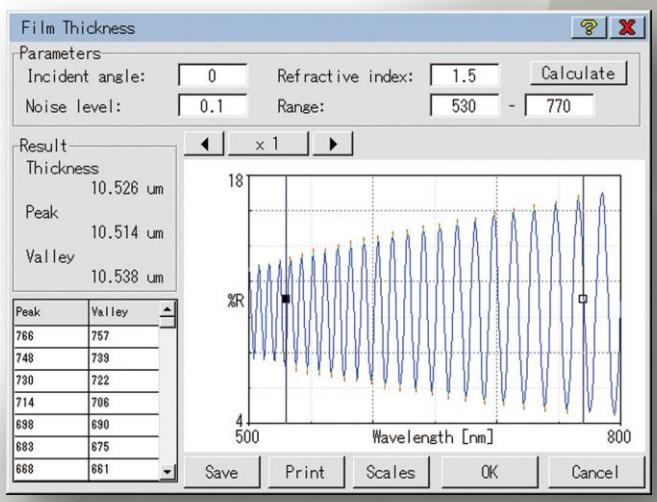
High resolution in the NIR- The figure below is the vibrational spectrum of CO2 gas (path length: 100 mm) in the NIR, measured using the V-780. Overtones are seen near 1430 nm and also combination bands near 1770 nm. Zooming into the spectrum at around 1437 nm shows that the V-780 offers sufficient resolution to see the rotational peaks in the vibrational spectra.

Transmittance Spectrum of CO2 Gas Sample
(long term accumulation)

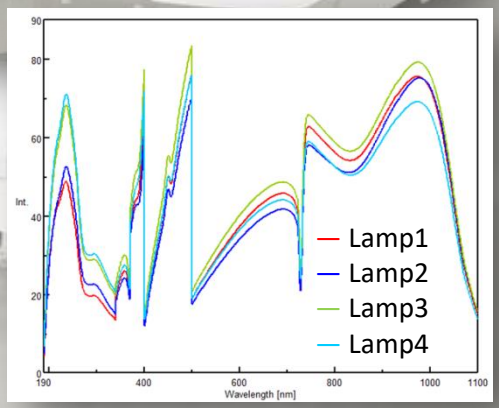


Zoomed View

Film thickness measurement - Film thickness measurements can be made using the SLM-907 specular reflectance accessory and integrated as standard Film Thickness measurement program.
The film thickness of a food packaging film using the SLM-907 single reflection accessory is shown below.



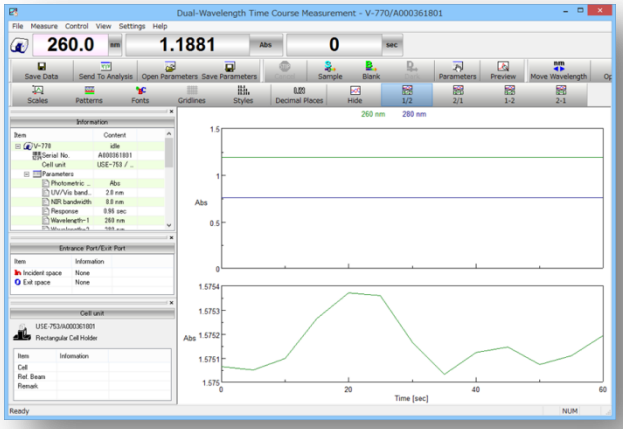
Alignment-free lamp replacement - The design of the socket deuterium lamp and socket tungsten halogen lamp facilitates light source over replacement, simplifies maintenance and reduces operation error. In the example below, single beam spectra and validation results of 4 different lamps mounted without any alignment tools.



	Lamp 1	Lamp 2	Lamp 3	Lamp 4
Wavelength Accuracy	Pass	Pass	Pass	Pass
Photometric Accuracy	Pass	Pass	Pass	Pass
Noise Level	Pass	Pass	Pass	Pass
Baseline Flatness	Pass	Pass	Pass	Pass

V-780 Spectrophotometer

Dual wavelength time course measurement - kinetics measurement can be performed by simultaneous dual wavelength, and the difference between dual photometric value and the ratio of dual photometric value can be plotted.

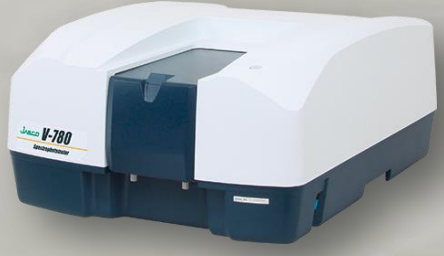


Dark Correction - A Dark Correction function is standard for all models of the V-700 Series, which provides photometrically accurate measurements of highly absorbing samples.

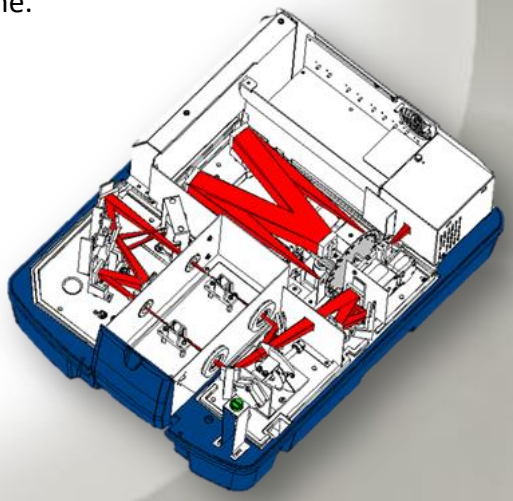
Energy and space-saving system

- Green technology, best energy-saving in its class Switch off the light source from the measurement screen when not in use.
- Save energy and lamp life.
- All models have the most compact design requiring minimal bench space.

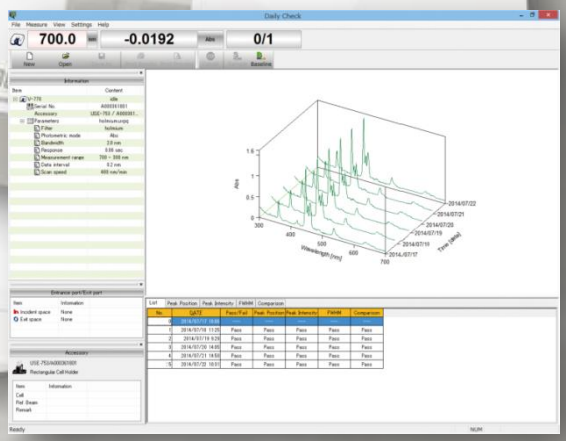
Validation - V-780 provides a standard validation program. This program supports USP, EP and JP instrument qualification requirements. The program automatically performs an analysis of the instrument results based on defined acceptance criteria. Results of the validation tests can be printed or saved electronically for further review.



True Double-Beam spectrophotometer - All JASCO V-700 spectrophotometers are true double-beam systems, provide the best possible stability and allow reference to be measured and corrected in real time.



Daily check program - For users who requires a regular validation check; use a simple Holmium glass filter (or other standard) for daily measurement with automatic execution of procedures to easily record and track a comprehensive history of instrument performance.



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.

JASCO V-780 Unique Features

- *Standard working range (**190** to **1600 nm**) and variable spectral bandwidth from **0.1 nm** enough to satisfy any requirements.*
- *Outstanding **RMS noise** (0.00003 Abs) and **Dynamic Range** (5 Abs) provide capabilities from education and routine analysis to high-end research applications.*
- ***Double detector system** (PMT and **InGaAs**) able to achieve the highest sensitivity and resolution in NIR region.*
- *The **'L' Mode and 'M' mode spectral bandwidth** settings for measurement of highly absorbing samples or for accurate measurements of trace amounts of sample in a micro cell.*
- ***True Double-Beam** spectrophotometer provides the best possible stability and allows reference to be measured and correct on real time.*
- ***IQ Accessory function** for automatic recognition of any accessory inserted into the sample compartment.*
- ***Validation** and **Daily Check** programs help operator to keep the instrument always in perfect conditions assuring maximum accuracy of obtained results.*
- *The V-700 Series can be integrated with more than **70 accessories** and over **30 optional programs** to offer flexible configurations for a wide variety of analytical requirements.*
- *Cross-platform software package, **SPECTRA MANAGER II**, for controlling JASCO spectroscopic instrumentation, upgradable on-field to **CFR version.***

JASCO SPECTRA MANAGER II

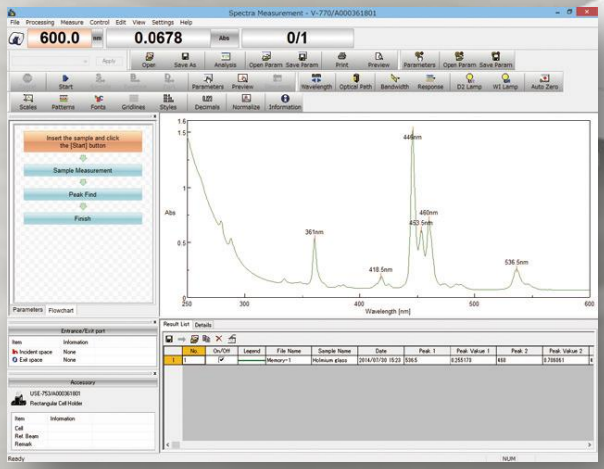
Software JASCO SPECTRA MANAGER II

The SPECTRA MANAGER II 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 can be viewed in a single window, and processed using a full range of data manipulation functions.

The basic package includes:

QUICK START MEASUREMENT PROGRAM - The Quick Start Measurement Program can automatically perform a series of operations as specified by a user, from measuring samples and processing data to saving and printing results, with a single click of the start button. The procedure is stored in memory for repeated use. The data processing functions include comparison of an obtained spectrum with spectra specified by a user.

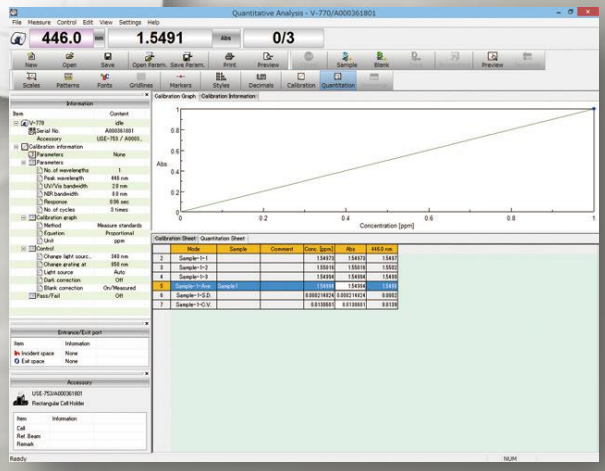
SPECTRA MEASUREMENT PROGRAM - The Spectra Measurement program measures photometric values of a sample in the selected wavelength range. Abs, %T or %R are available for the vertical axis while nm, cm-1, µm, and eV are available for the horizontal axis.



CANVAS PROGRAM - JASCO Canvas Program allows the user to prepare publication quality layouts of spectra, measurement parameters, text, 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.

QUANTITATIVE ANALYSIS PROGRAM - The quantitative measurement package consists of two programs; a calibration curve creation program and a quantitative measurement program. The program provides three types of baseline correction methods and eight types of calibration curves. A function for providing a pass/fail judgement for the obtained values is included.



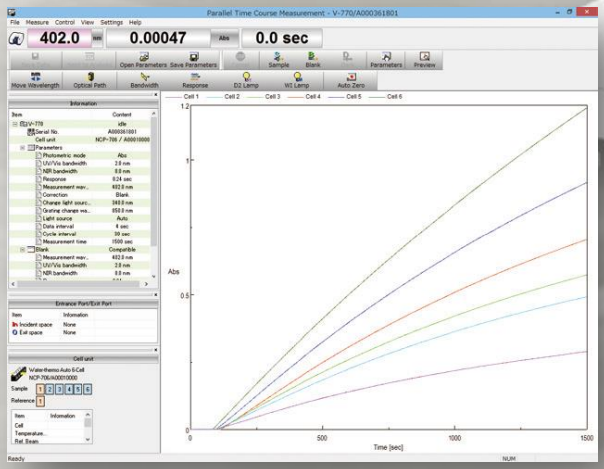
JASCO SPECTRA MANAGER II

Software JASCO SPECTRA MANAGER II

FIXED WAVELENGTH PROGRAM - The Fixed Wavelength measurement program measures the photometric values of up to eight multiple wavelengths. A 'cycle number' and 'wait time' are selectable, and the mean, standard deviation and C.V. value for each wavelength are displayed after completion of each cycle of sample measurements.

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 available. This function allows verification of the optimum set of instrument parameters and to check sample conditions before actual measurements.

TIME COURSE PROGRAM - The Time Course measurement program measures the changes of a sample's photometric value over time at a fixed wavelength and with a defined interval. For the time course measurement, the V-780 can obtain data at a minimum interval of 0.05 sec. Parallel time course measurements while controlling the cell positions of a cell changer are also possible.



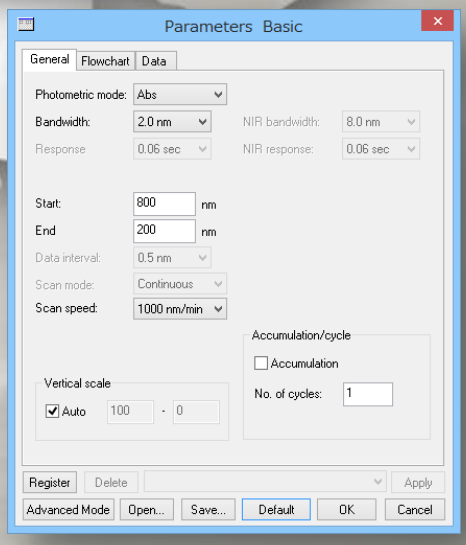
SPECTRA ANALYIS PROGRAM - The spectra analysis program includes all typical data analysis and data manipulation functions.

Furthermore, the film thickness measurement, color analysis, and the enzyme activity calculation programs are provided as standard.

Data manipulation functions

- *Spectral manipulations (zoom in, zoom out, rescale)*
- *Overlay*
- *Arithmetic operations*
- *Spectral Subtraction*
- *Derivatives*
- *Peak detection and processing - Find, Height, Area, FWHH*
- *Smoothing*
- *FFT Filter*
- *Deconvolution*
- *Baseline correction*
- *Unit conversion*

AUTOMATIC SETUP - The response time is automatically determined depending on the selected bandwidth and scan speed so that the spectrum profile does not become broad. The data interval is also automatically determined depending on the selected bandwidth.



V-780 - Technical Specifications

Optical System	• Czerny-Turner mount • Single Monochromator • True Double-Beam (Sample & Reference)
Light Source	Deuterium & Halogen lamps with automatic switching
Detector	Photomultiplier tube and Peltier cooled InGaAs photodiode
Wavelength Range	190 – 1600 nm
Wavelength Accuracy	± 0.3 nm at 656.1 nm ± 1.0 nm at 1.312.2 nm
Wavelength Repeatability	± 0.05 nm (UV-Vis) ± 0.1 nm (NIR)
Scanning Speed	10 to 4,000 nm/min (up to 8,000 in preview mode)
Slew Speed	12,000 nm/min (UV-Vis) 24,000 nm/min (NIR)
Spectral bandwidth	*UV-Vis* 0.1, 0.2, 0.5, 1, 2, 5, 10 nm - L2, L5, L10 nm - M1, M2 nm *NIR* 0.2, 0.4, 1, 2, 4, 8, 20 nm – L4, L10, L20 nm – M2, M4 nm
Photometric Range **(guaranteed on the whole spectral range)**	-4 + 4 Abs (UV-Vis) -3 + 3 Abs (NIR)
Maximum Photometric Range	-5 + 5 Abs ($KMnO_4$ aqueous solution)
Photometric Accuracy	±0.0015 Abs (0 to 0.5 Abs) ±0.0025 Abs (0.5 to 1 Abs) ±0.3 %T Tested with NIST SRM 930
Stray Light	1 % (198 nm KCl 12 g/L) 0.005 % (220 nm NaI 10 g/L) 0.005 % (340 nm and 370 nm NaNO2 50 g/L) 0.04 % (1420 nm H2O)
Baseline stability	±0.0003 Abs/hour
Baseline flatness	±0.0002 Abs
RMS noise	0.00003 Abs (0 Abs, 500 nm, 60 sec)
Communication	USB
Automatic Accessories Recognition	YES
Software	Spectra Manager II including the following programs: • Spectra Measurement • Quantitative analysis • Fixed Wavelenght • Dual Wavelenght Time Course Measurement • Quick Start Measurement • Canvas • Validation & Daily Check • Spectrum Preview • Film Thickness • Color • Enzyme Activity Calculation
Dimensions and weight	460(W)x602(D)x268(H) mm – 29 kg
Power requirements	150VA

JASCO Europe

Software & Sampling Accessories

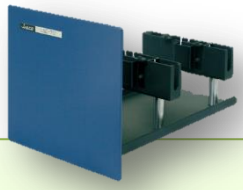
V-780 UV-Vis Spectrophotometer

V-780 – Liquid Sample Accessories

Sampling Accessories

V-700 Series can be integrated with a complement of more than 70 accessories 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.

LSE-701 - Long path cell holder



Specifications	
Sample Cell	Rectangular cell pathlength 10, 20, 50 or 100 mm
Reference Cell	Rectangular cell pathlength 10, 20, 50 or 100 mm
Capacity	1 sample and 1 reference cell
Temperature	Ambient
Suggested Software	• VWAC-796 - ASTM Color analysis program • VWSC-797 - Saybolt color analysis program • VWWQ-953 - Chromaticity/Turbidity measurement program

FSE-702 - 4-position manual long path cell changer

Specifications	
Sample Cell	Rectangular cell pathlength 10, 20, 50 or 100 mm
Reference Cell	Rectangular cell pathlength 10, 20, 50 or 100 mm
Capacity	4 sample and 1 reference cell
Temperature	Ambient

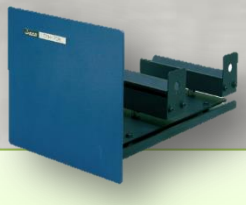
SSE-704 - 6-position manual cell changer

Specifications	
Sample Cell	Rectangular cell pathlength 10 mm
Reference Cell	Rectangular cell pathlength 10 mm
Capacity	6 sample and 1 reference cell
Temperature	Ambient

NCP-705 - 6-position automatic cell changer

Specifications	
Sample Cell	Rectangular cell pathlength 10 mm
Reference Cell	Rectangular cell pathlength 10 mm
Capacity	6 sample and 1 reference cell
Temperature	Ambient
Cell Switching	Software Controlled
Suggested Software	• VWIS-957 - Interval scan measurement program • VWIS-958 - Temperature interval scan measurement program

CYH-708 - Cylindrical cell holder



Specifications	
Sample Cell	Cylindrical cell pathlength 10, 20, 50 or 100 mm
Reference Cell	Cylindrical cell pathlength 10, 20, 50 or 100 mm
Capacity	1 sample and 1 reference cell
Temperature	Ambient

V-780 – Liquid Sample Accessories

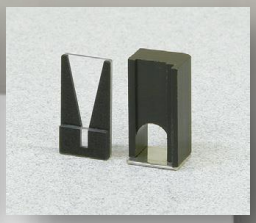
UCB-710 – Bio rectangular cell holder

Specifications	
A cell height adjustment function provides the ability to use a 100 µL micro cell. A mask for a 100 µL micro cell is standard, 50 µL can be supplied as option.	
Sample Cell	Rectangular cell pathlength 10 mm
Reference Cell	Rectangular cell pathlength 10 mm
Capacity	1 sample and 1 reference cell
Temperature	Ambient
Minimum Cell Volume	50 µL

EMC-709 – Micro cell holder

Specifications	
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.	
Sample Cell	Rectangular cell pathlength 10 mm
Reference Cell	Rectangular cell pathlength 10 mm
Capacity	1 sample and 1 reference cell
Temperature	Ambient
Minimum Cell Volume	5 µL

50 µL micro cell



5 µL micro cell and spacer

EMC-759 – Ultra-micro cell holder

Specifications	
The EMC-759 is a cell holder for a 5 µL micro cell	
Sample Cell	Rectangular cell pathlength 10 mm
Reference Cell	Rectangular cell pathlength 10 mm
Capacity	1 sample and 1 reference cell
Temperature	Ambient
Minimum Cell Volume	5 µL

5 µL micro cell

TCH-703 – 8-position Micro turret cell holder

Specifications	
Cell holder for an optional 8-position turret micro cell, containing eight cells with a volume of approximately 4 µL arranged in a circle.	
Sample Cell	pathlength 1 mm
Capacity	8 sample cells
Temperature	Ambient
Cell Volume	4 µL

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

V-780 – Liquid Sample Accessories

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

STR-773
Water thermostatted cell holder with stirrer

Specifications	
Sample Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Reference Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Capacity	1 sample and 1 reference cell
Temperature Control	Thermostatted water circulation for sample and reference
Operating Temperature	10 to 90 degC
Stirrer	Integrated variable speed magnetic stirrer - *2 mm path width micro cell cannot be used with the stirrer*

HMC-711
Water thermostatted micro cell holder

Specifications	
Minimum sample volume is 50 µL by using a rectangular cell, 5 mm path length and 2 mm path width.	
Sample Cell	Rectangular cell 10 x 10 or 5, 2 or 4 x 10, 2 x 5 mm
Reference Cell	Rectangular cell 10 x 10 or 5, 2 or 4 x 10, 2 x 5 mm
Capacity	1 sample and 1 reference cell
Temperature Control	Thermostatted water circulation for sample and reference
Operating Temperature	10 to 90 degC
Cell masks (standard)	• Mask for 100 µL cell (2 pcs.) for micro cell, 2 x 10 mm • Mask for 200 µL cell (2 pcs.) for micro cell, 4 x 10 mm

NCP-706
Water thermostatted 6-position automatic cell changer

Specifications	
Sample Cell	Rectangular cell 10 x 10 or 5, 2 or 4 x 10, 2 x 5 mm
Reference Cell	Rectangular cell 10 x 10 or 5, 2 or 4 x 10, 2 x 5 mm
Capacity	6 sample and 1 reference cell
Temperature Control	Thermostatted water circulation for sample and reference
Operating Temperature	10 to 90 degC
Cell Switching	Software Controlled

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

Specifications	
Sample Cell	Rectangular cell 10 x 10, 4 x 10 mm
Reference Cell	Rectangular cell 10 x 10, 4 x 10 mm
Capacity	4 sample and 1 reference cell
Temperature Control	Thermostatted water circulation for sample and reference
Operating Temperature	10 to 90 degC
Cell Switching	Manual

V-780 – Liquid Sample Accessories

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

Specifications	
Sample Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Reference Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Capacity	1 sample and 1 reference cell
Temperature Control	**Sample only** - Heating/cooling system using **air cooled Peltier** effect
Operating Temperature	10 to 60 degC (at 25 degC)
Temperature control accuracy	±0.1 degC (cell holder sensor)
Temperature Accuracy	*With cell holder sensor* ±0.5 degC (20 to 40 degC) ±1 degC (other temp. range) *With optional temperature sensor* ±0.2 degC
Stirrer	Integrated variable speed magnetic stirrer - *2 mm path width micro cell cannot be used with the stirrer*
Suggested Software	• VWIS-958 - Temperature interval scan measurement program • VWTP-959 - Temperature Gradient measurement and DNA melting analysis program

CSP-909
Lid for sample compartment with syringe port

Specifications	
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 x 10 mm rectangular cell. Required needle length for the syringe is 50 mm	
Compatible Cell Holder	STR-733 EHCS-760 - ETCS-761 - ETCR-762
Syringe	P/N 0507-0220 – Micro syringe 10µL P/N 0507-0223 – Micro syringe 100µL

ETCS-761 & ETCR-762
Peltier thermostatted single cell holder (Water cooled)

Sample Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Reference Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Capacity	1 sample and 1 reference cell
Temperature Control ETCS-761	**Sample only** Heating/cooling system using **Water cooled Peltier** effect
Temperature Control ETCR-762	**Sample & Reference** Heating/cooling system using **Water cooled Peltier** effect
Operating Temperature	0 to 100 degC *for cooling water temperature at 25 degC*
Temperature control accuracy	±0.1 degC (cell holder sensor)
Temperature Accuracy	*With cell holder sensor* ±0.5 degC (20 to 40 degC) ±1 degC (other temp. range) *With optional temperature sensor* ±0.2 degC
Stirrer	Integrated variable speed magnetic stirrer - *2 mm path width micro cell cannot be used with the stirrer*
Suggested Software	• VWIS-958 - Temperature interval scan measurement program • VWTP-959 - Temperature Gradient measurement and DNA melting analysis program

Options

Cell Mask 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.

Capillary adapter **-** 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.

V-780 – Liquid Sample Accessories

PSC-763
Automatic 6-position Peltier cell changer (Air cooled)

Specifications	
Sample Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Reference Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Capacity	6 sample and 1 reference cell
Temperature Control	**Sample only** - Heating/cooling system utilizing **air cooled Peltier** effect
Operating Temperature	10 to 70 degC (at 20 degC)
Temperature control accuracy	±0.1 degC (cell holder sensor)
Temperature Accuracy	*With cell holder sensor* ±0.5 degC (20 to 40 degC) ±1 degC (other temp. range) *With optional temperature sensor* ±0.2 degC
Stirrer	Integrated variable speed magnetic stirrer - *2 mm path width micro cell cannot be used with the stirrer*
Suggested Software	• VWIS-958 - Temperature interval scan measurement program • VWTP-959 - Temperature Gradient measurement and DNA melting analysis program

Options
OPS-513 **-** 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.

PAC-743 & PAC-743R
Automatic 6/8-position Peltier cell changer (Water cooled)

Specifications	
Sample Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Reference Cell	Rectangular cell 10 x 10, 4 x 10, 2 x 10 mm
Capacity	6/8 sample and 1 reference cell
Temperature Control PAC-743	**Sample only** Heating/cooling system utilizing **Water cooled Peltier** effect
Temperature Control PAC-743R	**Sample & Reference** Heating/cooling system utilizing **Water cooled Peltier** effect
Operating Temperature	0 to 100 degC (at 20 degC)
Temperature control accuracy	±0.1 degC (cell holder sensor)
Temperature Accuracy	*With cell holder sensor* ±0.5 degC (20 to 40 degC) ±1 degC (other temp. range)
Stirrer	Integrated variable speed magnetic stirrer - *2 mm path width micro cell cannot be used with the stirrer*
Suggested Software	• VWIS-958 - Temperature interval scan measurement program • VWTP-959 - Temperature Gradient measurement and DNA melting analysis program

MCB-100
Mini Water Circulation Bath

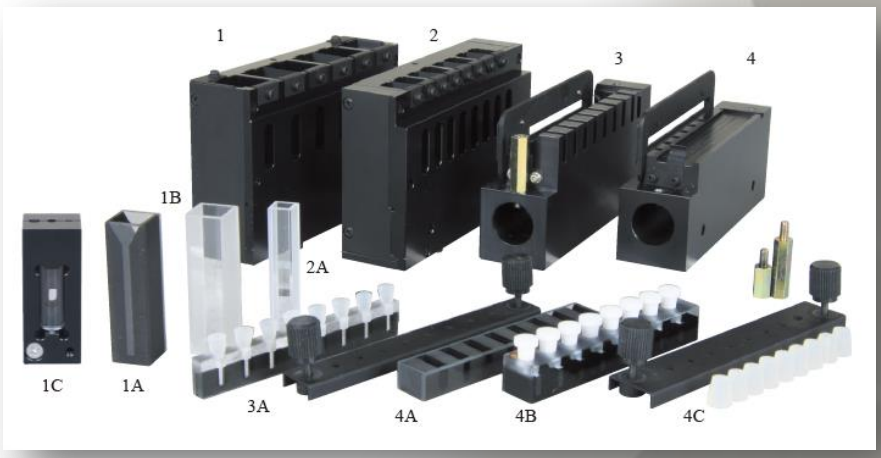
Specifications	
Temperature control range	10 degC below ambient temperature to 40 degC (IN and OUT connected)
Bath capacity	Approx. 200 mL
Temperature sensor accuracy	±0.2 degC (at 20 degC)
Cooling/heating capacity	52W
Dimensions	160 (W) \x 278 (H) x 225 (D) mm
Suggested accessories	ETCS-761 – ETCR-762 – PAC-743

V-780 – Liquid Sample Accessories

PAC-743 & PAC-743R

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.



How to configure it

Cell block (Cell and temp. sensor are optional)	#	*Compatible Cell*	#	*In-cell sensor (factory option)*
6916-H243A - 6-position cell block (with variable speed magnetic stirrer) for rectangular cell, 10 x 10 mm	1	Rectangular quartz cell, 2 x 10 mm, max. 6pcs.	1A	**6916-H516A** Sensor in cell, 1 pc. **6916-H517A** Sensor in cell, 6 pcs/set
		Rectangular quartz cell, 4 x 10 mm, max. 6pcs.		
		Rectangular quartz cell, 10 x 10 mm, max. 6pcs.	1B	
		6916-H360A - Capillary cell adaptor and Capillary cell, max. 6 pcs. (A sealing compound is required for using capillary cells.)	1C	
6916-H343A - 8-position cell block (with variable speed magnetic stirrer) for rectangular cell, 5 x 5 mm	2	Rectangular quartz cell, 5 x 5 mm, max 8 pcs.	2A	**6916-H516A** Sensor in cell, 1 pc. **6916-H518A** Sensor in cell, 8 pcs/set
6916-H643A - 1 mm 8-position micro cell block (Including Silicon cap x 8, Silicon cap with sensor hole x1, and cap fixture) *Stirrer function is not available	3	**1103-1171A** - 8-position 1 mm micro cell 1 mm path length, 10 µL for each position	3A	**6916-H516A** Sensor in cell, 1 pc. *The 8th cell position is used only to monitor cell block temperature.
6916-H743A - 10 mm 8-position micro cell block *Stirrer function is not available	4	**1103-0202A** - 8-position 10 mm micro cell 10 mm path length, 100 µL for each position without capability for well caps	4A	N/A
		1103-1168 - 8-position 10 mm micro cell with Teflon caps 10 mm path length, 100 µL for each position	4B	**6916-H516A** Sensor in cell, 1 pc. *The 8th cell position is used only to monitor cell block temperature.
		6916-H543A - Silicon cap kit for 1103-1168, to prevent volatilization of samples at high temperatures consisting of silicon cap x8 , Silicon cap with sensor hole x1, and cap fixture	4C	

V-780 – Liquid Sample Accessories

SAH-769 One drop accessory

Specifications

The SAH-769 One Drop accessory is a dedicated accessory for the V-700 Series to measure micro volume samples of protein and nucleic acid. The 1mm and 0.2 mm cells are included as standard with accessory.

	Minimum Sample Volume
1mm pathlenght	5 µL
0.2mm pathlenght	0.6 µL

Precision of Quantitative Analysis

Solutions of Calf Thymus DNA (KH2PO4 / NaOH buffer at pH7) at several concentrations were measured by using cells with 1-mm. The spectrum has shown at Figure 1 and LDL has shown at Table 1.

Table 1 Sample Conc. and Abs [OP: 1mm]

Legend	Conc. [ng/µL]	Abs
—	0	0.0005
—	13	0.0228
—	26	0.0417
—	52	0.0838
—	260	0.4500
—	520	0.8970
—	780	1.3443
—	1040	1.8137

Table 1
Sample Concentration and Abs
[optical path: 1 mm]

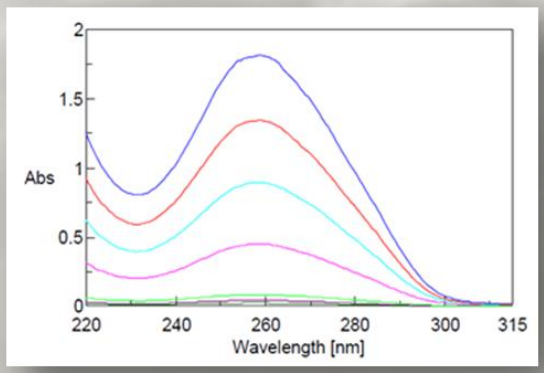
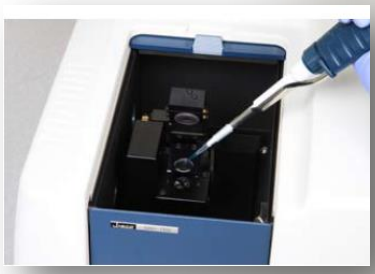
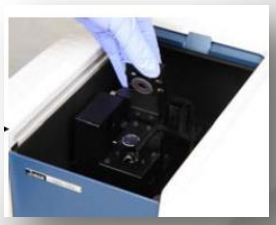


Figure 1
Absorbance spectra of DNA solution
[optical path: 1 mm]

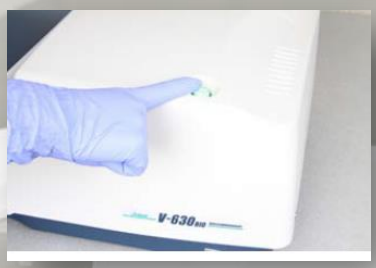
Measurement Procedure



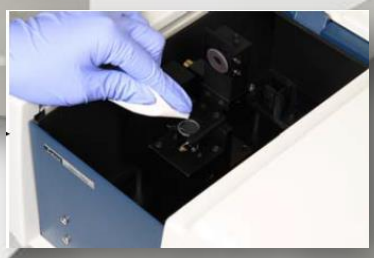
1) Drop sample on the cell



2) Close the cover glass and the lid of sample compartment



3) Start sample measurement



4) Cleaning the cell

less than
20 seconds

Measurement Parameters
Data interval: 0.5 nm
Measurement range: 220 to 315 nm
Band width: 1.5 nm
Response: Medium
Scan Speed: 200 nm/min

More information on *Application UV-0018-E*

V-780 – Liquid Sample Accessories

ASU-800 autosampler, combined with a syringe pump and a flow cell or a variety of sippers, automatically measures multiple liquid samples using spectrophotometer V-700 series. Tubes or tube racks according to the sample volume and the amount of samples, or dedicated racks for microplates can be purchased separately. PC control software is included as standard.

ASU-800 can be coupled with the following accessories:

- **NQF-781** - Vacuum sipper
- **NQF-783** - Vacuum sipper with long-path flow cell
- **NPF-721** - Peristaltic sipper
- **ASP-849** - Syringe pump

- **SFC-712** - Flow cell holder
- **MFC-714** - Micro flow cell holder
- **FIC-715** - Micro flow cell holder

- **AWU-828** Washing unit
- **Dust Cover**

ASU-800 - Autosampler unit

Rack	Tube/Microplate/Vials
6989-J111A – **SRA-811** 15 mm O.D. test tube rack - 100 samples	**6774-H110A** 15 mm O.D. test tube, 15 mm (O.D.) x 105 mm (H) - 10 mL - 100 pcs/set
6989-J112A – **SRA-812** 13 mm O.D. test tube rack – 100 samples	**6774-H109A** 13 mm O.D. test tube, 13 mm (O.D.) x 100 mm (H) - 7 mL - 100 pcs/set
6989-J113A – **SRA-813** 12 mm O.D. test tube rack – 150 samples	**6905-H146A** 12 mm O.D. test tube, 12 mm (O.D.) x 105 mm (H) - 5 mL - 100 pcs/set
6989-J114A – **SRA-814** 10 mm O.D. test tube rack – 150 samples	**6774-H111A** 10 mm O.D. test tube, 10 mm (O.D.) x 90 mm (H) - 3 mL - 100 pcs/set
6989-J116A **- SRA-816** Microplate Rack – 192 samples	Commercially available 1ml 96-well microplates
6989-J117A **- SRA-817** Thermostatted Microplate Rack – 192 samples	Commercially available 1ml 96-well microplates
6989-J118A – **SRA-818** Vial Rack	**0410-0102** Screw top vial – 1.5 mL - 500 pcs./set

Specifications

Nozzle	SUS-316 - 1.5 mm (O.D.) x 1.1 mm (I.D.)
Tubing	Teflon – 2.0 mm (O.D.) x 1.0 mm (I.D.)
Software	Fully controlled by Personal Computer - Included as standard: Spectra Measurement, Quantitative Calibration, Quantitative Analysis and Fixed Wavelenght Measurement
Communication	USB

AWU-828 Washing Unit

Washing unit specifically design for the sippers NQF-781, NQF-783 and NPF-782.
The AWU-828 can automatically wash the ASU-800 autosampler system.

Dust cover

This is a dust case that covers the rack part of ASU-800

V-780 – Liquid Sample Accessories

NQF-781 – Vacuum sipper

Specifications

NQF-781 can be used in conjunction with the autosampler ASU-800.
A 10 mm rectangular cell holder is integrated in addition to the 10 mm flow cell, and can be easily switched.

Optical Pathlenght	10 mm
Cell Capacity	about 50 µL
Cell Material	Quartz
Carryover	Less than 1%
Minimum sample requirement	0.7 mL for low-viscosity samples
Material in contact with sample/solvent	Teflon, Fluoroelastomer, Aflon
Maximum Processing Capacity	450 samples/hour
Wavelength Range	220 - 900 nm (V-750/760) 220 - 2200 nm (V-770) 220 - 1600 nm (V-780)

NQF-783
Vacuum sipper with long-path flow cell

Specifications

NQF-783 can be used in conjunction with the autosampler ASU-800.
A 50 mm rectangular cell holder is integrated in addition to the 50 mm flow cell, and can be easily switched.

Optical Pathlenght	50 mm
Cell Capacity	about 1400 µL
Cell Material	Quartz
Carryover	Less than 1%
Minimum sample requirement	2.4 mL for low-viscosity samples
Material in contact with sample/solvent	Teflon, Fluoroelastomer, Aflon
Maximum Processing Capacity	450 samples/hour
Wavelength Range	220 - 900 nm (V-750/760) 220 - 2200 nm (V-770) 220 - 1600 nm (V-780)

NPF-782 – Peristaltic sipper

Specifications

NPF-782 can be used in conjunction with the autosampler ASU-800.
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.

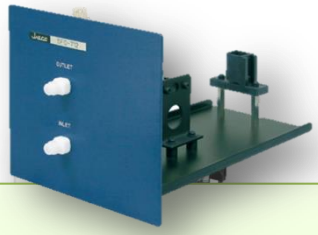
Optical Pathlenght	10 mm
Cell Capacity	about 50 µL
Cell Material	Quartz
Carryover	Less than 1%
Minimum sample requirement	0.7 mL for low-viscosity samples
Material in contact with sample/solvent	Teflon, Fluoroelastomer, Aflon
Maximum Processing Capacity	360 samples/hour
Wavelength Range	220 - 900 nm (V-750/760) 220 - 2200 nm (V-770) 220 - 1600 nm (V-780)

V-780 – Liquid Sample Accessories

ASP-849 – Syringe Pump

Specifications	
The ASP-849 can be used in conjunction with the ASU-800 and SFC-712/MFC-714/FIC-715 flow cell holders. The syringe pump is suitable for drawing small quantities of sample.	
Reproducibility of volume delivery	Within ±1%
Syringe volume	2.5 mL (included as standard)
Optional syringes	1 mL – 5 mL – 10 mL
Material in contact with sample/solvent	Teflon, Fluoroelastomer, Quartz
Compatible Flow Cell Holders	SFC-712 MFC-714 FIC-715

SFC-712 – Flow cell holder



Specifications	
Flow Cell compatibility	**6156-H607A** 5 mm path length flow cell (50 µL cell capacity) **6156-H608A** 10 mm path length flow cell (100 µL cell capacity)
Flow Cell	Rectangular Quartz
Material in contact with sample/solvent	Teflon, Fluoroelastomer, Quartz
Wavelength Range	220 - 900 nm (V-750/760) 220 - 2200 nm (V-770) 220 - 1600 nm (V-780)

MFC-714– Micro Flow cell holder
FIC-715 – Micro Flow cell holder

Specifications	
Cell Material	MFC-714: SUS FIC-715: Teflon
Optical Pathlenght	10 mm
Cell Capacity	20 µL

LFC-713 – Long path flow cell holder

Specifications	
Flow Cell compatibility	**6522-J343A** 30 mm path length flow cell (approx. 0.6 mL cell capacity) **6522-J333A** 50 mm path length flow cell (approx. 1 mL cell capacity) **6522-J243A** 100 mm path length flow cell (approx. 2 mL cell capacity)
Flow Cell	Synthetic Fused Silica
Wavelength Range	220 - 900 nm (V-750/760) 220 - 2200 nm (V-770) 220 - 1600 nm (V-780)

V-780 – Solid Sample Accessories

FLH-740 – Film holder

Specifications	
FLH-740 accessory are used to measure the transmittance of solid, transparent samples such as films, plate glass, and filters.	
Minimum Sample size	15 mm (H) x 15 mm (W)
Maximum Sample size	80 mm (H) x 100 mm (W)
Sample Thickness	0.5 to 10 mm
Insert Mode	Leaf Spring type

FLH-741 – Film holder

Specifications	
FLH-741 accessory are used to measure the transmittance of solid, transparent samples such as films, plate glass, and filters.	
Minimum Sample size	5 mm (H) x 5 mm (W)
Maximum Sample size	80 mm (H) x 100 mm (W)
Sample Thickness	0.5 to 25 mm
Insert Mode	Holding Plate type

RSH-744 – Rotary sample holder

Specifications	
RSH-744 accessory can be used to measure a film type sample and rotating the sample manually. The sample can be rotated 360º around the optical axis and the inclination (tilt) of the sample versus the source beam can be varied within a range of ±50º.	
Minimum Sample size	10 mm (H) x 30 mm (W)
Maximum Sample size	18 mm (H) x 38 mm (W)
Sample Thickness	1 to 2 mm
Rotation Angle	Optical axis: 360º Perpendicular to the optical axis: ±50º

VTA-752 – Film holder (variable incident angle)

Specifications	
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 1º increments.	
Minimum Sample size	15 mm (H) x 35 mm (W)
Maximum Sample size	80 mm (H) x 70 mm (W)
Sample Thickness	1 to 2 mm
Rotation Angle	±90º

V-780 – Solid Sample Accessories

SLM-907 – Specular Reflectance accessory

Specifications

SLM-907 accessory is designed to measure the relative reflectance of a sample using the reflected light from an aluminum-deposited plane mirror as a reference.
This accessory allows 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.

Incident angle	Approx. 5º
Minimum Sample size	10 x 10 mm
Maximum Sample size	100 x 120 mm
Beam Port	7 mm diam. (1 mm, 2 mm diam. Options)
Reflection Reference	Aluminum-deposited plane mirror (Standard)
Wavelength range	200 - 870 nm (V-750/760) 200 - 2500 nm (V-770) 200 - 1600 nm (V-780)
Sample chamber lid	Included as standard

Options

	MSK-001	**MSK-002**
Sample stage with mask	2 mm diam.	4 mm diam.
Minimum Sample Size	3 x 3 mm	5 x 5 mm
Maximum Sample Size	50 x 50 mm	50 x 50 mm
Suggested Software	VWRR-769 - Reflectance correction program	

VWRR-769
Reflectance correction program

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

Required Accessories	SLM-907-SLM-908

SLM-908
Specular Reflectance accessory

Specifications

SLM-908 accessory is designed to measure the relative reflectance of a sample using the reflected light from an aluminum-deposited plane mirror as a reference. This accessory allows 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. SLM-908 accessory can measure larger samples such as 6 inch silicon wafers.

Incident angle	Approx. 5º
Sample size	150 mm diam.
Beam Port	7 x 7 mm
Reflection Reference	Aluminum-deposited plane mirror (Standard)
Wavelength range	200 - 870 nm (V-750/760) 200 - 2500 nm (V-770) 200 - 1600 nm (V-780)
Sample chamber lid	Included as standard

Options

	MSK-001	**MSK-002**
Sample stage with mask	2 mm diam.	4 mm diam.
Minimum Sample Size	3 x 3 mm	5 x 5 mm
Maximum Sample Size	50 x 50 mm	50 x 50 mm
Suggested Software	VWRR-769 - Reflectance correction program	

DPL-515 – Depolarization Plate

Specifications

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

GPH-506 – Polarizer

Specifications

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

V-780 – Solid Sample Accessories

ISN-901i - Integrating Sphere, 60 mm

Specifications

ISN-901i integrating sphere are provided with a light trap so that the reflectance of samples can be measured with or without the specular reflectance component. 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.

Inside diameter of integrating sphere	60 mm
Minimum sample size (Reflectance)	20 (H) x 20 (W) x 0.5 (t) mm
Maximum sample size (Reflectance)	65 (H) x 50 (W) x 25 (t) mm
Sample cell (Transmittance)	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)
Wavelength range	200 – 1600 nm
On-board Detector	PMT & InGaAs
Incident angle to reflection surface	0º, approx. 5º

Options

PSH-002 Powder sample holder - *For diffuse reflectance measurements of powder samples - Size of sample area: 16 mm diameter - Thickness: 0.5 - 6 mm*

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*

SSH-506 Solid Sample Holder
For diffuse transmittance measurements of a solid sample
Min. sample size: 20 (H) x 20 (W) x 0.5 (t) mm
Max. sample size: 70 (H) x 40 (W) x 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

(*) 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.

ILN-902i - Integrating Sphere, 150 mm

Specifications

ILN-902i integrating sphere are provided with a light trap so that the reflectance of samples can be measured with or without the specular reflectance component. 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.

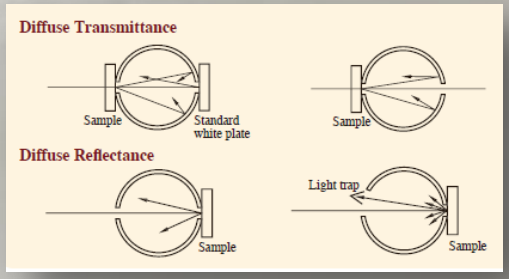
Inside diameter of integrating sphere	150 mm
Minimum sample size (Reflectance)	20 (H) x 20 (W) x 0.5 (t) mm
Maximum sample size (Reflectance)	100 (H) x 50 (W) x 30 (t) mm
Sample cell (Transmittance)	Rectangular cell 5, 10, 20 30, 50 mm path length
Reference cell (Transmittance)	Rectangular cell 5, 10, 20 30, 50 mm path length
Wavelength range	200 – 1600 nm
On-board Detector	PMT & InGaAs
Incident angle to reflection surface	approx. 5º

Options

PSH-002 Powder sample holder
For diffuse reflectance measurements of powder samples
Size of sample area: 16 mm diameter
Thickness: 0.5 - 6 mm

SSH-507 Solid sample holder
For diffuse transmittance measurements of a solid sample
Min. sample size: 20 (H) x 20 (W) x 0.5 (t) mm
Max. sample size: 70 (H) x 30 (W) x 40 (t) mm

Integrating spheres are designed to measure either the diffuse transmittance or diffuse reflectance of a sample. Usually, 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.



V-780 – Solid Sample Accessories

IJN-904i
Dedicated Gemstone integrating sphere

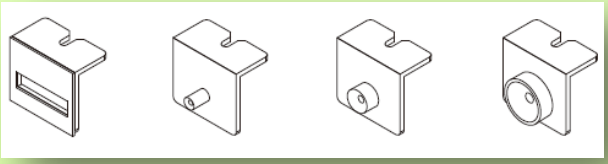
Specifications

IJN-904i is 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.

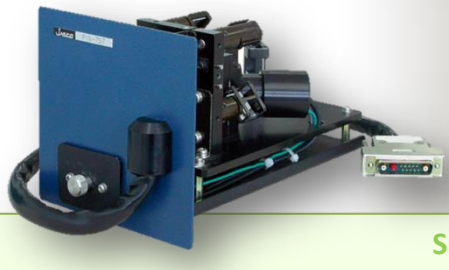
Inside diameter of integrating sphere	60 mm
Minimum sample size *(Transmittance/Reflectance)*	2 mm diameter
Maximum sample size (Transmittance)	10 mm diameter
Maximum sample size (Reflectance)	30 mm diameter
Wavelength range	250 – 1600 nm
On-board Detector	PMT & InGaAs

Options

Sample holders for rings, pearls, gemstones (included as standard)



PIN-903i - Horizontal integrating sphere



Specifications

PIN-903i can mount samples horizontally and allows the simple measurement of small and powder samples with little to no sample preparation.

Inside diameter of integrating sphere	60 mm
Minimum sample size (Transmittance)	3 mm diam.x 0.5 (T) mm
Maximum sample size (Transmittance)	50 (H) x 50 (W) x 2 (T) mm
Maximum sample size (Reflectance)	30 x 30 x 10 (T) mm
Reflectance measurement adaptor	20 mm diam. x 2 mm (no window required)
Wavelength range	250 – 1600 nm
On-board Detector	PMT & InGaAs

Options

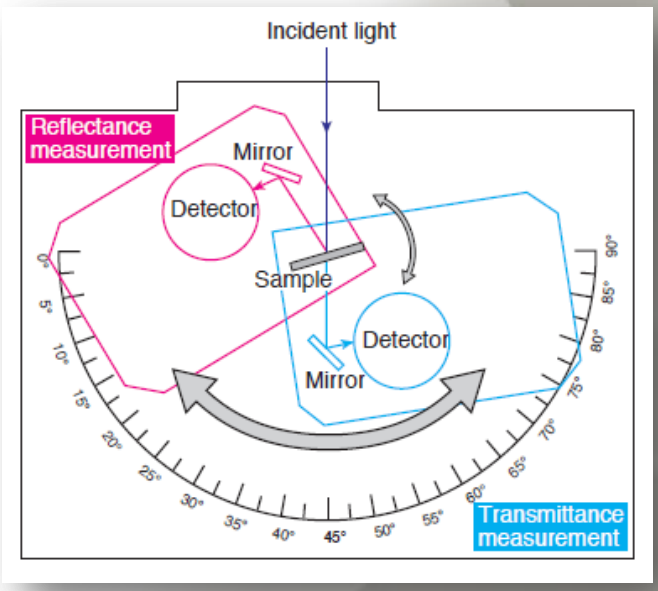
6916-J156A - Lens and mask for reflectance measurement - (mask size: 1, 2 and 3 mm diam.)

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.

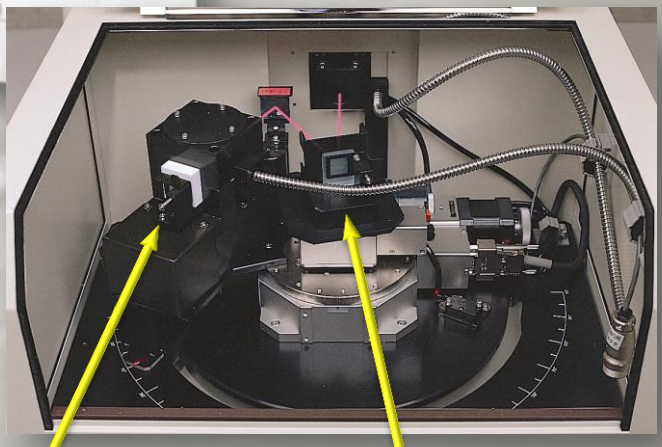
V-780 – Solid Sample Accessories

ARMN-921i
Automated Absolute Reflectance measurement accessory



Specifications	
Wavelength range	250 – 1600 nm
Movement of sample stage and detector	Asynchronous
Control of sample stage and detector	Automated
Measurement mode	Absolute reflectance Relative reflectance
Integrating sphere	60 mm
Incidence angle	*Absolute reflectance mode* 5º to 60º *Relative reflectance mode* Vertical incidence *Transmittance mode* 5º to 60º
Angle setting	Sample stage: 0.1º step (manual) Detector stage: 1º step (manual)
Minimum sample size (Absolute Reflectance)	20 (H) x 20 (W) x 1 (t) mm
Maximum sample size (Absolute Reflectance)	70 (H) x 100 (W) x 10 (t) mm
Minimum sample size (Relative Reflectance)	20(H) x 20(W) x 0.5(T) mm
Maximum sample size (Relative Reflectance)	70(H) x 100(W) x 10(T) mm
Accuracy	±1.5% at incidence angle of 6 °
100% line flatness	Within ±1%
Polarizer	Included as standard
Software included	• Absolute reflectance spectral measurement • Interval analysis

The ARMN-921i automates 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.
The interval data analysis program which is standard for the ARMN-920 can display the measurement results in three dimensions of the wavelength, photometric value and angle.



Integrating sphere ***Sample Stage***

V-780 – Solid Sample Accessories

ARN-915i
Absolute Reflectance measurement accessory (Synchronous type)

Specifications

The ARN-915i accessory provides 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.
Using the optional ARG-476 or GPH-506 polarizers, the polarization properties of the sample can also be examined.

Wavelength range	250 – 1600 nm
Movement of sample stage and detector	Synchronous
Control of sample stage and detector	Manual
Measurement mode	Absolute reflectance Relative reflectance
Integrating sphere	60 mm
Incidence angle	*Absolute reflectance mode* 5º to 60º *Relative reflectance mode* Vertical incidence
Angle setting	2.5º step (manual)
Minimum sample size (Absolute Reflectance)	20 (H) x 20 (W) x 1 (t) mm
Maximum sample size (Absolute Reflectance)	70 (H) x 100 (W) x 10 (t) mm
Minimum sample size (Relative Reflectance)	20(H) x 20(W) x 0.5(T) mm
Maximum sample size (Relative Reflectance)	70(H) x 100(W) x 10(T) mm
Accuracy	±1.5% at incidence angle of 6 °
100% line flatness	Within ±1%
Polarizer	Optional (ARG-476 or GPH-506)

ARSN-918i
Absolute Reflectance measurement accessory (Asynchronous type)

Specifications

The ARSN-918i accessory provides absolute reflectance measurements of samples by the manual, 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.

Wavelength range	250 – 1600 nm
Movement of sample stage and detector	Asynchronous
Control of sample stage and detector	Manual
Measurement mode	Absolute reflectance Relative reflectance
Integrating sphere	60 mm
Incidence angle	*Absolute reflectance mode* 5º to 60º *Relative reflectance mode* Vertical incidence *Transmittance mode* 5º to 60º
Angle setting	Sample stage: 0.1º step (manual) Detector stage: 1º step (manual)
Minimum sample size (Absolute Reflectance)	20 (H) x 20 (W) x 1 (t) mm
Maximum sample size (Absolute Reflectance)	70 (H) x 100 (W) x 10 (t) mm
Minimum sample size (Relative Reflectance)	20(H) x 20(W) x 0.5(T) mm
Maximum sample size (Relative Reflectance)	70(H) x 100(W) x 10(T) mm
Accuracy	±1.5% at incidence angle of 6 °
100% line flatness	Within ±1%
Polarizer	Optional (ARG-476 or GPH-506)

V-780 – Solid Sample Accessories

Absolute Reflectance accessories
Options

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 (0º) incidence.

Minimum sample size	30(H) x 30(W) x 0.5(T) mm
Maximum sample size	70(H) x 80(W) x 10(T) mm

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

- 6708-H163A for ARN-914/ARSN-917
- 6708-H460A for ARMN-920

ARN Minimum sample size	30(H) x 60(W) x 1(T) mm
ARSN - ARMN Minimum sample size	30(H) x 30(W) x 1(T) mm
Maximum sample size	70(H) x 100(W) x 10(T) mm
Incidence angle	0º - 85º

PDU-755 Phase difference measurement unit
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 (included)

Wavelength range	250 – 1600 nm
Polarization rotation angle	0º - 90º

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

Wavelength range	250 – 1600 nm
Polarization rotation angle	0º - 90º

Absolute Reflectance accessories
Softwares

VWAS-969
Variable incident angle measurement program
VWAS-969 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.

VWAS-969 is suitable for ARMN-921i accessory

VWAL-799
Average reflectance calculation program
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.
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.

VWAL-799 software can also be used with the SLM-907/908 single reflection measurement accessories.

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

VWML-791
Multi layer film thickness analysis program
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.

V-780 – Solid Sample Accessories

FAN-751 - Optical fiber unit

Specifications

FAN-751 accessory 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.

External detector	Photomultiplier tube
Wavelength range	250 – 1600 nm

Options

6916-J254A
Fiber connection port, Bundle type for FAN-751

6916-J250A
Fiber connection port, FC connector type for FAN-751

6916-J251A
Fiber connection port, SMA connector type for FAN-751

FAP-754 - Optical fiber unit

Specifications

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.

Options

6916-J154A
Fiber connection port, Bundle type for FAP-754

6916-J150A
Fiber connection port, FC connector type for FAP-754

6916-J151A
Fiber connection port, SMA connector type for FAP-754

ELM-912 - External light source interface

Specifications

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.

Options

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

V-780 – Additional Software Packages

Biochemical Softwares

VWKN-772
Kinetics analysis program

VWKN-772 Kinetics Analysis program performs time course measurements of multiple samples, plots the graphs and calculates the maximum reaction velocity (Vmax), Michaelis Menten constant (Km) 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
- Hill

Calculation items
- Maximum reaction velocity (Vmax)
- Michaelis-Menten constant (Km)
- Hill constant (n)
- determination of inhibitor type
- inhibitor constant

CFR compliant	YES

VWPN-952
Protein nucleic acid quantitation program

VWPN-952 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
- Absorbance ratio of 280/260 nm
- Absorbance ratio of 230/260 nm
- Warburg-Christian method
- User-defined absorbance ratio
- User-defined concentration calculation

CFR compliant	YES

VWTP-959
Temperature Gradient measurement and DNA melting analysis program

VWTP-959 temperature programming software offers DNA or protein melting analysis.
Controlling the temperature of a Peltier accessory (single or multi-cell), the VWTP-959 provides measurement of the absorbance at a specific wavelength during temperature changes, then calculates the melting temperature (Tm) from the results of the measurement.

Suggested Accessories	EHCS -760 - ETCS-761 – ETCR-762 PSC-763 - PAC-743
CFR compliant	YES

VWIS-957
Interval scan measurement program

VWIS-957 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. Data plots similar to the VWIS-957 software can be obtained using the VWTS-958 data array.
VWIS-957 can be used with an automated cell changer accessory for spectral data collection of multiple samples.

Suggested Accessories	NCP-705
CFR compliant	YES

VWIS-958
Temperature interval scan measurement program

VWTS-958 program measures spectra of samples automatically with a user-defined temperature interval between scans, providing a data array similar to the VWIS-957 program, but related to sample temperature. VWTS-958 can be used with an automated cell changer and/or with Thermostatted Single or Multiple holders for spectral data collection of multiple samples.

Suggested Accessories	NCP-705 EHCS -760 - ETCS-761 – ETCR-762 PSC-763 - PAC-743
CFR compliant	YES

Biochemical Package

VWKN-772
Kinetics analysis program

VWKN-772 Kinetics Analysis program performs time course measurements of multiple samples, plots the graphs and calculates the maximum reaction velocity (Vmax), Michaelis Menten constant (Km) 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
- Hill

Calculation items
- Maximum reaction velocity (Vmax)
- Michaelis-Menten constant (Km)
- Hill constant (n)
- determination of inhibitor type
- inhibitor constant

CFR compliant	YES

VWTP-959
Temperature Gradient measurement and DNA melting analysis program

VWTP-959 temperature programming software offers DNA or protein melting analysis.
Controlling the temperature of a Peltier accessory (single or multi-cell), the VWTP-959 provides measurement of the absorbance at a specific wavelength during temperature changes, then calculates the melting temperature (Tm) from the results of the measurement.

Suggested Accessories	EHCS -760 - ETCS-761 – ETCR-762 PSC-763 - PAC-743
CFR compliant	YES

VWPN-952
Protein nucleic acid quantitation program

VWPN-952 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
- Absorbance ratio of 280/260 nm
- Absorbance ratio of 230/260 nm
- Warburg-Christian method
- User-defined absorbance ratio
- User-defined concentration calculation

CFR compliant	YES

UCB-710 – Bio rectangular cell holder

Specifications

A cell height adjustment function provides the ability to use a 100 µL micro cell. A mask for a 100 µL micro cell is standard, 50 µL can be supplied as option.

Sample Cell	Rectangular cell pathlength 10 mm
Reference Cell	Rectangular cell pathlength 10 mm
Capacity	1 sample and 1 reference cell
Temperature	Ambient
Minimum Cell Volume	50 µL

6916-J310A – Bio-Package for V-700 series

Part Number	Model	Description
6916-H110A		*Bio cell holder block (sample side cell block of UCB-710) including Mask for 100uL micro cell*
4880-7472A	*VWKN-772*	*Advanced kinetics analysis program*
4880-6522A	*VWTP-959*	*Temperature gradient measurement and DNA melting analysis program*
4880-6515A	*VWPN-952*	*Protein nucleic acid quantitation program*

V-780 – Additional Software Packages

Multivariate Quantitative Analysis Softwares

VWPL-956
PLS Quantitative program

VWPL-956 (Partial Least Squares) 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 PLS calibration model editing program Calibration curve display samples.

VWCL-954
CLS Quantitative program

VWCL-954 (Classical Least Squares) 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-955
PCR Quantitative program

The VWPC-955 (Principal Components Regression) 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

VWPA-785 (Principal Components Analysis) 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.

V-780 – Additional Software Packages

Color Analysis Softwares

VWCD-960
Color diagnosis program

VWCD-960 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.

Light source	A, D65, C, B, user-defined light source
Viewing angle	2º, 10º
Wavelength Calculation range	380~780 nm
Calculation data interval	5 nm, 10 nm
Result table	Maximum 100 files
Color system	XYZ (JIS Z8701), L*a*b* (JIS Z8729), Lab, Munsell (JIS Z8721), L*u*v* (JIS Z8729)
Color calculation	• 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: λd • pure stimulus value: Pe • pass/fail judgement

VWCM-795
Color matching program

VVCM-795 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.

VWAC-796
ASTM Color analysis program

VWAC-796 calculates the ASTM color of petrochemical products such as lubricating oil, diesel and heating oils based on the ASTM and JIS K2580 standards.

Required Accessories	LSE-701

VWSC-797
Saybolt color analysis program

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).

Required Accessories	LSE-701

VWWQ-953
Chromaticity/Turbidity measurement program

VWWQ-953 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.
An optional color diagnosis program is required for displaying chromaticity using the calculated chromaticity coordinates.

Required Accessories	LSE-701 ISV-922 - ISN-923 - ISN-901i ILV-924 - ILN-925 - ILN-902i
Required Softwares	VWCD-960

V-780 – Additional Software Packages

Color Analysis Softwares

VWHC-977
Color evaluation (Hazen color) program

VWHC-977 software measures the spectrum of a sample from 380 to 780 nm and compare it to that for different Hazen color standards in terms of the color difference ΔE^*_{ab} the yellowness index YI, the chromaticity coordinate b* or the color at a specific wavelenght. The Hazen color for the sample can then be evaluated.

Standard Norms	JIS K 0071-1:1998 Testing methods for colour of chemical products – Part 1: Estimation of colour in Hazen units (platinum-cobalt scale)
	ISO 6271:2004 Clear Liquids - Estimation of colour by the platinum-cobalt scale
	ASTM D1209-05 Standard Test Method for Color of Clear Liquids (platinum-cobalt scale)

VWLU-788
Luminous color measurement program

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.

Viewing angle	2º, 10º
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 λd (complementary wavelength λc) • related color temperature Tcp and deviation Δ uv (JIS Z8725) • color rendering index Ra, R1~R15 (JIS Z8726) • fluorescent lamp light source color classification (JIS Z9112) • 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.

VWGC-976
Color evaluation (Gardner color) program

VWHC-976 software measures the spectrum of a sample from 380 to 780 nm perform color calculations and evaluate the Gardner color number based on Japanese Industrial Standard (JIS) or other standards.

Standard Norms	JIS K 0071-2:1998 Testing methods for colour of chemical products – Part 2: Gardner colour scale
	ISO 4630-1:2004 Clear Liquids - Estimation of colour by the Gardner colour scale - Part 1: Visual Method
	ISO 4630-2:2004 Clear Liquids - Estimation of colour by the Gardner colour scale - Part 2: Spectrophotometric Method
	ASTM D1544-04:2010 Standard Test Method for Color of Transparent Liquids (Gardner color scale)
	ASTM D6166-97:2003 Standard Test Method for Color of Pine Chemicals and Related products (Instrumental Determination of Gradner color)

V-780 – Additional Software Packages

Materials Analysis Softwares

VWBG-773
Band gap analysis program

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.

VWQM-978
Spectrum quantitative measurement program

VWSQ-978 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.

VWST-774
Solar/visible light measurement program

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.

For calculating visible light transmission and reflectance, spectrum measurement with a spectral range wider than 380 to 780 nm is necessary.

Required Accessories	ISN-901i ARSN-918i

VWSE-798
UV Shield factor calculation program

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.

VWRR-769
Reflectance correction program

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

Required Accessories	SLM-907/908

VWHZ-965
Haze measurement program

VWHZ-965 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.

Required Accessories	ILN-902i

VWSP- 966
SPF/PA calculation program

VWSP-966 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.

Required Accessories	ILN-902i

V-780 – Additional Software Packages

Other purpose softwares

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

VWMC-972
Macro command program

VWMC-972 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.

VWLK-777
Spectral concatenation program

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

Spectra Manager Ver.2

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